Carbon Monoxide
State Implementation Plan

APPENDIX A
EMISSIONS INVENTORY

Las Vegas Valley Non-attainment Area

Clark County, Nevada

August 2000

Department of Comprehensive Planning

Clark County Nevada

Clark County Board of Commissioners

APPENDIX A

CARBON MONOXIDE
EMISSION INVENTORY

APPENDIX A

Section One
Introduction

This document contains the 1990 base year carbon monoxide (CO) emissions inventory as well as the projected future year 1996 and 2000 emissions for the Las Vegas Valley Non-attainment Area. The inventory addresses CO emissions from the following four major source type categories: stationary point sources, area sources, on-road mobile sources, and non-road mobile sources. The 1990 emissions inventory served as starting point to update emission estimates from stationary and area and most non-road sources. With respect to the largest source category, on-road mobile sources, the latest version of EPA's MOBILE5a was utilized in conjunction with the Direct Travel Impact Model to update emissions from this source category. Additionally, emissions from civilian/commercial aircraft were updated utilizing the Emissions and Dispersion Modeling System (EDMS) developed specifically for airport emissions analysis and is approved for emissions inventory development by the EPA.

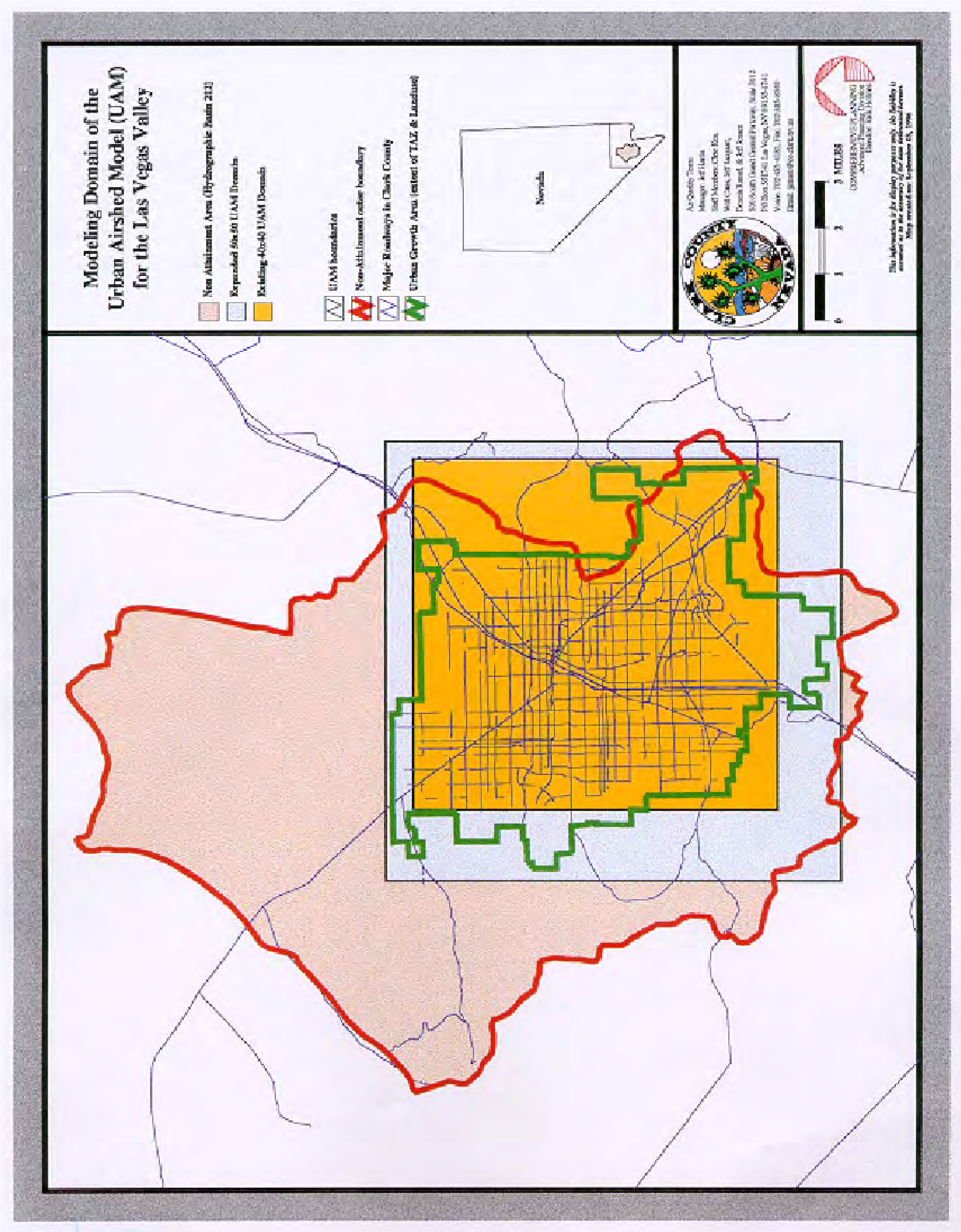
During the development of the Serious Area Carbon Monoxide Air Quality Implementation Plan, concern was raised regarding emissions from other sources (e.g. lawn and garden equipment, off-road construction equipment) including their impact on ambient concentrations. Non-road emission emissions are currently in the process of being addressed by the EPA via revisions to the NON-ROAD Model. Because the EPA has not released the NON-ROAD Model nor approved it for emission inventory purposes, it was not used in this emission inventory update. Although this may be a concern, sensitivity analyses, independent of the attainment modeling, indicate that increasing emissions from this source category will not jeopardize attainment of the NAAQS. This is attributed to the timing of emissions from the non-road source category.

1.1 Geographic Area

This emissions inventory covers the Clark County, Las Vegas Non-attainment Area which was designated as a moderate area for carbon monoxide by the EPA in a November 6, 1991, Federal Register notice (Vol. 56, No. 215, 56694). The geographic area referred to as the Clark County, Las Vegas Non-attainment Area is shown on the map in Figure 1-1. The inventoried area includes both the designated Non-attainment area and a 25-mile boundary extension around the Non-attainment area for large stationary point sources.

The Las Vegas Non-attainment Area boundary coincides with the Las Vegas Valley Hydrographic Basin 212. This area includes the City of Las Vegas, the City of North Las Vegas, and the City of Henderson. The remainder is comprised of unincorporated areas of Clark County.

Figure 1-1
Las Vegas Valley Carbon Monoxide Non-attainment Area



The Clark County Department of Comprehensive Planning (DCP) was the agency directly responsible for preparing and submitting the Clark County, Las Vegas Non-attainment Area 1990 base year carbon monoxide state implementation plan inventory. DCP was also responsible for coordinating and supervising the completion of each part of the inventory. Several other local agencies contributed information necessary for preparing emission estimates. These agencies included the Clark County Health District Air Pollution Control Division (APCD), Clark County Regional Transportation Commission, Clark County Department of Aviation, and the Clark County Fire Department. Additional information sources included: Nevada Department of Transportation, U.S. Forest Service, and Southwest Gas Corporation.

The point source inventory was prepared primarily from a mail survey by the Clark County APCD. Survey results were supplemented by information obtained through personal contacts by APCD staff during compliance inspections. Vehicle miles traveled (VMT) data necessary to calculate on-road mobile source emissions was provided by the Clark County Regional Transportation Commission (CCRTC). The MOBILE model was utilized to derive vehicle emission factors. The contact person for DCP and the other contributing agencies assisting in the inventory are listed in Table 1-1. The means by which each of these groups supported the development of the base year inventory are explained in detail in the appropriate source type documentation section.

Table 1-1

List of Contact Persons for Clark County, Las Vegas
Carbon Monoxide Inventory

AGENCY	RESPONSIBILITY	CONTACT
Clark County Department of Comprehensive Planning 500 S. Grand Central Pkwy Las Vegas, NV. 89106	Lead Air Quality Planning Agency, Overall Inventory Coordination and Supervision, Mobile Model Emission Factor Generation and Mobile Source Emissions	Clete Kus Principal Planner (702) 455-4181
Clark County Health District, Air Pollution Control Division 625 Shadow Lane Las Vegas, NV 89127	Point and Area Emission Data and Associated Activity Levels	Michael Naylor Director (702) 383-1276
Clark County Regional Transportation Commission 600 S. Grand Central Pkwy Las Vegas, NV 89106	VMT Generation and Other Highway Vehicle Data	Jerry Duke Principal Planner (702) 455-4481

1.2 Emissions Summary

The results of the Las Vegas Valley 1990, 1996, and 2000 base years carbon monoxide emissions inventory for stationary point, area, on-road mobile, and non-road mobile source categories are provided in this section. The biogenics category has been omitted, as it is not applicable to carbon monoxide. Table 1-2, 1-3 and 1-4 contain detailed listings of annual and peak season daily emissions by source category along with the projections with respective growth factors. The detailed information on growth factors used in the Tables 1-3 and 1-4 can be found in the report titled, The Las Vegas Valley Carbon Monoxide Urban Airshed Model Update Project – Phase II: Modeling to Demonstrate Attainment of the Carbon Monoxide Standard, by ENVIRON, also contained in Appendix C, Section 4, p 3-2.

TABLE 1-2
1990 CARBON MONOXIDE EMISSION SUMMARY
FOR THE LAS VEGAS NON-ATTAINMENT AREA

	Annual (Tons)	Annual Percent	CO Season (Lbs. / day)	Season Percent
STATIONARY SOURCES				
Timet	10,363	7.91	56,784	8.73
AREA SOURCES				
Small stationary	798	0.61	4,373	0.67
Steam Gen. Boilers	120	0.09	2,110	0.32
Fireplaces/Stoves	773	0.59	4,236	0.65
Cigarette Smoke	13	0.01	88	0.01
Fires				
Structural	191	0.15	1,407	0.22
Vehicular	16	0.01	110	0.02
Brush Fire	373	0.28	2,725	0.42
Total	580	0.44	4,242	0.65
Natural Gas Combustion				
Residential	91	0.07	1,260	0.19
Commercial	28	0.02	286	0.04
Industrial	95	0.07	582	0.09
Electrical Utility	165	0.13	905	0.14
Natural Gas Total	379	0.29	3,033	0.47
AREA TOTAL	2,663	2.03	18,082	2.80
ON ROAD MOBILE SOURCES				
Connectors	17,368	13.25	86,154	13.23
Collectors	13,987	10.67	69,275	10.70
Minor Arterials	21,288	16.24	104,505	16.10
Major Arterials	35,970	27.44	176,264	27.10
Express/Interstate	15,242	11.63	72,462	11.13
Minor Art.(rural)	536.9	0.41	2,549	0.39
Major Art. (rural)	1346.5	1.03	6,666	1.00
Exp/Inter.(rural)	971.3	0.74	1,580	0.24
ON ROAD TOTAL	106,710	81.40	519,455	79.82
NON-ROAD MOBILE SOURCES				
Aircraft	4,833	3.69	35,386	5.44
Railroads	80.5	0.06	442	0.07
MC & Recreational Vehicles	1,744.4	1.33	4,745.3	0.73
Construction Equipment	3,150.4	2.40	13,848.8	2.13
Lawn and Garden Equipment	1,534.2	1.17	2,023.1	0.31
NON-ROAD TOTAL	11,342.5	8.65	56,445.2	8.67
TOTAL	131,078.5	100.0	650,766..2	100.0

TABLE 1-3
AVERAGE DAILY CARBON MONOXIDE
EMISSIONS FOR THE LAS VEGAS NON-ATTAINMENT AREA

SOURCE CATEGORIES	**1996 Base**	**2000 Uncontrolled**	**2000 Controlled**	**2010**	**2020**			
	Emissions	**Emissions**	**Emissions**	**Emissions**	**Emissions**	Growth	Growth	Growth
	(Tons/Day)	**(Tons/Day)**	**(Tons/Day)**	**(Tons/Day)**	**(Tons/Day)**	Factor	Factor	Factor
						2000	2010	2020
STATIONARY POINT SOURCES								
Kerr McGee-BMI	0.24	0.24	0.24	0.24	0.24	1	1	1
Chemical Lime Co. Apex	0.82	0.82	0.82	0.82	0.82	1	1	1
Titanium Metals	2.92	2.92	2.92	2.92	2.92	1	1	1
Bonanza Materials	0.28	0.28	0.28	0.28	0.28	1	1	1
James Hardie Gypsum	0.55	0.55	0.55	0.55	0.55	1	1	1
Southern Nevada Paving	0.55	0.55	0.55	0.55	0.55	1	1	1
Pabco Cogeneration	0.55	0.55	0.55	0.55	0.55	1	1	1
Georgia Pacific	0.62	0.62	0.62	0.62	0.62	1	1	1
Total Point Sources	**6.53**	**6.53**	**6.53**	**6.53**	**6.53**			
AREA SOURCES								
Small Stationary	2.7	3.08	3.08	4.19	4.87	1.139	1.362	1.585
Boiler Emissions	0.38	0.43	0.43	0.59	0.69	1.139	1.362	1.585
Fireplaces	2.12	2.59	2.59	4.47	6.01	1.223	1.725	2.319
Structural Fires	0.64	0.78	0.78	1.35	1.82	1.223	1.725	2.319
Vehicular Fires	0.05	0.06	0.06	0.11	0.14	1.223	1.725	2.319
Brush Fires	1.26	1.54	1.54	2.66	3.57	1.223	1.725	2.319
Residential NG Combustion	0.31	0.34	0.34	0.42	0.46	1.088	1.233	1.35
Commercial NG Combustion	0.09	0.1	0.1	0.13	0.15	1.087	1.343	1.523
Industrial NG Combustion	0.32	0.36	0.36	0.5	0.58	1.14	1.363	1.586
Electrical Utility NG	0.56	0.63	0.63	0.83	0.95	1.126	1.315	1.505
Cigarette Smoking	0.04	0.05	0.05	0.08	0.11	1.223	1.725	2.319
Total Area Sources	**8.47**	**9.97**	**9.97**	**15.32**	**19.35**			
Non-Road Mobile Sources								
County Airports	36.4	40.4	40.4	55.6	77.1			
Nellis AFB	2.86	2.86	2.86	2.86	2.86	1	1	1
Locomotive Emissions	0.23	0.23	0.23	0.23	0.23	1	1	1
Lawn & Garden Equipment	3.57	3.52	3.52	3.51	3.74	0.986	0.982	1.048
MC & Recreation Equip.	5.90	5.86	5.86	6.74	7.09	.993	1.142	1.202
Construction Equipment	9.77	7.61	7.61	6.23	6.90	0.779	0.638	0.706
Total Non-Road Sources	**58.73**	**60.48**	**60.48**	**75.17**	**97.97**			
On-Road Mobile Sources	* **405.4**	**353.23**	**310.18**	**329.5**	**457.4**			
Grand Total	**479.13**	**430.21**	**387.16**	**426.52**	**581.20**			
*On Road Mobile Source Emissions are based on Seasonal CO								

TABLE 1-4
PEAK SEASON DAILY CARBON MONOXIDE
EMISSIONS FOR THE LAS VEGAS NON-ATTAINMENT AREA

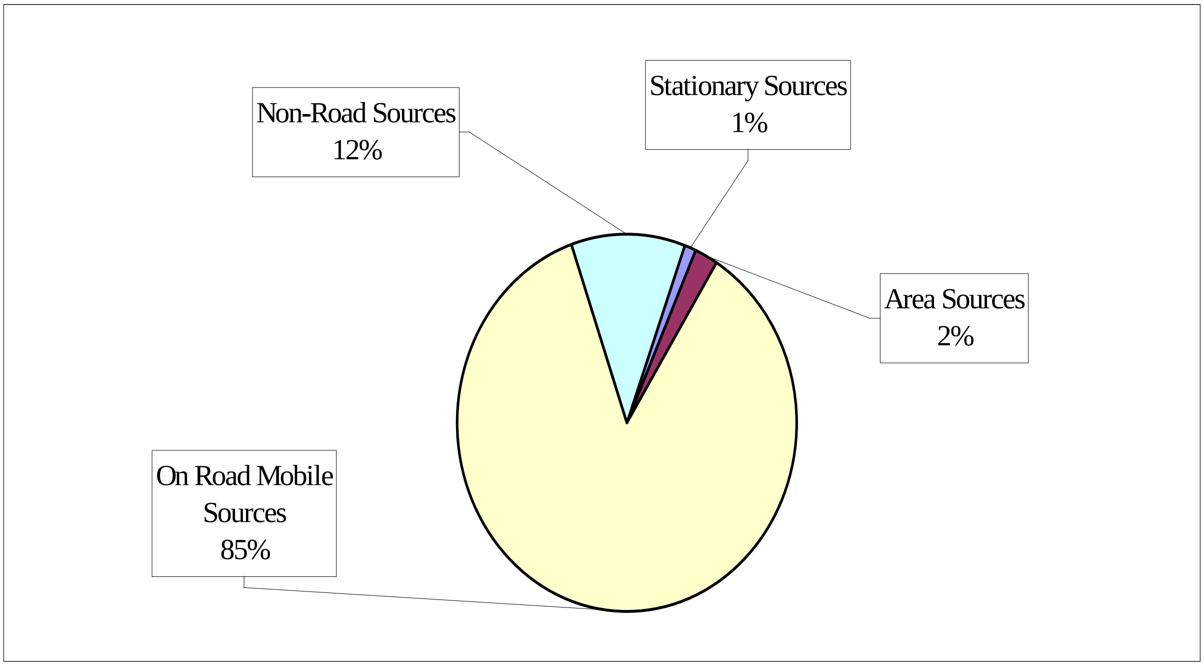
SOURCE CATEGORIES	**1996 Base**	**2000 Uncontrolled**	**2000 Controlled**	**2010**	**2020**			
	Emissions	**Emissions**	**Emissions**	**Emissions**	**Emissions**	Growth	Growth	Growth
	(Tons/Day)	**(Tons/Day)**	**(Tons/Day)**	**(Tons/Day)**	**(Tons/Day)**	Factor	Factor	Factor
						2000	2010	2020
STATIONARY POINT SOURCES								
Kerr McGee-BMI	0.24	0.24	0.24	0.24	0.24	1	1	1
Chemical Lime Co. Apex	0.82	0.82	0.82	0.82	0.82	1	1	1
Titanium Metals	2.839	2.839	2.839	2.839	2.839	1	1	1
Bonanza Materials	0.28	0.28	0.28	0.28	0.28	1	1	1
James Hardie Gypsum	0.55	0.55	0.55	0.55	0.55	1	1	1
Southern Nevada Paving	0.55	0.55	0.55	0.55	0.55	1	1	1
Pabco Cogeneration	0.55	0.55	0.55	0.55	0.55	1	1	1
Georgia Pacific	0.62	0.62	0.62	0.62	0.62	1	1	1
Total Point Sources	**6.45**	**6.45**	**6.45**	**6.45**	**6.45**			
AREA SOURCES								
Small Stationary	2.700	3.075	3.075	3.677	4.280	1.139	1.362	1.585
Boiler Emissions	1.235	1.407	1.407	1.682	1.957	1.139	1.362	1.585
Fireplaces	2.122	2.595	2.595	3.660	4.921	1.223	1.725	2.319
Structural Fires	0.869	1.063	1.063	1.499	2.015	1.223	1.725	2.319
Vehicular Fires	0.068	0.083	0.083	0.117	0.158	1.223	1.725	2.319
Brush Fires	1.683	2.058	2.058	2.903	3.903	1.223	1.725	2.319
Residential NG Combustion	0.778	0.846	0.846	0.959	1.050	1.088	1.233	1.35
Commercial NG Combustion	0.167	0.182	0.182	0.224	0.254	1.087	1.343	1.523
Industrial NG Combustion	0.359	0.409	0.409	0.489	0.569	1.14	1.363	1.586
Electrical Utility NG	0.559	0.629	0.629	0.735	0.841	1.126	1.315	1.505
Cigarette Smoking	0.054	0.066	0.066	0.093	0.125	1.223	1.725	2.319
Total Area Sources	**10.59**	**12.41**	**12.41**	**16.04**	**20.07**			
Non-Road Mobile Sources								
County Airports	36.4	40.4	40.4	55.60	77.10			
Nellis AFB	2.860	2.860	2.860	2.860	2.860	1.000	1.000	1.000
Locomotive Emissions	0.231	0.231	0.231	0.231	0.231	1.000	1.000	1.000
Lawn & Garden Equipment	0.860	0.848	0.848	0.845	0.901	0.986	0.982	1.048
MC & Recreation Equip.	2.930	2.909	2.909	3.346	3.522	.993	1.142	1.202
Construction Equipment	7.838	6.106	6.106	5.001	5.534	0.779	0.638	0.706
Total Non-Road Sources	**51.12**	**53.35**	**53.35**	**67.88**	**90.15**			
On-Road Mobile Sources	**405.4**	**353.23**	**310.18**	**329.50**	**457.40**			
Grand Total	**473.56**	**425.44**	**382.40**	**419.87**	**574.07**			
*On Road Mobile Source Emissions are based on Seasonal CO								

1.2.1 Total Annual Emissions

Total annual carbon monoxide emissions from the Las Vegas Valley Non-attainment Area for the 1996 base year are 174,882 tons per year. Figure 1-2 illustrates the relative contribution for each source category for 1996.

FIGURE 1-2

1996 ANNUAL CARBON MONOXIDE EMISSIONS
BY SOURCE CATEGORY

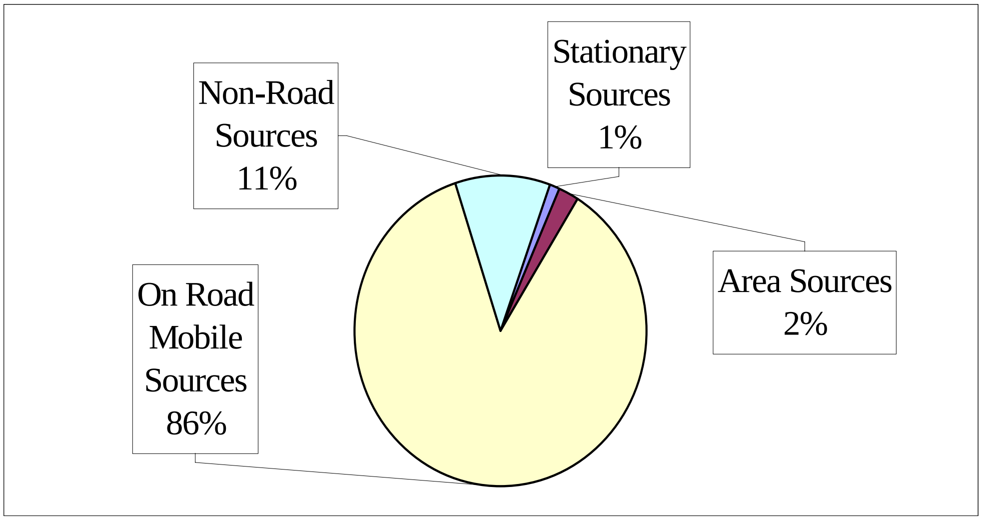


1.2.2 Total Seasonal Emissions

Total average daily peak carbon monoxide emission associated with the Las Vegas Valley Non-attainment Area for the 1996 base year is 473.6 tons per day. Figure 1-3 illustrates the relative contribution of peak season emissions by each source category for 1996.

FIGURE 1-3

1996 PEAK SEASON CARBON MONOXIDE EMISSIONS
BY SOURCE CATEGORY



1.3 Document Organization

The remainder of this document is organized as follows:

The description, documentation, and example calculations for the stationary point source component of the Las Vegas Valley inventory is provided in Section 2.

Section 3 describes the derivation of area source inventory. Supporting documentation for emission factors are also contained in this section.

Section 4 addresses on-road mobile source emissions. Detailed input and output data from the MOBILE5 emission factor model, vehicle miles traveled (VMT) data from the TRANPLAN regional transportation model and spreadsheets used to calculate annual emissions are contained in Section 4. And Non-road mobile source emissions are documented in Section 5.

APPENDIX A

Section Two
Stationary Point Sources

2.1 Introduction

This section documents the development of the Las Vegas Valley Non-attainment Area stationary point source list and serves to characterize the point source component of the emission inventory by describing data collection, verification, and emission estimation techniques. For the purposes of this emission inventory, point sources are defined as stationary, commercial, or industrial permitted operations that emit more than 100 tons per year of CO. The point source inventory consists of actual emissions for the base year 1990 and projections for the years 1995 and 2000. One major point source was identified in the Las Vegas Valley Non-attainment Area. No major point sources were identified in the 25-mile boundary zone.

The Clark County Health District, Air Pollution Control Division (APCD) was the agency responsible for compiling the point source inventory. The APCD was responsible for identifying point source meeting the cutoff criteria, and documenting the method used to calculate emissions from each source.

2.2 Point Source List

This section describes the methods used to develop the point source list from which point source emissions for the 1990 Las Vegas Valley base year inventory were estimated. This section is included in order to demonstrate that the source list is as complete as possible.

Point source data collection activities were initiated by Clark County APCD in January 1991 after an organizational meeting with Clark County Department of Comprehensive Planning (DCP). A recent emission inventory, compiled in 1989 by DCP, formed the starting point for the point source list. The 1989 inventory identified 1 point source emitting greater than 100 tons per year of CO.

To supplement the existing point source list, a thorough review of the source categories listed in Table 2.2-1 of the EPA procedures document (EPA-450/4-91-016) was conducted. Additionally, state and local lists of permitted air pollution sources were reviewed in order to adequately account for sources that have only recently begun operation. An informational survey was sent to all permitted facilities to ensure that no potential major sources were overlooked.

This survey confirmed that no additional sources in the Las Vegas Valley Non-attainment Area emit more than 100 tons per year. The survey and additional telephone calls to the facility provided the necessary site-specific data for the one major stationary source. A copy of the questionnaire used to obtain point source data is included in Appendix A. Additionally, site visits were performed at several facilities as part of the survey follow-up activities. These data verification techniques ensured a complete data set for the point

POINT SOURCE LIST

County	Plant Name	Location	Pollutant Emitted
Clark	Titanium Metals (TIMET)	BMI and Complex H Street and 15th Henderson, Nevada	Carbon Monoxide

2.3 Emission Estimation Procedures

Emission estimates for the point source on the list were derived using the direct measurement approach. Source test data were used to verify base year emissions and calculate peak season emissions. The next subsections provide information on this facility and how emissions were calculated.

2.3.1 General Facility Information

Titanium Metals Corporation (TIMET) is a primary nonferrous metals production facility that produces titanium ingot from Australian beach sand that contains greater than 90 percent rutile (Ti02). The rutile is chlorinated under intense heat from coke combustion. Then the TiC14 is reduced with magnesium ingot to form MgC14 and Ti(s). This solid titanium is sheared, leached and formed into titanium ingot. The CO emissions occur in the initial chlorination process. Currently there is no control technology associated with the CO fraction of the chlorination process and all emissions are discharged to ambient air. A corrective action order is in place to bring TIMET into control for its CO emissions. Two wet scrubbers are installed at this facility to scrub a fraction of chlorine attributed to the chlorination process. Because these scrubbers are not designed to control CO emissions, no rule effectiveness factor was applied to the uncontrolled emissions.

2.3.2 Calculations:

TIMET operates 24 hours/day, 7 days/week, and 365 days/year. Base Year emissions were derived as a result of a source test and are measured to be 10,362.5 tons per year. This emissions estimate was required to be controlled at 90% reduction efficiency.

CO season emissions are calculated to be:

10,362.5 tons/year * 1 year/365 days * 2000pounds/1 ton = 56,780.8 pounds/day each day of CO season. Table 2-1 presents the result of the above calculations.

TABLE 2-1

EMISSIONS SUMMARY TABLE
Total Annual CO Emissions from Point Sources
for The Las Vegas Valley Non-attainment Area - 1990 Base Year

County	Pollutant Emissions	
Clark	10,363 tons/year	56,780.8 pounds/day
TOTAL	10,363 tons/year	56,780.8 pounds/day

2.4 AIRS/AFS Point Source Submittal

EPA's AIRS/AFS was used to compile the stationary point source inventory and prepare the data for SIP submittal. After running the point source data by Ms. Sam Farrel (EPA Region IX) for SIP submittal approval, an AFS batch SIP submittal was prepared for the reviewing agency.

APPENDIX A

Section Three
Area Sources

3.1 Introduction

Minor stationary sources emitting less than 100 tons per year of CO were included in the area source category. This classification is attributed to the guidelines outlined in Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone, Volume 1 (May 1991). Identification of Source Categories Inventoried. A discussion on the area source categories which were inventoried follows.

All of the area source categories contained in the EPA Procedures document (EPA-450/4-91-016) were evaluated for emission estimates for the Las Vegas Valley. Non-attainment Area, with the following exceptions:

- Lube Oil Manufacture
- Iron and Steel Production
- Coke Production
- Synthetic Fiber Manufacture
- Carbon Black Manufacture
- Pulp and Paper Mills
- Glass Manufacture
- Open Burning
- Solid Waste Incineration
- Backyard Grills
- Charbroiling

Open burning and solid waste incineration were not included because they are prohibited in Clark County. David Misenheimer with EPA headquarters informed the APCD Inventory Specialist not to inventory for the backyard grilling and charbroiling categories during a conference call with EPA headquarters, Region IX and various other local agencies. The remaining categories were not inventoried because these types of industry do not exist in the Las Vegas Valley Non-attainment Area.

Several of the area source categories contained in the latest EPA Procedures document under the heading of Previously Un-inventoried Source Categories were not included in the Las Vegas Valley Non-attainment Area. Natural gas well blowouts were excluded because there are no natural gas wells in Clark County. Silage storage was excluded for the same reason. The only source category that was addressed in the approved IPP and subsequently inventoried is cigarette smoke.

Area source emission estimates were generally calculated using the recommended guidance in the EPA procedures document. Exceptions to the recommended approaches are detailed in the individual source category discussions. A summary of area source emissions for the entire Las Vegas Valley Non-attainment Area is provided.

3.2 Sources <100 Tons Per Year

Surveys were mailed to all sources permitted by the APCD (sample contained in Appendix B). This provided information on the type(s) of fuel combusted as well as annual and seasonal consumption rates. Emission factors from AP-42 were then applied to the consumption rates to derive annual and seasonal emissions. In instances where natural gas was used at a facility, it was excluded from this category. Natural gas emissions associated with a commercial facility are accounted for in the applicable category of either natural gas combustion or steam boilers. The annual emissions from all minor stationary sources under 100 tons totaled 798.4 tons.

The following table lists facilities and their emissions which were inventoried in the area source category.

TABLE 3-1

EMISSIONS BY FACILITIES

FACILITY ID	FACILITY	1990 TPY CO	PEAK SEASON #/DAY CO
A001	Airway, Inc.	0.8	5.4
A303	All Star Ready Mix	4.1	22.5
A334	American Asphalt	0.2	1.1
A258	American Sand and Gravel	1.1	6.2
A401	Basic Food Flavors	0.1	0.5
A033	Bishop Gorman High School	0.4	2.2
A118	Bobs Construction & Trucking	2.9	15.19
A290	Bonanza Materials, Inc.	6.4	35.1
A508	Boulder Sand & Gravel	0.5	2.7
A482	Capital Cabinet	0.1	0.5
A016	Central Grading Co.	21.9	120.0
A280	Central Telephone	4.0	21.9
A003	Chemstar Lime (Apex)	16.5	90.4
A005	Chemstar Lime (Henderson)	87.8	481.1
A296	Chief Roof & Floor Insulation	4.7	25.8
A046	Cind-A-Lite Co.	60.9	333.7
A546	Citibank National	12.5	68.5
A067	Conoco, Inc.	6.1	33.4
A056	Cornet Stores #24	0.03	0.2
A537	Crenshaw Backhoe Services	0.1	0.5
A407	Desert Memorial Çremation	0.1	0.5
A059	Desert Springs Hospital	1.0	5.5
A060	Diamond Construction Co.	0.1	0.5

A065	EG&G	0.3	1.6
A567	EG&G	0.9	4.9
A409	FKC, Inc.	28.8	157.8
A595	Frehner Construction	0.4	2.2
A593	Georgia Pacific Co.	78.5	430.1
A426	Hollywood Gravel	0.1	0.5
A529	Howlett Olsen Foods	0.2	1.1
A147	Humana Hospital	0.05	0.3
A087	Hydro-Conduit	14.8	81.1
A093	Jake's Crane & Rigging	1.4	7.7
A004	James Hardie Gypsum	43.1	236.2
A601	Jet Concrete, Inc.	5.6	30.7
A173	Jet Concrete, Inc.	5.6	30.7
A095	Kerr McGee	11.0	60.3
A535	Koch Materials Co.	0.6	3.3
A103	Las Vegas Laundry	0.7	3.8
A105	Las Vegas Paving Co.	61.7	338.1
A433	Las Vegas Paving Co.	6.0	32.9
A186	Las Vegas Paving Co.	3.3	18.1
A104	Las Vegas Paving Co.	7.0	38.4
A179	Leavitt Ready Mix	1.1	6.0
A569	Letica Corporation	34.5	189.0
A000	Bemis Mactac	2.9	15.9
A531	Mel Clark Construction	0.02	0.1
A599	Merrillat Industries	0.2	1.1
A028	Mission Linen	1.4	7.8
A030	Mission Linen	3.7	20.3
A112	Mission Linen	9.6	52.6
A346	Monier Roof and Tile	0.3	1.6
A115	Nevada Baking Co.	1.7	9.3
A576	Nevada Memorial Cremation	0.2	1.1
A007	Nevada Power-Çlark	47.3	259.2
A008	Nevada Power-Sunrise	30.5	167.1
A399	New-Com, Inc.	6.2	34.0
A011	Pabco Gypsum	14.8	81.1
A126	Palm Mortuary	0.5	2.7
A009	Pioneer Chlor-Alkali	8.2	44.9
A352	Pipes Paving	6.2	34.0
A170	Primerit Bank	0.4	2.2
A180	RC Farms	1.7	9.3
A438	Red Rose, Inc.	27.8	152.3
A325	Southern Nevada Operating Engrs.	0.4	2.2
A587	Southern Nevada Paving	6.4	35.1
A107	Southwest Gas Corporation	1.4	7.8
A259	Sparkletts	12.5	68.4
A406	Sweetheart Cup Corporation	0.4	2.2

A044	Thatcher Co.	0.6	3.3
A362	Eri-Delta Building Materials	1.5	8.2
A157	U.S. Post Office	0.1	0.5
A162	Uniflex	1.0	5.5
A176	Valley Hospital	1.6	8.8
A301	Western Electric Co.	1.0	5.5
A163	Western Linen Rental	2.7	14.8
A158	WMK Transit	65.7	360.0
A168	Women's Hospital	0.4	2.2
A625	Work Clothes Rental	1.2	6.6
	TOTALS	798.4	4374.8

Calculation:

798.4 tons * 1 year/365 days * 2000#/1 ton = 4374.8 #/day during peak season

3.3 Steam Generating Boilers

The information for this area source category originated from APCD permit files. Natural gas is the most used fuel to fire these boilers. The total number of cubic feet of natural gas used to fire these boilers was determined from a survey sent to APCD permitted facilities (Appendix B). AMSPC emission factors were used to generate the tons/year value.

TABLE 3-2

BOILERS EMISSIONS BY FACILITIES

FACILITY ID	FACILITY	1990 TPY CO	PEAK SEASON #/DAY CO
A026	Aladdin Hotel	2.8	49.23
A624	Alexis Park Hotel	0.8	14.07
A027	Algiers Hotel	0.3	5.27
A256	Ballys Grand Hotel	7.9	138.90
A611	Barbary Coast Hotel	0.6	10.55
A340	Boardwalk Hotel	0.4	7.03
A306	Boulevard Mall	0.7	12.31
A276	Caesars Palace Hotel	5.6	98.46
A284	California Hotel	2.3	40.44
A043	Center Strip Travelodge	0.2	3.52
A047	Circus Circus Hotel	1.3	22.86
A048	City Center Motel	0.1	1.76
A614	Continental Hotel	0.3	5.27
A124	Days Inn	0.4	7.03

A336	Del Mar Resort	0.1	1.76
A062	Dunes Hotel	0.3	5.27
A600	El Cortez Hotel	0.8	14.07
A066	El Morrocco Motel	0.5	8.79
A152	El Rancho Hotel	2.6	45.71
A609	Excalibur Hotel	12.8	225.05
A701	Fergusons Motel	0.2	3.52
A434	Fitzgeralds Hotel	0.8	14.07
A073	Flamingo Hilton Hotel	8.8	154.73
A076	Four Queens Hotel	1.4	24.62
A077	Fremont Hotel	3.2	56.26
A606	Gold Coast Hotel	1.4	24.62
A337	Golden Gate Motel	0.3	5.27
A080	Golden Inn Motel	0.3	5.27
A081	Golden Nugget Hotel	3.2	56.26
A338	GW Rainbow Vegas	0.3	5.27
A339	Hacienda Hotel	0.2	3.52
A257	Holiday Inn Center Strip	2.5	43.96
A085	Horseshoe Club	1.0	17.58
A275	Hotel Nevada	0.3	5.27
A613	Imperial Palace Hotel	0.3	5.27
A583	Jerry's Nugget Hotel	0.5	8.79
A602	Lady Luck Hotel	0.6	10.55
A098	Landmark Hotel	2.4	42.20
A604	Main Street Station	0.2	3.52
A342	Maxim Hotel	1.5	26.37
A282	Mirage Hotel	23.4	411.43
A615	Nevada Palace Hotel	0.4	7.03
A123	New West Motel	0.4	7.03
A605	Palace Station Hotel	2.6	45.71
A626	Quality Inn	0.4	7.03
A555	Rio Suite Hotel	2.0	35.16
A132	Royal Las Vegas Hotel	0.2	3.52
A133	Sahara Hotel	6.3	110.77
A616	Sam's Town Hotel	0.3	5.27
A135	Sands Hotel	1.6	28.13
A621	Santa Fe Hotel	0.7	12.31
A136	Showboat Hotel	0.1	1.76
A177	Somerset House	0.3	5.27
A143	Stardust Hotel	7.7	135.38
A146	Sulinda Gaslight Motel	0.1	1.76
A607	Town Hall Casino	0.4	7.03
A343	Town Palms	0.1	1.76
A358	Travel Inn Motel	0.1	1.76
A155	Union Plaza Hotel	1.9	33.41
A608	Vegas World Hotel	0.4	7.03

A305	Villa Roma Hotel	0.2	3.52
	TOTAL	119.8	2106.37

Calculation: (80 percent use in the CO season)

119.8 tons * 80% /91days * 2000#/1 ton = 2,106.37 #/day during CO season.

3.4 Fireplaces/woodstoves

Inquiry was made to the U.S. Forest Service regarding the number of cords of wood sold. Three U.S. Forest Service Districts distribute collection permits for residential firewood use: Spring Mountain District, Tonopah District and the Dixie National Forest. Additionally, there are several retail dealers in the Las Vegas Valley that sell firewood for residential use. AMSPC emission factors were used to generate the CO emissions value in tons/year.

The values for cords of wood for the base year are:

	No. of Cords	Wood Type	Lbs per Cords
Spring Mountain	400	Pine	2300
Tonopah	0		
Dixie Forest	700	Pine/Spruce	2300
Retail Outlets	3292	Pine/Oak/Mulberry	3300
Total Wood Sold	4392		

Total Tons Burned Tons — Pine/Spruce 1265

Pine/Oak/Mulberry

5431.8 Tons

TOTAL

6696.8 Tons

Sample Calculation:

6696.8 tons burned * 230.8 #/ton * 1 ton/2000# = 772.8 tons

3.5 Structural/Vehicular/Brush Fires

Local fire departments and the U.S. Forest Service were contacted to acquire statistics on fire incidents. Emission factors used were found in AP-42 and the CARB "Methods for Assessing Area Source Emissions in California" (MAASEC) September 1991.

U.S. Forest Service fires (86); acres burned (14.5)
Total fires for all jurisdictions:

	Structural	Vehicle	Brush/Trash
Clark County	744	782	1161
Henderson	73	117	229
Las Vegas	499	570	1214
U.S. Forest Service			86
TOTAL	1316	1469	2690

3.6 Brush Fires:

There were 2604 fires classified as brush/trash fires on non-forest land in 1990. The Clark County Fire Department estimates that these fires are less than 1/4 of an acre in size. A total of 14.5 acres were burned on Forest Service land. Based upon the information found in AP-42, Table 11.1.1, the State of Nevada lies within Region 4, called "Intermountain." The Intermountain region has a fuel loading of 8 tons per acre and CO Emissions of 140 pounds per ton of burned vegetation.

Calculation:

2604 fires * 0.25 acres/fires = 651 acres + 14.5 acres = 665.5 total acres burned.

8 tons/acre * 665.5 acres * 140 #/ton * 1 ton/2000# = 372.7 tons total from brush fires.

3.7 Vehicle Fires:

Local fire jurisdictions reported a total of 1469 vehicle fires in the Las Vegas Valley for base year 1990. MAASEC gives a CO emission factor of 21.25 pounds per fire.

Calculation:

1469 vehicle fires * 21.25 #/fire * 1 ton/2000# = 15.6 tons total from vehicle fires.

3.8 Structural Fires:

There were a total of 1316 structural fires in the Las Vegas Valley in 1990.

MAASEC estimates emissions from structure fires by determining the average percent structural loss per fire. This is done by dividing the total monetary damage due to fires by the product of the average value of a residence in the Las Vegas Valley and the number of residential fires. Data from the Clark County Fire Department was used to make this estimate.

Calculation:

Percent damage from fires - Total $ loss/(Ave Home $ * # of residential fires) * 100

2,566,490/(107,000 * 211 fires) * 100 = 11% average loss

The average residence has approximately 11 tons of combustible material so the structure loss will be:

11 tons combustible material * 0.11 average loss = 1.21 tons/fire structure loss

The average residence is approximately 1200 square feet and has a 7.91 pounds of combustible material per square foot. So the content loss for the average residential fire is:

1200/ft2 * 0.11 loss * 7.91 #/ft2 * 1 ton/2000# = 0.52 tons/fire content loss

Structure loss + content loss = 1.21 + 0.52 = 1.73 tons/fire total loss

Total Structure Fire Emissions = 1316 fires * 1.73 tons/fire * 168 #/ton * 1 ton/2000# = 191.2 tons total

Total CO Emissions from Brush, Vehicular and Structural fires is 579.5 tons for the 1990 Base Year. The table below provides greater detail on emissions associated with each type of fire.

TABLE 3-3

SUMMARY TABLE OF FIRE EMISSIONS

	Annual Emissions (tons/year)	Peak Season (lbs/day)
Structural	191.2	1407
Vehicular	15.6	110
Brush	372.7	2725
TOTAL	579.5	4242

3.9 Natural Gas Combustion

A request for information was made to Southwest Gas Company for pertinent data for each of the categories reportable by AMSPC (see Appendix B). The categories are: Electrical Utility, Commercial, Industrial and Residential. The therms for each category plus resale were added together to determine total therms for each category. Information was received in therms, so conversion to cubic feet was necessary to feed into AMSPC. AMSPC was used to generate the tons/year values. A summary table is provided below.

Therms to cubic feet calculation:

86,748,895 therms * 100,000 BTU/therm * 1ft3/1024BTU=8472(10^6 ft3)

TABLE 3-4

NATURAL GAS COMBUSTION EMISSION SUMMARY

	Annual (tons/year)	Seasonal (lbs/days)
Residential	911	260
Commercial	28	286
Industrial	95	582
Electric Utility	165	905
Totals	379	3033

3.10 Cigarette Smoking

The following methodology was approved in a conference call with David Miesenhiemer, Region IX and various other local agencies.

Information from the Nevada Department of Taxation to determine the number of cigarettes consumed was requested and the emission factor for cigarette smoking found in EPA-450/4-91-016 May 1991 (Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone) of 19 mg/cigarette was used. Refer to Attachments 31-32.

Sample calculation:

From 20 cigarette packages:

30,465,018 pack/base year * 20 cigs/pack * 19mg/1 cig * 1 gr/1000mg * 1kg/1000gr * 2.2#/1kg * 1 ton/2000# - 12.73 tons

From 25 cigarette packages:

130,032 pack/base year * 25 cigs/pack * 19mg/1 cig * 1 gr/1000mg * 1kg/1000gr * 2.2#/kg * 1 ton/2000# = 0.07 tons

Total: 12.73 tons + 0.07 tons = 12.8 tons

3.11 AIRS Submittal

The emissions associated with area sources have been submitted to AIRS in their respective module with exception of cigarette smoking.

APPENDIX A

Section Four
On-Road Mobile Sources

4.1 Introduction - On-road mobile sources

On-Road mobile sources are the major source of Carbon Monoxide emissions in Las Vegas Valley contributing about 86% of total emissions, on an annual basis. This is attributed to a significant number of motorized vehicles operating in this area combined with the number and length of trips. Mobile sources are composed of two types; on-road mobile sources (such as automobiles, trucks, and motorcycles) and non-road mobile sources (such as airplanes, trains, marine vessels, etc.). This section focuses on on-road mobile sources and details the accounting of vehicle miles traveled (VMT), CO emission factors, and the computation of on-road mobile source CO emissions. Non-road mobile sources are discussed in Section 5.

In general, the carbon monoxide emissions for on-road mobile sources are computed by multiplying the traffic activity levels, i.e. VMT, by emission factors. A significant amount of resources were expended to derive emission factors and VMT that are most representative of this area. This goal was accomplished by utilizing the EPA mobile source emission factor generating model (MOBILE5b) and the Clark County Regional Transportation Commission's (RTC) regional model (TRANPLAN).

4.2 Traffic Activity Levels (VMT) Estimation Procedure

In general, estimates of 1996 or other years VMT should be derived from annual reports submitted to the Federal Highway Administration's (FHWA) Highway Performance Monitoring System (HPMS). However, the VMT Forecasting and Tracking guidance discussed that "a state may use an alternative to HPMS to estimate actual VMT" in a particular situation.

> "*If a state or other entity operates an HPMS-like system to track VMT within an area that encompasses all vehicle travel contributing to the non-attainment situation and this alternative system is equivalent to HPMS in terms of providing a reliable and accurate VMT estimate for the area and if it conforms to Federal Highway Administration guidance, the state can use this alternative system to estimate actual VMT.*" (January 1992, Section 187 VMT Forecasting and Tracking Guidance, U.S. Environmental Protection Agency (EPA))

A comparison of data from HPMS and actual VMT traffic survey data has shown that HPMS data was underestimating the actual traffic activities in Las Vegas Valley. Therefore, an alternative method to more accurately estimate VMT in non-attainment area was necessary.

Under the consultation of the EPA Region IX, the Clark County RTC, the Metropolitan Planning Organization (MPO) for urbanized Clark County, working with the Clark County Department of Comprehensive Planning, derives vehicle miles of travel values by using the Las Vegas Regional Transportation Model (LVRTM). This model provided 1990 traffic activity level.

The LVRTM was developed for the RTC by BRW, Inc., San Diego, California. This model utilizes the computer software package TRANPLAN, a travel demand model developed by the Urban Analysis Group of Danville, California. TRANPLAN has the capability to provide average daily vehicle trips (i.e. link loading) as well as network summary statistics including regional totals, by roadway type, for daily vehicle-miles and vehicle-hours of travel.

The LVRTM has been updated via a step-wise calibration and validation process by BRW, Inc. Output from each modeling component was validated against measured and observed data prior to proceeding to the next modeling phase. The calibrated LVRTM has been judged sufficiently valid in replicating existing traffic patterns in the Valley. The screen-line evaluations, 33 screen-line locations throughout the Las Vegas Valley, show that total modeled or estimated volumes were within +/-4.68 percent of the observed volumes which indicates an acceptable model accuracy.

The socio-economic data in the Las Vegas Valley was generated as the starting point of the transportation modeling process. Next, land use assumptions related with trip generation were projected in conjunction with the RTC 1991 Planning Variables Report. These projections take into consideration county level population and employment for 1990, existing and "build-out" land use information from public planning departments and developers, and growth allocation.

4.2.1 Traffic Analysis Zones

Traffic Analysis Zones (TAZ) are the smallest geographic unit, for which travel demand is estimated. A modified and expanded Traffic Analysis Zone system was developed for the RTC designated transportation planning study area with cooperation of the Nevada Department of Transportation (NDOT) and BRW, Inc. In the current transportation planning study area, 749 TAZ provide the basis for roadway network coding and allocation of socio-economic data for trip generation. These zones have cross-reference capability with 1990 census tract geography and existing jurisdictional boundaries.

4.2.2 Highway Network

The highway network provides the travel path options for the interchange of trips between TAZ. The highway network used in the LVRTM is a computer-readable representation of the Las Vegas Valley street system using links and nodes to describe roadway segments. This whole network was coded by BRW based upon roadway inventory information collected by NDOT:

- Facility Type (Assignment Group)
- Number of Lanes (Link Group 1)
- Intersection Control (Link Group 2)
- Local Jurisdiction (Link Group 3)
- Posted Speeds

Assignment Group Code is a numeric code (0-9) which is used to identify links to which a common capacity constraint function is applied. The assignment group listing which corresponds to facility type classifications is presented in Table 4-1.

TABLE 4-1

LVRTM ASSIGNMENT GROUP CODE DESIGNATIONS

Assignment Group	Facility Type
0	External
1	Local
2	Minor Arterial
3	Major Arterial
4	Ramp
5	Interstate
6	Freeway
7	Expressway
8	Collector
9	Centroid Connector

Source: BRW, Inc. October 1990

Link groups utilize numeric codes (1-16) to group links with common characteristics for subsequent referencing, updating and/or reporting. Number of lanes, type of traffic control in existing intersections, and jurisdiction are indicated respectively by three different link group codes which are applied in the LVRTM model.

Capacity assumptions are assigned to links based upon link attributes and factors associated with each roadway type. Data was gathered via survey for different facility types and intersection control to determining saturation flow rates (Vehicles/hour/lane) and Green Time/Cycle Time (G/C ratio). Capacity assumptions were generated by using saturation flow rates and Green Time/Cycle Time values.
Posted roadway speeds were utilized where available for the LVRTM 1990 network. Where necessary, default speeds were employed which adjusted in the network calibration process.

4.2.3 Trip Generation

The approach used for trip generation in the LVRTM is a dis-aggregate, cross classification household trip rate model which utilized household trip rates and trip purposed percentages. Trip generation for the LVRTM is accomplished through an automated spreadsheet. Once user-supplied socio-economic and trip rate data have been imported to the trip generation spreadsheet, the remainder of trip generation is automatically calculated within the spreadsheet.

Given socio-economic and trip rate data, the trip generation model calculates internal person trip productions and attraction by zone while balancing regional production and attraction totals. Socio-economic data along with 1990 Las Vegas Household Travel Survey* information is used to generate person-trip productions and attractions for various internal trips.

With respect to internal trip purposes, only trips with both origins and destinations within the planning area are included. External trip ends, those which either begin or end beyond the model area, are not derived through the LVRTM Trip Generation process at the current time. Instead, existing NDOT external trip tables have been updated based on population growth and are added to the trip table file.

4.2.4 Trip Distribution

Trip distribution for the LVRTM is accomplished by the gravity model function of TRANPLAN. Inputs to the trip distribution model consist of a single data file containing balanced zonal person-trip productions and attractions and friction factors by time increment. Five internal person-trip purposes are distributed: Home-Based Work, Home-Based School, Home-Based Shopping, Home-Based Other, and Non-Home Based. Existing External, Taxi/Rental Car, and Commercial Truck Trip tables from the previous NDOT model have been updated based on population and other growth indicators and are added to the internal trip tables prior to assignment.

4.2.5 Mode Split

Inputs to the Mode Split procedure of the LVRTM consist of the following:

- Merged person-trip tables
- Transit mode share percentage matrix
- Vehicle occupancy rates by trip purpose

The mode split procedure as implemented in the LVRTM utilizes transit mode share percentage matrices developed through use of the QRS software version 2.1. The transit mode share matrix specifies the percent of transit utilization for each zonal trip interchange. The merged person-trip tables, output from the Trip Distribution model component, are multiplied by the transit mode share percentage matrix, resulting in a trip table of transit trips. The transit trip table is then subtracted from the total person-trip table to derive person-vehicle trips. Vehicle occupancy rates (derived by the 1990 Household Travel Survey) are applied to the person-vehicle trips resulting in vehicle trip table by purpose.

The resulting vehicle trip tables are then summed along with the External, Taxi/Rental Car and Truck trip tables into a single-vehicle trip table which is then input to the Trip Assignment component for loading into the highway network.

4.3 Motor Vehicle Sources 1999 Updates

The on-road motor vehicle component of the emissions inventory was prepared using the Direct Travel Impact Model, version 2.0 (DTIM2), distributed by the California Department of Transportation (CALTRANS). DTIM2 is a system of FORTRAN programs that calculate hourly gridded emissions by combining roadway link-specific traffic volumes (in terms of vehicle miles traveled, or VMT) from a transportation model with vehicle fleet emission factors from an emission factor model. For this study, VMT distributions were developed from the RTC's transportation demand model TRANPLAN. The emission factor model used in preparing the base year inventory was EPA's MOBILE5 model. The enhanced on-road mobile source emissions inventory utilized in the revised UAM Base Case applications described in this report resulted from modifications to both TRANPLAN and MOBILE5. We first provide a description of the procedure by which the mobile source emission inputs were initially constructed for Phase II. This is followed by a detailed description of the modifications made to enhance the Phase II mobile source inventory.

4.3.1 Initial Phase II Mobile Inventory

The development of the initial Phase II on-road mobile source inventory followed the procedures from Phase I (Emery et al., 1996) and utilized data from the original Las Vegas CO modeling effort (BRW and SAI, 1992). VMT estimates were generated from an older version of TRANPLAN that provided 1995 travel projections from a 1990 base year. In addition to the travel on each link (i.e., number of trips per link), the TRANPLAN output supplied other important information for estimating VMT such as link capacity, link length, and average link speed.

Each MOBILE5 run included a range of temperature/speed scenarios, and the DTIM2 emission factor preprocessors translated the MOBILE5 output into a large lookup table of emission factors for use in the DTIM2 program. The BRW/SAI study used estimates of operating modes (i.e., fraction of hot/cold starts and hot stabilized modes) for each hour of the day. These data were incorporated in this study in the form of hourly specific MOBILE5 input parameters, so MOBILE5 was run for each hour of the day. This, of course, resulted in different emission factor lookup tables for each hour, requiring a separate run of the DTIM2 program for each hour in the episode.

Figure 4-1 below shows a sample of the Mobile5 input file used to generate one set of hourly-specific factors. The UAM modeling episodes occurred during December of 1996, and so in order to accurately characterize the model year distribution of the vehicle fleet, MOBILE5 was run with an evaluation year of 1997. One of the tasks of the DTIM2 preprocessors is to create a fleet average emission factor. In order to do this the user must provide data describing the mix of vehicles in the fleet. The VMT data used for 1997 is shown in Table 4-2.

Table 4-2

Assumed VMT distribution of the 1997 Las Vegas fleet.

Vehicle Class	Fraction of Fleet
Light Duty Gas Vehicles	0.735
Light Duty Gas Trucks 1	0.123
Light Duty Gas Trucks 2	0.067
Heavy Duty Gas Vehicles	0.012
Light Duty Diesel Vehicles	0.019
Light Duty Diesel Trucks	0.007
Heavy Duty Diesel Vehicles	0.027
Motorcycles	0.010

The major features of the Las Vegas control programs existing in 1996 are enumerated below. These parameters were used in the Base Case MOBILE5a modeling.

Inspection and maintenance program:

- Start date: 1983
- Stringency (failure rate): 20%
- Model years covered: 1968 to current
- Waiver rates: 1% for pre- and post-1981 model years
- Compliance: 96%
- Program Type: computerized test and repair
- Frequency: annual
- Vehicle Types: light duty gas vehicles and trucks
- Test Type: 2-speed idle
- Cutpoints: default

Anti-tampering program:

- Start date: 1983
- Model years covered: 1981 to current
- Vehicle types: light duty gas vehicles and trucks
- Program type: test and repair
- Frequency: annual
- Compliance: 96%

Oxygenated fuel program:

- Oxygen contents: 3.5% for alcohol
- Market share: 100% alcohol
- RVP waiver: no

As stated earlier, the emission factor preprocessors of the DTIM2 system create a lookup table of emission factors by speed and temperature. When estimating emissions, the speed on each link is taken from the TRANPLAN output, or calculated within the DTIM2 program. The temperatures, however, must be provided by the user, either in the form of a gridded, hourly temperature file, or as an hourly temperature profile representative of the entire domain. In this study, temperature measurement data from the East Charleston site were used as a representative temperature profile. Table 4-3 shows the temperature profiles for the two UAM modeling episodes.

The link activity generated by the TRANPLAN model was given as daily volumes for a typical weekday in 1995. A 6% volume increase was assumed between 1995 and 1996, so the VMT output was scaled accordingly. The DTIM2 program must resolve daily volumes to an hourly profile of VMT. In order to do this, data describing the hourly distribution of travel must be provided as input to the DTIM2 program. Statistics from traffic count data gathered by the Nevada Department of Transportation (NDOT) were used to develop an hourly travel distribution. Rather than try to find a road-type that was representative of the entire transportation network, the overall average of all road types was used. The hourly traffic count statistics were provided by day-of-week, and these data were incorporated for the Sunday, Monday, Thursday, and Friday episode days. Figure 4-3 shows the hourly travel distribution for December 8-9.

Because the TRANPLAN data represent activity on a typical day, the hourly gridded emissions generated by the DTIM2 program are also typical day estimates. In order to better represent episodic conditions, the NDOT traffic count data were used to calculate a factor to adjust the typical day emissions generated by DTIM2 to a Sunday/Monday and Thursday/Friday in December. The adjustment used for a typical December day was 1.021 while the adjustment applied for Sunday, Monday, Thursday, and Friday were 0.774, 1.022, 1.062, and 1.109, respectively.

Table 4-3

Temperature profiles used in the DTIM2 emissions processor

Hour (LST)	Temperature (F) on December 8-9, 1996	Temperature (F) on December 19-20, 1996
15	66	55
16	66	54
17	62	50
18	58	45
19	55	43
20	53	41
21	51	38
22	50	37
23	48	36
24	47	34
1	45	32
2	44	32
3	44	31
4	43	30
5	42	29
6	42	29
7	42	28
8	44	32
9	49	40
10	51	44
11	55	47

Figure 4-1

Sample input file to the Mobile5 model.

```
5          PROMPT
    Las Vegas 2001 run; LV I/M with TTC begins on 3rd reg,incl HDGV
1          TAMFLG
1          SPDFLG
3          VMFLAG Ä Use Las Vegas VMT mix
3          MYMRFG
1          NEWFLG
6          IMFLAG Ä I/M program with TTC
1          ALHFLG
2          ATPFLG Ä AntiÄTampering program
2          RLFLAG Ä Las Vegas Vapor Recovery Program
2          LOCFLG Ä LAP record will appear once, in oneÄtime data section.
1          TEMFLG Ä Mobile 5 will calculate the ambient temperature
4          OUTFMT Ä 80 Column Descriptive Format
2          PRTFLG Ä print exhaust CO results
1          IDLFLG Ä No idel emission outputs
4          NMHFLG Ä Total organic gasses (TOG)
3          HCFLAG Ä Detailed component HC printed
735.123.067.012.019.007.027.010                        Local VMT Mix
043 .090 .083 .077 .077 .072 .066 .045 .042 .044      LDGV
046 .060 .053 .045 .031 .019 .018 .019 .014 .009
009 .008 .006 .006 .018
027 .099 .089 .080 .104 .075 .059 .037 .037 .035      LDGT1
035 .048 .042 .032 .024 .017 .020 .018 .019 .012
014 .010 .007 .010 .050
008 .042 .046 .033 .054 .043 .036 .029 .030 .043      LDGT2
036 .082 .080 .070 .059 .041 .045 .050 .042 .027
029 .027 .022 .008 .018
013 .045 .041 .030 .045 .040 .036 .025 .022 .020      HDGV
035 .079 .073 .065 .049 .039 .044 .054 .040 .028
030 .027 .017 .083 .020
043 .090 .083 .077 .077 .072 .066 .045 .042 .044      LDDV
046 .060 .053 .045 .031 .019 .018 .019 .014 .009
009 .008 .006 .006 .018
027 .099 .089 .080 .104 .075 .059 .037 .037 .035      LDDT
035 .048 .042 .032 .024 .017 .020 .018 .019 .012
014 .010 .007 .010 .050
040 .144 .084 .073 .095 .098 .076 .048 .046 .033      HDDV
038 .035 .032 .016 .013 .014 .020 .016 .019 .012
012 .008 .006 .004 .018
024 .056 .059 .074 .112 .098 .079 .096 .134 .098      MC
091 .079 .000 .000 .000 .000 .000 .000 .000 .000
000 .000 .000 .000 .000
1 1 2 1
83 20 68 99 01 01 096 2 1 2222 2222 220. 1.20 999.     2Äspeed test 68, incl HDGV
TECH12.D                                               I/M data file
IMDATA4.D                                              I/M data file
83 81 99 2222 21 096. 22212112                         AntiÄTampering
92 3 095 095                                           RLFLAG refueling emission
                 C  36.  64. 13.5 09.0 95 2 1 1        Local Area Parameter reco
000 1.00 .000 .035 1                                  Ether Alcohol oxyEther ox
4 02 19.6 50.0 20.6 27.3 20.6 01                       Scenario description reco
01 11
```

4.3.2 Enhanced Phase II Mobile Inventory

The initial Phase II mobile source inventory was enhanced in three ways:

- Use of a newer TRANPLAN model;
- The addition of "off-cycle" contributions to MOBILE5a; and
- The inclusion of emissions from transit operations.

Estimates of typical day link-specific VMT was improved through the use of the new interim 1997 TRANPLAN model, based on the definition of 751 traffic analysis zones (TAZ)[1]. In addition, the mobile source processing included the contribution from "centroid connector" links, which were not included in the original Phase I or initial Phase II inventories. Centroid connectors are specific links in the TRANPLAN model that represent the flow of traffic between the resolved roadway network and neighborhood-scale TAZs.

The issue of whether to include the centroid connectors in the DTIM2 model was first raised during Phase I of the CO modeling study. During initial review of the original TRANPLAN and DTIM2, Clark County indicated concern that the estimated VMT was unreasonably high. After consulting with the transportation modelers, it was concluded that the centroid connectors did not represent realistic volume in the traffic network and should be excluded from the analysis. This recommendation stemmed from the fact that the centroid connectors are basically an artificial component of the model. One of the improvements incorporated into the interim 1997 TRANPLAN model was better representation of centroid connectors. For this reason, as well as to remain consistent with RTC conformity analyses, VMT associated with the rectified centroid connector links were included in the enhanced Phase II mobile source inventory. The addition of these links increased the total VMT by about 6%.

MOBILE5 was modified to include the effects of "off-cycle" emissions, which refers to aggressive driving patterns that are not replicated in the Federal Test Procedure for vehicle emissions upon which MOBILE5 is based. The decision to add this component was, in some degree, a result of the significant improvement in UAM performance that occurred when this component was added during Phase II sensitivity tests. Additionally, the omission of off-cycle contributions has been a recognized deficiency of MOBILE5, and this has been rectified in the latest emission factor models developed by EPA (i.e. MOBILE6, due from EPA in late 2000). The modifications made to MOBILE5a to account for off-cycle emissions were those that were originally planned for MOBILE5b by EPA's Office of Mobile Sources (Brezinski, 1996) but ultimately omitted. The modification for CO emissions is an additive increase in all emission rates of 2.784 grams per mile for light duty gasoline vehicles and all light duty gasoline trucks.

[1] RTC is currently in the process of increasing the number of TAZ in the TRANPLAN model to 1140. This change is not expected to increase CO levels as the purpose is to redefine the transportation models geography for improved clarity. Planning variables are expected to remain unchanged.

However, the effect was assumed to disappear at low and high speeds. Therefore an adjustment was made that had originally been planned for MOBILE5b -- to linearly reduce this additive effect between 19.6 and 2.5 miles per hour (mph) so that the effect is zero at 2.5 mph, and to reduce the effect linearly between 55 and 65 mph so that the effect is zero at 65 mph. The overall effect is to increase the on-road mobile emission component by about 15%.

Given this uncertainty, and other deficiencies associated with MOBILE5, Clark County has undertaken parallel UAM analyses in which mobile source emission rates are derived from the T2AT model. Clark County determined that T2AT provides significantly higher emission rates for the 1996 base year, while estimating sharper CO reductions than MOBILE5 in future years due to differences in fleet turnover assumptions and the effects of the National Low Emission Vehicles (NLEV) program. These parallel calculations provide for the ability to bracket the estimated CO emissions in future years between the sluggish effects predicted by MOBILE5 and the optimistic effects predicted by T2AT; it is likely that “truth” lies somewhere in between. Detailed results of Clark County’s T2AT/UAM analyses are not described in this document.

One deficiency of the interim TRANPLAN estimates is that they do not include any VMT from vehicles engaged in public transportation. It was been estimated that transit vehicles account for an additional 0.295% of VMT. To account for this increase in VMT, a correction was made in the form of an across-the-board adjustment to the hourly gridded emissions estimates generated by the DTIM2 system. This assumes that the movement of public transportation vehicles are distributed across the entire traffic network proportional to VMT on each link, and ignores the use of established service routes. It also assumes that the fleet mix for public transportation vehicles matches that specified in MOBILE5a.

As indicated above, the on-road mobile source component of the emission inventory was developed using the RTC’s TRANPLAN model output in combination with the EPA’s MOBILE5 model and the DTIM model. DTIM is a mobile source emissions allocation model used to evaluate spatial and temporally allocated emissions inventories. It was developed by the California Department of Transportation and combines travel demand model data (providing link-based activity) and emission factor models (providing emission rates for MOBILE5) to produce hourly, gridded mobile source emissions. Hourly gridded emissions are then are then merged together for the entire episode using the EPA’s EPS MEDUAM module. A summary report of MEDUAM module is presented in Figure 4-2 below.

The next step in quantifying the episodic emissions is to apply an adjustment factor to account for transit VMT, as mentioned above, and to adjust the emissions for the month of December. This is accomplished by multiplying the MEDUAM output value of 395.85 (contained in Figure 4-2) by 1.024. The resulting value is 405.4 tons per day which is the total on road emissions from mobile sources.

Figure 4-2 EPS MEDUAM Output File

```
                              EPS 2.0 MEDUAM module v. 1.00 Mar. 93

            Input Files
        USERIN file                   :../../inputs/meduam/userin.dec9
        Input MEDS file               :../dtim2/96bsd/dec9/meds/dec9.p2b.meds
        Splits file                   :../../inputs/meduam/splits.dat.dtim2
        ASC-SCC/Profile code XREF file:../../inputs/meduam/sccvoc.xrf.dtim2

            Output Files
        Output UAM file               :../../uam_files/emiss.dec9.96bsd.mv
        MEDS error file               :msg_96bsd/err.meduam.dec9.96bsd

                  EPS 2.0 MEDUAM module v. 1.00 Mar. 93   03/09/99 17:34:37

        File note                     :MOBILE Emissions from DTIM2
        Beginning date                :96344
        Beginning time                :   0.00
        Ending date                   :96344
        Ending time                   :2400.00
        UTM origin (m)                : (      0.00,      0.00)
        UTM zone                      :   11
        Grid origin (m)               : ( 642000.00,3973000.00)
        Grid cell width (m)           : (   1000.00,   1000.00)
        Number of cells               : (   50,   50)
        Number of vertical layers     :   10
        Layers above and below        :    9    1
        Layer heights (m)             :   0.00   20.00   20.00

 Number of species in the splits file:     1
 Number of factors read from splits file:     1
 No default profile is available.
 Number of MEDS records read:      0
          -------------------------------------------------------------
Note to the User:  The criteria pollutant emissions are reported as the sum of all contributing
speciated emissions.

The speciated emissions are reported as methane equivalent.  Therefore the output criteria
emissions may not match the input criteria emissions.
         -------------------------------------------------------------

                             Total Criteria Emissions Processed
                                        English Tons

                          NOx         VOC          CO
 ----------------------------------------------------------------
 Input Emissions          65.0544     34.3852    395.8557
 Output Emissions           0.          0.       395.8522
 Outside Domain             0.          0.          0.
 Outside Interval           0.          0.          0.
 Written to EMAR            0.          0.          0.
----------------------------------------------------------------
                     Input Criteria Emissions by Profile Code
                                   English Tons

  Profile       NOx         VOC          CO
 ----------------------------------------------------
  0000          65.0544     34.3852    395.8557
 ----------------------------------------------------
 Total          65.0544     34.3852    395.8557

Output Speciated Emissions by Profile Code
               English Tons

  Profile        CO
 -------------------------------------------
  0000         395.8522
 -------------------------------------------
 Total        395.8522
```

APPENDIX A

Section Five
Non-Road Mobile Sources

5.1 Introduction

This section will address the emission contribution by non-road mobile sources. The non-road mobile source category includes all motorized vehicles that do not operate on public roadways, such as aircraft, railroad locomotives, recreational vehicles, construction equipment, commercial equipment, etc. The types of sources which are considered for this portion of the inventory were identified from EPA's documents. However, some source categories, which are listed in EPA's documents, are not included in this document because their use does not occur in the Las Vegas Valley Non-attainment Area. These categories include: Recreational Marine Equipment, Light Commercial Equipment, Industrial Equipment, Agricultural Equipment, Logging Equipment, Commercial Marine Vessels, and Snowmobiles.

The Carbon Monoxide emissions from non-road mobile sources totaled 11,342.5 tons in 1990. Non-road mobile sources, which present the third largest CO emission category in the Las Vegas Non-attainment Area contribute 8.8 percent of total CO emission in the Valley. The methods applied to calculate railroad locomotives and aircraft CO emissions are different from that for other non-road mobile source categories. Therefore, they are discussed separately under their respective headings.

5.2 Locomotive Emissions

Three types of railroad activity occur in this area; passenger service, line haul, and track switching. Union Pacific Railroad and Amtrak are the two Class I railroad companies which operate in the Las Vegas non-attainment area. A total of 41 track miles (17.5 miles north and 23.5 miles south of the downtown depot) are within the non-attainment area. Amtrak schedules two trains from its Las Vegas depot each day, one north and one south. Union Pacific has 20 trains (ten in each direction) which pass through their railroad daily. Union Pacific's switching operations include two switch engines.

To determine locomotive emissions in the non-attainment area, EPA's Final Draft of Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources, issued to EPA Regional Offices in March of 1992, was used. Both railroad companies were contacted to obtain pertinent information about their operations which was then utilized in conjunction with the methodology and emission factors contained in the aforementioned document.

5.2.1 Class I Line Haul Locomotives

Class I emissions from freight locomotives were calculated by multiplying fuel consumption by an applicable emission factor for Union Pacific locomotives. Fuel consumption was derived by dividing the traffic density in gross ton-miles (GTM) by the fuel consumption index in GTM per gallon (GTM/gal) as shown below:
Fuel consumption = Traffic density/fuel consumption index

Union Pacific Railroad is the Class I line haul freight rail company which operates in the inventory area. Its main office in Omaha, Nebraska was contacted to obtain traffic density for the Las Vegas area as well as information from the Interstate Commerce Commission's annual "R-1" report. The following table contains information provided by Union Pacific.

5.2.2 Union Pacific Railroad Data

Traffic Density (w/o locomotive weight)	1,380,470,000 GTM
Schedule 750, line 1	526,409,157 gals
Schedule 755, line 98	408,751,071,000 GTM
Schedule 755, line 104	38,098,350,000 GTM

Traffic density specific to the Las Vegas area, without locomotive weight (33,670,000 Gross Tons), was provided by Union Pacific for a one mile track segment. This required that this value be multiplied by the total track mileage (41 miles) within the non-attainment area. This produced a traffic density of 1,380,470,000 GTM.

As the traffic density excluded locomotive weight, total gross ton-miles were obtained by subtracting line 98 from line 104 of Schedule 755:

408,751,071,000 - 38,098,350,000 = 370,652,721,000 GTM

Thus, the fuel consumption index for Union Pacific railroad is:

370,652,721,000 GTM = 704 GTM per gal (526,409,157 gal)

As previously mentioned, the fuel consumption is derived by dividing traffic density by the fuel consumption index. Therefore, fuel consumption for Union Pacific freight locomotives operating in the Valley non-attainment Area equals 1,960,574 gallons.

Fuel Consumption = 1,380,470,000 GTM / 1,960,574 gal = 704 GTM per gal

The EPA's Final Draft of Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources, provided the CO emission factor applicable to Union Pacific's typical SD-40 locomotive (0.0721 lbs/gal). Emissions from Class I line haul freight locomotives were calculated by multiplying fuel consumption by the emission factor.

Class I line haul freight emissions = (1,960,574 gal)X(0.0721 lbs/gal)
= 141,357 lbs.
= 70.7 tons

Class I emissions from passenger locomotives were calculated by multiplying fuel consumption by an applicable emission factor for Amtrak locomotives. As the Interstate Commerce Commission exempts Amtrak from filling a "R-1" report, Amtrak's Safety Department was contacted to obtain information pertaining to its operations and fuel consumption in the non-attainment area (see Appendix D). The Desert Wind line passes through the Las Vegas Depot twice daily, one train in each direction, each consisting of two locomotives. The typical Amtrak locomotive is an F40 PH which consumes 2.30 gallons per train mile. To determine annual train miles, the following equation was utilized:

Train Frequency x No. of Trains x Track Miles = Annual Train Miles (ATM)
(365) x (2) x (41) = 29,930 ATM

To calculate the quantity of fuel consumed based on train miles, the following equation was used:
Gallons Consumed = Annual Train Miles x Fuel Consumption, or
29,930 x 2.30 = 68,839 Gallons.

Last, the appropriate emission factor for an F 40 PH locomotive taken from the EPA's Final Draft of Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources, was multiplied by the gallons of fuel consumed to determine annual CO emissions from Class I passenger locomotives. The calculation is below:

Gallons Consumed x Emission Factor = Annual Amtrak Emissions, or
68,839 x 2.30 = 3,166.59 lbs.

Dividing the 3,166.59 lbs. of CO emissions by 2,000 results in 1.6 tons of CO for Amtrak's activities in the Las Vegas Non-attainment Area.

5.2.3 Switching Operations

Emissions from switching operations were calculated by multiplying annual fuel consumption by a switch engine emission factor. Union Pacific is the only railway which has rail yard operations. The local Operations Manager was contacted to determine information on these activities. Two switch engines operate daily and each consume 250 gallons of fuel. Annual fuel consumption was calculated as follows:

Number of Switch Engines x Gallons/Day x Days/Year = Annual Fuel Use, or
2 x 250 x 365 = 182,500 gals.

Next, the switch engine locomotive emission factor from the EPA's Final Draft of Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources, was multiplied by the gallons of fuel consumed by switch engine locomotives to produce annual switch engine emissions.

182,500 gal X 0.08940 lbs./gal = 16,315.5 lbs.
Annual Switch Engine Emissions = 8.2 tons.

The annual and CO season emissions for the three locomotive activity types are listed below. As railroad activity is considered to be constant throughout the year, the CO season value was derived by multiplying the annual figure by 0.25.

TABLE 5-1

LOCOMOTIVE EMISSIONS

	Annual (Tons)	CO Season (Tons)
Line Haul	70.7	0.060
Passenger Trains	1.6	0.001
Switching Operations	8.2	0.010

5.3 Aircraft Emissions

In this non-attainment area there are four airports: Nellis Air Force Base, McCarran International Airport, North Las Vegas Airport, and Henderson’s Sky Harbor Airport. Nellis Air Force Base prepared a 1990 annual emission inventories for their facility utilizing the Office of Environment and Energy's FAA Aircraft Engine Emissions Database (FAEED) computer program. As the use of this program to estimate aircraft emissions is recommended by the EPA, the emission information provided by these two facilities was incorporated into this inventory after performing quality assurance/quality control measures.

The Clark County Department of Aviation (CCDOA) oversees operations at McCarran International Airport, North Las Vegas Airport and Henderson Executive Airports. CCDOA, through their consultants, recently completed work on an updated 1996 emissions inventory and modeling analysis for these facilities utilizing the Emissions and Dispersion Modeling System (EDMS). EDMS was developed specifically for airport emission analysis and is approved by the EPA. CCDOA provided specific information pertaining to flight operations (landing/takeoff cycles) ground support equipment and vehicular use for these facilities.

The emissions attributed to aircraft operations in the Las Vegas Valley are summarized in Table 5–2 below. For additional information on the emissions inventory please refer to Appendix D of this Emissions Inventory document which contains the *Air Pollutant Emissions Inventory, McCarran International, North Las Vegas and Henderson Executive Airports* by Leight and Fisher Associates and the FAEED computer output provided by Nellis Air Force Base.

Table 5-2

Aircraft Emissions

	Annual Emissions (Tons/year)	CO Season (lbs/day)
Military Aircraft	1,045	7,648
McCarran International	10,018	54,893
North Las Vegas Airport	2,727	14,942
Henderson Executive	536	2,936

5.4 Other Non-Road Mobile Source Emissions

Additional non-road mobile sources present in this nonattainment area were grouped into the following three categories: recreational vehicles, construction equipment, and lawn and garden equipment. Table 5-4 lists the individual vehicles and equipment of these categories. Emissions from these sources were calculated using level-of-activity emission factors. For a number of sources, vehicle and equipment population was estimated. Local data was used whenever possible. However, when local data was not available, national equipment population data contained in the Nonroad Engine and Vehicle Emission Study-Report was scaled down to estimate local vehicle population. The 1990 census population and county modified local population estimates were used as scaling factors. Some additional adjustments were made to particular source categories based on knowledge of local vehicle population and usage to make emission estimates more reflective of actual conditions.

TABLE 5-4

LIST OF NON-ROAD MOBILE SOURCES
BY CATEGORY OCCURING IN THE LAS VEGAS
NONATTAINMENT AREA

1. RECREATIONAL EQUIPMENT

    All Terrain Vehicles (ATV's)
    Minibikes
    Off-road Motorcycles
    Golf Carts
    Specialty Vehicles/Carts

2. CONSTRUCTION EQUIPMENT

    Asphalt Pavers
    Tampers/Rammers
    Plate Compactors
    Concrete Pavers
    Rollers
        Landfill Compactors
        Static And Vibratory Rollers
    Scrapers
    Paving Equipment
        Concrete Finishers
        Concrete Vibrators
        Other Miscellaneous Paving Equipment
    Surfacing Equipment
        Asphalt/Gravel Planers
        Asphalt Mixers/Agitators
        Crack/Joint Routes
        Pumper Kettles/Melters

- Soil Stabilizers
- Road Reclaimers
- Pavement Profilers
- Roofing Equipment
- Other Miscellaneous Surfacing Equipment

Signal Boards
Trenchers
- Portable/Walk-behind Trenchers
- Riding Trenchers
- Cable Layers
- Wheel Trenchers

Bore/drill Rigs
- Horizontal Boring Machines
- Self Propelled Drills
- Truck-mounted Drills

Excavators
- Dragline Excavators
- Hydraulic Excavators

Concrete/industrial Saws
Cement and Mortar Mixers
Cranes
- Pedestal Cranes
- Rough Terrain Cranes
- Shovel-type Cranes
- Straddle Cranes

Truck Mounted Cranes
Graders
Off-highway Trucks
Crushing/Processing Equipment
Rough Terrain Forklifts
Rubber Tired Loaders
Tractors/Loaders/Backhoes
Crawler/Tractors
Skid Steer Loaders
Off-highway Tractors
Dumpers/Tenders
Other Construction Equipment
- Concrete Pumps
- Other Miscellaneous Construction Equipment

3. LAWN AND GARDEN EQUIPMENT

Trimmers/Edgers/B rush Cutters
Lawnmowers
Leaf Blowers/Vacuums
Rear Engine Riding Mowers
Front Mowers
Chain Saws < 4 Hp

- Shredders < 5 Hp
- Tillers < 5 Hp
- Lawn and Garden Tractors
- Wood Splitters
- Chippers/Stump Grinders
- Commercial Turf Equipment
  - Hydro/Seeder Mulchers
  - Riding Turf Mowers
  - Thatchers/Aerators
  - Walk-behind Multi-spindle Mowers
  - Other Miscellaneous Equipment
- Other Lawn and Garden Equipment
  - Augers
  - Sickle Bar Mowers
  - Pruning Towers
  - Turf Cutters

After the annual activity levels were determined, the EPA's recommended methodology was used to calculate emissions. This calculation considers emission factors, typical load factors, average rated horsepower, and annual hours of *uses.* The formula associated with methodology is presented *below:*

$$M = N * HPS * HP * LF * EF$$

where:

M = mass of emission of CO during inventory period
N = source population (units)
HRS = annual hours of use
HP = average rated horsepower
LF = typical load factor
EF = average emissions of CO per unit of use

Once annual emissions were determined by using this formula, the emissions from most nonroad mobile sources are apportioned to the peak CO season using the seasonal activity distributions provided in the Nonroad Engine and Vehicle Emission Study-Report. When an activity distribution was not listed for a vehicle/equipment, an activity distribution representative of local conditions was estimated and utilized.

5.4.1 Recreational Vehicles

Emissions from recreational vehicles accounted for 1744.38 tons/year in year 1990. This source category is subdivided into five major groups: off-road motorcycles, ATV's, golf carts, minibikes, and specialty vehicles/carts. To determine the emissions from each of these groups, local vehicle population and usage must first be determined.

5.4.1.1 Off-Road Motorcycles

Emissions attributed to off-road motorcycle use are addressed in this section. On-road motorcycle use is discussed in Section Four. The document, Methods for Assessing Area Source Emissions in California (MAASEC)* reports that the total motorcycle population can be utilized to disaggregate motorcycle type/use based on the following percentages:

On-highway	71.1%
Dual Purpose	12.7%
Off-highway	9.4%
Competition	6.8%

The Nevada Department of Motor Vehicles and Public Safety reported that Clark County had 9,781 motorcycles registered in 1990. Assuming all on-highway and dual purpose motorcycles are registered, the number of off-highway and competition units were estimated using the distributions shown above. MAASEC indicates that only 8% of on-road motorcycles are used off-road at any time. The remainder of the motorcycle population (i.e. dual purpose, competition, and off-road) is assumed to be used off-road 100% of the time. Total emissions were calculated using the emission factors and average annual off-road mileage reported in the MAASEC document. Table 5-5 contains information used to derive emissions for each of the motorcycle types.

TABLE 5-5

OFF-ROAD MOTORCYCLE EMISSIONS

	Population Distribution	Total Number of Units	Number of Units Used Off-Road	Miles Per Year	Emission Factor (g/mi)	CO Emissions (T/yr)
On-highway	71.1%	8,299	664	368	11.9	3.21
Dual Purpose	12.7%	1,482	1,482	501	11.9	9.75
Competition						
2-stroke engine (46%)	3.1%	362	362	634	32.4	6.20
4-stroke engine (54%)	3.7%	432	432	634	39.6	11.97
Off-highway						
2-stroke engine (46%)	4.3%	502	502	495	32.4	8.88
4-stroke engine (54%)	5.1%	595	595	495	39.6	12.87
Total						54.88

5.4-1.2 ATV's, Carts, ETC.

Emissions from ATV's, golf carts, minibikes, and specialty vehicles/carts were determined using the data provided in Nonroad Engine Emission Inventories for CO and Ozone Nonattainment Boundaries, Las Vegas Area. From this document, the vehicle population in the Las Vegas Area, average rated horsepower, typical operating load factor, annual use, and emission factor for each of the categories, ATV's, golf carts, minibikes, and specialty vehicle/carts, are derived for both 4-stroke and 2-stroke engines. The methodology to compute emissions is also provided by this document showing as follows:

Vehicle Ave. Rated Load Annual Emission
Emissions = Population * Horsepower * Factor * Use * Factor

The data used to calculate emissions from ATV's, golf carts, minibikes, and specialty vehicles/carts along with annual carbon monoxide emissions are shown below in Table 5-6.

TABLE 5-6

EMISSIONS FROM ATVS, GOLF CARTS, MINIBIKES, AND SPECIALTY VEHICLES/CARTS

	Vehicle Population	Average Rated Horsepower	Typical Operating Load Factor	Annual Use Estimates (hr/yr)	Emission Factors (g/hp-hr)	Co Emissions (total/yr)
ATV's:						
4-stroke engine	2,946	1	100%	135	1,852.5	812.8
2-stroke engine	332	1	100%	135	1,520.0	75.1
Golf Carts:						
4-stroke engine	234	1	100%	1,145	1,852.5	547.1
2-stroke engine	72	1	100%	1,145	1,520.0	138.1
Minibikes:						
4-stroke engine	122	1	100%	65	1,852.5	16.2
2-stroke engine	0	1	100%	NA	NA	0
Specialty Vehicles/Carts:						
4-stroke engine	261	1	100%	73	1,852.5	38.9
2-stroke engine	501	1	100%	73	1,520.0	61.3
Total						1689.5

The peak season emissions from non-road recreational vehicles were determined using seasonal activity data reported in the Nonroad Engine and vehicle Emission Study -Report. The seasonal activity data used to calculate peak season CO emissions is shown below in Table 5-7. Total peak season emissions for non-road recreational vehicles were 4,600.56 lbs/day.

TABLE 5-7

SEASONAL ACTIVITY DATA FOR RECREATIONAL EQUIPMENT

	Peak Season (Winter) Percent of Annual Activity	Number of Activity Days	Peak Season CO Emissions (lbs/day)
Off-road Motorcycles	12%	7	144.73
ATV's	12%	7	2,341.64
Golf Carts	12%	7	1,807.25
Minibikes	12%	7	42.70
Specialty Vehicles/Carts	12%	7	2,64.24
Total			4,600.56

5.4.2 Construction Equipment

Emissions from construction equipment totaled 3,150.43 tons/year in 1990. Due to the lack of local data, carbon monoxide emissions for this source category were generated by using the vehicle population data provided in the EPA document, Nonroad-Engine and Vehicle Emission Study - Report. National vehicle population estimates provided in this report for construction vehicles were scaled down to represent local vehicle population. The scaling factors are calculated based on the ratio of Las Vegas area equipment population to the United States equipment population. The data and scaling factors used to calculate emissions are shown below in Table 5-8. Annual emissions and peak season emissions for these sources are presented in Table 5-8. The total carbon monoxide seasonal emission is 13,848.04 lbs/day.

TABLE 5-8

ACTIVITY DATA FOR CONSTRUCTION EQUIPMENT

	U.S. Equipment Population	Clark County Equipment Population	Average Rated Horsepower	Typical Operating Load Factor	Annual Use Estimates (hr/yr)	Emission Factors (g/hp-hr)
Asphalt Pavers:						
Diesel	15,536	46	91	0.62	690.0	3.2
4-stroke engine	3,022	9	31	0.66	329.5	257.4
Tampers/Rammers:						
4-stroke engine	1,045	3	4	0.55	148.0	376.2
2-stroke engine	22,566	67	4	0.55	148.0	923.4
Plate Compactors:						
Diesel	2,322	7	8	0.43	448.0	3.1
4-stroke engine	11,750	35	5	0.55	153.5	376.2
2-stroke engine	27,726	83	5	0.55	153.5	923.4

	U.S. Equipment Population	Clark County Equipment Population	Average Rated Horsepower	Typical Operating Load Factor	Annual Use Estimates (hr/yr)	Emission Factors (g/hp-hr)
Concrete Pavers:						
Diesel	5,511	16	130	0.68	694.0	4.6
Rollers:						
Diesel	36,300	108	99	0.56	614.5	3.1
4-stroke engine	21,999	66	17	0.62	512.5	383.8
Scrapers:						
Diesel	26,700	80	311	0.72	1,157.0	5.0
Paving Equipment:						
Diesel	43,615	130	99	0.53	535.0	4.6
4-stroke engine	218,942	653	7	0.59	150.5	376.2
2-stroke engine	11,868	35	7	0.59	150.5	923.4
Surfacing Equipment:						
4-stroke engine	30,033	92	8	0.49	395.0	376.2
Signal Boards:						
Diesel	20,324	61	6	0.82	713.0	5.0
4-stroke engine	1,559	5	8	0.76	211.0	376.2
Trenchers:						
Diesel	50,510	151	60	0.75	530.5	9.2
4-stroke engine	27,170	81	27	0.66	359.5	257.4
Bore/Driller Rigs:						
Diesel	7,761	23	209	0.75	405.5	9.2
4-stroke engine	8,395	25	54	0.79	93.0	257.4
2-stroke engine	10	0	54	0.79	93.0	923.4
Excavators:						
Diesel	61,336	183	183	0.57	752.0	5.2
4-stroke engine	18	0	80	0.53	331.0	257.4
Concrete/industrial Saws:						
Diesel	135	0	56	0.73	501.5	9.2
4-stroke engine	36,900	110	13	0.78	527.5	367.2
Cement and Mortar Mixers:						
Diesel	4,016	12	11	0.56	231.0	4.6
4-stroke engine	232,152	692	7	0.59	70.5	367.2
Cranes:						
Diesel	98,357	293	194	0.43	721.5	4.2
4-stroke engine	2,541	8	55	0.47	371.5	257.4
Graders:						
Diesel	70,045	208	172	0.61	714.0	3.8
Off-highway Trucks:						
Diesel	16,529	49	489	0.57	1,510.0	2.8
Crushing/Processing Equipment:						
Diesel	7,207	21	127	0.78	878.5	9.2
4-stroke engine	1,007	3	60	0.85	221.5	257.4

	U.S. Equipment Population	Clark County Equipment Population	Average Rated Horsepower	Typical Operating Load Factor	Annual Use Estimates (hr/yr)	Emission Factors (g/hp-hr)
Rough Terrain Forklifts:						
Diesel	53,853	161	93	0.60	592.5	10.0
4-stroke engine	2,217	7	88	0.63	369.5	257.4
Rubber Tired Loaders:						
Diesel	209,454	624	158	0.54	757.0	4.8
4-stroke engine	3,433	10	67	0.54	509.5	211.9
Rubber Tired Dozers:						
Diesel	7,757	23	356	0.59	840.5	2.8
Tractor/Loaders/Backhoes:						
Diesel	299,265	892	77	0.55	987.5	6.8
4-stroke engine	1,365	4	63	0.48	757.0	257.4
Crawlers/Tractors:						
Diesel	285,923	852	157	0.58	861.0	4.8
Skid Steer Loaders:						
Diesel	150,054	447	42	0.55	691.5	9.0
4-stroke engine	27,805	83	33	0.58	524.0	257.4
Off-highway Tractors:						
Diesel	38,921	116	214	0.65	885.0	14.7
Dumpers:						
Diesel	194	1	23	0.38	475.5	2.8
4-stroke engine	24,301	72	9	0.41	107.0	376.2
Others:						
Diesel	11,867	35	161	0.62	502.0	9.2
4-stroke engine	1,103	3	150	0.48	309.5	257.4

TABLE 5-9

CO EMISSIONS
FROM CONSTRUCTION EQUIPMENT

	Annual CO Emissions (tons/year)	Peak Season Percent of Annual Activity	Peak Season CO Emissions (lbs/day)
Asphalt Pavers	26.03	20%	114.42
Tampers/Rammers	22.63	20%	99.47
Plate Compactors	41.86	20%	184.00
Concrete Pavers	4.95	20%	21.76
Rollers	163.53	20%	718.81
Scrapers	114.32	20%	502.51
Paving Equipment	209.13	20%	919.25
Surfacing Equipment	59.12	20%	259.87
Signal Board	3.84	20%	16.88
Trenchers	183.70	20%	807.47

	Annual CO Emissions (tons/year)	Peak Season Percent of Annual Activity	Peak Season CO Emissions (lbs/day)
Bore/Driller Rigs	43.00	20%	189.01
Excavators	823.5	20%	361.98
Concrete/industrial Saws	238.35	20%	1,047.69
Cement and Mortar Mixers	81.71	20%	359.16
Cranes	103.53	20%	455.08
Graders	65.32	20%	287.12
Off-highway Trucks	63.70	20%	280.00
Crushing/Processing Equipment	28.17	20%	123.82
Rough Terrain Forklifts	99.44	20%	437.10
Rubber Tired Loaders	256.51	20%	1,127.52
Rubber Tired Dozers	12.54	20%	55.12
Tractor/Loaders/Backhoes	305.85	20%	1,344.40
Crawlers/Tractors	353.73	20%	1,554.86
Skid Steer Loaders	307.27	20%	1,350.64
Off-highway Tractors	231.26	20%	1,016.53
Dumpers	11.81	20%	51.91
Others	36.78	20%	161.67
TOTAL	3150.43		13848.8

5.4.3 Lawn and Garden Equipment

Emissions from lawn and garden equipment were determined by using equipment population data provided in the Nonroad Engine Emission Inventories for CO and Ozone Nonattainment Boundaries, Las Vegas Area. So do average horsepower, load factors, annual uses, and emission factors. The Las Vegas Area has an arid desert climate and unique vegetation. Therefore, many equipment types typical of this source category are not applicable to the Las Vegas Nonattainment Area and were not incorporated into this inventory.

With respect to estimating emissions for this source category, consideration must be given to the following three facts for adjusting the hours of usage and the equipment population. First, the desert climate results in the Las Vegas Valley having the lowest amount of vegetation coverage in the United States. Second, desert landscaping is becoming more prominent in new residential developments. Thus, using national data for hours of usage and equipment population will result in an overestimation of emissions. Third, the majority of lot sizes in the Las Vegas area are less than one eighth of an acre (50 X 100). Because of this, the electric powered lawn and garden equipment and non-motorized push mowers are more commonly used in the Valley than would be reflective in national figures. To avoid grossly overestimating emission for this source category, the annual use estimates adopted from the Nonroad Engine and Vehicle Emission Study– Report, were adjusted to be representative of local conditions.

Emissions from lawn and garden equipment totaled 1,534.17 tons/year in 1990. According to the EPA document Nonroad Engine and Vehicle Emission Study - Report, a 6 percent of winter season adjusted factor is applicable to determine the peak season carbon monoxide emissions from this source category. The peak season carbon monoxide emissions are 2,023.07 pounds. Table 5-10 depicts the carbon monoxide emissions for the various equipment types, and the data associated with the calculations.

TABLE 5-10
LAWN AND GARDEN EQUIPMENT EMISSIONS

	Las Vegas Area Equipment Population	Average Rated Horsepower	Typical Operating Load Factor	Annual Use Estimates (hr/yr)	Emission Factors (g/hp-hr)	CO Emissions Annual (tons/year)	CO Emissions Seasonal (lbs/day)
Trimmers/Edgers/Brush Cutters:							
4-stroke engine	28	1.0	36%	8.7*	747.35	0.07	0.09
2-stroke engine	23,431	1.0	50%	8.7-	1,383.62	155.58	205.16
Lawnmowers:							
4-stroke engine	40,105	4.0	36%	13.0**	817.00	676.67	892.31
2-stroke engine	4,481	4.0	36%	13.0**	923.40	85.45	112.68
Leaf Blowers/Vacuums:							
4-stroke engine	0	2.0	36%	13.5	722.57	0.00	0.00
2-stroke engine	3,357	2.0	50%	13.5	1,361.94	68.09	89.79
Commercial Turf Equipment:							
4-stroke engine	170	13.0	50%	670.5	672.60	548.31	723.04
Total:						1,534.17	2,023.07

Local annual use data are applied. Because more than 85% of parcels in the Las Vegas Valley are less than one eight of an acre in size, the use of this equipment is estimated at less than 10 minutes per week.
** Local annual use data are applied. Because of the smaller size of land parcels in the Las Vegas Valley, the use of this equipment is estimated at less than 15 minutes per week.

APPENDIX A

Section Six
Quality Assurance / Quality Control

6.1 Introduction

This Quality Assurance Section documents the procedures employed by the Department of Comprehensive Planning in generating an accurate emission inventory for carbon monoxide. The section also indicates the criteria used in quality assurance and quality control of the inventory. DCP has evaluated the comprehensiveness and reasonableness of emission estimates to preserve the integrity of the inventory. In general, QA consisted of the following three procedures: standard operation procedures, error and inconsistency detection and correction, and data quality assessment procedures.

The Las Vegas Valley Non-attainment Area QA/QC Plan includes the elements listed below. These elements are also listed in the order in which they are discussed in this section.

- The purpose of the QA/QC program including a policy statement.

- Summary of the organization of the emissions inventory and QA/QC programs, including assignment of emission inventory tasks and information flow.

- Description of the technical operating procedures, including resource allocation; personnel training and schedules; data collection, handling, analysis and validation procedures; and reporting formats.

- Description of audit responsibilities, schedules and procedures.

- Description of the methods used to document and quantify the implementation and effectiveness of the QA/QC Plan.

6.2 QA/QC Policy Statement

This section briefly describes a variety of ways in which an emissions inventory is utilized in creating and implementing air quality programs in the Las Vegas Valley Non-attainment Area. Also contained herein is a policy statement which formally committed the DCP to develop and institute an emission inventory QA/QC program.

6.2.1 Emission Inventory Purpose

The purpose of an emission inventory is to develop an accurate and comprehensive database of point, area and mobile source emissions estimates. This emission inventory will be utilized in conjunction with air quality planning efforts and regulatory activities which include:

- Supporting aspects of the air quality planning function, such as evaluating compliance with operating permits.
- Estimating air quality impacts through modeling. Related data, such as information on spatial and temporal resolution, are also used in episodic modeling.
- Determining the trends in emission levels, both historically and prospectively.
- Tracking, on a consistent basis, the three percent annual emission reduction requirement for Non-attainment pollutants.
- Assisting in the process of developing and evaluating air quality-related indicators for measuring progress in attaining ambient standards.
- Determining the effect of transportation control measures on a region's emissions.
- Distinguishing between actual versus allowable emission estimates.
- Determining emissions fees/offsets.
- Satisfying other regulatory needs, such as evaluating the effects of emission controls and meeting emissions reporting requirements.

As required by federal mandate, the DCP prepared a quality assurance program as a part of its Inventory Preparation Plan (IPP). The methodology for the preparation of the report was adopted from the EPA guidance documents and previous inventory experience. Some of the recommended techniques were tailored to accommodate this agency's specific needs.

6.2.2 Policy Statement

The following Policy Statement was submitted to EPA Region IX as part of the Las Vegas Valley Carbon Monoxide Inventory Preparation Plan.

The objective of this carbon monoxide (CO) emissions inventory is to compile an accurate and comprehensive inventory of emissions and facility data from point, area and mobile sources for the 1990 base year. To ensure that the inventory is of the highest quality, the Clark County Department of Comprehensive Planning will allocate resources to implement quality assurance procedures at strategic points during the inventory process. The DCP will follow the procedures outlined by the EPA in Guidance for the Preparation of Quality Assurance Plans for CO SIP Emission Inventories (December 1988) and Quality Review Guidelines for 1990 Base Year Emission Inventories (September,1991) .

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Jeff C. Harris
QA Coordinator

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Richard B. Holmes
Director
Clark County
Comprehensive Planning

6.3 Staff Responsibilities and Administrative Procedures

In an effort to comply with the 1990 Clean Air Act Amendments and to improve air quality, the Clark County Department of Comprehensive Planning (DCP), in coordination with the Clark County Health District, Air Pollution Control Division (CCHD APCD), has undertaken a comprehensive inventory of point, area and mobile source air pollutants. The development of a reasonable and comprehensive emission inventory requires the implementation of quality assurance and control procedures throughout the entire process. The inventory process strictly adhered to EPA guidelines for inventory documentation procedural requirements and quality assurance.

A detailed description of interdepartmental staff involved in the preparation of emission inventory is furnished in this subsection.

Jeff Harris, Coordinator, Department of Comprehensive Planning, Environmental Planning Division, served as QA Coordinator for the Las Vegas Valley area emission inventory. For the past five years with DCP, Mr. Harris has been actively involved in various air quality related projects including emission inventories, quality control and SIP preparation. Under his supervision, the department has developed direct mainframe and PC based computer capabilities to develop, access and process inventory data in a useful format.

Clete Kus, Principal Planner with the DCP, served as the inventory project manager. For approximately the past two years he has worked exclusively on air quality related issues. He has experience with mobile source pollutants, computer modeling, database design/management, emission inventory preparation and SIP documentation. Mr. Kus also provided valuable technical guidance to the inventory and QA/QC program.

Susan Ward, Emission Specialist, in the Engineering section of the APCD was responsible for inventorying stationary point and area sources. Ms. Ward has over six years of varied air quality experience. For the past two years, she has worked on facility permiting, conducting inspections, and maintaining the AIRS database. Prior to this postion, she worked as an auditor in the QA/QC section for Lockheed, a contractor of the EPA Inspector General. Ms. Ward has also conducted air quality sampling at the University of Las Vegas, Nevada, Environmental Research Center.

Yun Wu, Planner II with the DCP, was responsible for inventorying non-road and mobile source emissions. He has considerable knowledge of computers and was responsible for running the MOBILE4.1 model and for data entry to AMS PC. Additionally, he produced reports in AIRS to facilitate QA/QC procedures.

6.4 Task Planning

Resources were allocated to the QA program to ensure the development of a complete, accurate and consistent CO emission database for the Las Vegas Valley Non-attainment area. Emission inventory activities were coordinated with Clark County Health District, Air Pollution Control Division.

Task planning, as identified in the QA/QC portion of IPP, involves the following elements:

- Resource allocation and delineation of responsibilities.
- Prioritizing source of data elements.
- Personnel training.
- Schedule and project planning.
- Data sources.

These elements are discussed in the following subsections.

6.4.1 Resource Allocation and Delineation of Responsibilities

It is the responsibility of the DCP to prepare an air quality plan for improving the air quality and to attain national ambient air quality standards. Currently, three individuals work full time on air quality issues. Their efforts consist of inventory data collection, quality assurance, documentation, modeling and state implementation plan preparation.

The Clark County Health District, Air Pollution Control Division has three sub-sections. These sections with the corresponding number of employees are as follow: Engineering (5), Monitoring (7) and Enforcement (5). The responsibility for new source permitting and updating existing permits is assigned to the engineering section. Health District regulations allow permits to be updated on an annual basis; however, this time frame is generally extended. This section is also responsible for maintaining the AIRS database for Clark County as well as producing stationary and area source emission estimates, including quality control for emission inventory.

Both DCP and APCD were responsible for collecting data and information associated with the emission inventory. They were also responsible for conducting QA/QC revisions. In addition to interdepartmental reviews, the inventory is sent to the Nevada Division of Environmental Protection as a part of an external review process. Corrections to the emission database will be implemented before the emissions are used for SIP purposes.

6.4.2 Prioritizing Source and Data Elements

In order to effectively develop an inventory and to maintain QA/QC, the Department of Comprehensive Planning prioritized all data elements. This was accomplished based on a review of previous emission inventories and discussions with APCD staff members. By doing so, the larger contributing categories/sources received priority over those with relatively low emissions. Both DCP and APCD also considered elements omitted in the 1987 emission inventory to be important. These elements received priority over those which were included in previous year inventories.

Point sources of emissions are well delineated in the Las Vegas Non-attainment Area. This is attributed to previous inventories and the permitting database. The APCD and DCP discovered some deficiencies in the location and stack information for certain point sources. These data elements, required for submittal through AIRS, were obtained from the respective facility operator. The EPA procedure document (EPA 450/4-91-016) was also reviewed to identify any other possible point source omissions. All essential data previously unaccounted for was included in the 1990 base year inventory.

A significant amount of effort was dedicated to the mobile source inventory as it is the principal source of CO emissions in the Las Vegas Valley. The DCP was delegated the responsibility for calculating vehicle emissions and worked in conjunction with the Clark County Regional Transportation Commission to inventory this source.

6.4.3 Personnel Training

In order for staff to conduct an accurate and comprehensive emission inventory, DCP and APCD allocated funds for inventory and QA related training. Staff from both agencies attended numerous training sessions offered by EPA. Staff within the DCP attended the recent EPA "Workshop for Implementation of Clean Air Act Provisions Related to Ozone and Carbon Monoxide Emission Inventory" in Durham, North Carolina and in Las Vegas, Nevada. Both DCP and APCD staff attended the National AIRS Conference/Workshop in Orlando, Florida and an Emission Inventory Training Session/Workshop in Denver. These workshops, along with a continuing review of EPA guideline documents and reference material, permitted staff to inventory stationary mobile and area CO emission sources in accordance with EPA requirements.

6.4.4 Schedule and Project Planning

The Department of Comprehensive Planning and the Clark County Health District, Air Pollution Control Division jointly prepared a work program to establish a time frame for completing the inventory and QA/QC. The following chart highlights the inventory milestones and their completion dates.

Action	Date
Allocate resources for a QA program.	September 1991
Prepare checklist of CO sources to be evaluated.	January 1992
Identify critical data elements, impacts on results and utility of the inventory.	February 1992
Schedule routine checking of data entry and calculations.	February 1992
Develop audit procedures.	February 1992
Conduct standard range and missing data checks.	April 1992

Ample time was allocated to QA/QC procedures to insure the integrity of the emissions data. DCP and APCD performed internal audits on their respective inventories utilizing the following documents: Quality Review Guidelines for 1990 Base Year Emissions Inventories (EPA 450/4-91-022, September,1991), Quality Assurance Implementation Instructions and Examples for SIP Inventory Development (March, 1992), and Guidelines for the Preparation of Quality Assurance Plans for O3/CO Emission Inventories (EPA 450/4-88-023, December, 1988). Completed check-lists from these documents used in the QA/QC process are contained in Appendix E.

Prior to the use of the 1990 base year inventory for SIP development, the inventory will experience external audits by both the Nevada Division of Environmental Protection, Air Quality Section, and the U.S. EPA.

6.4.5 Data Sources

As previously mentioned, the APCD was responsible for permitting sources which emit regulated pollutants. The APCD database is updated as permits are renewed and after compliance inspections are conducted. The permit database provides information on the location of facilities, the type of operation, and pollutant emitted. This database served as the starting point to obtain activity level data for stationary sources.

In addition to the APCD database, other governmental agencies and private industry provided valuable data. They include: Clark County Regional Transportation Commission, Clark County Department of Aviation, Clark County Fire Department, U.S. Air Force (Nellis Air Force Base), U.S. Forest Service, Nevada Department of Transportation, Southwest Gas Corporation, Amtrak, and Union Pacific Railroad.

6.5 Data Collection and Handling Procedures

Data collection activities for the Las Vegas Non-attainment Area emissions inventory consisted of three major elements:

- Preliminary identification of emission sources.

- Specific collection procedures used to collect and handle emissions data from these sources.

- Performance of QA/QC tasks to ensure the completeness and reliability of the data collected, the processing of these emissions data, and the reasonableness of the resulting emissions estimates.

The following subsections present the methodology used to collect and process emissions data and develop the Las Vegas Non-attainment Area emissions inventory.

6.5.1 Identification of Emission Sources

The first activity in compiling the emission inventory was to identify all pertinent sources located within the Non-attainment area that emit CO. Identification of point sources was performed using information from:

- Permit applications
- Supplemental survey
- Southern Nevada Business Directory - 1990.

Identification of area sources was performed by reviewing:

- The post-1987 area source inventory
- EPA guidance documents
- Southern Nevada Business Directory - 1990
- Local telephone directories.

A complete checklist was prepared to ensure that all emission points within a source and all major sources impacting the Las Vegas Valley Non-attainment Area were included in the inventory.

Data collection on mobile, stationary, and area sources of emissions were implemented in accordance with the following EPA guidance documents: Emission Inventory Requirements for Carbon Monoxide State Implementation Plans (March 1991) and Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone: Volumes 1 and 2 (May 1991).

6.5.2 Data Collection Methods

Several data collection options for point and area source emissions exist. However, inventorying agencies were advised to use their discretion in selecting the method that suits them best. Point source methods include mail surveys, plant inspections, use of agency permit and compliance files and source listings. Area source methods include modified point source methods, local activity level surveys, apportioning of state and national data, per capita emission factors and emissions-per-employee factors.

To a certain extent, determining which data collection method is most appropriate to use occurs simultaneously during the data collection process as the agency experiences the success/failure of data collection. Whenever possible, both DCP and APCD attempted to determine (in the planning phase) which data collection methods would be the most appropriate. Determining in advance which methods to use allowed extra time to obtain necessary reference and support materials and allocate work hours to the individual data collection tasks.

After reviewing the above-mentioned methods, DCP decided to utilize APCD permit / compliance files and supplemental surveys to obtain information. Once preliminary data collection was completed, research was conducted to locate new stationary sources of pollution and to incorporate the data. This was made possible by utilizing the Southern Nevada Business Directory-1990 and the local yellow pages.

Data for the mobile source inventory were resolved to the Non-attainment area level. The RTC Regional Transportation Model provided all necessary information to calculate mobile source CO emissions in conjunction with MOBILE4.1 emission factors. The RTC also provided VMT estimates and speeds for roads in the Non-attainment Area which fall between the Regional

Transportation Model and the Non-attainment boundary. Nevada Department of Motor Vehicles and Public Safety registration data was used as inputs for MOBILE4.1.

6.5.3 Data Handling

Data handling responsibilities were shared by DCP and APCD. As mentioned earlier, DCP was in charge of handling mobile source emissions and APCD was in charge of both stationary and area source emissions. Separate emission databases were set up for each source utilizing AIRS AFS and AMS. Data was entered into the respective database as each category was completed.

Originally, it was anticipated that a computer file index system would be created to identify individuals responsible for changes to the emissions database; however, this system was not created. This is attributed to a number of reasons. First, the time associated with creating such a program does not yield additional benefits over a log book entry. Second, only two individuals were responsible for data entry and each were responsible for his/her assigned categories. Therefore, it is known which individual was responsible for changes to a particular category. Last, after the QA Coordinator personally verified any changes, he made the appropriate notes in the log book.

6.6 Data Analysis

Data analysis QA/QC procedures implemented by DCP included:

- Input data QA check.
- Emission estimation methodology consistency and reasonableness checks.
- Emission calculations consistency and documentation.
- Validation of emission estimates.

These procedures are discussed individually in the following subsections.

6.6.1 Input Data Quality Assurance Check

The DCP implemented several QA/QC measures to ensure that the data input to the emission data is accurate and is of the highest possible quality. Procedures have been implemented to evaluate the completeness, reasonableness, consistency, and correctness of emissions data. There are two purposes for these evaluations: first, to enable the analyst to make an informed choice between two sources of the same data, especially if the data differ significantly in some respect; and second, to allow the analyst and users of the inventory to make informed judgements about the validity of the emission estimates for a particular category.

First, AIRS AFS and AMS have QC checks that are inherent to their respective source categories. The design of the database program promotes accuracy and reduces the potential for typographical and reasonableness errors during data coding and handling. When a data entry error is made, the program communicates the problem to the user. The user must resolve the error before any more data can be entered. The following are examples of AIRS database QA/QC measures.

- Format Consistency --used to prevent entering data into the wrong field (e.g., entering a source identification number in the control equipment code field).

- Deletion Protection -- prevents deletion of data in fields that control other data field calculations.

- Accuracy Checks -- look up table is automatically invoked for data consistency (i.e., applicable state regulations per the Source Classification Codes (SCCs), percent efficiency per control device code, UTM zones, latitude/longitude coordinates, county and state codes).

- Completeness Checks -- all fields in data record must be entered before continuing to the next record.

The DCP reviewed the point source facility data to address its reasonableness and comprehensiveness. The data elements which are mandatory for inventory submittal through AIRS/AFS received the most attention. Reasonableness checks were performed on the data ranges to identify potentially incorrect data elements. The types of range checks developed included: operating schedule and throughput, equipment capacities, pollutant codes, stack and plume parameters, fuel heat content, fuel consumption, process rate, control equipment codes and efficiencies, and emission estimates.

The stationary point source category contained only one facility. All QA/QC was performed at the computer terminal utilizing QA checklists from the QA/QC documents. The mandatory AIRS data fields associated with this single facility all received QA checks. Any problems identified with these data fields were noted in the QA Coordinator’s log book.

The QA procedures implemented for the area source inventory are discussed in the following section. Mobile source QA procedures (checklists) are contained in Appendix C.

6.6.2 Emission Estimation, Methodology Consistency and Reasonableness Checks

With respect to emission estimating techniques, several options exist to calculate point and area source emissions. When more than one method is available for calculating a source's emissions, site-specific information, such as stack testing or continuous in-stack monitors, was given preference. If stack test or continuous emissions monitoring data was not available, process information for the source, such as annual coating quantities used in material balance calculations, was given priority. If site-specific emissions data was not available, emission factors were utilized in conjunction with site-specific throughput data to estimate emissions.

When emission factors were chosen as the designated estimation tool for a particular source category, all sources within that category used the same emission factor. If this was not the case, an explanation is provided clearly justifying the use of an alternative emission factor. All emission factor sources were also documented.

The emission estimation methods utilized in the point and area source inventory include:

Measurement-Derived Methods:

- Emissions based on source testing (primarily, stack testing).
- Emissions based on fuel analysis.

Estimation/Calculation Methods:

- Emissions based on material balance.
- Emissions calculated using standard emission factors.
- Emissions based on engineering calculations.
- Other (description of methodology was specified).

The DCP and APCD adopted EPA recommended approaches as the preferred emission estimation techniques for each source category. Only in instances when EPA guidance documents did not provide a particular estimation technique were other methodologies employed. With respect to structural, vehicular and brush fires, the California's Air Resource Board (CARB) document Methods for Assessing Area Source Emissions in California (September, 1991) was used.

Emission factors utilized to calculate CO emissions also received reasonableness checks. This check consisted of comparing emission factors from similar operations/sources with each other. In instances when uncertainty arose or clarification was needed, the appropriate EPA office was contacted.

6.6.3 Emissions Calculation Consistency and Documentation

Documenting the method used in calculating facility emissions estimates is a crucial aspect of a QA/QC program, particularly when these calculations are performed by a number of individuals. With respect to this inventory, only one stationary point source emits more than 100 tons per year. The emission estimate for this source was derived using the direct measurement approach. Thus, the emissions associated with this source are considered to be as accurate as possible.

For each source category included in the area source emissions inventory, the emission estimation method used was documented. A hand-calculated example showing all assumptions, unit conversions, and emissions factors used in calculating the emissions estimates for the subject source was also provided. The important point in this QA/QC step is to document calculation methods for all sources. The Appendices also provide additional information on the calculations.

The important aspect of this QA/QC step is to document calculation methods for all significant source types. Sample calculations illustrating the two general types of equations that were used to compute area source emissions are illustrated in the following examples.

The generalized equation to calculate CO emissions estimates was:

Emissions estimate = (F * SD) / (D * W)

where: F = fuel combusted (gallons or therms/year);
SD = solvent density (pounds/gallon);
D = daily activity rate (days/week); and
W = weekly activity rate (weeks/year).

The general equation used to calculate daily emissions estimates was:

$$\text{Emissions estimate} = \frac{EF * Q * SAF}{D * W}$$

where:
EF = emission factor (pounds/1000 gallons fuel or pounds/ton material);
Q = activity rate (1000 gallons fuel/year or tons material/year);
SAF = seasonal adjustment factor (dimensionless);
D = daily activity rate (days/week); and
W = weekly activity rate (weeks/year).

When seasonal adjustment factors (SAF) were applied, the following series of equations were used:

$$SAF = \frac{\text{(Peak season activity)} * 12 \text{ months}}{\text{(Annual activity)} * \text{(Peak season months)}}$$

Seasonally adjusted emissions estimates were then calculated using the following generalized formula:

$$\text{Emissions estimate} = \frac{Q * EF * SAF}{D * W}$$

where:

Q = activity rate (1000 gallons fuel/year or tons material/year);
EF = uncontrolled emission factor (lbs./1000 gals fuel, or lbs/ton material);
SAF = seasonal adjustment factor (dimensionless);
D = daily activity rate (days/week); and
W = weekly activity rate (weeks/year).

6.6.4 Validation Procedures for Emission Estimates

One of the final QA/QC checks performed in the emission inventory was the evaluation of the completeness, reasonableness, and accuracy of the emission estimates. Examples of these types of checks include evaluating whether all sources in a given source category are included and that the emission estimates are within the expected range for that source category.

The primary completeness check performed on the Las Vegas Non-attainment Area emission estimates was to evaluate if all sources emitting CO were reported in the inventory. This process included comparing the 1990 base year inventory with previous inventories, reviewing EPA guidance documents and utilizing local business directories to identify activities and facilities which cause CO emissions. As the main focus of this inventory was on CO, other pollutant types associated with these sources did not receive a significant amount of attention.

Reasonableness checks were also performed to evaluate the accuracy of the calculated emissions estimates. These checks determined whether the calculated emissions were within an acceptable range for a given source category. This was accomplished by comparing the 1990 base year estimates with those of previous years as well as with those of other Non-attainment areas.

A second reasonableness check was conducted on the area and point source emissions inventories. This check was performed to evaluate the accuracy of the source's actual emissions. Actual emissions were compared with the allowable emissions for that source. If actual emissions exceeded the allowable emissions, this fact was noted and the calculations were checked for errors.

Area source category emission estimates were validated by comparing the relative magnitude of estimated emissions with other published inventories. The area source categories were ranked according to emissions magnitude, where the largest category was assigned a rank equal to 1. If any of the source category ranks were unreasonably different than their corresponding ranks in the other published inventories, then the category emission factor and activity data were reviewed for errors.

6.7 Quality Assurance/Quality Control Audits

The final step of the QA/QC process was to perform an internal audit on the inventory. The internal audit is an opportunity to determine the effectiveness of the existing inventory preparation procedures, ensure that the procedures were followed, and provide input to improve the process.

6.7.1 Internal Audits

Internal audits were conducted by the DCP to verify the completeness and reliability of the emissions inventory data and procedures. Exhaustive quality review checklists have been developed by EPA that address two levels of review that should be performed during an audit (Quality Review Guidelines for 1990 Base Year Emission Inventories, EPA-450/4-91-022). The DCP performed inventory audits using these checklists prior to submittal of the emissions inventory. These checklists are contained in Appendix E.

6.7.2 External Audits

External audits will be performed by EPA to review the reasonableness of the emission estimates and of the QA/QC procedures. There are two stages in the inventory development process during which external audits may take place. The first is during the inventory preparation period, at which time the EPA Regional Office can review the procedures being used by a state/county. The auditors may review the IPP, which includes the QA/QC plan, with a view towards checking the inventory preparation activities against the proposed IPP and the QA/QC plan.

The second audit is after submittal of the emissions inventory to the EPA Regional Office. The purpose of such an audit is to ensure that all feasible required inventory requirements were addressed in the inventory submittal and that the information structure exists to support the data contained in the inventory.

External audit visits may include interviews with persons responsible for collecting the inventory data, assimilating the source and emissions information, calculating the emissions, and preparing the inventory reports and reviews of files/records. The purpose of the interviews is to establish that the agency has followed the procedures outlined in the QA/QC plan in preparing the inventory. The audit may include procedures to address:

- Comparison of the emissions inventory components to the specified requirements.

- Completeness of the inventory in terms of the source categories addressed.

- General quality of the inventory as determined by comparison to the QA/QC checklist.

- Necessary dis-aggregation of the inventory summary by source category to allow for evaluation of the emission estimations.

- Adequacy of supporting documentation including calculations or other emissions
- determinations.

6.7.3 Final Audit

MRI provided comments on the Draft Emission Inventory and recommended a final audit. The QA Coordinator conducted a final audition with the Emission Inventory and the Air Quality Implementation Plan.

APPENDIX A

Section Seven
Emission Inventory
Adjustments

7.1 INTRODUCTION

This section documents changes to the 1990 base year inventory presented in the previous sections. More specifically, this section contains the factors utilized to scale up the emissions to 1996 (Table 7-1). The growth factors used in the Table 7-1 are based on BRW/SAI study in 1992. The detailed information on the growth factors can be found in the document titled, Las Vegas Air Quality Implementation Plan Update, Phase II: Carbon Monoxide Modeling and Attainment Demonstrations (prepared by BRW, Inc, 1992). Table 7-2 provides Information about the projection factors as well as the horizon years 2000, 2010, and 2020 projected emissions inventories.

Table 7-1
Emissions and Inventory Adjustment Factors for the 1996 Base Year Inventory

SOURCE CATEGORIES	1990 Base Year (Tons/Year)	BEA Factor	1996 Base Year (Tons/Year)	1996 Base Year (Tons/Day)
STATIONARY POINT SOURCES				
Kerr McGee-BMI	--		87.6	0.24
Chemical Lime Co. Apex	--		299.3	0.82
Titanium Metals	10363	0.1027	1064.28	2.92
Bonanza Materials	--		102.3	0.28
James Hardie Gypsum	--		200	0.55
Southern Nevada Paving	--		202	0.55
Pabco Cogeneration	--		200	0.55
Georgia Pacific	--		227	0.62
Total Point Sources	**10363.0**		**2382.48**	**6.53**
AREA SOURCES				
Small Stationary	798	1.235	986.02	2.70
Boiler Emissions	120	1.1704	140.45	0.38
Fireplaces	773	1.0019	774.47	2.12
Structural Fires	191	1.235	235.89	0.65
Vehicular Fires	16	1.235	19.76	0.05
Brush Fires	373	1.235	460.66	1.26
Residential NG Combustion	91	1.235	112.39	0.31
Commercial NG Combustion	28	1.1704	32.77	0.09
Industrial NG Combustion	95	1.235	117.33	0.32
Electrical Utility NG	165	1.235	203.78	0.56
Cigarette Smoking	13	1.235	16.06	0.04
Total Area Sources	**2664.7**		**3101.2**	**8.5**
NON-ROAD MOBILE SOURCES				
County Airports	3788	New Estimates	13282.35	36.39
Nellis AFB	1045	1.00	1043.09	2.86
Locomotive Emissions	80.5	1.0435	83.95	0.23
Lawn and Garden Equipment	1534.2	0.85	1304.1	3.57
MC & Recreational Vehicles	1744.4	1.235	2154.33	5.9
Construction Equipment	3150.4	1.132	3566.05	9.77
Total Non-Road Sources	**11342.50**		**21433.87**	**58.73**
ON-ROAD MOBILE SOURCES	**115836.4**		**147971.00**	**405.4**
GRAND TOTAL	**140206.60**		**174888.55**	**479.13**

Table 7-2
Emissions and Inventory Adjustment Factors and Projections for the Horizon Years

SOURCE CATEGORIES	1996 Emissions (Tons/Day)	2000 Growth Factor	2000 Emissions (Tons/Day)	2010 Growth Factor	2010 Emissions (Tons/Day)	2020 Growth Factor	2020 Emissions (Tons/Day)
STATIONARY POINT SOURCES							
Kerr McGee-BMI	0.24	1.000	0.24	1.000	0.24	1.000	0.24
Chemical Lime Co. Apex	0.82	1.000	0.82	1.000	0.82	1.000	0.82
Titanium Metals	2.92	1.000	2.92	1.000	2.92	1.000	2.92
Bonanza Materials	0.28	1.000	0.28	1.000	0.28	1.000	0.28
James Hardie Gypsum	0.55	1.000	0.55	1.000	0.55	1.000	0.55
Southern Nevada Paving	0.55	1.000	0.55	1.000	0.55	1.000	0.55
Pabco Cogeneration	0.55	1.000	0.55	1.000	0.55	1.000	0.55
Georgia Pacific	0.62	1.000	0.62	1.000	0.62	1.000	0.62
Total Point Sources	**6.53**		**6.53**		**6.53**		**6.53**
AREA SOURCES							
Small Stationary	2.7	1.139	3.08	1.362	4.19	1.585	4.87
Boiler Emissions	0.38	1.139	0.43	1.362	0.59	1.585	0.69
Fireplaces	2.12	1.223	2.59	1.725	4.47	2.319	6.01
Structural Fires	0.64	1.223	0.78	1.725	1.35	2.319	1.82
Vehicular Fires	0.05	1.223	0.06	1.725	0.11	2.319	0.14
Brush Fires	1.26	1.223	1.54	1.725	2.66	2.319	3.57
Residential NG Combustion	0.31	1.088	0.34	1.233	0.42	1.350	0.46
Commercial NG Combustion	0.09	1.087	0.10	1.343	0.13	1.523	0.15
Industrial NG Combustion	0.32	1.140	0.36	1.363	0.50	1.586	0.58
Electrical Utility NG	0.56	1.126	0.63	1.315	0.83	1.505	0.95
Cigarette Smoking	0.04	1.223	0.05	1.725	0.08	2.319	0.11
Total Area Sources	**8.47**		**9.97**		**15.32**		**19.35**
NON-ROAD MOBILE SOURCES							
County Airports	36.4		40.4		55.60		77.10
Nellis AFB	2.86	1.000	2.86	1.000	2.86	1.000	2.86
Locomotive Emissions	0.23	1.000	0.23	1.000	0.23	1.000	0.23
Lawn and Garden Equipment	3.57	0.986	3.52	0.982	3.51	1.048	3.74
MC & Recreational Vehicles	5.9	0.993	5.86	1.142	6.74	1.202	7.09
Construction Equipment	9.77	0.779	7.61	0.638	6.23	0.706	6.90
Total Non-Road Sources	**58.73**		**60.48**		**75.17**		**97.92**
ON-ROAD MOBILE SOURCES*	**405.4**		**310.18**		**329.50**		**457.40**
GRAND TOTAL	**479.13**		**387.16**		**426.52**		**581.20**

* On Road Mobile Sources Emissions are based on Seasonal CO

7.2 Mobile Sources

7.2.1 Future Year VMT Estimates

The interim TRANPLAN model was used to estimate link-specific traffic volumes on the roadway network in each of the future years. TRANPLAN was exercised by the Regional Transportation Commission to produce a data-set containing link locations in the planned traffic network as well as the estimated traffic volume on each link for a typical day in the specified future year. These data were extracted and reformatted for use in the DTIM2 system. Table 7-3 shows the total daily VMT in the modeling domain for each of the future years. These estimates include the intra-zonal travel (travel within a given TAZ).

The TRANPLAN estimates, however, did not include any VMT from vehicles engaged in public transportation. It was estimated that these vehicles account for an additional 2.95% of VMT. To account for this increase in VMT, a correction was made in the form of an across-the-board adjustment to the emissions estimates generated by the DTIM2 system. It should be noted that this approach assumes that public transportation is distributed across the entire network based upon the projected traffic volumes, and that heavier public transportation volumes along specific routes were not taken into account.

Table 7-3

Daily VMT estimates in each of the TRANPLAN years.

Year	VMT (miles)	Growth relative to 1997
1997	22,327,733	0%
2001	24,776,320	11%
2010	37,718,248	69%
2020	57,152,956	156%

7.2.2 Future Year Emission Factor Estimates

Because of early plans to model years past 2020, the MOBILE5a model could not be used in the future year modeling effort. Instead, the MOBILE5b model was adopted for use in generating the mobile emission factors for the future years. Also, MOBILE5b simplifies the process of addressing I/M Technician Training and the National Low Emitting Vehicles (NLEV) programs, both of which were to be treated in these analyses. In order to be consistent with the 1996 base case, it was necessary to modify MOBILE5b to account for the off-cycle emissions component. The methodology followed exactly the procedure used in MOBILE5a; an additive offset was added independently for LDGV and LDGT, with ramps to zero below 19.6 mph and above 55 mph. Table 7-4 shows the offsets applied to each vehicle class in each of the future years.

For each future year, MOBILE5b was run using the next calendar year to accurately estimate the year-end (December) fleet. Although the current I/M and anti-tampering programs were kept in place for the future year base case scenarios, the future year MOBILE5b input files differed from the base year in two ways. First, the fuel oxygenate parameters were changed to reflect the phase out of MTBE in the fuel, with a 100% alcohol market share. Secondly, the phase in of NLEV vehicles starting in the year 2001 was implemented according to the Standard Federal LEV program. More details about Mobile5a and Mobile5b modeling exercises see Appendix C of this Plan.

Table 7-4

Emission factor offsets (g/mile) for the off-cycle emissions contribution.

	Emissions Offset (g/mi)		
Vehicle Class	2000	2010	2020
LDGV	2.480	1.088	0.728
LDGT1	2.462	1.055	0.755
LDGT2	2.644	1.639	0.788

APPENDIX A

Section Eight
Annexes

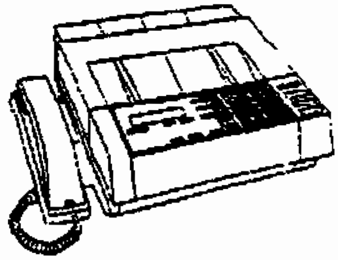
APPENDIX A

STATIONARY POINT SOURCES

COMPREHENSIVE PLANNING

TIMET.

Titanium Metals Corporation
Henderson, Nevada
FAX: (702)565-2689
PHONE: (702)564-2544



Date: 3-23-92 *Time:* 2:40p *Page* 1 *of* 2

To: APCD *Attn:* Susan Ward

From: R Allinger

Subject/Message:

FYI - Sorry so late. Please call if you have questions

Rick

SENT BY: 3-23-92 ; 2:42PM ; → CLARK CO. HEALTH:# 2/ 2
334-75342

March 23, 1992

RECEIVED
CCHD-APCD

1992 MAR 24 A 8:22

Susan Ward
APCD
Per your request

EMISSIONS INVENTORY FOR JANUARY 1 THROUGH DECEMBER 31, 1990 AND NOVEMBER 1, 1990 THROUGH FEBRUARY 28, 1991 TIMET, HENDERSON FACILITY				
PLANT AREA	NOx	SOx	VOCs	CO
Chlorination	0.04	0.04	NA	5,170*
Reduction	18.26	0.11	1.46	3.65
Magnesium Recov.	1.83	0.12	0.09	0.32
Blending/Melting	0.139	0.0008	0.011	0.027
Leaching	233.8	NA	NA	18.5
1990 Total	253.27	.271	1.56	10,362.5
NOTE: ALL VALUES REPORTED ABOVE IN TONS PER YEAR. VALUES MASS BALANCE CALCULATIONS WITH THE EXCEPTION OF CHLORINATION AND LEACHING WHICH ARE BASED ON RECENT AIR SAMPLING. CONTINUOUS MONITORING OF EMISSIONS IS NOT CARRIED OUT AT TIMET.				
Nov.'90-Feb.'91	84.4 TPY	0.09 TPY	0.52 TPY	3454.2 TPY

GENERAL: The values listed for November through February 91 are based on the yearly values reported above. Again, as TIMET does not complete continuous monitoring of emissions the numbers reported are merely estimates and should not be considered as based on measurements. TIMET recently completed stack testing of Chlorination and Leaching. The reports will be submitted to the APCD within a week or two. However, the values reported above for leaching and chlorination are based on the measurements.

*The values for Chlorination are based on 2 chlorinators in operation, noting that TIMET has the capacity to utilize 4.

Please contact Mr. Hoy Frakes or Mr. Larry Zeper for any future environmental matters as my last day with TIMET is March 27, 1992. It has been a pleasure working with you.

Richard J. Allinger
Manager, Environmental Affairs

APPENDIX B

AREA SOURCES

COMPREHENSIVE PLANNING

CLARK COUNTY HEALTH DISTRICT
P.O. BOX 4426 • 625 SHADOW LANE • LAS VEGAS, NEVADA 89127 • 702-385-1291 • FAX 702-384-5342

TO WHOM IT MAY CONCERN: January 17, 1992

The Clark County Health District Air Pollution Control Division (APCD) has the responsibility of preparing Emission Inventories of air pollutants from regulated facilities located in Clark County to the U.S. Environmental Protection Agency. The air pollutants of interest are: carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide (SOx), volatile organic chemicals (VOCs) and particulate matter (PM-10).

The emission inventory dates of interest are:

1. January 1, 1990 through December 31, 1990
 and
2. November 1, 1990 through February 28, 1991

Does your facility use any one or more of the following for energy or heating:

diesel fuel	natural gas	coal
gasoline	propane	butane
fuel oil	waste/reclaimed oil	

If so, you will emit the pollutants we are interested in. Often these combustion fuels are used for kilns, drying ovens, boilers, space heating and electrical generators (including emergency generators) among other uses.

Please complete and return to me no later than February 14, 1992, the attached survey form. Return the survey to my attention for both of the time periods of interest. If this survey does not apply to you, please indicate so and return to my attention for inventory purposes.

I will be happy to help you complete this survey, so if you have any questions/concerns, please feel free to contact me at (702) 383-1276.

Please be advised that failure to complete and return this form may result in enforcement action.

Sincerely,

Susan J. Ward

Susan J. Ward
Emission Specialist
Air Pollution Control Division

CLARK COUNTY HEALTH DISTRICT
P.O. BOX 4426 • 625 SHADOW LANE • LAS VEGAS, NEVADA 89127 • 702-385-1291 • FAX 702-384

PETROLEUM PRODUCT USAGE SURVEY

Please answer the following questionnaire as completely and accurately as possible. If you require more of the enclosed questionnaires, feel free to xerox this one, or telephone me (702-383-1276) at the Clark County Health District Air Pollution Control Division and I will send you more. Please return completed survey by February 14, 1992, to: Susan J. Ward, Clark County Health District, Air Pollution Control Division, P.O. Box 4426, Las Vegas, NV 89127.

COMPANY NAME ______________________________

COMPANY ADDRESS ______________ CITY __________ ZIP

TELEPHONE ____________ NATURE OF BUSINESS ____________

PERSON TO CONTACT ______________ TITLE ____________

*************SEE BELOW FOR ACCEPTABLE REPORTING UNITS**************

FUEL TYPE USED	AMT USED 1990	AMT USED NOV 90-FEB91

Natural Gas Units = therms, BTU, cubic feet used
Propane and Butane = pounds or gallons used
Coal = pounds or tons used
diesel and fuel oils = gallons used

THANK YOU FOR YOUR COOPERATION AND TIME.

CLARK COUNTY HEALTH DISTRICT
P.O. BOX 4426 • 625 SHADOW LANE • LAS VEGAS, NEVADA 89127 • 702-385-1291 • FAX 702-384-5342

February 12, 1992

To Whom It May Concern:

The Clark County Health District Air Pollution Control Division has the responsibility of determining the quantity of Criteria Air Pollutants released to the atmosphere from industrial and manufacturing facilities that have Operating Permits.

The emission dates of interest are: listed on survey)

1. January 1, 1990 through December 31, 1990

2. November 1, 1990 through February 28, 1991

The following are examples of the type of pollutants that the Air Pollution Control Division is interested in:

Carbon Monoxide	Nitrogen Oxides
Sulfur Oxides	Particulate Matter (solids
Lead	Volatile Organic Compounds VOC's
Acids	Air Toxics

If you produce or use any of the above, or any like them, fill out the attached form and return it to my attention. If you feel that this survey does not apply to you, call me to confirm and fill out the survey in the comment section explaining why and return it to my attention.

Please complete the attached survey form and return it to my attention at the Clark County Health District Air Pollution Control Division no later than March 6, 1992. If you require any assistance in completing the form, feel free to call me at 383-1276. I will be happy to answer your questions.

Thank you for your cooperation.

Sincerely,

CLARK COUNTY HEALTH DISTRICT

Susan J. Ward

Susan J. Ward
Emissions Specialist
Air Pollution Control Division

SJW/vm
Attachment
ws/reggie.ltr

CLARK COUNTY HEALTH DISTRICT

P.O. BOX 4426 • 625 SHADOW LANE • LAS VEGAS, NEVADA 89127 • 702-385-1291 • FAX 702-38[illegible]42

EMISSIONS INVENTORY SURVEY

Please answer the following questions as completely, thoroughly and accurately as possible. If you require more of the enclosed questionnaires, feel free to xerox this one, or telephone me (383-1276) at the Clark County Air Pollution Control Division and I will send you more. Return completed form by March 6, 1992 to: Susan J. Ward, Clark County Health District-Air Pollution Control Division; P.O. Box 4426, Las Vegas, NV 89127.

COMPANY NAME ______________________________

COMPANY ADDRESS ____________________ CITY __________ ZIP

NATURE OF BUSINESS ____________________ TELEPHONE __________

PERSON TO CONTACT ____________________ TITLE __________

************SEE BELOW FOR APPROPRIATE REPORTING UNITS*************

POLLUTANT NAME	AMOUNT IN 1990	AMOUNT IN NOV90-FEB91

COMMENTS? ______________________________

____

____

____

POLLUTANTS SHOULD BE REPORTED IN GALLONS, POUNDS, TONS OR GRAMS FOR THE INDICATED TIME PERIOD.

THANK YOU AGAIN FOR YOUR COOPERATION AND TIME.

SOUTHWEST GAS CORPORATION
SOUTHERN NEVADA – DISTRICT 21
CLARK COUNTY HEALTH DISTRICT DATA REQUEST

Description	11/90 – 2/91 Deliveries (Therms)			1990 Deliveries (Therms)		
	Sales	Transport	Total	Sales	Transport	Total
Residential	55,424,820	0	55,424,820	87,519,580	0	87,519,580
Commercial						
Small Commercial	21,634,947	0	21,634,947	44,305,981	0	44,305,981
Large Commercial	16,928,255	532,349	17,460,604	39,759,864	643,470	40,403,334
Total Commercial	38,563,202	532,349	39,095,551	84,065,845	643,470	84,709,315
Industrial	513,526	14,902,327	15,415,853	4,976,546	50,253,168	55,229,714
Power Plant	1,844,435	8,822,024	10,666,459	13,526,184	70,783,812	84,309,996
Resale [1]	236,260	4,695,613	4,931,873	1,496,020	6,348,520	7,844,540
Total Deliveries	96,582,243	28,952,313	125,534,556	191,584,175	128,028,970	319,613,145

[1] Resale load includes the following customer classes: Residential (73%), Small Commercial (20%), Large Commercial (6%), and Industrial (1%).

APPENDIX C

ON ROAD MOBILE SOURCES

COMPREHENSIVE PLANNING

Sample MOBILE 5 Run for Las Vegas

```
5       PROMPT
 Las Vegas 1996 Base Run
1       TAMFLG
1       SPDFLG
3       VMFLAG - Use Las Vegas VMT mix
3       MYMRFG
1       NEWFLG
6       IMFLAG - I/M program with TTC
1       ALHFLG
2       ATPFLG - Anti-Tampering program
2       RLFLAG - Las Vegas Vapor Recovery Program
2       LOCFLG - LAP record will appear once, in one-time data section.
1       TEMFLG - Mobile 5 will calculate the ambient temperature
4       OUTFMT - 80 Column Descriptive Format
2       PRTFLG - print exhaust CO results
1       IDLFLG - No idle emission outputs
4       NMHFLG - Total organic gasses (TOG)
3       HCFLAG - Detailed component HC printed
.735.123.067.012.019.007.027.010                       Local VMT Mix
.043 .090 .083 .077 .077 .072 .066 .045 .042 .044     LDGV
.046 .060 .053 .045 .031 .019 .018 .019 .014 .009
.009 .008 .006 .006 .018
.027 .099 .089 .080 .104 .075 .059 .037 .037 .035     LDGT1
.035 .048 .042 .032 .024 .017 .020 .018 .019 .012
.014 .010 .007 .010 .050
.008 .042 .046 .033 .054 .043 .036 .029 .030 .043     LDGT2
.036 .082 .080 .070 .059 .041 .045 .050 .042 .027
.029 .027 .022 .008 .018
.013 .045 .041 .030 .045 .040 .036 .025 .022 .020     HDGV
.035 .079 .073 .065 .049 .039 .044 .054 .040 .028
.030 .027 .017 .083 .020
.043 .090 .083 .077 .077 .072 .066 .045 .042 .044     LDDV
.046 .060 .053 .045 .031 .019 .018 .019 .014 .009
.009 .008 .006 .006 .018
.027 .099 .089 .080 .104 .075 .059 .037 .037 .035     LDDT
.035 .048 .042 .032 .024 .017 .020 .018 .019 .012
.014 .010 .007 .010 .050
.040 .144 .084 .073 .095 .098 .076 .048 .046 .033     HDDV
.038 .035 .032 .016 .013 .014 .020 .016 .019 .012
.012 .008 .006 .004 .018
.024 .056 .059 .074 .112 .098 .079 .096 .134 .098     MC
.091 .079 .000 .000 .000 .000 .000 .000 .000 .000
.000 .000 .000 .000 .000
1 1 2 1
83 20 68 99 01 01 096 2 1 2222 2222 220. 1.20 999.   2-speed test 68, incl HDGV
TECH12.D                                   I/M data file
IMDATA4.D                                  I/M data file
83 81 99 2222 21 096. 22212112                   Anti-Tampering
92 3 095 095                               RLFLAG refueling emission
          C 36. 64. 13.5 09.0 95 2 1 1     Local Area Parameter record
.240 .760 .027 .035 1                        Ether Alcohol oxyEther ox
1 96 19.6 50.0 20.6 27.3 20.6 01                Scenario description record
01 11
```

APPENDIX D

NON ROAD MOBILE SOURCES

COMPREHENSIVE PLANNING

LFA LEIGH FISHER ASSOCIATES

Consultants to Airport Management

Technical Memorandum

Air Pollutant Emissions Inventory McCarran International, North Las Vegas, and Henderson Executive Airports

Prepared for

Clark County Department of Aviation
Las Vegas, Nevada

June 1998

CONTENTS

TABLES

AIR POLLUTANT EMISSIONS INVENTORY
McCarran International, North Las Vegas,
and Henderson Executive Airports

This report documents 1997 air pollutant emissions inventories for McCarran International Airport, North Las Vegas Airport, and Henderson Executive Airport. These inventories will provide a "baseline" for the establishment of emissions budgets to be incorporated in revisions to Nevada's State Implementation Plan (SIP) for the Las Vegas metropolitan area.

The methodology and assumptions used to model emissions at each airport are described below and the emissions inventories developed for the three airports are then summarized. In addition, the assumptions used to model ground access vehicle emissions are set forth in Appendix A.

METHODOLOGY AND ASSUMPTIONS

Emissions inventories were prepared using the U.S. Air Force/Federal Aviation Administration Emissions and Dispersion Modeling System (EDMS). EDMS is the Environmental Protection Agency's preferred guideline model for air quality analyses at airports and was used to calculate emissions from the following sources:

- Aircraft
- Ground service equipment (GSE)
- Ground access vehicles (roadways and parking lots)
  Point sources, such as power and heating plants, incinerators, fuel tanks, and surface coating facilities

In addition to the EDMS analysis, particulate emissions from disturbed vacant land were calculated using factors developed by the Clark County Department of Comprehensive Planning. The methodologies and assumptions incorporated in these emissions inventories are described below.

Aircraft

Aircraft emissions are a function of the number of aircraft operations, expressed as landing and takeoff (LTO) cycles, the types of aircraft used (i.e., fleet mix), and the length of time required for aircraft taxiing. A summary of the assumptions incorporated in this analysis follows.

Aircraft LTO Cycles and Fleet Mix. The annual aircraft LTO cycles and fleet mix for each airport under consideration were obtained from the Clark County Department of Aviation and the supplemental sources noted.

- For McCarran International Airport, aircraft activity and fleet mix assumptions were based on information contained in the report *Noise Contour Update-1997/98, McCarran International Airport,* prepared by Brown-Buntin Associates, Inc. Aircraft engine types modeled for each aircraft type (airframe) were identified by Leigh Fisher Associates using (1) information obtained from Back Information Services, and (2) airline operations summaries obtained from the Clark County Department of Aviation. Table 1 summarizes annual LTO cycles by aircraft type at McCarran International Airport. As noted in Table 1, one LTO cycle consists of two operations, a landing and a takeoff.

- For North Las Vegas Airport, the number of LTO cycles was based on FAA control tower operations summaries for the airport prepared by the Clark County Department of Aviation. The aircraft fleet mix was based on information contained in the Final Environmental Assessment for proposed Runway 12L-30R and assumptions set forth in the North Las Vegas Airport Master Plan Update. The EDMS incorporates assumed, or "default," engine types for each airframe. EDMS default engine types were used for all aircraft. Table 2 summarizes aircraft LTO cycles by type at North Las Vegas Airport.

- For Henderson Executive Airport, the number of LTO cycles was based on FAA control tower operations summaries prepared by the Clark County Department of Aviation. The aircraft fleet mix was based on information contained in the *Final Environmental Assessment, Master Plan Report Recommendations, Henderson Executive Airport,* prepared by Leigh Fisher Associates. EDMS default engine types were used for all aircraft. Table 3 summarizes aircraft LTO cycles by type at Henderson Executive Airport.

Taxiing Time. The EDMS incorporates default operating times for the taxi in and out modes of operation for each aircraft type contained in the model database. For commercial aircraft, a default time of 26 minutes is assumed. For general aviation (GA) aircraft, default times of 16 minutes for piston engine aircraft and 12 minutes for turbine engine aircraft are assumed. These taxiing times include the time required to taxi to and from the runways as well as any delays encountered while the aircraft is on the ground.

To ensure that the emissions inventories did not understate taxiing emissions, taxiing times were investigated to determine if actual times exceeded default values in the EDMS. Taxiing times at each airport were investigated using the methodology described below.

Table 1

AIRCRAFT FLEET MIX AND ANNUAL LTO CYCLES— McCARRAN INTERNATIONAL AIRPORT
1997 Emissions Inventory

Aircraft type	EDMS type	Engine type	Annual LTO cycles *(a)*
Air carrier Jet			
A320	A320	V2500A-1	3,922
A320	A320-200	V2527-A5	5,791
A300/310	A300	CF6-50C	223
B727	727-200	JT8D-9	211
B727	727-200	JT8D-9A	1,261
B727	727-200	JT8D-15	6,855
B727	727-200	JT8D-17	312
B737-200	737-200	JT8D-9A	7,098
B737-200	737-200	JT8D-15	7,469
B737-200	737-200	JT8D-17	165
B737-300/400/500	737-300	CFM56-3	58,025
B737-300/400/500	737-300	CFM56-3B	12,912
B737-300/400/500	737-300	CFM56-3C1	3,655
B747	747-200	Default	157
B757	757-200	PW2037	6,285
B757	757-200	PW2040	775
B757	757-200	RB211-535C	6,026
B767	767-200	Default	3,420
DC10	DC10-30	Default	2,132
DC9	DC9-30	Default	606
L1011	L1011	Default	1,318
MD80	MD80	JT8D-2171	4,018
MD80	MD80	JT8D-219	2,533
MD80	MD90-10	MD90/V2525-D5	5
Subtotal			145,174
Air taxi/commuter			
30-50 passengers	Dash 8	PW120	10,618
19 passengers	Dash 6	PT6A-27	16,074
Multiengine piston	Aztec	TIO-540-J2B2	10,545
Subtotal			37,237
General aviation			
Business jet	Lear 25	CJ610-6	15,418
Twin engine turboprop	King Air 200	PT6A-41	10,483
Twin engine piston prop	Aztec	TIO-540-J2B2	8,326
Single engine piston prop	Cherokee 6	TIO-540-J2B2	16,341
Subtotal			50,568
Military			
Fighter/trainer	F16	F100-PW-100	3,285
Twin engine turboprop	C 130	T56-A-16	9,629
Subtotal			12,914
Total annual LTO cycles			**245,893**

LTO = Landing and takeoff.

(a) One LTO cycle equals two operations: a landing and a takeoff.

Source: Leigh Fisher Associates based on operations data provided by Brown-Buntin Associates, Inc., and airline engine type data obtained from Back Information Services.

Table 2

AIRCRAFT FLEET MIX AND ANNUAL LTO CYCLES—NORTH LAS VEGAS AIRPORT
1997 Emissions Inventory

Aircraft type	EDMS type	Engine type	Annual LTO cycles	Annual TG cycles
Itinerant operations				
Single-engine piston prop	Cherokee 6	TIO-540-J2B2	8,020 *(a)*	0
Single-engine piston prop	Cessna 150	0-200	22,370 *(a)*	0
Twin-engine piston prop	Piper Navajo	TIO-540-J2B2	6,469	0
Twin-engine turboprop	King Air 200	PT6A-41	1,038	0
Twin-engine turboprop	Dash 6	PT6A-27	1,038	0
Business jet	Lear 24	TFE-731-2-2B	998	0
Subtotal			39,933	0
Local operations				
Single-engine piston prop	Cherokee 6	TIO-540-J2B2	0	12,456 *(a)*
Single-engine piston prop	Cessna 150	0-200	0	33,626 *(a)*
Twin-engine piston prop	Piper Navajo	TIO-540-J2B2	0	9,584
Twin-engine turboprop	King Air 200	PT6A-41	0	1,722
Twin-engine turboprop	Dash 6	PT6A-27	0	0
Subtotal			0	57,388
Air taxi operations				
Single-engine piston prop	Cherokee 6	TIO-540-J2B2	1,268	0
Single engine turboprop	King Air 200 *(b)*	PT6A-41	1,887	0
Twin-engine piston prop	Piper Navajo	TIO-540-J2B2	19,001	0
Twin-engine turboprop	Dash 6	PT6A-27	14,735	0
Subtotal			36,891	0
Total annual cycles			76,824	57,388

Note: One touch-and-go (TG) operation equals two local operations.

LTO = Landing and takeoff.
TG = Touch and go.

(a) Based on information contained in the *Final Environmental Assessment, Proposed Runway 12L-30R, North Las Vegas Airport*.
(b) Modeled as King Air 200 with operations divided by 2 to adjust to single engine.

Sources: Operations data: Clark County Department of Aviation records.
Fleet mix: Leigh Fisher Associates, May 1998.

Table 3

**AIRCRAFT FLEET MIX AND ANNUAL LTO CYCLES—
HENDERSON EXECUTIVE AIRPORT**
1997 Emissions Inventory

Aircraft type	EDMS type	Engine type	Annual LTO cycles	Annual TG cycles
Air taxi				
Single-engine piston prop	Cherokee 6	TIO-540-J2B2	1,442	0
Single-engine turboprop	King Air 200 *(a)*	PT6A-41	1,997	0
Twin-engine turboprop	Dash 6	PT6A-27	5,658	0
Subtotal			9,097	0
General aviation				
Single-engine piston prop	Cherokee 6	TIO-540-J2B2	3,118	4,227
Single-engine piston prop	Cessna 150	0-200	4,401	6,127
Twin-engine piston prop	Piper Navajo	TIO-540-J2B2	1,466	1,156
Twin-engine turboprop	King Air 200	PT6A-41	473	0
Subtotal			9,458	11,510
Total annual cycles			18,555	11,510

Note: One touch-and-go (TG) operation equals two local operations.

LTO = Landing and takeoff.

(a) Modeled as King Air 200 with operations divided by 2 to adjust to single engine.

Sources: Operations Data: Clark County Department of Aviation
Fleet mix: Leigh Fisher Associates, May 1998.

For McCarran International Airport, data from the Consolidated Operations and Delay Analysis System (CODAS) were used to estimate average taxiing times for commercial aircraft. CODAS data are collected for scheduled air carriers and reflect the actual taxiing times experienced by individual aircraft. Average taxiing times for general aviation aircraft at McCarran International Airport were estimated by calculating an average taxiing distance from the west side general aviation facilities to Runways 1L-19R and 1R-19L and calculating the time required at typical taxiing speeds with typical delays to cover the distance. On the basis of these analyses, default taxiing times in the EDMS database were assumed for all aircraft.

For both North Las Vegas and Henderson Executive airports, average taxiing times for air tour operators and general aviation aircraft were estimated using a similar methodology to that used to estimate general aviation aircraft taxiing times at McCarran International Airport. On the basis of the results of taxiing time analyses, default taxiing times in the EDMS database were assumed for all aircraft at North Las Vegas Airport and Henderson Executive Airport.

Ground Service Equipment

Ground service equipment includes a wide range of vehicles that service aircraft. Examples of GSE include tugs that haul baggage carts and other equipment, fuel trucks, catering trucks and other service vehicles, and ground power units (GPUs) that provide electrical power to aircraft when they are parked. The EDMS database includes default GSE assignments for each aircraft expressed in terms of total operating times by specified type of vehicle.

For McCarran International Airport, default GSE assignments contained in the EDMS database were compared with the results of a GSE inventory conducted by the Clark County Department of Aviation in 1996. On the basis of this comparison, EDMS default assignments of equipment type were revised to reflect the proportion of equipment in the 1996 inventory (see Table 4). Because 400 MHz power is provided at all existing and planned aircraft gates at McCarran International Airport, it was also assumed that the use of aircraft power units (APUs) in 1997 was nominal; therefore, no APUs were modeled in the emissions inventory.

At North Las Vegas and Henderson Executive airports, no GSE assignments were made for general aviation aircraft. For air tour operators, it was assumed that aircraft tugs would be required.

Table 4

GROUND SERVICE EQUIPMENT—McCARRAN INTERNATIONAL AIRPORT
1997 Emissions Inventory

GSE type	Number of units: Diesel	Gasoline	Electric	Propane	Total
Air conditioner	8	1			9
Aircraft stairs	3	3			6
Air start	9	4	1		14
Belt loader	9	79			88
Bob tail		6			6
Cabin service truck	1	3			4
Cherry picker		3	1		4
Container loader	4				4
Deicer	2	4			6
Fork lift		7		5	12
Fuel tanker	2	4			6
Golf cart		4	4		8
Ground power unit	8	2			10
High lift	1	10			11
Hoist		1			1
Hydrant		28			28
Hydraulic loader	6	2			8
Lavatory truck	1	9			10
Lavatory waste		1			1
Pushback	18	10		2	30
Scrubber		1			1
Support vehicle		44			44
Tug	14	89	3	1	107
Water cart	--	--	3	--	3
Total	86	315	12	8	421

GSE = Ground service equipment.

Source: Leigh Fisher Associates, May 1998, based on responses to the 1996 GSE survey for McCarran International Airport conducted by the Clark County Department of Aviation.

Ground Access Vehicles

Ground access vehicle emissions generated on roadways and in airport parking lots and garages can be a significant source of emissions. The methodology used to model these emissions for the three emissions inventories is described below.

> For McCarran International Airport, annual average daily traffic counts for on-airport roadways and parking lots were developed by the Clark County Department of Aviation. Table 5 summarizes the average daily vehicular activity on the airport roadways and in the parking lots. Appendix A provides a detailed description of the on-airport roadway segments and associated traffic activity (see Figure A-1 and Table A-1).
>
> For North Las Vegas and Henderson Executive airports, ground access vehicle trips were calculated as shown in Tables 6 and 7, respectively. For both airports, vehicle trips associated with general aviation tenants and commercial (air tour) tenants were estimated separately.

To accurately represent conditions in the Las Vegas metropolitan area, mobile source emissions factors developed by the Regional Transportation Commission for ground access vehicles (see Table A-2) were used in lieu of the factors incorporated in the EDMS database for ground access vehicles (with the exception of oxides of sulfur). Paved road fugitive dust emissions of 3.06 grams per mile and mobile source fugitive dust emissions of 0.098 gram per mile were also incorporated into the EDMS database.

Point Sources

Point sources of emissions at airports include power generating and heating plants, incinerators, fuel storage tanks, and surface coating facilities. For the Clark County airport emissions inventories, facilities owned and controlled by the Clark County Department of Aviation were modeled in the EDMS. It was assumed that point sources not operated by the Clark County Department of Aviation but on airport property would be accounted for elsewhere in the SIP.

Tables 8, 9 and 10 present a summary of point sources at McCarran International, North Las Vegas, and Henderson Executive airports, respectively. The tables also provide information regarding the volume of fuel consumed by the various point sources at each airport.

Table 5

SUMMARY OF ACTIVITY ON MODELED ROADWAYS AND PARKING LOTS—McCARRAN INTERNATIONAL AIRPORT
1997 Emissions Inventory

Roadways

Average annual daily vehicles	Miles	Average miles traveled per vehicle	Average vehicle speed (mph)
40,750	8.33	0.97	25

Parking lots *(a)*

Lot name	Type	Daily throughput (vehicles)	Idle time (minutes)
Silver Garage	Short term	4,350	1.5
Gold Garage	Long term	1,825	1.5
Oversize Surface	Employee	4,400	1.5
West Side	Westside parking	800	1.5
Spencer	Eastside parking	3,500	1.5
West Departure	Departure curbside	11,100	2.8
East Departure	Departure curbside	2,700	2.8
Courtesy	Courtesy curbside	2,000	3.3
Taxi	Taxi curbside	5,200	3.5
Arrival	Arrival curbside	3,200	3.0

(a) Terminal curbsides were modeled as parking lots to account for dwell times reported in the *Las Vegas McCarran International Airport Curbside Traffic Simulation Study* prepared by SABRE Decision Technologies, October 3, 1996.

Source: Leigh Fisher Associates, May 1998, based on information provided by the Clark County Department of Aviation.

Table 6

ASSUMED AVERAGE DAILY TRAFFIC VOLUMES—
NORTH LAS VEGAS AIRPORT
1997 Emissions Inventory

Average daily air tour passengers *(a)*	789
Average daily aircraft operations *(a)*	746
Vehicle trip ends per day:	
Generated by air tour passengers	
Air tour 1 *(b)*	105
Air tour 2 *(c)*	19
Total	124
Generated by aircraft operations *(d)*	1,932
Total daily vehicle trips	2,056

Note: Load factors and bus capacities based on information obtained from air tour operators.

(a) Provided by Clark County Department of Aviation.
(b) Air tour 1 was assumed to consist of 75% of total daily passengers in 1997. Assuming 15 seats per bus with 75% load factor.
(c) Air tour 2 was assumed to consist of 25% of total daily passengers in 1997. Assuming 30 seats per bus with 70% load factor.
(d) Using a ratio of 2.59 vehicle trip ends per aircraft operation based on Institute of Transportation Engineers, *Trip Generation Manual, Fifth Edition.*

Source: Leigh Fisher Associates, May 1998, except as noted.

Table 7

ASSUMED AVERAGE DAILY TRAFFIC VOLUMES—
HENDERSON EXECUTIVE AIRPORT
1997 Emissions Inventory

Average daily air tour passengers *(a)*	261
Average daily aircraft operations *(a)*	176
Vehicle trip ends per day:	
Generated by air tour passengers	
Air tour 1 *(b)*	12
Air tour 2 *(c)*	14
Total	26
Generated by aircraft operations *(d)*	457
Total daily vehicle trips	483

(a) Provided by Clark County Department of Aviation.
(b) Air tour 1 was assumed to consist of 20% of total daily passengers in 1997. Assuming 15 seats per bus with 60% load factor.
(c) Air tour 2 was assumed to consist of 80% of total daily passengers in 1997. Assuming 50 seats per bus with 60% load factor.
(d) Using a ratio of 2.59 vehicle trip ends per aircraft operation based on Institute of Transportation Engineers, *Trip Generation Manual, Fifth Edition*.

Source: Leigh Fisher Associates, May 1998, except as noted.

Table 8

POINT SOURCE EMISSIONS DATA—McCARRAN INTERNATIONAL AIRPORT
1997 Emissions Inventory

Source	Type	Tank capacity (gallons)	Annual gallons used
Charter/International Terminal generator	Diesel fuel	700	259
North Finger generator	Diesel fuel	600	222
Bridge Area generator	Diesel fuel	1,000	370
Rotunda Main Terminal generator	Diesel fuel	1,000	370
Heating and refrigeration plant	Diesel fuel	12,000	4,444
Heating and refrigeration plant	Diesel fuel	12,000	4,444
Clark County Fire Department Station 13	Diesel fuel	2,000	741
Clark County Fire Department Station 13	Diesel fuel	500	185
Clark County Fire Department Station 13	Waste oil	500	n.a.
South Finger generator	Diesel fuel	6,000	2,222
Satellite 1 generator	Diesel fuel	1,500	556
East Airfield lighting vault generator	Diesel fuel	500	185
Department of Aviation shop	Diesel fuel	6,000	20,000
Department of Aviation shop	Unleaded gasoline	10,000	195,000
Surface coating facility degreasers	Solvents	30	1,900
Paint booth	Enamels	n.a.	24
Paint booth	Lacquer	n.a.	24
Paint booth	Cleaning solvent	n.a.	3
Paint booth	Primer	n.a.	12

n.a.= Not available.

Source: Clark County Department of Aviation, May 1998.

Table 9

POINT SOURCE EMISSIONS DATA—NORTH LAS VEGAS AIRPORT
1997 Emissions Inventory

Source	Type	Tank capacity (gallons)	Annual gallons used
Light trailer generator	Diesel fuel	n.a.	100
ATCT emergency backup generator	Diesel fuel	n.a.	400
80 Octane fuel truck	Gasoline	2,000	31,232
Jet A tank # 1	Jet A fuel	2,000	460,095
Jet A tank # 2	Jet A fuel	2,000	87,571
Jet A tank # 3	Jet A fuel	2,000	1,038,457
Low lead fuel truck	Avgas	1,200	394,631
Low lead fuel truck # 2	Avgas	2,000	100,500
Low lead fuel truck # 3	Avgas	2,000	308,196
Low lead fuel truck #4	Avgas	2,000	92,965
Low lead fuel truck #5	Avgas	2,000	81,115
Low lead fuel tank	Avgas	2,000	1,049,122
Low lead fuel tank #2	Avgas	2,000	1,049,122
Unleaded tank	Gasoline	600	11,367

ATCT = Airport traffic control tower.
n.a. = Not available.

Source: Clark County Department of Aviation, May 1998.

Table 10

POINT SOURCE EMISSIONS DATA—HENDERSON EXEUCTIVE AIRPORT
1997 Emissions Inventory

Source	Type	Tank capacity (gallons)	Annual Gallons Used
Jet A tank #1	Jet A fuel	10,000	476,564
Jet A tank #2	Jet A fuel	10,000	476,564
Avgas tank #1	Avgas	10,000	95,141
Avgas tank #2	Avgas	12,000	255,223
Gasoline storage tank	Gasoline	600	5,633

Source: Clark County Deparment of Aviation, May 1998.

Disturbed Vacant Land

Land that has been cleared or disturbed by construction activity is a source of particulate matter as a result of wind erosion. In the 1995 PM-10 SIP prepared by the Clark County Department of Comprehensive Planning, a factor 0.4472 ton per year for each acre of disturbed land was applied to determine PM-10 emissions caused by wind erosion in the Las Vegas Valley airshed. As small particles reflected in the PM-10 metric can be removed by wind erosion over time, County staff further assumed that approximately 50% of the vacant acreage in the airshed retained a significant reservoir of PM-10.

For the current emissions inventories, total vacant land (in acres) at each airport was estimated by the Clark County Department of Aviation using a geographic information system (GIS). Estimates of annual PM-10 generation per acre were then applied.

EMISSIONS INVENTORIES

The EDMS was used to calculate annual emissions of five pollutants: carbon monoxide (CO), hydrocarbons (HC), oxides of nitrogen (NOx), oxides of sulfur (SOx), and particulate matter less than 10 microns in diameter (PM-10). As noted earlier, PM-10 emissions for vacant disturbed land (on-airport) were also calculated using factors developed by the Clark County Department of Comprehensive Planning. These additional PM-10 emissions were then added into the 1997 baseline inventory tables.

Tables 11, 12, and 13 summarize the emissions inventories conducted for McCarran International, North Las Vegas, and Henderson Executive airports, respectively. As shown in the tables, emissions at the three airports are predominantly a result of aircraft and GSE activity. The primary source of PM-10 emissions was disturbed vacant land at each of the three airports. As noted earlier, ground access vehicle emissions in these inventories address only on-airport roadways and parking facilities. A summary of the 1997 emissions for all three Clark County Department of Aviation airports follows.

Pollutant	Tons per year
CO	13,999.71
HC	901.66
NOx	2,193.16
SOx	109.53
PM-10	513.59

Table 11

McCARRAN INTERNATIONAL AIRPORT RELATED EMISSIONS
1997 Emissions Inventory

Source	Pollutant emissions (tons per year)				
	CO	HC	NOx	SOx	PM-10
Aircraft	4,226.33	539.52	1928.19	97.28	0.00
GSE	5,520.30	156.46	169.44	7.50	3.90
Roadways	234.12	30.60	34.00	1.82	50.27
Parking lots	196.76	26.99	9.96	0.43	8.89
Stationary sources	0.71	6.67	3.28	0.22	0.23
Disturbed vacant land *(a)*	--	--	--	--	237.00
Total	10,178.22	760.24	2,144.87	107.25	300.29

CO = Carbon monoxide
GSE = Ground service equipment
HC = Hydrocarbons
NOx = Oxides of nitrogen
PM-10 = Particulate matter less than 10 microns in diameter
SOx = Oxides of sulfur

(a) Provided by the Clark County Department of Aviation.

Source: Leigh Fisher Associates, May 1998, except as noted.

Table 12

NORTH LAS VEGAS AIRPORT RELATED EMISSIONS
1997 Emissions Inventory

Source	Pollutant emissions (tons per year)				
	CO	HC	NOx	SOx	PM-10
Aircraft	2,827.93	86.68	18.95	1.02	0.00
GSE	393.50	8.81	24.94	0.86	1.07
Roadways	3.21	0.42	0.45	0.02	0.67
Parking lots	5.71	0.82	0.22	0.01	0.07
Stationary sources	0.03	13.61	0.12	0.01	0.01
Disturbed vacant land *(a)*	--	--	--	--	125.00
Total	3,230.38	110.34	44.68	1.92	126.82

CO = Carbon monoxide
GSE = Ground service equipment
HC = Hydrocarbons
NOx = Oxides of nitrogen
PM-10 = Particulate matter less than 10 microns in diameter
SOx = Oxides of sulfur

(a) Provided by the Clark County Department of Aviation.

Source: Leigh Fisher Associates, May 1998, except as noted.

Table 13

HENDERSON EXECUTIVE AIRPORT RELATED EMISSIONS
1997 Emissions Inventory

Source	Pollutant emissions (tons per year)				
	CO	HC	NOx	SOx	PM-10
Aircraft	571.98	28.95	2.98	0.32	0.00
GSE	15.57	0.26	0.26	0.02	0.00
Roadways	1.96	0.26	0.29	0.02	0.44
Parking lots	1.62	0.05	0.07	0.00	0.05
Stationary sources	0.00	1.57	0.00	0.00	0.00
Disturbed vacant land *(a)*	–	–	–	–	86.00
Total	591.13	31.09	3.60	0.36	86.49

CO = Carbon monoxide
GSE = Ground service equipment
HC = Hydrocarbons
NOx = Oxides of nitrogen
PM-10 = Particulate matter less than 10 microns in diameter
SOx = Oxides of sulfur

(a) Clark County Department of Aviation.

Source: Leigh Fisher Associates, May 1998, except as noted.

Appendix A

ASSUMPTIONS USED TO MODEL GROUND ACCESS VEHICLE EMISSIONS

This appendix provides a description of the assumptions used to model ground access vehicle emissions at McCarran International Airport. Factors used in modeling motor vehicle emissions related to ground access at McCarran International Airport, North Las Vegas Airport, and Henderson Executive Airport are also described.

ASSUMED ROAD NETWORK—MCCARRAN INTERNATIONAL AIRPORT

Figure A-1 depicts terminal area roadway segments at McCarran International Airport modeled for the 1997 emissions inventory. Table A-1 presents detailed information regarding each roadway segment modeled in EDMS including: segment length, assumed annual traffic volume, assumed annual daily traffic volume, and assumed vehicle speed. As noted in Table 1, roadway segments 32, 52, 53, 54, and 56 were modeled as parking lots in the EDMS to account for vehicle dwell time at the terminal curbsides.

Vehicle trips to the west side of the Airport by general aviation tenants and customers, and cargo vehicle trips on Spencer Road (east side of the airfield) were also modelled in EDMS. General aviation and cargo vehicle trips were modeled on roadway segments 82 and 83, respectively.

Airport-related traffic beyond the boundaries of McCarran International Airport was not modeled in the 1997 emissions inventory. For the purposes of the inventory, it was assumed that Airport-related traffic offsite would be accounted for elsewhere in the SIP.

Motor Vehicle Emissions Factors

Table A-2 presents motor vehicle emissions factors for the Las Vegas metropolitan area for three pollutants: carbon monoxide (CO), hydrocarbons (HC), and oxides of nitrogen (NOx). To be consistent with motor vehicle emissions modeling conducted by the Regional Transportation Commission for the Las Vegas metropolitan area, these factors were used instead of default emissions factors contained in the EDMS database to model all ground access vehicle emissions.

LEGEND

54 — Roadway segments modeled using the Emissions and Dispersion Modeling System

55 — Roadway segments modeled using the Emissions and Dispersion Modeling System, modeled as parking lots to account for dwell time at the curbside

N

2,000 0 2,000 4,000

Graphic Scale in Feet

Source: Leigh Fisher Associates, May 1998, based on data provided by the Clark County Department of Aviation.

Figure A-1

MODELED TERMINAL AREA ROADWAY SEGMENTS

1997 Emissions Inventory
McCarran International Airport
June 1998

LFA

Table A-1

MODELED TERMINAL AREA ROADWAY SEGMENTS
1997 Emissions Inventory
McCarran International Airport

Segment number *(a)*	Segment length (miles)	Annual traffic volume	Average daily traffic volume	Vehicle speed (mph)
1	0.08	365,000	1,000	20
2	0.36	365,000	1,000	20
3	0.08	1,788,500	4,900	20
4	0.09	803,000	2,200	20
5	0.09	803,000	2,200	20
6	0.13	803,000	2,200	20
7	0.04	803,000	2,200	20
8	0.13	803,000	2,200	20
10	0.08	803,000	2,200	20
11	0.04	803,000	2,200	20
12	0.10	985,500	2,700	20
13	0.06	985,500	2,700	20
14	0.12	985,500	2,700	20
15	0.06	985,500	2,700	10
16	0.05	985,500	2,700	10
17	0.15	2,956,500	8,100	20
18	0.02	1,788,500	4,900	20
19	0.10	1,095,000	3,000	30
20	0.12	693,500	1,900	30
21	0.13	6,898,500	18,900	30
22	0.05	5,365,500	14,700	30
23	0.10	153,300	420	30
24	0.10	1,533,000	4,200	30
25	0.09	9,709,000	26,600	30
26	0.08	2,263,000	6,200	30
27	0.07	4,964,000	13,600	30
28	0.02	3,650,000	10,000	30
29	0.15	5,584,500	15,300	30
30	0.12	3,403,625	9,325	30
31	0.03	3,403,625	9,325	30
32 *(b)*	0.18	--	--	--
33	0.12	666,125	1,825	15
34	0.12	1,168,000	3,200	15
35	0.04	1,606,000	4,400	20

Table A-1 *(page 2 of 3)*
MODELED TERMINAL AREA ROADWAY SEGMENTS
1997 Emissions Inventory
McCarran International Airport

Segment number *(a)*	Segment length (miles)	Annual traffic volume	Average daily traffic volume	Vehicle speed (mph)
36	0.15	1,587,750	4,350	15
37	0.05	3,358,000	9,200	20
38	0.02	693,500	1,900	15
39	0.14	1,587,750	4,350	15
40	0.03	5,721,375	15,675	20
41	0.04	6,086,375	16,675	25
42	0.03	3,951,125	10,825	30
43	0.05	1,204,500	3,300	30
44	0.19	2,746,625	7,525	30
45	0.25	2,135,250	5,850	30
46	0.20	2,609,750	7,150	30
47	0.06	5,476,750	15,005	30
48	0.09	365,000	1,000	20
49	0.02	8,066,500	22,100	30
50	0.04	8,431,500	23,100	30
51	0.08	7,665,000	21,000	25
52 *(b)*	0.24	--	--	--
53 *(b)*	0.24	--	--	--
54 *(b)*	0.21	--	--	--
55	0.05	2,628,000	7,200	15
56 *(b)*	0.21	--	--	--
57	0.02	5,037,000	13,800	15
58	0.06	5,767,000	15,800	20
59	0.03	182,500	500	20
60	0.05	1,898,000	5,200	20
61	0.03	1,898,000	5,200	20
62	0.05	2,664,500	7,300	20
63	0.02	766,500	2,100	20
64	0.33	766,500	2,100	20
65	0.23	2,080,500	5,700	30
66	0.07	2,080,500	5,700	30
67	0.02	777,450	2,130	30
68	0.03	1,303,050	3,570	30
69	0.06	1,554,900	4,260	20
70	0.03	777,450	2,130	20

Table A-1 *(page 3 of 3)*
MODELED TERMINAL AREA ROADWAY SEGMENTS
1997 Emissions Inventory
McCarran International Airport

Segment number *(a)*	Segment length (miles)	Annual traffic volume	Average daily traffic volume	Vehicle speed (mph)
71	0.06	2,080,500	5,700	20
72	0.09	730,000	2,000	30
73	0.06	1,715,500	4,700	30
74	0.08	365,000	1,000	25
75	0.06	2,737,500	7,500	25
76	0.04	2,445,500	6,700	30
77	0.08	2,965,625	8,125	15
78	0.19	693,500	1,900	15
79	0.09	2,272,125	6,225	20
80	0.15	1,606,000	4,400	20
81	0.08	666,125	1,825	20
82 *(c)*	0.258	292,000	800	20
83 *(c)*	0.365	1,277,500	3,500	20

mph = miles per hour.

(a) See Figure A-1.
(b) Roadway segments 32, 52, 53, 54, and 56 modeled as parking lots to account for dwell time at the curbside.
(c) Not shown on Figure A-1.

Source: Leigh Fisher Associates, May 1998, based on traffic volumes and roadway segments provided by the Clark County Department of Aviation.

Table A-2

MOTOR VEHICLE EMISSIONS FACTORS
1997 Emissions Inventory
Las Vegas Metropolitan Area

Speed (mph)	Emissions factors (grams per mile)		
	CO	HC	NOx
2.5	96.26	14.02	3.12
5.0	52.52	6.71	2.61
7.5	37.20	4.62	2.41
10.0	29.40	3.70	2.29
12.5	24.70	3.14	2.22
15.0	21.56	2.74	2.16
17.5	19.30	2.45	2.12
20.0	17.51	2.21	2.10
22.5	15.67	2.02	2.11
25.0	14.20	1.86	2.13
27.5	12.98	1.73	2.14
30.0	11.97	1.62	2.15
32.5	11.11	1.53	2.16
35.0	10.38	1.45	2.18

CO = Carbon monoxide
HC = Hydrocarbons
mph = miles per hour
NOx = Oxides of nitrogen

Source: Regional Transportation Commission, 1998.

DEPARTMENT OF THE AIR FORCE
554TH MEDICAL GROUP (TAC)
NELLIS AIR FORCE BASE NV 89191-5300

FROM: SGPB (652-3316) FEB 26 1992

SUBJ: Air Pollution Information for Calendar Year 1990

TO: Clark County Health District (Mr. George M. Ellyson)

1. Enclosed is our calculation of the carbon monoxide pollution contribution to the Las Vegas Valley for calendar year 1990 due to aircraft activity at Nellis AFB. You are welcome to use this information in calculating your emission inventory. Please alert us if your estimate is significantly different than ours.

2. If you have any questions or comments please contact Lt Karen Fruin at 652-3316.

HARRY F. LAWS II, Col, USAF, MC, FS
Commander

1990 current ACFLT data

CY90 AIRCRAFT FLIGHT OPERATIONS

CARBON MONOXIDE EMISSIONS

57 FIGHTER WEAPONS WING

AIRCRAFT TYPE	NUMBER OF SORTIES FLOWN (LTO/Yr)	NUMBER OF TOUCH & GO'S AND MISSED/LOW APPROACHES FLOWN (LTO/Yr)	SUM OF AVERAGE TAXI-OUT & TAXI-IN TIMES (Minutes)	AVERAGE QUEUE TIME (Minutes)	SUM OF AVERAGE ARM AND DE-ARM TIMES (Minutes)	IDLE FUEL FLOW, SINGLE ENGINE (Kg/Sec)	TAXI & QUEUE CARBON MONOXIDE EMISSION FACTOR (g/Kg Fuel)	TAXI & QUEUE CARBON MONOXIDE EMISSION RATE (Kg/LTO Cycle)	LTO CARBON MONOXIDE EMISSION RATE (EXCLUDING TAXI TIME) (Kg/LTO Cycle)	CARBON MONOXIDE EMISSIONS (Metric Tons/Yr)
A-10	3,012		30	4	8	0.049	212.00	26.18	11.12	112.34
F-5	0		30	4		0.057	356.00	41.40	15.80	0.00
F-15	4,208		30	4	8	0.179	48.00	21.65	6.62	118.97
F-16	11,806		30	4	8	0.179	24.00	10.83	7.77	219.54
SUBTOTAL	19,026	0							SUBTOTAL	450.85

MAC CONTRACT OPERATIONS

AIRCRAFT TYPE	NUMBER OF SORTIES FLOWN (LTO/Yr)	NUMBER OF TOUCH & GO'S AND MISSED/LOW APPROACHES FLOWN (LTO/Yr)	SUM OF AVERAGE TAXI-OUT & TAXI-IN TIMES (Minutes)	AVERAGE QUEUE TIME (Minutes)	SUM OF AVERAGE ARM AND DE-ARM TIMES (Minutes)	IDLE FUEL FLOW, SINGLE ENGINE (Kg/Sec)	TAXI & QUEUE CARBON MONOXIDE EMISSION FACTOR (g/Kg Fuel)	TAXI & QUEUE CARBON MONOXIDE EMISSION RATE (Kg/LTO Cycle)	LTO CARBON MONOXIDE EMISSION RATE (EXCLUDING TAXI TIME) (Kg/LTO Cycle)	CARBON MONOXIDE EMISSIONS (Metric Tons/Yr)
B727	3900		15			0.145	102.03	13.31	26.27	154.36
B737						0.145	68.02	0.00	17.51	0.00
SUBTOTAL	3900	0							SUBTOTAL	154.36

4440 TACTICAL FIGHTER TRAINING GROUP FLAG1

AIRCRAFT TYPE	NUMBER OF SORTIES FLOWN (LTO/Yr)	NUMBER OF TOUCH GO'S MISSED/LOW APPROACHES FLOWN (LTO/Yr)	OF AVERAGE TAXI-OUT TAXI IN TIMES (Minutes)	AVERAGE QUEUE TIME (Minutes)	OF AVERAGE DE-ARM TIMES (Minutes)	IDLE FUEL FLOW SINGLE ENGINE (Kg/Sec)	TAXI QUEUE CARBON MONOXIDE EMISSION FACTOR (g/Kg Fuel)	TAXI QUEUE CARBON MONOXIDE EMISSION RATE (Kg/LTO Cycle)	CARBON MONOXIDE EMISSION RATE (EXCLUDING TAXI TIME) (Kg/LTO Cycle)	CARBON MONOXIDE EMISSIONS (Metric Tons/Yr)
A-4J			20		10		85.20	17.		00
OA-4M			20		10	0.104	55.60	12.80	10.5	0.00
EA-6A,B	30		20			0.095	124.20	24.78	4.31	0.87
	65		20			0.127	119.00	31.74	18.71	3.28
A-7D,			20		10	0.127	119.90	31.74	18.71	6.71
A-7E			20		10	0.127	119.00	31.74	18.71	0.00
A-10,OA-10			20		10	0.049	212.00	21.81	11.12	29.74
A-10A			20		10	0.049	212.90	21.81	11.12	
A-10E			20		10	0.049	212.00	21.81	11.12	0.00
OA-37B			20		10	0.029	258.60	15.71	21.40	0.00
* B1B			20		10	.175		0.00		0.00
[illegible]2G	90		20		10	0.124	624.00	162.49	90	26.49
[illegible]2H	72		20		10	0.134	744.00	209.34	84.60	21.17
[illegible]111A	56		20		10	0.119	106.00	26.49	11.90	2.15
C-5			20		10	0.143	260.00	80.40	33.60	0.00
AC-130			20			0.091	128.00	24.46	9.00	0.00
AC-130E			20		10		128.00	24.46	9.60	0.00
C-[illegible]	91		20		10		128.00	24.46	9.00	3.00
C-130A			20		10		128.00	24.46	9.00	0.00
C-130E			20			0.091	128.00	24.46	9.00	0.00
C-130E			20		10	0.091	128.00	24.46	9.00	2.17
C-130H	4[illegible]		20		10	0.091	128.00	24.46	9.00	1.41
C-130K			20		10	0.091	128.00	24.46	9.00	0.00
CC-130			20			0.091	128.00	24.46		0.87
EC-130	62		20			0.091	128.00	24.46	9.00	2.07
EC-130E	42		20		10	0.091	128.00	24.46	9.00	1.41
EC-130H			20			0.091	126.00	24.46	9.00	0.00
MC-130H,N			20		10	0.091	128.00	24.46	3.38	0.00
KC-130E			20			0.091	128.00	24.46	9.00	0.00
MC-130			20		10	0.091	128.00	24.46	9.00	0.27
MC-130E			20		10	0.091	128.00	24.46	9.00	0.00
KC-135 ,A	53		20		10	.124	312.00	24	65.90	7.00
92-135			20			.134	372.00	104.60	42.30	4.56
,B			20		10		372.00	104.60	42.30	11.02
C-160			20		10			0.00		0.00
			20		10	.011	942.60	21	1.69	0.00
[illegible]-2C						.011	942.60	77	1.69	0.00
[illegible]			20		10		372.00	104.60	42.30	16.61
[illegible]			20		10		372.00	104.60	42.30	4.70
[illegible]			20		10	0.134	372.00	104.60	42.30	0.00
F-4C,D			20			0.142	114.00	33.99	10.80	0.00

F-4E,G,T	715		20	5	10	0.134	132.00	37.14	10.00	[illegible]
RF-4 B,C,T	290		20	5	10	0.142	114.00	33.99	10.88	[illegible]
F-5E	0		20	5	10	0.057	356.00	42.61	15.80	0.00
CF-5			20	5	10	0.057	356.00	42.61	15.80	0.00
F-14	0		20	5	10	0.125	125.80	33.02	19.11	0.00
F-14A	0		20	5	10	0.125	125.80	33.02	19.11	0.00
F-15	46		20	5	10	0.179	48.00	18.04	6.62	1.13
F-15A,B	1043		20	5	10	0.179	48.00	18.04	6.62	25.72
F-15C,E	1512		20	5	10	0.179	48.00	18.04	6.62	37.29
F-16,F-1	1120		20	5	10	0.179	24.00	9.02	7.77	18.81
F-16A,C	2079		20	5	10	0.179	24.00	9.02	7.77	34.91
FA-18	90		20	5	10	0.125	125.80	33.02	19.11	4.69
F-105			20	5	10	0.200	62.00	26.04	8.10	0.00
F-106A			20	5	10	0.196	86.00	35.40	14.33	0.00
F-111 ,A	112		20	5	10	0.119	96.00	23.99	9.40	3.74
F-111C	0		20	5	10	0.119	96.00	23.99	9.40	0.00
F-111D,F	175		20	5	10	0.119	96.00	23.99	9.40	5.84
F-111E	203		20	5	10	0.119	96.00	23.99	9.40	6.78
EF-111	0		20	5	10	0.119	96.00	23.99	9.40	0.00
EF-111A	301		20	5	10	0.119	96.00	23.99	9.40	10.05
EF-111M			20	5	10	0.119	96.00	23.99	9.40	0.00
O-2A			20	5	10	0.004	1696.00	14.25	20.44	0.00
AV-8B,C	0		20	5	10	0.042	30.16	2.66		0.00
OV-10 ,A	129		20	5	10	0.031	47.60	3.10	2.38	0.71
P-3C	0		20	5	10	0.091	128.00	24.46	3.38	[illegible]
S-2C			20	5	10	0.011	942.60	21.77	1.69	[illegible]
S-3A			20	5	10	0.049	212.00	21.81	11.12	[illegible]
T-38	0		20	5	10	0.057	356.00	42.61	15.80	0.00
U-2, TR-1			20	5	10			0.00	--	0.00
AH-1,S	0		20	5	10	0.017	28.10	1.00	0.20	0.00
EH-1X			20	5	10	0.017	28.10	1.00	0.20	0.00
HH-1H			20	5	10	0.017	28.10	1.00	0.20	0.00
UH-1N	0		20	5	10	0.017	28.10	1.00	0.20	0.00
CH-3			20	5	10	0.017	336.80	12.02	3.51	0.00
HH-3			20	5	10	0.017	336.80	12.02	3.51	0.00
OH-6A			20	5	10			0.00		0.00
CH-47D			20	5	10			0.00		0.00
HH-53	0		20	5	10	0.033	102.00	7.07	1.45	0.00
OH-58			20	5	10			0.00		0.00
UH-60	0		20	5	10			0.00		0.00
Lear Jet	0		20	5	10	0.023	122.78	5.93	2.93	0.00
Harrier			20	5	10	0.042	30.16	2.66		0.00
Jaguar	163		20	5	10			0.00		0.00
Tornado	340		20	5	10			0.00		0.00
SUBTOTAL	10386	0							SUBTOTAL	342.77
TOTAL:	33312	0							TOTAL	947.98

337.9 [illegible]

1045.[illegible]

144 43 25

91 DAYS PER SEASON

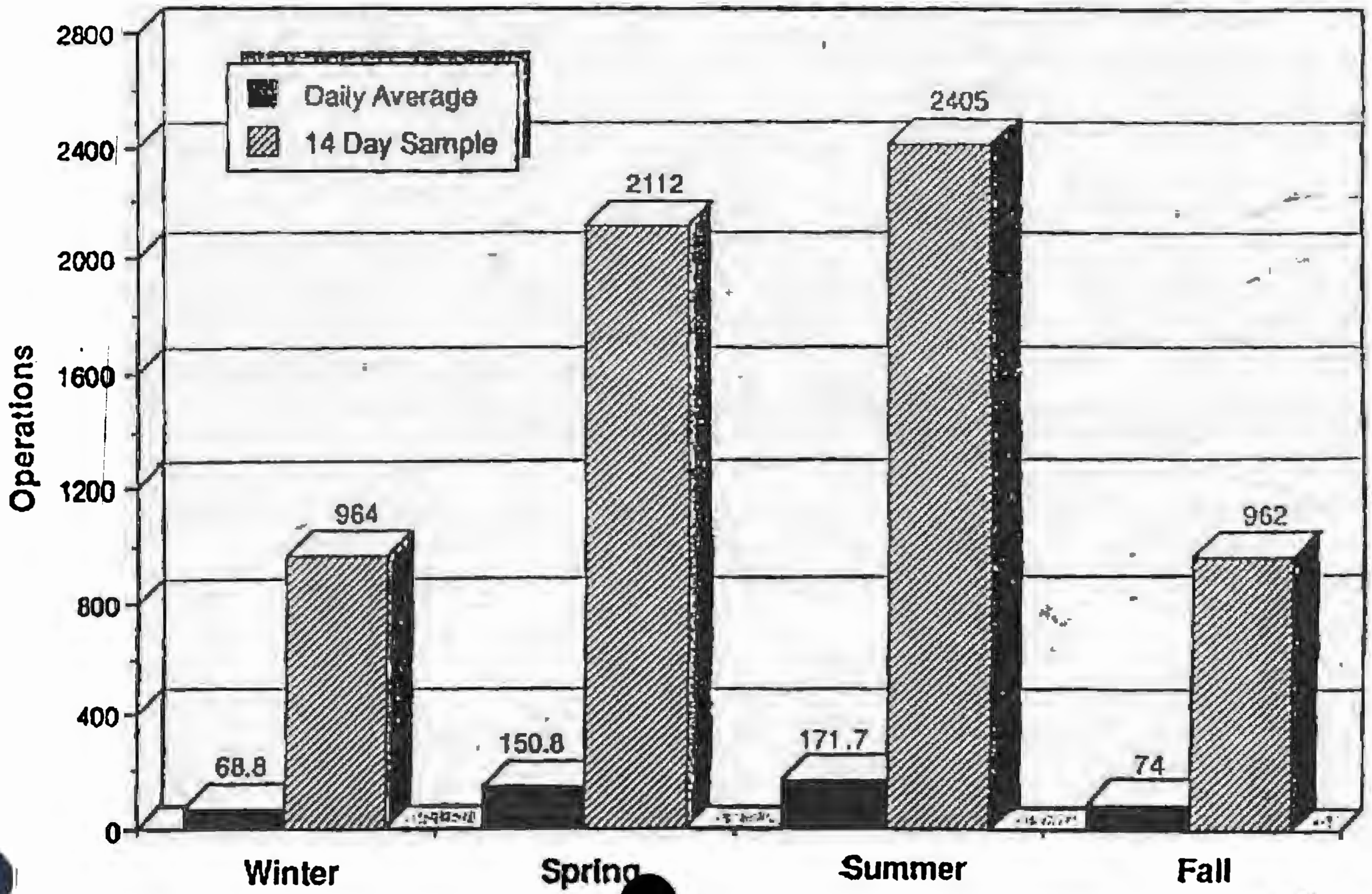
AIRCRAFT ACTIVITY COUNTER SUMMARIES

WINTER 68.8 x 91 = 6261
SPRING 150.8 x 91 = 13,723
[illegible]R 171.7 x 91 = 15,625
FALL 74 x 91 = 6,734
42,343 LTOs

ASSUME
20% [illegible] AIRCRAFT
80% LIGHT SINGLE ENGINE AIRCRAFT

APR 17 '92 12:39

Henderson - Sky Harbor



27.92 04:46PM P02

CALCULATION OF NEVADA LOCOMOTIVE MILEAGE/FUEL CONSUMPTION – CALENDAR YEAR 1990

Train	Freq	# of Trains	# of Locos	# of Cars	O-D Miles	NV Train Miles	Gallons Consumed Per TM	NV Gallons Consumed	NV Loco Miles
CALIFORNIA ZEPHYR	365	2	2	9	461	336,530	3.34	1,124,010	673,060
DESERT WIND	365	2	2	5	197	143,810	2.30	330,763	287,620
NEVADA TOTALS								1,454,773	960,680

Train Mile

Trip length in Nevada

mostly F40PH, but an occassional Dash 8 P32BH. Both of 3200 HP. fuel consumption about equal.

D:SMV52 F:\LOCOMILE\NV

APPENDIX E

QUALITY ASSURANCE / QUALITY CONTROL

COMPREHENSIVE PLANNING

FORM B-1. IDENTIFICATION OF RESPONSIBLE AGENCIES AND SPECIFICATION OF GEOGRAPHIC SCOPE

1.1 AGENCY SUBMITTING THE INVENTORY

Name Clark County Health District - Air Pollution Control Div.

Address P.O. Box 4426
Las Vegas, NV 89127

Telephone (702) 383-1276

CONTACT PERSON

Primary - Name Susan J. Ward
Title Emissions Specialist
Telephone (702) 383-1276

Secondary - Name Mike Ellyson
Title Environmental Health Analyst
Telephone (702) 383-1276

1.2 INVENTORY PREPARATION AGENCY

Name CCHD - Air Pollution Control Division

Address P.O. Box 4426
Las Vegas, NV 89127

Telephone (702) 383-1276

CONTACT PERSON

Primary - Name Susan J. Ward
Title Emissions Specialist
Telephone (702) 383-1276

Secondary - Name Mike Ellyson

Title Environmental Health Analyst

Telephone (702) 383-1276

1.3 GEOGRAPHIC AREA INCLUDED IN THE INVENTORY

State Nevada

Individual Counties/Parishes Towns Included in the Inventory	County/Parish/ Town Population
Clark County	741,458 (1990)

APPENDIX B

FORM B-2. INVENTORY QUALITY REVIEW RECORD

2.1 Original Inventory Receipt Date ____________

Received By:

Name ____________

Affiliation ____________

Telephone ____________

2.2 Inventory Review Record

Reviewer No. 1

Name Susan J. Ward - Level I review

Affiliation CCHD- Air Pollution Control

Date Review Initiated 4-24-92

Date Review Completed 4-30-92

Focus of Review Level I - Stationary Point + Area Sources

Reviewer No. 2

Name Mike Ellyson

Affiliation CCHD - Air Pollution Control

Date Review Initiated 4-30-92

Date Review Completed 4-30-92

Focus of Review Level II - Stationary + Point + Area Sources

Reviewer No. 3

Name JEFF HARRIS

Affiliation CLARK COUNTY DEPT. OF COMPREHENSIVE PLANNING

Date Review Initiated 5-1-92

Date Review Completed 5-12-92

Focus of Review FINAL QA REVIEW

Reviewer No. 4

Name ______

Affiliation ______

Date Review Initiated ______

Date Review Completed ______

Focus of Review ______

Reviewer No. 5

Name ______

Affiliation ______

Date Review Initiated ______

Date Review Completed ______

Focus of Review ______

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-1. LEVEL I QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
1.1	INVENTORY OVERVIEW			
1.1.1	Is the nonattainment area to which the inventory is applicable defined?	✓		Las Vegas Hydrogeologic Basin + 25 miles.
1.1.2	Has the correct nonattainment classification (Moderate or Serious) been indicated for the inventory area?	✓		Moderate
1.1.3	Are individual counties represented in the inventory identified?	✓		
1.1.4	Are summary emission totals tables provided for CO emission sources in the inventory area?	✓		
1.1.5	Are summary emission totals provided for CO emission sources on a county-specific basis?	✓		
1.1.6	Is the calendar year basis for the baseline inventory specified?	✓		1990
1.1.7	Have each of the following source types been addressed in the inventory? - Stationary Point Sources (SPS)	✓		
	- Stationary Area Sources (SAS)	✓		
	- On-Road Mobile Area Sources (OMAS)	✓		
	- Non-Road Mobile Area Source (NMAS)	✓		AIRCRAFT & LOCOMOTIVES ONLY
1.1.8	Specify the percent contribution of each of the source types listed in 1.1.7 to the total inventory emissions for CO. CO (%) -SPS 8.4 -SAS 2.3 -OMAS 86.4 -NMAS 2.9			
1.1.9	Do the emission estimates for CO reflect seasonal and weekday adjustments?		✓	No weekday adjustments
1.1.10	Have all existing regulatory requirements for each source category type been identified?	✓		

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-1. LEVEL I QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
1.2	POINT SOURCES			
1.2.1	Have all CO point sources in the nonattainment area with emissions equal to or greater than 100 tons/yr been included in the inventory?	✓		
1.2.2	Have detailed process and emissions data been provided for each CO point source with emissions equal to or greater than 100 tons/yr?	✓		
1.3	AREA SOURCES			
1.3.1	Have each of the following major categories of non-mobile area source emissions been addressed in the inventory?			
	-Stationary Source Fuel Combustion - Institutional	✓		
	- Residential	✓		
	-Waste Disposal, Treatment and Recovery - Open Burning		✓	not applicable
	-Miscellaneous Area Sources - Forest Wildfires	✓		
	- Managed (Slash/Described) Burning	✓		
	- Charcoal Grilling		✓	David Misenheimer told us not to do.
	- Structure Fires	✓		
	- Firefighting Training		✓	Fire Jurisdiction did not provide that category
	- Aircraft/Rocket Engine Firing and Testing		✓	not applicable
1.3.2	Are all area source emission estimates documented by providing the emission factor and activity level used and the sources of these data?	✓		
1.3.3	Where appropriate, have point sources' contributions been subtracted out from area source category estimates?	✓		

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-1. LEVEL I QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
1.4	MOBILE SOURCES			
1.4.1	Have all of the following on-road vehicle class been addressed in the inventory? - Light Duty Gasoline Vehicles (LDGV)	✓		
	- Light Duty Gasoline Trucks 1 (LDGT1)	✓		
	- Light Duty Gasoline Trucks 2 (LDGT2)	✓		
	- Heavy Duty Gasoline Vehicles (HDGV)	✓		
	- Motorcycles (MC)	✓		
	- Light Duty Diesel Vehicles (LDDV)	✓		
	- Light Duty Diesel Trucks (LDDT)	✓		
	- Heavy Duty Diesel Vehicles (HDDV)	✓		
1.4.2	Has EPA's MOBILE4.1 model been used to estimate on-road vehicle mobile source emission factors? (Exception: California may continue to use the EMFAC mobile model)	✓		
1.4.3	Has information been provided to document how on-road vehicle mobile source emissions estimates were determined using MOBILE4.1?	✓		
1.4.4	Is information provided to document how each of the following MOBILE4.1 inputs was derived? - tampering rates			SEE SECTION 4: REGION IX HAS ALSO
	- vehicle miles traveled by vehicle type			RECEIVED PHASE I: TRAFFIC AND
	- annual mileage accumulation rates and registration distribution by vehicle type and age			EMISSION INVENTORY DOCUMENTATION PREPARED FOR LAS VEGAS/CLARK COUNTY PREPARED
	- inspection and maintenance programs			FOR REVIEW. THIS DOCUMENT PROVIDES
	- anti-tampering programs			ADDITIONAL DETAILS
	- ASTM volatility class			

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-1. LEVEL 1 QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
1.4.4. cont'd	- minimum and maximum daily temperature			
	- base Reid Vapor Pressure (RVP)			
	- In-use RVP and in-use start year			
	- altitude region			
	- calendar year			
	- speed			
	- ambient temperature			
	- operating modes			DEFAULTS USED
1.4.5	If a procedure other than the MOBILE4.1 model was used to generate emission factors, was the procedure identified and documented?	N/A		
1.4.6	Are estimates of vehicle miles traveled (VMT) provided that are: - road-type specific?	✓		
	- vehicle-type specific?		✓	
1.4.7	Are VMT estimates documented by any of the following methods? - urban transportation planning model inputs and outputs are provided	✓		
	- traffic count program data are provided			
	- Highway Statistics data are provided along with the algorithms used to disaggregate the data to the county level			
	- the methods used to grow previous year VMT data to the base year are provided			
	- State/local program data are provided			
	- other (specify in Comments)			

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-1. LEVEL I QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
1.4.8	Have all of the following non-road vehicle classes been addressed in the inventory?			
	- farm equipment			
	- construction equipment			
	- industrial machinery			
	- lawn and garden equipment			
	- snowmobiles			
	- aircraft	✓		Information & AMSPC
	- railroad locomotives	✓		
	- marine vessels			
1.4.9	Was MOBILE4.1 used to estimate emissions for non-road mobile sources?			
1.4.10	If MOBILE4.1 was not used, are the emission calculation procedures documented by providing the following parameters?			
	- the emission factor used			
	- the source of the emission factor			
	- the activity level used			
	- the source of the activity level			
1.5	QUALITY ASSURANCE PROCEDURES			
1.5.1	Were quality assurance efforts carried out during the development of the inventory?	✓		
1.5.2	If yes, are these efforts documented in the submitted inventory or an accompanying plan?	✓		SECTION 6

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-1. LEVEL I QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
1.5.3	If a quality assurance program was used (Question 1.5.1 is answered yes), were the following activities performed?			
	- measures taken to ensure that the point and area source lists were complete	✓		
	- alternate emission estimation procedures were considered	✓		
	- the accuracy of the data collected as inputs to the emissions estimation procedures were checked	✓		
	- calculations were reviewed to identify errors	✓		
	- the reasonableness of the resulting emission estimates was evaluated	✓		
	- an independent audit of the inventory was conducted		✓	
	- other (please specify)			

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-2. LEVEL II QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
2.1	COMPLETENESS CHECKS - POINT SOURCES			
2.1.1	Are the following CO point source categories included in the inventory? - External fuel combustion	✓		
	- Stationary internal combustion	✓		
	- Waste disposal		✓	CLARK COUNTY DOES NOT OPERATE MUNI-WASTE INCENERATORS
	- Industrial processes	✓		
2.2	PROCEDURES CHECKS - POINT SOURCES			
2.2.1	Does the inventory documentation describe the methodology used (i.e., survey, plant inspections, AFS/NEDS, permit files, etc.) to develop the point source inventory listing?	✓		
2.2.2	Does the point source inventory reflect a base year of 1990?	✓		
2.2.3	Were summary emission estimates adjusted to reflect the peak CO season for the inventory area?	✓		
2.2.4	Were summary emission estimates adjusted to reflect rule effectiveness?		✓	
2.2.5	Does the inventory documentation describe the methodology used to define the peak CO season?	✓		
2.2.6	Does the point source inventory documentation include the contact person(s) for referring questions?	✓		
2.2.7	Select a subset which represents at least 25% of the listed point sources with CO emissions greater than or equal to 100 tons/yr and determine if the following data are compiled and presented for each of these sources (Note: Identify in the comment column the record numbers of these plants that were checked). - Plant name and location	—	—	N/A. ONLY ONE POINT SOURCE

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-2. LEVEL II QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
2.2.7 cont'd	- AFS (or NEDS) point ID			N/A. ONLY ONE POINT SOURCE
	- SIC code			↓
	- Operating Schedule			↓
	- Applicable Regulations			↓
	- Emission Limitations (only if subject to SIP Reg)			↓
	- Compliance year (only if subject to SIP Reg)			↓
	- SCC Code for Process Unit			↓
	- Daily Process Rate and units			↓
	- Control Equipment			↓
	- Control Efficiency			↓
	- Emission Estimation Method			↓
	- Emission Factor			↓
	- Annual Nonbanked emissions			↓
	- Rule Effectiveness			↓
	- Seasonal Adjustment Factor			↓
	- CO Season Daily Emissions			↓
2.3	CONSISTENCY CHECKS - POINT SOURCES			
2.3.1	Are unadjusted annual emission estimates for CO from point source within 25% of the values reported in AFS (or NEDS)?	✓		
2.4	COMPLETENESS CHECKS - AREA SOURCES			
2.4.1	Does the inventory contain CO area source emission estimates for the following source categories? - Stationary source fuel combustion - Electric utility boilers	✓		

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-2. LEVEL II QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
2.4.1 cont'd	- Industrial boilers	✓		
	- Commercial/institutional external fuel combustion	✓		
	- Residential fuel combustion	✓		
	- Waste disposal, treatment and recovery - On-site incineration		✓	N/A. SEE 2.1.1
	- Open burning		✓	PROHIBITED BY REGULATION
	- Miscellaneous area sources - Forest wildfires	✓		
	- Managed (slash/described) burning	✓		
	- Charcoal grilling		✓	N/A. PER DAVID MISENHEIMER, HQ USEPA
	- Structure fires	✓		
	- Firefighting training		✓	LOCAL FD DOES NOT RETAIN RECORDS
	- Aircraft/rocket engine firing and testing		✓	
2.5	**PROCEDURES CHECKS - AREA SOURCES**			
2.5.1	Were area CO emission estimates for the following categories developed using per capita emission factors? - Waste disposal combustion		✓	
	- Open burning		✓	
	- Structure fires		✓	
2.5.2	Was point source fuel use subtracted from total area-wide fuel use in determining fuel use for stationary area source fuel combustion categories?	✓		
2.5.3	Were CO emission estimates for forest fires based on information obtained from the U.S. Forest Service, a State forestry department or a local fire protection agency?	✓		

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-2. LEVEL II QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
2.5.4	Were data from the census of housing used to estimate residential consumption of wood for fuel use?		✓	COMPILED FROM LOCAL RETAIL SALES DATA
2.5.5	Was information from the U.S. Forestry Service and/or State forestry department used to estimate total area for managed burning?	✓		
2.6	CONSISTENCY CHECKS - AREA SOURCES [NOT AVAILABLE FOR DRAFT DOCUMENT]			
2.7	COMPLETENESS CHECKS - AREA ON-ROAD MOBILE SOURCES	—	—	2.7 - 2.9.6 PREPARED BY COMP PLANNING
2.7.1	Were all MOBILE4.1 input values documented?			
2.7.2	Does the documentation describe the derivation of all non-default MOBILE4.1 input values?			
2.8	PROCEDURES CHECKS - AREA ON-ROAD MOBILE SOURCES			
2.8.1	Were MOBILE4.1 defaults for tampering rates used?			
2.8.2	If alternative tampering rate values were used, did EPA review and approve the survey on which the data were based?			
2.8.3	Were specific values for VMT by vehicle type and road type developed?			
2.8.4	Were MOBILE4.1 default values for annual mileage accumulation rates, and registration distribution by vehicle type and age used?			
2.8.5	Was the January ASTM volatility class used for estimating CO season gasoline RVP?			
2.8.6	Were the MOBILE4.1 default values used to define percent of VMT by operating mode?			
2.8.7	Does the documentation describe how VMT estimates were developed if the transportation network input to the urban transportation model did not include rural and/or all urban roads in the inventory area?			

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-2. LEVEL II QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
2.9	CONSISTENCY CHECKS - AREA ON-ROAD MOBILE SOURCES			PREPARED BY COMP PLANNING
2.9.1	Was the value used for average wintertime temperature between 20 and 55°F?			↓
2.9.2	Was the average assumed speed between 2.5 and 55 mph?			
2.9.3	Was the VMT by road type apportionment within the following ranges? - Interstate: Between 13.3 and 27.7 percent of total VMT?			
	- Other Freeway and Expressway: Between 0 and 9.7 percent of total VMT?			
	- Other Principal Arterial: Between 10.5 and 29.2 percent of total VMT?			
	- Minor Arterial: Between 11.7 and 24.3 percent of total VMT?			
	- Major Collector: Between 7.1 and 19.7 percent of total VMT?			
	- Minor Collector: Between 0.6 and 3.9 percent of total VMT?			
	- Local: Between 2.6 and 45.4 percent of total VMT?			
2.9.4	Is the calculated annual index of VMT/person within the 1505 to 18991 range?			
2.9.5	Is the calculated annual index of VMT/registered vehicle within the 9181 to 12426 range?			
2.9.6	Is the calculated annual index of VMT/gal gasoline sold, within the range of 15.9 to 20.7?			
2.10	COMPLETENESS CHECKS - AREA NON-ROAD MOBILE SOURCES			
2.10.1	Does the inventory contain CO emission estimates for the following off-highway sources? - Construction equipment		✓	TO BE PREPARED AND SUBMITTED BY EPA

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-2. LEVEL II QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
2.10.1 cont'd	- Industrial/commercial equipment		✓	TO BE SUBMITTED BY EPA
	- Recreational vehicles		✓	
	- Farm equipment		✓	
	- Lawn and garden equipment	✓		[illegible]
	- Aircraft	✓		BY INQUIRY, COMPUTATION BY FAAED SOFTWARE
	- Marine vessels	–	–	N/A
	- Railroads	–	–	PREPARED BY COMPREHENSIVE PLANNING
2.11	PROCEDURES CHECKS - AREA NON-ROAD MOBILE SOURCES	–	–	CLOSEST AGRICULTURAL PRODUCTION > 25 MILES
2.11.1	Was information on the population of farm equipment items within the inventory area collected using data from the Census of Agriculture?			
2.11.2	Was the number of acres cultivated in each inventory area used to apportion agricultural equipment fuel use?			
2.11.3	Were emission calculations performed separately for combines, balers, harvesters, general purpose machines, and tractors?			
2.11.4	Were emission estimates from farm equipment adjusted to reflect CO season activity levels?			
2.11.5	Were local employment statistics for SIC 16 used to estimate the number of pieces of heavy construction equipment in the inventory area?			
2.11.6	Were emission calculations performed separately for the following equipment types?			
	- Tracklaying tractors (diesel)			
	- Tracklaying loaders (diesel)			
	- Motor scrapers (diesel and gas)			
	- Scrapers (diesel)			

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-2. LEVEL II QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
2.11.6 cont'd	- Non-Road trucks (diesel)			N/A. PREPARED BY COMP PLANNING
	- Wheel tractors (diesel and gas)			↓
	- Rollers (diesel and gas)			
	- Wheel dozers (diesel)			
	- Miscellaneous construction equipment (diesel and gas)			
2.11.7	Were local employment statistics for SIC codes 10-14, 20-39, and 50-51 used to estimate the number of industrial engines in use in the inventory area?			
2.11.8	Were CO emission calculations performed for the following industrial engine categories?			
	- Heavy duty diesel			
	- Heavy duty gasoline			
	- Light duty gasoline			
2.11.9	Were non-road motorcyle count estimates based on the number of motorcycles registered for on-road use?			
2.11.10	Were CO emission calculations performed for non-road motorcycle use?			
2.11.11	Was the NEDS Fuel Use Report used to estimate the amount of fuel used annually in lawn and garden equipment?			
2.11.12	Was lawn and garden fuel use apportioned by small engine type (2-cycle and 4-cycle)?		✓	
2.11.13	Were CO emissions calculated for each lawn and garden engine type?		✓	
2.11.14	Were emission estimates from lawn and garden equipment adjusted to reflect CO season activity levels?		✓	ACTIVITY LEVELS YEAR ROUND

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-2. LEVEL II QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
2.11.15	Was aircraft landing and take-off activity determined from FAA Air Traffic Activity or Airport Activity Statistics of Certified Route Air Carriers?		✓	LTO SUBMITTED BY COUNTY AIRPORT MANAGEMENT
2.11.16	Were emission estimates for railroad locomotives based on quantity of fuel used as recorded in DOE's Energy Data Reports?			REFER TO COMP PLANNING
2.11.17	Were State-wide railroad locomotive emissions apportioned to the inventory area by railroad track mileage, freight density, or population?	✓		TRACK MILEAGE
2.11.18	Was fuel consumption for recreational vehicles based on State-wide registration data?			
2.11.19	If recreational boats were included in the CO season inventory, were the number of boats (State-wide) apportioned to the inventory area level based on water surface area?	N/A		
2.11.20	Were emission estimates for Marine vessels based on quantity of fuel used as recorded in DOE's Energy Data Reports?	N/A		
2.11.21	Were statistics from Waterborne Commerce of the US used to apportion marine vessel activity by port location?	N/A		
2.12	CONSISTENCY CHECKS - AREA NON-ROAD MOBILE SOURCES			PREPARED BY EPA
2.12.1	Are annual emission estimates for agricultural equipment between 5.14 and 122.80 lbs CO/person?			
2.12.2	Are annual emission estimates for non-road construction equipment between 17.42 and 83.02 lbs CO/person?			
2.12.3	Are annual emission estimates for industrial machinery between 7.7 and 19.7 lbs CO/person?			
2.12.4	Are annual emission estimates for non-road motorcycles between 0.45 and 1.88 lbs CO/person?			

APPENDIX B - CO NONATTAINMENT INVENTORY REVIEW
TABLE B-2. LEVEL II QUALITY REVIEW CHECKLIST

		YES	NO	COMMENTS
2.12.5	Are annual emission estimates for lawn and garden equipment between 0.047 and 0.479 lbs CO/person?			PREPARED BY EPA

<u>Worksheet</u>

EMISSION FACTOR CALCULATIONS AND USE OF MOBILE4.1 (WORKSHEET [illegible])

		YES	NO	COMMENTS
1.1	**INPUT CHECKS**			
1.1.1	a. Were MOBILE4.1 tampering rates used (TAMFLG=1)?	X		
	b. If locality-specific tampering rates were used (TAMFLG=2), is documentation provided that the rates used and the tampering survey(s) on which they are based were reviewed and approved by EPA's Field Operations and Support Division?			
1.1.2	a. What average speeds were assumed for each of the following roadway types? Interstates Urban: 42.61 mph; Rural: 45.00 mph Principal Arterials Urban: 22.42 mph; Rural: 45.00 mph Minor Arterials Urban: 21.17 mph; Rural: 42.61 mph Major Collectors Urban: 15.30 mph; Rural: ______mph Minor Collectors Urban: 15.30 mph; Rural: ______mph Local Roads Urban: 15.00 mph; Rural: ______mph Any other roadway types (Specify: ______________) Urban: ______mph; Rural: ______mph			
	b. Was the source of the assumed average speeds by roadway type specified?	X		
1.1.3	a. Is the same VMT mix used for all roadway types and subareas?	X		
	b. Was the MOBILE4.1 VMT mix by vehicle type used (VMFLAG=1)?		X	
	c. If locality-specific VMT mix(es) by vehicle type were used (VMFLAG=2 or 3), are the derivation of these values and the data source(s) provided?	X		
1.1.4	a. Were MOBILE4.1 annual mileage accumulation rates by age used (MYMRFG = 1 or 3)?	X		
	b. If the locality-specific annual mileage accumulation rates by age were used for one or more vehicle types, are the derivation of the rates and the data sources(s) provided?			

WORKSHEET
(Continued)

		YES	NO	COMMENTS
1.1.4 cont'd	c. Were calendar year 1990 area- or State-specific registration distributions by age used (MYMRFG = 3 or 4)?	X		
	d. If area- or State-specific registration distributions were used for one or more vehicle types, are the derivation of the rates and data source(s) provided?	X		
	e. If the MOBILE4.1 (national) registration distributions were used, is justification provided for not having developed and used area- or State-specific distributions?	–	–	used local [illegible] data
1.1.5	a. Were MOBILE4.1 basic emission rates used (NEWFLG=1)?	X		
	b. If <u>any</u> alternate basic emission rate equations were used (NEWFLG=2), is justification provided?			
1.1.6	a. Is the area being modeled subject to the requirements of an inspection/maintenance (I/M) program in the base year?	X		
	b. If the answer to the preceding question was "yes", did the program cover: -the entire area being modeled?	X		
	-only a portion of area being modeled?		X	
	c. Were the effects of the I/M program on the emission factors calculated by MOBILE4.1 accounted for (IMFLAG=2)?	X		
	d. If the program applied only to a portion of the area being modeled, were MOBILE4.1 runs both with and without the I/M program used?			[illegible]
	e. If the I/M program applied to only a portion of the area, what areas are and are not covered by the program? Covered by I/M: Not covered by I/M:	NA		

WORKSHEET
(Continued)

		YES	NO	COMMENTS
1.1.6 cont'd	f. How was the VMT split from vehicles registered in each of the I/M domains (covered and not covered) determined? Data source(s):	N/A		
	Derivation (cite relevant section of submittal) pgs ________			
1.1.7	a. Were any "additional" correction factors (for air conditioning use, trailer towing, extra load, and/or NOx humidity correction) used in the MOBILE4.1 runs (ALHFLG = 2 or 3)?		X	
	b. If so, is justification provided for the use of these correction factors?			
1.1.8	a. Is the area being modeled subject to the requirements of an anti-tampering program (ATP) in the base year?	X		
	b. If the answer to the preceding question is "yes", did the ATP cover: - the entire area being modeled?	X		
	- only a portion of the area being modeled?			
	c. Were the effects of the ATP on the emission factors calculated by MOBILE4.1 accounted for (ATPFLG=2)?	X		
	d. If the program applied only to a portion of the area being modeled, were MOBILE4.1 runs both with and without the ATP used?			
	e. If the ATP applied to only a portion of the area, what areas are and are not covered by the program? Covered by ATP: Not covered by ATP:			

WORKSHEET
(Continued)

		YES	NO	COMMENTS
1.1.8 cont'd	f. How was the VMT split from vehicles registered in each of the AIP domains (covered and not covered) determined? Data source(s):			
	Derivation (cite relevant section of submittal) pgs _________			
1.1.9	a. Were refueling emissions included in the emission factors calculated by MOBILE4.1 (RLFLAG = 1, 2, 3, or 4)?	X		CO EMISSIONS ARE NOT ASSOCIATED
	b. If refueling emissions were not included in the emission factors (RLFLAG = 5), does the submittal make clear that these emissions are accounted for in the stationary (area) source portion of the inventory?			WITH REFUELING
	c. How were the refueling emission factors calculated: -in grams per gallon (g/gal) of dispensed fuel multiplied by the total gasoline sales (as recommended in the guidance); or			
	-in grams per mile (g/mi) multiplied by the total VMT?			
	d. If the g/mi * VMT approach is used, is justification for not using the preferred approach provided?			
	e. Is the area covered by a Stage II (at-the-pump) VRS control program?			
	f. If so, were the effects of this program on the emission factors accounted for in the MOBILE4.1 runs (RLFLAG = 2 or 4)?			
1.1.10	a. How were the emission factors calculated by MOBILE4.1? -for the entire day	X		
	-on an hourly basis			
	-both ways			
	b. Was the appropriate temperature flag setting used (TEMFLG=1 for daily emission factors, TEMFLG=2 for hourly emission factors)?	X		

WORKSHEET
(Continued)

		YES	NO	COMMENTS
1.1.11	a. What were the hydrocarbon (HC) emission factors used calculated as? -total HC (THC) (NMHFLG=1); -non-methane HC (NMHC) (NMHFLG=2); -volatile organic compounds (VOC) (NMHFLG=3);			Not Applicable
	-total organic gasses (TOG) (NMHFLG=4); or -non-methane organic gasses (NMOG) (NMHFLG=5).			
	b. Is an explanation provided for the choice of HC emission factor composition provided?			
	and is this choice consistent with the composition of the stationary source portion of the emission inventory?			
Item 1.1.12 to be completed only for areas with I/M programs operating in the base year (Areas for which the answers to items 1.1.6a and 1.1.6c were "Yes").				
1.1.12	a. Are the I/M program parameters used in the MOBILE4.1 runs provided?	X		
	b. Compare the parameters provided in the inventory submittal to those provided by EPA I/M staff. If the parameters agree, mark "yes"; if they do not agree, mark "no". Note any discrepancies in the comments section. -program start year	X		
	-stringency level (%)	X		
	-first model year (MY) covered	X		
	-last MY covered	X		
	-pre-1981 MY waiver rate (%)	X		
	-1981+ MY waiver rate (%)	X		
	-compliance rate (%)	X		
	-program type (centralized, decentralized computerized, decentralized manual)	X		

WORKSHEET
(Continued)

		YES	NO	COMMENTS
1.1.12 cont'd	-frequency of inspections (annual, biennial)	X		
	-vehicle types covered (LDGV/LDGT1/LDGT2/HDGV)	X		
	-test type	X		
	-alternate I/M credits used		X	
	c. If alternate I/M credits were used, are these credits adequately documented and approved for use by EPA I/M staff?			
Item 1.1.13 to be completed only for areas with anti-tampering programs operating in the base year (Areas for which the answers to items 1.1.8a and 1.1.8c were "Yes").				
1.1.13	a. Are the ATP parameters used in the MOBILE4.1 runs provided?	X		
	b. Compare the parameters provided in the inventory submittal to those provided by EPA I/M staff. If the parameters agree, mark "yes"; if they do not agree, mark "no". Note any discrepancies in the comments section. -program start year	X		
	-first model year (MY) covered	X		
	-last MY covered	X		
	-vehicle types covered (LDGV/LDGT1/LDGT2/HDGV)	X		
	-program type (centralized, decentralized)	X		
	-compliance rate (%)	X		
	-inspections performed (air system, catalyst, fuel inlet restrictor, tailpipe lead deposit test, EGR system, evaporative system, PCV, gas cap)	X		
Item 1.1.14 to be completed only for those areas with Stage II vapor recovery system requirements in place in the base year (Areas for which the answers to items 1.1.9e and 1.1.9f were "Yes").				
1.1.14	a. Are the Stage II program parameters used in the MOBILE4.1 runs provided?			

WORKSHEET (
(Continued)

		YES	NO	COMMENTS
1.1.14 cont'd	b. Compare the parameters provided in the submittal to those provided by EPA. If the parameters agree, mark "yes"; if they do not agree, mark "no". Note any discrepancies in the comments section.			
	-program start year			
	-phase-in period (years)			
	-efficiency at controlling refueling emissions from LDGVs and LDGTs (%)			
	-efficiency at controlling refueling emissions from HDGVs(%)			
Items 1.1.15 to 1.1.19 deal with the inputs required in the Local Area Parameter Record. Items 1.1.15 and 1.1.17 only apply for ozone modeling; items 1.1.16 and 1.1.18 only apply for CO modeling; item 1.1.19 applies in both cases.				
1.1.15	(For ozone/HC modeling) a. For daily emission factor calculations, are the minimum and maximum temperatures used to model "typical summer day" conditions based on the temperatures recorded on the days having the ten highest ozone concentrations within a 3-month peak ozone season during 1988-90, as provided in the inventory preparation guidance?			N/A
	b. What are the temperatures used for modeling "typical summer day" emission factors? Min: _____ °F, Max: _____ °F			
	c. What are the temperatures used for modeling average annual emission factors? Min: _____ °F, Max: _____ °F			
	d. Is the derivation of the temperatures used to model average annual emission factors documented?			

WORKSHEET
(Continued)

		YES	NO	COMMENTS
Items 1.1.15e through ~~1.1.~~15i apply only to areas that modeled hourly emission factors.				
1.1.15 cont'd	e. Were the hour-by-hour temperatures used to model "typical summer day" emission factors based on the temperatures recorded on the days having the ten highest ozone concentrations within a 3-month peak ozone season during 1988-90, as provided in the inventory preparation guidance?			
	f. Is the derivation of the temperatures used to model "typical summer day" emission factors on an hour-by-hour basis documented?			
	g. What are the minimum and maximum temperatures used in the 24-hour period modeled on an hourly basis for modeling "typical summer day" emissions factors, and at what times of day do they occur? Min: ______ °F at _______am/pm Max: ______ °F at _______am/pm			
	h. Are daily emission factors also calculated, using consistent temperatures, for the determination of diurnal evaporative and refueling HC emissions (which cannot be modeled directly on an hourly basis using MOBILE4.1)?			
	i. Is the procedure used to disaggregate the daily diurnal evaporative and refueling HC emissions into hourly emissions documented?			
1.1.16	(For CO modeling) a. For the emission factor calculations, are the temperatures used to model "typical winter day" conditions based on the temperatures recorded during the ten highest 8-hour CO concentrations within a 3-month peak CO season during 1988-90, as provided in the inventory preparation guidance?	X		
	b. What are the temperatures used for modeling "typical winter day" emission factors? Min: __33__ °F, Max: __56__ °F			

WORKSHEET
(Continued)

		YES	NO	COMMENTS
1.1.16 cont'd	c. What are the temperatures used for modeling average annual emission factors? Min: ____ °F, Max: _____ °F		X	12 INDIVIDUAL RUNS, [illegible]
	d. Is the derivation of the temperatures used to model average annual emission factors documented?	X		[illegible] FOR [illegible] — SEE SECTION FOUR.
1.1.17	(For ozone/HC modeling) a. What is the 1990 ("period 1") RVP used in the MOBILE4.1 runs? _________ psi			N/A
	b. Is the source of this value documented?			
	c. What values were used for "period 2" RVP in the MOBILE4.1 runs? ________ psi What was the period 2 start year in the MOBILE4.1 runs? ______________________			
	d. If the "period 2" start year used in the modeling is earlier than 1989, is any justification for this assumption provided?			
1.1.18	(For CO modeling) a. What is the 1990 ("period 1") RVP used in the MOBILE4.1 runs? 9.0 psi			
	b. Is the source of this value documented?	X		
	c. Is any winter volatility limit regulation in effect for the base year in the area being modeled?	X		
	d. If so, what values were used for "period 2" RVP in the MOBILE4.1 runs? 12.0 psi What values were used for "period 2" start year in the MOBILE4.1 runs? 90			
1.1.19	a. Are the effects of oxygenated fuels on the emission factors included in the MOBILE4.1 runs (i.e., is the OXYFLG value set to 2 following the "period 2" start year on the local area parameter record)?	X		

WORKSHEET
(Continued)

		YES	NO	COMMENTS
1.1.19 cont'd	b. If so, are the values provided for oxygenated fuels market shares and oxygen contents reasonable? -Ether blend market share: 47 % -Alcohol blend market share: 53 % -Ether blend average oxygen content: 2.6 % -Alcohol blend average oxygen content: 2.6 %			[redacted]
	c. Is an RVP waiver for alcohol blend fuels in effect in the area being modeled?	X		
Items 1.1.20 to 1.1.24 deal with the inputs required in the Scenario Record				
1.1.20	Is the proper region (1 = low altitude or 2 = high altitude) entered in the scenario record?	X		
1.1.21	Is the proper calendar year entered in the scenario record? -(For ozone/HC modeling) Are both 1990 and 1991 MOBILE4.1 runs used to interpolate to July 1990 emission factors?			
	-(For CO modeling) In the comments section, indicate if 1990 or 1991 MOBILE4.1 emission factors were used.	X		
1.1.22	Are MOBILE4.1 runs provided using each of the speeds by roadway type or grouping (see item 1.1.2) for which emission factors are required?	X		
1.1.23	a. For daily emission factors (TEMFLG=1), is an ambient temperature consistent with the minimum and maximum temperatures used (minimum ≤ ambient ≤ maximum)?	X		
	b. For hourly emission factors (TEMFLG=2), are MOBILE4.1 runs using each hourly ambient temperature provided?			
1.1.24	a. Was the standard (20.6/27.3/20.6) operating mode fraction used?	X		
	b. If the operating mode fractions used are different than the standard values, is documentation provided of the method by which the values used were developed?			

WORKSHEET
(Continued)

		YES	NO	COMMENTS
1.1.24 cont'd	c. Are different operating mode fractions used for the different roadway types?		X	
	d. If so, indicate what fractions were used for each of the following road types: -Interstates: Urban ___/___/___, Rural ___/___/___ -Principal Arterials: Urban ___/___/___, Rural ___/___/___ -Minor Arterials: Urban ___/___/___, Rural ___/___/___ -Major Collectors: Urban ___/___/___, Rural ___/___/___ -Minor Collectors: Urban ___/___/___, Rural ___/___/___ -Local Roads: Urban ___/___/___, Rural ___/___/___			
	d. If different operating mode fractions were used for the different roadway types, is the derivation of these values documented?			
Items 1.1.24e and 1.1.24f only apply for areas that modeled hourly emission factors.				
	e. Are different operating mode fractions used for each hour of the day?		X	
	f. If so, is the derivation of these values documented?			
Item 1.1.25 only applies to areas that used additional correction factors to model the emission factors (areas for which the answer to Item 1.1.7a was "Yes").				
1.1.25	a. Which of the options for application of additional correction factors was used? ALHFLG=2 ________ ALHFLG=3 ________			
	b. What value was used for "AC" (fraction of air-conditioner-equipped vehicles assumed to actually be using air conditioning)? ______			

WORKSHEET
(Continued)

		YES	NO	COMMENTS
1.1.25 cont'd	c. What values were used for "XLOAD" (fraction of LDGVs, LDGT1s, LDGT2s assumed to be carrying an extra 500 lb load)? LDGV: ______ LDGT1: ______ LDGT2: ______			
	d. What value(s) were used for "TRAILR" (fraction of LDGVs, LDGT1s, LDGT2s assumed to be towing a trailer)? LDGV: ______ LDGT1: ______ LDGT2: ______			
	e. What value was used for "ABSHUM" (absolute humidity in grains H_2O/lb dry air, used to correct NOx emissions for humidity)? ______			
	f. What dry bulb and wet bulb temperatures were used for determination of air conditioning correction factors? Dry: ______ ^oF, Wet: ______ ^oF			
	g. Is a rationale provided for the use of these additional correction factors?			
1.1.26	a. Were locality-specific diesel sales fractions by model year for LDVs and LDTs used in the MOBILE4.1 runs?		X	
	b. Is so, is the source of the information and the derivation of the values provided?			
1.1.27	a. Were alternate trip length distribution statistics used in the MOBILE4.1 runs for the calculation of running loss HC emission factors?			
	b. If so, is the source of the information and the derivation of the values provided?			

Worksheet

MOBILE 4.1 INPUT VALUES QUALITY ASSURANCE
(WORKSHEET)

Data Level	Record Number	Field	Data Element	Required Format	Allowable Values	Format Check	Value Check	Missing Entry Check	Error Documentation Number	Reviewers Initials/ Date
Control	1		PROMPT IOUNEW	I1,3A1	1 - 4	✓	✓	✓		CK
	2		PROJID	20A4	80 Characters	✓	✓	✓		CK
	3		TAMFLG	I1	1 - 2	✓	✓	✓		CK
	4		SPDFLG	I1	1 - 4	✓	✓	✓		CK
	5		VMFLAG	I1	1 - 3	✓	✓	✓		CK
	6		MYMRFG	I1	1 - 4	✓	✓	✓		CK
	7		NEWFLG	I1	1 - 2	✓	✓	✓		CK
	8		IMFLAG	I1	1 - 2	✓	✓	✓		CK
	9		ALHFLG	I1	1 - 3	✓	✓	✓		CK
	10		ATPFLG	I1	1 - 2	✓	✓	✓		CK
	11		RLFLAG	I1	1 - 5	✓	✓	✓		CK
	12		LOCFLG	I1	1 - 2	✓	✓	✓		CK
	13		TEMFLG	I1	1 - 2	✓	✓	✓		CK
	14		OUTFMT	I1	1 - 5	✓	✓	✓		CK
	15		PRTFLG	I1	1 - 4	✓	✓	✓		CK
	16		IDLFLG	I1	1 - 2	✓	✓	✓		CK
	17		NMFLG	I1	1 - 5	✓	✓	✓		CK
	18		HCFLAG	I1	1 - 3	✓	✓	✓		CK
One-time Data	1		24 or 48 Tampering Records (if TAMFLG = 2)	See Section 2.2.1 of User's Guide to Mobile4.1	Fractional units					
	2		1 VMT Mix Record (if VMFLAG = 3)	8F4.3	0.00 - 1.00	✓	✓	✓		CK
	3		24 Mileage Accumulation Rate By Age Records (if MYMRFG = 2 or 4)	See Section 2.2.3 of User's Guide to Mobile4.1						

WORKSHEET
(Continued)

Data Level	Record Number	Field	Data Element	Required Format	Allowable Values	Format Check	Value Check	Missing Entry Check	Error Documentation Number	Reviewers Initials/ Date
One-time Data (cont.)	4		24 Registration Distribution By Age Records (if MYMRFG = 3 or 4)	See Section 2.2.3 of User's Guide to Mobile4.1		✓	✓	✓		CK
	5		1 to 100 Basic Emission Rate Records (if NEWFLG =2)							
	(1)	1	-Number (N) of BER records to follow	I3	1 - 100					
	2-(N+1)	1	-BER region	I1, 1X	1 - 2					
		2	-BER vehicle type	I1, 1X	1 - 8					
		3	-BER pollutant	I1, 1X	1 - 3					
		4	-BER first model year	I2, 1X	60 - 99, 00 - 20					
		5	-BER last model year	I2, 1X	60 - 99, 00 - 20					
		6	-New zero-mile level	F6.2, 1X	≥ 0.00					
		7	-New deterioration rate	F6.2, 1X	≥ 0.00					
		8	-New DR2	F6.2	≥ 0.00					
	6		1 I/M Program Descriptive Record (if IMFLAG = 2)							
		1	-Program start year	I2, 1X	60 - 99, 00 - 20	✓	✓	✓		CK
		2	-Stringency level (percent)	I2, 1X	10 - 50	✓	✓	✓		CK
		3	-First model year	I2, 1X	41 - 99, 00 - 20	✓	✓	✓		CK
		4	-Last model year	I2, 1X	41 - 99, 00 - 20	✓	✓	✓		CK
		5	-Waiver rate for pre-1981 models	F2.0, 1X	0 - 50	✓	✓	✓		CK
		6	-Waiver rate for 1981 and later models	F2.0, 1X	0 - 50	✓	✓	✓		CK
		7	-Compliance rate (percent)	F3.0 1X	0 - 100	✓	✓	✓		CK
		8	-Program type	I1, 1X	1 - 3	✓	✓	✓		CK
		9	-Inspection frequency	I1, 1X	1 - 2	✓	✓	✓		CK

WORKSHEET
(Continued)

Data Level	Record Number	Field	Data Element	Required Format	Allowable Values	Format Check	Value Check	Missing Entry Check	Error Documentation Number	Reviewers Initials/ Date
One-time Data (cont.)		10	-Vehicle types subject to inspection	4I1, 1X	1 - 2	✓	✓	✓		CK
		11	-Test type	I1, 1X	1 - 3	✓	✓	✓		CK
		12	-I/M credit flag	2I1	1 - 2	✓	✓	✓		CK
		13	-Transient test first model year	1X, I2, 1X	41 - 99, 00 - 20	✓	✓	✓		CK
		14	-Purge system check first model year	I2,1X	41 - 99, 00 - 20	✓	✓	✓		CK
		15	-Pressure check first model year	I2	41 - 99, 00 - 20	✓	✓	✓		CK
	7		1 ATP Descriptive Record (if ATPFLG = 2)							
		1	-Program start year	I2, 1X	60 - 99, 00 - 20	✓	✓	✓		CK
		2	-First model year	I2, 1X	41 - 99, 00 - 20	✓	✓	✓		CK
		3	-Last model year	I2, 1X	41 - 99, 00 - 20	✓	✓	✓		CK
		4	-Vehicle types subject to inspections	4I1, 1X	1 - 2	✓	✓	✓		CK
		5	-Program type	I1	1 - 2	✓	✓	✓		CK
		6	-Inspection frequency	I1, 1X	1 - 2	✓	✓	✓		CK
		7	-Compliance rate (percent)	F4.0, 1X	0 - 100	✓	✓	✓		CK
		8	-Inspections performed	8I1	1 - 2	✓	✓	✓		CK
	8		1 or 2 Refueling VRS Descriptive Records (if RLFLAG = 2, 3, or 4)							
			• Stage II VRS Input Record							
		1	-Stage II start year	I2, 1X	89 - 99, 00 - 20					
		2	-Phase-in period	I1	1 - 5					
		3	-Percent efficiency: LDGV, LDGT	1X, I3	0 - 100					
		4	-Percent efficiency: HDGV	1X, I3	0 - 100					

WORKSHEET
(Continued)

Data Level	Record Number	Field	Data Element	Required Format	Allowable Values	Format Check	Value Check	Missing Entry Check	Error Documentation Number	Reviewers Initials/ Date
ie-time ita :ont.)			• Onboard VRS Input Record							
		1	-Onboard start year	I2, 1X	89 - 99, 00 - 20					
		2	-Vehicle types covered	4I1	1 - 2					
	9		1 Local Area Parameter Record (if LOCFLG = 2)							
		1	-Scenario Name	4A4, 2X	16 Characters	✓	✓	✓		CK
		2	-Minimum daily temperature (°F)	F5.0	0 - 100	✓	✓	✓		CK
		3	-Maximum daily temperature (°F)	F5.0	10 - 120	✓	✓	✓		CK
		4	-"Period 1" RVP (psi)	F5.1	7.0 - 16.0	✓	✓	✓		CK
		5	-"Period 2" RVP (psi)	F5.1, 1X	7.0 - 16.0	✓	✓	✓		CK
		6	-"Period 2" start year	I2	88 - 99, 00 - 20	✓	✓	✓		CK
		7	-Oxygenated fuel flag	1X, I1	1 - 2	✓	✓	✓		CK
		8	-Diesel sales fraction flag	1X, I1	1 - 2	✓	✓	✓		CK
	10		1 Oxygenated Fuel Descriptive Record (if LOCFLG = 2 and OXYFLG = 2)							
		1	-Ether blends market share	F4.3, 1X	0.0 - 1.00	✓	✓	✓		CK
		2	-Alcohol blends market share	F4.3, 1X	0.0 - 1.00	✓	✓	✓		CK
		3	-Average oxygen content of ether blend fuels (by weight)	F4.3, 1X	0.0 - .027	✓	✓	✓		CK
		4	-Average oxygen content of alcohol blend fuels (by weight)	F4.3, 1X	0.0 - .035	✓	✓	✓		CK
		5	-RVP waiver switch	I1	1 - 2	✓	✓	✓		CK
	11		1 Trip Length Distribution Record (if SPDFLG = 4)	6(1X, F4.1)	Fractional Units					

WORKSHEET
(Continued)

Data Level	Record Number	Field	Data Element	Required Format	Allowable Values	Format Check	Value Check	Missing Entry Check	Error Documentation Number	Reviewers Initials/ Date
One-time Data (cont.)	12		1 By Model Year Inclusion Vector Record (if OUTFMT = 5)	8I1, 2 (1X, I1)	1 - 2					
Scenario	1		1 Scenario Descriptive Record (MANDATORY)			✓	✓	✓		CK
		1	-Region	I1, 1X	1 - 2	✓	✓	✓		CK
		2	-Calendar year	I2, 1X	60 - 99, 00 - 20	✓	✓	✓		CK
		3	-Average speed • If SPDFLG = 1 ← • If SPDFLG = 2	F4.1 8(F4.1, 1X)	2.5 - 65.0 2.5 - 65.0	✓	✓	✓		CK
		4	-Ambient temperature (°F)	1X, F4.1	0.0 - 110.	✓	✓	✓		CK
		5	-Operating mode fractions	3(1X, F4.1)	0.0 - 100.	✓	✓	✓		CK
	2		1 Local Area Parameter Record (if LOCFLG = 1)	(See One-time Data Level: Record #9)						
	3		1 Oxygenated Fuel Descriptive Record (if LOCFLG = 1 and OXYFLG = 2)	(See One-time Data Level: Record #10)						
	4		3 Diesel Sales Fractions (if DSFLAG = 2 on LAP record and LOCFLG = 1)	See Section 2.3.10 of User's Guide to Mobile4.1						
	5		1 VMT Mix Record (if VMFLAG = 2)	8F4.3	0.00 - 1.00					
	6		1 Trip Length Distribution Record (if SPDFLG = 3)	(See One-time Data Level: Record #11)						
	7		1 Additional Correction Factor Record (if ALHFLG = 2 or 3)							
		1	Air conditioning use fraction	F4.2	0.00 - 1.00					
		2-4	Extra load fractions	3F4.2	0.00 - 1.00					
		5	Trailer towing fractions	F4.2	0.00 - 1.00					
		or								
		5-7	Percent assumed to be towing	3F4.2	0.00 - 1.00					

WORKSHEET
(Continued)

Data Level	Record Number	Field	Data Element	Required Format	Allowable Values	Format Check	Value Check	Missing Entry Check	Error Documentation Number	Reviewers Initials/ Date
Scenario (cont.)		6 or 8	Absolute humidity level	F4.0	20 - 140.					
		9 or 10	Dry and wet bulb temperatures (°F)	2F4.0	0 - 110.					

MRI REPORT

Quality Review of 1990 Base Year Draft CO Emission Inventory for Clark County Nevada

Interim Report No. 8

For U.S. Environmental Protection Agency
Emission Inventory Branch
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

MRI Project No. 9711-M(33-19)

June 22, 1992

MIDWEST RESEARCH INSTITUTE 425 Volker Boulevard, Kansas City, MO 64110-2299 • (816) 753-7600

SECTION 3

DETAILED COMMENTS

Detailed comments resulting from MRI's review of the Clark County, Nevada emission inventory are presented in Table 1. Comments are classified as pertaining to stationary point sources, stationary area sources, mobile sources, biogenic sources, and compliance with the inventory implementation plan (IPP) and QA plan.

TABLE 1. DIRECTIVES FOR EMISSION INVENTORY REVISION

Comment No.	Section/ page	Comments	Final review backcheck	
			Done	Not done
STATIONARY POINT SOURCES				
1	1-3, 2-3	The CO season daily emissions from point sources in Table 1-2 do not equal the CO season daily emissions in Table 2-1. This discrepancy needs to be resolved.	✓	
2	App. A	It is not clear how many chlorinators were in use at TIMET in 1990. The CO emission measurement for chlorination is annotated to show that it is based on two chlorinators and that TIMET has the capacity to utilize four chlorinators. The total 1990 CO emission however, is apparently based on using four chlorinators. If, on the average, TIMET only used two chlorinators during 1990, then the total of 10,362.5 TPY is an overestimate; and the correct total would be 5,192.5 TPY. If all four chlorinators were used during the winter CO season of 1990-1991, then the total of 10,362.5 TPY is a good estimate. TIMET should be contacted to verify CO emissions in winter 1991 due to chlorination.	✓	

Comment No.	Section/ page	Comments	Final review backcheck	
			Done	Not done
STATIONARY AREA SOURCES				
3	3-2	The activity levels and emission factors are not given for the minor stationary sources listed in Table 3-1. These could not be found in Appendix B or in the files on the diskettes which accompanied the inventory. Include the activity levels and emission factors in the inventory for all area sources.	✓	
4	3-4	In Table 3-1 the annual CO emissions and the daily CO emissions for minor stationary sources are shown to be 798.4 tons and 4374.8 pounds respectively but are shown to be 1021 tons and 6879 pounds in Table 1-2. These emissions should be the same or the differences should be explained.	✓	
5	3-4	In Table 3-1 the annual CO emissions and the daily CO emissions for steam generating boilers are shown to be 119.8 tons and 2106.37 pounds respectively but are shown to be 119.8 tons and 656.4 pounds in the example in the documentation and are shown to be 120 tons and 1582 pounds in Table 1-2. These emissions should match or the differences should be explained.	✓	
6	3-9	In Table 3-4 the CO emissions from residential natural gas combustion are shown to be 190 TPY. In Table 1-2 and in Appendix B these emissions are shown to be 91 TPY. The CO emissions per day are shown to be the same in Table 3-4, Table 1-2 and in Appendix B. These annual CO emissions should be the same in each table or the reasons for the differences should be given.	✓	
7	3-9	In Table 3-4 the total CO emissions from natural gas combustion is shown to be 478 TPY. In Table 1-2 the total CO emissions from natural gas combustion is shown to be 379 TPY. The daily CO emissions are shown to be the same in Table 3-4 and Table 1-2. The annual CO emissions for total natural gas combustion should be the same in these tables or the reasons for the differences should be given.	✓	

Comment No.	Section/ page	Comments	Final review backcheck	
			Done	Not done
8	App. B	The annual and period CO emission values have been manually changed on the AMS-PC INVENTORY REPORT for several categories; see natural gas, military aircraft and commercial aircraft. Explain these changes.	✓	
9	3-7	In the calculation to define brush fires the total should be 665.5 total acres burned not 66.5.5.	✓	
10	1-3, 3-9	Is solid waste incineration included with the minor stationary emissions in Table 3-1 or with brush/trash fires on page 3-9? Include the solid waste CO emissions in the CO inventory.	N/A	
11		The inventory did not include AMS-PC .dbf files; two diskettes were included, with six AMSAREA.XXX files on them. AMSAREA.BK1 contained parts of the FoxPro help file and some other unreadable data. AMSAREA.BK2 contained what was partially referred to as a semi-mobile-point source list, a "portable" source list and an asbestos source list. AMSAREA.BK3 contained the "Default Emissions File Report". Please submit .dbf files.	N/A	
MOBILE SOURCES				
12	4-4	Assignment group #8, collector, should be separated into major and minor collector roads.	N/A	
COMPLIANCE WITH IPP AND QA PLANS				
13		The final report should be audited.	✓	

RESPONSES TO MRI
DETAILED COMMENTS ON THE DRAFT
EMISSIONS INVENTORY FOR LAS VEGAS, CLARK COUNTY NEVADA

1. The daily CO seasonal emissions from point sources in Table 2-1 are correct. The discrepancy in Table 1-2 is attributed to data transfer while documenting the emission inventory. Table 1-2 has been corrected to reflect to the true emissions from point sources.

2. TIMET only operated two chlorinators during 1990. The emissions associated with this facility were based on source testing and the value of 10,363 tons per year is correct.

3. See attached memorandum from Clark County Health District.

4. The values in Table 3-1 are the correct for minor stationary sources. Table 1-2 been modified to resolve this discrepancy.

5. Table 3-1 does not contain emissions from steam generating boilers; however, Table 3-2 does. The correct value for daily seasonal emissions is 2,106 pounds per day. The value in Table 1-2 does not reflect the 80% seasonal adjustment factor.

6. The 1990 ton per year value in Table 3-4 is a typographical error. The correct value is 91 tons per year and Table 3-4 has been changed to reflect this.

7. Table 3-4 has been corrected in conjunction with the previous comment.

8. AMS-PC inventory reports were included to provided additional detailed information used to calculate emissions. Manual changes occurred as a result of the QA/QC process. These reports have not been included as part of the final inventory as all data has been entered into AIRS and this agency does not have printer connectivity with this system.

9. This typographical error has been corrected.

10. Solid waste incineration does not occur in this nonattainment area. Therefore, it is excluded from the inventory. This fact has also been mentioned in Chapter 3 of the inventory.

11. The diskettes which were included with the draft inventory were in a DOS backup format. No diskettes will be submitted with the final Air Quality Implementation Plan (AQIP) and Inventory. This information will be available through AIRS.

12. AMS and AIRS do not differentiate between major and minor collectors. All collectors in this nonattainment area are considered as major collectors.

13. The final Emission Inventory along with the AQIP have undergone a final audit.

CLARK COUNTY HEALTH DISTRICT
P.O. BOX 4426 • 625 SHADOW LANE • LAS VEGAS, NEVADA 89127 • 702-385-1291 • FAX 702-384-[illegible]

Act	Info	Dist	Initial
		RBH	
		RTS	
		DAS	
		OCH	
		DAW	
		BJR	
		CK	
FILE:			

'92 SEP -9 P2:34
RECEIVED

MEMORANDUM

TO: Clete Kus, Planner - CC Comprehensive Planning

FROM: Susan J. Ward, Permit Specialist II SJW

DATE: September 8, 1992

RE: MRI Interim Report No. 8 - DRAFT CO Emissions Inventory

Comment Number 3:

The minor Stationary Sources were handled as area sources per EPA. With EPA's approval, Air Pollution Control Division (APCD) submitted all information regarding the individual Stationary Sources via AIRS/AFS. Because there is no ONE emission factor or activity level associated with this sub-group, it could not be adequately entered into AMS/PC and therefore was reported to AIRS/AFS.

I hope this adequately explains this discrepancy, if not though, I can try again.

Thanks, Susan