APPENDIX E

Inventory Projections Methodology and Calculations

APPENDIX E: INVENTORY PROJECTIONS METHODOLOGY AND CALCULATIONS

INTRODUCTION

The BLM disposal area annual inventories were projected for 2001, the attainment deadline, while the 24-hour valley-wide emission inventory was projected for 2001 and 2006. An extension until 2006 is being requested for the 24-hour National Ambient Air Quality Standard (NAAQS). The design day 24-hour valley-wide inventory was calculated by dividing the design year valley-wide inventory values by 365 for emission categories not related to meteorological conditions. For these categories (see Appendix B), the design year emission inventory was also projected to 2006 to project the 24-hour inventory.

The nonattainment area inventories were not projected for future years because the attainment demonstration is based on the BLM disposal area, not the nonattainment area. The attainment demonstration has been limited to this area for several reasons, including:

- All violations of the NAAQS for the annual and 24-hour standards occur within the BLM disposal area;
- Over 99 percent of the population within the nonattainment area are within the BLM disposal area;
- Over 99 percent of the Vehicle Miles Traveled (VMT) within the nonattainment area are within the BLM disposal area;
- The topography within the BLM disposal area is relatively uniform, while the nonattainment area varies by over 8,000 feet;
- All man-made emissions of PM_{10} except one major stationary source, a small percentage of unpaved road dust, and a small percentage of paved road dust are within the BLM disposal area; and
- Focusing on the BLM disposal area places a greater emphasis on sources closest to human receptors.

The 24-hour micro-scale inventories were not adjusted to reflect changes that may occur in the future. The five micro-scale sites were chosen to represent a typical range of likely 24-hour nonattainment scenarios and to reflect worst-case scenarios. Conditions that may be typical at a specific location in 1999 leading to a 24-hour average concentration higher than the NAAQS may no longer be present within the same micro-scale area in 2006, but may be typical at another monitoring location due to growth into new areas. Therefore, the location may change but the worst-case conditions leading to a 24-hour violation are reflected in the current design day inventories.

Projected inventories were developed using four basic methods: emissions will remain the same in the future; emissions will change by the same ratio as the

population is predicted to change; emissions will change based upon vehicle miles traveled in the nonattainment area; or emissions will change based upon the number of acres in a given land use category. The methodology, equations, and emissions factors described in Appendix B were used to calculate the emissions in the out years. Only the activity levels were changed. The meteorological data used for the design day or design year were also used for the inventory projections. The emission categories and the method for emission projections are summarized in Table E-1. The methods for emission projections are discussed in detail below.

Table E-1

Projection Method by Source Category

Source Category	Projection Method
Stationary Point Sources	
Sand & Gravel Operations	No Change Projected
Utilities – Natural Gas	No Change Projected
Asphalt Concrete Manufacture	No Change Projected
Industrial Processes	No Change Projected
Other Sources	No Change Projected
Stationary Area Sources	
Small Point Sources	No Change Projected
Residential Firewood	Change Based Upon Population
Residential Natural Gas	Change Based Upon Population
Commercial Natural Gas	No Change Projected
Industrial Natural Gas	No Change Projected
NG-Purchased at the source – Carried by SWG	No Change Projected
Structural/Vehicle Fires/Wild Fires	Change Based Upon Population
Charbroiling/Meat Cooking	Change Based Upon Population
Disturbed Vacant Lands/Unpaved Parking Lots	Change Based Upon Land Use
Native Desert Fugitive Dust	Change Based Upon Land Use
Stabilized Vacant Land Dust	Change Based Upon Land Use
Construction Activity Fugitive Dust	Change Based Upon Land Use
Windblown Construction Dust	Change Based Upon Land Use
Nonroad Mobile Sources	
Airport Support Equipment	Change Based Upon Population
Commercial Equipment	Change Based Upon Population
Construction & Mining Equipment	Change Based Upon Population
Lawn & Garden Equipment	Change Based Upon Population
Railroad Equipment	Change Based Upon Population
Recreational Equipment	Change Based Upon Population
McCarran International Airport	Change Based Upon Airport Activity

Table E-1

Projection Method by Source Category
(continued)

Henderson Executive Airport	Change Based Upon Airport Activity
North Las Vegas Municipal Airport	Change Based Upon Airport Activity
Nellis Air Force Base	No Change Projected
Onroad Mobile Sources	
Paved Road Dust (Includes Const. Track Out)	Change Based Upon VMT
Unpaved Road Dust	Change Based Upon VMT
Highway Construction Projects Activities	Change Based Upon Land Use
Highway Construction Projects – Wind Erosion	Change Based Upon Land Use
Vehicular Sulfate PM	Change Based Upon VMT
Vehicular Tire Wear	Change Based Upon VMT
Vehicular Brake Wear	Change Based Upon VMT
Vehicular Exhaust	Change Based Upon VMT

SOURCES WITHOUT EMISSION CHANGES IN FUTURE YEARS

Stationary sources and Nellis Air Force Base emissions were projected to remain relatively the same in future years. The relative stability of stationary sources is reflected in annual emission inventories. In the 1995 emission inventory prepared as part of the Particulate Matter (PM_{10}) Attainment Demonstration Plan,[1] stationary sources including stationary point sources, small point sources, and natural gas combustion were estimated to emit 1,855 tons of PM_{10}. In the 1998 emission inventory, the emission estimates for these same sources totaled 1,806 tons. Individual source emissions may vary from year to year but the overall emissions do not reflect an increase. Utility natural gas combustion is not anticipated to increase as more electricity is being imported into the Las Vegas Valley from power plants located outside the nonattainment area.

It is also not anticipated that further increases will occur because emission increases require stationary sources to implement a Best Available Control Technology (BACT) evaluation. The requirement for BACT begins for sources with a potential to emit two tons or more. Modifications must also meet the BACT requirement.

Aircraft emissions from Nellis Air Force Base were also assumed to remain relatively constant. No new aircraft is proposed for the base unless Congress approves funding for the new F-22 fighter. If funding is provided, F-22 fighters will be stationed at the base in exchange for F-15 fighters. Both planes are double engine aircraft. As explained in the environmental impact statement

[1] *Particulate Matter (PM_{10}) Attainment Demonstration Plan Las Vegas Valley Nonattainment Area, Clark County, Nevada*, Clark County Board of Commissioners, August, 1997.

prepared for the F-22 beddown at Nellis, it is anticipated that for every F-22 stationed at the base, one F-15 will be reassigned, resulting in no net change in PM_{10} emissions.

Presented in Table E-2 are the 1998, 2001, and 2006 valley-wide annual and 24-hour emission levels for the categories where emissions did not change. The only categories with emission changes for the J. D. Smith annual inventory were categories with changes from VMT increases. The J. D Smith emissions are summarized at the end of this appendix.

Table E-2

Valley-Wide Annual and 24-Hour Emission Levels Which Remain Unchanged

Emission Category	Annual PM_{10} Emissions (tons/year)	24-hour PM_{10} Emissions (tons/day)
Sand & Gravel Operations	627	1.72
Utilities – Natural Gas	199	0.55
Asphalt Concrete Manufacture	171	0.47
Industrial Processes	80	0.22
Other Sources	124	0.34
Small Point Sources	184	0.5
Commercial Natural Gas	33	0.09
Industrial Natural Gas	14	0.04
NG-Purchased at the Source – Carried by SWG	210	0.58
Nellis Air Force Base	32	0.09

SOURCES WITH EMISSION CHANGES BASED UPON POPULATION

The 1998 population within the BLM disposal area was 1,153,667 people, based upon the population profile used in the Carbon Monoxide Air Quality Implementation Plan.[2] The Regional Transportation Commission developed population estimates for the nonattainment area of 1,367,692 in 2001 and 1,592,831 in 2006.[3] The growth ratio from 1998 to 2001 is 1.1855. The growth ratio from 1998 to 2006 is 1.38. The emissions from the 1998 emission inventory were multiplied by these factors to predict the 2001 and 2006 emission levels for the following emission categories:

[2] *Carbon Monoxide Air Quality Implementation Plan Las Vegas Valley Nonattainment Area, Clark County, Nevada*, Clark County Board of Commissioners, October, 1995.
[3] *Clark County & Las Vegas Metropolitan Area Population Forecast and Growth Rate: 1997-2035*, Regional Transportation Commission of Clark County, Nevada, July, 2000.

- Residential natural gas combustion;
- Residential firewood combustion;
- Structural/vehicle fires/wild fires;
- Charbroiling/Meat Cooking;
- Airport support equipment;
- Commercial equipment;
- Construction & mining equipment;
- Lawn & garden equipment;
- Railroad equipment; and
- Recreational equipment.

Emission calculations for fires, airport support equipment, commercial equipment, construction & mining equipment, lawn & garden equipment, and recreational equipment are based upon population. Population change is a reliable indicator of changes for the other categories listed above.

The 24-hour inventory was developed by applying the growth factor to the annual inventory and dividing by 365 days for all categories listed above except residential firewood combustion. This category was divided by 93 days because residential woodburning only occurs during the coldest quarter of the year and the design day was in the coldest quarter.

The 2001 and 2006 valley-wide annual emission levels for the source categories listed above are presented in Table E-3. The 2001 and 2006 24-hour emission levels are presented in Table E-4.

Table E-3

Valley-Wide Annual PM_{10} Emission Levels Which Change Based Upon Population (tons/year)

Emission Category	2001	2006
Residential Firewood	89	104
Residential Natural Gas	79	92
Structural/Vehicle Fires/Wild Fires	20	24
Charbroiling/Meat Cooking	889	1,035
Airport Support Equipment	44	51
Commercial Equipment	0	0
Construction & Mining Equipment	428	498
Lawn & Garden Equipment	15	17
Railroad Equipment	17	20
Recreational Equipment	1	1

Table E-4

Valley-Wide 24-Hour PM_{10} Emission Levels Which Change Based Upon Population (tons/day)

Emission Category	2001	2006
Residential Firewood	0.96	1.12
Residential Natural Gas	0.22	0.25
Structural/Vehicle Fires/Wild Fires	0.06	0.07
Charbroiling/Meat Cooking	2.44	2.84
Airport Support Equipment	0.12	0.14
Commercial Equipment	0.00	0.00
Construction & Mining Equipment	1.17	1.36
Lawn & Garden Equipment	0.04	0.05
Railroad Equipment	0.05	0.05
Recreational Equipment	0.00	0.00

SOURCES WITH EMISSION CHANGES BASED UPON LAND USE

Construction activity from 1998 through 2020 was estimated by Clark County Comprehensive Planning. An increase of 25 percent was predicted from 1998 to 2000. Construction acreage was then predicted to decline by 40 percent between 2000 and 2006 as available housing began to meet housing demands. A 15 percent decrease was predicted between 2006 and 2010, and another 15 percent decrease between 2010 and 2020. The number of acres under active construction between 1998 and 2006 are summarized in Table E-5.

Table E-5

Construction Acreage

Year	Construction Acreage
1998	19,449
1999	21,881
2000	24,312
2001	22,691
2002	21,070
2003	19,448
2004	17,827
2005	16,207
2006	14,587

As presented in Table E-5, the number of acres under active construction in 1998 was 19,449. The number of acres under active construction in 2003 using the estimates developed by Clark County would be 19,448. The number of workers on construction sites was projected by UNLV.[4] The number of workers employed within the county for construction in 1998 was 77,356. The projected number of workers on construction jobs in 2003 is 77,447.[5] The number of workers estimates match within one tenth of one percent. This is an additional indicator that the estimates developed by the county are accurate because they match well with projections developed independently.

It is assumed most construction takes place on vacant land within the Bureau of Land Management disposal area. The Clark County Health District Air Quality Division permitted 897 acres of demolition projects in 1998. This number is relatively high compared to most years because two major demolition projects were undertaken that year. Using this number as a conservative number, 4.6 percent of the construction that occurred in 1998 occurred on land previously constructed upon. Therefore, it is assumed that 95.4 percent of construction occurs on land not previously occupied. Table E-6 summarizes the number of acres of construction each year and the number of new acres that will be constructed upon.

Table E-6

Number of Acres of Construction and Vacant Land Constructed Upon

Year	Acres Under Construction	Acres of Vacant Land Constructed Upon
1998	19,449	18,555
1999	21,881	20,874
2000	24,312	23,193
2001	22,691	21,647
2002	21,070	20,101
2003	19,448	18,553
2004	17,827	17,007
2005	16,207	15,461
2006	14,587	13,916

Vacant land has been categorized as either native desert, stabilized, or unstable. Construction can occur on land in any of the given categories. No efforts have been made to determine construction on previously disturbed land, but native desert disturbance has been determined for previous years and projected for

[4] Riddel, Mary, Schwer, Keith; *Clark County Nevada Population Forecast: 1999-2035,* The Center for Business and Economic Research, University of Nevada, Las Vegas, December, 1999.
[5] Op. Cit.

future years as part of the Clark County Desert Conservation Plan, prepared in response to the Federal listing of the desert tortoise as a threatened species. This plan was integrated into the Multiple Species Habitat Conservation Plan (MSHCP) and Environmental Impact Statement.[6] The ratio of number of acres of native desert disturbance to each new inhabitant was developed by comparing the population increase of an area to the increase in the number of disturbed acres. The ratio used in the desert conservation plan was 0.1916. By multiplying this ratio by the population increase, the number of acres of construction on native desert can be calculated.

Therefore, construction will assume to take place on the number of acres of native desert predicted by the MSHCP. Subtracting the acres of native desert that may be disturbed from the total number of acres of vacant land with construction, we can determine the number of acres of construction that will occur on vacant land classified as stabilized or unstable. Table E-7 summarizes the number of acres of native desert that will constructed upon.

Table E-7
Number of Acres of Native Desert Constructed Upon

Year	Population	Change in Population	Number of Acres of Native Desert Constructed Upon
1997	1,111,607	72,276	
1998	1,183,883	71,370	13,848
1999	1,255,253	58,915	13,674
2000	1,314,168	53,524	11,288
2001	1,367,692	49,748	10,255
2002	1,417,440	47,148	9,531
2003	1,464,588	44,913	9,034
2004	1,509,501	42,718	8,605
2005	1,552,219	40,612	8,185
2006	1,592,831	39,035	7,781

For the remaining number of acres of construction, Clark County does not have any data that can be used to determine the amount of construction that takes place on stabilized or unstable land. In the 1998 inventory, one out of every ten acres of vacant land was unstable and three out of every ten acres was classified as stabilized. In other words, roughly 25 percent of the vacant land that was not native desert was unstable and 75 percent was classified as stabilized (See Appendix B). Of the remaining acres of construction on previously undeveloped land not predicted to be native desert, it is estimated 75 percent will be on land that was previously classified as stabilized and 25 percent will be on land that

[6] *Clark County Multiple Species Habitat Conservation Plan and Environmental Impact Statement,* Clark County Department of Comprehensive Planning, September, 2000.

was previously classified as unstable. Using these estimates, the number of acres of construction on each vacant land classification can be determined. Table E-8 summarizes the number of acres of each vacant land category being constructed upon by year.

Table E-8

Number of Acres of Construction by Vacant Land Category 1998-2006

Year	Acres of Vacant Land Constructed Upon	Number of Acres of Native Desert Constructed Upon	Remaining Acres of Vacant Land With Construction	Acres of Stabilized Land	Acres of Unstable Land
1998	18,555	13,848	4,707	3,530	1,177
1999	20,874	13,674	7,200	5,400	1,800
2000	23,193	11,288	11,905	8,929	2,976
2001	21,647	10,255	11,392	8,544	2,848
2002	20,101	9,531	10,569	7,927	2,642
2003	18,553	9,034	9,520	7,140	2,380
2004	17,007	8,605	8,402	6,301	2,100
2005	15,461	8,185	7,277	5,458	1,819
2006	13,916	7,781	6,135	4,601	1,534

The number of acres of vacant land in each vacant land category can be determined for each year. The results of these calculations are presented in Table E-9.

Table E-9

Number of Acres in Each Vacant Land Category 1998 through 2006

Year	Number of Acres of Native Desert	Number of Acres of Stabilized Land	Number of Acres of Unstable Land
1998	113,802	54,666	18,719
1999	99,953	51,136	17,542
2000	86,279	45,736	15,742
2001	74,991	36,807	12,766
2002	64,736	28,263	9,918
2003	55,204	20,337	7,276
2004	46,170	13,197	4,896
2005	37,565	6,896	2,795
2006	29,380	1,438	976

The acreage in Table E-5 for 2001 and 2006 was used to calculate construction, including track out, and wind erosion emissions for the valley-wide emission inventories. Track out emission estimates were adjusted to reflect the anticipated number of egress points based upon the number of acres under construction. The same meteorological data for the design day or year and resulting emission factors were used for wind erosion emission calculations. Land use acreage was assumed to not change within the J. D. Smith micro-scale area in future years. Land use acreage as depicted in Tables E-5 and E-9 were used for the following emission categories:

- Disturbed vacant lands/unpaved parking lots;
- Native desert fugitive dust;
- Stabilized vacant land dust;
- Construction activity fugitive dust;
- Windblown construction dust;
- Highway construction projects activities; and
- Highway construction projects – wind erosion.

Construction activity fugitive dust and highway construction projects activities are the only two categories listed above that are not dependent on wind conditions. For this reason, the 24-hour inventory was based upon the annual inventory divided by 365 days for these two categories.

The 2001 and 2006 valley-wide annual emission levels for the source categories listed above are presented in Table E-10. The 2001 and 2006 24-hour emission levels are presented in Table E-11.

Table E-10

Valley-Wide Annual PM_{10} Emission Levels Which Change Based Upon Land Use (tons/year)

Emission Category	2001	2006
Disturbed Vacant Lands/Unpaved Parking Lots	33,100	2,530
Native Desert Fugitive Dust	9,520	3,730
Stabilized Vacant Land Dust	3,640	142
Construction Activity Fugitive Dust	23,109	14,856
Windblown Construction Dust	18,381	11,816
Highway Construction Projects Activities	2,782	1,788
Highway Construction Projects – Wind Erosion	1,470	942

Table E-11

Valley-Wide 24-Hour PM_{10} Emission Levels Which Change Based Upon Land Use (tons/day)

Emission Category	2001	2006
Disturbed Vacant Lands/Unpaved Parking Lots	253.00	19.3
Native Desert Fugitive Dust	0.00	0.00
Stabilized Vacant Land Dust	28.00	1.09
Construction Activity Fugitive Dust	63.31	40.70
Windblown Construction Dust	140.53	90.34
Highway Construction Projects Activities	7.62	4.90
Highway Construction Projects – Wind Erosion	11.20	7.20

SOURCES WITH EMISSION CHANGES BASED UPON AIRPORT ACTIVITY

The Clark County Department of Aviation has predicted changes in the number of flights for McCarran International Airport, Henderson Executive Airport, and North Las Vegas Municipal Airport. A consultant calculated emissions for 1998 and 2006 in *PM_{10} Emissions Inventory* (February, 2000). Estimates were not made in the report for 2001. The 2006 emission estimates were annualized estimates. These estimates were divided by 365 days to develop the 2006 24-hour valley-wide emissions inventory.

Without estimates from Clark County Department of Aviation for 2001, it was assumed airplane traffic and resulting emissions would increase by the same ratio as the population, 1.1855. The following emission categories were based upon population growth for 2001 and Clark County Department of Aviation predictions for 2006:

- McCarran International Airport;
- Henderson Executive Airport; and
- North Las Vegas Municipal Airport.

The valley-wide annual and 24-hour emission levels for the categories listed above for 2001 and 2006 are presented in Tables E-12 and E-13.

Table E-12

Valley-Wide Annual PM_{10} Emission Levels Which Change Based Upon Airport Activity Levels (tons/year)

Emission Category	2001	2006
McCarran International Airport	297	208
Henderson Executive Airport	7	8
North Las Vegas Municipal Airport	27	24

Table E-13

Valley-Wide 24-Hour PM_{10} Emission Levels Which Change Based Upon Airport Activity Levels (tons/day)

Emission Category	2001	2006
McCarran International Airport	0.81	0.57
Henderson Executive Airport	0.02	0.02
North Las Vegas Municipal Airport	0.07	0.07

SOURCES WITH EMISSION CHANGES BASED UPON VEHICLE MILES TRAVELED (VMT)

The following emission categories were based upon the VMT numbers developed by the Regional Transportation Commission of Clark County (RTC) using the Tranplan model:

- Paved road dust;
- Unpaved road dust;
- Vehicular Sulfate PM;
- Vehicular Tire Wear;
- Vehicular Brake Wear; and
- Vehicular Exhaust.

The Tranplan model was run by RTC incorporating all approved and projected projects within Clark County. The VMT for the nonattainment area for 2001 and 2006 are presented in Table E-14.

Table E-14

Vehicle Miles Traveled in the Nonattainment Area

Roadway Category	2001 Daily VMT	2006 Daily VMT
Connectors	904,077.5	1,027,600
Freeway Ramps	106,055.7	152,222.4
Minor Arterial	11,688,430	13,241,455
Major Arterial	2,749,688	3,594,725
Ramps	346,873.2	487,962.3
Interstate	5,012,399	6,188,899
Freeway	2,091,923	3,311,378
Expressway	-	-
Collector	4,979,581	4,209,380
Local	3,073,666	3,264,388
Intrazonal Trips	74,402.1	80,072.6
Public Transit	79,880	144,780
VMT Totals	**31,106,976**	**35,702,862**

Changes in average daily trips on unpaved roads were based upon the predicted change on VMT for local roads. The local road traffic changed by a factor of 1.26 from 1998 to 2001 and by a factor of 1.34 from 1998 to 2006. Unpaved road emissions were changed by these factors for 2001 and 2006 respectively in the valley-wide annual inventory.

The emission factors for the vehicle sulfate PM, tire wear, brake wear, and exhaust emission categories were developed using the MOBILE5b and Part5 models. These models assume federal programs for vehicles will be implemented. The emission factors used in 2001 and 2006 are listed in Table E-15.

Table E-15

Vehicle Emission Factors for 2001 and 2006 (g/mile)

Emission Category	2001 Emission Factors	2006 Emission Factors
Vehicular Sulfate PM	0.038 – 0.039	0.028
Vehicular Tire Wear	0.008	0.009
Vehicular Brake Wear	0.013	0.013
Vehicular Exhaust		
PM	0.026 – 0.027	0.038
Sulfate	0.038 – 0.039	0.029
NO_x		
64.4	2.74	
27.4	1.64	
32.4	1.64	1.48
40.7	1.68	
23.7	1.63	
52.7	1.98	
52.6	1.98	
29.1	1.64	
14.9	1.69	
10.0	1.80	1.62
13.5	1.71	1.54
63.7		2.36
31.8		1.48
36.1		1.49
23.8		1.47
47.7		1.54
44.9		1.52
29.9		1.48
14.6		1.52

Using the VMT numbers and emission factors presented above, the 2001 and 2006 valley-wide annual and 24-hour emission levels for the affected categories are presented in Tables E-16 and E-17.

Table E-16

Valley-Wide Annual PM_{10} Emission Levels Which Change Based Upon VMT (tons/year)

Emission Category	2001	2006
Paved Road Dust	54,351	58,598
Unpaved Road Dust	18,932	20,115
Vehicular Sulfate PM	489	553
Vehicular Tire Wear	100	115
Vehicular Brake Wear	163	187
Vehicular Exhaust	346	332

Table E-17

Valley-Wide 24-Hour PM_{10} Emission Levels Which Change Based Upon VMT (tons/day)

Emission Category	2001	2006
Paved Road Dust	148.91	160.54
Unpaved Road Dust	51.87	55.11
Vehicular Sulfate PM	1.34	1.52
Vehicular Tire Wear	0.27	0.32
Vehicular Brake Wear	0.45	0.51
Vehicular Exhaust	0.95	0.91

The J. D. Smith annual emission inventory for the micro-scale area surrounding the J. D. Smith monitoring station was changed to reflect the growth in VMT between 1998 and 2001. The unpaved roads average daily trips was increased by the same ratio as for the valley-wide inventories, 1.26. The ratio of growth by roadway category on a valley-wide basis was applied to the VMT in the micro-scale area. The ratios by roadway classification are listed in Table E-18.

Table E-18

Ratio of VMT from 1998 to 2001

Roadway Classification	VMT Ratio
Collectors	1.39
Minor Arterial	1.17
Major Arterial	1.11
Freeway	1.46

The vehicle exhaust emission factors presented in Table E-15 and the increased VMT in the micro-scale area were used to calculate the 2001 emissions for unpaved road dust, paved road dust, and track out as presented in Table E-19.

Table E-19

J. D. Smith PM_{10} Emission Levels Which Change Based Upon VMT (tons)

Emission Category	2001
Paved Road Dust	4,789
Track Out	7.9
Unpaved Road Dust	1.8
Vehicular Emissions	35.9

SUMMARY

The valley-wide annual and 24-hour emission inventories for 1998, 2001, and 2006 are summarized in Tables E-20 and E-21 below. The J. D. Smith micro-scale inventories for 1998 and 2001 are presented in Table E-22.

Table E-20

Valley-Wide Annual Uncontrolled PM_{10} Emission Inventories (tons/year)

Emission Category	1998	2001	2006
Sand & Gravel Operations	627	627	627
Utilities – Natural Gas	199	199	199
Asphalt Concrete Manufacture	171	171	171
Industrial Processes	80	80	80
Other Sources (stationary point sources)	124	124	124
Small Point Sources	184	184	184
Residential Firewood	75.4	89	104
Residential Natural Gas	66.7	79	92
Commercial Natural Gas	33.2	33	33
Industrial Natural Gas	13.8	14	14
NG – Purchased at the source – Carried by SWG	210.3	210	210
Structural/Vehicle Fires/Wild Fires	17.2	20	24
Charbroiling/Meat Cooking	750	889	1,035
Disturbed Vacant Lands/Unpaved Parking Lots	48,500	33,100	2,530
Native Desert Fugitive Dust	14,500	9,520	3,730
Stabilized Vacant Land Dust	5,410	3,640	142
Construction Activity Fugitive Dust	19,807	23,109	14,856
Windblown Construction Dust	15,755	18,381	11,816
Airport Support Equipment	37.1	44	51

Table E-20

Valley-Wide Annual Uncontrolled PM_{10} Emission Inventories (tons/year) (continued)

Commercial Equipment	0.3	0.4	0.4
Construction & Mining Equipment	361	428	498
Lawn & Garden Equipment	12.4	15	17
Railroad Equipment	14.5	17	20
Recreational Equipment	1.0	1	1
McCarran International Airport	250.2	297	208
Henderson Executive Airport	5.5	7	8
North Las Vegas Municipal Airport	22.8	27	24
Nellis Air Force Base	31.9	32	32
Paved Road Dust (Includes Const. Track Out)	44,842	55,005	59,019
Unpaved Road Dust	15,025	18,932	20,115
Highway Construction Projects Activities	2,384	2,782	1,788
Highway Construction Projects – Wind Erosion	1,260	1,470	942
Vehicular Sulfate PM	408	346	553
Vehicular Tire Wear	83	100	115
Vehicular Brake Wear	135	163	187
Vehicular Exhaust	357	346	332
Total	**171,755**	**170,625**	**118,983**

Table E-21

Valley-Wide 24-Hour Uncontrolled PM_{10} Emission Inventories (tons/day)

Emission Category	1998	2001	2006
Sand & Gravel Operations	1.72	1.72	1.72
Utilities – Natural Gas	0.55	0.55	0.55
Asphalt Concrete Manufacture	0.47	0.47	0.47
Industrial Processes	0.22	0.22	0.22
Other Sources (stationary point sources)	0.34	0.34	0.34
Small Point Sources	0.50	0.50	0.50
Residential Firewood	0.81	0.96	1.12
Residential Natural Gas	0.18	0.22	0.25
Commercial Natural Gas	0.09	0.09	0.09
Industrial Natural Gas	0.04	0.04	0.04
NG – Purchased at the source – Carried by SWG	0.58	0.58	0.58
Structural/Vehicle Fires/Wild Fires	0.05	0.06	0.07
Charbroiling/Meat Cooking	2.05	2.44	2.84
Disturbed Vacant Lands/Unpaved Parking Lots	371	253	19.30
Native Desert Fugitive Dust	0	0	0

Table E-21

Valley-Wide 24-Hour Uncontrolled PM_{10} Emission Inventories (tons/day) (continued)

Stabilized Vacant Land Dust	41.5	28	1.09
Construction Activity Fugitive Dust	54.27	63.31	40.7
Windblown Construction Dust	272.72	140.53	90.34
Airport Support Equipment	0.10	0.12	0.14
Commercial Equipment	<0.01	<0.01	<0.01
Construction & Mining Equipment	0.99	1.17	1.36
Lawn & Garden Equipment	0.03	0.04	0.05
Railroad Equipment	0.04	0.05	0.05
Recreational Equipment	<0.01	<0.01	<0.01
McCarran International Airport	0.69	0.81	0.57
Henderson Executive Airport	0.02	0.02	0.02
North Las Vegas Municipal Airport	0.06	0.07	0.07
Nellis Air Force Base	0.09	0.09	0.09
Paved Road Dust (Includes Const. Track Out)	122.85	150.70	161.70
Unpaved Road Dust	41.16	51.87	55.11
Highway Construction Projects Activities	6.53	7.62	4.9
Highway Construction Projects – Wind Erosion	9.61	11.20	7.2
Vehicular Sulfate PM	1.12	1.34	1.52
Vehicular Tire Wear	0.23	0.27	0.32
Vehicular Brake Wear	0.37	0.45	0.51
Vehicular Exhaust	0.98	0.95	0.91
Total	**931.95**	**719.78**	**394.72**

Table E-22

J. D. Smith PM_{10} Uncontrolled Micro-Scale Emission Inventories (tons)

Emission Category	1998	2001
Native Desert Wind Erosion	2.1	2.1
Unstable Land Fugitive Dust	206	206
Stabilized Vacant Land	5.3	5.3
Construction Wind Erosion	109.8	109.8
Construction Activities	186.6	186.6
Track Out	6.3	7.9
Unpaved Road Dust	1.4	1.8
Paved Road Dust	3,951	4,789
Vehicle Emissions	35.9	35.9
Stationary Sources	6.3	6.3
Total	**4,511.0**	**5,350.7**