APPENDIX B

Emission Inventories Methodology, Emission Factors, and Emission Estimates

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Appendix B: Emissions Inventories Methodology, Emission Factors, and Emission Estimates

INTRODUCTION

One of the first steps of the proportional rollback model is the development of an emission inventory for the study area. Annual and 24-hour emission inventories were prepared for the PM_{10} nonattainment area as required for the PM_{10} State Implementation Plan (SIP). For the Bureau of Land Management (BLM) disposal area, two annual emissions inventories and six 24-hour emissions inventories were developed. The nonattainment area was designated valley-wide for descriptive purposes when describing inventories that cover only the BLM disposal area. All other inventories are micro-scale and described by the name of the monitoring station upon which the two-kilometer square area is centered.

Dames & Moore prepared the inventories for the five micro-scale sites under contract to Clark County. A copy of the final report is presented in Appendix D. The County modified the micro-scale inventories prepared by Dames & Moore when new data became available. Clark County prepared all other inventories used for proportional rollback modeling.

The inventories were prepared using four basic steps:

1. Identify potential PM_{10} sources in the study area;
2. Determine the activity level for each source;
3. Develop emission factors for each source; and
4. Use the activity level and emission factors to calculate the emissions.

In this appendix, each of these steps will be discussed in detail for the nonattainment area annual inventory, the nonattainment area 24-hour inventory, the valley-wide annual inventory, the valley-wide 24-hour emission inventory, and the annual J. D. Smith micro-scale inventory. The change made to the 24-hour micro-scale inventories will also be discussed. Inventory projections for 2001 and 2006 will be discussed in Appendix E. Calculations of emissions after SIP-adopted controls are presented in Appendix L.

The inventories were quality assured by an independent contractor. The quality assurance report is included in this appendix.

POTENTIAL PM_{10} SOURCES

Potential sources of primary, secondary and condensable PM_{10} were identified in the Clark County Emission Inventory Preparation Plan, September 1999.[1] The procedures by which emissions in a completed base year or projection year

[1] *Clark County Emission Inventory Plan*, developed by The Emission Inventory Preparation Committee, Clark County Department of Comprehensive Planning, September, 1999.

inventory are estimated can be found in the United States Environmental Protection Agency (U. S. EPA) guidance document (Guidance).[2] The potential emission sources were grouped into four broad categories: stationary point sources, stationary area sources, nonroad mobile sources and onroad mobile sources. A detailed listing of the potential sources by category is presented below.

Stationary Point Sources
- Electric Utilities
- Cogeneration Stations
- Boilers
- Furnaces
- Ovens
- Food Processing
- Agricultural Processes
- Service Fuel Combustion
- Commercial Fuel Combustion
- Sewage Treatment Plants
- Landfills
- Incinerators
- Recycling Facilities
- Laundering
- Degreasing
- Coatings
- Solvent Processes
- Printing
- Spray Paint Booths
- Petroleum Marketing
- Chemical Manufacturing
- Food Processing
- Agricultural Processes
- Mineral Processes
- Metal Processes
- Wood and Paper Manufacturing
- Glass Manufacturing
- Electronics Manufacturing

Stationary Area Sources
- Consumer Products
- Architectural Coatings
- Pesticides

[2] *Emission Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations*, EPA-454/R-99-006; U. S. Environmental Protection Agency, April, 1999.

- Fertilizers
- Asphalt Paving
- Refrigerants
- Residential Fuel Combustion
- Farming Operations
- Construction and Demolition
- Paved Road Dust
- Unpaved Road Dust
- Fugitive Windblown Dust
- Fires
- Waste Burning
- Small Point Sources
- Charbroiling/Meat Cooking

Nonroad Mobile Sources
- Aircraft Support Equipment
- Aircraft
- Trains
- Recreational Boats
- Off-road Recreational Vehicles
- Commercial Equipment
- Industrial Mobile Equipment
- Farm Support Equipment
- Construction and Mining Equipment
- Lawn and Garden Equipment
- Logging Equipment
- Snow Equipment

Onroad Mobile Sources
- Light-Duty Passenger Vehicles
- Light-Duty Trucks
- Medium-Duty Trucks
- Light Heavy-Duty Gas Trucks
- Medium Heavy-Duty Gas Trucks
- Light Heavy-Duty Diesel Trucks
- Medium Heavy-Duty Diesel Trucks
- Heavy Heavy-Duty Diesel Trucks
- Motorcycles
- Heavy-Duty Diesel Urban Buses

The list of potential sources presented above was used to review each inventory area, determine which sources were present, and, when necessary, quantify the number of each source type.

Nonattainment Area Potential PM_{10} Sources

Stationary Point Sources

The Clark County Health District Air Quality Division (AQD) tracks stationary point sources and issues Variable Location Permits (VLP) to sources that will be present at one location less than one year. A point source is defined by AQD as a source having 5.0 tons or more of PM_{10} emissions a year.[3] In 1998, within the nonattainment area, there were 46 permitted point sources and 178 permitted non-point (emitting less than 5.0 tons PM_{10}) sources. Seven of the permitted point sources were considered major sources because they had the potential to emit at least 70 tons per year of PM_{10}.

For the 1998 base year emissions inventory, the permitted point sources were grouped into five general categories:

- Sand & gravel operations;
- Utilities – natural gas;
- Asphalt concrete manufacturers;
- Industrial processes; and
- Other sources.

The emissions from non-point sources were labeled "small point sources" and listed with other area sources.

Stationary Area Sources

Many of the stationary area sources in the list are not present in the nonattainment area at levels sufficient for further study. Consumer products, architectural coatings, pesticides, fertilizers, and refrigerants are generally associated with Volatile Organic Compound (VOC) emissions rather than PM_{10} emissions. Farming operations are not present in the nonattainment area at any level approaching significance. The need for irrigation and the high cost of water in the area make farming operations economically infeasible. Open waste burning is prohibited under Regulation 42 of the Clark County Health District Air Quality Regulations. The only known waste incinerators are permitted as part of a larger stationary point source. The emissions from these incinerators are included in the stationary point sources.

Residential Fuel Combustion: Most residential fuel combustion in the Las Vegas Valley is associated with natural gas-fired furnaces and appliances. Fireplaces and wood stoves are also present within the nonattainment area.

Natural gas fuel combustion at residences and businesses throughout the nonattainment area was accessed using the natural gas sales report from Southwest Gas Corporation for the Southern Nevada Division for 1998. Southwest Gas Corporation (SWG) is the only supplier of natural gas within the micro-inventory area. Natural gas combustion was divided into four categories:

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[3] Mike Sword, Assistant Director, Air Quality Division, letter to Russell Roberts, Clark County Comprehensive Planning, July 26, 2000.

- Residential natural gas;
- Commercial natural gas;
- Industrial natural gas; and
- NG – Purchased at the source – Carried by SWG.

The category, NG – purchased at the source – carried by SWG, refers to natural gas combusted by Southwest Gas Corporation (SWG) at compressor stations as part of the supply system for the natural gas.

Construction and Demolition: Construction on parcels one-fourth acre or larger is regulated by the AQD through the dust permitting program. Demolition of buildings 1,000 square feet or greater is also regulated through the dust permitting program. Construction site emissions were calculated for construction activities and wind erosion of soil that had been disturbed by construction activities. There were 19,449 acres of land under construction in 1998.

Paved Road Dust: Paved road dust is recognized as a potentially significant source of PM_{10} in the Las Vegas Valley. While classified as an area source in the PM_{10} emission inventory plan, paved road dust emissions are presented under Onroad Mobile Sources in the emission inventories in the SIP. Paved road dust emissions are included in the transportation conformity budget and were included with onroad mobile sources for that reason. Vehicle miles traveled (VMT) within the nonattainment area are modeled by the Regional Transportation Commission of Clark County (RTC).

Unpaved Road Dust: There are many miles of unpaved roads within the nonattainment area. As part of the preparation of the inventory for the SIP, publicly owned and maintained and private unpaved roads were inventoried. The SIP inventory for the nonattainment area includes 263.5 miles of unpaved roads in 1998. Unpaved road dust emissions are included in the transportation conformity budget and were included with onroad mobile sources section of the inventories for that reason.

Fugitive Windblown Dust: Fugitive windblown dust can occur from any vacant land parcel. Land within the nonattainment area was broadly classified into the following categories:

- BLM disposal area – 303,776 acres;
- Public and private land (outside the BLM disposal area) – 132,504 acres;
- Bureau of Reclamation – 9,689 acres;
- Desert National Wildlife Refuge – 226,728 acres;
- Lake Mead National Recreational Area – 1,148 acres;
- Nellis Air Force Base (outside the BLM disposal area) – 5,700 acres;
- Nellis Bombing and Gunnery Range – 8,404 acres;
- Nellis Small Arms Range – 11,020 acres;
- Piute – Snow Mountain Indian Reservation – 3,907 acres;
- Red Rock Canyon National Conservation Area – 195,780 acres;
- Spring Mountain State Park – 561 acres;

- Toiyabe National Forest – 60,073 acres; and
- Floyd R. Lamb State Park – 710 acres.

Vacant land within the boundaries of the BLM disposal area was inventoried by UNLV. Their report is presented in Appendix D. According to the report prepared by UNLV, there were 148,575 acres of land described as vacant by the Clark County Assessor in mid-November of 1999. There were 19,449 acres with construction in 1998 and 21,881 acres with construction in 1999. Assuming all construction occurred on vacant land, the acres constructed in 1998 and 87.5 percent (10.5 months out of 12 months) of the acres constructed in 1999 should be added to the 148,575 acres vacant at the end of 1999 to determine the number of acres vacant in 1998. The total number of acres of vacant land in the BLM disposal area in 1998 is 187,189 acres (148,575 acres + 19,449 acres + 19,165 acres).

Vacant land was classified as native desert, stabilized, or unstable for emission inventory purposes. Vacant land within the BLM disposal area, and the public and private land outside the BLM disposal area but within the nonattainment area, was classified using surveys of smaller areas.

For the micro-scale inventories surrounding five monitoring sites, vacant land was tested using the test methods described in Regulation 90 of the Clark County Health District Air Quality Regulations (AQR)(See Appendix B). Each homogeneous area of a given parcel was tested and the vacant land classified as unstable, stabilized, or native desert. The percentage of vacant land that was classified as unstable varied between 10 percent and 59 percent. Those micro-scale areas with the largest number of acres of vacant land averaged almost 20 percent of vacant land classified as unstable. The overall average from all five micro-inventory sites dropped to 15 percent.

The Clark County Health District's (CCHD) enforcement staff was asked to give an estimate of the vacant land they inspected.[4] Noting that the enforcement staff watched for areas where they saw dust being emitted, they gave a qualitative estimate of the percentage of unstable vacant land from their field observations at 20 percent.

Several parcels were tested by UNLV using the test methods in Regulation 90 of the AQR.[5] Approximately one percent were classified as unstable. The UNLV study did not subdivide parcels into homogeneous areas to determine classifications so it is probable that unstable areas within parcels that were largely stable were not classified as unstable.

[4] Cheryl McDonnell-Canan and Lewis Wallenmeyer, Clark County Health District, Air Quality Division, personal communication, 2000.

[5] James, David, Pulgarin, Johan, Srinivas, Pulugurtha, Edwards, Sherrie, Becker, Jon, and Park, Monte; *Estimation of Valley-wide PM_{10} Emission Using UNLV 1995 Wind Tunnel-derived Emission Factors, 1998-1999 Emission Factors, Revised Vacant Land Classifications, and GIS-based Mapping of Vacant Lands*, September 13, 2000.

From the analysis that is available, the percentage of unstable land can be limited to a range of one percent to 20 percent. We know that the estimate from AQD enforcement staff was qualitative and likely to be high because the staff focuses on unstable areas. The micro-inventory sites are also representative of areas with higher-than-average PM_{10} sources surrounding them because the monitors at these sites have measured concentrations above the 24-hour standard. The UNLV study may have underestimated the percentage of unstable land because parcels were not subdivided into homogeneous areas. Therefore, it can be assumed the representative percentage of unstable land within the BLM disposal area and for public and private use outside the BLM disposal area is higher than one percent and lower than 15 percent. Rather than assume an average of eight percent, Clark County Department of Comprehensive Planning has assumed ten percent of the vacant land is unstable. This may overpredict the actual emissions from this source, but is unlikely to be an underprediction. The source can be evaluated to determine potential above-average impacts and the more conservative estimate is health protective of the exposed population.

The UNLV study did not classify stable land as native desert or stabilized. Using the three micro-inventory sites with the greatest number of acres of vacant land, Craig Road, Green Valley, and Pittman, the average percentage native desert and stabilized land was calculated. The average percentages were then applied to the stable vacant land (90 percent of vacant land). 67.5 percent of the stable land was estimated to be native desert and 32.5 percent of the stable land was classified as stabilized.

Based upon the percentage of unstable land and the ratio of native desert to stabilized vacant land, the distribution of vacant land is as follows:

- ten percent unstable;
- sixty percent native desert; and
- 30 percent stabilized.

The ratio of unstable to stabilized is three to one, or seventy-five percent unstable and twenty-five percent stabilized. These factors were applied to the vacant land in the BLM disposal area and the land outside the BLM disposal area determined to have public and private use.

Other land uses within the nonattainment area but outside the BLM disposal boundary were designated vacant. The vacant land classification was based upon land use. For example, the Nellis Bombing and Gunnery Range was classified as disturbed because of the activity that takes place there, while the Toiyabe National Forest was classified as stabilized because of the forest vegetation that grows there. Table B-1 summarizes the vacant land classification for the nonattainment area.

Table B-1

1998 Vacant Land Classification Within the Nonattainment Area (Acres)

Land Use	Classification	Acres
BLM Disposal Area	Native Desert	113,804
	Stabilized	54,666
	Unstable	18,719
Public and Private Lands (outside BLM disposal area)	Native Desert	80,828
	Stabilized	38,426
	Unstable	13,250
Bureau of Reclamation	Native Desert	9,689
Desert National Wildlife Range	Native Desert	226,728
Lake Mead National Recreational Area	Native Desert	8,404
Nellis Air Force Base (outside the BLM disposal area)	Stabilized	5,700
Nellis Bombing and Gunnery Range	Unstable	8,404
Nellis Small Arms Range	Unstable	11,020
Piute – Snow Mountain Indian Reservation	Native Desert	3,907
Red Rock Canyon National Conservation Area	Native Desert	195,780
Spring Mountain State Park	Native Desert	561
Toiyabe National Forest	Stabilized	60,073
Tule Springs State Park	Native Desert	710
Total	**Native Desert**	**633,155**
	Stabilized	**158,865**
	Unstable	**51,393**

Fugitive dust is presented in the emissions inventory in the following categories:

- Disturbed vacant lands/unpaved parking lots;
- Native desert fugitive dust;
- Stabilized vacant land dust; and
- Windblown construction dust.

Fires: A Federal Emergency Management Agency (FEMA) report published in 1994 gave a ratio of 2.3 fires per year per 1,000 people. The 1998 nonattainment area has a population of 1.17 million people. Based upon the FEMA statistic, there were approximately 2,700 fires within the nonattainment area.

Charbroiling/Meat Cooking: In May of 1998, a consultant prepared a report under contract to AQD entitled Las Vegas Valley Broiler Emissions Inventory for Clark County Health District. Based upon this report, there are 1,460 charbroilers in commercial restaurants in the Las Vegas Valley. The number of charbroilers was increased by one percent based upon the population ratio to represent charbroiling and meat cooking throughout the nonattainment area. A total of 1,475 charbroilers in commercial restaurants was estimated for the entire nonattainment area.

Nonroad Mobile Sources

Of the sources listed under nonroad mobile sources, a few were not found in the nonattainment area. There are not any navigable water bodies within Hydrographic Basin 212 so recreational boats were removed. Likewise, the scarcity of water and more economically viable uses of land in Hydrographic Basin 212 have effectively eliminated agricultural operations in the Clark County nonattainment area. Therefore, agricultural equipment was not included in the inventory. Although it does snow occasionally, snow equipment is not maintained in the region. In 1998, it snowed during the early morning of December 5th. The snow had melted before noon without the aid of any snow equipment. Logging equipment was also removed from the inventory as no commercial logging enterprises operate within the Las Vegas Valley.

Nonroad Engines: Of the remaining sources listed under Nonroad Mobile Sources, all except aircraft and trains have been inventoried in *Nonroad Engine Emission Inventories for CO and Ozone Nonattainment Boundaries Las Vegas Area.*[6] The carbon monoxide (CO) nonattainment boundary is Hydrographic Basin 212, matching the nonattainment area for PM_{10}. The inventory was prepared for 1990 and the nonattainment area population was listed as 741,459.

Based upon the Regional Transportation Commission of Clark County 1997 estimates and projections, the population of the BLM disposal area in 1998 was 1,153,667. A ratio of population from 1990 to 1998 is 1.56 (1,153,667/ 741,459). This factor was applied to the number of pieces of equipment inventoried in 1990 and the result rounded to the nearest whole number. Table B-2 lists the equipment in the inventory, the 1990 inventory, and the 1998 projection.

Clark County Department of Comprehensive Planning has estimated from the most recent census numbers available, though not yet finalized, that over 99 percent of the nonattainment area population is within the BLM disposal area. Therefore, the BLM disposal area nonroad inventory was increased by one percent for the nonroad engines in the U. S. EPA report.[7]

The U. S. EPA report[8] did not include any equipment counts for airport ground support equipment. There are four airports in the nonattainment area: Nellis Air Force Base, McCarran International Airport, North Las Vegas Airport, and Sky Harbor Airport (Henderson). Aircraft support equipment was included in the *Nonroad Engine and Vehicle Emission Study – Report* completed by U. S. EPA

[6] *Nonroad Engine Emission Inventories for CO and Ozone Nonattainment Boundaries Las Vegas Area*, U. S. Environmental Protection Agency: Ann Arbor, Michigan, 1992.
[7] Ibid.
[8] Ibid.

in 1991.[9] This report inventoried the entire United States of America. A ratio of population in the nonattainment area in 1996 to the 1990 national population was completed as part of the Clark County Carbon Monoxide Air Quality Implementation Plan.[10] The resulting factor was used to estimate the number of aircraft support equipment for 1996. The population of aircraft support equipment for 1998 was developed by applying the same RTC growth factors for population growth from 1996 to 1998 (ratio of 1.1116) to the 1996 CO inventory.

The U. S. EPA report[11] on the number on off-road motorcycles appeared to be significantly less than the number of off-road motorcycles reported in the CO inventory.[12] Using the nonroad report and applying the appropriate growth adjustment, an off-road motorcycle population of 772 vehicles would be estimated. The CO inventory estimated nearly 2,000 off-road motorcycles in use in the area based in part on vehicle registration of dual purpose vehicles (both on-road and off-road use). Conservatively, the vehicle population estimates from the CO inventory were used to estimate the population of off-road motorcycles for the PM_{10} SIP.

Due to the number of different types of nonroad engines, the engines were grouped into five subcategories:

- Airport support equipment (ASE);
- Commercial equipment (COM);
- Construction and Mining Equipment (CONS);
- Lawn & Garden Equipment (LEGC); and
- Recreational equipment (REC).

The subcategory into which each piece of equipment was placed is abbreviated in the last column of Table B-2.

Table B-2

Nonattainment Area Nonroad Engines Inventory

Equipment Type	Engine Type	1990 Equipment Population	1998 Equipment Population	Sub-category
Terminal Tractor	Diesel	786	874	ASE
	4 Stroke Gasoline	79	88	ASE
Aircraft Support Equipment	Diesel	116	129	ASE
	4 Stroke Gasoline	28	31	ASE

[9] *Nonroad Engine and Vehicle Emission Study – Report*, ANR-443; U. S. Environmental Protection Agency, Office of Air and Radiation: Washington, D.C., November, 1991.
[10] *Carbon Monoxide Air Quality Implementation Plan, Appendices, Volume I, Appendix A: Emission Inventory*, Clark County Department of Comprehensive Planning, October, 1995.
[11] Op. Cit.
[12] Op. Cit.

Table B-2

Nonattainment Area Nonroad Engines Inventory (continued)

Generator Sets < 50 HP	Diesel	6	9	COM
	4 Stroke Gasoline	87	136	COM
	2 Stroke Gasoline	1	2	COM
Pumps < 50 HP	Diesel	2	3	COM
	4 Stroke Gasoline	17	27	COM
	2 Stroke Gasoline	3	5	COM
Air Compressors < 50 HP	Diesel	1	2	COM
	4 Stroke Gasoline	6	9	COM
Welders < 50 HP	Diesel	3	5	COM
	4 Stroke Gasoline	10	16	COM
Pressure Washers < 50 HP	4 Stroke Gasoline	8	12	COM
Forklifts	Diesel	1	2	COM
	4 Stroke Gasoline	1	2	COM
Asphalt Pavers	Diesel	59	92	CONS
	4 Stroke Gasoline	11	17	CONS
Tampers/Rammers	4 Stroke Gasoline	4	6	CONS
	2 Stroke Gasoline	84	131	CONS
Plate Compactors	Diesel	8	12	CONS
	4 Stroke Gasoline	831	1296	CONS
	2 Stroke Gasoline	196	306	CONS
Concrete Pavers	Diesel	20	31	CONS
Rollers	Diesel	325	507	CONS
	4 Stroke Gasoline	83	129	CONS
Scrapers	Diesel	161	251	CONS
Paving Equipment	Diesel	164	256	CONS
	4 Stroke Gasoline	820	1279	CONS
	2 Stroke Gasoline	44	69	CONS
Surfacing Equipment	4 Stroke Gasoline	115	179	CONS
Signal Boards	Diesel	76	119	CONS
	4 Stroke Gasoline	6	9	CONS
Trenchers	Diesel	189	295	CONS
	4 Stroke Gasoline	101	158	CONS
Bore/Drill Rigs	Diesel	29	45	CONS
	4 Stroke Gasoline	31	48	CONS
Excavators	Diesel	230	359	CONS
Concrete/Industrial Saws	Diesel	1	2	CONS
	4 Stroke Gasoline	139	217	CONS
Cement and Mortar Mixers	Diesel	15	23	CONS
	4 Stroke Gasoline	869	1356	CONS
Cranes	Diesel	368	574	CONS
	4 Stroke Gasoline	9	14	CONS
Graders	Diesel	262	409	CONS
Off-Highway Trucks	Diesel	62	97	CONS
Crushing/Processing Equipment	Diesel	27	42	CONS

Table B-2

Nonattainment Area Nonroad Engines Inventory (continued)

	4 Stroke Gasoline	4	6	CONS
Rough Terrain Forklifts	Diesel	202	315	CONS
	4 Stroke Gasoline	8	12	CONS
Rubber Tired Loaders	Diesel	785	1225	CONS
	4 Stroke Gasoline	13	20	CONS
Rubber Tired Dozers	Diesel	29	45	CONS
Tractors/Loaders/ Backhoes	Diesel	1120	1747	CONS
	4 Stroke Gasoline	5	8	CONS
Crawler Tractors	Diesel	1070	1669	CONS
Skid Steer Loaders	Diesel	562	877	CONS
	4 Stroke Gasoline	104	162	CONS
Off-Highway Tractors	Diesel	146	228	CONS
Dumpers/Tenders	Diesel	1	2	CONS
	4 Stroke Gasoline	91	142	CONS
Other Construction Equipment	Diesel	45	70	CONS
	4 Stroke Gasoline	4	6	CONS
Lawn & Garden Tractors	Diesel	282	440	LEGC
	4 Stroke Gasoline	7822	12202	LEGC
Chippers/Stump Grinders	Diesel	20	31	LEGC
	4 Stroke Gasoline	19	30	LEGC
Commercial Turf Equipment	Diesel	102	159	LEGC
	4 Stroke Gasoline	557	869	LEGC
Other Lawn & Garden Equipment	4 Stroke Gasoline	331	516	LEGC
	2 Stroke Gasoline	128	200	LEGC
Trimmers/Edgers/ Brush Cutters	4 Stroke Gasoline	26	41	LEGR
	2 Stroke Gasoline	21786	33986	LEGR
Lawn Mowers	4 Stroke Gasoline	37290	58172	LEGR
	2 Stroke Gasoline	4166	6499	LEGR
Leaf Blowers/Vacuums	2 Stroke Gasoline	3121	4869	LEGR
Rear Engine Riding Mowers	Diesel	6	9	LEGR
	4 Stroke Gasoline	1000	1560	LEGR
Front End Mowers	4 Stroke Gasoline	161	251	LEGR
Shredders < 5 HP	4 Stroke Gasoline	101	158	LEGR
	2 Stroke Gasoline	23	36	LEGR
Specialty Vehicles/Carts	Diesel	8	12	REC
	4 Stroke Gasoline	257	401	REC
	2 Stroke Gasoline	494	771	REC
All Terrain Vehicles (ATVs)	4 Stroke Gasoline	2904	4530	REC
	2 Stroke Gasoline	327	510	REC
Minibikes	4 Stroke Gasoline	120	187	REC

Table B-2

Nonattainment Area Nonroad Engines Inventory (continued)

Off-road Motorcycles	4 Stroke Gasoline	N/A	1027	REC
	2 Stroke Gasoline	N/A	864	REC
Golf Carts	4 Stroke Gasoline	231	360	REC
	2 Stroke Gasoline	71	111	REC

Aircraft Emissions: As previously mentioned, there are four airports in the nonattainment area. An outside contractor estimated emissions from aircraft from the three airports under the jurisdiction of the Clark County Department of Aviation and provided the inventory to Clark County Comprehensive Planning.[13] Similarly, Nellis Air Force Base (Nellis AFB) used another outside contractor to calculate aircraft emissions for 1998 from the airbase. The aircraft emissions inventory for Nellis AFB was also provided to Clark County.[14]

Train Equipment: Two types of railroad activity occur in the Las Vegas Valley: line haul and track switching. Union Pacific Railroad is a Class I railroad that operates in the Las Vegas nonattainment area. A total of 41 track miles are within the nonattainment area, with less than one percent outside the BLM disposal boundary area. Union Pacific's switching operations include two switch engines.

Onroad Mobile Sources

Provided by Guidance and included in the emission inventory plan was a listing of different onroad vehicle types typically found in metropolitan areas. In addition to the exhaust, brake wear, and tire wear emissions from these vehicles, paved road dust, unpaved road dust, and highway construction emissions were included in the emission inventory under onroad mobile sources. These sources were grouped in this manner to aid in the development of the transportation conformity budget determination.

BLM Disposal Boundary Area Inventory of Potential PM_{10} Sources

The 1998 inventory for the BLM disposal area matches the inventory for the nonattainment area for most sources except vacant land. The population within the BLM disposal area is estimated to be over 99 percent of the population of the total nonattainment area. Sometimes the nonattainment area inventory has been scaled based upon this population increment as previously described. Many times an entire source category is the same because all of the sources are within

[13] *PM_{10} Emissions Inventory – McCarran International Airport, North Las Vegas Airport, Henderson Executive Airport*, submitted to Clark County Department of Aviation, February, 2000.
[14] Catherine MacDougall, Dames & Moore, Inc., personal communication to Rick Matar, Clark County Department of Comprehensive Planning, 1999.

the BLM disposal area, such as all of the airports within the nonattainment area. The sources in the two inventories are the same except where indicated below.

<u>Stationary Point Sources</u>
All of the point sources with permits except James Hardie Gypsum are within the BLM disposal boundary area. The emissions from this source were not included in the BLM disposal area inventory. The source is located to the west of the BLM disposal area, separated by a ridge. The source is permitted by AQD and located on land established as mining claims before the implementation of the BLM disposal area boundary.

<u>Stationary Area Sources</u>
The same sources that were eliminated from the nonattainment area inventory were found to be not present in the BLM disposal area as well. The BLM disposal area is within the nonattainment area. Residential firewood combustion, residential natural gas combustion, structural/vehicle wild fires, and charbroiling/meat cooking sources were estimated based upon population to be 99 percent of the nonattainment inventory.

Construction and Demolition: As a conservative estimate, it was assumed that all construction and demolition would occur within the BLM disposal area. This is a fairly realistic estimate given that most of the land outside the BLM disposal area is under federal government control, changes in land use are not planned, and it would likely require congressional action to change designated land uses. None of the dust permits issued by AQD in 1998 for construction or demolition were within the nonattainment area and outside the BLM disposal area.

Paved Road Dust: The Regional Transportation Commission of Southern Nevada (RTC) does not model roadways outside the BLM disposal boundary area. Based upon the few traffic counts they did have of roadways within the nonattainment area but outside the BLM disposal area, the percentage of traffic outside the BLM disposal area was less than one percent. Therefore, the BLM disposal area paved road dust is assumed to be 100 percent of the modeled vehicle miles traveled and the inventory for the entire nonattainment area was increased by one percent.

Unpaved Road Dust: There are 4.5 miles of unpaved roads outside the BLM disposal area. Therefore, there are 259 miles of unpaved roads within the BLM disposal boundary area.

Fugitive Windblown Dust: The vacant land within the BLM disposal area was inventoried as part of the vacant land within the nonattainment area. In Table B-1, the acreage of vacant land is listed by vacant land classification for the BLM disposal boundary area. These acreages are:

- native desert – 113,804 acres;

- stabilized land – 54,666 acres; and
- unstable land – 18,719 acres.

<u>Nonroad Mobile Sources</u>

The nonroad emission inventory was based on the population of the BLM disposal area except for the airports and airport support equipment as previously described (See Table B-3). As all the airport activities are within the BLM disposal area, the sources were the same as the nonattainment area. All other sources were ratioed based upon population, with the BLM disposal area sources set one percent lower than the nonattainment area sources for:

- commercial equipment;
- construction & mining equipment;
- lawn & garden equipment;
- railroad equipment; and
- recreational equipment.

Table B-3

BLM Disposal Area Nonroad Engines Inventory

Equipment Type	Engine Type	1990 Equipment Population	1998 Equipment Population	Sub-category
Terminal Tractor	Diesel	786	874	ASE
	4 Stroke Gasoline	79	88	ASE
Aircraft Support Equipment	Diesel	116	129	ASE
	4 Stroke Gasoline	28	31	ASE
Generator Sets < 50 HP	Diesel	6	9	COM
	4 Stroke Gasoline	87	136	COM
	2 Stroke Gasoline	1	2	COM
Pumps < 50 HP	Diesel	2	3	COM
	4 Stroke Gasoline	17	27	COM
	2 Stroke Gasoline	3	5	COM
Air Compressors < 50 HP	Diesel	1	2	COM
	4 Stroke Gasoline	6	9	COM
Welders < 50 HP	Diesel	3	5	COM
	4 Stroke Gasoline	10	16	COM
Pressure Washers < 50 HP	4 Stroke Gasoline	8	12	COM
Forklifts	Diesel	1	2	COM
	4 Stroke Gasoline	1	2	COM
Asphalt Pavers	Diesel	59	92	CONS
	4 Stroke Gasoline	11	17	CONS
Tampers/Rammers	4 Stroke Gasoline	4	6	CONS
	2 Stroke Gasoline	84	131	CONS
Plate Compactors	Diesel	8	12	CONS
	4 Stroke Gasoline	831	1296	CONS

Table B-3

BLM Disposal Area Nonroad Engines Inventory (continued)

	2 Stroke Gasoline	196	306	CONS
Concrete Pavers	Diesel	20	31	CONS
Rollers	Diesel	325	507	CONS
	4 Stroke Gasoline	83	129	CONS
Scrapers	Diesel	161	251	CONS
Paving Equipment	Diesel	164	256	CONS
	4 Stroke Gasoline	820	1279	CONS
	2 Stroke Gasoline	44	69	CONS
Surfacing Equipment	4 Stroke Gasoline	115	179	CONS
Signal Boards	Diesel	76	119	CONS
	4 Stroke Gasoline	6	9	CONS
Trenchers	Diesel	189	295	CONS
	4 Stroke Gasoline	101	158	CONS
Bore/Drill Rigs	Diesel	29	45	CONS
	4 Stroke Gasoline	31	48	CONS
Excavators	Diesel	230	359	CONS
Concrete/Industrial Saws	Diesel	1	2	CONS
	4 Stroke Gasoline	139	217	CONS
Cement and Mortar Mixers	Diesel	15	23	CONS
	4 Stroke Gasoline	869	1356	CONS
Cranes	Diesel	368	574	CONS
	4 Stroke Gasoline	9	14	CONS
Graders	Diesel	262	409	CONS
Off-Highway Trucks	Diesel	62	97	CONS
Crushing/Processing Equipment	Diesel	27	42	CONS
	4 Stroke Gasoline	4	6	CONS
Rough Terrain Forklifts	Diesel	202	315	CONS
	4 Stroke Gasoline	8	12	CONS
Rubber Tired Loaders	Diesel	785	1225	CONS
	4 Stroke Gasoline	13	20	CONS
Rubber Tired Dozers	Diesel	29	45	CONS
Tractors/Loaders/ Backhoes	Diesel	1120	1747	CONS
	4 Stroke Gasoline	5	8	CONS
Crawler Tractors	Diesel	1070	1669	CONS
Skid Steer Loaders	Diesel	562	877	CONS
	4 Stroke Gasoline	104	162	CONS
Off-Highway Tractors	Diesel	146	228	CONS
Dumpers/Tenders	Diesel	1	2	CONS
	4 Stroke Gasoline	91	142	CONS
Other Construction Equipment	Diesel	45	70	CONS
	4 Stroke Gasoline	4	6	CONS
Lawn & Garden Tractors	Diesel	282	440	LEGC
	4 Stroke Gasoline	7822	12202	LEGC

Table B-3

BLM Disposal Area Nonroad Engines Inventory (continued)

Chippers/Stump Grinders	Diesel	20	31	LEGC
	4 Stroke Gasoline	19	30	LEGC
Commercial Turf Equipment	Diesel	102	159	LEGC
	4 Stroke Gasoline	557	869	LEGC
Other Lawn & Garden Equipment	4 Stroke Gasoline	331	516	LEGC
	2 Stroke Gasoline	128	200	LEGC
Trimmers/Edgers/ Brush Cutters	4 Stroke Gasoline	26	41	LEGR
	2 Stroke Gasoline	21786	33986	LEGR
Lawn Mowers	4 Stroke Gasoline	37290	58172	LEGR
	2 Stroke Gasoline	4166	6499	LEGR
Leaf Blowers/Vacuums	2 Stroke Gasoline	3121	4869	LEGR
Rear Engine Riding Mowers	Diesel	6	9	LEGR
	4 Stroke Gasoline	1000	1560	LEGR
Front End Mowers	4 Stroke Gasoline	161	251	LEGR
Shredders < 5 HP	4 Stroke Gasoline	101	158	LEGR
	2 Stroke Gasoline	23	36	LEGR
Specialty/Vehicles Carts	Diesel	8	12	REC
	4 Stroke Gasoline	257	401	REC
	2 Stroke Gasoline	494	771	REC
All Terrain Vehicles (ATVs)	4 Stroke Gasoline	2904	4530	REC
	2 Stroke Gasoline	327	510	REC
Minibikes	4 Stroke Gasoline	120	187	REC
Off-road Motorcycles	4 Stroke Gasoline	N/A	1027	REC
	2 Stroke Gasoline	N/A	864	REC
Golf Carts	4 Stroke Gasoline	231	360	REC
	2 Stroke Gasoline	71	111	REC

Onroad Mobile Sources

As previously described for the paved road dust source description, the RTC models the BLM disposal area. The results of the RTC models will be used for this inventory category. The same emission categories are present within the BLM disposal boundary area as for the nonattainment area.

1998 J. D. Smith Micro-Scale Inventory of Potential PM_{10} Sources

The 1998 J. D. Smith micro-scale inventory was based largely on the inventory developed for the 24-hour design day, aerial photographs, and AQD permitting records. The 24-hour design day for the monitoring station was March 30, 1999, so much of the data collected in the micro-inventory was relevant for the 1998 annual inventory.

Stationary Point Sources

All stationary sources with permits, regardless of emissions, were classified as stationary point sources. There are 12 stationary sources that were identified as having potential PM_{10} emissions within the micro-scale area. They are:

- Anderson Dairy Inc.;
- Allegis Pipe Company;
- Bridger Junior High School;
- J. D. Smith Middle School;
- Jerry's Nugget;
- Joe's Excavating;
- Mission Industries;
- Palm Mortuaries/Cemeteries;
- Rancho High School;
- U. S. Post Office;
- U. S. Department of Energy; and
- Unitog Company.

Stationary Area Sources

The same sources that were eliminated from the valley-wide inventory were found to be not present in the micro-scale inventories as well. Sources that contributed less than one-half of one percent on a valley-wide basis and having no indication of being heavily concentrated in the micro-scale area were also not individually evaluated. These source categories included residential fuel combustion, fires, and charbroiling.

Construction and Demolition: According to AQD dust permits, there were 115.5 acres under active construction during 1998 in the micro-scale area.

Paved Road Dust: There are 4.5 miles of freeway and 12 miles of major arterial roadways in the micro-scale area. Collector streets cover 92 miles, while minor arterial roadways in the area total 20 miles.

Unpaved Road Dust: There are 0.08 miles of unpaved roads in the southeastern portion of the micro-scale area.

Fugitive Windblown Dust: There were 239.8 acres of vacant land within a two-kilometer area of the J. D. Smith monitoring station: 29 acres of native desert, 53.93 acres of stabilized land, and 156.44 acres designated as unstable.

Nonroad Mobile Sources

None of the four airports within the nonattainment area are within two kilometers of the J. D. Smith monitoring station. The total emissions estimated on a valley-wide basis for nonroad mobile sources, including airports, was less than one-half of one percent of the total emissions inventory. Therefore, nonroad mobile sources were not addressed in the micro-scale emission inventories.

Onroad Mobile Sources
Transportation conformity budgets are not set for micro-scale areas. Therefore, the onroad mobile source emissions were based solely on vehicle emissions in the inventory. These emissions were labeled as vehicle emissions for clarity.

SOURCE ACTIVITY LEVELS

Potential sources were previously identified. Some of the source activities vary from day to day, month to month, or year to year. Although located within the nonattainment area or within a micro-scale area, some sources may have lower emissions during 1998 or no emissions on a particular design day. For many sources, the source contribution during the design year or on the design day was considered average. The activity levels for the nonattainment area inventories, the BLM disposal area inventories, and the J. D. Smith annual inventory are described below. The activity levels for the micro-scale inventories are described in Appendix B.

Nonattainment Area Annual Source Activity Levels

Stationary Point Sources
Permitted stationary sources report their actual emission levels each year to the AQD. Every facility submitting emissions inventory information either in the form of throughput or in the form of emission estimates has signed a certification page attesting to the validity of the information submitted. The inputs and emission estimates are reviewed for reasonableness and consistency with historical operations by the AQD staff. These self-reported activity levels, as reviewed and approved by AQD, were used in the 1998 annual emission inventory.

Stationary Area Sources
Small Point Sources: Small point sources are required to complete the same self-reporting procedure stationary point sources are required to complete. The 1998 emissions reported by the sources to AQD,[15] as described for stationary point sources, was used for 1998 nonattainment emission inventory.

Residential Natural Gas Combustion: The SWG natural gas sales report for the Southern Nevada Division reported 17,896,667 dekatherms of natural gas were sold for residential use in 1998. It is assumed an additional one percent was used outside the BLM disposal boundary area.

Commercial Natural Gas Combustion: The SWG natural gas sales report for the Southern Nevada Division listed small commercial, large commercial, compressed natural gas, and irrigation/water pumping gas sales. Based upon input from the sales staff, it was determined that these categories reflected commercial gas users. Gas combustion from all of these categories were

[15] Op. Cit.

grouped as commercial natural gas combustion in the emission inventory. The gas consumption by category is listed in Table B-4.

Table B-4

Commercial Natural Gas Combustion Quantities

Category	Dekatherms Combusted
Small Commercial	6,628,926
Large Commercial	2,250,844
Compressed Natural Gas	31,439
Irrigation/Water Pumping	10,708
Total Commercial NG Combusted	8,921,917

Industrial Natural Gas Combustion: The SWG sales report listed other gas sales for the Southern Nevada Division. It was determined that this category represented industrial use. Together with natural gas sales categorized as industrial, 3,686,737 dekatherms of natural gas were combusted and listed as industrial natural gas emissions in the inventory.

NG – Purchased at the Source – Carried by SWG: The SWG sales report indicated 56,452,728 dekatherms of natural gas were combusted at compressor stations as part of the supply system for the natural gas network.

Residential Firewood Combustion: To determine the amount of firewood used in 1998, local suppliers of firewood were contacted. Each of the local suppliers reported the number of cords of wood they sold in 1998. It was assumed that the amount of wood sold equaled the amount of wood burned. There were 2,316 cords of wood sold in 1998. An average cord weight of 3,763 pounds was used to determine a total of 4,358 tons of wood consumed in 1998 within the BLM disposal boundary area. The wood consumed in the entire nonattainment area was one percent more than in the BLM disposal boundary area, or 4,402 tons. Firewood is available in the Toiyabe National Forest and residents in outlying areas may gather, rather than purchase, wood for residential use. Assuming all wood burned outside the BLM disposal area was gathered rather than purchased is a conservative assumption that would overpredict, not underpredict potential emissions from this source category.

Structural/Vehicle Fires/Wild Fires: Based upon a population of 1.17 million people and a FEMA factor of 2.3 fires per 1,000 people, there were approximately 2,700 fires in the nonattainment area in 1998.

Charbroiling/Meat Cooking: In the 1998 report Las Vegas Valley Broiler Emissions Inventory for Clark County Health District, commercial meat suppliers and distributors were polled to determine the amount of meat supplied annually to restaurants within the BLM disposal area. The nonattainment area inventory was determined by increasing the BLM disposal area inventory by one percent. The estimated amount of meat sold is summarized in Table B-5.

Table B-5

Quantity of Meat Sold Annually in the Nonattainment Area

Type of Meat	Quantity Sold (million pounds)
Beef Hamburger	44.2
Beef Steak	29.5
Chicken	3.4
Fish	1.8
Total Amount of Meat Sold	**78.9**

Disturbed Vacant Land/Unpaved Parking Lots: Emissions from vacant land are caused by high winds. The meteorological data for 1998 collected at McCarran International Airport by the National Weather Service was reviewed. The number of days and hours hourly average wind speeds matched the wind speed categories used in wind tunnel tests to measure emission rates was tallied. Days with rain were eliminated from the evaluation as rain stabilizes fugitive dust. The results of the tally are presented in Table B-6.

Table B-6

Average Hourly Wind Speed Classification for 1998

Wind Speed Category (mph)	Number of Days Average Hourly Winds Occurred	Number of Hours Average Hourly Winds Occurred
15 – 19.9	144	685
20 – 24.9	91	383
25 – 29.9	31	55
30 – 34.9	9	18
35 – 39.9	1	1

Native Desert Fugitive Dust: Fugitive dust emissions from undisturbed native desert occur when average hourly wind speeds exceed 25 mph. It is assumed that the reservoir of particles on undisturbed parcels is small and emissions only occur during the first hour the average hourly wind speeds are in each category. It is assumed the reservoir would be recharged within 24 hours. Listed in Table B-7 are the number of days in 1998 average hourly wind speeds reached the range of each wind speed category. The meteorological data for 1998 collected at McCarran International Airport by the National Weather Service was reviewed and the days with winds in each category was tallied.

Table B-7

Number of Days in 1998 With Average Hourly Wind Speeds in Each Wind Speed Category for Native Desert Emissions

Wind Speed Category (mph)	Number of Days Average Hourly Winds Occurred
25 – 29.9	31
30 – 34.9	9
35 – 39.9	1

Stabilized Vacant Land Dust: Similar to native desert, it is assumed the reservoir for fugitive dust from stabilized vacant lands is depleted within the first hour of sustained wind speeds within a given category. Unlike native desert, the average hourly wind speeds where emissions are first observed are lower. The number of days average hourly wind speeds were recorded for each wind speed category where emissions were recorded for stabilized land is summarized in Table B-8. Again, meteorological data recorded at McCarran International Airport was reviewed to develop the tally of days.

Table B-8

Number of Days in 1998 With Average Hourly Wind Speeds in Each Wind Speed Category for Stabilized Vacant Land Emissions

Wind Speed Category (mph)	Number of Days Average Hourly Winds Occurred
15 – 19.9	144
20 – 24.9	91
25 – 29.9	31
30 – 34.9	9
35 – 39.9	1

Construction Activity Fugitive Dust: As previously stated there were 19,449 acres under active construction in 1998. Based upon the dust control permits issued by AQD for each individual project, the acres under construction were categorized as listed in Table B-9.

Table B-9

Acres Under Construction by Category

Type of Construction	Number of Acres Under Active Construction in 1998	Months Under Active Construction
Airport	84.4	12
Commercial	3,226.8	3
Flood Detention	174.3	12
Highway	788.4	12
Public Parks	190.7	6
Public Bridges	574.8	12
Public Works	1132.8	3
Residential Homes	10,555.3	6
Underground Utilities	736.8	1
Miscellaneous	1,984.7	6
Total	**19,449**	

Enforcement officers from AQD provided information on the average length of time that a construction site was active based upon the type of construction taking place. This information has been included in Table B-9.

Windblown Construction Dust: Current CCHD regulations require the control of PM_{10} emissions at construction sites. The AQD enforcement officers also provided compliance rates for each type of construction activity as shown in Table B-10.

Table B-10

Dust Mitigation Compliance Rate by Construction Type

Type of Construction	Percentage of Sites Implementing Controls
Airport	80
Commercial	50
Flood Detention	70
Highway	80
Public Parks	80
Public Bridges	70
Public Works	70
Residential Homes	50
Underground Utilities	20
Miscellaneous	80

Water is the only substance currently being required for use to control dust on construction sites. The use of water has an associated 50 percent control efficiency.[16] Based upon these compliance rates, and the control efficiency of water, the number of acres of land under construction were divided into disturbed, uncontrolled, and stabilized. The wind erosion emissions were then calculated based upon this classification. The acres in each classification by construction type are listed in Table B-11.

Table B-11

Classification of Soils on Construction Sites

Type of Construction	Acres Disturbed, Uncontrolled	Acres Stabilized
Airport	50.6	33.8
Commercial	2,420.1	806.7
Flood Detention	113.3	61.0
Highway	473.0	315.4
Public Parks	114.4	76.3
Public Bridges	373.6	201.2
Public Works	736.3	396.5
Residential Homes	7,916.5	2,638.8
Underground Utilities	663.1	73.7
Miscellaneous	1,190.8	793.9
Total	**14,051.7**	**5,397.3**

<u>Nonroad Mobile Sources</u>

Nonroad Engines: The activity level for nonroad engines was developed using U. S. EPA's recommended methodology. This calculation considers typical load factors, average rated horsepower, and annual hours of use. Typical load factors, average rated horsepower, and annual hours of use were developed by the U. S. EPA.[17] As previously discussed, the CO nonattainment area and PM_{10} nonattainment area are the same. The one exception to the EPA estimated hours of use was made for lawn and garden equipment.

The Las Vegas area has an arid desert climate and unique vegetation. 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, the 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

[16] *Control of Open Fugitive Dust Sources*, United States Environmental Protection Agency, Office of Air Quality Planning and Standards: Research Triangle Park, North Carolina, September, 1988.

[17] *Nonroad Engine Emission Inventories for CO and Ozone Nonattainment Boundaries Las Vegas Area*, United States Environmental Protection Agency: Ann Arbor Michigan, 1992.

sizes in the Las Vegas area are less than one-eighth of an acre (50 x 100). Because of this, 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 overestimating emissions for this source category, the U. S. EPA use estimates were adjusted to be representative of local conditions. Because more than 85 percent of parcels in the Las Vegas Valley are less than one-eighth of an acre in size, the use of trimmers, edgers, and brush cutters was estimated at less than 10 minutes per week. Also because of the smaller size of land parcels, the use of lawnmowers was estimated at less than 15 minutes per week.

The average rated horsepower, typical operating load factor as a percentage, and annual use in hours per year are presented for nonroad engines in Table B-12. The category each engine was placed in for the emission inventory has also been included.

Table B-12

Nonroad Engines Activity Levels

Equipment Type	Engine Type	Average Rated Horse-power	Typical Operating Load Factor (Percent)	Annual Use Estimates (hr/year)	Sub-Category
Terminal Tractor	Diesel	137	0.51	842	ASE
	4 Stroke Gasoline	48	0.56	783	ASE
Aircraft Support Equipment	Diesel	96	0.82	1408	ASE
	4 Stroke Gasoline	82	0.78	926	ASE
Generator Sets < 50 HP	Diesel	22	0.74	375	COM
	4 Stroke Gasoline	11	0.68	128	COM
	2 Stroke Gasoline	11	0.68	128	COM
Pumps < 50 HP	Diesel	23	0.74	480	COM
	4 Stroke Gasoline	7	0.69	263	COM
	2 Stroke Gasoline	7	0.69	263	COM
Air Compressors < 50 HP	Diesel	37	0.48	937	COM
	4 Stroke Gasoline	9	0.56	557	COM
Welders < 50 HP	Diesel	35	0.45	746	COM
	4 Stroke Gasoline	19	0.51	241	COM
Pressure Washers < 50 HP	4 Stroke Gasoline	7	0.85	133	COM
Forklifts	Diesel	83	0.30	1717	COM
	4 Stroke Gasoline	62	0.30	1818	COM
Asphalt Pavers	Diesel	91	0.62	829	CONS
	4 Stroke Gasoline	31	0.66	396	CONS

Table B-12

Nonroad Engines Activity Levels
(continued)

Tampers/ Rammers	4 Stroke Gasoline	4	0.55	182	CONS
	2 Stroke Gasoline	4	0.55	182	CONS
Plate Compactors	Diesel	8	0.43	600	CONS
	4 Stroke Gasoline	5	0.55	206	CONS
	2 Stroke Gasoline	5	0.55	206	CONS
Concrete Pavers	Diesel	130	0.68	837	CONS
Rollers	Diesel	99	0.56	745	CONS
	4 Stroke Gasoline	17	0.62	621	CONS
Scrapers	Diesel	311	0.72	1005	CONS
Paving Equipment	Diesel	99	0.53	709	CONS
	4 Stroke Gasoline	7	0.59	200	CONS
	2 Stroke Gasoline	7	0.59	200	CONS
Surfacing Equipment	4 Stroke Gasoline	8	0.49	503	CONS
Signal Boards	Diesel	6	0.82	962	CONS
	4 Stroke Gasoline	8	0.76	284	CONS
Trenchers	Diesel	60	0.75	640	CONS
	4 Stroke Gasoline	27	0.66	434	CONS
Bore/Drill Rigs	Diesel	209	0.75	541	CONS
	4 Stroke Gasoline	54	0.79	124	CONS
Excavators	Diesel	183	0.57	893	CONS
Concrete/ Industrial Saws	Diesel	56	0.73	592	CONS
	4 Stroke Gasoline	13	0.78	622	CONS
Cement and Mortar Mixers	Diesel	11	0.56	300	CONS
	4 Stroke Gasoline	7	0.59	92	CONS
Cranes	Diesel	194	0.43	798	CONS
	4 Stroke Gasoline	55	0.47	411	CONS
Graders	Diesel	172	0.61	821	CONS
Off-Highway Trucks	Diesel	489	0.57	1838	CONS
Crushing/Proc. Equipment	Diesel	127	0.78	1146	CONS
	4 Stroke Gasoline	60	0.85	289	CONS
Rough Terrain Forklifts	Diesel	93	0.60	761	CONS
	4 Stroke Gasoline	88	0.63	475	CONS
Rubber Tired Loaders	Diesel	158	0.54	875	CONS
	4 Stroke Gasoline	67	0.54	589	CONS
Rubber Tired Dozers	Diesel	356	0.59	1016	CONS
Tractors/Loaders Backhoes	Diesel	77	0.55	1146	CONS
	4 Stroke Gasoline	63	0.48	879	CONS
Crawler Tractors	Diesel	157	0.58	1048	CONS

Table B-12

Nonroad Engines Activity Levels
(continued)

Skid Steer Loaders	Diesel	42	0.55	843	CONS
	4 Stroke Gasoline	33	0.58	319	CONS
Off-Highway Tractors	Diesel	214	0.65	975	CONS
Dumpers/Tenders	Diesel	23	0.38	662	CONS
	4 Stroke Gasoline	9	0.41	149	CONS
Other Construction Equipment	Diesel	161	0.62	612	CONS
	4 Stroke Gasoline	150	0.48	375	CONS
Lawn & Garden Tractors	Diesel	16	0.50	317	LEGC
	4 Stroke Gasoline	12	0.50	61	LEGC
Chippers/ Stump Grinders	Diesel	99	0.37	96	LEGC
	4 Stroke Gasoline	62	0.39	96	LEGC
Commercial Turf Equipment	Diesel	24	0.50	1239	LEGC
	4 Stroke Gasoline	13	0.50	850	LEGC
Other Lawn & Garden Equipment	4 Stroke Gasoline	3	0.50	28	LEGC
	2 Stroke Gasoline	3	0.50	28	LEGC
Trimmers/Edgers/Brush Cutters	4 Stroke Gasoline	1	0.36	8.7	LEGR
	2 Stroke Gasoline	1	0.50	8.7	LEGR
Lawn Mowers	4 Stroke Gasoline	4	0.36	13	LEGR
	2 Stroke Gasoline	4	0.36	13	LEGR
Leaf Blowers/Vacuums	2 Stroke Gasoline	2	0.50	19	LEGR
Rear Engine Riding Mowers	Diesel	17	0.38	48	LEGR
	4 Stroke Gasoline	9	0.38	48	LEGR
Front End Mowers	4 Stroke Gasoline	12	0.50	13	LEGR
Shredders < 5 HP	4 Stroke Gasoline	4	0.36	5	LEGR
	2 Stroke Gasoline	4	0.36	5	LEGR
Specialty/Vehicles Carts	Diesel	1	1.00	487	REC
	4 Stroke Gasoline	1	1.00	73	REC
	2 Stroke Gasoline	1	1.00	73	REC
All Terrain Vehicles (ATVs)	4 Stroke Gasoline	1	1.00	135	REC
	2 Stroke Gasoline	1	1.00	135	REC
Minibikes	4 Stroke Gasoline	1	1.00	65	REC
Off-road Motorcycles	4 Stroke Gasoline	1	1.00	137	REC
	2 Stroke Gasoline	1	1.00	137	REC
Golf Carts	4 Stroke Gasoline	1	1.00	1145	REC
	2 Stroke Gasoline	1	1.00	1145	REC

Aircraft Emissions: Aircraft activities are measured as landing and takeoff (LTO) cycles. The LTO cycles for McCarran International Airport, North Las Vegas Airport, and Henderson Executive Airport during 1998 were reported in PM_{10} Emissions Inventory.[18] The number of LTO cycles in 1998 at Nellis Air Force Base were tabulated by an Air Force contractor and provided to Clark County Comprehensive Planning. The number of LTOs in 1998 for each airfield are presented in Table B-13.

Table B-13

Number of LTOs at Clark County Airfields

Airfields	Number of LTOs
McCarran International Airport	242,165
North Las Vegas Airport	96,086
Henderson Executive Airport	23,242
Nellis Air Force Base	34,157

Train Equipment: To determine locomotive equipment in the nonattainment area, U. S. EPA's Final Draft of *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources* was used.[19] The railroad company, Union Pacific, was contacted to obtain pertinent information about their operations which was then utilized in conjunction with the methodology in the aforementioned document.

Class I emissions from freight locomotives are based upon fuel consumption. Fuel consumption was derived by dividing the traffic density in gross ton miles (GTM) by the fuel consumption index in GTM per gallon (GTM/gallon) as 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.

[18] Op. Cit.
[19] *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources*, United States Environmental Protection Agency, March, 1992.

Table B-14

Union Pacific Railroad Data

Traffic Density (w/o locomotive weight)	1,380,470,000 GTM
Schedule 750, line 1	526,409,157 gallons
Schedule 755, line 98	408,751,071,000 GTM
Schedule 755, line 104	38,098,350,000 GTM
Two Switch Engines	250 gallons/day/engine

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 nonattainment area. This produced a traffic density of 1,380,470,000 GTM.

The traffic density excluded the locomotive weight, so total gross ton miles (370,652,721,000 GTM) were obtained by subtracting line 98 from line 104 of Schedule 755 (408,751,071,000 – 38,098,350,000). Fuel consumption for the entire network (704 GTM/gallon) was calculated by dividing the gross ton miles by the amount of fuel consumed as reported by Union Pacific (370,652,721,000 GTM/526,409,157 gallons).

As previously mentioned, the fuel consumption within the nonattainment area is derived by dividing traffic density by the fuel consumption rate. Therefore, fuel consumption for Union Pacific freight locomotives operating in the Las Vegas Valley nonattainment area equals 1,960,895 gallons (1,380,470,000 GTM/704 GTM per gallon). Fuel consumption throughout the nonattainment area was estimated to be one percent higher or 1,980,504 gallons.

Onroad Mobile Sources

Paved Road Dust: Paved road dust emissions are based on the vehicle miles traveled (VMT) and the silt loading on a particular road. The Regional Transportation Commission of Clark County provided the VMT by roadway classification within the nonattainment area for 1998. This information is presented in Table B-15.

Table B-15

Vehicle Miles Traveled in 1998 in the Nonattainment Area

Roadway Category	1998 Daily VMT
Ext. Connector	834,249.5
Freeway Ramps	95,304.2
Minor Arterial	10,051,686.6

Table B-15

Vehicle Miles Traveled in 1998 in the Nonattainment Area (continued)

Major Arterial	2,499,334.9
Ramps	296,993.4
Interstate	4,567,626
Freeway	1,445,086.8
Expressway	-
Collector	3,621,570
Local	2,462,719.4
Intrazonal Trips	74,000.7
Public Transit	63,632.7
VMT Totals	**26,012,204.2**

Some roadways within the nonattainment area have unimproved shoulders and higher silt loading. The VMT for these roadways was not directly measured. The number of miles of roadways with unimproved shoulders was provided by each of the cities in the nonattainment area and Clark County Public Works. If the number of miles with unimproved shoulders was not provided by roadway classification, it was assumed the roadways were local. The VMT on these roadways was estimated by multiplying the VMT for the appropriate roadway category by the percentage of miles that have unimproved shoulders. Table B-16 summarizes the number of miles of roads with unimproved shoulders and the corresponding VMT on these roadways.

Table B-16

VMT on Roadways with Unimproved Shoulders

Roadway Category	Total Unimproved Miles in Nonattainment Area	Percentage of Roadway Inventory by Classification	Estimated VMT
Minor Arterial	57.18	10.00	1,005,168.7
Major Arterial	21	25.54	638,330.1
Collector	30.3	4.79	173,473.2
Local	335.7	11.69	287,891.9

In the fall of 1999, road surface silt loading measurements were conducted by Dames & Moore.[20] Dames & Moore used the method prescribed in AP-42,

[20] *Silt Loading Measurements for Clark County Paved Roads*, Dames & Moore, Inc., October, 1999.

Appendix C.1. Dames & Moore did not complete any measurements on freeways. For freeways the U. S. EPA default value of 0.02 g/m^2 was used. The silt loading measurements are presented in Table B-17.

Table B-17

Paved Road Silt Loading Measurements by Road Type (g/m^2)

Roadway Category	Paved Roads with Improved Shoulders Silt Loading	Paved Roads with Unimproved Shoulders Silt Loading
Ext. Connector	0.49	-
Freeway Ramps	0.86	-
Minor Arterial	1.04	1.34
Major Arterial	0.49	1.34
Ramps	0.86	-
Interstate	0.02	-
Freeway	0.02	-
Expressway	0.49	-
Collector	0.86	24.7
Local	1.70	24.7
Intrazonal Trips	1.70	-
Public Transit	1.70	-

Increased emissions from track out were also calculated. The AQD staff estimated the average number of access points per site based upon the type of construction being completed. Based upon the number of acres under construction in 1998 by category, the number of access points was estimated.

Access points for construction sites are usually placed on the least busy street adjacent to a construction site. An average of 10,000 vehicles per day was assumed for the number of vehicles traveling across the paved roads with track out. Dames & Moore developed a factor of 3.29 for silt loading increase using the silt measurements they collected before and after construction traffic egress points. The factor was applied to the average silt loading for paved roads of 0.86 g/m^2. The silt loading measurements after construction traffic egress points were collected within a distance of 150 feet, so the distance used in the track out emission calculations was 150 feet. Table B-18 summarizes the activity levels used for track out calculations.

Table B-18

Activity Levels for Construction Track Out Calculations

Type of Construction	Number of Acres in 1998	Access Point Rates	Number of Access Points	ADT	Miles per Track Out Point	Silt Loading (g/m^2)
Airport	84.4	1 per 30 acres	3	10,000	0.0284	2.829
Commercial	3,226.8	1 per 10 acres	323	10,000	0.0284	2.829
Flood Detention	174.3	1 per 30 acres	6	10,000	0.0284	2.829
Highway	788.4	1 per 10 acres	79	10,000	0.0284	2.829
Public Parks	190.7	1 per 10 acres	19	10,000	0.0284	2.829
Public Bridges	574.8	1 per 10 acres	57	10,000	0.0284	2.829
Public Works	1,132.8	1 per 10 acres	113	10,000	0.0284	2.829
Residential Homes	10,555.3	1 per 30 acres	352	10,000	0.0284	2.829
Underground Utilities	736.8	0 access	0	10,000	0.0284	2.829
Miscellaneous	1,984.7	1 per 10 acres	198	10,000	0.0284	2.829
Total	**1,9449**		**1150**			

Unpaved Road Dust: Emissions from unpaved roads are directly related to the number of vehicles that drive on an unpaved road and the length of the road. To determine the vehicle miles traveled on the unpaved roads in the nonattainment area, the cities and Clark County performed vehicle counts and measured roadway lengths. Actual measurement, maps, or aerial photographs easily determined the lengths of roadways. The methodology for determining average daily traffic (ADT) counts varied by jurisdiction.

The City of North Las Vegas performed traffic counts on each of the unpaved roads within their jurisdiction. The City of Las Vegas completed traffic counts on several roads and then used a traffic model to predict traffic counts on the unpaved roadway network in their city. Alleys were assumed to have an ADT of 50 based on counts taken for several alleys. The City of Henderson used a similar approach to the City of Las Vegas. Traffic counts were taken on a representative sample of the unpaved roads. These counts were used with a model to predict the traffic counts on the rest of the unpaved roads.

The roadways within the nonattainment area and not within any of the cities are maintained by Clark County Public Works. The Public Works department inventoried the unpaved roads within Clark County. Vehicle counts were completed for representative roads and a model was used to predict traffic counts on the other roads. The results of the model produced ADT classes as follows:

Class 1 – Estimated 1 - 50 ADT;
Class 2 – Estimated 51 - 100 ADT;
Class 3 – Estimated 101 – 150 ADT;
Class 4 – Estimated 151 and above.

The average of each range of the first three classifications (25, 75, and 125) was used for the ADT for unpaved roads in those classes. For Class 4, 151 ADT was assumed as there was no way to know the upper limit of this classification. This may underpredict the actual emissions from these roads but no other reasonable assumption is readily apparent. This assumption is conservative as it does not overpredict the impact of unpaved roads in the inventory, nor does it make other sources that might be considered significant appear insignificant, and more stringent control measures for significant sources will be developed. The conservative assumption will not affect the overall attainment demonstration as these roads will be controlled (paved) and the emissions will be removed from the unpaved roads inventory.

It was difficult to measure directly the traffic on private unpaved roads as the public works departments did not have the authority to conduct counts on these roads. Using counts on adjacent roads, the counts for private unpaved roads were estimated. None of the private unpaved roads had estimated counts that exceeded 50. Therefore, the ADT for private roads was set at 49.

Table B-19 summarizes the number of miles of unpaved roads by ADT range. The 45 miles of private unpaved roads are included in the less-than-50 ADT category.

Table B-19

1998 Unpaved Roads Activity Levels in the Nonattainment Area

ADT Range	Miles
Equal to or greater than 150 ADT	64
Less than 150 ADT and equal to or greater than 125 ADT	7
Less than 125 ADT and equal to or greater than 100 ADT	12
Less than 100 ADT and equal to or greater than 75 ADT	20
Less than 75 ADT and equal to or greater than 50 ADT	13
Less than 50 ADT	147
Total	**263**

Vehicular Emissions: The average daily vehicle counts within the nonattainment area were provided by the Regional Transportation Commission of Clark County.[21] These counts are based upon actual vehicle counts taken in 1998 and the Tranplan model. The vehicle miles traveled by roadway classification are presented in Table B-20.

[21] *Transportation Improvement Plan Fiscal Years 2001-2003*, Regional Transportation Commission of Southern Nevada, October, 2000.

Table B-20

Vehicle Miles Traveled by Roadway Classification

Roadway Classification	1998 Average Daily VMT (miles)
Externals	834,249.5
System Ramps	95,304.2
Minor Arterials	10,051,686.6
Major Arterials	2,499,334.9
Ramps	296,993.4
Interstates	4,567,626
Freeways	1,445,086.8
Expressways	-
Collectors	3,621,570
Local	2,462,719.4
Intrazonal Trips	74,000.7
Public Transit	63,632.7
Total	**26,012,204.2**

Nonattainment Area 24-Hour Source Activity Levels

The nonattainment area 24-hour emissions inventory was developed for the design day, December 21, 1998. For most sources the activity level for the design day was estimated to be the same as a daily activity level for the 1998 emissions inventory. Annual activity levels were divided by 365 (365 days in 1998). Some of the Stationary Area Sources have activity levels that are not directly related to the annual activity levels or cannot be estimated relating the annual level to the daily level. For example, fugitive dust sources are largely based upon wind speeds. The activity levels that are exceptions to the general methodology are described in detail below.

Residential Firewood Combustion

Firewood is not used throughout the year in the nonattainment area. Typically, residential fires are only burned about three months of the year. As the 24-hour inventory is for a day in December, one of the colder months, it is assumed residential fire burning occurred on that day. The annual firewood consumption value was divided by 93 days (3 months). Approximately 25 cords of wood were burned a day.

Disturbed Vacant Land

Emissions from vacant land are caused by high winds, vehicle activity, and weed abatement. Due to the difficulty of quantifying emissions from vehicles and weed abatement, and the fact that it would be a relatively small portion of the emissions attributable to vacant lots, these emissions are not quantified in the SIP. The meteorological data for December 21, 1998 collected at McCarran

International Airport by the National Weather Service was reviewed. The number of hours hourly average wind speeds matched the wind speed categories used in wind tunnel tests to measure emission rates was tallied. The results of the tally are presented in Table B-21.

Table B-21

Average Hourly Wind Speed Classification for December 21, 1998

Wind Speed Category (mph)	Number of Hours Average Hourly Winds Occurred
15 – 19.9	9
20 – 24.9	3

Native Desert Fugitive Dust

Fugitive dust emissions from undisturbed native desert occur when average hourly wind speeds exceed 25 mph. Average hourly wind speeds did not reach 25 mph on December 21, 1998. Therefore, the activity level for this category was set to zero.

Stabilized Vacant Land Dust

For stabilized vacant lands it is assumed that the reservoir of particles is small and emissions only occur during the first hour the average hourly wind speeds are in each category. It is assumed the reservoir would be recharged within 24 hours. Therefore, for a 24-hour period, once hourly average wind speeds are recorded in a category, emissions are assumed to occur for only one hour. For December 21, 1998 average hourly wind speeds were measured in two categories: 15 to 19.9 mph and 20 to 24.9 mph (Table B-21).

Windblown Construction Dust

It was conservatively assumed that construction took place on December 21, 1998 on all construction sites evaluated for 1998. The number of acres of stabilized and unstable disturbed land were the same as on an annual basis. The meteorological data from McCarran International Airport for December 21, 1998 was used to evaluate the emissions from construction acres. The numbers of hours of average hourly wind speeds by category are summarized in Table B-21.

BLM Disposal Area Annual Inventory

Most of the activities that took place within the nonattainment area took place within the BLM disposal boundary area as well. The ratio between the two inventories and differences in activity levels are listed by source category below.

Stationary Point Sources

Permitted stationary sources report their actual emission levels each year to the AQD. Every facility submitting emissions inventory information either in the form of throughput or in the form of emission estimates has signed a certification page attesting to the validity of the information submitted. The inputs and emission estimates are reviewed for reasonableness and consistency with historical operations by the AQD staff. These self-reported activity levels, as reviewed and approved by AQD, were used in the 1998 annual emission inventory.

This same reporting procedure was used for the BLM disposal area with the exception of James Hardie Gypsum, which is located outside the BLM disposal boundary area.

Stationary Area Sources

Small Point Sources: Small point sources are required to complete the same self-reporting procedure stationary point sources are required to complete. The 1998 emissions reported by the sources to AQD, as described for stationary point sources, were used for the 1998 valley-wide emission inventory. As a conservative assumption, it is assumed all small point sources are located within the BLM disposal boundary area.

Residential Natural Gas Combustion: The SWG natural gas sales report for the Southern Nevada Division reported 17,896,667 dekatherms of natural gas were sold for residential use within the BLM disposal boundary area in 1998.

Commercial Natural Gas Combustion: It is assumed all commercial natural gas combustion occurs within the BLM disposal boundary area. This assumption is conservative and avoids potential double counting. Data is not available that would be representative of the ratio of commercial natural gas combustion within the BLM disposal area versus the entire nonattainment area.

Residential Firewood Combustion: To determine the amount of firewood used in 1998, local suppliers of firewood were contacted. Each of the local suppliers reported the number of cords of wood they sold in 1998. It was assumed that the amount of wood sold equaled the amount of wood burned. There were 2,316 cords of wood sold in 1998. An average cord weight of 3,763 pounds was used to determine a total of 4,358 tons of wood consumed in 1998.

Structural/Vehicle Fires/Wild Fires: Based upon a population of 1.15 million people and a FEMA factor of 2.3 fires per 1000 people, there were approximately 2,645 fires in the nonattainment area in 1998.

Charbroiling/Meat Cooking: In the 1998 report *Las Vegas Valley Broiler Emissions Inventory for Clark County Health District*, commercial meat suppliers and distributors were polled to determine the amount of meat supplied annually to restaurants within the BLM disposal area. The amount of meat sold is summarized in Table B-22.

Table B-22

Quantity of Meat Sold Annually in the Las Vegas Valley

Type of Meat	Quantity Sold (million pounds)
Beef Hamburger	43.8
Beef Steak	29.2
Chicken	3.4
Fish	1.7
Total Amount of Meat Sold	**78.1**

Disturbed Vacant Land/Unpaved Parking Lots: Emissions from vacant land are caused by high winds. The same meteorological data that was used in the nonattainment area inventory was used for the BLM disposal boundary inventory, as McCarran International Airport is located within the BLM disposal boundary. The meteorological data for 1998 collected at McCarran International Airport are presented in Table B-6.

Native Desert Fugitive Dust: Fugitive dust emissions from undisturbed native desert occur when average hourly wind speeds exceed 25 mph. Using the same meteorological data as the nonattainment area, the meteorological profile presented in Table B-7 was used when calculating the emissions from native desert within the BLM disposal boundary area.

Stabilized Vacant Land Dust: Similar to native desert, it is assumed the reservoir for fugitive dust from stabilized vacant lands is depleted within the first hour of sustained wind speeds within a given category. Unlike native desert, the average hourly wind speeds where emissions are first observed are lower. The number of days average hourly wind speeds were recorded for each wind speed category where emissions were recorded for stabilized land is summarized in Table B-7. Again, meteorological data recorded at McCarran International Airport was reviewed to develop the tally of days as for the nonattainment area.

Construction Activity and Windblown Fugitive Dust: As previously stated, there were 19,449 acres under active construction in 1998. It is assumed that all of this construction took place within the BLM disposal boundary. Therefore, the nonattainment area construction activities and wind erosion are assumed for the BLM disposal boundary area as well.

Nonroad Mobile Sources

Nonroad Engines: The same activity levels used to calculate the nonattainment emission inventory were used for the BLM disposal area inventory as well.

Aircraft Emissions: As all of the airports within the nonattainment area are within the BLM disposal boundary, the same activity levels were used for the BLM disposal area inventory.
Train Equipment: The same methodology for estimating activity levels within the nonattainment area was used for the BLM disposal area as well. Fuel consumption within the BLM disposal area equals 1,906,895 gallons.

<u>Onroad Mobile Sources</u>
Paved Road Dust: Paved road dust emissions are based on the vehicle miles traveled (VMT) and the silt loading on a particular road. The Regional Transportation Commission of Clark County provided the VMT by roadway classification within the BLM disposal area for 1998. This information is presented in Table B-23.

Table B-23

Vehicle Miles Traveled Within the BLM Disposal Area in 1998

Roadway Category	1998 Daily VMT
Ext. Connector	825,989.6
Freeway Ramps	94,340.6
Minor Arterial	9,952,165
Major Arterial	2,474,589
Ramps	294,052.9
Interstate	4,522,402
Freeway	1,430,779
Expressway	-
Collector	3,585,713
Local	2,438,336
Intrazonal Trips	73,268
Public Transit	63,002.7
VMT Totals	**25,754,637.8**

Some roadways within the BLM disposal area have unimproved shoulders and higher silt loading. The VMT for these roadways was not directly measured. The number of miles of roadways with unimproved shoulders was provided by each of the cities in the nonattainment area and Clark County Public Works. If the number of miles with unimproved shoulders was not provided by roadway classification it was assumed the roadways were local. The VMT on these roadways was estimated by multiplying the VMT for the appropriate roadway category by the percentage of miles that have unimproved shoulders. Table B-24 summarizes the number of miles of roads with unimproved shoulders and the corresponding VMT on these roadways.

Table B-24

VMT on Roadways with Unimproved Shoulders

Roadway Category	Total Unimproved Miles in Nonattainment Area	Percentage of Roadway Inventory by Classification	Estimated VMT
Minor Arterial	57.18	10.0033239	995,547.3
Major Arterial	21	25.5412308	632,010.5
Collector	30.3	4.7904381	171,771.4
Local	335.7	11.6894513	285,028.1

The road surface silt loading measurements that were conducted by Dames & Moore[22] were conducted within the BLM disposal boundary. Therefore, the same silt loading factors that were used for the nonattainment area were considered representative of the BLM disposal area.

The silt loading measurements taken for track out were also conducted within the BLM disposal area. Additionally, all construction is assumed to take place within the BLM disposal boundary. Therefore, the track out activity for the BLM disposal area was assumed to equal track out activity levels for the nonattainment area.

Unpaved Road Dust: Emissions from unpaved roads are directly related to the number of vehicles that drive on an unpaved road and the length of the road. The same methodology that was used for the nonattainment area was used to estimate the activity levels of unpaved roads in the BLM disposal area. Not all unpaved roads within the nonattainment area are within the BLM disposal boundary. The activity levels for unpaved roads within the BLM disposal area are presented in Table B-25.

Table B-25

1998 Unpaved Roads Activity Levels in the BLM Disposal Area

ADT Range	Miles
Equal to or greater than 150 ADT	64
Less than 150 ADT and equal to or greater than 125 ADT	7
Less than 125 ADT and equal to or greater than 100 ADT	12
Less than 100 ADT and equal to or greater than 75 ADT	20
Less than 75 ADT and equal to or greater than 50 ADT	13
Less than 50 ADT	142
Total	**259**

[22] Op. Cit.

Vehicular Emissions: The average daily vehicle counts within the BLM disposal area were provided by the Regional Transportation Commission of Clark County. These counts are based upon actual vehicle counts taken in 1998 and the Tranplan model. The vehicle miles traveled by roadway classification are presented in Table B-26.

Table B-26

Vehicle Miles Traveled by Roadway Classification

Roadway Classification	1998 Average Daily VMT (miles)
Externals	825,989.6
System Ramps	94,340.6
Minor Arterials	9,952,165
Major Arterials	2,474,589
Ramps	294,052.9
Interstates	4,522,402
Freeways	1,430,779
Expressways	-
Collectors	3,585,713
Local	2,438,336
Intrazonal Trips	73,268
Public Transit	63,002.7
Total	**25,754,637.8**

BLM Disposal Area 24-Hour Source Activity Levels

The valley-wide 24-hour emissions inventory was developed for the design day, December 21, 1998. For most sources the activity level for the design day was estimated to be the same as a daily activity level for the 1998 emissions inventory. Annual activity levels were divided by 365 (365 days in 1998). Some of the Stationary Area Sources have activity levels that are not directly related to the annual activity levels or cannot be estimated relating the annual level to the daily level. For example, fugitive dust sources are largely based upon wind speeds. The activity levels that are exceptions to the general methodology are described in detail below.

<u>Residential Firewood Combustion</u>

Firewood is not used throughout the year in the Las Vegas Valley. Typically, residential fires are only burned about three months of the year. As the 24-hour inventory is for a day in December, one of the colder months, it is assumed residential fire burning occurred on that day. The annual firewood consumption value was divided by 93 days (3 months). Approximately 25 cords of wood were burned a day.

Disturbed Vacant Land
Emissions from vacant land are caused by high winds. The meteorological data for December 21, 1998 collected at McCarran International Airport by the National Weather Service was reviewed. The hourly average wind speed data used for the calculation of fugitive dust from vacant land is presented in Table B-21.

Native Desert Fugitive Dust
Fugitive dust emissions from undisturbed native desert occur when average hourly wind speeds exceed 25 mph. Average hourly wind speeds did not reach 25 mph on December 21, 1998. Therefore, the activity level for this category was set to zero.

Stabilized Vacant Lands Dust
For stabilized vacant lands it is assumed that the reservoir of particles is small and emissions only occur during the first hour the average hourly wind speeds are in each category. It is assumed the reservoir would be recharged within 24 hours. Therefore, for a 24-hour period, once hourly average wind speeds are recorded in a category, emissions are assumed to occur for only one hour. For December 21, 1998, average hourly wind speeds were measured in two categories: 15 to 19.9 mph and 20 to 24.9 mph (Table B-21).

Windblown Construction Dust
It was conservatively assumed that construction took place on December 21, 1998 on all construction sites evaluated for 1998. It is also assumed all construction took place within the BLM disposal area. The number of acres of stabilized and unstable disturbed land were the same as on an annual basis. The meteorological data from McCarran International Airport for December 21, 1998 was used to evaluate the emissions from construction acres. The numbers of hours of average hourly wind speeds by category are summarized in Table B-21.

1998 J. D. Smith Micro-Scale Inventory Activity Levels

Stationary Point Sources
The stationary sources with permits identified in the micro-scale area were identified. The annual permit limits were reviewed and it was assumed the emissions from these sources met but did not exceed their annual permit limits.

Disturbed Vacant Land
Emissions from vacant land are caused by high winds. The J. D. Smith 1998 annual micro-scale inventory was assumed to have the same wind profile as the 1998 valley-wide inventory. The meteorological data for 1998 collected at McCarran International Airport by the National Weather Service was reviewed. The number of days and hours hourly average wind speeds matched the wind speed categories used in the wind tunnel tests to measure emission rates was

tallied. Days with rain were eliminated from the evaluation as rain stabilizes fugitive dust. The results of the tally are presented in Table B-27.

Table B-27

Average Hourly Wind Speed Classification for 1998

Wind Speed Category (mph)	Number of Days Average Hourly Winds Occurred	Number of Hours Average Hourly Winds Occurred
15 – 19.9	144	685
20 – 24.9	91	383
25 – 29.9	31	55
30 – 34.9	9	18
35 – 39.9	1	1

Native Desert Fugitive Dust

Fugitive dust emissions from undisturbed native desert occur when average hourly wind speeds exceed 25 mph. It is assumed that the reservoir of particles on undisturbed parcels is small and emissions only occur during the first hour the average hourly wind speeds are in each category. It is assumed the reservoir would be recharged within 24 hours. Listed in Table B-28 are the number of days in 1998 average hourly wind speeds reached the range of each wind speed category. The meteorological data for 1998 collected at McCarran International Airport by the National Weather Service was reviewed and the days with winds in each category was tallied.

Table B-28

Number of Days in 1998 With Average Hourly Wind Speeds in Each Wind Speed Category for Native Desert Emissions

Wind Speed Category (mph)	Number of Days Average Hourly Winds Occurred
25 – 29.9	31
30 – 34.9	9
35 – 39.9	1

Stabilized Vacant Land Dust

Similar to native desert, it is assumed the reservoir for fugitive dust from stabilized vacant lands is depleted within the first hour of sustained wind speeds within a given category. Unlike native desert, the average hourly wind speeds where emissions are first observed are lower. The number of days average hourly wind speeds were recorded for each wind speed category where emissions were recorded for stabilized land is summarized in Table B-29. Again, meteorological data recorded at McCarran International Airport was reviewed to develop the tally of days.

Table B-29

Number of Days in 1998 With Average Hourly Wind Speeds in Each Wind Speed Category for Stabilized Vacant Land Emissions

Wind Speed Category (mph)	Number of Days Average Hourly Winds Occurred
15 – 19.9	144
20 – 24.9	91
25 – 29.9	31
30 – 34.9	9
35 – 39.9	1

Construction Activity Wind Erosion

Current CCHD regulations require the control of PM_{10} emissions at construction sites. The AQD enforcement officers also provided compliance rates for each type of construction activity as shown in Table B-30.

Table B-30

Dust Mitigation Compliance Rate by Construction Type

Type of Construction	Percentage of Sites Implementing Controls
Airport	80
Commercial	50
Flood Detention	70
Highway	80
Public Parks	80
Public Bridges	70
Public Works	70
Residential Homes	50
Underground Utilities	20
Miscellaneous	80

Water is the only substance currently being required for use to control dust on construction sites. The use of water has an associated 50 percent control efficiency.[23] Based upon these compliance rates, the number of acres of land under construction in the micro-scale area (115.5 acres) was divided into

[23] *Control of Open Fugitive Dust Sources*, United States Environmental Protection Agency, Office of Air Quality Planning and Standards: Research Triangle Park, North Carolina, September, 1988.

disturbed, uncontrolled and stabilized. The wind erosion emissions were then calculated based upon this classification. The acres in each classification by construction type are listed in Table B-31.

Table B-31

Classification of Soils on Construction Sites

Type of Construction	Acres Disturbed, Uncontrolled	Acres Stabilized
Airport	0	0
Commercial	21	7
Flood Detention	0.7	0.4
Highway	25.2	16.8
Public Parks	2.4	1.6
Public Bridges	0	0
Public Works	12.8	6.9
Residential Homes	8.5	2.8
Underground Utilities	4.5	0.5
Miscellaneous	2.7	1.8
Total	**77.73**	**37.8**

<u>Construction Activity Emissions</u>
As previously stated, there were 115.5 acres under active construction in the micro-scale area in 1998. Based upon the dust control permits issued by AQD for each individual project, the acres under construction were categorized as listed in Table B-32.

Table B-32

Acres Under Construction by Category in J. D. Smith Micro-Scale Area

Type of Construction	Number of Acres Under Active Construction in 1998	Months Under Active Construction
Airport	0	12
Commercial	28	3
Flood Detention	1	12
Highway	42	12
Public Parks	4	6
Public Bridges	0	12
Public Works	19.67	3
Residential Homes	11.34	6
Underground Utilities	5	1
Miscellaneous	4.49	6
Total	**115.5**	

Enforcement officers from AQD provided information on the average length of time that a construction site was active based upon the type of construction taking place. This information has been included in Table B-32.

Construction Track Out

Increased emissions from construction track out onto paved roads were calculated within the micro-scale area. The AQD staff estimated the average number of access points per site based upon the type of construction being completed. Based upon the number of acres under construction within the micro-scale area in 1998 by category, the number of access points was estimated.

Access points for construction sites are usually placed on the least busy street adjacent to a construction site. An average of 10,000 vehicles per day was assumed for the number of vehicles traveling across the paved roads with track out. Dames & Moore[24] developed a factor 3.29 for silt loading increase using the silt measurements they collected before and after construction traffic egress points. The factor was applied to the average silt loading for paved roads of 0.86 g/m^2. The silt loading measurements after construction traffic egress points were collected within a distance of 150 feet, so the distance used in the track out emission calculations was 150 feet. Table B-33 summarizes the activity levels used for track out calculations for the J. D. Smith micro-scale area.

Table B-33

Activity Levels for Construction Track Out Calculations

Type of Construction	Number of Acres in 1998	Access Point Rates	Number of Access Points	ADT	Miles per Track Out Point	Silt Loading (g/m^2)
Airport	0	1 per 30 acres	0	10,000	0.0284	2.829
Commercial	28	1 per 10 acres	3	10,000	0.0284	2.829
Flood Detention	1	1 per 30 acres	0	10,000	0.0284	2.829
Highway	42	1 per 10 acres	4	10,000	0.0284	2.829
Public Parks	4	1 per 10 acres	0	10,000	0.0284	2.829
Public Bridges	0	1 per 10 acres	0	10,000	0.0284	2.829
Public Works	19.67	1 per 10 acres	2	10,000	0.0284	2.829
Residential Homes	11.34	1 per 30 acres	0	10,000	0.0284	2.829
Underground Utilities	5	0 access	0	10,000	0.0284	2.829
Miscellaneous	4.49	1 per 10 acres	0	10,000	0.0284	2.829
Total	**115.5**		**10**			

Unpaved Road Dust

Emissions from unpaved roads are directly related to the number of vehicles that drive on an unpaved road and the length of the road. The unpaved roadways

[24] Op. Cit.

within the J. D. Smith micro-scale area were not evaluated for traffic counts as the roadways are short cuts across vacant land. The average number of vehicles per day on these unpaved roads was estimated to be 30. Alleys have an ADT of 50 and the valley-wide average was determined to be 30 in the 1997 PM_{10} Attainment Plan.[25]

Paved Road Dust

Paved road dust emissions are based on the vehicle miles traveled (VMT) and the silt loading on a particular road. Clark County Comprehensive Planning, using the Tranplan model, developed average daily VMT for the micro-scale area. In the fall of 1999, Dames & Moore conducted road surface silt loading measurements.[26] Dames & Moore used the method prescribed in AP-42, Appendix C.1. Dames & Moore did not complete any measurements on freeways. For freeways the U. S. EPA default value of 0.02 g/m^2 was used. The VMT and silt loading information is presented in Table B-34.

Table B-34

Paved Road Dust Activity Data for J. D. Smith Micro-Scale Area in 1998

Roadway Category	1998 Daily VMT	Silt Loading (g/m^2)
Collectors	521,941	0.86
Minor Arterial	1,189,705	1.04
Major Arterial	620,473	0.49
Freeway	342,315	0.02
VMT Total	**2,674,434**	

Vehicles

Clark County Comprehensive Planning developed the average daily vehicle counts within the micro-scale area. These counts are based upon actual vehicle counts taken in 1998 and the Tranplan model. The vehicle miles traveled by roadway classification are presented in Table B-34.

PM_{10} EMISSION FACTORS

The emission factors described below were used for all inventories unless otherwise stated. Generally, U. S. EPA emission factors were used unless directly measured factors from the sources within the nonattainment area were available.

[25] *Clark County, Particulate Matter (PM_{10}) Attainment Demonstration Plan*, prepared by Clark County Board of Commissioners, Las Vegas, Nevada. August, 1997.
[26] Op. Cit.

Stationary Sources

The emissions inventory for stationary sources is completed by the AQD and based largely on emissions reports submitted by the sources. Point source emissions are estimated using algorithms developed in the early 1990's based on AP-42 data emissions, performance test data, or Continuous Emissions Monitoring (CEMs) data. The throughputs or inputs to the emission estimate methods of each major source are verified by a Level II inspection on an annual basis. As appropriate, the emission factors have periodically been updated as better or more reliable data are obtained.

For the J. D. Smith annual emission inventory, the annual potential to emit from each facility's permit was used. Although on a valley-wide basis the emissions from stationary sources remained fairly constant or decreased a small amount, no analysis was completed for the stationary sources within the micro-scale area surrounding J. D. Smith. Therefore, the highest allowable emissions were included in the inventory.

Stationary Area Sources

Residential Firewood Combustion

The emission factors for residential firewood were developed by U. S. EPA and are published in AP-42 Section 1.9, Table 1.9-1, dated October, 1996. These factors are presented in Table B-35.

Table B-35

Residential Wood Combustion Emission Factors

Pollutant	Emission Factor (pound pollutant/ton wood combusted)
PM_{10}	34.6
SOx	0.4
NOx	2.6

Natural Gas Combustion

The emission factors for natural gas combustion were developed by U. S. EPA and are published in AP-42 Section 1.4, Tables 1.4-1 and 1.4-2, dated July, 1998. These factors are presented in Table B-36. Because the records kept by Southwest Gas Corporation were in dekatherms which equal MMBtus, the EPA emission factors were converted from lb/10^6 scf to lb/MMBtu by using an average natural gas higher heating value of 1,020 Btu/scf.

Table B-36

Natural Gas Combustion Emission Factors

Pollutant	Type of Combustor	Emission Factor ($lb/10^6$ scf)	Emission Factor (lb/MMBtu)
PM_{10}	All	7.6	0.0075
NOx	Residential	94	0.09216
	Small Boiler	100	0.09804
	Large Boiler	190	0.18627
SOx	All	0.6	0.0006

Structural/ Vehicle Fires/ Wild Fires

The California Air Resources Board (CARB) estimate for combustible structural mass is 16.3 pounds per square foot. The national median home size is 1,732 square feet, so the average residence has 13.88 tons of combustible material (16.3 times 1,732 divided by 2,000 pounds per ton). Assuming that about seven percent of the material is consumed by each fire incidence, as most fires are stopped before entire structures are consumed, an estimated 1.15 tons of material is consumed during each fire incidence.

The CARB established particulate emission factors for fires in 1984. The U. S. EPA established an emission factor for NOx in 1991. These factors and the corresponding pound per fire incidence emission rates are presented in Table B-37.

Table B-37

Fire Emission Factors and Rates

Pollutant	Emission Factor (pound pollutant per ton material burned)	Emission Rate (pound pollutant per fire incidence)
PM_{10}	10.8	12.42
NOx	1.4	1.61

Charbroiling/ Meat Cooking

The consultant who provided the emissions estimate for charbroiling and meat cooking used emission factors developed by South Coast Air Quality Management District in Southern California (SCAQMD). The emission factors are based upon the type of meat cooked and are presented in Table B-38.

Table B-38

Charbroiling/Meat Cooking Emission Factors

Cooking Implement	Type of Meat			
	Hamburger	Steak	Chicken	Fish
Chain-driven Charbroiler With Controls	1.29			
Chain-driven Charbroiler, No Controls	7.42			
Underfired Charbroiler, No Controls	32.65	17.19	10.48	3.3
Flat-top Griddle and Grooved Griddle	5.08			

Vacant Land

Representative parcels of vacant land within the nonattainment area and parcels within the micro-scale areas were tested to determine if the soil was stable. The stability test methods are outlined in AQD Regulations, Section 90, Subsection 90.4. There are three test methods used to evaluate a parcel: the ball drop, the rock test, and threshold friction velocity determination.

For the ball drop test a steel ball with a diameter of 15.9 millimeters (0.625 inches) and a mass ranging from 16-17 grams is dropped from a height of 30 centimeters (one foot) directly above the soil surface. If the falling ball neither creates a dent nor pulverizes the surface upon which the ball fell, the soil passes the ball drop test. Three tests were conducted within a one-foot square area on three randomly chosen survey areas of a parcel. The soil must pass two of the three individual ball drops and all three survey areas must pass for the parcel or portion of the parcel to be determined to be stabilized.

The survey areas were chosen by facing away from the parcel and throwing a weighted object over one's shoulder. Where the object landed was used as the center of the one-foot square area for the ball drop testing.

If a parcel or portion of a parcel failed the ball drop test, then the rock test was completed. The rock test examines the wind-resistance effects of rocks and other non-erodible elements on disturbed surfaces. Non-erodible elements are objects larger than one (1) centimeter (cm) (3/8 inch) in diameter that remain firmly in place even on windy days. Typically non-erodible elements include rocks, stones, glass fragments, and hard packed clumps of soil lying on or embedded in the surface. Vegetation does not count as a non-erodible element in this method.

A survey area was chosen using the same method used for the drop ball test. Where the object landed was used as the lower left-hand corner of a one-meter square survey area (slightly greater than a three-foot square area). Without moving them, the non-erodible elements within the survey square were mentally grouped into small, medium, and large. The number of elements in each group were counted. The width and length of two representative elements in each group were measured and the area determined by multiplying the width times the length. The average dimension was multiplied by the number of elements in the group to determine the total area covered by non-erodible elements. The total rock area was divided by two, then divided by the survey square area using the same units (e.g., if the non-erodible element area was measured in centimeters the survey area used in the division was 10,000 square centimeters); the result was then multiplied by 100 to determine the percentage of non-erodible element coverage.

Three survey areas were evaluated and the calculated percentages averaged. If the average non-erodible element cover was greater than or equal to 20 percent, the surface passed and was determined to be stable. If the average non-erodible surface area was less than 20 percent, the threshold friction velocity (TFV) was determined.

The TFV was determined using the sieve analysis described in subsection 90.4.1.3, which was based on W. S. Chepil's 1952 laboratory procedure. A set of sieves with 4 mm, 2 mm, 1 mm, 0.5 mm and 0.25 mm openings were stacked in order of the size opening with the largest size opening on top. A collector pan was placed under the bottom sieve.

A sample of loose material from a one-foot square area down to a depth of about one (1) cm was collected using a brush and a dustpan. Rocks larger than one (1) cm were removed from the sample. The sample was poured into the top sieve and the sieve unit covered with a lid. The covered sieve apparatus was then moved using a broad, circular motion in a horizontal plane. Twenty circular arm movements were completed: ten in a clockwise direction and ten in a counterclockwise direction. The sieve apparatus was moved just fast enough to achieve some relative horizontal motion between the sieves and the particles.

After the sieve apparatus was disassembled, each sieve and the collector pan were tilted slightly, and gently tapped to align the material along one side. The sieves and the collector pan were lined up in a row and visibly inspected to determine the relative quantities of catch in each and the sieve or collector pan with the greatest volume of material. The correlation between sieve size and TFV is presented in Table B-39 below.

Table B-39

Determination of Threshold Friction Velocity

Sieve Opening (mm)	TFV (cm/s)
4	135
2	100
1	76
0.5	58
0.25	43
Collector Pan	30

Three random soil samples representing random portions of the overall conditions of a site were selected using the weighted object method previously described. The results of the three samples were averaged together to determine the uncorrected TFV. The TFV was corrected for non-erodible elements if the uncorrected TFV average was below 100. Non-erodible elements were evaluated as described for the rock test above. A correction factor was identified based upon the results of the non-erodible elements evaluation. Table B-40 lists the correction factors. The TFV was multiplied by the corresponding correction factor to calculate the TFV corrected for non-erodible elements.

Table B-40

Correction Factors for Threshold Friction Velocity

Percent Cover of Non-Erodible Elements	Correction Factor
Greater than or equal to 10%	5
Greater than or equal to 5%	3
Less than 5% and greater than or equal to 1%	2
Less than 1%	None

Sites with a TFV or corrected TFV greater than or equal to 100 were classified as stable. Sites with a lower TFV were evaluated for vegetation.

Disturbed Vacant Lands: To estimate wind erosion emissions from unpaved surfaces, the University of Nevada Las Vegas (UNLV) was contracted by Clark County Comprehensive Planning to calculate geometric mean hourly emission rates from native desert and unstable soils within the Las Vegas Valley (Appendix C). The emissions rates varied by soil type as defined in the U. S. Department of Agriculture[27] report. The results of the study provided PM_{10}

[27] *Soil Survey of Las Vegas Valley Area Nevada: Part of Clark County,* U. S. Department of Agriculture, July, 1985.

emission factors dependent of varying wind speeds measured by UNLV's portable wind tunnel during the summer of 1995 for native desert and disturbed vacant lands.[28] The extrapolated emission factors accounted for vegetation cover. An initial "spike" was measured when wind speeds reached a level where particles were first measured. An initial wind threshold of 20 mph was determined by UNLV for disturbed vacant land because emissions would occur at this wind speed for ninety percent of disturbed vacant land parcels. The mean hourly emission rates and spike values for disturbed vacant land are presented in Table B-41.

Table B-41

Mean Hourly Emission Rates for Disturbed Vacant Land

Soil Type	Wind Speed (mph)	Geometric Mean Flux (ton/acre/hour)	Geometric Mean Spike (ton/acre)
All Soils	10 – 14.9	N/A	N/A
	15 – 19.9	$4.95x10^{-3}$	$9.65x10^{-4}$
	20 – 24.9	$5.21x10^{-3}$	$8.16x10^{-4}$
	25 – 29.9	$6.40x10^{-3}$	$1.94x10^{-3}$
	30 – 34.9	$4.62x10^{-3}$	$1.41x10^{-3}$
	35 – 39.9	$7.05x10^{-3}$	$3.80x10^{-3}$
	40 – 44.9	$1.13x10^{-2}$	$3.45x10^{-3}$
	45 – 49.9	$7.12x10^{-3}$	$4.50x10^{-3}$
	50 – 54.9	$3.69x10^{-3}$	$1.30x10^{-3}$
Soil Group 2	10 – 14.9	N/A	N/A
	15 – 19.9	N/A	N/A
	20 – 24.9	N/A	N/A
	25 – 29.9	N/A	N/A
	30 – 34.9	$4.12x10^{-3}$	$8.28x10^{-4}$
	35 – 39.9	$2.81x10^{-3}$	$8.63x10^{-4}$
	40 – 44.9	$2.80x10^{-3}$	$1.37x10^{-3}$
	45 – 49.9	$7.27x10^{-3}$	$2.33x10^{-3}$
	50 – 54.9	$2.13x10^{-3}$	$1.82x10^{-3}$
Soil Group 3	10 – 14.9	N/A	N/A
	15 – 19.9	N/A	N/A
	20 – 24.9	N/A	N/A
	25 – 29.9	N/A	N/A
	30 – 34.9	$1.36x10^{-3}$	$6.59x10^{-4}$
	35 – 39.9	$5.42x10^{-3}$	$1.49x10^{-3}$
	40 – 44.9	N/A	N/A
	45 – 49.9	N/A	N/A
	50 – 54.9	N/A	N/A

[28] Op. Cit.

Table B-41

Mean Hourly Emission Rates for Disturbed Vacant Land (continued)

Soil Group 5	10 – 14.9	N/A	N/A
	15 – 19.9	N/A	N/A
	20 – 24.9	$4.26x10^{-3}$	$2.67x10^{-3}$
	25 – 29.9	$2.72x10^{-2}$	$1.19x10^{-2}$
	30 – 34.9	$7.23x10^{-2}$	$2.67x10^{-2}$
	35 – 39.9	$1.95x10^{-2}$	$5.93x10^{-3}$
	40 – 44.9	$7.99x10^{-3}$	$3.37x10^{-3}$
	45 – 49.9	N/A	N/A
	50 – 54.9	$2.33x10^{-2}$	$6.95x10^{-3}$
Soil Group 6	No wind tunnel tests were performed for disturbed soils in this soil group.		
Soil Group 7	No wind tunnel tests were performed for disturbed soils in this soil group.		
Soil Group 8	10 – 14.9	N/A	N/A
	15 – 19.9	N/A	N/A
	20 – 24.9	$1.62x10^{-3}$	$1.10x10^{-4}$
	25 – 29.9	$3.00x10^{-3}$	$3.34x10^{-4}$
	30 – 34.9	$3.75x10^{-3}$	N/A
	35 – 39.9	$1.21x10^{-2}$	$2.36x10^{-3}$
	40 – 44.9	$3.96x10^{-3}$	$1.58x10^{-3}$
	45 – 49.9	$1.44x10^{-2}$	$4.79x10^{-3}$
	50 – 54.9	$8.26x10^{-2}$	$1.15x10^{-2}$
Soil Group 9	10 – 14.9	N/A	N/A
	15 – 19.9	N/A	N/A
	20 – 24.9	$1.75x10^{-2}$	$3.06x10^{-3}$
	25 – 29.9	N/A	N/A
	30 – 34.9	$4.57x10^{-2}$	$1.30x10^{-2}$
	35 – 39.9	N/A	N/A
	40 – 44.9	$3.40x10^{-1}$	$3.87x10^{-2}$
	45 – 49.9	$5.08x10^{-2}$	$6.25x10^{-3}$
	50 – 54.9	N/A	N/A

The all soils factors were used for the nonattainment area and BLM disposal area inventories. The disturbed soil was classified by soil type and the appropriate emission factor was applied for the 1998 J. D. Smith inventory. The particulate reservoir for disturbed vacant land was assumed to have no limit. For every hour the sustained wind speeds were within a given wind speed category above the "spike" wind speed, the emissions were calculated. A single "spike" mass was added for each acre, assuming each day represented a single wind event and reservoir recharging would not have occurred during a 24-hour period. Wind speeds less than the “spike” speed do not contribute to PM_{10} emissions from natural wind erosion and were eliminated from emission calculations.

Native Desert Fugitive Dust: The emission factors for native desert were determined using the same methods as for disturbed vacant land. Hourly average wind speeds 25 mph or greater produced emissions from 30 of the 34 native desert parcels. Therefore, 25 mph was determined to be the initial wind threshold for native desert parcels. The emission factors developed by UNLV for native desert are presented in Table B-42.

Table B-42

Mean Hourly Emission Rates for Native Desert

Soil Type	Wind Speed (mph)	Geometric Mean Flux (ton/acre/hour)	Geometric Mean Spike (ton/acre)
All Soils	10 – 14.9	N/A	N/A
	15 – 19.9	N/A	N/A
	20 – 24.9	N/A	N/A
	25 – 29.9	2.57×10^{-3}	4.90×10^{-4}
	30 – 34.9	3.16×10^{-3}	5.88×10^{-4}
	35 – 39.9	2.99×10^{-3}	9.24×10^{-4}
	40 – 44.9	5.92×10^{-3}	1.70×10^{-3}
	45 – 49.9	7.58×10^{-3}	2.20×10^{-3}
	50 – 54.9	1.10×10^{-2}	2.5×10^{-3}
Soil Group 2	10 – 14.9	N/A	N/A
	15 – 19.9	N/A	N/A
	20 – 24.9	4.65×10^{-4}	5.53×10^{-5}
	25 – 29.9	1.52×10^{-3}	1.34×10^{-4}
	30 – 34.9	2.48×10^{-3}	5.46×10^{-4}
	35 – 39.9	2.45×10^{-3}	1.04×10^{-3}
	40 – 44.9	6.48×10^{-3}	1.87×10^{-3}
	45 – 49.9	7.18×10^{-3}	2.25×10^{-3}
	50 – 54.9	1.24×10^{-2}	3.19×10^{-3}
Soil Group 3	10 – 14.9	N/A	N/A
	15 – 19.9	N/A	N/A
	20 – 24.9	N/A	N/A
	25 – 29.9	5.16×10^{-4}	N/A
	30 – 34.9	N/A	N/A
	35 – 39.9	N/A	N/A
	40 – 44.9	1.91×10^{-3}	5.13×10^{-4}
	45 – 49.9	5.68×10^{-3}	1.45×10^{-3}
	50 – 54.9	7.46×10^{-3}	3.52×10^{-3}
Soil Group 5	10 – 14.9	N/A	N/A
	15 – 19.9	N/A	N/A
	20 – 24.9	N/A	N/A

Table B-42

Mean Hourly Emission Rates for Native Desert (continued)

Soil Group 5 (continued)	25 – 29.9	$2.52x10^{-3}$	$6.32x10^{-4}$
	30 – 34.9	$2.15x10^{-3}$	$5.66x10^{-4}$
	35 – 39.9	$2.66x10^{-3}$	$7.48x10^{-4}$
	40 – 44.9	$7.18x10^{-3}$	$3.49x10^{-3}$
	45 – 49.9	$8.69x10^{-3}$	$2.38x10^{-3}$
	50 – 54.9	$1.32x10^{-2}$	$3.52x10^{-3}$
Soil Group 6	10 – 14.9	N/A	N/A
	15 – 19.9	N/A	N/A
	20 – 24.9	$1.61x10^{-3}$	$6.56x10^{-5}$
	25 – 29.9	$7.25x10^{-3}$	$1.42x10^{-3}$
	30 – 34.9	$1.69x10^{-2}$	$2.11x10^{-3}$
	35 – 39.9	$4.78x10^{-3}$	$2.15x10^{-3}$
	40 – 44.9	$3.63x10^{-3}$	$9.28x10^{-4}$
	45 – 49.9	$9.08x10^{-3}$	$4.20x10^{-3}$
	50 – 54.9	$7.78x10^{-3}$	$1.48x10^{-3}$
Soil Group 7	10 – 14.9	N/A	N/A
	15 – 19.9	N/A	N/A
	20 – 24.9	N/A	N/A
	25 – 29.9	N/A	N/A
	30 – 34.9	$1.43x10^{-3}$	$1.88x10^{-4}$
	35 – 39.9	$2.41x10^{-3}$	$3.79x10^{-4}$
	40 – 44.9	$5.90x10^{-3}$	$1.25x10^{-3}$
	45 – 49.9	$1.03x10^{-2}$	$2.19x10^{-3}$
	50 – 54.9	$1.43x10^{-2}$	$1.50x10^{-3}$
Soil Group 8	10 – 14.9	N/A	N/A
	15 – 19.9	$1.95x10^{-3}$	$4.00x10^{-4}$
	20 – 24.9	$1.06x10^{-2}$	$2.64x10^{-3}$
	25 – 29.9	N/A	N/A
	30 – 34.9	$6.33x10^{-3}$	$6.40x10^{-4}$
	35 – 39.9	$3.44x10^{-3}$	$1.21x10^{-3}$
	40 – 44.9	$4.81x10^{-3}$	$1.41x10^{-3}$
	45 – 49.9	$3.26x10^{-3}$	$4.15x10^{-3}$
	50 – 54.9	N/A	N/A

Table B-42

Mean Hourly Emission Rates for Native Desert (continued)

Soil Group 9	10 – 14.9	N/A	N/A
	15 – 19.9	N/A	N/A
	20 – 24.9	N/A	N/A
	25 – 29.9	$1.61x10^{-3}$	$3.61x10^{-4}$
	30 – 34.9	$3.01x10^{-3}$	$4.68x10^{-4}$
	35 – 39.9	$3.18x10^{-3}$	$8.15x10^{-4}$
	40 – 44.9	$8.47x10^{-3}$	$1.64x10^{-3}$
	45 – 49.9	$8.78x10^{-3}$	$2.48x10^{-3}$
	50 – 54.9	$1.03x10^{-2}$	$1.79x10^{-3}$

The all soils factors were used for the nonattainment area and BLM disposal area inventories. The disturbed soil was classified by soil type and the appropriate emission factor was applied for the 1998 J. D. Smith inventory. If an emission factor was not available for a given soil type, the all soils factor was used. Because the native desert parcels have a limited PM_{10} reservoir, it was assumed the reservoir would be depleted within one hour of sustained winds above the “spike” wind speed. Therefore, only one hour of emissions was calculated during each day winds exceed the threshold friction velocity (“spike” wind speed) for native desert parcels. The “spike” mass was added to the mass calculated using the mean hourly emission factors.

Stabilized Vacant Land Dust: The third category for vacant land was stabilized. This designation was given to parcels which were no longer native desert and had been determined to be stable using the methodology previously described. The emission factors for this category were also developed by UNLV using data from a 1998-1999 wind tunnel study.[29]

The same wind tunnel methodology used to measure emissions from native desert and unstable parcels was used to estimate emissions from nine dust suppressants including water. The parcels were measured before and after being disturbed by vehicle traffic, giving a representative sample the types of dust suppressants likely to be used and the condition the vacant land parcels may have at any given time. Because the parcels were subject to some disturbance that may have caused some dust palliatives to break down, the initial wind threshold for this category was lower than the other categories. However, the use of dust palliatives greatly reduced the overall emission factors. The average emission factor at a given wind speed was used to calculate the

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[29] *Estimation of Valley-Wide PM_{10} Emissions Using UNLV 1995 Wind Tunnel-Derived Emission Factors, 1998-1999 Emission Factors, Revised Vacant Land Classifications, and GIS-Based Mapping of Vacant Lands*, Dr. David James et al., University of Nevada, Las Vegas, Nevada, September, 2000

emissions from the stabilized parcels. Spikes were generally not observed from the stabilized parcels, and emission factors without spike correction were used. The factors used for stabilized parcels are presented in Table B-43.

Table B-43

Mean Hourly Emission Rates for Stabilized Land

Wind Speed (mph)	Geometric Mean Flux (ton/acre/hour)
15 – 19.9	4.2×10^{-4}
20 – 24.9	3.4×10^{-4}
25 – 29.9	1.9×10^{-4}

As with native desert, it was assumed that the stabilized parcels have a limited PM_{10} reservoir that would be depleted within one hour of sustained winds above the threshold wind velocity. Therefore, only one hour of emissions was calculated during each day for stabilized parcels.

<u>Construction Activity Fugitive Dust</u>

Construction activity fugitive dust includes particulate emissions from activities such as grading, trenching, crushing, screening, and back filling. A Best Available Control Measure (BACM) report on construction activities completed by Midwest Research Institute (MRI)[30] recommends up to five different levels of uncontrolled PM_{10} emission estimates methods for construction activities. Each level of emission estimate varied based on the amount of valid data known about each construction project. The emission estimates derived by MRI were from on-site evaluation of construction operations within four serious PM_{10} nonattainment areas: Las Vegas, NV; Coachella Valley, CA; South Coast, CA; and San Joaquin Valley, CA.

For the construction sites in the Las Vegas Valley, the available information from the AQD construction activities permits data base included the type of construction project and the number of acres previously described as activity levels. For construction sites where only the amount of land involved and the type of construction project is known, two emission factors are provided. For general construction sites that do not include any cut and fill areas, large-scale earthmoving operations, or heavy traffic volumes, an emission factor of 0.11 tons/acre/month would apply. For general construction sites which do include cut and fill areas, large-scale earthmoving operations, or heavy traffic volumes, an emission factor of 0.42 tons/acre/month would apply.

CCHD enforcement officers provided information as to which types of construction operations within the Las Vegas Valley usually include cut and fill areas, large-scale earthmoving activities, and/or heavy traffic volumes. In

[30] *Improvement of Specific Emission Factors (BACM Project No. 1), Final Report,* Midwest Research Institute, March, 1996.

general, all airport, flood detention, highway, public works, and underground utility operations include either cut and fill areas, large-scale earthmoving activities, and/or heavy traffic volumes. Therefore an emission factor of 0.42 tons/acre/month was assigned to those types of construction projects.

The remaining types of construction projects, including commercial, public parks, public buildings, and residential homes, sometimes include cut and fill areas, large-scale earthmoving activities, and/or heavy traffic volumes and other times do not. Therefore, an average emission factor of 0.265 tons/acre/month (0.11 plus 0.42 divided by two) was used to account for this variation.

The emission factors developed by MRI are uncontrolled emission values, meaning no soil stabilization was assumed to occur. The CCHD regulations require the control of PM_{10} emissions at construction sites. Dust control at construction sites is usually implemented using water. The U. S. EPA assigns a 50 percent control efficiency to watering for control of particulate emissions from construction sites.[31] The CCHD enforcement officers also provided compliance rates for each type of construction activity as shown in Table B-30.

Windblown Construction Dust

As previously described, some acres on construction sites were evaluated as stabilized and some acres disturbed based upon the percentages of construction sites implementing controls by category. The emission factors used for the stabilized acres are the same emission factors as used for stabilized vacant land. The emission factors for disturbed soil were used for the uncontrolled acres on construction sites. The all soils factors were used because the exact soil types were not known.

Nonroad Mobile Sources

The *Nonroad Engine Emission Inventories for CO and Ozone nonattainment Boundaries Las Vegas Area* report completed by U. S. EPA in 1993 included emission factors for PM_{10} for nonroad engines. These factors were used for nonroad gasoline engines with the exception of recreational equipment. U. S. EPA updated diesel emission factors in 1998.[32] The report covers all diesel-fueled engines. The emission factors for pre-Tier I and after 1988 engines from Table 1 of the document were used assuming the age of most of the engines in the nonattainment air shed are within that 11-year period. Sulfur oxide emission rates were calculated using the equation provided in the report.

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[31] Op. Cit.

[32] *Exhaust Emission Factors for Nonroad Engine Modeling - - Compression Ignition, Report No. NR-009A*, U. S. EPA, 1998.

Emission factors for 2-stroke and 4-stroke gasoline-fired recreational equipment were provide by U. S. EPA in 1999.[33] Emission factors from Table 28 of the report were used for 4-stroke gasoline-fired recreational vehicles. The 2-stroke gasoline-fired emission rates were presented elsewhere in the report.

Table B-44 lists the emission factors for PM_{10}, NOx, and SOx for each of the nonroad engines within the nonattainment area by engine type. The U. S. EPA published all of these emission factors.

Table B-44

Nonroad Engines Emission Factors

Equipment Type	Engine Type	PM_{10} Emission Factor (g/hp-hr)	NOx Emission Factor (g/hp-hr)	SOx Emission Factor (g/hp-hr)
Terminal Tractor	Diesel	0.4	8.38	1.07
	4 Stroke Gasoline	0.8	5.16	0.27
Aircraft Support Equipment	Diesel	0.72	8.3	1.19
	4 Stroke Gasoline	0.72	5.16	0.27
Generator Sets < 50 HP	Diesel	0.8	6.9	1.18
	4 Stroke Gasoline	0.22	0.81	0.27
	2 Stroke Gasoline	7.7	0.29	0.27
Pumps < 50 HP	Diesel	0.8	6.9	1.18
	4 Stroke Gasoline	0.22	0.81	0.27
	2 Stroke Gasoline	0.18	2.82	0
Air Compressors < 50 HP	Diesel	0.8	6.9	1.18
	4 Stroke Gasoline	0.22	0.81	0.27
Welders < 50 HP	Diesel	0.8	6.9	1.18
	4 Stroke Gasoline	0.22	0.81	0.27
Pressure Washers < 50 HP	4 Stroke Gasoline	0.22	0.81	0.27
Forklifts	Diesel	0.72	8.3	1.19
	4 Stroke Gasoline	0.06	5.16	0.27
Asphalt Pavers	Diesel	0.72	8.3	1.19
	4 Stroke Gasoline	0.06	4.79	0.25
Tampers/Rammers	4 Stroke Gasoline	0.22	1.92	0.25
	2 Stroke Gasoline	7.7	0.29	0.25
Plate Compactors	Diesel	1	10	1.18
	4 Stroke Gasoline	0.22	1.92	0.25
	2 Stroke Gasoline	7.7	0.29	0.25
Concrete Pavers	Diesel	0.4	8.38	1.07
Rollers	Diesel	0.72	8.3	1.19
	4 Stroke Gasoline	0.22	2.11	0.28
Scrapers	Diesel	0.4	8.38	1.07

[33] *Exhaust Emission Factors for Nonroad Engine Modeling - - Spark Ignition, Report No. NR-010b*, EPA420-R-99-009; U. S. EPA Office of Mobile Sources, Assessment and Modeling Division, March, 1999.

Table B-44

Nonroad Engines Emission Factors (continued)

Paving Equipment	Diesel	0.72	8.3	1.19
	4 Stroke Gasoline	0.22	1.92	0.25
	2 Stroke Gasoline	7.7	0.29	0.25
Surfacing Equipment	4 Stroke Gasoline	0.22	1.92	0.25
Signal Boards	Diesel	1	10	1.18
	4 Stroke Gasoline	0.22	1.82	0.25
Trenchers	Diesel	0.72	8.3	1.19
	4 Stroke Gasoline	0.06	4.79	0.25
Bore/Drill Rigs	Diesel	0.4	8.38	1.07
	4 Stroke Gasoline	0.06	4.79	0.25
Excavators	Diesel	0.4	8.38	1.07
Concrete/Industrial Saws	Diesel	0.72	8.3	1.19
	4 Stroke Gasoline	0.22	1.92	0.25
Cement and Mortar Mixers	Diesel	1	10	1.18
	4 Stroke Gasoline	0.22	1.92	0.25
Cranes	Diesel	0.4	8.38	1.07
	4 Stroke Gasoline	0.06	4.79	0.25
Graders	Diesel	0.4	8.38	1.07
Off-Highway Trucks	Diesel	0.4	8.38	1.07
Crushing/Processing Equipment	Diesel	0.4	8.38	1.07
	4 Stroke Gasoline	0.06	4.79	0.25
Rough Terrain Forklifts	Diesel	0.72	8.3	1.19
	4 Stroke Gasoline	0.06	4.79	0.25
Rubber Tired Loaders	Diesel	0.4	8.38	1.07
	4 Stroke Gasoline	0.06	5.42	0.24
Rubber Tired Dozers	Diesel	0.4	8.38	1.07
Tractors/Loaders Backhoes	Diesel	0.72	8.3	1.19
	4 Stroke Gasoline	0.06	4.79	0.25
Crawler Tractors	Diesel	0.4	8.38	1.07
Skid Steer Loaders	Diesel	0.8	6.9	1.18
	4 Stroke Gasoline	0.06	4.79	0.25
Off-Highway Tractors	Diesel	0.4	8.38	1.07
Dumpers/Tenders	Diesel	0.8	6.9	1.18
	4 Stroke Gasoline	0.22	1.92	0.22
Other Construction Equipment	Diesel	0.4	8.38	1.07
	4 Stroke Gasoline	0.06	4.79	0.25
Lawn & Garden Tractors	Diesel	1	10	1.18
	4 Stroke Gasoline	0.36	0.84	0.37
Chippers/Stump Grinders	Diesel	0.72	8.3	1.19
	4 Stroke Gasoline	0.05	2.02	0.37
Commercial Turf Equipment	Diesel	0.8	6.9	1.18
	4 Stroke Gasoline	0.36	0.84	0.37
Other Lawn & Garden Equipment	4 Stroke Gasoline	0.18	0.81	0.37

Table B-44

Nonroad Engines Emission Factors (continued)

	2 Stroke Gasoline	7.7	0.29	0.54
Trimmers/Edgers/Brush Cutters	4 Stroke Gasoline	1.48	0.81	0.37
	2 Stroke Gasoline	3.89	0.91	0.54
Lawn Mowers	4 Stroke Gasoline	2.66	0.81	0.37
	2 Stroke Gasoline	7.7	0.29	0.54
Leaf Blowers/Vacuums	2 Stroke Gasoline	3.6	0.96	0.54
Rear Engine Riding Mowers	Diesel	0.8	6.9	1.18
	4 Stroke Gasoline	0.18	0.81	0.37
Front End Mowers	4 Stroke Gasoline	0.18	0.81	0.37
Shredders < 5 HP	4 Stroke Gasoline	2.66	0.81	0.37
	2 Stroke Gasoline	7.7	0.29	0.54
Specialty Vehicles/Carts	Diesel	1	10	1.18
	4 Stroke Gasoline	0.045	3.5	0.55
	2 Stroke Gasoline	2.4	1.5	0.95
All Terrain Vehicles (ATVs)	4 Stroke Gasoline	0.045	3.5	0.55
	2 Stroke Gasoline	2.4	0.47	0.95
Minibikes	4 Stroke Gasoline	0.045	3.5	0.55
Off-road Motorcycles	4 Stroke Gasoline	0.045	3.5	0.55
	2 Stroke Gasoline	2.4	0.47	0.95
Golf Carts	4 Stroke Gasoline	0.045	3.5	0.55
	2 Stroke Gasoline	2.4	0.47	0.95

Railroad Equipment

Emission factors for PM_{10} and NOx for locomotives were published by the U. S. EPA.[34] Emission factors from Table 4 of the fact sheet were used. Emission factors for SOx were not included in the fact sheet. The EPA Procedures for Emission Inventory Preparation[35] listed an emission factor for SO_2 of 0.0360 lbs/gal based upon a fuel sulfur content of 0.25 percent. Clark County Health District Air Quality Regulations, Section 26 limits sulfur fuel content to 0.05 percent by weight. The emission factor was reduced based upon the ratio of the sulfur contents. The emission factors for locomotives are listed in Table B-45.

Table B-45

Emission Factors for Locomotives

Type of Locomotive	Emission Factor (gram/gallon)		
	PM_{10}	NOx	SOx
Line-Haul	6.7	178	3.27
Switch	9.2	262	3.27

[34] *Emission Factors for Locomotives*, U. S. EPA Office of Mobile Sources, December, 1997.
[35] *EPA Procedures for Emission Inventory Preparation – Volume IV: Mobile Sources*, U. S. EPA, 1992.

Aircraft Emissions
Emission factors from AP-42[36] were used for aircraft at McCarran International Airport, Henderson Executive Airport, and North Las Vegas Municipal Airport. Table B-46 lists the particulate emission factors for the different engine types listed in AP-42.

Table B-46

PM_{10} Emission Factors by Aircraft Type and Mode (kg/hr)

Engine Type	Particulate Emission Factors by Mode			
	Approach	Climbout	Takeoff	Taxi/Idle
CF6-50C	0.20	0.24	0.24	0.02
CF6-6D	0.20	0.24	0.24	0.02
F100-PW-100	0.50	3.90	0.00	0.05
JT3D-7 SERIES	3.60	3.90	3.70	0.20
JT8D-17	0.68	1.20	1.70	0.16
JT9D-7	1.00	1.80	1.70	1.00
JT9D-70A	1.00	1.80	1.70	1.00
SPEY MK511	0.68	4.50	7.30	0.08
T56-A-7	1.40	1.40	1.70	0.70
TPE331-3	0.27	0.27	0.36	0.14

Because AP-42 contains particulate emission factors for only nine types of commercial aircraft engines, engine and aircraft manufacturers were consulted to determine appropriate engine substitutions for the existing and forecast aircraft fleets at the three airports. An aircraft engine substitution matrix was developed and is presented in Table B-47. The EPA-approved process described in AP-42 was then used to calculate aircraft PM_{10} emissions.

Table B-47
Commercial Aircraft Engine Substitution Matrix

Aircraft Type	EDMS Engine Type	PM_{10} Engine Type
B727	JT8D-9	JT8D-17
B727	JT8D-9A	JT8D-17
B727	JT8D-15	JT8D-17
B727	JT8D-17	JT8D-17
B737-200(a)	JT8D-9A	JT8D-17
B737-200	JT8D-15	JT8D-17
B737-200	JT8D-17	JT8D-17
B737-300/400/500	CFM56-3	CF6-50C
B737-300/400/500	CFM56-3B	CF6-50C

[36] *AP-42, Compilation of Air Pollution Emission Factors, Volume II: Mobile Sources, Fourth Edition*, U. S. EPA, September, 1985.

Table B-47
Commercial Aircraft Engine Substitution Matrix
(continued)

B737-300/400/500	CFM56-3C1	CF6-50C
B737-600/700	CFM56-3C1	CF6-50C
B747	Default	CF6-50C
B757	PW2037	CF6-50C
B757	PW2040	CF6-50C
B757	RB211-535C	CF6-50C
B767	Default	CF6-50C
A300/310	CF6-50C	CF6-50C
A320	V2527-A5	CF6-50C
A320	V2500A-1	CF6-50C
Twin engine piston prop	TIO-540-J2B2	TPE331-3
Twin engine turboprop	T56-A-16	T56-A-7
Single engine piston prop	0-200	TPE331-3
Single engine piston prop	TIO-540-J2B2	TPE331-3
Twin engine turboprop	PT6A-27	TPE331-3
30-50 passengers	PW120	TPE331-3
DC10	Default	CF6-50C
DC9	Default	CF6-50C
Fighter/Trainer	F100-PW-100	F100-PW-100
Single engine turbo prop	PT6A-41	TPE331-3
L1011	Default	CF6-50C
Business Jet	TFE-731-2-2B	SPEY MK511
Business Jet	CJ610-6	SPEY MK511
MD80	JT8D-2171	JT8D-17
MD80	JT8D-219	JT8D-17
MD80	MD90/V2525-D5	JT8D-17

The aircraft emissions for Nellis Air Force Base were calculated using the Air Quality Utility Information System (AQUIS) Emission Algorithm manual, version 6.11. The emission factors are based upon the mode in which the aircraft engine is running. The Time In Mode (TIM) for emissions from aircraft has been developed by U. S. EPA, published in AP-42, and presented in Table B-48. The emissions from the military aircraft were then calculated by using the AQUIS emission factors (Table B-49) and the AP-42 TIM.

Table B-48

Aircraft Time in Mode

Aircraft	Idle Out	Military	Burner	Approach	Idle In
Piston	6.5	0.6	5.0	4.6	6.5
Trainer	6.8	0.5	1.4	4.0	4.4
Helicopter	8.0	0.0	6.8	6.8	7.0
Transport	9.2	0.4	1.2	5.1	6.7
Combat	18.5	0.4	0.8	3.5	11.3

Table B-49

Military Aircraft Emission Factors (pounds/hour)

Jet Engine	Idle	Approach	Intermediate	Military	Burner
TF30-003	0.0085	0.105	2.219	2.6	5.76
TF3901C	0.017	0.024	0.3606	0.3173	0.3173
F101-102	0.396	0.09	0.14	0.2	3.337
T58-GE5	0.1	0.8	0	0	0.8
TF33-007	0.1177	0.975	9.399	7.926	7.926
TF33-100A	0.132	0.975	9.399	10.7	10.7
F108100	0.15	0.81	2.4	3.5	3.5
J57-59W	0.1625	0.41	2.322	6.636	272.9
J5759	0.1625	0.41	2.322	6.636	272.9
F100-100	0.1704	0.81	2.402	3.5	6.902
TF33-003	0.207	3.762	11.73	12.87	12.87
TF34-100	0.306	4.276	7.353	7.586	7.586
TF33-102	0.555	7.866	8.064	7.704	7.704
TF33-005	0.56	7.866	8.064	7.704	7.704
J79-15	0.565	6.3	15.01	19.65	4.836
T5607	0.5904	0.8051	0.9435	0.98	0.98
T5615	0.664	0.8051	0.9435	1.04	1.04
T5609	0.664	0.8051	0.9435	0.935	0.935
JT8D17	0.57	4.75	5.11	5.47	5.47
F404-400	10.3	16	21.7	24.1	24.1

Onroad Mobile Sources

Paved Road Dust (including construction track out)
The AP-42 equation for calculating PM_{10} emissions from re-entrained paved road dust is:

$$E = 7.3(sL/2)^{0.65}(W/3)^{1.5}$$

where:

E = particulate emission factor (g/VMT);
sL = road surface silt loading (g/m^2); and
W = average weight (tons) of the vehicles traveling the roads.

The average weight of the vehicles traveling the roads was established by Clark County in the 1997 Particulate Matter (PM_{10}) Attainment Demonstration Plan, and verified based upon current vehicle fleet information, as three tons. The road surface silt loading factor varies depending on the type of roadway as previously described. The emission factors by roadway category are presented in Table B-50.

Table B-50

Paved Road Dust Emission Factors (g/mile)

Roadway Category	Emission Factor (g/mile)	
	With Improved Shoulders	Without Improved Shoulders
Ext. Connector	2.93	-
Freeway Ramps	4.22	-
Minor Arterial	4.77	5.63
Major Arterial	2.93	5.63
Ramps	4.22	-
Interstate	0.37	-
Freeway	0.37	-
Expressway	2.93	-
Collector	4.22	37.4
Local	6.57	37.4
Intrazonal Trips	6.57	-
Public Transit	6.57	-

Construction track out emissions are estimated using the same equation. As described under source activities, the silt loading value was multiplied by a factor of 3.29 for those areas where track out was predicted to occur.

Unpaved Road Dust

The AP-42 equation for calculating PM_{10} emissions from unpaved roads is:

$$E = \frac{2.6(s/12)^{0.8}(W/3)^{0.4}}{(M/0.2)^{0.3}}$$

where:

E = site-specific emission factor (lb/VMT);
s = surface material silt content (%);
W = mean vehicle weight (tons); and
M = surface material moisture content (%).

Grab samples from unpaved roads within the Las Vegas Valley were analyzed for silt content by Desert Research Institute in 1996.[37] The average silt content measured for unpaved roads was about 16 percent. The mean vehicle weight within Clark County is three tons.

The surface material moisture content was not directly measured for any of the design days. As Las Vegas has an average rainfall of less than ten inches per year and average daily high temperatures exceed 80° Fahrenheit, it is reasonable to assume that uncontrolled unpaved roads would have low moisture contents. Rainfall, watering, and the application of salts such as magnesium chloride increase the moisture content. Therefore, the moisture content of unpaved roads is likely to vary widely within the nonattainment area. The range for moisture contents from AP-42 is 0.03 to 20 percent with 0.2 percent presented as the default when site-specific parameters are not known. Given the wide variability of moisture content values and the lack of site-specific data, the EPA default values of 0.2 percent was used.

Incorporating the values for s, W and M in the equation for unpaved roads, the emission factor becomes E = 3.27 lb/VMT.

Vehicle Emissions

The PM_{10} and SOx emission factors for motor vehicle exhaust were developed using the Part5 model, modified on February 24, 1995. The Nevada State 1998 vehicle mix was used when the model was run. The PM_{10} emission factors for brake and tire wear were also developed using Part5 and are 0.013 g/mile and 0.008 g/mile respectively. The emission factors for exhaust and sulfate are presented in Table B-51.

[37] *Fugitive Dust and Other Source Contributions to PM_{10} in Nevada's Las Vegas Valley, Vol. II, Final Report,* Desert Research Institute, April, 1997.

Table B-51

Vehicle Emission Factors for PM_{10} and Sulfur Oxides (g/mile)

Segment	PM Exhaust	Sulfate PM
Ext. Connector	0.034	0.039
Freeway Ramps	0.033	0.039
Minor Arterial	0.033	0.039
Major Arterial	0.034	0.039
Ramps	0.033	0.039
Interstate	0.034	0.039
Freeway	0.034	0.039
Collector	0.033	0.039
Local	0.033	0.039
Intrazonal Trips	0.033	0.039
Public Transit	0.477	0.181

The NOx emission factors were developed using the MOBILE5b model with 1998 vehicle fleet data. Summer and winter emission rates were averaged. NOx emission rates are presented in Table B-52.

Table B-52

Vehicle Emission Factors for Nitrogen Oxides (g/mile)

Vehicle Speeds (mph)	NOx Emission Factors		
	Summer	Winter	Average
64.7	2.94	3.18	3.06
28.4	1.71	1.86	1.78
33.2	1.73	1.87	1.80
42	1.77	1.92	1.84
24	1.70	1.84	1.77
54.8	2.24	2.43	2.34
54.3	2.20	2.39	2.30
29.6	1.71	1.86	1.78
14.9	1.76	1.90	1.83
10	1.87	2.02	1.94
13.5	1.78	1.92	1.85

The MOBILE5b model results are presented in Tables B-53 and B-54. The Part5 model output is presented in Table B-55.

Table B-53

NOx Vehicle Summer MOBILE5b Output

```
1    Las Vegas 1998 run; LV I/M with TTC begins on 3rd reg,incl HDGV

 MOBILE5b (14-Sep-96)
0
-M 49 Warning:
+                 1.00     MYR sum not = 1. (will normalize)
-M 49 Warning:
+                0.998     MYR sum not = 1. (will normalize)
-M 49 Warning:
+                0.999     MYR sum not = 1. (will normalize)
-M 49 Warning:
+                 1.00     MYR sum not = 1. (will normalize)
-M 49 Warning:
+                0.998     MYR sum not = 1. (will normalize)
-M 49 Warning:
+                0.999     MYR sum not = 1. (will normalize)
-M 49 Warning:
+                0.999     MYR sum not = 1. (will normalize)
-M170 Warning:
+               Exhaust emissions for gasoline fueled vehicles
                beginning in 1995 have been reduced as a result of
                Gasoline Detergent Additive Regulations (1994).
-M153 Warning:
+               Refueling emissions in grams-per-gallon are only
                available using the 120 column descriptive output
                option (OUTFMT =3 or 5).  See MOBILE5 Users Guide
                chapters 2.1.15, 2.1.19 and 2.1.20 for more information.
-M154 Warning:
+               Refueling emissions for LDGV and LDGT after 1998
                model year have been reduced as a result of the
                Onboard Refueling Vapor Recovery Regulations (1994).
0I/M program selected:

0    Start year (January 1):             1983
     Pre-1981 MYR stringency rate:        20%
     First model year covered:           1968
     Last model year covered:            1995
     Waiver rate (pre-1981):              1.%
     Waiver rate (1981 and newer):        1.%
     Compliance Rate:                    96.%
     Inspection type:                    Computerized Test and Repair
     Effectiveness - HC: 0.50  CO: 0.50  NOx: 0.50
     Inspection frequency                Annual
     Vehicle types covered:              LDGV - Yes
                                        LDGT1 - Yes
                                        LDGT2 - Yes
                                         HDGV - Yes
     1981 & later MYR test type:         2500 rpm / Idle
     Cutpoints, HC:  220.000   CO:    1.200   NOx:  999.000
  Low alt, Annl and Bien Insp Freq TECH 1 & 2 I/M cred data
```

```
 Annl Insp Freq & TECH 4+ I/M credit 2500/Idle test data
 With 100.0% Technician Training and Certification Credit
0Functional Check Program Description:
0Check Start Model Yrs Vehicle Classes Covered    Inspection        Comp   Eff
      (Jan1) Covered   LDGV LDGT1 LDGT2 HDGV   Type        Freq     Rate   Adj
 ATP   1983  1981-1995 Yes  Yes   Yes   Yes Test & Repair Annual    96.0%  0.00
0Air pump system disablements:       Yes  Catalyst removals:                 Yes
 Fuel inlet restrictor disablements: Yes  Tailpipe lead deposit test:        No
 EGR disablement:                    Yes  Evaporative system disablements:   No
 PCV system disablements:            No   Missing gas caps:                  Yes
0
                     Minimum Temp: 76. (F)   Maximum Temp:106. (F)
                     Period 1 RVP: 13.5      Period 2 RVP:  9.0 Period 2 Yr: 1995
0TOG HC emission factors include evaporative HC emission factors.
0_________________________________________________________________________________
0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1998           Region: Low          Altitude:  500. Ft.
                      I/M Program: Yes      Ambient Temp:   99.2 / 99.2 / 99.2 F
                Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 13.5   13.5   13.5          13.5   13.5   13.5   13.5   13.5
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  5.91   4.90   6.25   4.98  11.86   0.93   1.19   2.92  10.77   5.42
 Exhst  HC:  1.94   2.16   2.85   2.20   4.81   0.93   1.19   2.92   3.29   2.08
 Evap.  HC:  0.67   0.77   0.98   0.78   3.13                        6.76   0.71
 Refuel HC:  0.02   0.03   0.03   0.03   0.05                               0.03
 Runing HC:  3.19   1.88   2.33   1.91   3.81                               2.53
 Rsting HC:  0.10   0.09   0.08   0.09   0.12                        0.72   0.09
 Exhst  CO: 24.62  27.99  37.90  28.59  96.09   2.39   2.57  15.76  46.73  26.01
 Exhst NOX:  1.43   1.47   1.73   1.49   4.10   1.73   1.84  12.53   0.63   1.78
 ________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1998           Region: Low          Altitude:  500. Ft.
                      I/M Program: Yes      Ambient Temp:   99.2 / 99.2 / 99.2 F
                Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 10.0   10.0   10.0          10.0   10.0   10.0   10.0   10.0
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  7.58   6.13   7.91   6.24  14.75   1.08   1.39   3.41  11.74   6.88
 Exhst  HC:  2.43   2.71   3.67   2.77   6.31   1.08   1.39   3.41   4.26   2.60
 Evap.  HC:  0.67   0.77   0.98   0.78   3.13                        6.76   0.71
 Refuel HC:  0.02   0.03   0.03   0.03   0.05                               0.03
 Runing HC:  4.38   2.57   3.17   2.60   5.19                               3.47
 Rsting HC:  0.10   0.09   0.08   0.09   0.12                        0.72   0.09
 Exhst  CO: 30.79  35.06  49.41  35.93 123.69   3.02   3.24  19.90  64.54  32.63
 Exhst NOX:  1.48   1.52   1.77   1.53   3.97   1.93   2.05  13.98   0.63   1.87
 ________________________________________________________________________________
```

-M154 Warning:
+ Refueling emissions for LDGV and LDGT after 1998 model year have been reduced as a result of the Onboard Refueling Vapor Recovery Regulations (1994).

0Emission factors are as of July 1st of the indicated calendar year.

0User supplied veh registration distributions.

0Cal. Year: 1998 Region: Low Altitude: 500. Ft.
I/M Program: Yes Ambient Temp: 99.2 / 99.2 / 99.2 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	14.9	14.9	14.9		14.9	14.9	14.9	14.9	14.9	
VMT Mix:	0.545	0.387	0.025		0.002	0.003	0.006	0.029	0.003	
0Composite Emission Factors (Gm/Mile)										
TOG HC:	5.37	4.54	5.78	4.62	10.94	0.87	1.12	2.75	10.52	4.97
Exhst HC:	1.81	2.02	2.64	2.05	4.34	0.87	1.12	2.75	3.04	1.94
Evap. HC:	0.67	0.77	0.98	0.78	3.13				6.76	0.71
Refuel HC:	0.02	0.03	0.03	0.03	0.05					0.03
Runing HC:	2.78	1.67	2.08	1.69	3.36					2.22
Rsting HC:	0.10	0.09	0.08	0.09	0.12				0.72	0.09
Exhst CO:	22.98	26.13	34.92	26.66	87.52	2.19	2.35	14.45	42.21	24.25
Exhst NOX:	1.42	1.46	1.72	1.48	4.15	1.67	1.77	12.05	0.64	1.76

-M154 Warning:
+ Refueling emissions for LDGV and LDGT after 1998 model year have been reduced as a result of the Onboard Refueling Vapor Recovery Regulations (1994).

0Emission factors are as of July 1st of the indicated calendar year.

0User supplied veh registration distributions.

0Cal. Year: 1998 Region: Low Altitude: 500. Ft.
I/M Program: Yes Ambient Temp: 99.2 / 99.2 / 99.2 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Spd.:	29.6	29.6	29.6		29.6	29.6	29.6	29.6	29.6	
VMT Mix:	0.545	0.387	0.025		0.002	0.003	0.006	0.029	0.003	
0Composite Emission Factors (Gm/Mile)										
TOG HC:	2.84	2.78	3.51	2.82	6.41	0.52	0.67	1.63	9.34	2.80
Exhst HC:	1.05	1.20	1.50	1.21	1.79	0.52	0.67	1.63	1.86	1.14
Evap. HC:	0.67	0.77	0.98	0.78	3.13				6.76	0.71
Refuel HC:	0.02	0.03	0.03	0.03	0.05					0.03
Runing HC:	1.01	0.72	0.95	0.74	1.37					0.86
Rsting HC:	0.10	0.09	0.08	0.09	0.12				0.72	0.09
Exhst CO:	12.79	14.98	19.07	15.22	42.55	1.09	1.17	7.19	20.83	13.61
Exhst NOX:	1.46	1.49	1.78	1.51	4.72	1.31	1.39	9.47	0.83	1.71

-M154 Warning:
+ Refueling emissions for LDGV and LDGT after 1998 model year have been reduced as a result of the Onboard Refueling Vapor Recovery Regulations (1994).

0Emission factors are as of July 1st of the indicated calendar year.

0User supplied veh registration distributions.

0Cal. Year: 1998 Region: Low Altitude: 500. Ft.
I/M Program: Yes Ambient Temp: 99.2 / 99.2 / 99.2 F
Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
Reformulated Gas: No

0Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh

```
+            ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 54.3   54.3   54.3          54.3   54.3   54.3   54.3   54.3
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  1.79   2.00   2.49   2.03   4.67   0.33   0.43   1.04   8.87   1.88
 Exhst  HC:  0.71   0.84   1.01   0.85   0.91   0.33   0.43   1.04   1.39   0.77
 Evap.  HC:  0.67   0.77   0.98   0.78   3.13                         6.76   0.71
 Refuel HC:  0.02   0.03   0.03   0.03   0.05                                0.03
 Runing HC:  0.31   0.31   0.42   0.32   0.51                                0.30
 Rsting HC:  0.10   0.09   0.08   0.09   0.12                         0.72   0.09
 Exhst  CO:  8.07   9.96  12.47  10.11  36.96   0.82   0.88   5.39  12.59   8.84
 Exhst NOX:  1.85   1.92   2.32   1.95   5.66   1.74   1.85  12.60   1.17   2.20
 ________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1998           Region: Low          Altitude:  500. Ft.
                      I/M Program: Yes       Ambient Temp:   99.2 / 99.2 / 99.2 F
                Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+            ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 54.8   54.8   54.8          54.8   54.8   54.8   54.8   54.8
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  1.79   2.00   2.49   2.03   4.66   0.33   0.42   1.04   8.87   1.88
 Exhst  HC:  0.71   0.84   1.01   0.85   0.91   0.33   0.42   1.04   1.39   0.77
 Evap.  HC:  0.67   0.77   0.98   0.78   3.13                         6.76   0.71
 Refuel HC:  0.02   0.03   0.03   0.03   0.05                                0.03
 Runing HC:  0.30   0.30   0.41   0.31   0.50                                0.29
 Rsting HC:  0.10   0.09   0.08   0.09   0.12                         0.72   0.09
 Exhst  CO:  8.07   9.96  12.47  10.11  37.37   0.82   0.88   5.42  12.59   8.84
 Exhst NOX:  1.87   1.95   2.36   1.98   5.68   1.77   1.88  12.78   1.18   2.24
 ________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1998           Region: Low          Altitude:  500. Ft.
                      I/M Program: Yes       Ambient Temp:   99.2 / 99.2 / 99.2 F
                Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+            ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 24.0   24.0   24.0          24.0   24.0   24.0   24.0   24.0
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  3.31   3.18   4.03   3.23   7.36   0.62   0.79   1.95   9.65   3.24
 Exhst  HC:  1.26   1.42   1.80   1.44   2.41   0.62   0.79   1.95   2.17   1.36
 Evap.  HC:  0.67   0.77   0.98   0.78   3.13                         6.76   0.71
 Refuel HC:  0.02   0.03   0.03   0.03   0.05                                0.03
 Runing HC:  1.27   0.90   1.17   0.91   1.71                                1.07
 Rsting HC:  0.10   0.09   0.08   0.09   0.12                         0.72   0.09
 Exhst  CO: 15.73  18.22  23.35  18.53  52.95   1.36   1.46   8.95  26.22  16.66
```

```
 Exhst NOX:  1.43   1.46   1.74   1.48   4.50   1.38   1.47  10.01   0.76   1.70
 ________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1998           Region: Low          Altitude:  500. Ft.
                       I/M Program: Yes      Ambient Temp:   99.2 / 99.2 / 99.2 F
                 Anti-tam. Program: Yes    Operating Mode:   20.6 / 27.3 / 20.6
                  Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 42.0   42.0   42.0          42.0   42.0   42.0   42.0   42.0
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  2.13   2.25   2.81   2.28   5.22   0.39   0.50   1.22   8.94   2.18
 Exhst  HC:  0.78   0.91   1.11   0.92   1.13   0.39   0.50   1.22   1.46   0.85
 Evap.  HC:  0.67   0.77   0.98   0.78   3.13                         6.76   0.71
 Refuel HC:  0.02   0.03   0.03   0.03   0.05                                0.03
 Runing HC:  0.57   0.48   0.64   0.49   0.85                                0.51
 Rsting HC:  0.10   0.09   0.08   0.09   0.12                         0.72   0.09
 Exhst  CO:  9.09  10.94  13.74  11.11  33.52   0.82   0.88   5.41  14.01   9.80
 Exhst NOX:  1.50   1.53   1.83   1.55   5.19   1.36   1.44   9.80   0.93   1.77
 ________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1998           Region: Low          Altitude:  500. Ft.
                       I/M Program: Yes      Ambient Temp:   99.2 / 99.2 / 99.2 F
                 Anti-tam. Program: Yes    Operating Mode:   20.6 / 27.3 / 20.6
                  Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 33.2   33.2   33.2          33.2   33.2   33.2   33.2   33.2
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  2.60   2.59   3.25   2.63   5.97   0.47   0.60   1.48   9.19   2.59
 Exhst  HC:  0.95   1.09   1.35   1.10   1.53   0.47   0.60   1.48   1.71   1.03
 Evap.  HC:  0.67   0.77   0.98   0.78   3.13                         6.76   0.71
 Refuel HC:  0.02   0.03   0.03   0.03   0.05                                0.03
 Runing HC:  0.87   0.64   0.84   0.65   1.20                                0.75
 Rsting HC:  0.10   0.09   0.08   0.09   0.12                         0.72   0.09
 Exhst  CO: 11.40  13.43  17.03  13.65  38.35   0.97   1.05   6.43  18.19  12.17
 Exhst NOX:  1.47   1.51   1.80   1.52   4.85   1.29   1.37   9.35   0.87   1.73
 ________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1998           Region: Low          Altitude:  500. Ft.
                       I/M Program: Yes      Ambient Temp:   99.2 / 99.2 / 99.2 F
                 Anti-tam. Program: Yes    Operating Mode:   20.6 / 27.3 / 20.6
```

```
                 Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT    HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 28.4   28.4   28.4          28.4   28.4   28.4   28.4   28.4
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  2.93   2.85   3.60   2.90   6.58   0.54   0.69   1.69   9.40   2.89
 Exhst  HC:  1.09   1.24   1.56   1.26   1.90   0.54   0.69   1.69   1.92   1.18
 Evap.  HC:  0.67   0.77   0.98   0.78   3.13                        6.76   0.71
 Refuel HC:  0.02   0.03   0.03   0.03   0.05                               0.03
 Runing HC:  1.06   0.76   0.99   0.77   1.44                               0.90
 Rsting HC:  0.10   0.09   0.08   0.09   0.12                        0.72   0.09
 Exhst  CO: 13.32  15.58  19.86  15.83  44.34   1.14   1.22   7.50  21.84  14.17
 Exhst NOX:  1.45   1.49   1.77   1.50   4.67   1.32   1.40   9.54   0.82   1.71
 ________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of July 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1998           Region: Low          Altitude:  500. Ft.
                      I/M Program: Yes      Ambient Temp:   99.2 / 99.2 / 99.2 F
                Anti-tam. Program: Yes    Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT    HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 64.7   64.7   64.7          64.7   64.7   64.7   64.7   64.7
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  2.02   2.32   2.94   2.35   4.54   0.32   0.41   1.02   9.83   2.14
 Exhst  HC:  1.03   1.24   1.58   1.26   0.93   0.32   0.41   1.02   2.35   1.12
 Evap.  HC:  0.67   0.77   0.98   0.78   3.13                        6.76   0.71
 Refuel HC:  0.02   0.03   0.03   0.03   0.05                               0.03
 Runing HC:  0.22   0.22   0.30   0.22   0.36                               0.21
 Rsting HC:  0.10   0.09   0.08   0.09   0.12                        0.72   0.09
 Exhst  CO: 18.89  25.52  34.50  26.07  52.03   1.01   1.08   6.66  42.00  21.47
 Exhst NOX:  2.39   2.55   3.10   2.58   6.06   2.55   2.70  18.41   1.50   2.94
 ________________________________________________________________________________
```

Table B-54

NOx Vehicle Winter MOBILE5b Output

```
1    Las Vegas 1999 run; LV I/M with TTC begins on 3rd reg,incl HDGV

 MOBILE5b (14-Sep-96)
0
-M 49 Warning:
+               1.00     MYR sum not = 1. (will normalize)
-M 49 Warning:
+              0.998     MYR sum not = 1. (will normalize)
-M 49 Warning:
+              0.999     MYR sum not = 1. (will normalize)
-M 49 Warning:
+               1.00     MYR sum not = 1. (will normalize)
-M 49 Warning:
+              0.998     MYR sum not = 1. (will normalize)
-M 49 Warning:
+              0.999     MYR sum not = 1. (will normalize)
-M 49 Warning:
+              0.999     MYR sum not = 1. (will normalize)
-M170 Warning:
+              Exhaust emissions for gasoline fueled vehicles
               beginning in 1995 have been reduced as a result of
               Gasoline Detergent Additive Regulations (1994).
-M153 Warning:
+              Refueling emissions in grams-per-gallon are only
               available using the 120 column descriptive output
               option (OUTFMT =3 or 5).  See MOBILE5 Users Guide
               chapters 2.1.15, 2.1.19 and 2.1.20 for more information.
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0I/M program selected:

0    Start year (January 1):             1983
     Pre-1981 MYR stringency rate:        20%
     First model year covered:           1968
     Last model year covered:            1996
     Waiver rate (pre-1981):              1.%
     Waiver rate (1981 and newer):        1.%
     Compliance Rate:                    96.%
     Inspection type:                    Computerized Test and Repair
     Effectiveness - HC: 0.50  CO: 0.50  NOx: 0.50
     Inspection frequency                Annual
     Vehicle types covered:              LDGV - Yes
                                        LDGT1 - Yes
                                        LDGT2 - Yes
                                         HDGV - Yes
     1981 & later MYR test type:         2500 rpm / Idle
     Cutpoints, HC:  220.000   CO:    1.200   NOx:  999.000
  Low alt, Annl and Bien Insp Freq TECH 1 & 2 I/M cred data
 Annl Insp Freq & TECH 4+ I/M credit 2500/Idle test data
 With 100.0% Technician Training and Certification Credit
```

```
0Functional Check Program Description:
0Check Start Model Yrs Vehicle Classes Covered    Inspection        Comp   Eff
      (Jan1) Covered   LDGV LDGT1 LDGT2 HDGV   Type        Freq     Rate   Adj
 ATP   1983  1981-1996 Yes  Yes   Yes   Yes Test & Repair Annual    96.0%  0.00
0Air pump system disablements:       Yes  Catalyst removals:                  Yes
 Fuel inlet restrictor disablements: Yes  Tailpipe lead deposit test:         No
 EGR disablement:                    Yes  Evaporative system disablements:    No
 PCV system disablements:            No   Missing gas caps:                   Yes
0
                     Minimum Temp: 36. (F)   Maximum Temp: 64. (F)
                     Period 1 RVP: 13.5      Period 2 RVP:  9.0 Period 2 Yr: 1995
0TOG HC emission factors include evaporative HC emission factors.
0_____________________________________________________________________________________
0Emission factors are as of Jan. 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1999           Region: Low          Altitude:  500. Ft.
                        I/M Program: Yes      Ambient Temp:   55.9 / 55.9 / 55.9 F
                  Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                   Reformulated Gas: No
0  Ether Blend Market Share: 0.000      Alcohol Blend Market Share: 1.000
 Ether Blend Oxygen Content: 0.000    Alcohol Blend Oxygen Content: 0.035
                                          Alcohol Blend RVP Waiver: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 13.5   13.5   13.5          13.5   13.5   13.5   13.5   13.5
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  2.50   2.77   3.82   2.83   5.31   0.90   1.14   2.90   4.65   2.65
 Exhst  HC:  1.97   2.18   3.05   2.24   4.32   0.90   1.14   2.90   3.57   2.11
 Evap.  HC:  0.13   0.16   0.29   0.17   0.47                        0.86   0.15
 Refuel HC:  0.02   0.03   0.03   0.03   0.04                               0.02
 Runing HC:  0.37   0.40   0.46   0.40   0.49                               0.37
 Rsting HC:  0.03   0.03   0.02   0.03   0.03                        0.22   0.03
 Exhst  CO: 18.81  20.50  26.91  20.89  45.81   2.34   2.51  15.71  28.14  19.51
 Exhst NOX:  1.58   1.64   2.01   1.66   4.32   1.68   1.77  12.16   0.83   1.92
 ____________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of Jan. 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1999           Region: Low          Altitude:  500. Ft.
                        I/M Program: Yes      Ambient Temp:   55.9 / 55.9 / 55.9 F
                  Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                   Reformulated Gas: No
0  Ether Blend Market Share: 0.000      Alcohol Blend Market Share: 1.000
 Ether Blend Oxygen Content: 0.000    Alcohol Blend Oxygen Content: 0.035
                                          Alcohol Blend RVP Waiver: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 10.0   10.0   10.0          10.0   10.0   10.0   10.0   10.0
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  3.10   3.46   4.86   3.54   6.82   1.05   1.33   3.39   5.70   3.29
 Exhst  HC:  2.44   2.72   3.91   2.79   5.67   1.05   1.33   3.39   4.63   2.62
 Evap.  HC:  0.13   0.16   0.29   0.17   0.47                        0.86   0.15
 Refuel HC:  0.02   0.03   0.03   0.03   0.04                               0.02
 Runing HC:  0.49   0.55   0.63   0.56   0.65                               0.50
```

```
 Rsting HC:  0.03   0.03   0.02   0.03   0.03                              0.22   0.03
 Exhst  CO: 23.23  25.24  34.45  25.79  58.97   2.96   3.17  19.83  38.86  24.13
 Exhst NOX:  1.63   1.69   2.05   1.71   4.17   1.88   1.97  13.57   0.82   2.02
 ________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of Jan. 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1999           Region: Low          Altitude:  500. Ft.
                      I/M Program: Yes       Ambient Temp:   55.9 / 55.9 / 55.9 F
                Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0  Ether Blend Market Share: 0.000      Alcohol Blend Market Share: 1.000
 Ether Blend Oxygen Content: 0.000    Alcohol Blend Oxygen Content: 0.035
                                          Alcohol Blend RVP Waiver: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 14.9   14.9   14.9          14.9   14.9   14.9   14.9   14.9
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  2.33   2.57   3.53   2.63   4.84   0.85   1.07   2.74   4.38   2.47
 Exhst  HC:  1.84   2.04   2.82   2.09   3.90   0.85   1.07   2.74   3.30   1.97
 Evap.  HC:  0.13   0.16   0.29   0.17   0.47                              0.86   0.15
 Refuel HC:  0.02   0.03   0.03   0.03   0.04                                     0.02
 Runing HC:  0.33   0.34   0.40   0.35   0.44                                     0.32
 Rsting HC:  0.03   0.03   0.02   0.03   0.03                              0.22   0.03
 Exhst  CO: 17.63  19.24  24.95  19.59  41.73   2.15   2.30  14.40  25.41  18.28
 Exhst NOX:  1.56   1.62   2.01   1.65   4.37   1.62   1.70  11.69   0.84   1.90
 ________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of Jan. 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1999           Region: Low          Altitude:  500. Ft.
                      I/M Program: Yes       Ambient Temp:   55.9 / 55.9 / 55.9 F
                Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0  Ether Blend Market Share: 0.000      Alcohol Blend Market Share: 1.000
 Ether Blend Oxygen Content: 0.000    Alcohol Blend Oxygen Content: 0.035
                                          Alcohol Blend RVP Waiver: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 29.6   29.6   29.6          29.6   29.6   29.6   29.6   29.6
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  1.38   1.54   2.08   1.57   2.32   0.50   0.64   1.63   3.10   1.47
 Exhst  HC:  1.07   1.22   1.60   1.24   1.61   0.50   0.64   1.63   2.02   1.16
 Evap.  HC:  0.13   0.16   0.29   0.17   0.47                              0.86   0.15
 Refuel HC:  0.02   0.03   0.03   0.03   0.04                                     0.02
 Runing HC:  0.15   0.13   0.16   0.13   0.20                                     0.13
 Rsting HC:  0.03   0.03   0.02   0.03   0.03                              0.22   0.03
 Exhst  CO:  9.77  11.00  13.69  11.16  20.29   1.07   1.14   7.16  12.54  10.22
 Exhst NOX:  1.61   1.66   2.08   1.69   4.96   1.27   1.34   9.19   1.10   1.86
 ________________________________________________________________________________
-M154 Warning:
```

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+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of Jan. 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1999          Region: Low          Altitude:  500. Ft.
                     I/M Program: Yes      Ambient Temp:   55.9 / 55.9 / 55.9 F
                Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0  Ether Blend Market Share: 0.000      Alcohol Blend Market Share: 1.000
 Ether Blend Oxygen Content: 0.000    Alcohol Blend Oxygen Content: 0.035
                                        Alcohol Blend RVP Waiver: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 54.3   54.3   54.3          54.3   54.3   54.3   54.3   54.3
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  0.94   1.10   1.47   1.12   1.41   0.32   0.41   1.04   2.58   1.02
 Exhst  HC:  0.72   0.86   1.08   0.87   0.82   0.32   0.41   1.04   1.51   0.79
 Evap.  HC:  0.13   0.16   0.29   0.17   0.47                        0.86   0.15
 Refuel HC:  0.02   0.03   0.03   0.03   0.04                               0.02
 Runing HC:  0.06   0.06   0.07   0.06   0.09                               0.05
 Rsting HC:  0.03   0.03   0.02   0.03   0.03                        0.22   0.03
 Exhst  CO:  5.97   7.04   8.72   7.14  17.62   0.80   0.86   5.37   7.58   6.42
 Exhst NOX:  2.04   2.14   2.73   2.17   5.96   1.69   1.78  12.23   1.54   2.39
 ________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of Jan. 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1999          Region: Low          Altitude:  500. Ft.
                     I/M Program: Yes      Ambient Temp:   55.9 / 55.9 / 55.9 F
                Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0  Ether Blend Market Share: 0.000      Alcohol Blend Market Share: 1.000
 Ether Blend Oxygen Content: 0.000    Alcohol Blend Oxygen Content: 0.035
                                        Alcohol Blend RVP Waiver: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 54.8   54.8   54.8          54.8   54.8   54.8   54.8   54.8
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  0.94   1.10   1.47   1.12   1.40   0.32   0.41   1.04   2.58   1.02
 Exhst  HC:  0.72   0.86   1.08   0.87   0.82   0.32   0.41   1.04   1.51   0.79
 Evap.  HC:  0.13   0.16   0.29   0.17   0.47                        0.86   0.15
 Refuel HC:  0.02   0.03   0.03   0.03   0.04                               0.02
 Runing HC:  0.05   0.05   0.07   0.06   0.08                               0.05
 Rsting HC:  0.03   0.03   0.02   0.03   0.03                        0.22   0.03
 Exhst  CO:  5.97   7.04   8.72   7.14  17.82   0.81   0.86   5.40   7.58   6.42
 Exhst NOX:  2.06   2.17   2.78   2.21   5.98   1.72   1.81  12.41   1.56   2.43
 ________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of Jan. 1st of the indicated calendar year.
0User supplied veh registration distributions.
```

```
0Cal. Year: 1999           Region: Low           Altitude:  500. Ft.
                      I/M Program: Yes       Ambient Temp:   55.9 / 55.9 / 55.9 F
                Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0  Ether Blend Market Share: 0.000      Alcohol Blend Market Share: 1.000
 Ether Blend Oxygen Content: 0.000     Alcohol Blend Oxygen Content: 0.035
                                           Alcohol Blend RVP Waiver: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 24.0   24.0   24.0          24.0   24.0   24.0   24.0   24.0
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  1.63   1.79   2.45   1.83   2.92   0.60   0.76   1.94   3.43   1.73
 Exhst  HC:  1.29   1.45   1.93   1.48   2.16   0.60   0.76   1.94   2.35   1.39
 Evap.  HC:  0.13   0.16   0.29   0.17   0.47                        0.86   0.15
 Refuel HC:  0.02   0.03   0.03   0.03   0.04                               0.02
 Runing HC:  0.18   0.16   0.20   0.16   0.25                               0.17
 Rsting HC:  0.03   0.03   0.02   0.03   0.03                        0.22   0.03
 Exhst  CO: 12.11  13.48  16.86  13.69  25.25   1.33   1.43   8.92  15.79  12.61
 Exhst NOX:  1.57   1.63   2.04   1.65   4.74   1.34   1.41   9.71   1.00   1.84
 ________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of Jan. 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1999           Region: Low           Altitude:  500. Ft.
                      I/M Program: Yes       Ambient Temp:   55.9 / 55.9 / 55.9 F
                Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0  Ether Blend Market Share: 0.000      Alcohol Blend Market Share: 1.000
 Ether Blend Oxygen Content: 0.000     Alcohol Blend Oxygen Content: 0.035
                                           Alcohol Blend RVP Waiver: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 42.0   42.0   42.0          42.0   42.0   42.0   42.0   42.0
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  1.06   1.21   1.61   1.23   1.65   0.38   0.48   1.21   2.66   1.13
 Exhst  HC:  0.80   0.93   1.19   0.95   1.01   0.38   0.48   1.21   1.58   0.87
 Evap.  HC:  0.13   0.16   0.29   0.17   0.47                        0.86   0.15
 Refuel HC:  0.02   0.03   0.03   0.03   0.04                               0.02
 Runing HC:  0.09   0.09   0.11   0.09   0.13                               0.09
 Rsting HC:  0.03   0.03   0.02   0.03   0.03                        0.22   0.03
 Exhst  CO:  6.82   7.88   9.72   7.99  15.98   0.81   0.86   5.40   8.44   7.23
 Exhst NOX:  1.66   1.70   2.15   1.73   5.46   1.32   1.38   9.52   1.23   1.92
 ________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of Jan. 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1999           Region: Low           Altitude:  500. Ft.
                      I/M Program: Yes       Ambient Temp:   55.9 / 55.9 / 55.9 F
                Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0  Ether Blend Market Share: 0.000      Alcohol Blend Market Share: 1.000
```

```
 Ether Blend Oxygen Content: 0.000     Alcohol Blend Oxygen Content: 0.035
                                           Alcohol Blend RVP Waiver: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 33.2   33.2   33.2          33.2   33.2   33.2   33.2   33.2
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  1.27   1.42   1.91   1.45   2.05   0.46   0.58   1.47   2.93   1.35
 Exhst  HC:  0.97   1.11   1.45   1.13   1.37   0.46   0.58   1.47   1.85   1.05
 Evap.  HC:  0.13   0.16   0.29   0.17   0.47                        0.86   0.15
 Refuel HC:  0.02   0.03   0.03   0.03   0.04                               0.02
 Runing HC:  0.13   0.11   0.15   0.12   0.18                               0.12
 Rsting HC:  0.03   0.03   0.02   0.03   0.03                        0.22   0.03
 Exhst  CO:  8.68   9.83  12.19   9.97  18.28   0.96   1.02   6.41  10.95   9.10
 Exhst NOX:  1.62   1.67   2.11   1.70   5.11   1.25   1.32   9.08   1.15   1.87
________________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of Jan. 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1999           Region: Low          Altitude:  500. Ft.
                      I/M Program: Yes       Ambient Temp:   55.9 / 55.9 / 55.9 F
                Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0  Ether Blend Market Share: 0.000       Alcohol Blend Market Share: 1.000
 Ether Blend Oxygen Content: 0.000     Alcohol Blend Oxygen Content: 0.035
                                           Alcohol Blend RVP Waiver: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 28.4   28.4   28.4          28.4   28.4   28.4   28.4   28.4
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  1.43   1.58   2.15   1.62   2.43   0.52   0.66   1.68   3.16   1.52
 Exhst  HC:  1.11   1.26   1.67   1.29   1.71   0.52   0.66   1.68   2.09   1.20
 Evap.  HC:  0.13   0.16   0.29   0.17   0.47                        0.86   0.15
 Refuel HC:  0.02   0.03   0.03   0.03   0.04                               0.02
 Runing HC:  0.15   0.14   0.17   0.14   0.21                               0.14
 Rsting HC:  0.03   0.03   0.02   0.03   0.03                        0.22   0.03
 Exhst  CO: 10.20  11.45  14.27  11.62  21.14   1.12   1.19   7.47  13.15  10.65
 Exhst NOX:  1.60   1.65   2.08   1.68   4.92   1.28   1.35   9.26   1.08   1.86
 _______________________________________________________________________________
-M154 Warning:
+              Refueling emissions for LDGV and LDGT after 1998
               model year have been reduced as a result of the
               Onboard Refueling Vapor Recovery Regulations (1994).
0Emission factors are as of Jan. 1st of the indicated calendar year.
0User supplied veh registration distributions.
0Cal. Year: 1999           Region: Low          Altitude:  500. Ft.
                      I/M Program: Yes       Ambient Temp:   55.9 / 55.9 / 55.9 F
                Anti-tam. Program: Yes     Operating Mode:   20.6 / 27.3 / 20.6
                 Reformulated Gas: No
0  Ether Blend Market Share: 0.000       Alcohol Blend Market Share: 1.000
 Ether Blend Oxygen Content: 0.000     Alcohol Blend Oxygen Content: 0.035
                                           Alcohol Blend RVP Waiver: No
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+           ______ ______ ______ ______ ______ ______ ______ ______ ______ ______
 Veh. Spd.: 64.7   64.7   64.7          64.7   64.7   64.7   64.7   64.7
```

```
   VMT Mix:  0.545  0.387  0.025         0.002  0.003  0.006  0.029  0.003
0Composite Emission Factors (Gm/Mile)
 TOG    HC:  1.24   1.47   2.04   1.50   1.40   0.31   0.40   1.01   3.63   1.34
 Exhst  HC:  1.04   1.24   1.68   1.27   0.84   0.31   0.40   1.01   2.55   1.13
 Evap.  HC:  0.13   0.16   0.29   0.17   0.47                         0.86   0.15
 Refuel HC:  0.02   0.03   0.03   0.03   0.04                                0.02
 Runing HC:  0.04   0.04   0.05   0.04   0.06                                0.04
 Rsting HC:  0.03   0.03   0.02   0.03   0.03                         0.22   0.03
 Exhst  CO: 13.13  16.44  22.50  16.81  24.81   0.99   1.06   6.63  25.29  14.41
 Exhst NOX:  2.63   2.83   3.65   2.88   6.38   2.47   2.60  17.87   1.97   3.18
```

Table B-55

PM_{10} and SOx Vehicle Emission Factors

```
WARNING: According to historical records
          there are no Class 2B Heavy Duty Diesel vehicles
          for model years before 1981 or Light Heavy Duty
          Diesel vehicles after 1976.  PART5 will always
          assume 0.0 registration for these vehicles
          during those periods.

 PART5 Revised 02-24-95
 Las Vegas 1998 Input File (Dames & Moore Silt Loading)
```

```
 User supplied veh miles traveled mixture    , veh registration distributions.
 Public Transit   :scene name
 Particle Size Cutoff 10.00 Microns              Altitude:  500. Ft.                Driving:  Transient RFG:No
 Cal. Year: 1998                                 I/M Program: Yes                   Region:   Low
```

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Veh. Speeds:	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
VMT Mix:	0.5450	0.3870	0.0250	0.0020	0.0030	0.0080	0.0010	0.0053	0.0006	0.0067	0.0151	0.0014	
Composite Emission Factors (g/mi)													
Lead:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SOF:	-	-	-	-	-	0.050	0.146	0.075	0.447	0.233	0.150	0.195	-
RCP:	-	-	-	-	-	0.179	0.101	0.072	0.430	0.296	0.475	0.248	-
Direct SO4:	0.008	0.010	0.009	0.010	0.002	0.006	0.007	0.015	0.025	0.029	0.035	0.034	0.010
Exhaust PM:	0.013	0.016	0.033	0.091	0.020	0.235	0.254	0.163	0.902	0.559	0.660	0.477	0.033
Indir. SO4:	0.023	0.030	0.031	0.053	0.009	0.032	0.038	0.062	0.102	0.120	0.145	0.141	0.029
Sulfate PM:	0.031	0.040	0.041	0.063	0.011	0.037	0.045	0.077	0.127	0.150	0.181	0.175	0.038
Brake:	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Tire:	0.008	0.008	0.008	0.012	0.004	0.008	0.008	0.008	0.012	0.012	0.036	0.008	0.008
Total PM:	0.057	0.067	0.085	0.168	0.046	0.287	0.313	0.245	1.029	0.704	0.854	0.638	0.083

```
Fugitive Dust: Unpaved Roads Fleet Average 1781.09 g/mi (as calculated in AP42 Vol 1 9/88)*
                 Paved Roads Fleet Average   84.40 g/mi (as calculated in draft AP42 Vol 1 3/93)*
               Unpaved Roads Fleet Average 1780.89 g/mi (as calculated in AP42 Vol 1 9/88, minus tailpipe and
                                                         tire-wear emissions)**
                 Paved Roads Fleet Average   84.19 g/mi (as calculated in draft AP42 Vol 1 3/93, minus tailpipe
                                                         and tire-wear emissions)**

*  Includes fleet average tailpipe, tire-wear and brake-wear emissions.
** Includes fleet average brake-wear emissions.

 Paved Road Silt:  1.69 (g/m^2)                              Fleet average vehicle weight:  33000
 Unpaved Silt: 16.0%                                        Fleet average number of wheels:  4
 Precipitation Days:   24 >0.01 in. (per year)
```

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Total Idle (g/hr) :	*	*	*	*	*	*	*	1.634	5.270	2.041	1.890	1.791	*
Gas. SO2: (g/mi) :	0.079	0.105	0.109	0.183	0.032	0.110	0.132	0.215	0.356	0.418	0.505	0.489	0.101

```
* Missing Data
User supplied veh miles traveled mixture    , veh registration distributions.
Intrazonal Trips :scene name
Particle Size Cutoff 10.00 Microns           Altitude:  500. Ft.             Driving:  Transient RFG:No
Cal. Year: 1998                              I/M Program: Yes                Region:   Low
```

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Veh. Speeds:	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
VMT Mix:	0.5450	0.3870	0.0250	0.0020	0.0030	0.0080	0.0010	0.0053	0.0006	0.0067	0.0151	0.0014	

Composite Emission Factors (g/mi)

Lead:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SOF:	-	-	-	-	-	0.050	0.146	0.075	0.447	0.233	0.150	0.195	-
RCP:	-	-	-	-	-	0.179	0.101	0.072	0.430	0.296	0.475	0.248	-
Direct SO4:	0.008	0.010	0.009	0.010	0.002	0.006	0.007	0.015	0.025	0.029	0.035	0.034	0.010
Exhaust PM:	0.013	0.016	0.033	0.091	0.020	0.235	0.254	0.163	0.902	0.559	0.660	0.477	0.033

....

Indir. SO4:	0.023	0.030	0.031	0.053	0.009	0.032	0.038	0.062	0.102	0.120	0.145	0.141	0.029
Sulfate PM:	0.031	0.040	0.041	0.063	0.011	0.037	0.045	0.077	0.127	0.150	0.181	0.175	0.038
Brake:	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Tire:	0.008	0.008	0.008	0.012	0.004	0.008	0.008	0.008	0.012	0.012	0.036	0.008	0.008
Total PM:	0.057	0.067	0.085	0.168	0.046	0.287	0.313	0.245	1.029	0.704	0.854	0.638	0.083

Fugitive Dust: Unpaved Roads Fleet Average 400.04 g/mi (as calculated in AP42 Vol 1 9/88)*
Paved Roads Fleet Average 6.54 g/mi (as calculated in draft AP42 Vol 1 3/93)*
Unpaved Roads Fleet Average 399.83 g/mi (as calculated in AP42 Vol 1 9/88, minus tailpipe and tire-wear emissions)**
Paved Roads Fleet Average 6.34 g/mi (as calculated in draft AP42 Vol 1 3/93, minus tailpipe and tire-wear emissions)**

* Includes fleet average tailpipe, tire-wear and brake-wear emissions.
** Includes fleet average brake-wear emissions.

Paved Road Silt: 1.69 (g/m^2)
Unpaved Silt: 16.0%
Precipitation Days: 24 >0.01 in. (per year)

Fleet average vehicle weight: 6000
Fleet average number of wheels: 4

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Total Idle (g/hr) :	*	*	*	*	*	*	*	1.634	5.270	2.041	1.890	1.791	*

Gas. SO2: (g/mi) :	0.079	0.105	0.109	0.183	0.032	0.110	0.132	0.215	0.356	0.418	0.505	0.489	0.101

* Missing Data
User supplied veh miles traveled mixture , veh registration distributions.
Local Street :scene name
Particle Size Cutoff 10.00 Microns Altitude: 500. Ft. Driving: Transient RFG:No
Cal. Year: 1998 I/M Program: Yes Region: Low

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Veh. Speeds:	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9
VMT Mix:	0.5450	0.3870	0.0250	0.0020	0.0030	0.0080	0.0010	0.0053	0.0006	0.0067	0.0151	0.0014	
Composite Emission Factors (g/mi)													
Lead:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SOF:	-	-	-	-	-	0.050	0.146	0.075	0.447	0.233	0.150	0.195	-
RCP:	-	-	-	-	-	0.179	0.101	0.072	0.430	0.296	0.475	0.248	-
Direct SO4:	0.008	0.010	0.009	0.010	0.002	0.006	0.007	0.015	0.025	0.029	0.035	0.034	0.010
Exhaust PM:	0.013	0.016	0.033	0.091	0.020	0.235	0.254	0.163	0.902	0.559	0.660	0.477	0.033
Indir. SO4:	0.023	0.030	0.031	0.053	0.009	0.032	0.038	0.062	0.102	0.120	0.145	0.141	0.029
Sulfate PM:	0.031	0.040	0.041	0.063	0.011	0.037	0.045	0.077	0.127	0.150	0.181	0.175	0.038
Brake:	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Tire:	0.008	0.008	0.008	0.012	0.004	0.008	0.008	0.008	0.012	0.012	0.036	0.008	0.008
Total PM:	0.057	0.067	0.085	0.168	0.046	0.287	0.313	0.245	1.029	0.704	0.854	0.638	0.083

Fugitive Dust: Unpaved Roads Fleet Average 596.05 g/mi (as calculated in AP42 Vol 1 9/88)*
Paved Roads Fleet Average 6.54 g/mi (as calculated in draft AP42 Vol 1 3/93)*
Unpaved Roads Fleet Average 595.85 g/mi (as calculated in AP42 Vol 1 9/88, minus tailpipe and tire-wear emissions)**
Paved Roads Fleet Average 6.34 g/mi (as calculated in draft AP42 Vol 1 3/93, minus tailpipe and tire-wear emissions)**

* Includes fleet average tailpipe, tire-wear and brake-wear emissions.

** Includes fleet average brake-wear emissions.

Paved Road Silt: 1.69 (g/m^2)
Unpaved Silt: 16.0%
Precipitation Days: 24 >0.01 in. (per year)

Fleet average vehicle weight: 6000
Fleet average number of wheels: 4

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Total Idle (g/hr) :	*	*	*	*	*	*	*	1.634	5.270	2.041	1.890	1.791	*
Gas. SO2: (g/mi) :	0.079	0.105	0.109	0.183	0.032	0.110	0.132	0.215	0.356	0.418	0.505	0.489	0.101

* Missing Data
User supplied veh miles traveled mixture , veh registration distributions.
Collectors :scene name
Particle Size Cutoff 10.00 Microns Altitude: 500. Ft. Driving: Transient RFG:No
Cal. Year: 1998 I/M Program: Yes Region: Low

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Veh. Speeds:	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6
VMT Mix:	0.5450	0.3870	0.0250	0.0020	0.0030	0.0080	0.0010	0.0053	0.0006	0.0067	0.0151	0.0014	
Composite Emission Factors (g/mi)													
Lead:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SOF:	-	-	-	-	-	0.050	0.146	0.075	0.447	0.233	0.150	0.195	-
RCP:	-	-	-	-	-	0.179	0.101	0.072	0.430	0.296	0.475	0.248	-
Direct SO4:	0.009	0.011	0.010	0.010	0.001	0.006	0.007	0.015	0.025	0.029	0.035	0.034	0.010
Exhaust PM:	0.013	0.018	0.034	0.091	0.020	0.235	0.254	0.163	0.902	0.559	0.660	0.477	0.033
Indir. SO4:	0.023	0.030	0.031	0.053	0.009	0.032	0.038	0.062	0.102	0.120	0.145	0.141	0.029
Sulfate PM:	0.031	0.041	0.041	0.063	0.011	0.037	0.045	0.077	0.127	0.150	0.181	0.175	0.039

Brake:	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Tire:	0.008	0.008	0.008	0.012	0.004	0.008	0.008	0.008	0.012	0.012	0.036	0.008	0.008
Total PM:	0.057	0.068	0.086	0.168	0.046	0.287	0.313	0.245	1.029	0.704	0.854	0.638	0.083

Fugitive Dust: Unpaved Roads Fleet Average 1184.11 g/mi (as calculated in AP42 Vol 1 9/88)*
Paved Roads Fleet Average 4.22 g/mi (as calculated in draft AP42 Vol 1 3/93)*
Unpaved Roads Fleet Average 1183.90 g/mi (as calculated in AP42 Vol 1 9/88, minus tailpipe and tire-wear emissions)**
Paved Roads Fleet Average 4.01 g/mi (as calculated in draft AP42 Vol 1 3/93, minus tailpipe and tire-wear emissions)**

* Includes fleet average tailpipe, tire-wear and brake-wear emissions.
** Includes fleet average brake-wear emissions.

Paved Road Silt: 0.86 (g/m^2)
Unpaved Silt: 16.0%
Precipitation Days: 24 >0.01 in. (per year)

Fleet average vehicle weight: 6000
Fleet average number of wheels: 4

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Total Idle (g/hr) :	*	*	*	*	*	*	*	1.634	5.270	2.041	1.890	1.791	*
Gas. SO2: (g/mi) :	0.079	0.105	0.108	0.183	0.033	0.110	0.132	0.215	0.356	0.418	0.505	0.489	0.100

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* Missing Data
User supplied veh miles traveled mixture , veh registration distributions.
Freeways :scene name
Particle Size Cutoff 10.00 Microns Altitude: 500. Ft. Driving: Transient RFG:No
Cal. Year: 1998 I/M Program: Yes Region: Low

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.

Veh. Speeds:	54.3	54.3	54.3	54.3	54.3	54.3	54.3	54.3	54.3	54.3	54.3	54.3	54.3
VMT Mix:	0.5450	0.3870	0.0250	0.0020	0.0030	0.0080	0.0010	0.0053	0.0006	0.0067	0.0151	0.0014	
Composite Emission Factors (g/mi)													
Lead:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SOF:	-	-	-	-	-	0.050	0.146	0.075	0.447	0.233	0.150	0.195	-
RCP:	-	-	-	-	-	0.179	0.101	0.072	0.430	0.296	0.475	0.248	-
Direct SO4:	0.009	0.012	0.011	0.010	0.001	0.006	0.007	0.015	0.025	0.029	0.035	0.034	0.010
Exhaust PM:	0.014	0.018	0.035	0.090	0.020	0.235	0.254	0.163	0.902	0.559	0.660	0.477	0.034

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Indir. SO4:	0.023	0.030	0.031	0.053	0.009	0.032	0.038	0.062	0.102	0.120	0.145	0.141	0.029
Sulfate PM:	0.031	0.042	0.042	0.063	0.010	0.037	0.045	0.077	0.127	0.150	0.181	0.175	0.039
Brake:	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Tire:	0.008	0.008	0.008	0.012	0.004	0.008	0.008	0.008	0.012	0.012	0.036	0.008	0.008
Total PM:	0.057	0.069	0.086	0.168	0.046	0.287	0.313	0.245	1.029	0.704	0.854	0.638	0.083

Fugitive Dust: Unpaved Roads Fleet Average 2172.19 g/mi (as calculated in AP42 Vol 1 9/88)*
Paved Roads Fleet Average 0.37 g/mi (as calculated in draft AP42 Vol 1 3/93)*
Unpaved Roads Fleet Average 2171.99 g/mi (as calculated in AP42 Vol 1 9/88, minus tailpipe and tire-wear emissions)**
Paved Roads Fleet Average 0.16 g/mi (as calculated in draft AP42 Vol 1 3/93, minus tailpipe and tire-wear emissions)**

* Includes fleet average tailpipe, tire-wear and brake-wear emissions.
** Includes fleet average brake-wear emissions.

Paved Road Silt: 0.02 (g/m^2)
Unpaved Silt: 16.0%
Precipitation Days: 24 >0.01 in. (per year)

Fleet average vehicle weight: 6000
Fleet average number of wheels: 4

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.

	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Total Idle (g/hr) :	*	*	*	*	*	*	*	1.634	5.270	2.041	1.890	1.791	*
Gas. SO2: (g/mi) :	0.079	0.105	0.108	0.183	0.033	0.110	0.132	0.215	0.356	0.418	0.505	0.489	0.100

* Missing Data
User supplied veh miles traveled mixture , veh registration distributions.
interstate :scene name
Particle Size Cutoff 10.00 Microns Altitude: 500. Ft. Driving: Transient RFG:No
Cal. Year: 1998 I/M Program: Yes Region: Low

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Veh. Speeds:	54.8	54.8	54.8	54.8	54.8	54.8	54.8	54.8	54.8	54.8	54.8	54.8	54.8
VMT Mix:	0.5450	0.3870	0.0250	0.0020	0.0030	0.0080	0.0010	0.0053	0.0006	0.0067	0.0151	0.0014	
Composite Emission Factors (g/mi)													
Lead:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SOF:	-	-	-	-	-	0.050	0.146	0.075	0.447	0.233	0.150	0.195	-
RCP:	-	-	-	-	-	0.179	0.101	0.072	0.430	0.296	0.475	0.248	-
Direct SO4:	0.009	0.012	0.011	0.010	0.001	0.006	0.007	0.015	0.025	0.029	0.035	0.034	0.010
Exhaust PM:	0.014	0.018	0.035	0.090	0.020	0.235	0.254	0.163	0.902	0.559	0.660	0.477	0.034
Indir. SO4:	0.023	0.030	0.031	0.053	0.009	0.032	0.038	0.062	0.102	0.120	0.145	0.141	0.029
Sulfate PM:	0.031	0.042	0.042	0.063	0.010	0.037	0.045	0.077	0.127	0.150	0.181	0.175	0.039
Brake:	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Tire:	0.008	0.008	0.008	0.012	0.004	0.008	0.008	0.008	0.012	0.012	0.036	0.008	0.008
Total PM:	0.057	0.069	0.086	0.168	0.046	0.287	0.313	0.245	1.029	0.704	0.854	0.638	0.083

Fugitive Dust: Unpaved Roads Fleet Average 2192.20 g/mi (as calculated in AP42 Vol 1 9/88)*
Paved Roads Fleet Average 0.37 g/mi (as calculated in draft AP42 Vol 1 3/93)*
Unpaved Roads Fleet Average 2191.99 g/mi (as calculated in AP42 Vol 1 9/88, minus tailpipe and tire-wear emissions)**
Paved Roads Fleet Average 0.16 g/mi (as calculated in draft AP42 Vol 1 3/93, minus tailpipe

and tire-wear emissions)**

* Includes fleet average tailpipe, tire-wear and brake-wear emissions.
** Includes fleet average brake-wear emissions.

Paved Road Silt: 0.02 (g/m^2)
Unpaved Silt: 16.0%
Precipitation Days: 24 >0.01 in. (per year)

Fleet average vehicle weight: 6000
Fleet average number of wheels: 4

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Total Idle (g/hr) :	*	*	*	*	*	*	*	1.634	5.270	2.041	1.890	1.791	*
Gas. SO2: (g/mi) :	0.079	0.105	0.108	0.183	0.033	0.110	0.132	0.215	0.356	0.418	0.505	0.489	0.100

* Missing Data
User supplied veh miles traveled mixture , veh registration distributions.
Ramps :scene name
Particle Size Cutoff 10.00 Microns   Altitude: 500. Ft.   Driving: Transient RFG:No
Cal. Year: 1998   I/M Program: Yes   Region: Low

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Veh. Speeds:	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
VMT Mix:	0.5450	0.3870	0.0250	0.0020	0.0030	0.0080	0.0010	0.0053	0.0006	0.0067	0.0151	0.0014	
Composite Emission Factors (g/mi)													
Lead:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SOF:	-	-	-	-	-	0.050	0.146	0.075	0.447	0.233	0.150	0.195	-
RCP:	-	-	-	-	-	0.179	0.101	0.072	0.430	0.296	0.475	0.248	-
Direct SO4:	0.008	0.010	0.010	0.010	0.002	0.006	0.007	0.015	0.025	0.029	0.035	0.034	0.010
Exhaust PM:	0.013	0.017	0.034	0.091	0.020	0.235	0.254	0.163	0.902	0.559	0.660	0.477	0.033

Indir. SO4:	0.023	0.030	0.031	0.053	0.009	0.032	0.038	0.062	0.102	0.120	0.145	0.141	0.029
Sulfate PM:	0.031	0.041	0.041	0.063	0.011	0.037	0.045	0.077	0.127	0.150	0.181	0.175	0.039
Brake:	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Tire:	0.008	0.008	0.008	0.012	0.004	0.008	0.008	0.008	0.012	0.012	0.036	0.008	0.008
Total PM:	0.057	0.068	0.085	0.168	0.046	0.287	0.313	0.245	1.029	0.704	0.854	0.638	0.083

```
Fugitive Dust: Unpaved Roads Fleet Average  960.09 g/mi (as calculated in AP42 Vol 1 9/88)*
                 Paved Roads Fleet Average    4.22 g/mi (as calculated in draft AP42 Vol 1 3/93)*
               Unpaved Roads Fleet Average  959.88 g/mi (as calculated in AP42 Vol 1 9/88, minus tailpipe and
                                                         tire-wear emissions)**
                 Paved Roads Fleet Average    4.01 g/mi (as calculated in draft AP42 Vol 1 3/93, minus tailpipe
                                                         and tire-wear emissions)**
```

* Includes fleet average tailpipe, tire-wear and brake-wear emissions.
** Includes fleet average brake-wear emissions.

Paved Road Silt: 0.86 (g/m^2) Fleet average vehicle weight: 6000
Unpaved Silt: 16.0% Fleet average number of wheels: 4
Precipitation Days: 24 >0.01 in. (per year)

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Total Idle (g/hr) :	*	*	*	*	*	*	*	1.634	5.270	2.041	1.890	1.791	*
Gas. SO2: (g/mi) :	0.079	0.105	0.108	0.183	0.033	0.110	0.132	0.215	0.356	0.418	0.505	0.489	0.101

* Missing Data
User supplied veh miles traveled mixture   , veh registration distributions.
Major Arterials :scene name
Particle Size Cutoff 10.00 Microns   Altitude: 500. Ft.   Driving: Transient RFG:No

Cal. Year: 1998 I/M Program: Yes Region: Low

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Veh. Speeds:	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0
VMT Mix:	0.5450	0.3870	0.0250	0.0020	0.0030	0.0080	0.0010	0.0053	0.0006	0.0067	0.0151	0.0014	
Composite Emission Factors (g/mi)													
Lead:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SOF:	-	-	-	-	-	0.050	0.146	0.075	0.447	0.233	0.150	0.195	-
RCP:	-	-	-	-	-	0.179	0.101	0.072	0.430	0.296	0.475	0.248	-
Direct SO4:	0.009	0.012	0.011	0.010	0.001	0.006	0.007	0.015	0.025	0.029	0.035	0.034	0.010
Exhaust PM:	0.014	0.018	0.035	0.090	0.020	0.235	0.254	0.163	0.902	0.559	0.660	0.477	0.034
Indir. SO4:	0.023	0.030	0.031	0.053	0.009	0.032	0.038	0.062	0.102	0.120	0.145	0.141	0.029
Sulfate PM:	0.031	0.042	0.042	0.063	0.010	0.037	0.045	0.077	0.127	0.150	0.181	0.175	0.039
Brake:	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Tire:	0.008	0.008	0.008	0.012	0.004	0.008	0.008	0.008	0.012	0.012	0.036	0.008	0.008
Total PM:	0.057	0.069	0.086	0.168	0.046	0.287	0.313	0.245	1.029	0.704	0.854	0.638	0.083

Fugitive Dust: Unpaved Roads Fleet Average 1680.15 g/mi (as calculated in AP42 Vol 1 9/88)*
Paved Roads Fleet Average 2.93 g/mi (as calculated in draft AP42 Vol 1 3/93)*
Unpaved Roads Fleet Average 1679.95 g/mi (as calculated in AP42 Vol 1 9/88, minus tailpipe and tire-wear emissions)**
Paved Roads Fleet Average 2.72 g/mi (as calculated in draft AP42 Vol 1 3/93, minus tailpipe and tire-wear emissions)**

* Includes fleet average tailpipe, tire-wear and brake-wear emissions.
** Includes fleet average brake-wear emissions.

Paved Road Silt: 0.49 (g/m^2)
Unpaved Silt: 16.0%
Precipitation Days: 24 >0.01 in. (per year)

Fleet average vehicle weight: 6000
Fleet average number of wheels: 4

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Total Idle (g/hr) :	*	*	*	*	*	*	*	1.634	5.270	2.041	1.890	1.791	*
Gas. SO2: (g/mi) :	0.079	0.105	0.108	0.183	0.033	0.110	0.132	0.215	0.356	0.418	0.505	0.489	0.100

* Missing Data
User supplied veh miles traveled mixture , veh registration distributions.
Minor arterials :scene name
Particle Size Cutoff 10.00 Microns Altitude: 500. Ft. Driving: Transient RFG:No
Cal. Year: 1998 I/M Program: Yes Region: Low

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Veh. Speeds:	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2
VMT Mix:	0.5450	0.3870	0.0250	0.0020	0.0030	0.0080	0.0010	0.0053	0.0006	0.0067	0.0151	0.0014	
Composite Emission Factors (g/mi)													
Lead:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SOF:	-	-	-	-	-	0.050	0.146	0.075	0.447	0.233	0.150	0.195	-
RCP:	-	-	-	-	-	0.179	0.101	0.072	0.430	0.296	0.475	0.248	-
Direct SO4:	0.009	0.011	0.011	0.010	0.001	0.006	0.007	0.015	0.025	0.029	0.035	0.034	0.010
Exhaust PM:	0.014	0.018	0.035	0.090	0.020	0.235	0.254	0.163	0.902	0.559	0.660	0.477	0.033
Indir. SO4:	0.023	0.030	0.031	0.053	0.009	0.032	0.038	0.062	0.102	0.120	0.145	0.141	0.029
Sulfate PM:	0.031	0.042	0.042	0.063	0.011	0.037	0.045	0.077	0.127	0.150	0.181	0.175	0.039
Brake:	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Tire:	0.008	0.008	0.008	0.012	0.004	0.008	0.008	0.008	0.012	0.012	0.036	0.008	0.008
Total PM:	0.057	0.069	0.086	0.168	0.046	0.287	0.313	0.245	1.029	0.704	0.854	0.638	0.083

Fugitive Dust: Unpaved Roads Fleet Average 1328.12 g/mi (as calculated in AP42 Vol 1 9/88)*
Paved Roads Fleet Average 4.77 g/mi (as calculated in draft AP42 Vol 1 3/93)*

Unpaved Roads Fleet Average 1327.92 g/mi (as calculated in AP42 Vol 1 9/88, minus tailpipe and tire-wear emissions)**
Paved Roads Fleet Average 4.57 g/mi (as calculated in draft AP42 Vol 1 3/93, minus tailpipe and tire-wear emissions)**

* Includes fleet average tailpipe, tire-wear and brake-wear emissions.
** Includes fleet average brake-wear emissions.

Paved Road Silt: 1.04 (g/m^2) Fleet average vehicle weight: 6000
Unpaved Silt: 16.0% Fleet average number of wheels: 4
Precipitation Days: 24 >0.01 in. (per year)

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Total Idle (g/hr) :	*	*	*	*	*	*	*	1.634	5.270	2.041	1.890	1.791	*
Gas. SO2: (g/mi) :	0.079	0.105	0.108	0.183	0.033	0.110	0.132	0.215	0.356	0.418	0.505	0.489	0.100

* Missing Data
User supplied veh miles traveled mixture , veh registration distributions.
System Ramps :scene name
Particle Size Cutoff 10.00 Microns Altitude: 500. Ft. Driving: Transient RFG:No
Cal. Year: 1998 I/M Program: Yes Region: Low

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Veh. Speeds:	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4
VMT Mix:	0.5450	0.3870	0.0250	0.0020	0.0030	0.0080	0.0010	0.0053	0.0006	0.0067	0.0151	0.0014	
Composite Emission Factors (g/mi)													
Lead:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SOF:	-	-	-	-	-	0.050	0.146	0.075	0.447	0.233	0.150	0.195	-
RCP:	-	-	-	-	-	0.179	0.101	0.072	0.430	0.296	0.475	0.248	-
Direct SO4:	0.009	0.011	0.010	0.010	0.001	0.006	0.007	0.015	0.025	0.029	0.035	0.034	0.010

Exhaust PM:	0.013	0.018	0.034	0.091	0.020	0.235	0.254	0.163	0.902	0.559	0.660	0.477	0.033
Indir. SO4:	0.023	0.030	0.031	0.053	0.009	0.032	0.038	0.062	0.102	0.120	0.145	0.141	0.029
Sulfate PM:	0.031	0.041	0.041	0.063	0.011	0.037	0.045	0.077	0.127	0.150	0.181	0.175	0.039
Brake:	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Tire:	0.008	0.008	0.008	0.012	0.004	0.008	0.008	0.008	0.012	0.012	0.036	0.008	0.008
Total PM:	0.057	0.068	0.086	0.168	0.046	0.287	0.313	0.245	1.029	0.704	0.854	0.638	0.083

Fugitive Dust: Unpaved Roads Fleet Average 1136.10 g/mi (as calculated in AP42 Vol 1 9/88)*
Paved Roads Fleet Average 4.22 g/mi (as calculated in draft AP42 Vol 1 3/93)*
Unpaved Roads Fleet Average 1135.90 g/mi (as calculated in AP42 Vol 1 9/88, minus tailpipe and tire-wear emissions)**
Paved Roads Fleet Average 4.01 g/mi (as calculated in draft AP42 Vol 1 3/93, minus tailpipe and tire-wear emissions)**

* Includes fleet average tailpipe, tire-wear and brake-wear emissions.
** Includes fleet average brake-wear emissions.

Paved Road Silt: 0.86 (g/m^2)
Unpaved Silt: 16.0%
Precipitation Days: 24 >0.01 in. (per year)

Fleet average vehicle weight: 6000
Fleet average number of wheels: 4

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Total Idle (g/hr) :	*	*	*	*	*	*	*	1.634	5.270	2.041	1.890	1.791	*
Gas. SO2: (g/mi) :	0.079	0.105	0.108	0.183	0.033	0.110	0.132	0.215	0.356	0.418	0.505	0.489	0.100

* Missing Data

User supplied veh miles traveled mixture , veh registration distributions.
Externals :scene name
Particle Size Cutoff 10.00 Microns Altitude: 500. Ft. Driving: Transient RFG:No
Cal. Year: 1998 I/M Program: Yes Region: Low

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Veh. Speeds:	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0
VMT Mix:	0.5450	0.3870	0.0250	0.0020	0.0030	0.0080	0.0010	0.0053	0.0006	0.0067	0.0151	0.0014	
Composite Emission Factors (g/mi)													
Lead:	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SOF:	-	-	-	-	-	0.050	0.146	0.075	0.447	0.233	0.150	0.195	-
RCP:	-	-	-	-	-	0.179	0.101	0.072	0.430	0.296	0.475	0.248	-
Direct SO4:	0.009	0.012	0.011	0.010	0.001	0.006	0.007	0.015	0.025	0.029	0.035	0.034	0.010
Exhaust PM:	0.014	0.018	0.035	0.090	0.020	0.235	0.254	0.163	0.902	0.559	0.660	0.477	0.034
Indir. SO4:	0.023	0.030	0.031	0.053	0.009	0.032	0.038	0.062	0.102	0.120	0.145	0.141	0.029
Sulfate PM:	0.031	0.042	0.042	0.063	0.010	0.037	0.045	0.077	0.127	0.150	0.181	0.175	0.039
Brake:	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Tire:	0.008	0.008	0.008	0.012	0.004	0.008	0.008	0.008	0.012	0.012	0.036	0.008	0.008
Total PM:	0.057	0.069	0.086	0.168	0.046	0.287	0.313	0.245	1.029	0.704	0.854	0.638	0.083

Fugitive Dust: Unpaved Roads Fleet Average 2200.20 g/mi (as calculated in AP42 Vol 1 9/88)*
Paved Roads Fleet Average 0.37 g/mi (as calculated in draft AP42 Vol 1 3/93)*
Unpaved Roads Fleet Average 2199.99 g/mi (as calculated in AP42 Vol 1 9/88, minus tailpipe and tire-wear emissions)**
Paved Roads Fleet Average 0.16 g/mi (as calculated in draft AP42 Vol 1 3/93, minus tailpipe and tire-wear emissions)**

* Includes fleet average tailpipe, tire-wear and brake-wear emissions.
** Includes fleet average brake-wear emissions.

Paved Road Silt: 0.02 (g/m^2)
Unpaved Silt: 16.0%
Precipitation Days: 24 >0.01 in. (per year)

Fleet average vehicle weight: 6000
Fleet average number of wheels: 4

Veh. Type:	LDGV	LDGT1	LDGT2	HDGV	MC	LDDV	LDDT	2BHDDV	LHDDV	MHDDV	HHDDV	BUSES	All Veh.
Total Idle (g/hr) :	*	*	*	*	*	*	*	1.634	5.270	2.041	1.890	1.791	*
Gas. SO2: (g/mi) :	0.079	0.105	0.108	0.183	0.033	0.110	0.132	0.215	0.356	0.418	0.505	0.489	0.100

* Missing Data

PM_{10} EMISSION INVENTORY RESULTS

The emission inventory results are presented below for each of the three inventories discussed. The annual valley-wide inventory will be presented first in the same order as the sources were described previously. The 24-hour valley-wide inventory is based on the annual inventory. Only the results for those sources that are not a result of dividing the annual inventory by 365 will be presented. The results for the annual J. D. Smith inventory are presented last.

Annual Nonattainment Area Inventory

Stationary Point Sources

The stationary point sources with emissions greater than five tons per year or major sources are listed below with their emission rates and the category in which they were placed. Table B-56 was developed directly from the information provided by AQD.

Table B-56

1998 PM_{10} Emissions from Stationary Point Sources

Facility Name	1998 Actual PM_{10} Emissions	Inventory Category
James Hardie Gypsum	96.94	Asphalt Concrete Manufacturing
Chemical Lime Company - Henderson	36.43	Asphalt Concrete Manufacturing
Nevada Power – Clark Station	141.13	Utilities – Natural Gas
Nevada Power – Sunrise Station	1.68	Utilities – Natural Gas
Chemical Lime Company – Sloan Quarry	4.62	Industrial Processes
Wells Cargo, Inc.	63.1	Sand & Gravel Operations
Titanium Metals Corp. (TIMET)	65.79	Industrial Processes
Kerr McGee – BMI Facility	9.7	Industrial Processes
Las Vegas Paving Corporation	33.72	Sand & Gravel Operations
USAF – 99 CES/CEV (Nellis AFB)	6.0	Other Sources
CSR West	45.86	Sand & Gravel Operations
Uniflex Corporation	0.23	Industrial Processes
Hanson Aggregates Las Vegas	42.97	Sand & Gravel Operations
Morgan Adhesives Company	0.044	Industrial Processes
Nevada Cogeneration Association #1	19.1	Utilities – Natural Gas
Nevada Cogeneration Association #2	24.1	Utilities – Natural Gas
Saguaro Power Company	4.8	Utilities – Natural Gas

Table B-56

1998 PM_{10} Emissions from Stationary Point Sources (continued)

Republic Dumpco, Inc. Silver State Disposal	60.87	Other Sources
Nevada Sun Peak Ltd. Partnership/NPS	7.74	Utilities – Natural Gas
Nevada Ready Mix	50.27	Sand & Gravel Operations
Georgia Pacific Company	40.2	Asphalt Concrete Manufacture
Las Vegas Valley Water District	12.16	Other Sources
Airway, Inc.	71.27	Sand & Gravel Operations
Blue Diamond Materials, Inc.	26.66	Sand & Gravel Operations
Las Vegas Paving Corporation	23.9	Asphalt Concrete Manufacture
Southern Nevada Paving - Western	6.41	Sand & Gravel Operations
Hollywood Gravel – Lone Mtn.	5.3	Sand & Gravel Operations
Diamond Construction – Red Rock Co.	6.7	Sand & Gravel Operations
Las Vegas Paving Corporation	6.32	Sand & Gravel Operations
Las Vegas Paving Corporation	20.51	Asphalt Concrete Manufacture
Hanson Aggregates Las Vegas	19.59	Sand & Gravel Operations
Tropicana Hotel & Casino	21.55	Other Sources
All Star Transit Mix	9.99	Asphalt Concrete Manufacture
Caesars Palace	6.98	Other Sources
Frehner Construction Company	40.95	Sand & Gravel Operations
Southern Nevada Paving Company	7.24	Sand & Gravel Operations
Quality Sand & Gravel	8.97	Sand & Gravel Operations
Las Vegas Paving Corporation	5.64	Asphalt Concrete Manufacture
Southern Nevada Liteweight	78.93	Sand & Gravel Operations
Silver State Materials	6.11	Asphalt Concrete Manufacture
Southern Nevada Paving	28.01	Asphalt Concrete Manufacture
Diamond Construction Company	6.8	Sand & Gravel Operations
Southern Nevada Paving - Summerlin	9.14	Sand & Gravel Operations
Bob's Construction	6.99	Sand & Gravel Operations
MGM Grand Hotel/Casino, Inc.	16.03	Other Sources
Rees's Enterprise	18.309	Sand & Gravel Operations
Nevada Ready Mix	6.26	Sand & Gravel Operations
Lake Mead Constructors	9.61	Sand & Gravel Operations
Southern Nevada Paving Corporation	8.23	Sand & Gravel Operations

Table B-56

1998 PM_{10} Emissions from Stationary Point Sources (continued)

Acme Sand & Gravel, Inc.	6.6	Sand & Gravel Operations
Western States Contracting, Inc.	21.91	Sand & Gravel Operations
Western States Contracting, Inc.	8.69	Sand & Gravel Operations
Pipes Paving	10.56	Sand & Gravel Operations
Total	**1,298**	

Stationary Area Sources

Small Point Sources: The stationary sources with emissions less than five tons per year are listed below in Table B-57. This information was developed directly from the information provided by AQD.

Table B-57

1998 PM_{10} Emissions from Stationary Area Sources

Facility Name	1998 Actual PM_{10} Emissions
Good Humor-Breyers Ice Cream	0.78
Val-Pak Direct Marketing System	0.3
Anderson Dairy, Inc.	0.2
Mission of Nevada, Inc.	0.28
Black Mountain Road “A”	0.002
Bishop Gorman High School	0.09
Circus Circus Hotel	0.37
Clark County Sanitation District	1.1
Koch Performance Asphalt Corp.	0.94
Flamingo Hilton Hotel/Casino	2.37
Monte Carlo Resort & Casino	0.91
Four Queens Hotel & Casino	0.86
Fremont Hotel	0.4
Frontier Hotel	0.21
Hanson Aggregates Las Vegas	1.88
Golden Nugget, Inc.	0.61
Horseshoe Club	0.96
Riviera Hotel	1.45
CSR Hydro Conduit	0.18
Circus Circus Hotel/Casino – Amusement Park	0.48
Nevada Ready Mix	1.32
Las Vegas Convention	0.27
Las Vegas Hilton Hotel	2.08

Table B-57

1998 PM_{10} Emissions from Stationary Area Sources (continued)

McCarran International Airport	1.75
Mission of Nevada	3.33
Nevada Ready Mix	0.62
Household Credit Services	0.01
Ready Mix, Inc. – Delhi Plant	4.05
Sahara Hotel	0.44
Venetian Hotel & Casino	0.298
Showboat Hotel	0.15
University Medical Center	0.65
Stardust Hotel	1.6
Sunrise Hospital/Medical Center	0.3
Union Plaza Hotel	0.28
Charlie Brown Construction	3.78
Valley Hospital Medical Center	0.5
Golden Bear Oil Specialties	1.23
Bally's Casino Resort	1.4
Harrah's Las Vegas Hotel/Casino	0.36
West Best Foods, Inc.	0.02
HIS of Shadow Mountain	0.07
Vegas Towers Management	0.18
Mirage Hotel & Casino	2.17
CSR West	1.41
Mission Roofing	0.04
Hanson Aggregates Las Vegas	0.14
Hotel Linen Services, Inc./ Bally's	0.56
Jet Concrete	0.1
Las Vegas Cogeneration Limited	1.913
Holiday Inn Casino Boardwalk	0.33
Monier Lifetile, LLC	0.9
Tri-Delta Building Materials	0.85
New York – New York Hotel Casino	1.02
Desert Woodworking, Inc.	0.4
Southwest Gas Corporation	0.14
Environmental Technologies	0.07
Southern Nevada Paving Co.	0.27
Silver State Materials Corporation	3.820
LV Waste Water Treatment Plant	1.58
CSR West	0.44
Dean Roofing Company	0.04
Silver State Materials/Sloan Plant	1.54

Table B-57

1998 PM_{10} Emissions from Stationary Area Sources (continued)

Southern Nevada Paving Company	2.73
Nevada Power Company (Pearson Building)	0.013
Pratte Development	0.83
Road Runner Grading, Inc.	0.350
Sierra Ready Mix, LLC	0.19
Nevada Ready Mix	0.72
Boulder Sand & Gravel, Inc.	3.59
Hard Rock Hotel & Casino	0.5
L'eggs Products	0.58
R. L. McVane, Inc.	0.92
Cind-R-Lite Company	0.58
Texas Gambling Hall/Hotel	0.3
Cintas Corporation	0.16
All State Sand & Gravel	1.6
Rio Suites Hotel & Casino	0.99
R. L. McVane, Inc./BLM	2.2
Stratosphere Tower	1.06
Baker Commodities, Inc.	0.33
Savage Industries, Inc.	2.39
Jensen Precast	1.22
Las Vegas Review Journal	0.004
El Cortez Hotel & Casino	0.44
Palace Station Hotel & Casino	0.28
Gold Coast Hotel & Casino	0.140
Excalibur Hotel & Casino	1.9
Imperial Palace Hotel & Casino	0.76
Sam's Town Hotel/Casino	1.22
Santa Fe Hotel & Casino	0.35
Alexis Park Resort Hotel	0.29
University of Nevada, Las Vegas	0.34
Short Load Concrete, Inc.	0.04
Eagle Ready Mix/Pioneer Concrete	3.09
Tri-Delta, Inc.	0.36
CSR West	0.44
Southwest Paving & Grading, Inc.	2.11
Casino Ready Mix, Inc.	0.083
Southern Nevada Paving Company	2.85
Las Vegas Paving Corporation	3.97
Cabinetec, Inc.	0.54
Nevada Resort Properties	0.1

Table B-57

1998 PM_{10} Emissions from Stationary Area Sources (continued)

Las Vegas Valley Water District	0.44
Treasure Island Corporation	2.12
Nevada Ready Mix	1.23
Ocean Spray Cranberries	0.01
Luxor Hotel & Casino	2.55
Meadow Valley Contractors	0.71
Charlie Brown Construction	0.91
Granite Construction Company	3.22
Airway Rock Products, Inc.	0.34
Airway Rock Products, Inc.	0.22
Chemical Lime Company	0.001
Chemical Lime Company	0.018
Chemical Lime Company	0.02
Wells Cargo, Inc.	1.44
CSR West/Plant 80	0.14
Southern Nevada Paving/Plant B	0.69
Acme Sand & Gravel, Inc.	0.43
Stimpel-Wiebelhaus Associates	0.736
Nevada Ready Mix	3.95
Reyburn Lawn & Landscape Design	0.76
Southern Nevada Paving Company	0.25
Las Vegas Paving Corporation	3.37
Western States Contracting, Inc.	2.0
Frehner Construction Company, Inc.	0.390
Lake Mead Constructors	0.05
Diamond Construction Company	1.14
Southern Nevada Paving Company	0.88
Stimpel-Wiebelhaus Associates	1.206
P & P Sand and Gravel	0.04
Hollywood Gravel Company	3.640
Bartholomew Enterprises	1.32
Goldie Incorporated	3.35
So. NV Paving – Lone Mountain Canica Crush	2.61
Southern Nevada Paving – AC Aggregate	0.65
Southern Nevada Paving – Wash Plant	0.4
Southern Nevada Paving – Recycle Plant	0.65
Morrison Knudson Corporation	1.09
Airway Rock Products, Inc.	0.51
K. W. Pipeline Inc. – Parcel “C”	2.18
CSR West – Plant 81	0.44

Table B-57

1998 PM_{10} Emissions from Stationary Area Sources (continued)

Las Vegas Paving Corporation	2.29
Wesley Corp. – Burkholder Reservoir 110	0.24
Nevada Ready Mix	0.69
Pro-turf International Inc.	0.87
Southern Nevada Paving Corporation	4.53
Southern Nevada Paving Corporation	1.47
Nevada Ready Mix	4.95
Western States Contracting	2.77
Bulldog Equipment Company	1.14
Granite Construction Company	0.15
Art Goldstrom Ent. – Hacienda Hotel	3.25
Triple 5 Nevada Development Corporation	0.08
Rocky Mountain Crushing, Inc.	3.51
Kaufman & Broad	0.65
Acme Materials & Construction	2.87
Airway Rock Products, Inc.	0.23
R. L. McVane – Portable Crush	3.39
Acme Electric	0.02
Michael's Cleaners	0.021
Maple Cleaners	0.011
Modern Cleaners & Laundry	0.012
Cleanitizing	0.002
Nu-Glo Cleaners	0.008
All Star Dry Cleaners	0.007
One Hour Martinizing	0.008
All Pro Cleaners	0.011
Rancho Cleaners	0.014
Royal Crest Cleaners	0.003
Royal Crest Cleaners	0.014
Sierra Cleaners	0.027
Sparkle Cleaners	0.016
Spring Fresh Cleaners	0.005
Steiner Cleaners	0.022
Sunrise Cleaners	0.007
Andy's Cleaners	0.001
Swiss Cleaners	0.012
Tidy & Fresh Cleaners	0.002
Tiffany Cleaners	0.131
Tiffany Cleaners	0.01
Town & Country Cleaners	0.006

Table B-57

1998 PM_{10} Emissions from Stationary Area Sources (continued)

Village East Cleaners, Inc.	0.009
Wally's Cleaners	0.018
The Washboard	0.005
X-Press Cleaners, Inc.	0.01
Dan Dee Dry Cleaners	0.013
Premier Dry Cleaning & Laundry	0.01
Mission Industries, Plant #50	1.671
Grand Laundry, Inc.	0.889
Harrah's Casino Hotel	4.805
Aloha Cleaners	0.073
Total	**184**

Residential Firewood: Firewood sales within the BLM disposal boundary in 1998 were 2,316 cords. The average cord weighs 3,763 pounds. Therefore, 4,357.6 tons of firewood were sold within the BLM disposal boundary area. The wood consumed in the entire nonattainment area was assumed to be one percent more than in the BLM disposal area, or 4,402 tons. The emission factors and resulting emissions are summarized in Table B-58.

Table B-58

Residential Firewood Combustion Emissions

Pollutant	Emission Factor (pounds/ton burned)	Emissions (tons/year)
PM_{10}	34.6	76.2
NOx	2.6	5.7
SOx	0.4	0.9

Natural Gas Combustion: Residential, commercial, industrial, and purchased at the source natural gas combustion emissions are summarized in Table B-59. The categories listed are from the Southwest Gas sales records. Residential natural gas use was increased by one percent to reflect the entire nonattainment area. The inventory groupings are also provided.

Table B-59

Natural Gas Combustion Emissions

Category (Inventory Category)	Natural Gas Sales for 1998 (MMBtu)	Emission Factor (lb/MMBtu)			Emissions (tons/year)		
		PM_{10}	NOx	SOx	PM_{10}	NOx	SOx
Residential (Residential)	18,075,634	0.0075	0.09216	0.0006	67.4	832.8	5.4
Small Commercial (Commercial)	6,628,926	0.0075	0.09804	0.0006	24.7	324.9	1.9
Large Commercial (Commercial)	2,250,844	0.0075	0.18627	0.0006	8.4	209.6	0.7
Industrial (Industrial)	33,614	0.0075	0.18627	0.0006	0.125	3.1	0.01
Compressed Natural Gas (Commercial)	31,439	0.0075	0.09804	0.0006	0.12	1.5	0.009
Irrigation/Water Pumping (Commercial)	10,708	0.0075	0.09804	0.0006	0.04	0.5	0.003
Other Gas Sales (Industrial)	3,653,123	0.0075	0.09804	0.0006	13.6	179.1	1.1
Transportation (Purchased at the Source)	56,452,728	0.0075	0.09804	0.0006	210.3	2,767.3	16.6

Structural/Vehicle Fires/Wild Fires: There were 3,217 tons of material consumed by structural, vehicle, and wild fires in 1998. The emissions are presented in Table B-60.

Table B-60

Structural/Vehicle/Wild Fire Emissions

Pollutant	Emission Factor (pounds/ton burned)	Emissions (tons/year)
PM_{10}	10.8	17.4
NOx	1.4	2.3

Charbroiling/Meat Cooking: The particulate emissions from meat cooking within the nonattainment area are presented in Table B-61. Emissions are based on type of equipment used and the amount of meat cooked.

Table B-61

PM_{10} Emissions from Charbroiling/Meat Cooking

Cooking Equipment	Type of Meat	Amount of Meat (pounds)	Emission Factor (pounds/1,000 pounds of meat cooked)	Emissions (tons/year)
Chain-driven Charbroiler with Controls	Hamburger	3,708,720	1.29	2.4
Chain-driven Charbroiler, No Controls	Hamburger	1,564,959	7.42	5.8
Underfired Charbroiler, No Controls	Hamburger	27,274,826	32.65	445.3
	Steak	29,492,000	17.19	253.5
	Chicken	3,429,960	10.48	18.0
	Fish	1,766,888	3.3	2.9
Flat-top Griddle and Grooved Griddle	Hamburger	11,673,851	5.08	29.7

Disturbed Vacant Land: The emissions for disturbed vacant land were calculated using the emission factors developed for meteorology measured at McCarran International Airport during 1998. The emission factor and the resulting emissions are presented in Table B-62.

Table B-62

Disturbed Vacant Land Emissions

Wind Speed Category (mph)	# of Hours in Range	# of Days in Range	Sustained Winds Emission Factor (ton/acre/ hour)	Spike Emission Factor (ton/acre)	1998 Emission Factor of Unstable Land (ton/acre)
15 – 19.9	685	144	N/A	N/A	N/A
20 – 24.9	383	91	$5.21x10^{-3}$	$8.16x10^{-4}$	$2.07x10^{0}$
25 – 29.9	55	31	$6.40x10^{-3}$	$1.94x10^{-3}$	$4.12x10^{-1}$
30 – 34.9	18	9	$4.62x10^{-3}$	$1.41x10^{-3}$	$9.59x10^{-2}$
35 – 39.9	1	1	$7.05x10^{-3}$	$3.80x10^{-3}$	$1.09x10^{-2}$
Total					$2.59x10^{0}$
(51,393 Acres) * (2.59 tons/acre) = $1.33x10^{5}$					

Native Desert Fugitive Dust: Native desert fugitive dust emissions were calculated for sustained hourly winds 25 mph or higher as measured at McCarran International Airport. The emissions from native desert fugitive dust are summarized in Table B-63.

Table B-63

Native Desert Fugitive Dust Emissions

Wind Speed Category (mph)	# of Days in Range	Sustained Winds Emission Factor (ton/acre/ hour)	Spike Emission Factor (ton/acre)	1998 Emission Factor of Unstable Land (ton/acre)
15 – 19.9	144	N/A	N/A	N/A
20 – 24.9	91	N/A	N/A	N/A
25 – 29.9	31	2.57×10^{-3}	3.61×10^{-4}	9.09×10^{-2}
30 – 34.9	9	3.16×10^{-3}	4.68×10^{-4}	3.27×10^{-2}
35 – 39.9	1	2.99×10^{-3}	8.15×10^{-4}	3.81×10^{-3}
Total				1.27×10^{-1}
(633,155 Acres) * (1.27×10^{-1} tons/acre) = 8.04×10^{4}				

Stabilized Vacant Land Dust: The stabilized vacant land emissions are summarized in Table B-64. The emissions for stabilized vacant land were calculated using the emission factors developed for meteorology measured at McCarran International Airport during 1998.

Table B-64

Stabilized Vacant Land Emissions

Wind Speed Category (mph)	# of Days in Range	Sustained Winds Emission Factor (ton/acre/ hour)	1998 Emission Factor of Unstable Land (ton/acre)
15 – 19.9	144	4.20×10^{-4}	6.05×10^{-2}
20 – 24.9	91	5.21×10^{-3}	3.09×10^{-2}
25 – 29.9	31	6.40×10^{-3}	5.89×10^{-3}
30 – 34.9	9	4.62×10^{-3}	1.71×10^{-3}
35 – 39.9	1	7.05×10^{-3}	1.90×10^{-4}
Total			9.90×10^{-2}
(158,865 Acres) * (9.90×10^{-2} tons/acre) = 1.57×10^{4}			

Construction Activity Fugitive Dust: Construction sites are currently regulated by the AQD. The CCHD enforcement officers provided compliance rates for each type of construction activity as shown in Table B-30. Dust control on construction sites is usually implemented using water. The U. S. EPA assigns a 50 percent control efficiency to watering for control of particulate emissions from construction sites.[38] The overall compliance rate as well as the emissions from construction activities are summarized in Table B-65.

Table B-65

Construction Activity Emissions

Type of Construction	Number of Acres Under Active Construction in 1998	Percentage of Sites Implementing Controls	Overall Control Efficiency	Months Under Active Construction	PM_{10} Emission Rate (tons/acre/ month)	PM_{10} Emissions for 1998 (tons)
Airport	84.4	80%	40%	12	0.42	255.2
Commercial	3226.8	50%	25%	3	0.265	1924.0
Flood Detention	174.3	70%	35%	12	0.42	571.0
Highway	788.4	80%	40%	12	0.42	2384.1
Public Parks	190.7	80%	40%	6	0.265	181.9
Public Bridges	574.8	70%	35%	12	0.265	1188.1
Public Works	1132.8	70%	35%	3	0.42	927.8
Residential Homes	10555.3	50%	25%	6	0.265	12587.2
Underground Utilities	736.8	20%	10%	1	0.42	278.5
Miscellaneous	1984.7	80%	40%	6	0.265	1893.4
Total	**19,449**					**22,191.2**

Windblown Construction Dust: The emission factors shown for disturbed and stabilized vacant land in Tables B-61 and B-63 respectively were used for the uncontrolled and controlled acres of construction. The emission factors are the same because the same meteorological profiles were used. The wind erosion emissions from construction sites are summarized in Table B-66.

Table B-66

Wind Erosion Emissions From Construction Sites

Type of Construction	Acres Uncontrolled	Acres Stabilized	Unstable Land Emission Rate (ton/acre/year)	Stabilized Land Emission Rate (ton/acre/year)	PM_{10} Emissions for 1998 (tons)
Airport	50.6	33.8	2.59	9.90×10^{-2}	1.34×10^{2}
Commercial	2,420.1	806.7	2.59	9.90×10^{-2}	1.59×10^{3}
Flood Detention	113.3	61.0	2.59	9.90×10^{-2}	2.99×10^{2}
Highway	473.0	315.4	2.59	9.90×10^{-2}	1.26×10^{3}
Public Parks	114.4	76.3	2.59	9.90×10^{-2}	1.52×10^{2}
Public Bridges	373.6	201.2	2.59	9.90×10^{-2}	9.88×10^{2}

[38] Op. Cit.

Table B-66

Wind Erosion Emissions From Construction Sites (continued)

Public Works	736.3	396.5	2.59	$9.90x10^{-2}$	$4.87x10^{2}$
Residential Homes	7,916.5	2,638.8	2.59	$9.90x10^{-2}$	$1.04x10^{4}$
Underground Utilities	663.1	73.7	2.59	$9.90x10^{-2}$	$1.44x10^{2}$
Miscellaneous	1,190.8	793.9	2.59	$9.90x10^{-2}$	$1.58x10^{3}$
Total	**14,051.7**	**5,397.3**			**17,011**

Nonroad Mobile Sources

The subtotals of nonroad engine emissions by inventory category are summarized in Table B-67 below. The nonroad engine emissions are presented in detail in Table B-68.

Table B-67

Nonroad Engine Emissions Subtotals

Inventory Category	PM_{10} Emissions (tons/year)	NOx Emissions (tons/year)	SOx Emissions (tons/year)
Airport Support Equipment	37.1	626.6	80.5
Commercial Equipment	0.3	2.41	0.4
Construction & Mining Equipment	364.6	6,324	832
Lawn & Garden Equipment	12.5	42	9.4
Recreational Equipment	1.0	5.0	1.1

Table B-68

Nonroad Engine Emissions

Equipment Types	Engine Type	1998 Equipment Population	Average Rated Horsepower	Typical Operating Load Factor (Percent)	Annual Use Estimates (hour/year)	PM_{10} Emission Factors (g/hp-hr)	PM_{10} Emissions (tons/year)	NOx Emission Factors (g/hp-hr)	NOx Emissions (tons/year)	SOx Emission Factors (g/hp-hr)	SOx Emissions (tons/year)	Classification
Terminal Tractor	Diesel	874	137	0.51	842	0.4	22.66	8.38	474.82	1.07	60.63	ASE
	4 Stroke Gasoline	88	48	0.56	783	0.8	1.63	5.16	10.51	0.27	0.55	ASE
Aircraft Support Equipment	Diesel	129	96	0.82	1408	0.72	11.34	8.3	130.76	1.19	18.75	ASE
	4 Stroke Gasoline	31	82	0.78	926	0.72	1.46	5.16	10.49	0.27	0.55	ASE
Generator Sets < 50 HP	Diesel	9	22	0.74	375	0.8	0.05	6.9	0.44	1.18	0.08	COM
	4 Stroke Gasoline	137	11	0.68	128	0.22	0.03	0.81	0.12	0.27	0.04	COM
	2 Stroke Gasoline	2	11	0.68	128	7.7	0.01	0.29	0.00	0.27	0.00	COM
Pumps < 50 HP	Diesel	3	23	0.74	480	0.8	0.02	6.9	0.20	1.18	0.03	COM
	4 Stroke Gasoline	27	7	0.69	263	0.22	0.01	0.81	0.03	0.27	0.01	COM
	2 Stroke Gasoline	5	7	0.69	263	0.18	0.00	2.82	0.02	0	0.00	COM
Air Compressors < 50 HP	Diesel	2	37	0.48	937	0.8	0.02	6.9	0.20	1.18	0.03	COM
	4 Stroke Gasoline	9	9	0.56	557	0.22	0.01	0.81	0.02	0.27	0.01	COM
Welders < 50 HP	Diesel	5	35	0.45	746	0.8	0.05	6.9	0.42	1.18	0.07	COM
	4 Stroke Gasoline	16	19	0.51	241	0.22	0.01	0.81	0.03	0.27	0.01	COM
Pressure Washers < 50 HP	4 Stroke Gasoline	13	7	0.85	133	0.22	0.00	0.81	0.01	0.27	0.00	COM
Forklifts	Diesel	2	83	0.30	1717	0.72	0.05	8.3	0.62	1.19	0.09	COM
	4 Stroke Gasoline	2	62	0.30	1818	0.06	0.00	5.16	0.30	0.27	0.02	COM
Asphalt Pavers	Diesel	93	91	0.62	829	0.72	3.45	8.3	39.78	1.19	5.70	CONS

Table B-68

Nonroad Engine Emissions
(continued)

	4 Stroke Gasoline	17	31	0.66	396	0.06	0.01	4.79	0.74	0.25	0.04	CONS
Tampers/Rammers	4 Stroke Gasoline	6	4	0.55	182	0.22	0.00	1.92	0.01	0.25	0.00	CONS
	2 Stroke Gasoline	132	4	0.55	182	7.7	0.45	0.29	0.02	0.25	0.01	CONS
Plate Compactors	Diesel	13	8	0.43	600	1	0.03	10	0.29	1.18	0.03	CONS
	4 Stroke Gasoline	1309	5	0.55	206	0.22	0.18	1.92	1.57	0.25	0.20	CONS
	2 Stroke Gasoline	309	5	0.55	206	7.7	1.48	0.29	0.06	0.25	0.05	CONS
Concrete Pavers	Diesel	32	130	0.68	837	0.4	1.03	8.38	21.54	1.07	2.75	CONS
Rollers	Diesel	512	99	0.56	745	0.72	16.79	8.3	193.51	1.19	27.74	CONS
	4 Stroke Gasoline	131	17	0.62	621	0.22	0.21	2.11	1.99	0.28	0.26	CONS
Scrapers	Diesel	254	311	0.72	1005	0.4	25.17	8.38	527.33	1.07	67.33	CONS
Paving Equipment	Diesel	258	99	0.53	709	0.72	7.63	8.3	87.95	1.19	12.61	CONS
	4 Stroke Gasoline	1292	7	0.59	200	0.22	0.26	1.92	2.26	0.25	0.29	CONS
	2 Stroke Gasoline	69	7	0.59	200	7.7	0.49	0.29	0.02	0.25	0.02	CONS
Surfacing Equipment	4 Stroke Gasoline	181	8	0.49	503	0.22	0.09	1.92	0.76	0.25	0.10	CONS
Signal Boards	Diesel	120	6	0.82	962	1	0.62	10	6.25	1.18	0.74	CONS
	4 Stroke Gasoline	9	8	0.76	284	0.22	0.00	1.82	0.03	0.25	0.00	CONS
Trenchers	Diesel	298	60	0.75	640	0.72	6.81	8.3	78.47	1.19	11.25	CONS
	4 Stroke Gasoline	159	27	0.66	434	0.06	0.08	4.79	6.50	0.25	0.34	CONS
Bore/Drill Rigs	Diesel	46	209	0.75	541	0.4	1.71	8.38	35.79	1.07	4.57	CONS
	4 Stroke Gasoline	49	54	0.79	124	0.06	0.02	4.79	1.36	0.25	0.07	CONS
Excavators	Diesel	362	183	0.57	893	0.4	14.88	8.38	311.82	1.07	39.81	CONS
Concrete/Industrial Saws	Diesel	2	56	0.73	592	0.72	0.03	8.3	0.35	1.19	0.05	CONS
	4 Stroke Gasoline	219	13	0.78	622	0.22	0.33	1.92	2.92	0.25	0.38	CONS

Table B-68

Nonroad Engine Emissions
(continued)

Cement and Mortar Mixers	Diesel	24	11	0.56	300	1	0.05	10	0.48	1.18	0.06	CONS
	4 Stroke Gasoline	1369	7	0.59	92	0.22	0.13	1.92	1.10	0.25	0.14	CONS
Cranes	Diesel	580	194	0.43	798	0.4	17.02	8.38	356.55	1.07	45.53	CONS
	4 Stroke Gasoline	14	55	0.47	411	0.06	0.01	4.79	0.80	0.25	0.04	CONS
Graders	Diesel	413	172	0.61	821	0.4	15.68	8.38	328.47	1.07	41.94	CONS
Off-Highway Trucks	Diesel	98	489	0.57	1838	0.4	22.07	8.38	462.29	1.07	59.03	CONS
Crushing/Processing Equipment	Diesel	43	127	0.78	1146	0.4	2.13	8.38	44.61	1.07	5.70	CONS
	4 Stroke Gasoline	6	60	0.85	289	0.06	0.01	4.79	0.49	0.25	0.03	CONS
Rough Terrain Forklifts	Diesel	318	93	0.60	761	0.72	10.73	8.3	123.65	1.19	17.73	CONS
	4 Stroke Gasoline	13	88	0.63	475	0.06	0.02	4.79	1.75	0.25	0.09	CONS
Rubber Tired Loaders	Diesel	1237	158	0.54	875	0.4	40.71	8.38	852.95	1.07	108.91	CONS
	4 Stroke Gasoline	20	67	0.54	589	0.06	0.03	5.42	2.61	0.24	0.12	CONS
Rubber Tired Dozers	Diesel	46	356	0.59	1016	0.4	4.30	8.38	90.07	1.07	11.50	CONS
Tractors/Loaders/ Backhoes	Diesel	1765	77	0.55	1146	0.72	67.97	8.3	783.59	1.19	112.35	CONS
	4 Stroke Gasoline	8	63	0.48	879	0.06	0.01	4.79	1.11	0.25	0.06	CONS
Crawler Tractors	Diesel	1686	157	0.58	1048	0.4	70.94	8.38	1486.17	1.07	189.76	CONS
Skid Steer Loaders	Diesel	885	42	0.55	843	0.8	15.21	6.9	131.15	1.18	22.43	CONS
	4 Stroke Gasoline	164	33	0.58	319	0.06	0.07	4.79	5.28	0.25	0.28	CONS
Off-Highway Tractors	Diesel	230	214	0.65	975	0.4	13.76	8.38	288.19	1.07	36.80	CONS
Dumpers/Tenders	Diesel	2	23	0.38	662	0.8	0.01	6.9	0.07	1.18	0.01	CONS
	4 Stroke Gasoline	143	9	0.41	149	0.22	0.02	1.92	0.17	0.22	0.02	CONS
Other Construction Equipment	Diesel	71	161	0.62	612	0.4	1.91	8.38	40.01	1.07	5.11	CONS
	4 Stroke Gasoline	6	150	0.48	375	0.06	0.01	4.79	0.90	0.25	0.05	CONS
Lawn & Garden Tractors	Diesel	444	16	0.50	317	1	1.24	10	12.42	1.18	1.47	LEGC

Table B-68

Nonroad Engine Emissions (continued)

	4 Stroke Gasoline	12324	12	0.50	61	0.36	1.79	0.84	4.18	0.37	1.84	LEGC
Chippers/Stump Grinders	Diesel	32	99	0.37	96	0.72	0.09	8.3	1.01	1.19	0.15	LEGC
	4 Stroke Gasoline	30	62	0.39	96	0.05	0.00	2.02	0.15	0.37	0.03	LEGC
Commercial Turf Equipment	Diesel	161	24	0.50	1239	0.8	2.11	6.9	18.17	1.18	3.11	LEGC
	4 Stroke Gasoline	878	13	0.50	850	0.36	1.92	0.84	4.49	0.37	1.98	LEGC
Other Lawn & Garden Equipment	4 Stroke Gasoline	522	3	0.50	28	0.18	0.00	0.81	0.02	0.37	0.01	LEGC
	2 Stroke Gasoline	202	3	0.50	28	7.7	0.07	0.29	0.00	0.54	0.01	LEGC
Trimmers/Edgers/ Brush Cutters	4 Stroke Gasoline	41	1	0.36	8.7	1.48	0.00	0.81	0.00	0.37	0.00	LEGR
	2 Stroke Gasoline	34326	1	0.50	8.7	3.89	0.64	0.91	0.15	0.54	0.09	LEGR
Lawn Mowers	4 Stroke Gasoline	58754	4	0.36	13	2.66	3.23	0.81	0.98	0.37	0.45	LEGR
	2 Stroke Gasoline	6564	4	0.36	13	7.7	1.04	0.29	0.04	0.54	0.07	LEGR
Leaf Blowers/Vacuums	2 Stroke Gasoline	4917	2	0.50	19	3.6	0.37	0.96	0.10	0.54	0.06	LEGR
Rear Engine Riding Mowers	Diesel	9	17	0.38	48	0.8	0.00	6.9	0.02	1.18	0.00	LEGR
	4 Stroke Gasoline	1576	9	0.38	48	0.18	0.05	0.81	0.23	0.37	0.11	LEGR
Front End Mowers	4 Stroke Gasoline	254	12	0.50	13	0.18	0.00	0.81	0.02	0.37	0.01	LEGR
Shredders < 5 HP	4 Stroke Gasoline	159	4	0.36	5	2.66	0.00	0.81	0.00	0.37	0.00	LEGR
	2 Stroke Gasoline	36	4	0.36	5	7.7	0.00	0.29	0.00	0.54	0.00	LEGR
Specialty Vehicles/Carts	Diesel	13	1	1.00	487	1	0.01	10	0.07	1.18	0.01	REC
	4 Stroke Gasoline	405	1	1.00	73	0.045	0.00	3.5	0.11	0.55	0.02	REC

Table B-68

Nonroad Engine Emissions (continued)

	2 Stroke Gasoline	778	1	1.00	73	2.4	0.15	1.5	0.09	0.95	0.06	REC
All Terrain Vehicles (ATVs)	4 Stroke Gasoline	4576	1	1.00	135	0.045	0.03	3.5	2.38	0.55	0.37	REC
	2 Stroke Gasoline	515	1	1.00	135	2.4	0.18	0.47	0.04	0.95	0.07	REC
Minibikes	4 Stroke Gasoline	189	1	1.00	65	0.045	0.00	3.5	0.05	0.55	0.01	REC
Off-road Motorcycles	4 Stroke Gasoline	1027	1	1.00	137	0.045	0.01	3.5	0.54	0.55	0.09	REC
	2 Stroke Gasoline	864	1	1.00	137	2.4	0.31	0.47	0.06	0.95	0.12	REC
Golf Carts	4 Stroke Gasoline	364	1	1.00	1145	0.045	0.02	3.5	1.61	0.55	0.25	REC
	2 Stroke Gasoline	112	1	1.00	1145	2.4	0.34	0.47	0.07	0.95	0.13	REC

Railroad Equipment: Emissions from locomotive engines are summarized in Table B-69. Sulfur emissions are based on a diesel sulfur content of 0.05 percent.

Table B-69

Railroad Equipment Emissions

Type of Engine	Gallons of Diesel Consumed	Emission Rate (pounds/gallon consumed)			Emissions (tons/year)		
		PM_{10}	NOx	SOx	PM_{10}	NOx	SOx
Line Haul	1,980,504	0.0148	0.595	0.0072	14.65	583.6	7.05
Switching	182,500	0.0203	0.798	0.0072	1.85	656.4	0.657

Aircraft Emissions: Aircraft emissions for the municipal and military aircraft were calculated using the same basic formulas. The activity levels and emission factors have already been previously described. In addition to the Time In Mode (TIM), the number of engines must be included in the emission calculations because emission factors are based upon a single engine. The following equation was used to calculate particulate emissions for each aircraft type.

$$PM_m = NE_a \times TIM_m \times EF_m$$

where:

PM_m = PM$_{10}$ emissions from one aircraft type for mode m during one LTO cycle;
NE_a = Number of engines on aircraft a;
TIM_m = Time In Mode in hours for specified mode m for a single engine; and
EF_m = Emissions factor of the engine type for the specified mode m.

After the particulate emissions were calculated for each mode, they were added together to determine the total particulate emissions for each specified aircraft type per LTO cycle (PM_{LTO}).

$$PM_{LTO} = PM_{approach} + PM_{climbout} + PM_{takeoff} + PM_{taxi/idle}$$

The particulate emissions per LTO cycle (PM_{LTO}) were then multiplied by the annual number of LTO cycles to determine annual particulate emissions by aircraft type.

$$PM_{total} = PM_{LTO} \times LTO_y$$

Where:

PM_{total} = Total particulate emissions per year for aircraft y
LTO_y = Landing/Take-off cycles per year for aircraft y

Airport emissions for the four airfields within the nonattainment area are presented in Table B-70.

Table B-70

Airport Emissions

Airfields	Number of LTOs	PM_{10} Emissions (tons/year)	NOx Emissions (tons/year)	SOx Emissions (tons/year)
McCarran International Airport	242,165	250.2	2,080	93.2
North Las Vegas Airport	96,086	22.8	19.1	0.5
Henderson Executive Airport	23,242	5.5	5.7	1.5
Nellis Air Force Base	34,157	31.9	268.6	396.5

Onroad Mobile Sources

Paved Road Dust: Emissions of paved road dust were calculated for three types of silt loading values measured in the Las Vegas Valley: roadways with improved shoulders, roadways with unimproved shoulders, and roadways with track out from construction sites. The paved road dust emissions from roadways with and without improved shoulders were calculated by roadway category and are presented in Table B-71. Paved road dust emissions from roadways within 150 feet of a construction egress point are presented in Table B-72. The total PM_{10} emissions from paved road dust throughout the nonattainment area in 1998 was 45,284 tons.

Table B-71

Paved Road Dust Emissions from Roadways With and Without Improved Shoulders

Roadway Category	With Improved Shoulders			Without Improved Shoulders		
	Daily VMT[a]	Emission Factor (g/mile)	PM_{10} Emission (tpy)	Daily VMT	Emission Factor (g/mile)	PM_{10} Emission (tpy)
Ext. Connector	834,249.5	2.93	983.5			
Freeway Ramps	95,304.2	4.22	161.8			
Minor Arterial	10,051,686.6	4.77	17,361.2	1,005,502.8	5.63	2277.7
Major Arterial	2,499,334.9	2.93	2,193.8	638,360.9	5.63	1446.0
Ramps	296,993.4	4.22	504.3			
Interstate	4,567,626	0.37	672.4			
Freeway	1,445,086.8	0.37	212.7			
Expressway	-	2.93	0.0			
Collector	3,621,570	4.22	5,854.5	173,489.1	37.4	2610.6
Local	2,462,719.4	6.57	5,749.0	287,878.4	37.4	4331.9
Intrazonal Trips	74,000.7	6.57	195.6			
Public Transit	63,632.7	6.57	168.2			
Total	**26,012,204.2**		**34,056.9**			**10,666.2**

[a] The daily vehicle miles traveled presented in the second column of Table B-71 are the total number of miles modeled by RTC. The number of miles used for calculating paved road dust emissions for roads with improved shoulders is the total VMT minus the vehicle miles traveled on roadways without improved shoulders. The daily vehicle miles used to calculate the emissions presented in this table are the same except as follows: Minor Arterial – 9,046,138.8; Major Arterial – 1,860,944; Collector – 3,448,080.9; and Local – 2,174,841.

Table B-72

Paved Road Dust Emissions from Track Out

Type of Construction	Number of Acres Under Active Construction in 1998	Number of Access Points	Silt Loading (g/m^2)	PM_{10} Emissions (tons/year)
Airport	84.4	3	2.829	2.93
Commercial	3226.8	323	2.829	84.04
Flood Detention	174.3	6	2.829	6.05
Highway	788.4	79	2.829	82.13
Public Parks	190.7	19	2.829	9.93
Public Bridges	574.8	57	2.829	59.88
Public Works	1132.8	113	2.829	29.50
Residential Homes	10555.3	352	2.829	183.27
Underground Utilities	736.8	0	2.829	0.00
Miscellaneous	1984.7	198	2.829	103.38
Total	**19,449**	**1,150**		**561.14**

Unpaved Road Dust: Emissions from unpaved roads are presented by ADT range in Table B-73. The emission factor, as discussed previously, is 3.27 pounds per vehicle mile traveled.

B-73

Unpaved Road Dust Emissions in Nonattainment Area

ADT Range	Miles	PM_{10} Emissions (tons/year)
Equal to or greater than 150 ADT	64	9,905
Less than 150 ADT and equal to or greater than 125 ADT	7	557
Less than 125 ADT and equal to or greater than 100 ADT	12	715
Less than 100 ADT and equal to or greater than 75 ADT	20	935
Less than 75 ADT and equal to or greater than 50 ADT	13	420
Less than 50 ADT	147	2,624
Total	**263**	**15,156**

Highway Construction Projects: The construction activities and wind erosion emissions from highway construction projects were presented with the results for other stationary area sources. Emissions from highway construction activities during 1998 were calculated to be 2,384 tons. The emissions from wind erosion from highway construction projects was calculated to be 1,260 tons.

Vehicle Emissions: Emissions from vehicle exhaust, tire wear, and brake wear were calculated using the emission rates and vehicle miles traveled data previously discussed. Average daily vehicle miles traveled in the nonattainment area in 1998 were 26,012,184.2. The PM_{10}, NOx, and SOx emissions are summarized in Table B-74.

Table B-74

Nonattainment Area 1998 Vehicle Emissions

Inventory Category	**Emissions (tons/year)**		
	PM_{10}	**NOx**	**SOx**
Vehicular Sulfate PM	407		
Vehicular Tire Wear	84		
Vehicular Brake Wear	136		
Vehicular Exhaust	361	20,587	411
Total	**988**	**20,587**	**411**

Annual Nonattainment Area Inventory Summary

A summary of the 1998 annual nonattainment area inventory is presented in Table B-75. The categories are presented in the summary in the same order they were previously discussed.

Table B-75

PM_{10} 1998 Nonattainment Area Emissions Inventory

Source	**PM_{10} (TPY)**	**NOx (TPY)**	**SOx (TPY)**
Stationary Point Sources			
Sand & Gravel Operations	627.0	294.0	22.0
Utilities - Natural Gas	199.0	5,319.0	2.0
Asphalt Concrete Manufacture	268.0	60.0	26.0
Industrial Processes	80.0	437.0	124.0
Other Sources	124.0	126.0	5.0
Total	1,298.0	6,236.0	179.0

Table B-75

PM_{10} 1998 Nonattainment Area Emissions Inventory (continued)

Stationary Area Sources			
Small Point Sources	184.0	1,825.0	25.0
Residential Firewood	76.2	5.8	0.9
Residential Natural Gas	67.4	832.8	5.4
Commercial Natural Gas	33.2	536.7	2.6
Industrial Natural Gas	13.8	182.2	1.1
NG - Purchased at the source - Carried by SWG	210.3	2,767.3	16.6
Structural/Vehicle Fires/Wild Fires	17.4	2.2	-
Charbroiling/Meat cooking	757.5	-	-
Disturbed Vacant Lands/Unpaved Parking Lots	133,000	-	-
Native Desert Fugitive Dust	80,400	-	-
Stabilized Vacant Land Dust	15,700	-	-
Construction Activity Fugitive Dust	19,807	-	-
Windblown Construction Dust	15,755	-	-
Total	266,022	6,152.0	51.6
Nonroad Mobile Sources			
Airport Support Equipment	37.1	626.6	80.5
Commercial Equipment	0.3	2.4	0.4
Construction & Mining Equipment	364.6	6,323.8	832.0
Lawn & Garden Equipment	12.5	41.6	9.4
Railroad Equipment	14.6	656.0	7.7
Recreational Equipment	1.0	5.0	1.1
McCarran International Airport	250.2	2,080.0	93.2
Henderson Executive Airport	5.5	5.7	0.5
North Las Vegas Municipal Airport	22.8	19.1	1.5
Nellis Air Force Base	31.9	268.6	396.5
Total	740.6	10,028.8	1,422.7
Onroad Mobile Sources			
Paved Road Dust (Includes Const. Track Out)	45,284.4	-	-
Unpaved Road Dust	15,156.0	-	-
Highway Construction Projects Activities	2,384.0		
Highway Construction Projects - Wind Erosion	1,260.0	-	-
Vehicular Sulfate PM	407.0	-	-
Vehicular Tire Wear	84.0	-	-
Vehicular Brake Wear	136.0	-	-
Vehicular Exhaust	361.0	20,587.0	411.0
Total	65,072.0	20,587.0	411.0
Total	**333,132.7**	**43,003.8**	**2,064.3**

Nonattainment Area 24-Hour Inventory

The 24-hour nonattainment area inventory is based largely on the annual nonattainment area inventory. The 24-hour design day, December 21, 1998, occurred during the 1998 base year. The emissions for the following inventory categories were calculated by dividing the annual emissions by 365, the number of days in 1998:

- Sand & Gravel Operations;
- Utilities – Natural Gas;
- Asphalt Concrete Manufacture;
- Industrial Processes:
- Stationary Point Sources – Other Sources:
- Small Point Sources;
- Residential Natural Gas;
- Commercial Natural Gas;
- Industrial Natural Gas;
- NG – Purchased at the Source – Carried by SWG;
- Structural/Vehicle Fires/Wild Fires;
- Charbroiling/Meat Cooking;
- Construction Activity Fugitive Dust;
- Airport Support Equipment;
- Commercial Equipment;
- Construction & Mining Equipment;
- Lawn & Garden Equipment;
- Railroad Equipment;
- McCarran International Airport;
- Henderson Executive Airport;
- North Las Vegas Municipal Airport;
- Nellis Air Force Base;
- Paved Road Dust;
- Unpaved Road Dust;
- Highway Construction Projects Activities;
- Vehicular Sulfate PM;
- Vehicular Tire Wear;
- Vehicular Brake Wear; and
- Vehicular Exhaust.

The residential firewood emissions were estimated by dividing the annual emissions by 93 for the number of days estimated to be in the wood-burning season. Hourly average wind speeds measured at McCarran International Airport did not exceed 25 mph, so no emissions were estimated from native desert fugitive dust. All other source categories and the results of the emission calculations are discussed in detail below.

Disturbed Vacant Land
The emissions for disturbed vacant land were calculated using the emission factors developed for meteorology measured at McCarran International Airport on December 21, 1998. The emission factor and the resulting emissions are presented in Table B-76.

Table B-76

24-Hour Disturbed Vacant Land Emissions

Wind Speed Category (mph)	# of Hours in Range	# of Days in Range	Sustained Winds Emission Factor (ton/acre/ hour)	Spike Emission Factor (ton/acre)	24-hour Emission Factor of Unstable Land (ton/acre)
15 – 19.9	9	1	N/A	N/A	N/A
20 – 24.9	3	1	5.21×10^{-3}	8.16×10^{-4}	1.64×10^{-2}
25 – 29.9	0	1	6.40×10^{-3}	1.94×10^{-3}	1.94×10^{-3}
30 – 34.9	0	1	4.62×10^{-3}	1.41×10^{-3}	1.41×10^{-3}
Total					1.98×10^{-2}
(51,393 Acres) * (1.98×10^{-2} tons/acre) = 1.02×10^{3}					

Stabilized Vacant Land Dust
The stabilized vacant land emissions are summarized in Table B-77. The emissions for stabilized vacant land were calculated using the emission factors developed for meteorology measured at McCarran International Airport on December 21, 1998.

Table B-77

24-Hour Stabilized Vacant Land Emissions

Wind Speed Category (mph)	# of Days in Range	Sustained Winds Emission Factor (ton/acre/hour)	Emission Factor of Stabilized Land (ton/acre)
15 – 19.9	1	4.20×10^{-4}	4.20×10^{-4}
20 – 24.9	1	3.40×10^{-4}	3.40×10^{-4}
Total			7.60×10^{-4}
(158,865Acres) * (7.60×10^{-4} tons/acre) = 1.21×10^{2}			

Windblown Construction Dust
The emission factors shown for disturbed and stabilized vacant land in Tables B-76 and B-77 respectively were used for uncontrolled and controlled acres of

construction. The emission factors are the same, as the same meteorological profiles were used. The wind erosion emissions from construction sites are summarized in Table B-78.

Table B-78

24-Hour Wind Erosion from Construction Sites

Type of Construction	Acres Uncontrolled	Acres Stabilized	Unstable Land Emission Rate (ton/acre/day)	Stabilized Land Emission Rate (ton/acre/year)	24-hour PM_{10} Emissions (tons)
Airport	50.6	33.8	$1.98x10^{-2}$	$7.60x10^{-4}$	$1.03x10^{0}$
Commercial	2,420.1	806.7	$1.98x10^{-2}$	$7.60x10^{-4}$	$4.85x10^{1}$
Flood Detention	113.3	61.0	$1.98x10^{-2}$	$7.60x10^{-4}$	$2.29x10^{0}$
Highway	473.0	315.4	$1.98x10^{-2}$	$7.60x10^{-4}$	$9.61x10^{0}$
Public Parks	114.4	76.3	$1.98x10^{-2}$	$7.60x10^{-4}$	$2.32x10^{0}$
Public Bridges	373.6	201.2	$1.98x10^{-2}$	$7.60x10^{-4}$	$7.55x10^{0}$
Public Works	736.3	396.5	$1.98x10^{-2}$	$7.60x10^{-4}$	$1.49x10^{1}$
Residential Homes	7,916.5	2,638.8	$1.98x10^{-2}$	$7.60x10^{-4}$	$1.59x10^{2}$
Underground Utilities	663.1	73.7	$1.98x10^{-2}$	$7.60x10^{-4}$	$1.32x10^{1}$
Miscellaneous	1,190.8	793.9	$1.98x10^{-2}$	$7.60x10^{-4}$	$2.42x10^{1}$
Total	**14,051.9**	**5,397.2**			**$2.82x10^{2}$**

<u>Highway Construction Projects – Wind Erosion</u>
The wind erosion emissions from highway construction projects were presented with the results for windblown construction dust. Emissions from wind erosion from highway construction projects on December 21, 1998 were calculated to be 9.61 tons.

<u>Valley-wide 24-Hour Inventory</u>
A summary of the nonattainment area 24-hour inventory for December 21, 1998 is presented in Table B-79. The categories are presented in the summary in the same order they were in which they were previously discussed.

Table B-79

PM_{10} Nonattainment Area 24-Hour Emissions Inventory

Source	PM_{10} (TPY)	NOx (TPY)	SOx (TPY)
Stationary Point Sources			
Sand & Gravel Operations	1.72	0.81	0.06
Utilities - Natural Gas	0.55	14.57	0.01
Asphalt Concrete Manufacture	0.73	0.16	0.07
Industrial Processes	0.22	1.20	0.34
Other Sources	0.34	0.35	0.01
Total	3.56	17.08	0.49

Table B-79

PM_{10} Nonattainment Area 24-Hour Emissions Inventory (continued)

Stationary Area Sources			
Small Point Sources	0.50	5.00	0.07
Residential Firewood	0.82	5.76	0.91
Residential Natural Gas	0.18	2.28	0.01
Commercial Natural Gas	0.09	1.47	0.01
Industrial Natural Gas	0.04	0.50	0.00
NG - Purchased at the source - Carried by SWG	0.58	7.58	0.05
Structural/Vehicle Fires/Wild Fires	0.05	0.01	
Charbroiling/Meat cooking	2.08	-	-
Disturbed Vacant Lands/Unpaved Parking Lots	1,020.00	-	-
Native Desert Fugitive Dust	0.00		
Stabilized Vacant Land Dust	121.00	-	-
Construction Activity Fugitive Dust	54.27	-	-
Windblown Construction Dust	272.72	-	-
Total	1,472.32	22.60	1.05
Nonroad Mobile Sources			
Airport Support Equipment	0.10	1.72	0.22
Commercial Equipment	0.00	0.01	0.00
Construction & Mining Equipment	1.00	17.33	2.28
Lawn & Garden Equipment	0.03	0.11	0.03
Railroad Equipment	0.04	1.80	0.02
Recreational Equipment	0.00	0.01	0.00
McCarran International Airport	0.69	5.70	0.26
Henderson Executive Airport	0.02	0.02	0.00
North Las Vegas Municipal Airport	0.06	0.05	0.00
Nellis Air Force Base	0.09	0.74	1.09
Total	2.03	27.48	3.90
Onroad Mobile Sources			
Paved Road Dust (Includes Const. Track out)	124.07	-	-
Unpaved Road Dust	41.52	-	-
Highway Construction Projects Activities	6.53		
Highway Construction Projects - Wind Erosion	9.61	-	-
Vehicular Sulfate PM	1.23	-	-
Vehicular Tire Wear	0.26	-	-
Vehicular Brake Wear	0.37	-	-
Vehicular Exhaust	2.01	56.40	1.13
Total	185.60	56.40	1.13
Total	**1,662**	**124**	**7**

Annual BLM Disposal Area Inventory

Stationary Point Sources

All the stationary point sources with emissions greater than five tons per year or major sources are located within the BLM disposal area boundary except James Hardie Gypsum. James Hardie Gypsum reported 96.94 tons of emissions in 1998. This source was categorized as Asphalt Concrete Manufacturing in the emission inventory. Therefore, the emission inventory for the BLM disposal area for stationary point sources is the same as the nonattainment area annual inventory except the asphalt concrete manufacturing emissions are 97 tons less. The stationary point source emissions are listed in detail in Table B-56 and summarized in Table B-80. This inventory was developed directly from the information provided by AQD.

Table B-80

1998 PM_{10} Emissions from Stationary Point Sources within the BLM Disposal Area

Stationary Point Sources	PM_{10} (TPY)	NOx (TPY)	SOx (TPY)
Sand & Gravel Operations	627.0	294.0	22.0
Utilities - Natural Gas	199.0	5319.0	2.0
Asphalt Concrete Manufacture	171.0	60.0	26.0
Industrial Processes	80.0	437.0	124.0
Other Sources	124.0	126.0	5.0
Total	**1,201.0**	**6,236.0**	**179.0**

Stationary Area Sources

Small Point Sources: The stationary sources with emissions less than five tons per year are listed in Table B-56. This information was developed directly from the information provided by AQD. It is assumed all stationary area sources are within the BLM disposal boundary and all of these sources have been included in the annual inventory.

Residential Firewood: Firewood sales in 1998 were 2,316 cords. The average cord weighs 3,763 pounds. Therefore 4,357.6 tons of firewood were sold and assumed to be burned. The emission factors and resulting emissions are summarized in Table B-81.

Table B-81

Residential Firewood Combustion Emissions

Pollutant	Emission Factor (pounds/ton burned)	Emissions (tons/year)
PM_{10}	34.6	75.4
NOx	2.6	5.7
SOx	0.4	0.9

Natural Gas Combustion: Residential, commercial, industrial, and purchased at the source natural gas combustion emissions are summarized in Table B-82. The categories listed are from the Southwest Gas sales records. It is assumed the Southwest Gas sales represent the BLM disposal area as the sales were recorded for the Las Vegas Valley. The inventory groupings are also provided.

Table B-82

Natural Gas Combustion Emissions

Category (Inventory Category)	Natural Gas Sales for 1998 (MMBtu)	Emission Factor (lb/MMBtu)			Emissions (tons/year)		
		PM_{10}	NOx	SOx	PM_{10}	NOx	SOx
Residential (Residential)	17,896,667	0.0075	0.09216	0.0006	66.7	824.6	5.3
Small Commercial (Commercial)	6,628,926	0.0075	0.09804	0.0006	24.7	324.9	1.9
Large Commercial (Commercial)	2,250,844	0.0075	0.18627	0.0006	8.4	209.6	0.7
Industrial (Industrial)	33,614	0.0075	0.18627	0.0006	0.125	3.1	0.01
Compressed Natural Gas (Commercial)	31,439	0.0075	0.09804	0.0006	0.12	1.5	0.009
Irrigation/Water Pumping (Commercial)	10,708	0.0075	0.09804	0.0006	0.04	0.5	0.003
Other Gas Sales (Industrial)	3,653,123	0.0075	0.09804	0.0006	13.6	179.1	1.1
Transportation (Purchased at the Source)	56,452,728	0.0075	0.09804	0.0006	210.3	2,767.3	16.6

Structural/Vehicle Fires/Wild Fires: There were an estimated 3,174 tons of material consumed by structural, vehicle, and wild fires within the BLM disposal area in 1998. The emissions are presented in Table B-83.

Table B-83

Structural/Vehicle/Wild Fire Emissions

Pollutant	Emission Factor (pounds/ton burned)	Emissions (tons/year)
PM_{10}	10.8	17.2
NOx	1.4	2.2

Charbroiling/Meat Cooking: The particulate emissions from meat cooking within the Las Vegas Valley are presented in Table B-84. Emissions are based on type of equipment used and the amount of meat cooked.

Table B-84

PM_{10} Emissions from Charbroiling/Meat Cooking

Cooking Equipment	Type of Meat	Amount of Meat (pounds)	Emission Factor (pounds/1000 pounds of meat cooked)	Emissions (tons/year)
Chain-driven Charbroiler with Controls	Hamburger	3,672,000	1.29	2.4
Chain-driven Charbroiler, No Controls	Hamburger	1,549,309	7.42	5.7
Underfired Charbroiler, No Controls	Hamburger	27,002,078	32.65	440.8
	Steak	29,197,080	17.19	250.9
	Chicken	3,395,660	10.48	17.8
	Fish	1,749,219	3.3	2.9
Flat-top Griddle and Grooved Griddle	Hamburger	11,557,112	5.08	29.4

Disturbed Vacant Land: The emissions for disturbed vacant land within the BLM disposal area were calculated using the emission factors developed for meteorology measured at McCarran International Airport during 1998. The emission factor and the resulting emissions are presented in Table B-85.

Table B-85

Disturbed Vacant Land Emissions

Wind Speed Category (mph)	# of Hours in Range	# of Days in Range	Sustained Winds Emission Factor (ton/acre/ hour)	Spike Emission Factor (ton/acre)	1998 Emission Factor of Unstable Land (ton/acre)
15 – 19.9	685	144	N/A	N/A	N/A
20 – 24.9	383	91	$5.21x10^{-3}$	$8.16x10^{-4}$	$2.07x10^{0}$
25 – 29.9	55	31	$6.40x10^{-3}$	$1.94x10^{-3}$	$4.12x10^{-1}$
30 – 34.9	18	9	$4.62x10^{-3}$	$1.41x10^{-3}$	$9.59x10^{-2}$
35 – 39.9	1	1	$7.05x10^{-3}$	$3.80x10^{-3}$	$1.09x10^{-2}$
Total					$2.59x10^{0}$
(18,718.9 Acres) * (2.59 tons/acre) = $4.85x10^{4}$					

Native Desert Fugitive Dust: Native desert fugitive dust emissions were calculated for sustained hourly winds 25 mph or higher as measured at McCarran International Airport. The emissions from native desert fugitive dust are summarized in Table B-86.

Table B-86

Native Desert Fugitive Dust Emissions

Wind Speed Category (mph)	# of Days in Range	Sustained Winds Emission Factor (ton/acre/ hour)	Spike Emission Factor (ton/acre)	1998 Emission Factor of Unstable Land (ton/acre)
15 – 19.9	144	N/A	N/A	N/A
20 – 24.9	91	N/A	N/A	N/A
25 – 29.9	31	$2.57x10^{-3}$	$3.61x10^{-4}$	$9.09x10^{-2}$
30 – 34.9	9	$3.16x10^{-3}$	$4.68x10^{-4}$	$3.27x10^{-2}$
35 – 39.9	1	$2.99x10^{-3}$	$8.15x10^{-4}$	$3.81x10^{-3}$
Total				$1.27x10^{-1}$
(113,803.9 Acres) * ($1.27x10^{-1}$ tons/acre) = $1.45x10^{4}$				

Stabilized Vacant Land Dust: The stabilized vacant land emissions are summarized in Table B-87. The emissions for stabilized vacant land were calculated using the emission factors developed for meteorology measured at McCarran International Airport during 1998.

Table B-87

Stabilized Vacant Land Emissions

Wind Speed Category (mph)	# of Days in Range	Sustained Winds Emission Factor (ton/acre/ hour)	1998 Emission Factor of Unstable Land (ton/acre)
15 – 19.9	144	N/A	$6.05x10^{-2}$
20 – 24.9	91	$5.21x10^{-3}$	$3.09x10^{-2}$
25 – 29.9	31	$6.40x10^{-3}$	$5.89x10^{-3}$
30 – 34.9	9	$4.62x10^{-3}$	$1.71x10^{-3}$
35 – 39.9	1	$7.05x10^{-3}$	$1.90x10^{-4}$
Total			$9.90x10^{-2}$
(54,666.2 Acres) * ($9.90x10^{-2}$ tons/acre) = $5.41x10^{3}$			

Construction Activity Fugitive Dust: Construction sites are currently regulated by the AQD. The CCHD enforcement officers provided compliance rates for each type of construction activity as shown in Table B-30. Dust control on construction sites is usually implemented using water. The U. S. EPA assigns a 50 percent control efficiency to watering for control of particulate emissions from construction sites.[39] It is assumed that all construction within the nonattainment area occurred within the BLM disposal area boundary. Therefore, the emissions for the annual BLM disposal area inventory are the same as for the annual nonattainment inventory. The overall compliance rate as well as the emissions from construction activities are summarized in Table B-65.

To aid in developing a transportation conformity budget, the emissions associated with highway construction were listed under Onroad Mobile Sources in the inventory. The total construction activity emissions without highway construction is 19,807 tons.

Windblown Construction Dust: The emission factors shown for disturbed and stabilized vacant land in Tables B-62 and B-64 respectively were used for the uncontrolled and controlled acres of construction. The emission factors are the same because the same meteorological profiles were used. Again, it is assumed all construction activity within the nonattainment area occurred within the BLM disposal boundary and the emissions within the BLM disposal boundary area are the same as the windblown construction dust within the annual nonattainment emission inventory. The wind erosion emissions from construction sites are summarized in Table B-66.

To aid in developing a transportation conformity budget, the emissions associated by highway construction were listed under Onroad Mobile Sources in the inventory. The total without highway construction is 15,755 tons.

[39] Op. Cit.

Nonroad Mobile Sources

The subtotals of nonroad engine emissions by inventory category are summarized in Table B-88 below. The nonroad engine emissions are presented in detail in Table B-89.

Table B-88

Nonroad Engine Emissions Subtotals

Inventory Category	PM_{10} Emissions (tons/year)	NOx Emissions (tons/year)	SOx Emissions (tons/year)
Airport Support Equipment	37.1	626.6	80.5
Commercial Equipment	0.3	2.4	0.4
Construction & Mining Equipment	361	6,261	824
Lawn & Garden Equipment	12.4	42	9.3
Recreational Equipment	1.0	5.0	1.1

Table B-89

Nonroad Engine Emissions Within the BLM Disposal Area

Equipment Types	Engine Type	1998 Equipment Population	Average Rated Horsepower	Typical Operating Load Factor (Percent)	Annual Use Estimates (hour/year)	PM_{10} Emission Factors (g/hp-hr)	PM_{10} Emissions (tons/year)	NOx Emission Factors (g/hp-hr)	NOx Emissions (tons/year)	SOx Emission Factors (g/hp-hr)	SOx Emissions (tons/year)	Classification
Terminal Tractor	Diesel	874	137	0.51	842	0.4	22.66	8.38	474.82	1.07	60.63	ASE
	4 Stroke Gasoline	88	48	0.56	783	0.8	1.63	5.16	10.51	0.27	0.55	ASE
Aircraft Support Equipment	Diesel	129	96	0.82	1408	0.72	11.34	8.3	130.76	1.19	18.75	ASE
	4 Stroke Gasoline	31	82	0.78	926	0.72	1.46	5.16	10.49	0.27	0.55	ASE
Generator Sets < 50 HP	Diesel	9	22	0.74	375	0.8	0.05	6.9	0.43	1.18	0.07	COM
	4 Stroke Gasoline	136	11	0.68	128	0.22	0.03	0.81	0.12	0.27	0.04	COM
	2 Stroke Gasoline	2	11	0.68	128	7.7	0.01	0.29	0.00	0.27	0.00	COM
Pumps < 50 HP	Diesel	3	23	0.74	480	0.8	0.02	6.9	0.19	1.18	0.03	COM
	4 Stroke Gasoline	27	7	0.69	263	0.22	0.01	0.81	0.03	0.27	0.01	COM
	2 Stroke Gasoline	5	7	0.69	263	0.18	0.00	2.82	0.02	0	0.00	COM
Air Compressors < 50 HP	Diesel	2	37	0.48	937	0.8	0.02	6.9	0.20	1.18	0.03	COM
	4 Stroke Gasoline	9	9	0.56	557	0.22	0.01	0.81	0.02	0.27	0.01	COM
Welders < 50 HP	Diesel	5	35	0.45	746	0.8	0.05	6.9	0.42	1.18	0.07	COM
	4 Stroke Gasoline	16	19	0.51	241	0.22	0.01	0.81	0.03	0.27	0.01	COM
Pressure Washers < 50 HP	4 Stroke Gasoline	12	7	0.85	133	0.22	0.00	0.81	0.01	0.27	0.00	COM
Forklifts	Diesel	2	83	0.30	1717	0.72	0.05	8.3	0.61	1.19	0.09	COM
	4 Stroke Gasoline	2	62	0.30	1818	0.06	0.00	5.16	0.30	0.27	0.02	COM
Asphalt Pavers	Diesel	92	91	0.62	829	0.72	3.42	8.3	39.39	1.19	5.65	CONS

Table B-89

Nonroad Engine Emissions Within the BLM Disposal Area (continued)

	4 Stroke Gasoline	17	31	0.66	396	0.06	0.01	4.79	0.73	0.25	0.04	CONS
Tampers/Rammers	4 Stroke Gasoline	6	4	0.55	182	0.22	0.00	1.92	0.01	0.25	0.00	CONS
	2 Stroke Gasoline	131	4	0.55	182	7.7	0.45	0.29	0.02	0.25	0.01	CONS
Plate Compactors	Diesel	12	8	0.43	600	1	0.03	10	0.28	1.18	0.03	CONS
	4 Stroke Gasoline	1296	5	0.55	206	0.22	0.18	1.92	1.55	0.25	0.20	CONS
	2 Stroke Gasoline	306	5	0.55	206	7.7	1.47	0.29	0.06	0.25	0.05	CONS
Concrete Pavers	Diesel	31	130	0.68	837	0.4	1.02	8.38	21.32	1.07	2.72	CONS
Rollers	Diesel	507	99	0.56	745	0.72	16.62	8.3	191.59	1.19	27.47	CONS
	4 Stroke Gasoline	129	17	0.62	621	0.22	0.21	2.11	1.97	0.28	0.26	CONS
Scrapers	Diesel	251	311	0.72	1005	0.4	24.92	8.38	522.11	1.07	66.67	CONS
Paving Equipment	Diesel	256	99	0.53	709	0.72	7.55	8.3	87.08	1.19	12.48	CONS
	4 Stroke Gasoline	1279	7	0.59	200	0.22	0.26	1.92	2.24	0.25	0.29	CONS
	2 Stroke Gasoline	69	7	0.59	200	7.7	0.48	0.29	0.02	0.25	0.02	CONS
Surfacing Equipment	4 Stroke Gasoline	179	8	0.49	503	0.22	0.09	1.92	0.75	0.25	0.10	CONS
Signal Boards	Diesel	119	6	0.82	962	1	0.62	10	6.19	1.18	0.73	CONS
	4 Stroke Gasoline	9	8	0.76	284	0.22	0.00	1.82	0.03	0.25	0.00	CONS
Trenchers	Diesel	295	60	0.75	640	0.72	6.74	8.3	77.69	1.19	11.14	CONS
	4 Stroke Gasoline	158	27	0.66	434	0.06	0.08	4.79	6.43	0.25	0.34	CONS
Bore/Drill Rigs	Diesel	45	209	0.75	541	0.4	1.69	8.38	35.44	1.07	4.52	CONS
	4 Stroke Gasoline	48	54	0.79	124	0.06	0.02	4.79	1.35	0.25	0.07	CONS
Excavators	Diesel	359	183	0.57	893	0.4	14.74	8.38	308.73	1.07	39.42	CONS
Concrete/Industrial Saws	Diesel	2	56	0.73	592	0.72	0.03	8.3	0.35	1.19	0.05	CONS
	4 Stroke Gasoline	217	13	0.78	622	0.22	0.33	1.92	2.89	0.25	0.38	CONS

Table B-89

Nonroad Engine Emissions Within the BLM Disposal Area (continued)

Cement and Mortar Mixers	Diesel	23	11	0.56	300	1	0.05	10	0.48	1.18	0.06	CONS
	4 Stroke Gasoline	1356	7	0.59	92	0.22	0.12	1.92	1.09	0.25	0.14	CONS
Cranes	Diesel	574	194	0.43	798	0.4	16.85	8.38	353.02	1.07	45.08	CONS
	4 Stroke Gasoline	14	55	0.47	411	0.06	0.01	4.79	0.79	0.25	0.04	CONS
Graders	Diesel	409	172	0.61	821	0.4	15.52	8.38	325.22	1.07	41.53	CONS
Off-Highway Trucks	Diesel	97	489	0.57	1838	0.4	21.85	8.38	457.72	1.07	58.44	CONS
Crushing/Processing Equipment	Diesel	42	127	0.78	1146	0.4	2.11	8.38	44.17	1.07	5.64	CONS
	4 Stroke Gasoline	6	60	0.85	289	0.06	0.01	4.79	0.49	0.25	0.03	CONS
Rough Terrain Forklifts	Diesel	315	93	0.60	761	0.72	10.62	8.3	122.43	1.19	17.55	CONS
	4 Stroke Gasoline	12	88	0.63	475	0.06	0.02	4.79	1.74	0.25	0.09	CONS
Rubber Tired Loaders	Diesel	1225	158	0.54	875	0.4	40.31	8.38	844.51	1.07	107.83	CONS
	4 Stroke Gasoline	20	67	0.54	589	0.06	0.03	5.42	2.58	0.24	0.11	CONS
Rubber Tired Dozers	Diesel	45	356	0.59	1016	0.4	4.26	8.38	89.18	1.07	11.39	CONS
Tractors/Loaders/ Backhoes	Diesel	1747	77	0.55	1146	0.72	67.30	8.3	775.83	1.19	111.23	CONS
	4 Stroke Gasoline	8	63	0.48	879	0.06	0.01	4.79	1.09	0.25	0.06	CONS
Crawler Tractors	Diesel	1669	157	0.58	1048	0.4	70.24	8.38	1471.46	1.07	187.88	CONS
Skid Steer Loaders	Diesel	877	42	0.55	843	0.8	15.06	6.9	129.85	1.18	22.21	CONS
	4 Stroke Gasoline	162	33	0.58	319	0.06	0.07	4.79	5.23	0.25	0.27	CONS
Off-Highway Tractors	Diesel	228	214	0.65	975	0.4	13.62	8.38	285.34	1.07	36.43	CONS
Dumpers/Tenders	Diesel	2	23	0.38	662	0.8	0.01	6.9	0.07	1.18	0.01	CONS
	4 Stroke Gasoline	142	9	0.41	149	0.22	0.02	1.92	0.17	0.22	0.02	CONS
Other Construction Equipment	Diesel	70	161	0.62	612	0.4	1.89	8.38	39.61	1.07	5.06	CONS
	4 Stroke Gasoline	6	150	0.48	375	0.06	0.01	4.79	0.89	0.25	0.05	CONS
Lawn & Garden Tractors	Diesel	440	16	0.50	317	1	1.23	10	12.30	1.18	1.45	LEGC

Table B-89

Nonroad Engine Emissions Within the BLM Disposal Area (continued)

	4 Stroke Gasoline	12202	12	0.50	61	0.36	1.77	0.84	4.14	0.37	1.82	LEGC
Chippers/ Stump Grinders	Diesel	31	99	0.37	96	0.72	0.09	8.3	1.00	1.19	0.14	LEGC
	4 Stroke Gasoline	30	62	0.39	96	0.05	0.00	2.02	0.15	0.37	0.03	LEGC
Commercial Turf Equipment	Diesel	159	24	0.50	1239	0.8	2.09	6.9	17.99	1.18	3.08	LEGC
	4 Stroke Gasoline	869	13	0.50	850	0.36	1.91	0.84	4.45	0.37	1.96	LEGC
Other Lawn & Garden Equipment	4 Stroke Gasoline	516	3	0.50	28	0.18	0.00	0.81	0.02	0.37	0.01	LEGC
	2 Stroke Gasoline	200	3	0.50	28	7.7	0.07	0.29	0.00	0.54	0.00	LEGC
Trimmers/Edgers/ Brush Cutters	4 Stroke Gasoline	41	1	0.36	8.7	1.48	0.00	0.81	0.00	0.37	0.00	LEGR
	2 Stroke Gasoline	33986	1	0.50	8.7	3.89	0.63	0.91	0.15	0.54	0.09	LEGR
Lawn Mowers	4 Stroke Gasoline	58172	4	0.36	13	2.66	3.19	0.81	0.97	0.37	0.44	LEGR
	2 Stroke Gasoline	6499	4	0.36	13	7.7	1.03	0.29	0.04	0.54	0.07	LEGR
Leaf Blowers/ Vacuums	2 Stroke Gasoline	4869	2	0.50	19	3.6	0.37	0.96	0.10	0.54	0.06	LEGR
Rear Engine Riding Mowers	Diesel	9	17	0.38	48	0.8	0.00	6.9	0.02	1.18	0.00	LEGR
	4 Stroke Gasoline	1560	9	0.38	48	0.18	0.05	0.81	0.23	0.37	0.10	LEGR
Front End Mowers	4 Stroke Gasoline	251	12	0.50	13	0.18	0.00	0.81	0.02	0.37	0.01	LEGR
Shredders < 5 HP	4 Stroke Gasoline	158	4	0.36	5	2.66	0.00	0.81	0.00	0.37	0.00	LEGR
	2 Stroke Gasoline	36	4	0.36	5	7.7	0.00	0.29	0.00	0.54	0.00	LEGR
Specialty Vehicles/Carts	Diesel	12	1	1.00	487	1	0.01	10	0.07	1.18	0.01	REC
	4 Stroke Gasoline	401	1	1.00	73	0.045	0.00	3.5	0.11	0.55	0.02	REC

Table B-89

Nonroad Engine Emissions Within the BLM Disposal Area (continued)

	2 Stroke Gasoline	771	1	1.00	73	2.4	0.15	1.5	0.09	0.95	0.06	REC
All Terrain Vehicles (ATVs)	4 Stroke Gasoline	4530	1	1.00	135	0.045	0.03	3.5	2.36	0.55	0.37	REC
	2 Stroke Gasoline	510	1	1.00	135	2.4	0.18	0.47	0.04	0.95	0.07	REC
Minibikes	4 Stroke Gasoline	187	1	1.00	65	0.045	0.00	3.5	0.05	0.55	0.01	REC
Off-road Motorcycles	4 Stroke Gasoline	1027	1	1.00	137	0.045	0.01	3.5	0.54	0.55	0.09	REC
	2 Stroke Gasoline	864	1	1.00	137	2.4	0.31	0.47	0.06	0.95	0.12	REC
Golf Carts	4 Stroke Gasoline	360	1	1.00	1145	0.045	0.02	3.5	1.59	0.55	0.25	REC
	2 Stroke Gasoline	111	1	1.00	1145	2.4	0.34	0.47	0.07	0.95	0.13	REC

Railroad Equipment: Emissions from locomotive engines are summarized in Table B-90. Sulfur emissions are based on a diesel sulfur content of 0.05 percent.

Table B-90

Railroad Equipment Emissions Within the BLM Disposal Area

Type of Engine	Gallons of Diesel Consumed	Emission Rate (pounds/gallon consumed)			Emissions (tons/year)		
		PM_{10}	NOx	SOx	PM_{10}	NOx	SOx
Line Haul	1,960,895	0.0148	0.595	0.0072	14.5	583.6	7.05
Switching	182,500	0.0203	0.798	0.0072	1.85	656.4	0.657

Airport Emissions: All of the airports within the nonattainment area are also within the BLM disposal area. Therefore, the airport emissions for the BLM disposal area were the same as for the nonattainment area.

<u>Onroad Mobile Sources</u>

Paved Road Dust: Emissions of paved road dust were calculated for three types of silt loading values measured in the Las Vegas Valley: roadways with improved shoulders, roadways with unimproved shoulders, and roadways with track out from construction sites. The paved road dust emissions from roadways with and without improved shoulders were calculated by roadway category and are presented in Table B-91. Paved road dust emissions from roadways within 150 feet of a construction egress point are presented in Table B-92. The total PM_{10} emissions from paved road dust throughout the BLM disposal area in 1998 was 44,842 tons.

Table B-91

Paved Road Dust Emissions from Roadways With and Without Improved Shoulders

Roadway Category	With Improved Shoulders			Without Improved Shoulders		
	Daily VMT	Emission Factor (g/mile)	PM_{10} Emission (tpy)	Daily VMT	Emission Factor (g/mile)	PM_{10} Emission (tpy)
Ext. Connector	825,989.6	2.93	973.7			
Freeway Ramps	94,340.6	4.22	160.2			
Minor Arterial	8,956,617.7	4.77	17,189.4	995,547.3	5.63	2,255.1
Major Arterial	1,842,548.5	2.93	2,172.1	632,040.5	5.63	1,431.7
Ramps	294,052.9	4.22	499.3			
Interstate	4,522,402	0.37	665.7			
Freeway	1,430,779	0.37	210.6			
Expressway	-	2.93	-			
Collector	3,413,941.6	4.22	5,796.5	171,771.4	37.4	2,584.8
Local	2,153,309.9	6.57	5,692.0	285,028.1	37.4	4,289.0
Intrazonal Trips	73,268	6.57	193.7			
Public Transit	63,002.7	6.57	166.5			
Total	**25,754,637.8**		**33,720**			**10,561**

Table B-92

Paved Road Dust Emissions from Track Out

Type of Construction	Number of Acres Under Active Construction in 1998	Number of Access Points	Silt Loading (g/m^2)	PM_{10} Emissions (tons/year)
Airport	84.4	3	2.829	2.93
Commercial	3226.8	323	2.829	84.04
Flood Detention	174.3	6	2.829	6.05
Highway	788.4	79	2.829	82.13
Public Parks	190.7	19	2.829	9.93
Public Bridges	574.8	57	2.829	59.88
Public Works	1132.8	113	2.829	29.50
Residential Homes	10555.3	352	2.829	183.27
Underground Utilities	736.8	0	2.829	0.00
Miscellaneous	1984.7	198	2.829	103.38
Total	**19,449**	**1,150**		**561.14**

Unpaved Road Dust: Emissions from unpaved roads are presented by ADT range in Table B-93. The emission factor, as discussed previously, is 3.27 pounds per vehicle mile traveled.

Table B-93

Unpaved Road Dust Emissions Within the BLM Disposal Area

ADT Range	Miles	PM_{10} Emissions (tons/year)
Equal to or greater than 150 ADT	64	9,905
Less than 150 ADT and equal to or greater than 125 ADT	7	557
Less than 125 ADT and equal to or greater than 100 ADT	12	715
Less than 100 ADT and equal to or greater than 75 ADT	20	935
Less than 75 ADT and equal to or greater than 50 ADT	13	420
Less than 50 ADT	143	2,492
Total	**259**	**15,025**

Highway Construction Projects: The construction activities and wind erosion emissions from highway construction projects were presented with the results for other stationary area sources. Emissions from highway construction activities during 1998 were calculated to be 2,384 tons. The emissions from wind erosion from highway construction projects was calculated to be 1,260 tons.

Vehicle Emissions: Emissions from vehicle exhaust, tire wear and brake wear were calculated using the emission rates and vehicle miles traveled data previously discussed. Average daily vehicle miles traveled in the BLM disposal area in 1998 were 25,754,637.8. The PM_{10}, NOx, and SOx emissions are summarized in Table B-94.

Table B-94

Valley-wide 1998 Vehicle Emissions

Inventory Category	Emissions (tons/year)		
	PM_{10}	NOx	SOx
Vehicular Sulfate PM	408		
Vehicular Tire Wear	83		
Vehicular Brake Wear	135		
Vehicular Exhaust	357	20,383	407
Total	**983**	**20,383**	**407**

Annual BLM Disposal Area Inventory Summary

A summary of the 1998 annual valley-wide inventory is presented in Table B-95. The categories are presented in the summary in the same order they were previously discussed.

Table B-95

PM_{10} 1998 Valley-Wide Emissions Inventory

Source	PM_{10} (TPY)	NOx (TPY)	SOx (TPY)
Stationary Point Sources			
Sand & Gravel Operations	627	294	22
Utilities - Natural Gas	199	5,319	2
Asphalt Concrete Manufacture	171	60	26
Industrial Processes	80	437	124
Other Sources	124	126	5
Total	1,201	6,236	179
Stationary Area Sources			
Small Point Sources	184	1,825	25
Residential Firewood	75.4	6	0.9
Residential Natural Gas	66.7	824.6	5.3
Commercial Natural Gas	33.2	536.7	2.6
Industrial Natural Gas	13.8	182.2	1.1
NG - Purchased at the source - Carried by SWG	210.3	2,767.3	16.6
Structural/Vehicle Fires/Wild Fires	17.2	2.2	-
Charbroiling/Meat cooking	750.0	-	-
Disturbed Vacant Land/Unpaved Parking Lots	48,500	-	-

Table B-95

PM_{10} 1998 Valley-Wide Emissions Inventory (continued)

Native Desert Fugitive Dust	14,500	-	-
Stabilized Vacant Land Dust	5,410	-	-
Construction Activity Fugitive Dust	19,807	-	-
Windblown Construction Dust	15,755	-	-
Total	105,323	6,972	52
Nonroad Mobile Sources			
Airport Support Equipment	37.1	626.6	80.5
Commercial Equipment	0.3	2.4	0.4
Construction & Mining Equipment	361	6,261	824
Lawn & Garden Equipment	12.4	42	9.3
Railroad Equipment	14.5	656.0	7.7
Recreational Equipment	1.0	5.0	1.1
McCarran International Airport	250.2	2,080.0	93.2
Henderson Executive Airport	5.5	5.7	0.5
North Las Vegas Municipal Airport	22.8	19.1	1.5
Nellis Air Force Base	31.9	268.6	396.5
Total	737	9,966	1,414
Onroad Mobile Sources			
Paved Road Dust (Includes Const. Track Out)	43,967	-	-
Unpaved Road Dust	15,025	-	-
Highway Construction Projects Activities	2,384	-	-
Highway Construction Projects - Wind Erosion	1,260	-	-
Vehicular Sulfate PM	408	-	-
Vehicular Tire Wear	83	-	-
Vehicular Brake Wear	135	-	-
Vehicular Exhaust	357	20,383	407
Total	64,494	20,383	407
Total	**171,755**	**43,557**	**2,052**

BLM Disposal Area 24-Hour Inventory

The 24-hour valley-wide inventory is based largely on the annual valley-wide inventory. The 24-hour design day, December 21, 1998, occurred during the 1998 base year. The emissions for the following inventory categories were calculated by dividing the annual emissions by 365, the number of days in 1998:

- Sand & Gravel Operations;
- Utilities – Natural Gas;
- Asphalt Concrete Manufacture;
- Industrial Processes:
- Stationary Point Sources – Other Sources:

- Small Point Sources;
- Residential Natural Gas;
- Commercial Natural Gas;
- Industrial Natural Gas;
- NG – Purchased at the Source – Carried by SWG;
- Structural/Vehicle Fires/Wild Fires;
- Charbroiling/Meat Cooking;
- Construction Activity Fugitive Dust;
- Airport Support Equipment;
- Commercial Equipment;
- Construction & Mining Equipment;
- Lawn & Garden Equipment;
- Railroad Equipment;
- McCarran International Airport;
- Henderson Executive Airport;
- North Las Vegas Municipal Airport;
- Nellis Air Force Base;
- Paved Road Dust;
- Unpaved Road Dust;
- Highway Construction Projects Activities;
- Vehicular Sulfate PM;
- Vehicular Tire Wear;
- Vehicular Brake Wear; and
- Vehicular Exhaust.

The residential firewood emissions were estimated by dividing the annual emissions by 93 for the number of days estimated to be in the wood-burning season. Hourly average wind speeds measured at McCarran International Airport did not exceed 25 mph, so no emissions were estimated from native desert fugitive dust. All other source categories and the results of the emission calculations are discussed in detail below.

Disturbed Vacant Land

The emissions for disturbed vacant land were calculated using the emission factors developed for meteorology measured at McCarran International Airport on December 21, 1998. The emission factor and the resulting emissions are presented in Table B-96.

Table B-96

24-Hour Disturbed Vacant Land Emissions

Wind Speed Category (mph)	# of Hours in Range	# of Days in Range	Sustained Winds Emission Factor (ton/acre/hour)	Spike Emission Factor (ton/acre)	24-hour Emission Factor of Unstable Land (ton/acre)
15 – 19.9	9	1	N/A	N/A	N/A
20 – 24.9	3	1	5.21×10^{-3}	8.16×10^{-4}	1.64×10^{-2}
25 – 29.9	0	1	6.40×10^{-3}	1.94×10^{-3}	1.94×10^{-3}
30 – 34.9	0	1	4.62×10^{-3}	1.41×10^{-3}	1.41×10^{-3}
Total					1.98×10^{-2}
(18,718.9 Acres) * (1.98×10^{-2} tons/acre) = 3.71×10^{2}					

Stabilized Vacant Land Dust

The stabilized vacant land emissions are summarized in Table B-97. The emissions for stabilized vacant land were calculated using the emission factors developed for meteorology measured at McCarran International Airport on December 21, 1998.

Table B-97

24-Hour Stabilized Vacant Land Emissions

Wind Speed Category (mph)	# of Days in Range	Sustained Winds Emission Factor (ton/acre/hour)	Emission Factor of Stabilized Land (ton/acre)
15 – 19.9	1	4.20×10^{-4}	4.20×10^{-4}
20 – 24.9	1	3.40×10^{-4}	3.40×10^{-4}
Total			7.60×10^{-4}
(54,666.2 Acres) * (7.60×10^{-4} tons/acre) = 4.15×10^{1}			

Windblown Construction Dust

The emission factors shown for disturbed and stabilized vacant land in Tables B-96 and B-97 respectively were used for uncontrolled and controlled acres of construction. The emission factors are the same because the same meteorological profiles were used. The wind erosion emissions from construction sites are summarized in Table B-98.

Table B-98

24-Hour Wind Erosion from Construction Sites

Type of Construction	Acres Uncontrolled	Acres Stabilized	Unstable Land Emission Rate (ton/acre/day)	Stabilized Land Emission Rate (ton/acre/year)	24-hour PM_{10} Emissions (tons)
Airport	50.6	33.8	$1.98x10^{-2}$	$7.60x10^{-4}$	$1.03x10^{0}$
Commercial	2,420.1	806.7	$1.98x10^{-2}$	$7.60x10^{-4}$	$4.85x10^{1}$
Flood Detention	113.3	61.0	$1.98x10^{-2}$	$7.60x10^{-4}$	$2.29x10^{0}$
Highway	473.0	315.4	$1.98x10^{-2}$	$7.60x10^{-4}$	$9.61x10^{0}$
Public Parks	114.4	76.3	$1.98x10^{-2}$	$7.60x10^{-4}$	$2.32x10^{0}$
Public Bridges	373.6	201.2	$1.98x10^{-2}$	$7.60x10^{-4}$	$7.55x10^{0}$
Public Works	736.3	396.5	$1.98x10^{-2}$	$7.60x10^{-4}$	$1.49x10^{1}$
Residential Homes	7,916.5	2,638.8	$1.98x10^{-2}$	$7.60x10^{-4}$	$1.59x10^{2}$
Underground Utilities	663.1	73.7	$1.98x10^{-2}$	$7.60x10^{-4}$	$1.32x10^{1}$
Miscellaneous	1,190.8	793.9	$1.98x10^{-2}$	$7.60x10^{-4}$	$2.42x10^{1}$
Total	**14,051.9**	**5,397.2**			**$2.82x10^{2}$**

To aid in developing a 24-hour transportation conformity budget, the emissions associated with highway construction were listed under Onroad Mobile Sources in the inventory. The total construction activity emissions without highway construction is 272.72 tons.

<u>Highway Construction Projects – Wind Erosion</u>
The wind erosion emissions from highway construction projects were presented with the results for windblown construction dust. Emissions from wind erosion from highway construction projects on December 21, 1998, were calculated to be 9.61 tons.

<u>BLM Disposal Area 24-Hour Inventory</u>
A summary of the valley-wide 24-hour inventory for December 21, 1998, is presented in Table B-99. The categories are presented in the summary in the same order they were in which they were previously discussed.

Table B-99

PM_{10} Valley-Wide 24-Hour Emissions Inventory

Source	PM_{10} (TPY)	NOx (TPY)	SOx (TPY)
Stationary Point Sources			
Sand & Gravel Operations	1.72	0.81	0.06
Utilities - Natural Gas	0.55	14.57	0.01
Asphalt Concrete Manufacture	0.47	0.16	0.07
Industrial Processes	0.22	1.20	0.34
Other Sources	0.34	0.35	0.01
Total	3.29	17.08	0.49

Table B-99

PM_{10} Valley-Wide 24-Hour Emissions Inventory (continued)

Stationary Area Sources			
Small Point Sources	0.50	5.00	0.07
Residential Firewood	0.81	0.02	0.00
Residential Natural Gas	0.18	2.26	0.01
Commercial Natural Gas	0.09	1.47	0.01
Industrial Natural Gas	0.04	0.50	0.00
NG - Purchased at the source - Carried by SWG	0.58	7.58	0.05
Structural/Vehicle Fires/Wild Fires	0.05	0.01	-
Charbroiling/Meat cooking	2.05	-	-
Disturbed Vacant Land/Unpaved Parking Lots	371.00	-	-
Native Desert Fugitive Dust	0.00	-	-
Stabilized Vacant Land Dust	41.50	-	-
Construction Activity Fugitive Dust	54.27	-	-
Windblown Construction Dust	272.72	-	-
Total	743.79	19	0.14
Nonroad Mobile Sources			
Airport Support Equipment	0.10	1.72	0.22
Commercial Equipment	0.00	0.01	0.00
Construction & Mining Equipment	0.99	17.15	2.26
Lawn & Garden Equipment	0.03	0.11	0.03
Railroad Equipment	0.04	1.80	0.02
Recreational Equipment	0.00	0.01	0.00
McCarran International Airport	0.69	5.70	0.26
Henderson Executive Airport	0.02	0.02	0.00
North Las Vegas Municipal Airport	0.06	0.05	0.00
Nellis Air Force Base	0.09	0.74	1.09
Total	2.02	27.30	3.88
Onroad Mobile Sources			
Paved Road Dust (Includes Const. Track Out)	122.85	-	-
Unpaved Road Dust	41.16	-	-
Highway Construction Projects Activities	6.53	-	-
Highway Construction Projects - Wind Erosion	9.61	-	-
Vehicular Sulfate PM	1.12	-	-
Vehicular Tire Wear	0.23	-	-
Vehicular Brake Wear	0.37	-	-
Vehicular Exhaust	0.98	55.84	1.12
Total	182.85	55.84	1.12
Total	**931.95**	**119.33**	**5.62**

1998 J. D. Smith Micro-Scale Inventory

The J. D. Smith micro-scale inventory includes vacant land wind erosion, construction emissions, unpaved road dust, paved road dust, vehicle emissions, and stationary source emissions. The results of emission calculations for these categories are presented below.

Vacant Land Wind Erosion

As done in the valley-wide inventories, the vacant land in the micro-scale area was divided into native desert, disturbed, and stabilized. Soil types were known for the vacant parcels, and emissions were calculated by soil type for native desert and unstable land as shown in Tables B-100 and B-101. Stabilized emission factors are not soil dependent and therefore only one emission factor was developed for stabilized soils. Emissions from each of the vacant land categories were calculated separately.

Table B-100

J. D. Smith Native Desert Fugitive Dust Emission Factors

Wind Speed Category (mph)	# of Days in Range	Sustained Winds Emission Factor (ton/acre/hour)		Soils Spike Emission Factor (ton/acre)		1998 Emission Factor for Native Desert (ton/acre)	
		Group 2 Soils	Group 8 Soils	Group 2 Soils	Group 8 Soils	Group 2 Soils	Group 8 Soils
15 – 19.9	144	N/A	N/A	N/A	N/A	N/A	N/A
20 – 24.9	91	N/A	N/A	N/A	N/A	N/A	N/A
25 – 29.9	31	1.52×10^{-3}	N/A	1.34×10^{-4}	N/A	5.13×10^{-2}	N/A
30 – 34.9	9	2.48×10^{-3}	6.33×10^{-3}	5.46×10^{-4}	6.40×10^{-4}	2.72×10^{-2}	6.27×10^{-2}
35 – 39.9	1	2.45×10^{-3}	3.44×10^{-3}	1.04×10^{-3}	1.21×10^{-3}	3.49×10^{-3}	4.65×10^{-3}
Total						$\mathbf{8.20 \times 10^{-2}}$	$\mathbf{6.74 \times 10^{-2}}$

Table B-101

J. D. Smith Unstable Land Fugitive Dust Emission Factors

Wind Speed Category (mph)	# of Days in Range	# of Days in Range	Sustained Winds Emission Factor by Soil Group (ton/acre/hour)			Soils Spike Emission Factor by Soil Group (ton/acre)			1998 Emission Factor of Unstable Land by Soil Group (ton/acre)		
			2	8	9	2	8	9	2	8	9
15 – 19.9	685	144	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20 – 24.9	383	91	N/A	1.62×10^{-3}	1.75×10^{-2}	N/A	1.10×10^{-4}	3.06×10^{-3}	N/A	6.30×10^{-1}	6.98×10^{0}
25 – 29.9	55	31	N/A	3.00×10^{-3}	N/A	N/A	3.34×10^{-4}	N/A	N/A	1.75×10^{-1}	N/A
30 – 34.9	18	9	4.12×10^{-3}	3.75×10^{-3}	4.57×10^{-2}	8.28×10^{-4}	N/A	1.30×10^{-2}	8.16×10^{-2}	6.75×10^{-2}	9.40×10^{-1}
35 – 39.9	1	1	2.81×10^{-3}	1.21×10^{-2}	N/A	8.63×10^{-4}	2.36×10^{-3}	N/A	3.67×10^{-3}	1.45×10^{-2}	N/A
Total									$\mathbf{8.53 \times 10^{-2}}$	$\mathbf{8.88 \times 10^{-2}}$	$\mathbf{7.92 \times 10^{0}}$

Native Desert Fugitive Dust: Native desert fugitive emissions were calculated for sustained hourly winds 25 mph or higher as measured at McCarran International Airport. The emissions from native desert fugitive dust from the micro-scale area are summarized in Table B-102.

Table B-102

J. D. Smith Native Desert Fugitive Dust Emissions

Soil Group	Acres of Native Desert	1998 Native Desert Emission Factor (ton/acre)	Emissions from Native Desert (tons)
2	7.56	8.20×10^{-2}	6.20×10^{-1}
8	21.87	6.74×10^{-2}	1.47×10^{0}
Total	**29.43**		$\mathbf{2.09 \times 10^{0}}$

Unstable Vacant Land: The emissions for unstable vacant land were calculated using the emission factors developed for meteorology measured at McCarran International Airport during 1998, and by soil type as shown in Table B-101. The resulting emissions are presented in Table B-103.

Table B-103

J. D. Smith Unstable Vacant Land Emissions

Soil Group	Acres of Unstable Land	1998 Unstable Land Emission Factor (ton/acre)	Emissions from Unstable Land (tons)
2	65.73	8.53×10^{-2}	5.61×10^{0}
8	73.6	8.88×10^{-1}	6.54×10^{1}
9	17.11	7.92×10^{0}	1.36×10^{2}
Total	**156.44**		$\mathbf{2.06 \times 10^{2}}$

Stabilized Vacant Land Dust: The stabilized vacant land emissions are 5.34 tons (53.93 acres x 9.9×10^{-2} tons/acre). The emission factor for stabilized vacant land, 9.9×10^{-2} tons/acre, is the same as the one developed for the valley-wide inventory shown in Table B-64.

<u>Construction</u>

In the J. D. Smith annual micro-scale inventory, track out emissions were included in the construction category because micro-scale inventories are not used for transportation conformity budgets. Therefore, construction emissions included wind erosion, construction activities, and track out.

Wind Erosion from Construction Sites: The emission factors shown for disturbed vacant land and stabilized land in Tables B-62 and B-64 respectively were used for the uncontrolled and controlled acres of construction. Soil types were not known for construction areas. The emission factors are the same because the same meteorological profiles were used. The wind erosion emissions from construction sites are summarized in Table B-104.

Table B-104

Wind Erosion Emissions from Construction Sites Within the J. D. Smith Micro-Scale Area

Type of Construction	Acres Uncontrolled	Acres Stabilized	Unstable Land Emission Rate (ton/acre/year)	Stabilized Land Emission Rate (ton/acre/year)	PM_{10} Emissions for 1998 (tons)
Airport	0	0	2.59	9.90×10^{-2}	0
Commercial	21	7	2.59	9.90×10^{-2}	1.38×10^{1}
Flood Detention	0.7	0.4	2.59	9.90×10^{-2}	1.72×10^{0}
Highway	25.2	16.8	2.59	9.90×10^{-2}	6.69×10^{1}
Public Parks	2.4	1.6	2.59	9.90×10^{-2}	3.19×10^{0}
Public Bridges	0	0	2.59	9.90×10^{-2}	0
Public Works	12.8	6.9	2.59	9.90×10^{-2}	8.45×10^{0}
Residential Homes	8.5	2.8	2.59	9.90×10^{-2}	1.12×10^{1}
Underground Utilities	4.5	0.5	2.59	9.90×10^{-2}	9.75×10^{-1}
Miscellaneous	2.7	1.8	2.59	9.90×10^{-2}	3.58×10^{0}
Total	**77.7**	**37.8**			**109.76**

Construction Activities: Construction sites are currently regulated by the AQD. The CCHD enforcement officers provided compliance rates for each type of construction activity as shown in Table B-26. Dust control on construction sites is usually implemented using water. The U. S. EPA assigns a 50 percent control efficiency to watering for control of particulate emissions from construction sites.[40] The overall compliance rate as well as the emissions from construction activities are summarized in Table B-105.

[40] Op Cit.

Table B-105

J. D. Smith Construction Activity Emissions

Type of Construction	Number of Acres Under Active Construction in 1998	Percentage of Sites Implementing Controls	Overall Control Efficiency	Months Under Active Construction	PM_{10} Emission Rate (tons/acre/ month)	PM_{10} Emissions for 1998 (tons)
Airport	0	80%	40%	12	0.42	0
Commercial	28	50%	25%	3	0.265	16.7
Flood Detention	1	70%	35%	12	0.42	3.3
Highway	42	80%	40%	12	0.42	127.0
Public Parks	4	80%	40%	6	0.265	3.8
Public Bridges	0	70%	35%	12	0.265	0
Public Works	19.67	70%	35%	3	0.42	16.1
Residential Homes	11.34	50%	25%	6	0.265	13.5
Underground Utilities	5	20%	10%	1	0.42	1.9
Miscellaneous	4.49	80%	40%	6	0.265	4.3
Total	**115.5**					**186.6**

Track Out: Paved road dust emissions from roadways within 150 feet of a construction egress point were calculated as track out. Measurements of silt loading in this area were discussed earlier. Track out emissions in the J. D. Smith micro-scale area are summarized in Table B-106.

Table B-106

J. D. Smith Paved Road Dust Emissions From Track Out

Type of Construction	Number of Acres Under Active Construction in 1998	Number of Access Points	Silt Loading (g/m^2)	PM_{10} Emissions (tons/year)
Airport	0	3	2.829	0
Commercial	28	323	2.829	0.73
Flood Detention	1	6	2.829	0.03
Highway	42	79	2.829	4.38
Public Parks	4	19	2.829	0.21
Public Bridges	0	57	2.829	0
Public Works	19.67	113	2.829	0.51
Residential Homes	11.34	352	2.829	0.2
Underground Utilities	5	0	2.829	0
Miscellaneous	4.49	198	2.829	0.23
Total	**115.5**	**1,150**		**6.29**

Unpaved Road Dust
Emissions from unpaved roads were 1.4 tons. This value was calculated by multiplying the 0.08 miles of unpaved roads in the micro-scale area by the estimated 30 vehicles per day that traveled the road by the 3.27 pounds per vehicle mile traveled on the roads.

Paved Road Dust
Paved road dust emissions are summarized in Table B-107. Only four roadway categories were within the micro-scale area.

Table B-107

J. D. Smith 1998 Paved Road Dust Emissions

Roadway Category	Daily VMT	Annual VMT	Emission Factor (g/mile)	PM_{10} Emissions (tons/year)
Collector	521,941	190,508,341	4.22	886
Minor Arterial	1,189,705	434,242,417	4.77	2,283
Major Arterial	620,473	226,472,558	2.93	731
Freeway	342,315	124,945,039	0.37	50
Total				**3,951**

Vehicle Emissions
Emissions from vehicle exhaust, tire wear, and brake wear were calculated using the emission rates and vehicle miles traveled data previously discussed. Average daily vehicle miles traveled in the micro-scale area in 1998 were 2,674,434. The PM_{10}, NOx, and SOx emissions are summarized in Table B-108.

Table B-108

J. D. Smith 1998 Vehicle Emissions

Roadway Category	1998 Annual Average Vehicle Miles Traveled	Emissions (tons)		
		PM_{10}	NOx	SOx
Collector	190,508,341	6.93	374.85	8.19
Minor Arterial	434,242,417	15.80	861.61	18.67
Major Arterial	226,472,558	8.49	460.59	9.74
Freeway	124,945,039	4.68	316.09	5.37
Total		**35.90**	**2,013.14**	**41.97**

Stationary Sources
The stationary sources within the micro-scale area are listed below in Table B-109. These emissions are based upon the potential to emit in each source's permit.

Table B-109

J. D. Smith 1998 Annual Inventory Stationary Sources

Stationary Source Name	Annual PM_{10} Emissions (tons/year)	Annual SOx Emissions (tons/year)	Annual NOx Emissions (tons/year)
Anderson Dairy Inc.	0.39	0.03	5.15
Allegis Pipe Company	1	1	2
Bridger Junior High School	0.17	0.01	2.29
Hotel Linen Services	0.39	0.03	5.15
J. D. Smith Middle School	0.257	0.02	3.4
Jerry's Nugget	0.06	0.01	2.38
Joe's Excavating	0.45	0	0
Mission Industries	2.84	0.08	24.11
Palm Mortuary	0.16	0.32	1.72
Rancho High School	0.22	0.02	2.9
U. S. Post Office	0.04	0	0.27
U. S. Department of Energy	0.01	0.05	0.45
Unitog Co.	0.3	0.03	5.4
Total	**6.287**	**1.6**	**55.22**

1998 J. D. Smith Micro-Scale Inventory Summary
A summary of the 1998 J. D. Smith Micro-scale inventory is presented in Table B-110. The categories are presented in the summary in the same order they were previously discussed.

Table B-110

J. D. Smith 1998 Emission Inventory

Source Category	PM_{10} (TPY)	SOx (TPY)	NOx (TPY)
Vacant Land			
Native Desert	2.1	-	-
Unstable	206.0	-	-
Stabilized	5.3	-	-
Construction			
Wind Erosion	109.8	-	-
Construction Activities	186.6	-	-
Track Out	6.3	-	-

Table B-110

J. D. Smith 1998 Emission Inventory
(continued)

Unpaved Road Dust	1.4	-	-
Paved Road Dust	3951.3	-	-
Vehicles	35.9	41.9	2,013.1
Stationary Sources	6.3	1.6	55.2
Total	**4,620.4**	**43.5**	**2,068.3**

Appendix B

Quality Assurance Audit - PM_{10} Emissions Inventory Clark County, Nevada

(Converse Consultants –
Project No. 99-43456-01 and 01-43162-01)

Section One - Final Report, November 7, 2000

Section Two - Second Final Report, June 19, 2001

Appendix B

Section One
Quality Assurance Audit - PM_{10} Emissions Inventory Clark County, Nevada

(Converse Consultants – Project No. 99-43456-01)

Final Report
November 7, 2000

Converse Consultants
Over 50 Years of Dedication in Geotechnical Engineering and Environmental Sciences

QUALITY ASSURANCE AUDIT

PM_{10} EMISSIONS INVENTORY
CLARK COUNTY, NEVADA

Prepared for:

**Clark County Department of
Comprehensive Planning
500 South Grand Central Parkway
Suite 3012
Las Vegas, NV 89155-4000**

Converse Project No. 99-43456-01

November 7, 2000

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Quality Assurance Audit of PM_{10} Emissions Inventory

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1.0 Introduction

Converse Consultants (Converse) is pleased to submit this draft report for the Quality Assurance (QA) audit of the 1998 PM_{10} Emissions Inventory for the Clark County Department of Comprehensive Planning (CCDCP). Between August 7, 2000 and August 11, 2000 a technical systems audit was conducted by Converse at the County Government Center in Las Vegas, Nevada.

Converse has objectively and independently assessed the procedures, systems, and data used to develop the 1998 *PM_{10} Emissions Inventory* reported in the *PM_{10} State Implementation Plan for Clark County.* Since Converse has not been directly involved in the inventory development process, an independent quality audit has been preformed by Converse using effective quality assurance procedures. The audit is part of the QA program designed to help produce an accurate and complete emissions inventory.

Converse has fostered a good working relationship with the CCDCP Inventory Development team (ID team). Information regarding data quality from the ID team was readily given to Converse to further our understanding of the emissions inventory development procedures and the concerns of the ID team. Converse noted continuous improvement of the inventory development throughout the process and has given recommendations for improvement, where necessary. The following sections present background, audit procedures and findings, and recommendations to improve the program followed by a final discussion and limitations of this report.

2.0 Background

The Clean Air Act (CAA) requires state and local air quality agencies to develop complete and accurate air pollutant emissions inventories as an integral part of their air quality management responsibilities.

Under the authority granted by the Governor of Nevada, the Clark County Board of Commissioners is responsible for the preparation of a SIP for non-attainment areas within Clark County to attain National Ambient Air Quality Standards (NAAQS). Once approved by the Clark County Board of Commissioners, the State Implementation Plan (SIP) is forwarded to the Nevada Division of Environmental Protection (NDEP) for approval. After approval by the State of Nevada, the Governor of Nevada sends the SIP to the United States Environmental Protection Agency (USEPA) for federal approval in accordance with the 1990 CAA Amendments (CAAA).

The Clark County Air Quality Planning Committee (AQPC) was formed by a resolution adopted by the Clark County Board of County Commissioners in 1993. Membership includes representatives from Clark County Health District's (CCHD) Air Quality Division (AQD); the Regional Transportation Commission of Clark County (RTC); and the Clark County Department of Aviation (DOA). The AQD collects data from permitted stationary sources. The RTC provides the emissions from the on-road mobile sources. The DOA provides the emissions from the three airports in the area. The Clark County Department of Public Works, the Nevada Division of Environmental Protection, the Nevada Department of Transportation, the Desert Research Institute, and the Cities of Las Vegas, North Las Vegas, and Henderson provided review comments on the work related to the emissions inventory. The data is then collected by CCDCP and entered into the annual *PM_{10} Emissions Inventory* database. The emissions data from the AQD, RTC, and CCDCP are combined to yield the final emissions inventory included in the SIP.

These air emission inventories are used to evaluate air quality, track emission reduction levels, and set policy on a national and regional scale. Since the data are often developed and complied on a local level by multiple agencies and individuals, a uniform and systematic approach to collecting and reporting data are needed, as well as, standardized procedures and guidance to eliminate variations of interpretation.

The main goal of a standardized approach is to improve the quality of the emissions data collected, as well as to improve the manner in which data and information are transferred and shared. However, it is important to recognize that good quality assurance/quality control (QA/QC) procedures only produce results that are as good as the emission estimation methodology allows.

A draft QA Plan prepared by CCDCP was discussed with the Inventory Development Manager, Mr. Will Cates of CCDCP. Because the QA Plan was not approved and distributed to the ID team before commencing the inventory activities, Converse did not expect to find complete compliance with the quality control procedures. However, the Quality Control (QC) and documentation procedures in use at the time of the audit were assessed and compared to the QA requirements established by the USEPA for emissions inventory development work. The ultimate goals of the QA/QC program developed for emissions inventory development are data accuracy, procedural consistency, and good documentation of the data and all inventory development activities. When the potential for problems or deficiencies in the QC program were found, recommendations have been given in this report for improvements. The following section describes the procedures used to conduct the audit.

3.0 Audit Procedures

Converse has assessed the overall quality of the inventory by reviewing project activities. The objective of the QA review was to provide the best available indication of the overall quality and completeness of the *PM_{10} Emissions Inventory.* Project activities reviewed included data gathering, data documentation, calculating emissions, data checking, reporting, and maintenance of the master file. Specifically, the following tasks were conducted:

1. Converse interviewed project personnel to obtain available information about their duties. Before the audits,

Converse informed the persons to be interviewed of the date and time of the audit and data/system to be reviewed. Source specific checklists given in Appendix A were used. System audits were also conducted to determine whether the procedures used are effective to collect data, document inventory development activities, and maintain the data (Appendix B).

2. Converse reviewed/audited the final inventory data when the results were reported for (1) Stationary Point Sources, (2) Area Sources such as Geologic, Burning and Fuel Combustion, and fugitive dust from construction activities and various types of lands, (3) On-Road Mobile Sources, (4) Non-Road Mobile Sources, and (5) Secondary Geogenic Sources such as house-hold cleaners, soils, and meat charbroiling for each of the following inventories:

   a) 100% of the data for the 1998 base year Valley-Wide Annual Emissions Inventory.

   b) 100% of the data for the 1998 base year Valley-Wide 24-hour Emission Inventory.

   c) 100% of the data for J. D. Smith Air Monitoring Station Annual Emissions Inventory.

   d) 20% of the 24-hour micro-inventories surrounding five air quality monitoring stations selected as representative sites that lead to elevated concentration of particulate matter by reviewing J. D. Smith air quality monitoring station's data.

The following data quality parameters were assessed regarding the above-described data for the following data quality parameters:

1. *Accuracy* – Reviewed 100% of data summary to check the calculations made by the data generator (or inventory

development (ID) team member). Reviewed findings and identified corrective actions.

2. *Completeness* – Reviewed 20% of the files to ensure that all sources identified were included in the inventory.

3. *Representativeness* – Determined if the primary source data was compared to previous emissions and similar results from comparable regions to determine the reasonableness of the emissions estimates and representativeness of the data.

4. *Comparability* – Reviewed reporting units to ensure that they are the same as the last inventory units used.

The audit did not include the emission projections out to the 2006-attainment year.

During the audit, Converse met with several individuals involved in point and area sources inventory development and asked them to describe the procedures followed. Some personnel were asked about the physical review, analysis, and data entry process. While this was being done, Converse assessed each person's experience using the database and ease in assessing the information recorded on the forms. Data documentation procedures, data management procedures, and use of senior technical resources were also evaluated. The results of the audit were documented using the forms presented in Appendices A and B of this report. The findings from these individual assessments and the recommendations to improve the QC procedures are presented in the next section of this report.

4.0 Audit Findings

This external audit was conducted after the completion of the inventory. Overall, no major deficiencies in the accuracy or completeness of the emission inventory were found. No major mathematical errors were found in hand calculations or in spreadsheets reviewed. This includes the use of incorrect conversion factors, mismatched units in the emission factor and activity parameters, incorrect constants, and arithmetic errors. Failures to include major sources or source categories were not found. Double-counting emissions between area and point source inventories were not apparent. However, the audit findings revealed that inadequate resources are devoted to QA/QC activities. Instead, more effort is being placed on technical over-sight during inventory development.

The audit confirmed that CCDCP works with the CCHD's AQD and the RTC on the major development of the emissions inventory for the Las Vegas Valley area. The District Board of Health, through the AQD within the CCHD is the air quality regulatory authority for Clark County. In addition to administering the ambient air quality monitoring network, the AQD also administers the CCHD's air pollution control regulations adopted to implement the New Source Review (NSR) and Title V regulations under the 1990 CAAA. A draft memorandum from CCDCP to AQD requesting the *1998 Base Year PM_{10} Actual Emissions Inventory Data* is given in Appendix C. Another memorandum from CCDCP to AQD requesting dust permits to identify construction sites in 1998 is also given in Appendix C.

The audit also confirmed, during an interview with Messrs. Mike Sword and Ben Griffith of CCHD AQD on August 11, 2000, that the Annual Emission Inventory Survey's are conducted by the AQD for permitted stationary sources of regulated air pollutants in Clark County, Nevada. A copy of two survey forms used in the year 2000 is included in Appendix C. All survey forms received from permitted facilities are forwarded to an inventory staff member of the AQD. The information recorded on the survey forms by the permittee is assessed for completeness and reasonableness. Calls are made to the submitter, if needed, to request or clarify data before inputting total emissions results. The data is then entered into a master data electronic file. Data from 1997 was used if 1998 data was never submitted. If the permittee changes parameters, this data is entered as corrected (the NSR group is not notified of these changes). Other details on data maintenance and collection and data evaluation can be found in Appendix B on the *Quality Assurance Inventory Checklist* used during the interview of Mr. Griffith.

There are no existing Standard Operating Procedures (SOPs) for the development of the emissions inventory to date. With respect to completeness of the inventory for stationary point sources, Mr. Sword stated that 100% of the major sources are included in the inventory and that all of the smaller point sources that have permits are also included. He estimated that less than 5% of small stationary sources are not included because of the lack of a permit. During an interview with Ms. Catherine MacDougall at CCDCP, it became apparent that SOPs at CCDCP also did not readily exist. Ms. MacDougall started employment at CCDCP in late May 2000 and diligently began to update and QA the *PM_{10} Emissions Inventory* started by a former employee at CCDCP, Mr. Rick Matar (for more details, Ms. MacDougall's memos to Mr. Cates of CCDCP are attached to her quality assurance inventory checklist documenting her interview given in Appendix B).

Another audit finding, during the interview with Ms. MacDougall and Mr. Cates, was the use of sufficient, adequately-trained personnel at the CCDCP and the presence of sufficient, senior, technical supervision at the CCDCP to develop an accurate emissions inventory. However, peer review documentation was not found for the data produced by each inventory staff member. Implementation documentation of the QA plan including quality objectives and data validation were not found. In addition, use of data documentation procedures were not found at CCDCP and AQD which facilitated referencing data obtained via telephone or added/corrected because of engineering judgement. Data documentation to facilitate reconstruction of inventory development activities and thus provide a means to better assess data quality and accuracy of the inventory was not readily available in most cases.

Copies of the audit quality control checklist for each inventory and the corresponding subcategory are included in Appendix A. Since implementation of an emission inventory quality assurance plan did not occur, some questions listed in the checklist were not applicable.

Although the audit findings do not suggest major deficiencies or errors in calculations in the emission inventory data, recommendations for improvement of the QC program are made to further verify the accuracy of the inventory results and integrity of the data.

5.0 Recommendations to Improve QA Program

Because of the audit findings, the following recommendations are made to improve the overall quality of the emissions inventory development program:

1. *Prepare Standard Operating Procedures (SOPs)* describing the methods and emission factors used to determine emissions from all primary and secondary sources for dissemination to emission inventory development staff. Also, included in these SOPs should be QA/QC procedures and documentation/database management procedures. This could be accomplished by converting Appendix C of the 1998 PM_{10} SIP for Clark County–Emissions Inventories Methodology, Emission Factors, and Emission Estimates into SOPs, and including SOPs used by other supporting agencies. A memo describing SOP development status as of January 2000 at the AQD is included in Appendix C.

2. *Prepare an Emissions Inventory Development Work Plan concurrently with or after preparation of the QA plan.* The workplan should discuss staff assignments and responsibilities, including those of inventory development personnel and the QA coordinator. It should include standard operating procedures for data collection, data

handling, emission estimates and documentation, and reporting of inventory development activities. An effective QA program will include a schedule including numerous QC checks during inventory development, and QA audits at strategic points in the process.

1. *Implementation of a data attribute rating system (DARS) to rank point and area source methods.* Because of the different emission estimating methods that can be used to develop the emissions inventory, there is inherent uncertainty of the estimation methodology. The DARS scores provide a means of assessing the relative merits of alternative approaches to estimation. Implementation of the DARS can serve as indicators of data quality, be used to identify appropriate estimation methods, and help determine which sources are in need of improvement.

6.0 Discussion

QA activities are essential to the development of comprehensive, high-quality emission inventories for any purpose. Furthermore, a well-developed and well-implemented QA program fosters confidence in the inventory and any resulting regulatory and/or control program. Failure to implement and adhere to a QA program most likely leads to undesirable consequences such as an incomplete and/or inaccurate inventory.

Management plays a critical role in supporting and maintaining quality systems. Management must define the organization's environmental policy, which must ensure continual improvement, must provide a framework for setting and reviewing objects, and must be documented.

7.0 Limitations

The information, estimates, and statements are presented in accordance with generally accepted practices for professional services rendered in environmental engineering. No other warranty is made, either express or implied.

Certified Environmental Manager (CEM) Statement

For the services provided and described in this document, the following language is from NAC 459.

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and to the best of my knowledge comply with all applicable federal, state, and local statutes, regulations, and ordinances.

Thank you for the opportunity to be of service. Should you have any questions or comments regarding this report, please do not hesitate to call us at (702)263-7600.

Respectfully submitted,

CONVERSE CONSULTANTS

Lori Headrick

Lori Headrick, C.E.M.
Senior Scientist
Nevada CEM 1742 (Exp. 6/21/02)
Date Signed 5/29/01

Appendix A

Table 3-4

1998 Base Year PM10 Emissions Inventory

	Source	PM10 (TPY)	NOx (TPY)	SOx (TPY)	Percent Contribution
	Stationary Point Sources				
	Sand & Gravel Operations	627	294	22	0.39%
	Utilities - Natural Gas	199	5,319	2	0.12%
AQP	Asphalt Concrete Manufacture	268	60	26	0.17%
	Industrial Processes	80	437	124	0.05%
	Other Sources	124	126	5	0.08%
	Total	1,298	6,236	179	0.80%
	Stationary Area Sources				
	Small Point Sources AQD	184	1,825	25	0.11%
	Residential Firewood	75.4	6	0.9	0.05%
	Residential Natural Gas	66.7	824.6	5.3	0.04%
	Commercial Natural Gas	33.2	536.7	2.6	0.02%
	Industrial Natural Gas	13.8	182.2	1.1	0.01%
Rick	NG - Purchased at the source - Carried by SWG	210.3	2,767.3	16.6	0.13%
	Structural / Vehicle Fires / Wild Fires	17.2	2.222	-	0.01%
Gen Yamely	Charbroiling / Meat cooking	750.0	-	-	0.46%
	Soil Microbial Activity / Biological Sources	-	828	-	0.00%
	Disturbed Vacant Lands / Unpaved Parking Lots	48,500	-	-	30.05%
	Native Desert Fugitive Dust	11,000			6.82%
Kerry	Stablized Vacant Lands Dust	5,410	-	-	3.35%
	Construction Activity Fugitive Dust	19,807	-	-	12.27%
	Windblown Construction Dust	9,882	-	-	6.12%
	Total	95,950	6,972	52	59.45%
	Nonroad Mobile Sources				
	Airport Support Equipment	37.1	626.6	80.5	0.02%
Kerry	Commercial Equipment	0.3	2.4	0.4	0.00%
	Construction & Mining Equipment	361	6,261	824	0.22%
	Lawn & Garden Equipment	12.4		9.3	0.01%
	Railroad Equipment	14.5	656.0	7.7	0.01%
	Recreational Equipment	1.0	5.0	1.1	0.00%
airport authority	McCarran International Airport	1,338.0	2,080.0	93.2	0.83%
	Henderson Executive Airport	154.5	5.7	0.5	0.10%
	North Las Vegas Municipal Airport	148.8	19.1	1.5	0.09%
DHM	Nellis Airforce Base	31.9	268.6	396.5	0.02%
	Total	2,099	9,966	1,414	1.30%
	Onroad Mobile Sources				
	Paved Road Dust (Includes Const. Trackout)	43,967	-	-	27.24%
	Unpaved Road Dust	13,840	-	-	8.57%
Jerry	Highway Construction Projects Activities	2,384			1.48%
	Highway Construction Projects - Wind Erosion	471	-	-	0.29%
	Vehicular Sulfate PM	446	-	-	0.28%
	Vehicular Tire Wear	93	-	-	0.06%
	Vehicular Brake Wear	135	-	-	0.08%
	Vehicular Exhaust	725	22,357	446	0.45%
	Total	62,061	22,357	446	38.45%
	TOTALS	161,408	45,531	2,091	

1998
(ANNUAL)

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. CETER

Date: AUGUST 10, 2000

Data/Procedure Reviewed: AREA VALLEY WIDE

Inventory Development Personnel Involved in Work: CARRIE MAC DOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA - NATURAL GAS EMISSIONS TABLE, COMPUTER FILE (COMMERCIAL, RESIDENTIAL AND INDUSTRIAL)

A. Identify the source evaluated. ~~NATURAL GAS~~, RESIDENTIAL COMMERCIAL AND INDUSTRIAL

B. Describe the data included in the master file for the facility or source category.
EMISSION FACTORS. AND DATA TABLE

C. Are the data documented in a manner that will not have the potential to be misinterpreted?
Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

STATIONARY POINT SOURCES

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL, INFORMATION PROVIDED BY SOUTHWEST GAS for 1998

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

Rick Matar

STATIONARY POINT

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? N/A Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

STATIONARY POINT

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

- NG PURCHASED AT THE SOURCE & TRANSPORTATION ON SPREADSHEET.
- EMISSION FACTORS WERE PROVIDED BY DAMES AND MOORE
- COMMERCIAL GAS IS SUBDIVIDED INTO SMALL & LARGE COMMERCIAL
- INDUSTRIAL IS SUBDIVIDED INTO : INDUSTRIAL, COMPRESSED NATURAL GAS, IRRIGATION, AND OTHER GAS SALES
- NATURAL GAS SALES NUMBERS WERE PROVIDED BY SOUTHWEST GAS.

STATIONARY POINT

AREA VALLEY WIDE 1998
ANNUAL

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T GETER

Date: AUGUST 11, 2000

Data/Procedure Reviewed: AREA VALLEY WIDE 1998 ANNUAL

Inventory Development Personnel Involved in Work: WILL CATES

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA - FILE AND COMPUTER DATA

A. Identify the source evaluated.
STATIONARY AREA SOURCES (DISTURBED VACANT LANDS, NATIVE DESERT FUGITIVE DUST, STABILIZED VACANT LAND)

B. Describe the data included in the master file for the facility or source category.
REPORTS FROM UNLV, DATA TABLE

C. Are the data documented in a manner that will not have the potential to be misinterpreted?
Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ESTIMATED - VARIOUS METHODS WERE USED

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

BY COMPUTER DISK

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

AQD

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? N/A Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

o. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

- METHOD USED FOR EACH VALUE SHOULD BE DETERMINED AND INSERTED IN THE FILE

IV. COMMENTS

- VALUES FOR CONSTRUCTION ACTIVITY FUGITIVE DUST AND WINDBLOWN CONSTRUCTION DUST WERE NOT OBTAINED. (THIS WAS NOTICED AFTER 5:30 – NO REPS AVAILABLE).

AREA VALLEY WIDE 1998
ANNUAL

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. GETER

Date: AUGUST 11, 2000

Data/Procedure Reviewed: STATIONARY AREA SOURCES

Inventory Development Personnel Involved in Work: WILL CATES

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA - TABLES AND REPORTS

A. Identify the source evaluated.

CHARBROILING / MEAT COOKING

B. Describe the data included in the master file for the facility or source category.

EXCEL EMISSION SHEETS, A REPORT BY KENNEDY - JENKS AND A REFERENCE BY THE FOOD AND ~~AG~~ AGRICULTURAL INDUSTRY

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.) SEE ATTACHED SHEETS

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

Rick Metar

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? N/A Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

o. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

None

IV. COMMENTS

None

10-1-99

RICK

Enclosed is copy of most of Broiler Emissions study. Copied all but 30 or 40 pages of equipment list.

Let me know if you need this list or any other information.

Hope this helps, call if any questions

Ron Smolinski
383-1294
smolinski@cchd.co.clark.nv.us

PM_{10} = 1,500,082 lbs/YR
= 4,109.8 lbs/day
= 750.04 TPY

NO_x ÷ SO_x accounted for in fuel combustion

PM Emission Factor (lb/1000lbs meat cooked)

Sit Down	Hamburger	Steak	Chicken	Fish
Underfired Charbroiler, no controls	32.65	17.19	10.48	3.3
Flat-top Griddle and Grooved Griddle	5.08			

Fast Food	Hamburger	Steak
Chain-driven Charbroiler with Controls	1.29	
Chain-driven Charbroiler, no controls	7.42	
Underfired Charbroiler, no controls	32.65	17.19
Flat-top Griddle and Grooved Griddle	5.08	

Emissions for Las Vegas Valley	PM (lbs) Hamburger	Steak	Chicken	Fish
Sit Down				
Underfired Charbroiler, no controls	828,813	500,324	35,591	5,773
Flat-top Griddle and Grooved Griddle	14,328			
Fast Food				
Chain-driven Charbroiler with Controls	4,737			
Chain-driven Charbroiler, no controls	11,612			
Underfired Charbroiler, no controls	52,893	1,624		
Flat-top Griddle and Grooved Griddle	32,505			
Unsurveyed Estimate of Fast Food Hamburger, Flat-top Grill	11,883			
Subtotal for PM Emissions	956,771	501,948	35,591	5,773

Total PM emissions lbs. /year $\boxed{1,500,082}$

Total PM emissions lbs./day 4109.814

	VOC Emission Factor (lb/1000lbs meat cooked)			
Sit Down	Hamburger	Steak	Chicken	Fish
Underfired Charbroiler, no controls	3.94	0.86	1.82	0.38
Flat-top Griddle and Grooved Griddle	0.07			
Fast Food	Hamburger	Steak		
Chain-driven Charbroiler with Controls	0.32			
Chain-driven Charbroiler, no controls	2.27			
Underfired Charbroiler, no controls	3.94	0.86		
Flat-top Griddle and Grooved Griddle	0.07			

Emissions for Las Vegas Valley	VOC (lbs/year)			
	Hamburger	Steak	Chicken	Fish
Sit Down				
Underfired Charbroiler, no controls	100,016	25,031	6,181	665
Flat-top Griddle and Grooved Griddle	197			
Fast Food				
Chain-driven Charbroiler with Controls	1,175			
Chain-driven Charbroiler, no controls	3,552			
Underfired Charbroiler, no controls	6,383	81		
Flat-top Griddle and Grooved Griddle	448			
otal pounds from surveyed fast food chains	164			
Subtotal for VOC Emissions	111,935	25,112	6,181	665
Total VOC emissions (lb/year)	143,893			
Total VOC emissions (lb/day)	394			

Area Valley Wide 1998
(Annual)

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. Geter

Date: August 10, 2000

Data/Procedure Reviewed: Stationary Area Sources

Inventory Development Personnel Involved in Work: Carrie MacDougall

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA - Calculation sheets, a report of miscellaneous sources

A. Identify the source evaluated. Structural Fires

B. Describe the data included in the master file for the facility or source category.

Master file has calculation sheets of the method used in the data table. Additional calc. sheets were provided as well. Fires in Henderson, LV.

C. Are the data documented in a manner that will not have the potential to be misinterpreted?
Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ALLOWABLE, EMISSIONS were based on the 1994 fires for 260.4 million people

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.) Calculation of emissions are provided with the appendix

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

Rick Matar

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N\A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N\A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? N\A Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

None

IV. COMMENTS

- An alternate method was used to estimate the fires for Clark County for 1998. The calculation sheets are attached to the appendix.
- Source for numbers provided are 1994 FEMA Report and Book titled EIP.

— structural fires —

Fuel Loading (EIP Vol III Chp. 18 p. 18.4-3)

CARB's estimate for combustible structural mass is 16.3 lbs/ft^2. Assuming an average residence size is 1350 sq. ft.

$\Longrightarrow (16.3\ lb/ft^2 \times 1350\ ft^2) \div 2000\ lb/ton$
$= 11$ tons ✓

Let us say we use the national median size home of ~~#~~ 1732 ft^2

$\Longrightarrow (16.3 \times 1732) / 2000 = 13.882$
13.9 tons ✓
of combustible materials.
for an average residence

(combustible Bldg. content.)

$(13.88 + 4.7) \times 0.073$ (7.3% loss in fire)

$\Longrightarrow 1.15$ tons / fire ✓

(CARB, 1994) →	PM	= 10.8 lb/ton burned ✓
EPA, 1991	NO_x	= 1.4 lb/ton burned
EPA, 1991	CO	= 60 lb/ton burned.

Using an alternate method for estimating fires

1994 FEMA reports $\frac{602,5000 \text{ fires}}{260.4 \text{ million people}}$

$\Rightarrow$ 2.3 fires / 1000 people

Clark county: 1.2 million people

$$\Rightarrow \left(1.2 \times 10^{6}\right)\left(\frac{2.3 \text{ fires}}{1000}\right)$$

$$= \left(1.2 \times 10^{3}\right)\left(2.3\right)$$

$$= 2.76 \times 10^{3} \text{ fires}$$

2,760 fires in 1998 ✓

$$\text{fire loading} = 2,760 \text{ fires} \times 1.15 \frac{\text{ton}}{\text{fire}}$$

$$= (2,760)(1.15)$$

$$= 3174 \text{ tons} ✓$$

1998 $\Rightarrow$ $PM_{10} = (10.8 \text{ lbs/ton})(3,174 \text{ tons})$

$$= 34,279.2 \text{ lbs}$$

$$= 17.14 \text{ tons} ✓$$

$$NO_x = (1.4)(3,174) = 4,443.6 \text{ lb} = 2.222 \text{ tons}$$

$$CO = (60)(3,174) = 190,440 \text{ lbs} = 95.22 \text{ tons.}$$

AREA VALLEY WIDE 1998
ANNUAL

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. GETER

Date: AUGUST 10, 2000

Data/Procedure Reviewed: ANNUAL VALLEY WIDE INVENTORY for 1998

Inventory Development Personnel Involved in Work: Charlie MacDougall

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA - Table, a computer spreadsheet, Sections of Residential Fireplace & Wood Stoves

A. Identify the source evaluated.

Firewood Emissions

B. Describe the data included in the master file for the facility or source category.

Tables, reports, e-mail message (explaining method used)

C. Are the data documented in a manner that will not have the potential to be misinterpreted?
Y/N ~~Report have data~~ Reports are dated in 1996. Current emission value is for 1998.

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

Actual, data was provided by BLM and US Forestry.

F. Are the procedures used to calculate emissions described in the data provided? Y/N

ON THE COMPUTER DISKETTE

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

Rick Mador

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? N/A Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

o. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

None

IV. COMMENTS

None

NEVES Non-road
AREA VALLEY WIDE
1998 ANNUAL

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. GETER

Date: AUGUST 10, 2000

Data/Procedure Reviewed: NEVES NON-ROAD EMISSIONS – for Non-attainment Area

Inventory Development Personnel Involved in Work: CARRIE MAC DOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA – Computer diskette, calculation sheets, REPORTS PROVIDED BY EPA.

A. Identify the source evaluated.

NON-ROAD EMISSIONS

B. Describe the data included in the master file for the facility or source category.
Sources used from EPA and Energy and Environmental Analysis for the parameters used to calculate emissions.

C. Are the data documented in a manner that will not have the potential to be misinterpreted?
Y/N THE OLD non-approved information was mixed up with the NEVES model calculations.

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

MAXIMUM DESIGN CAPACITY – A COMPUTER MODEL WAS GENERATED FOR NON-ROAD MOBILE SOURCES

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.) CALCULATIONS WERE VERIFIED BY COMPUTER DISK AND CALC. SHEETS.

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

Carrie MacDougall

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? N/A Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

o. Is the data entry progressing as expected and are the procedures followed adequate to ~~ensure~~ data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

- SEPARATE THE OLD FILES FROM THE NEW ONES.

IV. COMMENTS

- EMISSION FACTORS FOR NON-ROAD MOBILE SOURCES WERE OBTAINED FROM EPA.
- MODEL RUNS WERE ~~[illegible]~~ TESTED AT CCCP.
- NON-ROAD MOBILE SOURCE WHICH WERE NOT CALC BY CCCP ARE LISTED AS FOLLOWS:

  - McCARRAN INTERNATIONAL AIRPORT, HENDERSON EXECUTIVE AIRPORT, NORTH LAS VEGAS MUNICIPAL AIRPORT } AIRPORT AUTHORITY
  - NELLIS AIRFORCE BASE (DAMES & MOORE)

- ~~POPULATION, [illegible]~~ & SOURCE FOR PARAMETER WERE PROVIDED BY ENERGY AND ENVIRONMENTAL ANALYSIS, INC. "NONROAD ENGINE EMISSION INVENTORIES FOR CO AND OZONE NONATTAINMENT BOUNDARIES FOR LAS VEGAS AREA"
- A COPY OF THE (PERTINENT INFORMATION) ~~[illegible]~~ REPORT HAS BEEN COPIED AND PUT IN THE NON ROAD FILE.

(ANNUAL)

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. GETER

Date: AUGUST 11, 2000

Data/Procedure Reviewed: AREA VALLEY WIDE - ON ROAD MOBILE SOURCES

Inventory Development Personnel Involved in Work: WILL CATES

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA - TABLES OF ON-ROAD MOBILE DUST (PAVED INCLUDING UNPAVED SHOULDERS) DATA TABLE FROM AN ON ROAD MODEL, DATA INPUT FOR THE MODEL

A. Identify the source evaluated.

PAVED ROAD DUST - INCLUDES UNPAVED SHOULDERS

B. Describe the data included in the master file for the facility or source category.

TABLES, INPUT FILE AND OUTPUT TABLE FOR MODEL

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

THERE IS NO DOCUMENTATION FOR THE CONSTRUCTION TRACKOUT

ON ROAD MOBILE SOURCES

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

EMISSION CALCULATIONS LOOK SIMILAR TO THE DATA PROVIDED FOR J.D. SMITH ANNUAL

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.) SEE ATTACH TABLE w/ SAMPLE CALCULATION.

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

Carrie MacDougall

ON ROAD MOBIL SOURCES

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? N/A Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

ON ROAD MOBILE SOURCES

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

ALL COMPUTER TABLES RELATED TO PAPER FILES SHOULD BE INCLUDED IN ~~ALL~~ PAPER FILES.

IV. COMMENTS

- CONSTRUCTION.XLS FILE HAS CONSTRUCTION ACTIVITIES EMISSIONS OF 561.
  — THIS WAS THE AMOUNT THAT WAS MISSING FROM THE FILE AND THE ON ROAD MOBILE EMISSIONS TABLE. (SHEET AREA WIDE)

- TOTAL ON ROAD SHOULD B 62,152 (according to spreadsheet). 91 TONS IS MISSING — DESCREPENCY

- COULD NOT FIND BREAK DOWN OF VEHICULAR EMISSIONS
  I USED TABLES TO VERIFY MY NUMBERS.

ALL DRAFT

1998 Particulate Emissions from On-Road Mobile - On Road Dust[1]

Segment	1998 Daily VMT By Segment Type	Speed Category (miles)	Paved Road Silt Loading (g/m2)	Emission Factor (g/mile)	Paved Road Dust Emissions (g/day)	Paved Road Dust Emissions (Lbs/Day)	Paved Road Dust Emissions (TPY)
Ext. Connector	825,989.60	65	0.49	2.93	2,420,149.5	5,335.5	973.732
Fwy Ramps	94,340.60	35	0.86	4.22	398,117.3	877.7	160.180
Minor Arterial	9,952,165.00	35	1.04	4.77	42,723,066.4	94,188.2	17,189.352
Major Arterial	2,474,589.00	45	0.49	2.93	5,398,667.1	11,902.0	2,172.119
Ramps	294,052.90	25	0.86	4.22	1,240,903.2	2,735.7	499.269
Interstate	4,522,402.00	60	0.02	0.00	3,627.0	8.0	1.459
Freeway	1,430,779.00	55	0.02	0.00	1,147.5	2.5	0.462
Expressway	-	55	0.49	2.93	0.0	0.0	-
Collector	3,585,713.00	30	0.86	4.22	14,406,833.7	31,761.6	5,796.497
Local	2,438,336.00	15	1.70	6.57	14,147,232.9	31,189.3	5,692.049
Intrazonal Trips	73,268.00	10	1.70	6.57	481,370.8	1,061.2	193.676
Public Transit	63,002.70	14	1.70	6.57	413,927.7	912.6	166.541
VMT Totals	**25,754,637.80**				**81,635,043**	**179,974.5**	**32,845**

[1] These emissions do not include track out or the affects of unpaved shoulders.

EXT. CONNECTOR

825,987.60 × 2.93 = 2,420,149.528 g/day

= 5335.51 lb/day → 973.7317

≅ 973.732 TPY

Unimproved Shoulders Calculations[2]

Segment	County-Wide Miles	City of Henderson Unimproved Miles	City of Las Vegas Unimproved Miles	City of North Las Vegas Unimproved Miles	Clark County Unimproved Miles	Total Unimproved Miles in Nonattainment Area	Percentage of Inventory	Representative VMT	Paved Road Silt Loading (g/m2)	Emission Factor (g/mile)	Paved Road Dust Emissions (g/day)	Paved Road Dust Emissions (Lbs/Day)	Paved Road Dust Emissions (TPY)
Ext. Connector						0							
Fwy Ramps						0							
Minor Arterial	571.61	40.18		17		57.18	0.100033239	995,547.30	1.34	5.63	5,604,931.32	12,356.82	2,255.12
Major Arterial	82.22			21		21	0.255412308	632,040.49	1.34	5.63	3,558,387.95	7,844.94	1,431.70
Ramps						0							
Interstate						0							
Freeway	64.98					0							
Expressway	32.86					0							
Collector	632.51	18.3		12		30.3	0.047904381	171,771.36	24.7	37.4	6,424,248.92	14,163.12	2,584.77
Local	2871.82	13.7	130	12	180	335.7	0.116894513	285,028.10	24.7	37.4	10,660,050.90	23,501.51	4,289.03
Intrazonal Trips						0							
Public Transit						0							

[2] Major and minor arterials were assumed to have gravel or other stabilized shoulder. Collectors and locals were assumed to have dirt shoulders and 15 foot lanes. If roadway classifications were not provided by a jurisdiction, the classification was assumed to be local as a worst case assumption.

Paved Road Dust with Unpaved Shoulders = 32,845 + 10,561 = 43,406

* This is off from 43,967 by 561 - must be track out value (YES IT IS)

JJ
8-11-00

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. GETER

Date: AUGUST 11, 2000

Data/Procedure Reviewed: AREA VALLEY WIDE ON-ROAD MOBILE SOURCES

Inventory Development Personnel Involved in Work: WILL CATES / CARRIE MAC DOUGAL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA – DOWNLOADED FILES (TRAFFIC COUNTS),

A. Identify the source evaluated.

UNPAVED ROAD EMISSIONS

B. Describe the data included in the master file for the facility or source category.

TABLES, FAXED FILES, E-mails, ADT ESTIMATES FOR LAS VEGAS VALLEY

C. Are the data documented in a manner that will not have the potential to be misinterpreted?
Y/N DATA NOT USED HAS BEEN CROSSED OUT, OR RUBBER BANDED WITH AN "OLD ~~DATA~~ DATA DO NOT USE" NOTE ON IT.

Were the instructions for documenting the data followed? Y/N

YES FORMULAS ON DISK

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL, ALTHOUGH MILEAGE WAS ESTIMATED,

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N
VIA FORMULAS AND INFO ON THE DISK
Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.) SEE DISKETTE

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

Carrie MacDougall

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? N/A Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

AN UPDATED COPY OF THE DATA TABLE SHOULD BE INCLUDED IN THIS FILE

IV. COMMENTS

- ~~DOWNLOADED~~ FILES OF TRAFFIC COUNTS FOR UNPAVED ROADS FOR CITY OF HENDERSON AND LAS VEGAS VALLEY ARE PROVIDED BY EPA. (CLARK COUNTY COUNTS, ETC)
- SOURCE INFORMATION ALSO PROVIDED BY RTC.
- EMISSION FACTOR FOR ADT WERE PROVIDED BY EPA
- 16% SILT CONTENT AND 3,000 lb AVERAGE VEHICLE WEIGHTS USED WERE NOTED BY STAFF (PROVIDED BY EPA)
- BASED ON APPROXIMATE MILEAGE TOTAL EMISSIONS IS 13,840.
  - ~~ACCORDING~~ THE TOTAL FOR ~~THE~~ CLARK COUNTY, NORTH LAS VEGAS, LAS VEGAS AND HENDERSON IS ~~13,560~~ 13,840 (SEE UNPAVED ROAD.XLS SHEETS)
- THERE ARE ADDITIONAL SHEETS (WHICH MAY BE OLD DATA) WHICH HAS THE EMISSION TOTAL AS 15,674.

Source Category	1998 Emissions (tons)	Percent Contribution	Relative Mass Contribution (ug/m^3)	Overall Reduction	Contribution After Controls (ug/m^3)
Vacant Land	421.0	9.02%	3.52		3.52
Native Desert	7.0	0.15%	0.06		0.06
Unstable	8.4	0.18%	0.07	77%	0.02
Stabilized	406.0	8.70%	3.39		3.39
Construction	243.4	5.22%	2.03		2.03
Wind Erosion	50.5	1.08%	0.42	75%	0.11
Construction Activities	186.6	4.00%	1.56	63%	0.58
Track Out	6.3	0.13%	0.05	55%	0.02
Unpaved Road Dust	1.4	0.03%	0.01		0.01
Paved Road Dust	3901.0	83.59%	32.60	54%	15.00
Vehicles					
PM_{10}	93.4	2.00%	0.78		0.78
SOx	46.5				
NOx	2330.8				
Stationary Sources					
PM_{10}	6.3	0.13%	0.05		0.05
SOx	1.6				
NOx	55.2				
Background			14		14.00
Total					
PM_{10}	4666.9				34.0
SOx	48.1				
NOx	2386.0				
Design Concentration			53		
Concentration After Controls					34.0

* UNPAVED ROAD DUST IS A RATIO DIVIDED BY 365 days

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor:

Date: AUGUST 8, 2000

Data/Procedure Reviewed: J. D. SMITH - ANNUAL

Inventory Development Personnel Involved in Work: MRS. CARRIE MAC DOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA - 1998 VACANT LAND EMISSION RATES TABLE & CALCULATION SHEETS.

A. Identify the source evaluated.
1998 EMISSIONS IN TONS

B. Describe the data included in the master file for the facility or source category.
DATA TABLES PROVIDING ACRES, LAND EMISSION FACTORS AND TOTAL EMISSIONS FOR STABLE AND UNSTABLE LAND.

C. Are the data documented in a manner that will not have the potential to be misinterpreted?
Y/N DATA TABLES ARE A LITTLE CONFUSING

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N

I HAD TO GO TO THE MICRO-INVENTORY FILE AND REVIEW THE CALCULATIONS.

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

COMPLETE CALCULATIONS WERE NOT PROVIDED IN THIS FILE

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

A COPY OF THE TABLES WITH CALCULATIONS ARE ATTACHED TO THIS APPENDIX.

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? NA Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

J.D. Smith Annex 2

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

PROVIDE A ~~&~~ SAMPLE CALCULATION FOR EACH SUBCATEGORY.

IV. COMMENTS

STATIONARY SOURCES

- PM_{10} VALUE FOR ~~ANNUAL~~ IS BASED ON PTE LISTED IN PERMITS.
- I HAD TO RELY ON THE FORMULAS FROM THE MICRO-INVENTORY FILE TO CONFIRM THE VALUES IN THE ANNUAL TABLES.
- VACANT LAND CONSISTS OF STABLIZED AND UNSTABILED AREAS. THE STABILIZED AREA IS SUBDIVIDED INTO STABILIZED AND NATIVE SOIL.
- SAMPLE CALC. AREA (ACRES) * STABLE EROSION FACTOR (TONS/ACRE) = ANNUAL EMISSION (TONS)
-

(T? Correct ANNUAL.

J. D. Smith

1998 Vacant Land Wind Erosion Emissions

Acres of Vacant Land	Acres of Native Desert	Acres of Stabilized Land[1]	Acres of Unstable Land	1998 Native Desert Emission Factor (ton/acre)	1998 Stabilized Land Emission Factor (ton/acre)	1998 Unstable Land Emission Factor (ton/acre)	Emissions from Native Desert (tons)	Emissions from Stabilized Land (tons)	Emissions from Unstable Land (tons)	Total Emissions for 1998
Soil Group 2	7.56	53.93	65.73	2.20E-01	1.55E-01	2.76E-01	1.66E+00	8.36E+00	1.81E+01	2.82E+01
Soil Group 8	21.87	0	73.6	2.46E-01	1.55E-01	1.87E+00	5.38E+00	0.00E+00	1.38E+02	1.43E+02
Soil Group 9	0	0	17.11			1.46E+01	0.00E+00	0.00E+00	2.50E+02	2.50E+02
Total	29.43	53.93	156.44				7.04E+00	8.36E+00	4.06E+02	4.21E+02

[1] Stabilized emission factors are not soil type dependent. All acres of stabilized soils have been placed in the top row of the table.

* EMISSION FACTOR BASED ON ~~FROF~~ WIND SPEED GREATER THAN 25 mi/hr.

STABLE HAS GROUP 2 & 8

- NATIVE SOIL 7.56 ACRES × 2.20 × 10⁻¹ ton/acre = 1.66 Group 2
  21.87 ACRES × 2.46 × 10⁻¹ ton/acre = 5.38 Group 8 > 7.04 TONS ✓

- STABLIZED 53.93 ACRES × 1.55 × 10⁻¹ = 8.359 TONS ✓

UNSTABLE GROUPS 2, 8 AND 9

Group 2 - 65.73 ACRES × 2.76×10^{-1} = 18,141 TONS

Group 8 - 73.6 ACRES × 1.87×10^{0} = 137,632 TONS

Group 9 - 17.11 ACRES × 1.46×10^{1} = 249,806 TONS

) 405,579 ≅ 406 TONS ✓

1 of 1

7/25/00

JA 8-9-00

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. GETER

Date: AUGUST 9, 2000

Data/Procedure Reviewed: J. D. SMITH ANNUAL INVENTORY

Inventory Development Personnel Involved in Work: CARRIE MACDOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA CONSTRUCTION EMISSIONS TABLE

A. Identify the source evaluated.

WIND, CONSTRUCTION AND TRACK OUT EROSION EMISSIONS

B. Describe the data included in the master file for the facility or source category.

ONE TABLE ~~WHAT~~ OF CONSTRUCTION ACTIVITIES WITH ACRES OF ACTIVE CONSTRUCTION STABLE LAND AND UNSTABLE LAND EMISSION RATES AND TOTAL PM_{10} EMISSIONS.

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

THE COMPUTER SPREADSHEETS (WITH FORMULAS IN EXCEL) HELPED TREMENDOUSLY.

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.) SEE ATTACHED SHEETS

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

YES, THE UNPAVED ROAD DUST APPEARS TO BE A RATIO OF SOME KIND.

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? N/A Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

CONSTRUCTION CONSISTS OF CONSTRUCTION ACTIVITIES, WIND EROSION AND TRACK OUT.

- CONSTRUCTION CONSISTS OF CONSTRUCTION ACTIVITIES, BUT THE SUBCATEGORIES AREN'T VERY OBVIOUS. THEY ARE ALL ON THE SAME SHEET,
- CALCULATIONS FOR CONSTRUCTION ACTIVITIES WERE VERIFIED BY COMPUTER ~~RES~~ DISK DATA.
- CONSTRUCTION ACTIVITIES LIST WAS CREATED BY A LIST OF ACTIVE PERMITS IN 1998 FOR TOWNSHIP 20 S RANGE 61 EAST. THE LOCATIONS CROSSED OUT WERE NOT WITHIN THE 2 KM RANGE OF J.D. SMITH, THOSE WITH STARS NEXT TO THEM WERE INCLUDED AND SUBDIVIDED INTO THE VARIOUS CONSTRUCTION TYPES. A COPY OF THIS LIST IS INCLUDED.

Type of Construction	Number of Acres Under Active Construction In 1998	Percentage of Sites Implementing Controls	Overall Control Efficiency	Months Under Active Construction	PM_{10} Emission Rate (tons/acre/month)	PM_{10} Emissions for 1998 (tons)	Access Point Rates	Number of Access Points	ADT	Miles per Track Out Point	Silt Loading (g/m^2)	PM_{10} Emissions Per Day (lbs)	PM_{10} Emissions Per Day (tons)	PM_{10} Emissions Per Year (tons)
Airport	0	80%	40%	12	0.42	0.0	1 per 30 acres	0	10,000	0.0284	2.829	0.00	0.000	0.00
Commercial	28	50%	25%	3	0.265	16.7	1 per 10 acres	3	10,000	0.0284	2.829	15.94	0.008	0.73
Flood Detention	1	70%	35%	12	0.42	3.3	1 per 30 acres	0	10,000	0.0284	2.829	0.19	0.000	0.03
Highway	42	80%	40%	12	0.42	127.0	1 per 10 acres	4	10,000	0.0284	2.829	23.91	0.012	4.38
Public Parks	4	80%	40%	6	0.265	3.8	1 per 10 acres	0	10,000	0.0284	2.829	2.28	0.001	0.21
Public Bridges	0	70%	35%	12	0.265	0.0	1 per 10 acres	0	10,000	0.0284	2.829	0.00	0.000	0.00
Public Works	19.67	70%	35%	3	0.42	16.1	1 per 10 acres	2	10,000	0.0284	2.829	11.20	0.006	0.51
Residential Homes	11.34	50%	25%	6	0.265	13.5	1 per 30 acres	0	10,000	0.0284	2.829	2.15	0.001	0.20
Underground Utilities	5	20%	10%	1	0.42	1.9	0 access	0	10,000	0.0284	2.829	0.00	0.000	0.00
Miscellaneous	4.49	80%	40%	6	0.265	4.3	1 per 10 acres	0	10,000	0.0284	2.829	2.56	0.001	0.23
Total	115.5					186.6		10				58	0.03	6.29
													0.65	
				Without Highway		59.6							0.016	

TOTAL FOR CONSTRUCTION ACTIVITIES

TOTAL FOR TRACK OUT.

FOR CONSTRUCTION ACTIVITIES

- COMMERCIAL - 28 ACRES * 12 MONTHS * (0.42) * (1 - 0.40) = 127.008 TONS = 127.0 TONS

FOR TRACK OUT

PUBLIC WORKS - (3 MONTHS) ($\cancel{0.035}$ 30.5) (0.006) =

MONTHS UNDER ACTIVE CONSTRUCTION

EMISSIONS PER DAY (TON/DAY) - WHICH HAS BEEN ROUNDED UP
ACTUAL # (0.0056)

(3) (30.5) (0.0056) = 0.5124 = 0.51 TONS

DAYS/MONTH

ANNUAL

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. GETER

Date: AUGUST 9, 2000

Data/Procedure Reviewed: J. D. SMITH ANNUAL INVENTORY

Inventory Development Personnel Involved in Work: MRS. CARRIE MAC DOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA – DATA TABLES

A. Identify the source evaluated.

1998 PAVED ROAD DUST EMISSIONS

B. Describe the data included in the master file for the facility or source category.

DATA TABLES PROVIDING AVERAGE DAILY MILES TRAVELED (98/99), ROAD SILT LOADING EMISSION FACTOR AND TOTAL EMISSIONS

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

ACTUAL CALCULATIONS ARE NOT CLEAR

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.) COPIED SPREAD SHEETS WITH SAMPLE FORMULAS ARE ~~P~~PROVIDED WITH THIS APPENDIX

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? N/A Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

o. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

None

IV. COMMENTS

- VMT's PROVIDED BY RTC. RTC files were not reviewed.
- EMISSION FACTOR FOR FREEWAYS WAS LESS THAN 0.000 AND ROUNDED UP TO 0.00. THE ACTUAL NUMBER WAS DISPLAYED (BY A COMPUTER FILE) AS 0.000802 g/mi.

CONVERSE COPY

J. D. Smith 1998 Annual Inventory
Paved Road Dust

Roadway Classification	Average Daily Vehicle Miles Traveled 1999	Average Daily Vehicle Miles Traveled 1998	1998 Annual Average Vehicle Miles Traveled	Paved Road Silt Loading (g/m^2)	Emission Factor (g/mile)	Paved Road Dust Emissions (g/year)	Paved Road Dust Emissions (tons/year)
Collectors	536555	521941	190508341.4	0.86	4.22	803945201	886.202519
Minor Arterial	1223017	1189705	434242417.3	1.04	4.77	2071336331	2283.2694
Major Arterial	637846	620473	226472558.4	0.49	2.93	663564596	731.458582
Freeway	351900	342315	124945038.9	0.02	0.00	100205.921	0.1104587
Total							3901.04095

COLLECTORS 190,508,341.4 mi x 4.22 g/mi = 803945200.708 g /1000 = Kilogram

→ 803945,201 Kg = 886.197 TONS/YEAR

MINOR ARTERIAL 434,242,417.3 mi x 4.77 g/mi = 2071336330.52 g → 2071366.331 Kg

= 2283.257 TONS

MAJOR ARTERIAL 226,472,558.4 mi x ~~0.49 g/mi~~ = ~~110971.553 kg~~ JA JA

2.93 g/mi = 663564.596 kg

= 731.454 TONS

FREEWAY* 124945038.9 mi x 0.0008 = 100205.921198 g

= 0.110458 TONS/YEAR

*EMISSION FACTOR WAS SHOWN ON COMPUTER SPREADSHEET

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. GETER

Date: AUGUST 9, 2000

Data/Procedure Reviewed: J. D. SMITH ANNUAL INVENTORY

Inventory Development Personnel Involved in Work: MRS. CARRIE MAC DOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA — DATA TABLE

A. Identify the source evaluated.

VEHICLE EXHAUST, BRAKE AND TIRE WEAR EMISSION

B. Describe the data included in the master file for the facility or source category.

DATA TABLES

C. Are the data documented in a manner that will not have the potential to be misinterpreted?
Y/N

Were the instructions for documenting the data followed? Y/N

NO INSTRUCTIONS OR FORMULAS IN THIS FILE TO FOLLOW

D. Are there missing data fields? Y/N

VEHICLES

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N

PROCEDURES ARE NOT PROVIDED, BUT ALL OF YOUR FACTORS ARE GIVEN IN THE TABLE

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.) INSIGNIFICANT DIGITS WERE OFF, BUT I RECEIVED THE SAME FINAL VALUES FOR EACH CLASSIFICATION.

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

RTC

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? NA Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

None

IV. COMMENTS

VMT's PROVIDED BY RTC. RTC file were not reviewed

CONVERS COPY

J. D. Smith 1998 Annual Inventory
Vehicle Exhaust, Brake, and Tire Wear

Roadway Classification	Average[1] Daily Vehicle Miles Traveled 1999	Average Daily Vehicle Miles Traveled 1998	1998 Annual Average Vehicle Miles Traveled	PM_{10} Emission Factor (g/mile)	NOx Emission Factor (g/mile)	SOx Emission Factor (g/mile)	PM_{10} Emissions (g)	NOx Emissions (g)	SOx Emissions (g)	PM_{10} Emissions (tons)	NOx Emissions (tons)	SOx Emissions (tons)
Collectors	536555	521941	190508341	0.086	2.058	0.044	16383717	392066167	8382367.02	18.060051	432.18123	9.2400263
Minor Arterial	1223017	1189705	434242417	0.087	2.11	0.043	37779090	916251501	18672423.9	41.644536	1009.9997	20.582932
Major Arterial	637846	620473	226472558	0.087	2.294	0.043	19703113	519528049	9738320.01	21.719077	572.68464	10.734716
Freeway	351900	342315	124945039	0.087	2.294	0.043	10870218	286623919	5372636.67	11.982427	315.95044	5.9223491
Total										93.406092	2330.816	46.480023

COLLECTORS — 190,508,341 mi × 0.086 g/mi = 16383717.326 g → 18.05995 tons

MINOR ARTERIAL — 434242417 mi × 0.087 = ~~37779.09~~ 37779090.279 g → 41.644 TONS

MAJOR ARTERIAL — 226472558 mi × 0.087 = 19703112.546 g → 21.718 TONS

FREEWAY — 124945039 mi × 0.087 = 10870218.393 g → 11.982 TONS

93.40395 TONS TOTAL

1 VMT's PROVIDED BY RTC. RTC files were not reviewed

JG 8-9-00

7/22/00

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. GETER

Date: AUGUST 9, 2000

Data/Procedure Reviewed: J. D. SMITH ANNUAL INVENTORY

Inventory Development Personnel Involved in Work: MES. CARRIE MACDOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA - DATA SHEETS, TABLES AND CALCULATIONS FROM THE MICRO-INVENTORY FILE

A. Identify the source evaluated.

STATIONARY SOURCES EMISSIONS

B. Describe the data included in the master file for the facility or source category.

TABLES AND CALCULATIONS ARE LOCATED IN THE ~~the~~ J.D. SMITH MICRO-INVENTORY FILE.

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

POTENTIAL TO EMIT (ALLOWABLE) VALUES WERE USED FOR MOST OF THE STATIONARY SOURCES

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.) CALCULATIONS WERE VERIFIED ~~AND~~, SIGNED OFF AND RETURNED TO THE J.D. SMITH MICRO-INVENTORY FILE

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

UNAVAILABLE DATA RESULTED FROM LOCATIONS THAT WERE OUT OF THE 2 KM GRID. FILES FOR THESE LOCATIONS ARE PROVIDED FOR OTHER PROJECTS.

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? N/A Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

o. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

None

IV. COMMENTS

None

Table 3-2
Five Monitoring Station Micro-Inventories

2 kib -

Source Category	Craig Road		East Flamingo		Green Valley		J. D. Smith		Pittman	
	Emissions (tons)	% Contribution	Emissions (tons)	% Contribution	Emissions (tons)	% Contribution	Emissions (tons)	% Contribution	Emissions (tons)	% Contribution
Vacant Land	4.82	30.79	2.91	24.38	7.33	21.83	10.08 ✓	36.56	13.16	67.07
Native Desert	-	-	0.141	1.18	-	-	0.63 ✓	2.28	-	
Unstable	4.32	27.60	2.68	22.44	7.29	21.71	9.40 ✓	34.09	12.9	65.75
Stabilized	0.50	3.19	0.091	0.76	0.04	0.12	0.05 ✓	0.18	0.26	1.33
Construction	3.43	21.91	3.92	32.83	21.19	63.11	✓ ~~5.52~~ [illegible]	20.02	1.32	6.73
Wind Erosion	2.72	17.38	3.56	29.81	18.3	54.50	✓ ~~5.10~~ [illegible]	18.50	1.12	5.71
Construction Activities	0.68	4.34	0.32	2.68	2.85	8.49	0.35 ✓	1.27	0.19	0.97
Track Out	0.03	0.19	0.04	0.33	0.04	0.12	0.016 ~~0.07~~	0.25	0.01	0.05
Unpaved Road Dust	0.14	0.89	0.01	0.08	0.017	0.05	0.004 ✓	0.01	0.66	3.36
Paved Road Dust	3.98	25.42	4.96	41.53	3.54	10.54	11.63 ✓	42.18	2.92	14.88
Unpaved Parking	0.514	3.28	-	-	-	-	-	-	1.14	5.81
Wind Erosion	0.51	3.26	-	-	-	-	-	-	1.11	5.66
Vehicles	0.004	0.03	-	-	-	-	-	-	0.03	0.15
Race Tracks	2.43	15.52	-	-	1.26	3.75	-	-	-	-
Wind Erosion	1.71	10.92	-	-	1.08	3.22	-	-	-	-
Vehicles	0.72	4.60	-	-	0.18	0.54	-	-	-	-
Vehicles	-	-	-	-	-	-	-	-	-	-
PM10	0.1	0.64	0.13	1.09	0.07	0.21	0.26 ✓	0.94	0.06	0.31
SOx	0.05	-	0.06	-	0.03	-	0.13 ✓	-	0.03	0.15
NOx	2.36	-	3.22	-	1.64	-	6.6 ✓	-	1.51	7.70
Stationary Sources	-	-	-	-	-	-	-	-	-	-
PM10	0.24	1.53	0.01	0.08	0.17	0.51	0.08 ✓	0.29	0.36	1.83
SOx	0.0004	-	0.001	-	0.19	-	0.002 ✓	-	0.02	-
NOx	0.0583	-	0.14	-	0.02	-	0.12 ✓	-	0.19	-
Total	-	-	-	-	-	-	-	-	-	-
PM10	15.65	-	11.94	-	33.58	-	27.57	-	19.62	-
SOx	0.0504	-	0.061	-	0.22	-	0.132 ✓	-	0.05	-
NOx	2.418	-	3.36	-	1.66	-	6.72 ✓	-	1.7	-

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T GETER

Date: AUGUST 7, 2000

Data/Procedure Reviewed: J. D. SMITH / EMISSIONS FROM VACANT LAND

Inventory Development Personnel Involved in Work: Dames and Moore developed + Mrs. Carrie MacDougall

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA - TABLES 3-2 AND TABLE 3-3

A. Identify the source evaluated. STABILIZED VACANT LAND CALCULATION SHEETS.

B. Describe the data included in the master file for the facility or source category.
CALCULATIONS FOR VACANT LAND INCLUDED STABILIZED AND UNSTABILIZED AREAS. STABILIZED AREAS WERE BROKEN DOWN EVEN FURTHER INTO NATIVE DESERT AND STABILIZED AREAS. "STABLE" HAS GROUPS 2 & 8; UNSTABLE HAS GROUPS 2, 8 and 9

C. Are the data documented in a manner that will not have the potential to be misinterpreted?
Y/N ACREAGE FOR THE VARIOUS GROUPS WERE NOT CLEAR OF THE ORIGINAL SOURCE (WHERE THE NUMBERS CAME FROM).

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

VACANT LAND

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)
NONE. ORIGINAL DATA WAS FOUND IN THE MASTER FILE.

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.) A SIGNATURE IS PROVIDED AFTER EACH CALCULATION (SEE PINK INK)

If any of the values are incorrect, explain how the emissions data were corrected.
THE STABILIZED VACANT LAND CALCULATIONS WERE BROKEN DOWN FURTHER INTO TWO CATEGORIES "STABILIZED" AND "NATIVE DESERT."

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database?
Y/N THIS COULD BE DUE TO A ROUNDING ERROR (SIGNIFICANT DIGITS)

F. Who provided the data to the data entry personnel?
AN OUTSIDE SOURCE (DAMES and MOORE)

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

CALCULATIONS WERE REVIEWED AND CORRECTED WITH PINK INK.

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

? If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N/A

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

IV. COMMENTS

- CONFIRMED WITH CARRIE THAT SOME OF THE VALUES HAVE BEEN ROUNDED UP BY USING THE EPA METHOD ROUNDING RULE. ~~AT~~ THIS IS WHEN YOUR FINAL ANSWER (ONLY YOUR FINAL ANSWER) IS ROUNDED.
- WIND SPEED FOR VACANT LAND CALCS ARE PROVIDED FROM TABLE 6-3 (DAMES & MOORE REPORT). THE WIND SPEED IS THE TOTAL OF THE GEOMETRIX MEAN FLUX & GEOMETRIC MEAN SPIKE FOR EACH SOIL GROUP.
- ACREAGE FOR STABILIZED AREA INCLUDES STABLE AND NATIVE DESERT LOCATIONS.

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. GETER

Date: AUGUST 8, 2000

Data/Procedure Reviewed: J. D. SMITH MICRO INVENTORIES FOR CONSTRUCTION

Inventory Development Personnel Involved in Work: CARRIE McDOUGAL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA : CALCULATION SHEETS AND DATA TABLE

A. Identify the source evaluated. CONSTRUCTION, WHICH IS BROKEN DOWN INTO WIND EROSION, CONSTRUCTION ACTIVITIES, TRACK OUT.

B. Describe the data included in the master file for the facility or source category.
MASTER FILE HAS CALCULATION SHEETS, WHICH BREAKS DOWN THE SUBCATEGORIES.
- WIND EROSION – SOIL GROUPS
- CONSTRUCTION ACTIVITIES – PUBLIC WORKS, COMMERCIAL, HIGHWAY & UNDERGROUND
- TRACK OUT – COLLECTOR/COMMERCIAL, COLLECTOR/PUBLIC, MINOR/COMMERCIAL, HIGHWAY/MINOR, HIGHWAY/MAJOR

C. Are the data documented in a manner that will not have the potential to be misinterpreted?
Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

MICRO FOR CONSTRUCTION

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N
FORMULAS ARE PROVIDED

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.) CALCULATIONS OF EMISSIONS WERE CHECKED AND VERIFIED ON ORIGINAL CALCULATION SHEETS FROM THE MASTER FILE.

If any of the values are incorrect, explain how the emissions data were corrected.
MARKED UP WITH PINK INK AND SIGNED BY AUDITOR

I. How are unavailable data identified? Are they mentioned in the report? NO.
~~UNAVAILABLE DATA IS IDENTIFIED BY~~

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database?
Y/N MIST

F. Who provided the data to the data entry personnel?

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N/A

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

o. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

None

IV. COMMENTS

- TRACK OUT CALCULATION SHEET HAS $E = 0.016 (1.70\ sL/2)^{0.65} (W/3)^{1.5}\ VMT$
  THE REPORT HAS $E = 0.016 (3.49\ sL/2)^{0.65} (W/3)^{1.5}\ VMT.$
  CARLIE said that the difference between the two are the units.
  (metric, lbs .....)

Micro For Construction

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. GETER

Date: August 9, 2000

Data/Procedure Reviewed: J.D. SMITH @ MICRO INVENTORY

Inventory Development Personnel Involved in Work: MRS CARRIE MACDOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA - DATA TABLE, CALC. SHEETS AND REPORT

A. Identify the source evaluated. PAVED ROAD DUST EMISSIONS

B. Describe the data included in the master file for the facility or source category.

CALCULATION SHEETS AND REPORT

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

PAVED ROAD

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.) CALCULATIONS WERE VERIFIED, SIGNED AND RETURNED TO THE MASTER FILE

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N/A

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

o. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

None

IV. COMMENTS

- ~~VEHICLE MILES WERE CONFIRMED IN THE REPORT.~~ COMPARED VEHICLE MILES ~~TO THE VEH~~ FROM THE CALC SHEETS TO THE VEHICLE MILES IN THE REPORT

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. GETER

Date: AUGUST 8, 2000

Data/Procedure Reviewed: MICRO – INVENTORIES J. D. SMITH (UNPAVED ROAD DUST)

Inventory Development Personnel Involved in Work: MRS. CARRIE MACDOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA – TABLE 3-2 & CALCULATION SHEETS

A. Identify the source evaluated. PM_{10} EMISSIONS FOR UNPAVED ROAD DUST.

B. Describe the data included in the master file for the facility or source category.
EMISSION ~~FORMULA~~ FACTOR PROVIDED

C. Are the data documented in a manner that will not have the potential to be misinterpreted?
Y/N ALTHOUGH IT'S NOT VERY CLEAR WHERE THE MILEAGE AND VEHICLE ~~NUMBERS~~ VALUES CAME FROM.

Were the instructions for documenting the data followed? Y/N

N/A

D. Are there missing data fields? Y/N
APPEARS STRAIGHT FORWARD

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N/A

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. GETER

Date: AUGUST 9, 2000

Data/Procedure Reviewed: J. O. SMITH MICRO - INVENTORIES

Inventory Development Personnel Involved in Work: MRS. CARRIE MACDOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA - MICRO - STATION TABLE, DAMES AND MOORE REPORT, CALCULATION SHEETS.

A. Identify the source evaluated.

VEHICLE EMISSIONS

B. Describe the data included in the master file for the facility or source category.

CALCULATION SHEETS AND REPORT

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

VEHICLE EMISSION

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

see comments

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

CALCULATIONS WERE CHECKED AND SIGNED

If any of the values are incorrect, explain how the emissions data were corrected.

N/A

I. How are unavailable data identified? Are they mentioned in the report?

see comments

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel? N/A

VEHICLE EMISSION

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N/A

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? N/A Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

IV. COMMENTS

- PM_{10} FACTOR FOR LOCAL AND COLLECTORS WAS 0.086
  FOR MINOR, MAJOR ARTERIAL & FREEWAY → 0.087

- MILES TRAVELLED for L&C = 536,555 MI
  for MM&F = ~~221~~ 2,770 MI

THIS VALUES WERE WRITTEN IN CALC SHEETS AND CONFIRMED IN THE REPORT.

- NO_x & SO_x WERE NOT EVALUATED (QA/QC for this project)

- VEHICLE MILES TRAVELED (VMT) ~~were~~ VALUES WERE PROVIDED BY CLARK COUNTY COMPREHENSIVE PLANNING. THE ACTUAL 1997 VEHICLE COUNT WAS USED AND EXTRAPOLATED TO 1999 USING A GROWTH RATE OF 2.8% a year.

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: T. GETER

Date: AUGUST 8, 2000

Data/Procedure Reviewed: J.D. SMITH STATIONARY TOTALS (CALCULATIONS)

Inventory Development Personnel Involved in Work: CARRIE MCDOUGAL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA TABLE 3-2

A. Identify the source evaluated. STATIONARY SOURCES FOR PM10, ~~SOX AND NOX~~

B. Describe the data included in the master file for the facility or source category.
MASTER FILE HAS A LIST OF STATIONARY SOURCE LOCATIONS, ACCOMPANIED BY PERMIT CONDITIONS. (TWENTY-NINE SOURCES LISTED)

C. Are the data documented in a manner that will not have the potential to be misinterpreted?
Y/N IA FIRST PAGE HAS A LISTING OF SOURCES, IF THERE IS A PM10 VALUE BY THE SOURCE ~~THEN THERE IS ADDITIONAL INFORMATION WHICH SHOWS THE CALCULATION~~ AND SHOWS THE PERMIT. IF THIS IS NOT PROVIDED THE WORD "NONE" IS WRITTEN NEXT TO THE SOURCE
Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N
HOWEVER, NOT ALL THE STATIONARY SOURCE LOCATIONS HAD PM10 VALUES. ~~PROVIDED.~~

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

see comments

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report? Kerry

AQD estimated that 100% of major sources and minor permitted source have been included.

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel?

AQD

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? N/A Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N
N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N
N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N
N/A

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

Standard SEVACES

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

- AQD TO PROVIDE CALCULATION SPREADSHEETS ALONG WITH PERMITS.

IV. COMMENTS

- FOR MISSION INDUSTRIES, THE PTE VALUE WAS USED. INSTEAD OF THE ACTUAL VALUE.
- VALUES USED IN EMISSIONS INVENTORY FOR STATIONARY SOURCES WERE PTE'S EXCEPT FOR TWO SOURCES — PALM MORTUARY
  AMERIS PIPE COMPANY (lbs/day)
- CHEMICAL LIME CO WAS NOT WITHIN THE MICRO (2 Km) AREA
- POTLATCH CORP & ROCKWAY PRECAST FACILITIES DO NOT BELONG TO J. D. SMITH, THE FILES ARE LOCATED IN THE CRAIG ROAD FILE.
- RANCHO HIGH SCHOOL WAS OMITTED BECAUSE THE BOILERS WERE NOT RUNNING ON DESIGN DAY.
- SCHOOL FILES ARE LOCATED UNDER CLARK COUNTY SCHOOL DISTRICT FILE
- SOME OF THE EMISSIONS FROM BOILERS WERE RE-CALCULATED
  – CALCULATION SHEETS ARE LOCATED @ DAMES & MOORE AND WERE NOT REVIEWED

J. D. Smith 1998 Annual Inventory
Stationary Sources

Stationary Source Name	Annual PM_{10} Emissions (tons/year)	Annual SOx Emissions (tons/year)	Annual NOx Emissions (tons/year)
Anderson Dairy Inc.	0.39	0.03	5.15
Allegis Pipe Company	1	1	2
Bridger Junior High School	0.17	0.01	2.29
Hotel Linen Services	0.39	0.03	5.15
J. D. Smith Middle School	0.257	0.02	3.4
Jerry's Nugget	0.06	0.01	2.38
Joe's Excavating	0.45	0	0
Mission Industries	2.84	0.08	24.11
Palm Mortuary	0.16	0.32	1.72
Rancho High School	0.22	0.02	2.9
U. S. Post Office	0.04	0	0.27
U. S. Department of Energy	0.01	0.05	0.45
Unitog Co.	0.3	0.03	5.4
Total	6.287	1.6	55.22

APPENDIX B

QUALITY CONTROL CHECKLIST

Auditor: LEH

Date: 8-~~10~~-00

Data/Procedure Reviewed: mike sword

Inventory Development Personnel Involved in Work:

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated. point source PM10

B. Describe the data included in the master file for the facility or source category. Survey tables are sent to permit holders. Data in file is the returned table.

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N
not a category form for every source

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

Form review.

At what point in the inventory process are requests for missing data made? How is the receipt of the missing data handled? (Are original data sheets placed in the master file?) No

Missing data is handled during the inventory development after the surveys have been returned.

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N

methods describe in individual point source files - major sources have best description

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N major sources

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.) Not done by auditor

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report? NO

70-80% use AP-42 factor

II. EMISSIONS DATABASE

E. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

F. Who provided the data to the data entry personnel? Ben Griffith

SOP VLP - Dave Wignall

NSR manual - elizabeth Gilmartin

no SOP emission inventory

G. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

H. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

There is no QAP N/A

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

N/A

I. Is the database routinely backed up at the end of each updating event? Y/N

network system, backup nightly

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

N/A

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

IV. COMMENTS

No major sources missing

~0% ~~10-20%~~ non-major >5tons/year

5% ~~perm~~ non permitted

survey forms

when parameters are changed by owner, ~~those~~ this data is entered as corrected.

if survey was not submitted 1997 values were used.

Appendix B

QUALITY ASSURANCE INVENTORY CHECKLIST

Auditor: Lori Headrick

Date: 8/7/00

Personnel Interviewed: Carrie MacDougall

This audit checklist is to be used to document the findings from the audit of activities and data associated with the Clark County emissions inventory. Use applicable parts of the checklist to identify the quality concerns associated with each task. Document the results and use them to generate the audit report.

I. MANAGEMENT OF THE WORK

A - Is the QAP available to the personnel audited? Y/N

B - Are the procedures applicable to their work understood and followed? Y/N

C - Are the procedures adequate for the desired outcome of the work performed? Y/N

D - Are meetings held routinely to discuss the progress of the work and any quality problems that were found? Y/N

E - Are the personnel adequately trained to perform the duties assigned? Y/N

F - Are the resources required to perform the duties assigned available and adequate to achieve the objective of the work? Y/N

G - Is the work on schedule? Y/N

II. DATA MAINTENANCE AND COLLECTION

A. Are the data used for the inventory coded to facilitate tracking? Y/N

B. Are the data organized to facilitate retrievals? Y/N

C. Does the data file include of all of the data required to estimate the emissions from a given source? (Check about 4-5 sources) Y/N

D. Are the data in a place where access is controlled and limited? Y/N

E. Are the data copied when requests are made for retrievals? Y/N

F. If originals are released to inventory development personnel, is the location of the original data documented in the data tracking database? N/A Y/N

G. Is the data tracking database operational and used to track the receipt and distribution of the data? Y/N

H. Are the state permit applications and supporting data completed in a manner that will not lead to misinterpretation of the data? (Check for obscuring of data when making corrections, insufficient data to discern the identity and level of emissions of a given pollutant, unclear labels on attachments, etc.) Y/N

I. Are the data documented in black ink so that reproductions will include all of the data recorded on the data forms? Y/N majority

J. Are the data request forms complete? If not, what is done to acquire the missing data? Y/N

III. DATA EVALUATION

A. What steps were taken to ensure that the data collected are complete?
Pulled all construction permits for applicable day, called point sources to verify operation on applicable day. Walked all sites. Called municipalities for unpaved roads

B. What steps were taken to evaluate the accuracy, completeness, comparability, and representativeness of the data?
see comments in III A. Inventory compared to Last SIP and other design days (ie. craig road) and non road model with nationwide and Maricopa County

C. What procedures were followed to eliminate double counting of sources or points within a source?
Mobile/non-mobile, paved/unpaved roads were seperated to avoid double counting.

D. How were sources below the cutoff point handled?
non permitted sources were not included for point sources.
However, the amount of non permitted sources is belived to be insignificant (>1%).

E. Were task activities prioritized to provide emissions data about the highest emitters first?
Y/N

F. Were discrepancies found in the data? If yes, what were they and how were they eliminated?
Y/N see memo's from Carrie MacDougal to Will Cates

G. Were calculations reviewed by another IDT member for technical soundness and accuracy?
Y/N Were results documented? Y/N
Rick Matar produced some data, Carrie and Rick Trapp reviewed

H. Were evaluated data reviewed by a senior technical reviewer prior to entering it into the emissions database? Y/N Were results from the data reviews documented and corrective actions implemented as requested? Y/N If corrections were made, will the corrections affect other emissions data? Y/N

How was the impact of the erroneous data evaluated?

I. Were the data validation procedures and activities adequately documented in the bound project notebook assigned to the persons evaluating the data? Y/N

PM10 SIP Development Notes

If no, describe the problems found.

IV. EMISSIONS DATABASE DEVELOPMENT

A. Were the data validated prior to being entered into the database? Y/N

B. Were the data presented to the entry personnel recorded in a manner that facilitated entry into the database? Y/N

C. Was all of the information required to be entered in the database included on the data form? Y/N

D. If data are missing from data request forms, how are data gaps handled?

Gaps were followed up by senior planner until gaps were filled.

E. Were results in the units to be reported? If not, were calculations performed manually or electronically? Y/N

F. Were the database activities documented in the ~~bound~~ project ~~notebooks~~ files? Y/N

Did the data recorded allow reconstruction of the activities? Y/N
Were pages in the notebook reviewed and signed by the senior technical reviewer Y/N

G. Were data entries reviewed for transcription errors by someone other than the person entering the data into the database? Y/N If problems were found, were the resolution of them documented and the revision of the data indicated in the electronic file? Y/N

H. Was the database developed so that revised versions of the database are identified? Y/N

No old data is kept, database is dated

J. Were the software and hardware evaluated to determine whether they are adequate to achieve the objectives of the computer database activities prior to using them? Y/N

Comp. Ed. and Integration Program

What tests were performed and were the results from the tests documented? (response time, available memory, available power, accessibility for use)

all of the above by the centralized Computer Group. They are responsible for nightly Network Backup.

A. How often are files backed up? Is the schedule appropriate to minimize data loss? yes
nightly

K. Was a log maintained of database revisions? Y/N yes

L. Are the computer manuals available for use by the operators? Y/N

Does the manual include all of the data needed to log into the system and perform the duties required to develop the emissions database? Y/N

V. REPORTING

A. Was the report formatted as required by U.S. EPA? Y/N N/A

B. Was the report clearly written and inclusive of the applicable emission source identified during the planning phase of the work? Y/N

If a source was missing, can the reason for the omission be verified to be acceptable? Y/N

C. Did the report accurately reflect the data included in the database? (Compare the results in the report to the information included in the database for 5-10 sources). Y/N

D. Was there evidence in the data file of editorial and technical review of the document? Y/N

E. Was a copy-ready version of the report included in the master data file? Y/N

VI. QUALITY CONTROL

A. Were the QC measures taken adequate to ensure data quality? Y/N

B. Were the project and quality goals met? N/A Y/N

C. Were actions taken in response to all previous recommendations for corrective actions? Y/N
N/A

Did the actions taken adequately address the quality concerns found? N/A Y/N

VII. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

None

VIII. COMMENTS

Implementation of QAP would lead to better management of overall project with respect to goals, objectives and schedules.

Memorandum

To: Will Cates

CC: Ricky Tropp,

From: Carrie MacDougall

Date: 6/1/00

Re: PM_{10} Emission Inventory Update

On Tuesday, May 30, 2000, you asked to me to review the annual 1998 PM_{10} emission inventory developed by Rick Matar. I have completed my initial review and am now working to finalize the inventory based upon the following parameters:

1. Quality assuring the data;
2. Documenting the data and calculations;
3. Confirming the default data and assumptions correspond to the data and assumptions used in the microinventory; and
4. Writing the corresponding section for Chapter 3 of the SIP.

Step one will be completed by COB June 2, 2000. I am proposing that Steps two through four be completed based upon source category. I am proposing the following order for the source categories. The related issues for each source category is also presented.

Paved Roads – I am already aware the paved road annual inventory was prepared using the TRAKER data. This needs to be changed to reflect the D&M data. The D&M data will allow us to make estimates of the affects of unpaved shoulders and track out. This has a large potential change to the emission inventory.

Unpaved Roads – There is a large uncertainty with the paved road inventory. The silt loading numbers we are receiving vary but appear to be higher than the EPA default of 12%.

Vacant Land – Thank you for the UNLV report. I am still hopeful that in the next few days we can get the preliminary satellite data. Regardless of the estimated acres, we need to address the change in categories from two: stable and unstable, to two: stabilized, native desert, and unstable.

Construction Activities – The issues for this category are QA and a confirmation that the same methodology was used in the micro inventories.

Stationary Sources – If we had more time I would like to do a thorough review of this data. Initially I need to confirm that the 1998 emission inventory does not double count natural gas burning or off road vehicles. I also need to determine the potential to emit from the stationary sources for the 2006 determination as no new controls are proposed.

Airports – The data between McCarran and Nellis varies greatly. Want to double check. Rick received new data from McCarran and I want to see if the new F15 and F16 emission factors are available from Brooks.

Trains – At first glance the estimated emissions seem very low.

The proposed schedule is to have steps two through four completed for paved roads, unpaved roads, vacant land and construction activities by COB June 9, 2000. Steps two through four will be completed for the other categories by June 15, 2000 and a draft presented for review by COB June 16, 2000.

At the time I submit the draft, I will also highlight any remaining issues. If this schedule or plan is problematic in any way, please contact me immediately so it can be resolved.

Memorandum

To: Will Cates

CC: Ricky Tropp

From: Carrie MacDougall

Date: June 5, 2000

Re: Update on Initial QA of 1998 Emission Inventory

The initial review and quality assurance of the 1998 emission inventory has been completed. I am summarizing where we stand based upon the priorities in the earlier memo.

Paved Roads – Although the traffic counts appear to be well established I have not located the documentation. I am also not sure the counts are reflective of the non-attainment area. I will be checking this. I have recalculated using the D&M factors. The emissions without track out and unimproved shoulder affects are about 37,000 tons. Next week I will confirm and document the counts and include track out and unimproved shoulder affects. This category should be complete on schedule.

Unpaved Roads – The current number in the inventory was based upon county and Henderson roads only. The calculation completed using a 12% silt factor. DRI documented 16% silt content and this number was used in the microinventories. The average from North Las Vegas was 23% and the City of Las Vegas measurements averaged 19%. The unpaved road emissions will be recalculated using the newer network data and a 16% silt factor. The tons emitted will increase well above the current 6,700 estimate, probably greater than 22,000 tons.

Vacant Land – As previously mentioned, the current estimate does not use three vacant land categories. Nor was the most recent UNLV report available. This category will be recalculated next week.

Construction Activities – The current emission inventory uses 80% for a compliance rate and 50% for control efficiency of water. The microinventories are broken down by construction type and range from 20-70% for compliance rate. The emission factor for wind erosion will be confirmed as well as the number of hours winds were above 15 mph.

Stationary Sources – The stationary source data comes directly form CCAQD. I am concerned that there may be double counting for natural gas sources. I am also concerned that Variable Location Permit (LVP) emissions were not included. This is a lesser priority and may need to be updated after the SIP is completed because it may take several hours to reconcile.

Airports - I will double-check the McCarran data next week. I will look at the raw calculations for both McCarran and Nellis.

Non-Road Mobile Sources – The non-road mobile sources with the exception of the airports were developed using the non-road model and statistics from Clark County. For example, pleasure craft and recreational equipment emissions were estimated using the non-road model with an input of 467 acres of water surface. Clearly Hydrographic basin 212 does not. Neither does the non-attainment area have 5,470 acres of harvested cropland. This entire source category is based upon countywide and sometimes questionable data. For example, the input for golf courses was for public courses. There are several more than 10 golf courses in the non-attainment area. This will need to be corrected and the model rerun next week.

Natural Gas Combustion – The emission factor for particulate is correct although the emission factor for NO_2 was used instead of the emission factor for NOx. The emission factor for NOx is orders of magnitude higher than the NO_2 emission factor. We should correct this.

Diesel Fuel Combustion – The report was completed for all of Clark County. Although this overestimates emissions within the non-attainment area it would take a lot of work to correct for relatively little difference as the bulk of the emissions in the county probably are emitted within the non-attainment area.

Charbroiling/Meat Cooking – The emissions are based upon a report completed by a consultant for AQD. The report and the emission estimates look accurate.

Residential Fireplaces/Wood Burning – The emissions are based upon the amount of wood sold in the metropolitan Las Vegas area and AP-42 emission factors. The estimates appear reasonable and defensible.

Structural/Vehicle Fires/Wild Fires – The emissions are based upon estimates documented by FEMA and CARB. We do not have any better numbers and the contribution is relatively small.

The earlier schedule should be met. New estimates for paved roads, unpaved roads, vacant land, and construction activities will be complete by Friday, June 9. I will complete unpaved roads first to address Bruce Arkell's concerns. The vacant land estimates will be greatly enhanced if we can get the satellite data quickly. The other categories to be addressed are minor and even with meetings with EPA we should not have a problem with getting the draft completed by Close of Business (COB) on June 16, 2000.

Please contact me if there are any additional issues regarding this memo or the inventory.

Memorandum

To: Will Cates

CC: Ricky Tropp

From: Carrie MacDougall

Date: 6/26/00

Re: Update on 1998 Base Year Emission Inventory

I am continuing to work of the 1998 Base Year Emission Inventory. Summarized below are the recent updates and anticipated further progress.

Paved Roads – I still have not located the documentation of the traffic counts. I will approach Phil Shinbein this week. I have sent an email to Bruce Arkell asking for the miles of roadway with unimproved shoulders for the county. I have this data for Las Vegas and Henderson. Leslie Long from North Las Vegas thought she had already sent it but will send it again. I updated the freeway and intrastate silt loading to match the EPA default. California is also using the EPA default for their inventories.

Unpaved Roads – The unpaved road emissions are complete with the exception of Henderson data. I am going with what we have for Henderson thus far. It is not likely new data will be available in time to update the inventory. The total from this category is 14,611 tons.

Vacant Land – The inventory has been updated to include native desert, stabilized land and unstable land. The meteorological data from McCarran was used. Days with rain or traces of rain were not used in the calculations. Native desert emissions were calculated when winds exceeded 25 mph. Unstable land emissions were calculated when winds exceeded 20 mph. The total from this category is 64,900 tons.

Construction Activities – The emissions from construction activities has been calculated including wind erosion and track out. The wind erosion emissions did not account for rain days, as the disturbance was considered continual.

Stationary Sources – I have received additional stationary source data from the county. From what I can see, the natural gas emissions are currently being double counted in the emission inventory. I have a call into Mike Sword – AQD and hope to be able to correct the double counting by the end of today.

Non-Road Mobile Sources – The non-road emissions in the current emission inventory are based upon the NON-ROAD model. EPA has not approved this model. The NEVES method will be required to be used for an approvable SIP. I have reviewed the SB-432 report that includes some of this work as well as the CO SIP. I will be finishing my calculations tomorrow and asking Clete Kus to review them to ensure they are based similarly to the CO SIP.

All other source categories are expected to stay the same. If you have any questions please let me know. Otherwise I anticipate completing the inventory this week and have Section 3 complete by July 7, 2000.

QUALITY ASSURANCE INVENTORY CHECKLIST

Auditor: Lori Headrick

Date: 8/10/00

Personnel Interviewed: Ben Griffith

This audit checklist is to be used to document the findings from the audit of activities and data associated with the Clark County emissions inventory. Use applicable parts of the checklist to identify the quality concerns associated with each task. Document the results and use them to generate the audit report.

I. MANAGEMENT OF THE WORK

A - Is the QAP available to the personnel audited? Y/N

B - Are the procedures applicable to their work understood and followed? Y/N

C - Are the procedures adequate for the desired outcome of the work performed? Y/N

D - Are meetings held routinely to discuss the progress of the work and any quality problems that were found? Y/N

E - Are the personnel adequately trained to perform the duties assigned? Y/N

F - Are the resources required to perform the duties assigned available and adequate to achieve the objective of the work? Y/N

G - Is the work on schedule? Y/N

II. DATA MAINTENANCE AND COLLECTION

A. Are the data used for the inventory coded to facilitate tracking? Y/N

B. Are the data organized to facilitate retrievals? Y/N

C. Does the data file include of all of the data required to estimate the emissions from a given source? (Check about 4-5 sources) survey forms are in master checklist, stored in binders on bookshelf. Y/N

D. Are the data in a place where access is controlled and limited? electronic versions are password protected Y/N

E. Are the data copied when requests are made for retrievals? Y/N

F. If originals are released to inventory development personnel, is the location of the original data documented in the data tracking database? Y/N

G. Is the data tracking database operational and used to track the receipt and distribution of the data? Y/N

H. Are the state permit applications and supporting data completed in a manner that will not lead to misinterpretation of the data? (Check for obscuring of data when making corrections, insufficient data to discern the identity and level of emissions of a given pollutant, unclear labels on attachments, etc.) Y/N

I. Are the data documented in black ink so that reproductions will include all of the data recorded on the data forms? Y/N

J. Are the data request forms complete? If not, what is done to acquire the missing data? Y/N

III. DATA EVALUATION

A. What steps were taken to ensure that the data collected are complete?
Phone calls are made to permit holders. If no data or incomplete data is received than 1997 data is used.

B. What steps were taken to evaluate the accuracy, completeness, comparability, and representativeness of the data? Data is compared to previous year.

C. What procedures were followed to eliminate double counting of sources or points within a source? use of standard forms from permit.

D. How were sources below the cutoff point handled?
sources below 5 tons/year are not included.

E. Were task activities prioritized to provide emissions data about the highest emitters first?
Y/N

F. Were discrepancies found in the data? If yes, what were they and how were they eliminated?
Y/N

G. Were calculations reviewed by another IDT member for technical soundness and accuracy?
Y/N Were results documented? N/A Y/N

H. Were evaluated data reviewed by a senior technical reviewer prior to entering it into the emissions database? Y/N Were results from the data reviews documented and corrective actions implemented as requested? Y/N If corrections were made, will the corrections affect other emissions data? N/A Y/N

How was the impact of the erroneous data evaluated? It is not evaluated

I. Were the data validation procedures and activities adequately documented in the bound project notebook assigned to the persons evaluating the data? Y/N

If no, describe the problems found.

Procedures do not exist

IV. EMISSIONS DATABASE DEVELOPMENT

A. Were the data validated prior to being entered into the database? Y/N

B. Were the data presented to the entry personnel recorded in a manner that facilitated entry into the database? Y/N

C. Was all of the information required to be entered in the database included on the data form? Y/N

D. If data are missing from data request forms, how are data gaps handled?

Permit holders are called. If data is not obtained, prior year's data is used.

E. Were results in the units to be reported? If not, were calculations performed manually or electronically? Y/N

F. Were the database activities documented in the bound project notebooks? Y/N

Did the data recorded allow reconstruction of the activities? Y/N

Were pages in the notebook reviewed and signed by the senior technical reviewer Y/N

G. Were data entries reviewed for transcription errors by someone other than the person entering the data into the database? Y/N If problems were found, were the resolution of them documented and the revision of the data indicated in the electronic file? Y/N N/A

Only if overbilled were errors discovered

H. Was the database developed so that revised versions of the database are identified? Y/N

J. Were the software and hardware evaluated to determine whether they are adequate to achieve the objectives of the computer database activities prior to using them? Y/N

What tests were performed and were the results from the tests documented? (response time, available memory, available power, accessibility for use) N/A = done by others

A. How often are files backed up? Is the schedule appropriate to minimize data loss? yes
Nightly

K. Was a log maintained of database revisions? Y/N LEO

L. Are the computer manuals available for use by the operators? Y/N

Does the manual include all of the data needed to log into the system and perform the duties required to develop the emissions database? Y/N

V. REPORTING

A. Was the report formatted as required by U.S. EPA? Y/N

B. Was the report clearly written and inclusive of the applicable emission source identified during the planning phase of the work? Y/N

If a source was missing, can the reason for the omission be verified to be acceptable? Y/N

C. Did the report accurately reflect the data included in the database? (Compare the results in the report to the information included in the database for 5-10 sources). Y/N

D. Was there evidence in the data file of editorial and technical review of the document? Y/N

E. Was a copy-ready version of the report included in the master data file? Y/N

VI. QUALITY CONTROL

A. Were the QC measures taken adequate to ensure data quality? N/A Y/N

B. Were the project and quality goals met? N/A Y/N

C. Were actions taken in response to all previous recommendations for corrective actions? Y/N
N/A

Did the actions taken adequately address the quality concerns found? Y/N
N/A

VII. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

Develop QA/QC Plan and SOPs

VIII. COMMENTS

Pertinent Correspondence Memos

Appendix C

DRAFT

MEMORANDUM

DRAFT

Date: September 2, 1999

From: Russell Roberts / Will Cates

To: Michael Naylor

Subject: 1998 Base Year PM_{10} Actual emissions inventory Data Request.

As part of the Clark County emission inventory preparation committee the Health District, Air Pollution Control Division (APCD) has committed to contribute data, time, and effort to the development of emission inventories. A draft inventory preparation plan (IPP) was developed to guide the activities of all interested parties in compiling a comprehensive, complete, accurate, and defensible emission inventory.

The first application of the IPP will be to assist Clark County in the development of a PM_{10} emission inventory in support of the PM_{10} air quality implementation plan (AQIP). The PM_{10} AQIP is on a fast-track schedule with a target submittal date to the EPA during the first part of the year 2000. In order to meet this expedited and ambitious schedule, the PM_{10} emission inventory needs to be complete by the end of October 31, 1999.

The preparation of the 1998 PM_{10} base year actual emissions inventory will be a cooperative effort between the Clark County Department of Comprehensive Planning (DCP), the Clark County Department of Aviation (DOA), the APCD, and the Regional Transportation Commission (RTC). All inventory work should be completed by October 31, 1999. The programmatic roles and responsibilities of the four agencies with respect to air quality planning and related activities are specified in a project organizational chart as part of the QA/QC Plan for this project (Exhibit A). Coordination among the cities and other entities will be achieved through the Emission Inventory Preparation Committee. In addition, the following agencies will be provided an opportunity to review and comment on all work relating to the PM_{10} emissions inventory: Clark County Department of Public Works; Nevada Division of Environmental Protection; Nevada Department of Transportation; Desert Research Institute; and The Cities of Las Vegas, North Las Vegas, and Henderson.

Particulate Matter (PM) pollution with an aerodynamic diameter of 10 microns or less (PM-10) is classified into two major categories, primary and secondary PM which are defined as follows:

1. **Primary PM:** Particles that enter the atmosphere as a direct emission from a stack or an open source. It is comprised of two components: filterable PM and Condensable PM.

    - Filterable PM: Particles that are directly emitted by a source, or become airborne as a solid or liquid at stack or release conditions and can be captured on the filter of a stack test train.

Please provide us with the following data items including supporting documentation for all PM_{10} sources within your jurisdiction:

1. Stationary sources primary and secondary PM_{10} emissions for 1998 tabulated by permitted source, actual emissions, source coordinates, stack parameters for major sources, and allowable / permitted emissions. Please include data source and emission estimation methodology - emission factors used (stack test, AP-42, etc.).

2. Area-wide sources primary and secondary PM_{10} actual emissions for 1998, including:

   (a) County-wide firewood sales / consumption

   (b) Estimate of county-wide inventory of fast food restaurants, major restaurants (including tourist industry), and community kitchens. Please obtain estimates of cooking fuel consumption and estimates of number of meat charbroilers and tons of meat charbroiled.

   (c) Estimates of automotive fires, industrial fires, waste burning, and other fires prescribed and / or accidental.

   ~~(d) Natural gas consumption broken down by residential and commercial (industrial – entertainment).~~

   (e) Inventory of surface coating operations, print shops, laundering facilities, and their respective chemical consumption / sales.

   (f) Consumer product sales such as, cleaning supplies, fertilizers, pesticides, and refrigerants.

   (g) Asphalt paving and road surfacing operations (if available) in terms of road miles and / or tons of materials used.

   (h) Inventory of construction and demolition activities in terms of total acres.

   (i) Estimates of area-wide diesel generators and diesel fuel consumed. (if available)

   (j) Inventory of disturbed vacant land (if available).

   (k) Inventory of unpaved roads in the offsets / credits program.

   ~~(l) Estimate of the PM_{10} fraction of valley-wide pollen emissions.~~ NA.

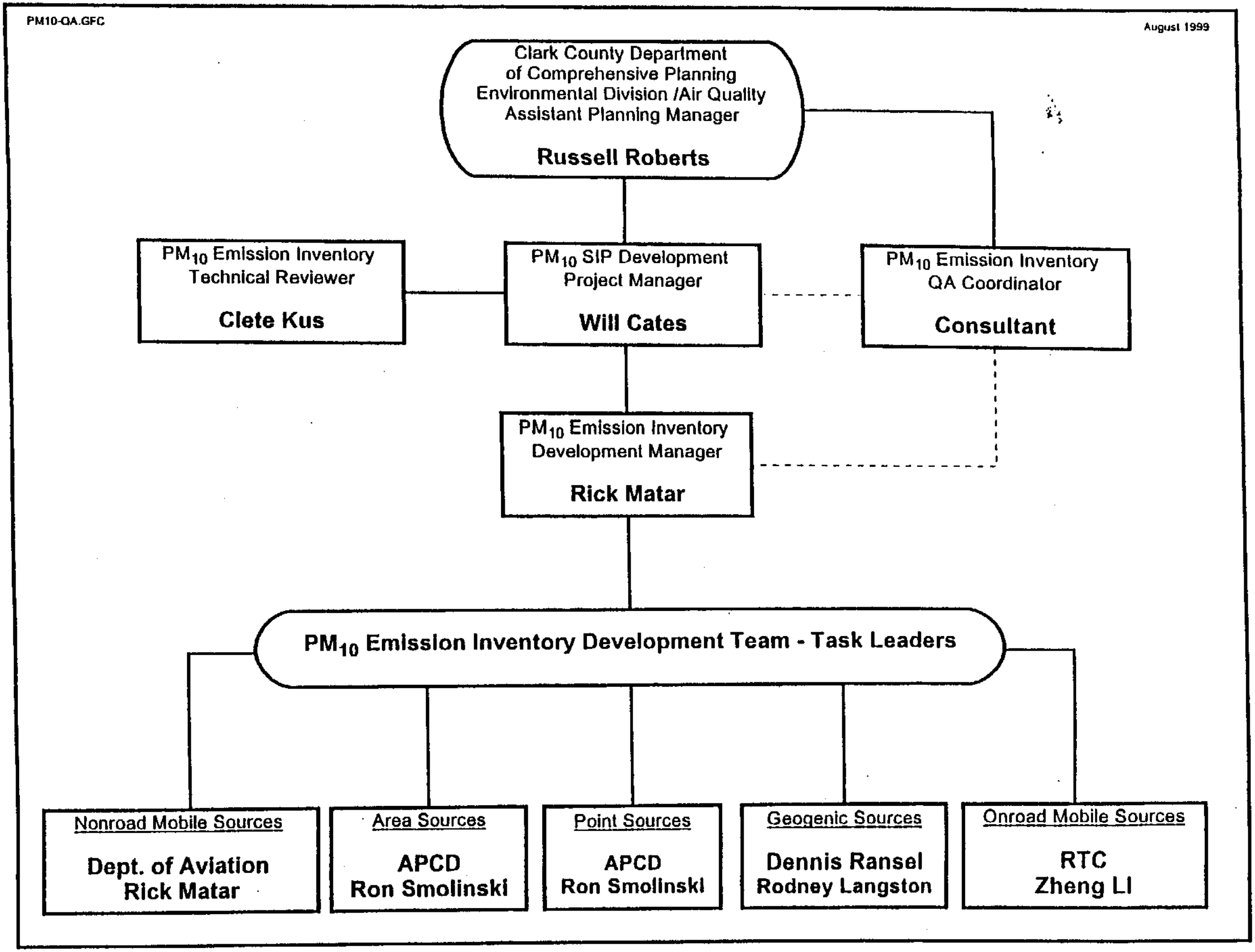
Please provide as much details and documentation as possible for the listed sources and any other data that you feel may help us compile a complete emission inventory.

Attachment:

over

EXHIB

PM_{10} Emission Inventory Quality Assurance Organization



CONVERSE COPY

Memorandum

To: Cyndy Mikes

CC: Russell Roberts, Michael Naylor

From: Carrie MacDougall Carrie

Date: 07/24/00

Re: Dust Permits for 1998

Comprehensive Planning is working to finalize the PM_{10} State Implementation Plan. As part of the attainment demonstration for the plan, an annual emission inventory for the area surrounding the J. D. Smith monitoring station must be completed. We need your help in identifying the construction sites.

Most of the sources in the area have been characterized with the exception of active construction sites. We are seeking a list of dust permits issued during 1998 within the following township, range, and sections.

Township:	20
Range:	61
Sections:	13
	14
	15
	16
	21
	22
	23
	24
	25
	26
	27
	28
	29
	33
	34
	35
	36

It is our understanding that the dust permits are entered into a database and the database can be queried for this information. The database print out would include the permit date, the number of acres, the address, and a title for the project.

Please provide this information at your earliest convenience. We can begin using this information as soon as the report can be generated. Please excuse the late date of this memo however, we were informed the information was available by verbal rather than written request until today. If we do not receive the data by Wednesday, July 26, 2000, we will not be able to incorporate the information into the SIP.

Thank you for your continued attention in this matter. Please contact me at (702) 455-3131 or email me at CmacDoug@co.clark.nv.us if you have any questions or concerns regarding this request for data.

CLARK COUNTY HEALTH DISTRICT
P.O. BOX 3902 • 625 SHADOW LANE • LAS VEGAS, NEVADA 89127 • 702-383-1276 • FAX 702-383-1443

July 29, 2000

Facility

ID Number: 00104
Name: LAS VEGAS PAVING CORPORATION
Address: N. FIFTH STREET/ASPHALT-RECYCLE PLANT
City, State: LAS VEGAS, NV
Zip Code: 89030
Contact: Dave Breault - 371-2605 (Mobile)
Voice: (702) 251-5800
E-mail:

Company

ID Number: 00104
Name: LAS VEGAS PAVING CORPORATION
Address: 4420 S. DECATUR BLVD.
City, State: LAS VEGAS, NV
Zip Code: 89103

Please correct any errors or deficiencies in the facility/company information above.

RE: 1999 Clark County Health District - Air Quality Division – Annual Emission Inventory Survey

Dear Sir or Madam:

It is again time for the Clark County Health District, Air Quality Division's (formerly Air Pollution Control Division) annual emissions inventory survey. This survey is being sent to all permitted sources of Regulated Air Pollutants in Clark County , Nevada.

Before August 18, 2000 please return this completed inventory survey to:

CCHD – AQD Inventory
PO Box 3902
Las Vegas, NV 89127
Attn: Ben Griffith

Many permitted sources have been submitting their inventory as a hard-copy of what appears to be an electronic spreadsheet. We will work with you as much as possible to allow inventory data to be submitted in any format which satisfies our needs and is comfortable to the permittee. We would request that an electronic copy of the inventory spreadsheet (table, database report, etc) be sent also. The electronic copy may be sent via floppy disk, CD, or (preferably) e-mail to Griffith@cchd.co.clark.nv.us.

We are currently renovating the inventory process. In the future we hope to accommodate the inventory process with all electronic reporting. This reporting might take a variety of forms and formats. To begin to establish dialogue it would be helpful if you could supply an e-mail address for the facility/company contacts.

Again if you are sending a survey based on your own format, and there is a "soft" (electronic, floppy disc, CD, e-mail) copy, please transfer an electronic copy so that it may be added to your records for future reference.

If there are any questions or comments please contact me at (702) 383-1276.

Sincerely,

Ben Griffith
Scanned

Ben Griffith, Project Manager

1999 Emissions Inventory Survey
(Grouped by Emission Unit Type)

Sand and Gravel Emission Units:

Definitions:
vmt = vehicle miles travelled annually
acre = total facility acreage (only needs to be entered once even if requested for seperate stockpiles, etc.)

Instructions: Fill in the production/throuput amount in tons for sand and gravel and vmt or acres as requested. Moisture contents are required only for sand and gravel. Moisture is adssumed to be 1.5% if not filled in.

Facility	Permit #	Equipment ID - Description	Production/ Throughput	Units	Moisture Content (%)
104	A01	Loader Loading		(ton)	
104	A02	Loader Unloading		(ton)	
104	A03	Hewitt Robins Jaw Crusher; S/N 42 48 2039580		(ton)	
104	A04	Material Transfer		(ton)	
104	A05	Material Transfer		(ton)	

Facility	Permit #	Equipment ID - Description	Production/ Throughput	Units	Moisture Content (%)
104	A06	Cedar Rapids Jaw Roll & Screen; S/N 20662 - Crushing		(ton)	
104	A07	Material Transfer		(ton)	
104	A08	Material Transfer		(ton)	
104	A09	El Jay 1140 Crusher/Screen; S/N 42CD478 - crusher		(ton)	
104	A10	Material Transfer		(ton)	
104	A11	Material Transfer		(ton)	
104	A12	Stacking Conveyor		(ton)	
104	A13	Conveyor		(ton)	
104	B01	Feed Hopper		(ton)	
104	B02	Material Transfer		(ton)	
104	B03	Material Transfer		(ton)	
104	B04	Loader Loading		(ton)	
104	B05	Feed Hopper		(ton)	
104	B06	Material Transfer		(ton)	
104	B07	Scalping Screen; S/N PR-1339 410-1-SD		(ton)	
104	B08	Material Transfer		(ton)	
104	B09	Pug Mill; S/N 305-50-486-93 50		(ton)	
104	B10	Material Transfer		(ton)	
104	B11	Loader Loading		(ton)	
104	B12	Feed Hopper		(ton)	
104	B13	Material Transfer		(ton)	
104	B14	Material Transfer		(ton)	
104	B15	Batch Drop		(ton)	
104	B16	Material Transfer		(ton)	
104	B17	Load-out		(ton)	
104	B18	Lime Silo; S/N 6920164		(ton)	
104	B19	Asphalt Storage Silo (North)		(ton)	
104	B20	Asphalt Storage Silo (South); S/N 220		(ton)	
104	C01	Loader Loading		(ton)	
104	C02	Screen; S/N Key Y 50-2202		(ton)	
104	C03	Loader Loading		(ton)	
104	C04	Feed Hopper		(ton)	
104	C05	Material Transfer		(ton)	
104	C06	Screen; S/N 7203637		(ton)	
104	C07	Feed Dryer		(ton)	
104	C08	Mixing Screw		(ton)	
104	C09	Stacker		(ton)	
104	D01	Aggregate stockpile		(acre)	
104	D02	RAP stockpile		(acre)	
104	D03	Haul Road		(vmt)	

External Combustion Sources

Emissions from External Combustion Sources may be estimated using either load/run time data or total fuel consumption.

Full Load Equivalent Operating Hours = The actual operating hours times the average load on the device over the operating period. For instance, a boiler operated for 1000 hours at an average load of 50% would have 500 full load equivalent operating hours.

Total fuel use may be expressed in units of gallons for diesel or other liquid fuel, or units of therms or cubic feet for natural gas.

Facility	Permit #	Equipment ID - Description	Firing Rate (MMBtu/hr)	Full Load Equivalent Operating Hours		Amount of Fuel Consumed	Fuel Units (therm, gal, or cu.ft)
104	E02	Hot Oil Heater, CEI 2000 H 63284 (hours=gallons, E/F=lb/gall)	1		or		
104	E03	S.T. Johanson Gas After Burner; M/N DHF 150 G4G/BTU/HR; Rotary Dryer; S/N DA60X391 (hours=gallons, E/F=lb/gall)	1		or		

Asphalt Plants

Particulate emissions from asphalt plants may be estimated from the amount of asphalt concrete produced. Gaseous emissions from the asphalt plant and associated heaters, etc. may be estimated from the amount of fuel consumed in gallons for fuel oil, or in therms or cubic feet for natural gas.

Please correct any incorrect information below.

Facility	Permit #	Equipment ID - Description	Asphalt Produced (tons)	Amount of Fuel Consumed	Fuel Units (therm, gal, or cu.ft)
104	E01	Drum Mix Asphalt/Recycle Machine Asphalt Paving Mix			

Asphalt Concrete Facilities

Emissions from asphalt plants are treated separately. Other emissions from asphalt concrete facilities may be estimated as sand and gravel processing as follows:

Definitions:

vmt = vehicle miles traveled annually

acre = total facility acreage (only needs to be entered once even if requested for separate stockpiles, etc.)

Description	Throughput	Units		Moisture Content %		Control Efficiency%
Mining/Excavation		(ton)	and		or	
Crushing		(ton)	and		or	
Screening		(ton)	and		or	
Stacker Conveyor, Batch Drop (8 ft)		(ton)	and		or	
Belt Conveyor /Transfer point (2 ft)		(ton)	and		or	
Overburden removal		(ton)	and		or	
Hauling		(vmt)	and		or	
Surfaces		(acre)	and		or	

Alternatively the emissions may be estimated by adding the emissions of the individual units as follows:

Facility	Permit #	Equipment ID - Description	Production/ Throughput	Units	Moisture Content (%)
104	B21	Truck load out		(ton)	

spreadsheet (table, database report, etc) be sent also. The electronic copy may be sent via floppy disk, CD, or (preferably) e-mail to Griffith@cchd.co.clark.nv.us.

We are currently renovating the inventory process. In the future we hope to accommodate the inventory process with all electronic reporting. This reporting might take a variety of forms and formats. To begin to establish dialogue it would be helpful if you could supply an e-mail address for the facility/company contacts.

Again if you are sending a survey based on your own format, and there is a "soft" (electronic, floppy disc, CD, e-mail) copy, please transfer an electronic copy so that it may be added to your records for future reference.

If there are any questions or comments please contact me at (702) 383-1276.

Sincerely,

Ben Griffith
Scanned

Ben Griffith, Project Manager

1999 Emissions Inventory Survey
(Grouped by Emission Unit Type)

Internal Combustion Engines (IC Engines)

Emissions from IC Engines may be estimated using either load/run time data or total fuel consumption.

Full Load Equivalent Operating Hours = The actual operating hours times the average load on the engine over the operating period. For instance, an IC engine operated for 1000 hours at an average load of 50% would have 500 full load equivalent operating hours.

The power for engines used in generator sets may be expressed in terms of electrical power (Kilowatts) as opposed to Horsepower. If the input is in Kw as opposed to horsepower, please note it on the form. Also, if the Horsepower of the engine on the form is incorrect, please correct it by overwriting.

Total fuel use may be expressed in units of gallons for diesel or other liquid fuel, or units of therms or cubic feet for natural gas.

Facility	Permit #	Equipment ID - Description	Power Output (Horsepower)	Full Load Equivalent Operating Hours		Amount of Fuel Consumed	Fuel Units (therm, gal, or cu.ft)
588	C01	Emergency Diesel Generator (Caterpillar); M/N 3306; S/N 9 NR 01874; 337 HP	337		or		
588	H01	I.C. Gasoline Engine; Wisconsin Model EY 18-3W; S/N 80088			or		

External Combustion Sources

Emissions from External Combustion Sources may be estimated using either load/run time data or total fuel consumption.

Full Load Equivalent Operating Hours = The actual operating hours times the average load on the device over the operating period. For instance, a boiler operated for 1000 hours at an average load of 50% would have 500 full load equivalent operating hours.

Total fuel use may be expressed in units of gallons for diesel or other liquid fuel, or units of therms or cubic feet for natural gas.

Facility	Permit #	Equipment ID - Description	Firing Rate (MMBtu/hr)	Full Load Equivalent Operating Hours		Amount of Fuel Consumed	Fuel Units (therm, gal, or cu.ft)
588	B01	Boiler, 0.25 MMBTU/HR Kochinvar PBN0250; S/N	0.25		or		
588	B02	Boiler, 0.25 MMBTU/HR Kochinvar PBN0250; S/N	0.25		or		
588	B03	Boiler, 0.25 MMBTU/HR Kochinvar PBN0250; S/N	0.25		or		

Cooling Towers

Emissions from Cooling Towers may be estimated from the operating hours, water flow rate, total dissolved solids, and the drift factor.

Operating Hours = The number of hours the unit was operated during the inventory period

Water Flow = The water flow rate in gallons per minute (gal/min) for the tower

TDS = Total Dissolved Solids present in the water in parts per million or milligrams per liter

Drift Factor = the fraction of cooling water evolved as liquid water usually expressed as %drift. (i.e. .005% drift is equivalent to a drift factor of .00005)

Please correct any incorrect information below.

Facility	Permit #	Equipment ID - Description	Operating Hours	Water Flow (gal/min)	Drift Factor (fraction)	Total Disoved Solids (ppm)
588	A01	Cooling Tower Marley NC II Tower; S/N 8904 5-409-85			0.0005	
588	A02	Cooling Tower Marley Tower; S/N 8904 5-540-86			0.0005	
588	A03	Cooling Tower Haven Model M47225			0.0005	
588	A04	Cooling Tower Expansion Bldg. Cooling Tower			0.0005	

VOC (Volatile Organic Compound) and HAP (Hazardous Air Pollutant) Emitting Facilities

VOC Emissions from VOC Emitting Facilities are most readily determined by listing the quantities of VOC containing substances consumed at the facility and multiplying the quantities used by the VOC content of the substances. HAP emissions are best determined in a similar manner.

Below are listed the emission points/units that are permitted for this facility with a blank space for a throughput, a unit, and a control efficiency. The throughput may be a consumption, production, usage figure or any parameter that indicates the amount of usage a unit received which is proportional to the emissions. A facility that produced10 tons of product would be entered with a "10" in the "Throughput" column and the word "tons" in the "Units" column. If the emissions from the unit are vented to an air pollution control device, express the efficiency of the device in the "Control Efficiency" column in units of %. Please complete these as best as possible.

The following three pages are worksheets for VOC and HAP Material usage and a list of Hazardous Air Pollutants. Please complete and return the worksheets as well as you can with this survey. Copy the worksheets if additional space is needed. It may take some time to get HAP and VOC reporting completely online. Again if you have your own format please try to submit an electronic (computer) copy also. Such that they can be used again in following years.

Facility	Permit #	Equipment ID - Description	Throughput/ Production/ Consumption	Units	Control Efficiency %
588	D01	Process D (Film Developing Agents)			
588	E01	Process E Platemaking (Developers/Finishers)			
588	F01	A.B. Dick Offset (non-heatset) lithographic press; S/N 004087			
588	F02	Community Offset; (non-heatset) Lithographic Press; S/N SSC368			
588	F03	Goss Metro Offset (non-heatset) Lithographic Press; S/N 1970-3076			
588	F04	Goss Metro Offset (non-heatset) Lithographic Press; S/N 1985-3395			

Facility	Permit #	Equipment ID - Description	Throughput/ Production/ Consumption	Units	Control Efficiency %
588	F05	Offset (non-heatset) lithographic press; Future Expansion Bldg. (western) Press			
588	F06	Offset (non-heatset) lithographic press; Future Expansion Bldg. (eastern) Press			
588	F07	Offset (non-heatset) lithographic press; Future Main Bldg. Press			
588	F08	Offset (non-heatset) lithographic press; Blanket Wash for A.B. Dick press			
588	F09	Offset (non-heatset) lithographic press; Blanket Wash for Community Press			
588	F10	Offset (non-heatset) lithographic press; Blanket Wash for Goss Metro 1970 Press			
588	F11	Offset (non-heatset) lithographic press; Blanket wash for Goss Metro 1985 Press			
588	F12	Offset (non-heatset) lithographic press; Blanket Wash for future expansion bldg. (western) Press			
588	F13	Offset (non-heatset) lithographic press; Blanket Wash for future expansion bldg. (eastern) Press			
588	F14	Offset (non-heatset) lithographic press; Blanket Wash for future main bldg. Press			
588	F15	Offset (non-heatset) lithographic press; Fountain Solution for Community press			
588	F16	Offset (non-heatset) lithographic press; Fountain Solution for Goss Metro 1970 press			
588	F17	Offset (non-heatset) lithographic press; Fountain Solution for Goss Metro 1985 press			
588	F18	Offset (non-heatset) lithographic press; Fountain Solution for future expansion bldg. (western) press			
588	F19	Offset (non-heatset) lithographic press; Fountain Solution for future expansion bldg. (eastern) press			
588	F20	Offset (non-heatset) lithographic press; Fountain Solution for future main bldg. press			
588	F21	Offset (non-heatset) lithographic press; Press lubrication			
588	F22	Offset (non-heatset) lithographic press; Safety Kleen Equipment Cleaner			
588	F23	Offset (non-heatset) lithographic press; Flow thru process tank (5000 gal. capacity)			
588	F24	Offset (non-heatset) lithographic press; Flow thru process tank (4000 gal. capacity)			
588	G01	Surface Coating Operations; Base Coating Aqua Sash (white) Water Base Paint			
588	G02	Surface Coating Operations; Enamel Based Colored Paints			
588	G03	Surface Coating Operations; Kermac Mineral Spirits Thinner			
588	G04	Surface Coating Operations; Safety Kleen Equipment Cleaner			
588	I01	Process I O & M (Floor Soap, Press Lube)			

interoffice memo

Date: 1-28-00

To: M. Sword

CC: M. Naylor, F. Durosinmi, A. Bashor, H. Glasser, E. Gilmartin, D. Wignall, M. McNinch, D. Lee, J. Hartwell

From: Ron Smolinski

RE: SOP development Status

The following establishes the current status and Estimates to Completion (ETC) for the development of Division wide Standard Operating Procedures (SOP's). Each of the Supervisors has provided the following information regarding SOP development within their respective sections.

SOP's complete

SOP's in work, status, ETC

SOP's planned, estimated start date, ETC

Please note that the stated ETC's are anticipated dates that the SOP will be completed and submitted for review.

ATTACHMENT:

SOP Development Status Chart.

To MS
for review
1-28-00

STANDARD OPERATING PROCEDURE DEVELOPMENT STATUS

PROCEDURE NAME	NUMBER ASSIGNED	RESPONSIBLE SECTION	STATUS	AUTHOR	DATE ISSUED	EST. START	ETC
PROCEDURES COMPLETED							
Data Processing Service Requests (DPSRs)	AP-0101	Project Mgmt	Published	D. Fischer	9/17/99		
Procedure Documentation & Issue	AP-0001	Project Mgmt	Published	R. Smolinski	1/3/00		
PROCEDURES IN WORK							
Management Responsibility	AP-0002	Project Mgmt	In Review	R. Smolinski			3/1/30
Training, Staff	AP-0003	Project Mgmt	In Work	R. Smolinski			6/1/00
Contact of New Business Permitees	AP-0100	Project Mgmt	In Work	R. Smolinski			4/1/00
Emission Offset Program - Existing Sources	AP-0110	Project Mgmt	In Work	A.Leskys			5/1/00
Emission Offset Program - New/Mod Sources	AP-0111	Project Mgmt	In Work	A.Leskys			
Complaint Response (Work Hours)	AP-0400	Enforcement (Bashor)	In Work	S. Newell			3/1/00
Part 70 Operating Permit (OP) Process	AP-0500	Title V	In Review	D. Fischer			8/1/00
New Source Registration & Billing	AP-0600	NSR	In Work	R. Smolinski			5/1/00
Sample/Test CBG gasoline, Reg 54	AP-0700	Compliance	In Work	R. Smolinski			8/1/00
Administrative Procedures - Compliance Section	AP-0701	Compliance	In Work	D. Cord			7/1/00
Inspections and AIRS		Compliance	In Work	T. Goewert			7/1/00
Gas Dispensing Facility Permitting		Compliance	In Work	R. Moreno			7/1/00
Gas Dispensing Facility Test & Inspections		Compliance	In Work	C. Morris			7/1/00
Permit Compliance		Compliance	In Work	L. Kain			7/1/00
Performance Testing	AP-0750	Compliance	In Review	R. Folle			7/1/00
Continuous Emissions Monitoring (CEMS)	AP-0751	Compliance	In Review	R. Folle			7/1/00
PROCEDURES PLANNED							
Major Part 70 Operating Permit Process		Title V				1/1/01	1/1/02
New Source Review Guidance Manual		NSR				3/1/00	7/1/00
NSR Data Base Management Guidelines		NSR				7/1/00	1/1/01
Emission Inventory Inspections	AP-0112	Project Mgmt		G. Savage		4/1/00	1/1/01
Enforcement Guidance Manual		Enforcement (Glasser)				7/1/01	7/1/02
Sect 18 Permit & Tech. Fees, Annual Adjustments		Project Mgmt		R. Smolinski		8/1/00	10/1/00
Document Control		Proj Mgmt		G. Savage ?			

Appendix B

Section Two
Quality Assurance Audit - Clark County March 2001 SIP PM_{10} Emissions Inventory Clark County, Nevada

(Converse Consultants – Project No. 01-43162-01)

Second Final Report
June 15,2001

Converse Consultants
Over 50 Years of Dedication in Geotechnical Engineering and Environmental Sciences

QUALITY ASSURANCE AUDIT

CLARK COUNTY MARCH 2001 SIP
PM_{10} EMISSIONS INVENTORY
CLARK COUNTY, NEVADA

Prepared for:

Clark County Department of
Comprehensive Planning
500 South Grand Central Parkway
Suite 3012
Las Vegas, NV 89155-4000

Converse Project No. 01-43162-01

June 19, 2001

30/2CS

731 Pilot Road, Suite H, Las Vegas, Nevada 89119-4429
Telephone: (702) 269-8336 ♦ Facsimile: (702) 269-8353 ♦ e-mail: converse@convrs.com

Quality Assurance Audit of Revised PM_{10} Emissions Inventory

Contents

Page

1.0 Introduction 1

2.0 Background 2

3.0 Audit Procedures 4

4.0 Audit Findings 5

5.0 Recommendations to Improve QA Program 7

6.0 Discussion 9

Appendix A – Source Specific Checklists

Appendix B – Quality Assurance Inventory Checklist

Quality Assurance Audit of Revised PM_{10} Emissions Inventory

1.0 Introduction

Converse Consultants (Converse) is pleased to submit this report for the Quality Assurance (QA) audit of the *Revised* PM_{10} *Emission Inventory* for the Clark County Department of Comprehensive Planning (CCDCP). Between April 9, 2001 to April 12, 2001, a second technical systems audit of the PM_{10} emission inventory was conducted by Converse at the County Government Center in Las Vegas, Nevada. Converse previously conducted a QA audit of the *Draft PM_{10} State Implementation Plan* (SIP) *for Clark County (September 2000) Emissions Inventory* in August 2000. This audit was necessary since the inventory had been revised. Specifically, references used to develop the initial inventory reported in this version of the SIP had been updated (e.g., disturbed vacant lands) and new inventory categories were reported (e.g., 1998 Annual and 24-hour BLM Disposal Area PM_{10} Emission Inventory).

Converse has objectively re-assessed the procedures, systems, and data independently used to develop the *Revised PM_{10} Emissions Inventory*. Since Converse has not been directly involved in the inventory development process, a high quality audit has been preformed using effective quality procedures. The audit is part of the QA program designed to help produce an accurate and complete emissions inventory.

Converse continued to foster a good working relationship with CCDCP Inventory Development team (ID team). Information regarding data quality from the ID team was readily given to Converse to further our understanding of the emissions inventory development procedures and the concerns of the ID team. Converse noted continuous improvement of the inventory development throughout the process and has given recommendations for improvement, where necessary. The following sections present background, audit procedures and findings, and recommendations to improve the program, followed by a final discussion.

2.0 Background

The Clean Air Act (CAA) requires state and local air quality agencies to develop complete and accurate inventories as an integral part of their air quality management responsibilities. Under the authority granted by the Governor of Nevada, the Clark County Board of Commissioners is responsible for the preparation of a SIP for non-attainment areas within Clark County to attain National Ambient Air Quality Standards (NAAQS). Once approved by the Clark County Board of Commissioners, the SIP is forwarded to the Nevada Division of Environmental Protection (NDEP) for approval. After approval by the State of Nevada, the Governor of Nevada sends the SIP to the United States Environmental Protection Agency (USEPA) for federal approval in accordance with the 1990 CAA Amendments.

The Clark County Air Quality Planning Committee (AQPC) was formed by a resolution adopted by the Clark County Board of County Commissioners in 1993. Membership includes representatives from Clark County Health District's (CCHD) Air Quality Division (AQD); the Regional Transportation Commission of Clark County (RTC); and the Clark County Department of Aviation (DOA). The AQD collects data from permitted stationary sources. The RTC provides the emissions from the on-road mobile sources. The DOA provides the emissions from the three airports in the area. The Clark County Department of Public Works (CCPW), the NDEP, the Nevada Department of Transportation (NDOT), the Desert Research Institute (DRI), and the Cities of Las Vegas, North Las Vegas, and Henderson provided review comments on the work related to the emissions inventory. The data is then collected by CCDCP and entered into the annual *PM_{10} Emissions Inventory* database. The emissions data from the AQD, RTC, and CCDCP are combined to yield the final emissions inventory included in the SIP.

This data was continuously updated throughout the development of the inventory. After the publication of the *Draft PM_{10} SIP* dated September 2000, the inventory was updated using new reference values for disturbed vacant land and other updates received after the this *Draft* SIP was issued for review by these other agencies.

These air emission inventories are used to evaluate air quality, track emission reduction levels, and set policy on a national and regional scale. Since the data are often developed and complied on a local level by multiple agencies and individuals, a uniform and systematic approach to collecting and reporting data are needed, as well as, standardized procedures and guidance to eliminate variations of interpretation.

The main goal of a standardized approach is to improve the quality of the emissions data collected, as well as to improve the manner in which data and information are transferred and shared. However, it is important to recognize that good quality assurance/quality control (QA/QC) procedures only produce results that are as good as the emission estimation methodology allows.

Converse previously identified a draft *QA Plan* prepared by CCDCP during the first emission inventory audit (Converse 2000). This plan was never approved and still had not been distributed to the ID team before commencing the inventory activities. Therefore, Again, Converse did not expect to find complete compliance with the quality control procedures. However, the Quality Control (QC) and documentation procedures in use at the time of the audit were assessed and compared to the QA requirements established by the USEPA for emissions inventory development work. The ultimate goals of the QA/QC program developed for emissions inventory development are data accuracy, procedural consistency, and good documentation of the data and all inventory development activities. When the potential for problems or deficiencies in the QC program were found, recommendations have been given in this report for improvements. The following section describes the procedures used to conduct the audit.

3.0 Audit Procedures

Converse has assessed the overall quality of the inventory by reviewing project activities that led to the *Revised PM_{10} Emission Inventory.* The objective of the QA review was review and confirm the revised calculations, as well as to provide the best available indication of the overall quality and completeness of the *PM_{10} Emissions Inventory.* Project activities reviewed included data gathering, data documentation, calculating emissions, data checking, reporting, and maintenance of the master file. Specifically, the following tasks were conducted:

1. Converse interviewed project personnel to obtain available information about their duties. Before the audits, Converse informed the persons to be interviewed of the date and time of the audit and data/system to be reviewed. Source specific checklists given in Appendix A were used. System audits were also conducted to determine whether the procedures used are effective to collect data, document inventory development activities, and maintain the data (Appendix B).

2. Identified the revised emission inventory calculations from the previous audited emissions inventory by comparing the Tables given in Section 3 of the September 2000 *Draft SIP* to the Tables given in Section 3 of the March 2001 *Draft SIP.*

3. Reviewed/audited the revised emission inventory for the following parameters:

   - *Accuracy* – Reviewed of 100% of data summary to check the calculations made by the data generator (or inventory development team (ID)) member. Reviewed findings and identified corrective actions.

- *Completeness* – Reviewed 50% of the files to ensure that all sources identified were included in the inventory.

- *Representativeness* – Determined if the primary source data was compared to previous emissions and similar results from comparable regions to determine the reasonableness of the emissions estimates and representativeness of the data.

- *Comparability* – Reviewed reporting units to ensure that they are the same as the last inventory units used.

The audit did not include the emission projections out to the 2006-attainment year.

During the audit, Converse met with several individuals involved in permitted and non-permitted sources inventory development and ask them to describe the procedures followed. Some personnel were asked about the physical review, analysis, and data entry process. While this was being done, Converse assessed each person's experience using the database and ease in assessing the information recorded on the forms. Data documentation procedures, data management procedures, and use of senior technical resources were also evaluated. The results of the audit were documented using the forms presented in Appendices A and B of this report. The findings from these individual assessments and the recommendations to improve the QC procedures are presented in the next section of this report.

4.0 Audit Findings

This external audit was conducted after the completion of the *Revised PM_{10} Emission Inventory*. Overall, no major deficiencies in the accuracy or completeness of the emission inventory were found. No major mathematical errors were found in hand calculations or in spreadsheets reviewed. This includes the use of incorrect conversion factors, mismatched units in the emission factor and activity parameters, incorrect constants, and arithmetic errors. Failures to include major sources or source categories were not found. Double-counting emissions between area and point source inventories were not apparent. However, the audit findings revealed that inadequate resources are devoted to QA/QC activities. Instead, more effort is being placed on technical over-sight during inventory development.

Two minor errors were found during audit activities. The 1998 emissions for *Vacant Land* for the *J.D. Smith Micro-Scale PM_{10} Emission Inventory* were reported as 231.4 versus 213.4 (typing error). However, the error was not carried to the subtotals and totals given in the table. The second error found was found in the inventory file for *Railroad Equipment Emissions*. A total of 14.6 tons/year were reported instead of 16.4 tons in Table 3-1 of the *March 2001 SIP*.

During the initial audit stages, the most current hard copies of the emission inventory Excel (spreadsheets) calculation sheets were not found in the files where changes had been made. The electronic files were audited instead. The old sheets were later pulled and replaced with updated copies.

No changes were made to the five monitoring station micro-inventories. No changes in the *Stationary Point Sources* emission inventory were found.

There are no existing Standard Operating Procedures (SOPs) for the development of the emissions inventory to date. During an interview with Ms. MacDougall at CCDCP during the previous audit, it became apparent that SOPs at CCDCP did not readily exit. Ms. MacDougall started employment at CCDCP in late May 2000 and diligently began to independently update and QA the *PM_{10} Emissions Inventory* started by a former employee at CCDCP, Mr. Rick Matar. The development of the SIP document along with the emission inventory update continued to be her main priority. For more details of her interview, see the quality assurance inventory checklist documenting her interview given in Appendix B.

Another audit finding, during the interview with Ms. MacDougall, was the use of sufficient adequately trained personnel at the CCDCP and the use of sufficient senior technical supervision at the CCDCP to develop an accurate emissions inventory. However, Ms. MacDougall was leaving CCDCP and moving to the CCHD's AQD as Assistant Director. Again, peer review documentation was not found for the data produced by each inventory staff members. Implementation of the QA plan would help identify staff who could be assigned responsibility for meeting quality objectives and data validation. In addition, data documentation procedures could be improved at CCDCP and AQD to facilitate referencing data obtained via telephone or added/corrected because of engineering judgment. The improvement in data documentation would also facilitate reconstruction of inventory development activities and thus provide a means to better assess data quality and accuracy of the inventory.

Copies of the audit quality control checklist for each inventory and the corresponding subcategory are included in Appendix A. Since implementation of an emission inventory quality assurance plan did not occur, some questions listed in the checklist were not applicable.

Although the audit findings do not suggest major deficiencies in the emission inventory data, recommendations for improvement of the QC program are made to further verify the accuracy of the inventory results and integrity of the data.

5.0 Recommendations to Improve QA Program

Because of the audit findings, the following recommendations are again made to improve the overall quality of the emissions inventory development program:

1. *Prepare Standard Operating Procedures (SOPs)* describing the methods and emission factors used to determine emissions from all primary and secondary sources for dissemination to emission inventory development staff. Also, included in these SOPs should be QA/QC procedures and documentation/database management procedures including a controlled emission inventory electronic database with update tracking procedures. This could be accomplished by converting Appendix C of the *1998 PM_{10} SIP for Clark County– Emissions Inventories Methodology, Emission Factors, and Emission Estimates* into SOPs, and including SOPs used by other supporting agencies.

2. *Prepare an Emissions Inventory Development Work Plan concurrently with or after preparation of the QA plan.* The workplan should discuss staff assignments and responsibilities, including those of inventory development personnel and the QA coordinator. It should include standard operating procedures for data collection, data handling, emission estimates and documentation, and reporting of inventory development activities. An effective QA program will include a schedule including numerous QC checks during inventory development, and QA audits at strategic points in the process.

3. *Implementation of a data attribute rating system (DARS) to rank point and area source methods.* Because of the different emission estimating methods that can be used to develop the emissions inventory, there is inherent uncertainty of the estimation methodology. The DARS scores provide a means of assessing the relative merits of alternative approaches to estimation. Implementation of the DARS can serve as indicators of data quality, be used to identify appropriate estimation methods, and help determine which sources are in need of improvement.

6.0 Discussion

This discussion is essentially the same as reported in the previous audit of the PM_{10} emission inventory — that QA activities are essential to the development of comprehensive, high-quality emission inventories for any purpose. Furthermore, a well-developed and well-implemented QA program fosters confidence in the inventory and any resulting regulatory and/or control program. Failure to implement and adhere to a QA program most likely leads to undesirable consequences such as incomplete and/or inaccurate inventory. Failure would have major impacts with respect to future inventories developed for SIP compliance and attainment demonstration purposes.

Management plays a critical role in supporting and maintaining quality systems. Through strong leadership, management must define the organization's environmental policy that ensures continual improvement, must provide a framework for setting and reviewing objectives, and must be documented.

Source Specific Checklists

Appendix A

QUALITY CONTROL CHECKLIST

Auditor: TRACY GETER Date APRIL 11, 2001 / 4/12/01

Data/Procedure Reviewed: 1998 ANNUAL NON ATTAINMENT AREA PM_{10} EMISSIONS INVENTORY (CALCULATIONS)

Inventory Development Personnel Involved in Work: MS. CARRIE MAC-DOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

DISTURBED VACANT LANDS / UNPAVED PARKING LOTS

B. Describe the data included in the master file for the facility or source category.

COMPUTER FILE <NAAAnnualVacantLandEmissions>

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

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How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Actual Y/N

F. Are the procedures used to calculate emissions described in the data provided Y/N
Yes

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

CARRIE MACDOUGALL

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? COPIES Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

CALCULATED VALUE HAS INCREASED DUE TO THE

INCREASE IN UNSTABLE LAND ACREAGE

QUALITY CONTROL CHECKLIST

Auditor: Tracy Geter   Date: April 12, 2001

Data/Procedure Reviewed: 1998 Annual Nonattainment ~~PM_{10}~~ Area PM_{10} Emissions Inventory

Inventory Development Personnel Involved in Work: Ms. Carrie MacDougall

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

~~Disturbed~~ Native Desert Fugitive Dust (Stationary Sources)

B. Describe the data included in the master file for the facility or source category.

Calculation sheets, spreadsheets and reference materials are found in the file folder; Excel file <NAAANNUAL Vacant Land Emissions>

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

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How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? ACTUAL Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

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I. How are unavailable data identified? Are they mentioned in the report?

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II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

CARRIE MACDOUGALL

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? COPIES Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

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III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

APPEARS TO BE AN INCREASE IN ACREAGE FOR ~~THIS~~ THIS CALCULATION

PUT AN UPDATED SPREADSHEET INSIDE FOLDER

QUALITY CONTROL CHECKLIST

Auditor: TRACY GETER Date APRIL 11, 2001

Data/Procedure Reviewed: 1998 ANNUAL NON ATTAINMENT AREA PM_{10} EMISSIONS INVENTORY (CALCULATIONS)

Inventory Development Personnel Involved in Work: MS. CARRIE MACDOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

STRUCTURAL / VEHICLE FIRES / WILD FIRES

B. Describe the data included in the master file for the facility or source category.

HARD COPY OF CALCULATION SHEETS

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

AFTER REVIEWING THE CALCULATION SHEETS AND EXCEL SPREAD SHEET,

WE REVIEWED APPENDIX B.

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How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

BY REVIEWING APPENDIX B FROM THEIR SIP DRAFT REPORT

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N

YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

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I. How are unavailable data identified? Are they mentioned in the report?

METHODOLOGY IS EXPLAINED IN APPENDIX B.

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

CARRIE MACDOUGALL

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

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III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

IV. COMMENTS

QUALITY CONTROL CHECKLIST

Auditor: TRACY GETER Date APRIL 11, 2001

Data/Procedure Reviewed: 1998 ANNUAL NONATTAINMENT AREA PM10 EMISSIONS INVENTORY

Inventory Development Personnel Involved in Work: MS. CARRIE MACDOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

RAILROAD EQUIPMENT (NONROAD MOBILE SOURCE)

B. Describe the data included in the master file for the facility or source category.

NON-ROAD SOURCE FOLDER, EMISSION FACTORS (PROVIDED BY EPA), NEVES MODEL SPREADSHEET, AND HANDWRITTEN CALCULATIONS

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

RESEARCH AND REVIEW ALL POSSIBLE OPTIONS

At what point in the inventory process are requests for missing data made?

AFTER FILE AND COMPUTER REVIEW.

How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

DATA TABLE, B-69, IS SHOWN IN APPENDIX B OF THE SIP 2001 DRAFT REPORT, CALCULATION IS CONFIRMED BY COMPUTER SPREADSHEET

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N
ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N
YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

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I. How are unavailable data identified? Are they mentioned in the report?

CALCULATIONS ARE SHOWN ON EXCEL SPREADSHEET NON ROAD INVENTORY

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

CARRIE MACDOUGALL

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

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III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

A COPY OF THIS SPREADSHEET FOR RAILROAD EQUIPMENT SHOULD BE INCLUDED IN THE FILE FOR QA/QC PURPOSES.

~~CAN'T FIND ORIGINAL SOURCE FOR RAILROAD CALCULATION~~

EMISSIONS CALCULATION INCLUDES LINE HAUL AND SWITCHING WHICH SHOULD BE 14.5 + 1.85 = 16.35 TABLE SHOWS 14.6 tons/year

VERBAGE CONFIRMS (B-13) TWO TYPES OF ACTIVITY 'LINE HAUL AND TRACK SWITCHING

QUALITY CONTROL CHECKLIST

Auditor: TRACY GETER Date APRIL 12, 2001

Data/Procedure Reviewed: 1998 ANNUAL NONATTAINMENT AREA PM_{10} EMISSIONS INVENTORY (CALCULATIONS)

Inventory Development Personnel Involved in Work: MS CARRIE MACDOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

VEHICULAR EXHAUST (ON ROAD MOBILE SOURCES)

B. Describe the data included in the master file for the facility or source category.

UNABLE TO LOCATE FOLDERS. I HAVE OBTAINED A COMPUTER FILE WHICH CONTAINS EMISSIONS DATA AND FINAL CALCULATIONS

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

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How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

CARRIE MAC DOUGALL

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? ALL INFORMATION IS ON DISK Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

A HARD COPY OF THE EXCEL SPREADSHEET SHOULD BE PROVIDED IN A FOLDER.

CALCULATED NUMBERS WERE PROVIDED BY RTC.

QUALITY CONTROL CHECKLIST

Auditor: TRACY GETER Date APRIL 12, 2001

Data/Procedure Reviewed: 1998 ANNUAL NONATTAINMENT AREA PM10 EMISSIONS INVENTORY (CALCULATIONS)

Inventory Development Personnel Involved in Work: MS CARRIE MACDOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

VEHICULAR BRAKE WEAR (~~NONROAD~~ ONROAD MOBILE SOURCES)

B. Describe the data included in the master file for the facility or source category.

UNABLE TO FIND FOLDER. I MANAGED TO OBTAIN A COMPUTER FILE WHICH CONTAINS EMISSION DATA AND FINAL CALCULATIONS

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

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How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? ACTUAL Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N
YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

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I. How are unavailable data identified? Are they mentioned in the report?

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II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

CARRIE MACDOUGAL

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? ALL INFORMATION IS ON A DISK Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

A HARD COPY OF THE EXCEL SPREADSHEET SHOULD BE PROVIDED IN A FOLDER

CALCULATED NUMBERS WERE PROVIDED BY RTC.

QUALITY CONTROL CHECKLIST

Auditor: TRACY GETER Date APRIL 12, 2001

Data/Procedure Reviewed: 1998 ANNUAL NON ATTAINMENT AREA PM_{10} EMISSIONS INVENTORY (CALCULATIONS)

Inventory Development Personnel Involved in Work: MS. CARRIE MACDOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

VEHICULAR TIRE WEAR (ONROAD MOBIE SOURCES)

B. Describe the data included in the master file for the facility or source category.

UNABLE TO FIND ACTUAL FOLDER, I MANAGED TO OBTAIN A COMPUTER FILE <NAAANNUAL VEHICLE EXHAUST> WHICH CONTAINS EMISSION DATA AND FINAL CALCULATIONS

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

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How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? ACTUAL Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N

YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

CARRIE MacDOUGALL

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? DATA AND CALCULATIONS ARE FOUND ON ~~CEO~~ CRM'S COMPUTER Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

A HARD COPY OF THE EXCEL SPREADSHEET SHOULD BE PROVIDED IN A FOLDER

THESE VALUES WERE PROVIDED BY RTC

QUALITY CONTROL CHECKLIST

Auditor: TRACY GETER Date APRIL 12, 2001

Data/Procedure Reviewed: 1998 ANNUAL NONATTAINMENT AREA PM_{10} EMISSIONS INVENTORY (CALCULATIONS)

Inventory Development Personnel Involved in Work: MS. CARRIE MACDOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

VEHICULAR SULFATE PM (ON ROAD MOBILE SOURCES)

B. Describe the data included in the master file for the facility or source category.

UNABLE TO FIND HARDCOPY. I OBTAINED COMPUTER FILE NAAANNUALVEHICLE EXHAUST WHICH CONTAIN EMISSION DATA AND CALCULATIONS.

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

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How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N
ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N
YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

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I. How are unavailable data identified? Are they mentioned in the report?

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II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

CARRIE MACDOUGALL

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? NO, CALCULATIONS ARE FOUND ON A COMPUTER. Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

IV. COMMENTS

A HARD COPY OF THE EXCEL SPREADSHEET SHOULD BE PROVIDED IN A FOLDER.

CALCULATION INCREASED BY ONE PERCENT.

THESE VALUES WERE PROVIDED BY RTC

QUALITY CONTROL CHECKLIST

Auditor: Tracy Geter Date April 12, 2001

Data/Procedure Reviewed: 1998 Annual Nonattainment Area PM_{10} Emissions Inventory

Inventory Development Personnel Involved in Work: Ms. Carrie MacDougall

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

Highway Construction Projects - Wind Erosion (Onroad Mobile)

B. Describe the data included in the master file for the facility or source category.

Refence materials, spreadsheets and charts are located in the construction operation file folder.

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

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How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N
ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N
YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

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I. How are unavailable data identified? Are they mentioned in the report?

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II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

Carrie MacDougall

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Copies Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

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III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

CHANGE IN WIND EROSION VALUE IS DUE TO CHANGE IN UNCONTROLLED AND STABILIZED AREES. THIS INCREASE THE EMISSIONS FOR WIND EROSION UNDER HIGHWAY CONSTRUCTION.

QUALITY CONTROL CHECKLIST

Auditor: Tracy Geter Date April 12, 2001

Data/Procedure Reviewed: 1998 Annual Nonattainment Area PM_{10} Emissions Inventory (Calculations)

Inventory Development Personnel Involved in Work: Ms. Carrie MacDougall

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

Unpaved Road Dust (Onroad Mobile Sources)

B. Describe the data included in the master file for the facility or source category.

Spreadsheets and reference materials are found in the unpaved roads folder file

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

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How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N

YES, ON EXCEL SPREADSHEET

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

CARRIE MACDOUGALL

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? COPIES Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

A COPY OF THE MOST CURRENT SPREADSHEET SHOULD BE PROVIDED IN THE FOLDER FILE

• CHANGE IN VALUE FROM PREVIOUS INVENTORY WAS DUE TO MORE CURRENT INFORMATION PROVIDED FROM ~~AGO~~ ADT.

(SEE UNPAVED ROADS / SHEET BY ADT)

QUALITY CONTROL CHECKLIST

Auditor: TRACY GETER Date APRIL 12, 2001

Data/Procedure Reviewed: 1998 ANNUAL NONATTAINMENT AREA PM_{10} EMISSIONS INVENTORY

Inventory Development Personnel Involved in Work: MS. CARRIE MACDOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

PAVED ROAD DUST (W TRACK OUT) [ONROAD MOBILE SOURCE]

B. Describe the data included in the master file for the facility or source category.

SPREADSHEETS, REFERENCE MATERIAL AND CALCULATION SHEETS ARE PROVIDED IN THE PAVED ROAD FILE.

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

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How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? ACTUAL Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N
YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

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I. How are unavailable data identified? Are they mentioned in the report?

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II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

Carrie MacDougall
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C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Copies Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

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III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

MOST CURRENT SPREADSHEET SHOULD BE PROVIDED IN THE FILE.
(EXCEL: NAAANNUAL PAVED ROAD DUST)

CHANGE IN VALUE FROM PREVIOUS INVENTORY: CHANGES IN SEGMENT COLUMNS IN UNIMPROVED SHOULDERS TABLE & 1998 PARTICULATE EMISSIONS FROM ON-ROAD MOBILE

34,057 + 10,666 = 44,723.22

TRACKOUT = 561.4 + 44723 ≅ 45,284.4

QUALITY CONTROL CHECKLIST

Auditor: Tracy Geter Date April 12, 2001

Data/Procedure Reviewed: 1998 Annual Nonattainment Area PM10 Emissions Inventory (Calculations)

Inventory Development Personnel Involved in Work: Ms. Carrie MacDougall

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

North Las Vegas Municipal Airport (Nonroad Mobile Sources)

B. Describe the data included in the master file for the facility or source category.

Emission values from other contractors are provided in the airport emissions file

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

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How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N

YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

CARRIE MacDougall

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? COPIES Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

PROVIDE AT LEAST ONE HANDWRITTEN CALCULATION

QUALITY CONTROL CHECKLIST

Auditor: Tracy Geter Date April 12, 2001

Data/Procedure Reviewed: 1998 Annual Nonattainment Area PM10 Emissions Inventory (Calculations)

Inventory Development Personnel Involved in Work: Ms. Carrie MacDougall

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

Henderson Executive Airport (Nonroad Mobile Sources)

B. Describe the data included in the master file for the facility or source category.

Emission calculations from other contractors are provided in the airport emissions file

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

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How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? ACTUAL Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N
YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

Carrie McDonald

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? COPIES Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

AT LEAST THE HANDWRITTEN CALCULATION SHOULD HAVE BEEN PROVIDED BY THE CONTRACTOR

QUALITY CONTROL CHECKLIST

Auditor: TRACY GETER Date APRIL 12, 2001

Data/Procedure Reviewed: 1998 ANNUAL NONATTAINMENT AREA PM_{10} EMISSIONS INVENTORY (CALCULATIONS)

Inventory Development Personnel Involved in Work: MS. CARRIE MACDOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

MCCARRAN INTERNATIONAL AIRPORT (NONROAD MOBILE SOURCES)

B. Describe the data included in the master file for the facility or source category.

AIRPORT FILES ARE NOT PROVIDED IN THE NONROAD MOBILE SOURCE FOLDER. THEY ARE LISTED UNDER AIRPORT EMISSIONS

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

REVIEW APPENDIX B FROM SIP 2001 DRAFT, THEN REQUEST

FOR A COPY OF THE MISSING DATA

At what point in the inventory process are requests for missing data made?

AFTER REVIEWING APPENDIX B.

How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N

YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

A CLAUSE ON PAGE B-13, STATES WHERE THE VALUES FOR THE AIRPORT EMISSIONS CAME FROM.

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

CARRIE MACDOUGALL

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? COPIES Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

IV. COMMENTS

~~A MEMO SHEET OR FAX FROM CLARK COUNTY DEPARTMENT OF AVIATION SHOULD BE PROVIDED IN THE NONROAD SOURCE FILE.~~

ACCORDING TO APPENDIX B OF THE SIP 2001 DRAFT, " AN OUTSIDE CONTRACTOR ESTIMATED EMISSIONS FROM AIRCRAFT FROM THE THREE AIRPORTS UNDER THE JURISDICTION OF THE CLARK COUNTY DEPARTMENT OF AVIATION. ALL NECESSARY INFO IS PROVIDED IN THE AIRPORT EMISSIONS FILE

QUALITY CONTROL CHECKLIST

Auditor: TRACY GETER Date APRIL 11, 2001

Data/Procedure Reviewed: 1998 ANNUAL NONATTAINMENT AREA PM_{10} EMISSIONS INVENTORY (CALCULATIONS)

Inventory Development Personnel Involved in Work: MS. CARRIE MACDOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

CONSTRUCTION AND MINING EQUIPMENT (NON ROAD MOBILE SOURCES)

B. Describe the data included in the master file for the facility or source category.

NON-ROAD SOURCE FOLDER WHICH CONTAINS EMISSION FACTORS FOR LOCOMOTIVES (by EPA), SPREADSHEETS WITH CALCULATED EMISSIONS USING NEVES MODEL, AND HANDWRITTEN CALCULATIONS

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

INFO EXPLAINING 10% INCREASE

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

RESEARCH AND REVIEW ALL POSSIBLE OPTIONS

At what point in the inventory process are requests for missing data made?

AFTER THE FILE AND COMPUTER (SPREADSHEET) REVIEW

How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

DATA IS EXPLAINED IN APPENDIX B. (TABLE B-68)

AND FILE (EXCEL) NONROAD INVENTORY SEPARATES CONSTRUCTION

AND MINING FROM THE OTHER NONROAD PARAMETERS.

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? ACTUAL Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N

YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

UNAVAILABLE CALCULATIONS ARE EXPLAINED IN APPENDIX B.

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

Carrie MacDougall

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

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III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

PROVIDE AN EXPLANATION OF THE 1% INCREASE IN FILE FOLDER

A COPY OF TABLE B-68 SHOULD BE INCLUDED IN THE HARD COPY FILE.

QUALITY CONTROL CHECKLIST

Auditor: Tracy Geter Date April 11, 2001

Data/Procedure Reviewed: 1998 Annual Nonattainment Area PM_{10} Emissions Inventory (Calculations)

Inventory Development Personnel Involved in Work: Ms. Carrie MacDougall

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

Lawn and Garden Equipment (Nonroad Mobile Source)

B. Describe the data included in the master file for the facility or source category.

Nonroad Source Folder which contains emission factors for various non-road parameters (by EPA), spreadsheets of NEVES model, hand written calculations.

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

RESEARCH AND REVIEW ALL POSSIBLE OPTIONS.

At what point in the inventory process are requests for missing data made?

AFTER FILE AND COMPUTER REVIEW.

How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

DATA TABLE IS SHOWN IN APPENDIX B (B-69) OF SIP 2001 DRAFT REPORT. CALCULATION IS CONFIRMED BY COMPUTER SPREAD SHEET.

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N

YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

EACH CALCULATIONS ARE SHOWN ON NAKANONDAD INVENTORY Spreadsheet

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

Carrie MacDougall

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

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III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

A COPY OF THIS SPREADSHEET (B-69) FOR LAWN AND GARDEN EQUIPMENT SHOULD BE INCLUDED IN THE FILE.

TOTAL ON SPREADSHEET FOR LEGC / LEGR = 12.57 VALUE SHOULD BE ROUNDED TO 12.6.

QUALITY CONTROL CHECKLIST

Auditor: TRACY GETER Date APRIL 11, 2001

Data/Procedure Reviewed: 1998 ANNUAL NON ATTAINMENT AREA PM_{10} EMISSIONS INVENTORY (CALCULATIONS)

Inventory Development Personnel Involved in Work: MS. CARRIE MAC DOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

CHARBROILING / MEAT COOKING

B. Describe the data included in the master file for the facility or source category.

A FOLDER REVIEW WHICH CONTAINED A REPORT BY KENNEDY - JENKS, EXCEL SPREADSHEETS, AND A REFERENCE BY THE FOOD AND ~~AGRICULTURAL~~ AGRICULTURAL INDUSTRY

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

At what point in the inventory process are requests for missing data made?

AFTER REVIEWING THE FILE AND EXCEL SPREADSHEETS, WE REVIEWED APPENDIX B (SEEKING A REASON FOR INCREASING THE EMISSION VALUE BY 1%)

How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

MISSING INFORMATION IS EXPLAINED IN APPENDIX B OF THE SIP DRAFT.

Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? Y/N

ACTUAL

F. Are the procedures used to calculate emissions described in the data provided? Y/N

YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

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I. How are unavailable data identified? Are they mentioned in the report?

ONE PERCENT INCREASE IS SUMMARIZED IN APPENDIX B.

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

Carrie MacDougall

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

NONE

IV. COMMENTS

A SMALL ~~EXTRA~~ EXPLANATION FOR THE 1% INCREASE SHOULD BE PROVIDED IN THE FILES.

APPENDIX B (B-8) EXPLAINS THE 1% INCREASE FOR CHARBROILING / MEAT COOKING.

QUALITY CONTROL CHECKLIST

Auditor: Tracy Geter Date April 11, 2001

Data/Procedure Reviewed: 1998 Annual Nonattainment Area PM_{10} Emissions Inventory (Calculations)

Inventory Development Personnel Involved in Work: Ms. Carrie MacDougall

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

Residential Natural Gas

B. Describe the data included in the master file for the facility or source category.

Hard copy (folder) emission factors and data table

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N 14

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

MISSING CALCULATION FOR NEW VALUE IS EXPLAINED

IN APPENDIX B

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How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? ACTUAL Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N
YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

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I. How are unavailable data identified? Are they mentioned in the report?

THE REASONING FOR THE CALCULATED VALUE IS PROVIDED IN APPENDIX B.

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

CARRIE MAC DOUGALL

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

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III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

IV. COMMENTS

ORIGINAL VALUES FOR RESIDENTIAL NATURAL GAS WAS PROVIDED TO COMP PLANNING BY SOUTHWEST GAS COMPANY. THE CHANGE IN THE INITIAL VALUE (AUGUST 2000) IS EXPLAINED IN APPENDIX B (B-19)*. "IT IS ASSUMED AN ADDITIONAL ONE PERCENT WAS USED OUTSIDE THE BLM DISPOSAL BOUNDARY AREA."

* IF THIS INFORMATION WAS PROVIDED IN THE FOLDERS, IT COULD SAVE A LOT OF TIME ON RESEARCHING THE NEW CALCULATION.

QUALITY CONTROL CHECKLIST

Auditor: TRACY GETER Date APRIL 10, 2001

Data/Procedure Reviewed: 1998 ANNUAL NONATTAINMENT AREA PM_{10} EMISSIONS INVENTORY (CALCULATIONS)

Inventory Development Personnel Involved in Work: MR CLETE KUS MS. CARRIE MAC DOUGALL

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

RESIDENTIAL FIREWOOD (STATIONARY AREA SOURCES)

B. Describe the data included in the master file for the facility or source category.

FOLDER FILE: DOCUMENTS SHOWING A LIST OF CALCULATED EMISSIONS

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

AFTER REVIEWING THE INITIAL FILE AND COMPUTER EXCEL SHEETS, WE REQUESTED TO REVIEW THEIR DRAFT REPORT FOR MORE DETAILED INFORMATION.

How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

MISSING DATA HAS BEEN EXPLAINED IN APPENDIX B OF THE PM_{10} SIP (FOR 2001 DRAFT)

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? ACTUAL Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N
YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

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I. How are unavailable data identified? Are they mentioned in the report?

ALL NECESSARY DATA WAS ~~READY~~ ~~REALL~~ READILY AVAILABLE

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

CARRIE MAC DOUGALL

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

THERE WAS CORRESPONDENCE REQUESTING FOR ADDITIONAL INFORMATION.

E. Were copies or original data sheets submitted to the data entry personnel? Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N
VALUES ARE DOCUMENTED (EXPLAINED) IN APPENDIX B.

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

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III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

IV. COMMENTS

EMISSION VALUE HAS INCREASED FROM THE AUGUST 2000 INVENTORY EVENT. THE VALUE CALCULATED IN AUGUST 2000 WAS MULTIPLIED BY 1.01. ACCORDING TO APPENDIX B OF THE PM_{10} SIP UNDER "RESIDENTIAL FIREWOOD COMBUSTION", THE WOOD CONSUMED IN THE NON-ATTAINMENT AREA WAS ONE PERCENT MORE THAN THE BLM DISPOSAL BOUNDARY AREA.

QUALITY CONTROL CHECKLIST

Auditor: Tracy Geter　　Date April 12, 2001

Data/Procedure Reviewed: 1998 24-Hour Nonattainment Area PM10 Inventory (Calculations)

Inventory Development Personnel Involved in Work: Mr. Carlos MacDonald

Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures (access, organization, completeness, etc.). Record the findings and recommendations for corrective actions, if any, on the checklist and comment sheet provided.

If recommendations for corrective actions are made, discuss them with the Task Leader immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source evaluated.

Stationary Point, Stationary Area, Nonroad & Onroad Mobile Sources

B. Describe the data included in the master file for the facility or source category.

Using Excel Spreadsheet (Hard Copy) these files have been previously reviewed for the annual inventory

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N

Were the instructions for documenting the data followed? Y/N

D. Are there missing data fields? Y/N

What procedures are taken by the Data Manager and Task Leaders to ascertain missing data?

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At what point in the inventory process are requests for missing data made?

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How is the receipt of the missing data handled? (Are original data sheets placed in the master file?)

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Is the procedure followed to ascertain missing data efficient and adequate? Y/N

E. Are emissions types given (e.g., actual, allowable, maximum design capacity)? ACTUAL Y/N

F. Are the procedures used to calculate emissions described in the data provided? Y/N

YES

G. Are the emissions determined in a technically sound manner? Y/N

H. Are sufficient data provided to recalculate the emission results? Y/N

Verify the accuracy of the calculations of the emissions for some of the pollutants. (Attach calculation sheets to the checklist.)

If any of the values are incorrect, explain how the emissions data were corrected.

I. How are unavailable data identified? Are they mentioned in the report?

II. EMISSIONS DATABASE

A. Do the values reported on the data sheets reviewed agree with the entries in the database? Y/N

B. Who provided the data to the data entry personnel?

CARRIE MACDOUGAL

C. Was there evidence that the data were reviewed for accuracy and completeness prior to submittal to the data entry personnel? Y/N

D. Were the data sheets complete when they were received? Y/N

E. Were copies or original data sheets submitted to the data entry personnel? COPIES Y/N

If original data sheets were used, do the data tracking records show the release of the original data to the data entry personnel? Y/N

F. Were the QAP and a user's manual accessible to the data entry personnel? Y/N

G. Were the personnel adequately trained to perform the duties assigned? Y/N

H. Were the procedures followed in agreement with those specified in the QAP? Y/N

I. Is the database routinely backed up at the end of each updating event? Y/N

J. Does the computer allow double entries for the same source? Y/N

K. Are default values understood and properly documented? Y/N

L. Are key data fields flagged when data are not entered or are not available? Y/N

M. Ask the data entry personnel to explain the QC procedures followed to ensure data quality.

Do they agree with the procedures described in the QAP? Y/N

N. Does the computer system appear to be adequate for its intended use? (Ask the data entry personnel about the problems they have experienced with the system.) Y/N

O. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? Y/N

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Appendix B

QUALITY ASSURANCE INVENTORY CHECKLIST

Auditor Lori Headrick
Date 4-10-01

Personnel Interviewed Ms. Carrie MacDougall

This audit checklist is to be used to document the findings from the audit of activities and data associated with the (PM10 emissions inventory. Use applicable parts of the checklist to identify the quality concerns associated with each task. Document the results and use them to generate the audit report.

I. MANAGEMENT OF THE WORK

A.	Is the QAP available to the personnel audited?	Y/N
B.	Are the procedures applicable to their work understood and followed?	Y/N
C.	Are the procedures adequate for the desired outcome of the work performed?	Y/N
D.	Are meetings held routinely to discuss the progress of the work and any quality problems that were found?	Y/N
E.	Are the personnel adequately trained to perform the duties assigned?	Y/N
F.	Are the resources required to perform the duties assigned available and adequate to achieve the objective of the work?	Y/N
G.	Is the work on schedule?	Y/N

Converse Consultants

II. DATA MAINTENANCE AND COLLECTION

A. Are the data used for the inventory coded to facilitate tracking? Y/N

B. Are the data organized to facilitate retrievals? Y/N

C. Does the data file include of all of the data required to estimate the emissions from a given source? (Check about 4-5 sources) Y/N

D. Are the data in a place where access is controlled and limited? Y/N

E. Are the data copied when requests are made for retrievals? Y/N

F. If originals are released to inventory development personnel, is the location of the original data documented in the data tracking database? Y/N

G. Is the data tracking database operational and used to track the receipt and distribution of the data? Y/N

H. Are the state permit applications and supporting data completed in a manner that will not lead to misinterpretation of the data? (Check for obscuring of data when making corrections, insufficient data to discern the identity and level of emissions of a given pollutant, unclear labels on attachments, etc.) Y/N

I. Are the data documented in black ink so that reproductions will include all of the data recorded on the data forms? Y/N

J. Are the data request forms complete? If not, what is done to acquire the missing data? Y/N

Data request forms did not exist.

III. DATA EVALUATION

A. What steps were taken to ensure that the data collected are complete?

B. What steps were taken to evaluate the accuracy, completeness, comparability, and representativeness of the data?

C. What procedures were followed to eliminate double counting of sources or points within a source?

D. How were sources below the cutoff point handled?

E. Were task activities prioritized to provide emissions data about the highest emitters first? Y/N

F. Were discrepancies found in the data? If yes, what were they and how were they eliminated? Y/N

G. Were calculations reviewed by another IDT member for technical soundness and accuracy? used external audit Y/N

Were results documented? Y/N

H. Were evaluated data reviewed by a senior technical reviewer prior to entering it into the emissions database? Y/N

Were results from the data reviews documented and corrective actions implemented as requested? Y/N

If corrections were made, will the corrections affect other emissions data? Y/N

How was the impact of the erroneous data evaluated?

I. Were the data validation procedures and activities adequately documented in the bound project notebook assigned to the persons evaluating the data? Y/N

If no, describe the problems found.

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IV. EMISSIONS DATABASE DEVELOPMENT

A. Were the data validated prior to being entered into the database? Y/N

B. Were the data presented to the entry personnel recorded in a manner that facilitated entry into the database? Y/N

C. Was all of the information required to be entered in the database included on the data form? Y/N

D. If data are missing from data request forms, how are data gaps handled?

Given back to IDT member to fill

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E. Were results in the units to be reported? If not, were calculations performed manually or electronically? Y/N

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F. Were the database activities documented in the bound project notebooks? Y/N

Did the data recorded allow reconstruction of the activities? Y/N

Were pages in the notebook reviewed and signed by the senior technical reviewer? Y/N

G. Were data entries reviewed for transcription errors by someone other than the person entering the data into the database? Y/N

If problems were found, were the resolution of them documented and the revision of the data indicated in the electronic file? Y/N

H. Was the database developed so that revised versions of the database are identified? Y/N

I. Were the software and hardware evaluated to determine whether they are adequate to achieve the objectives of the computer database activities prior to using them? Y/N

What tests were performed and were the results from the tests documented? (response time, available memory, available power, accessibility for use)

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J. How often are files backed up?

Nightly

Is the schedule appropriate to minimize data loss? yes

K. Was a log maintained of database revisions? Y/N

L. Are the computer manuals available for use by the operators? Y/N

Does the manual include all of the data needed to log into the system and perform the duties required to develop the emissions database? Y/N

V. REPORTING

A. Was the report formatted as required by U.S. EPA? Y/N

B. Was the report clearly written and inclusive of the applicable emission source identified during the planning phase of the work? Y/N

If a source was missing, can the reason for the omission be verified to be acceptable? NA Y/N

C. Did the report accurately reflect the data included in the database? (Compare the results in the report to the information included in the database for 5-10 sources). Y/N

D. Was there evidence in the data file of editorial and technical review of the document? Y/N

E. Was a copy-ready version of the report included in the master data file? Y/N

VI. QUALITY CONTROL

A. Were the QC measures taken adequate to ensure data quality? Y/N

B. Were the project and quality goals met? NA Y/N

C. Were actions taken in response to all previous recommendations for corrective actions? Y/N

Did the actions taken adequately address the quality concerns found? Y/N

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