APPENDIX M

Reasonable Further Progress Inventory for 2003

APPENDIX M: REASONABLE FURTHER PROGRESS INVENTORY FOR 2003

INTRODUCTION

Part D of the Clean Air Act, Section 171 indicates that the term "Reasonable Further Progress" means "such annual incremental reductions in emissions of the relevant air pollutant as are required by this part or may be reasonably required by the Administrator for the purpose of ensuring attainment by the applicable National Ambient Air Quality Standard (NAAQS) by the applicable date." As demonstrated in Chapter 5 of the SIP, the 24-hour standard will not be met in 2001 and an extension of the 24-hour NAAQS attainment date is formally requested in Chapter 7 of the SIP. Therefore, reasonable further progress toward the attainment of the 24-hour standard must be demonstrated in the SIP.

According to the General Preamble,[1] the PM_{10} nonattainment area SIP must include quantitative milestones which are to be achieved every three years until the area is redesignated attainment and which demonstrate reasonable further progress (RFP) toward attainment by the applicable date. The quantitative milestones allow progress to be quantified or measured. Specifically, states should identify and submit quantitative milestones providing for the amount of emission reductions adequate to achieve the 24-hour NAAQS by the attainment date. Reasonable further progress should be met by showing incremental emission reductions sufficient generally to maintain linear progress toward attainment.

The milestone achievement dates analyzed in this plan for achieving the 24-hour NAAQS are 2003 and 2006. These milestones have been addressed by quantifying emission reductions that result from the implementation of committed control measures after predicted growth has occurred. The development of the 2006 24-hour emission inventory is presented in detail in Appendix E. The effect of the committed controls on the 2006 inventory is presented in Appendix L.

The 2003 inventory was developed using the same methodologies for growth as the 2006 inventory. The committed controls were applied at the same level as 2006 with the exception of the controls for paved roadways with unimproved shoulders. The commitment for 2003 is based upon the roadways scheduled to be improved in the Transportation Improvement Plan.[2] The growth projections for the 2003 inventory and a detailed description of control application are described below.

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[1] 40 CFR Part 52, Federal Register 5052-2, August 16, 1994.

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

INVENTORY PROJECTIONS FOR 2003

The projected inventory was 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 changed based upon the number of acres in a given land use category. The methodology, equations, and emission factors described in Appendix B were used to calculate the emissions in 2003. Only the activity levels were changed. The meteorological data used for the design day was also used for the inventory projection. The emission categories and the method for emission projections are summarized in Table M-1. The methods for emission projections are discussed in detail below.

Table M-1

Projection Method by Source Category

Source Category	Projection Method
Stationary Point Sources	
Sand & Gravel	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 Land/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

Table M-1

Projection Method by Source Category
(continued)

McCarran International Airport	Change Based Upon Airport Activity
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

The following sources were projected to remain relatively the same in future years:

- Sand & gravel operations;
- Utilities – natural gas;
- Asphalt concrete manufacture;
- Industrial processes;
- Other stationary point sources;
- Small point sources;
- Commercial natural gas;
- Industrial natural gas;
- Natural gas purchased at the source; and
- Nellis Air Force Base.

The causes for these sources to remain relatively unchanged between 1998 and 2003 are described in detail in Appendix E. The 24-hour 2003 emissions from these sources are listed in Table M-2.

Table M-2

Valley-Wide 24-Hour Emission Levels Which Remain Unchanged

Emission Category	2003 24-Hour PM_{10} Emissions (tons/day)
Sand & Gravel Operations	1.72
Utilities – Natural Gas	0.55
Asphalt Concrete Manufacture	0.47
Industrial Processes	0.22
Other Sources (Stationary Point)	0.34
Small Point Sources	0.50
Commercial Natural Gas	0.09
Industrial Natural Gas	0.04
NG – Purchased at the Source – Carried by SWG	0.58
Nellis Air Force Base	0.09

Sources With Emission Changes Based Upon Population

The 1998 population within the BLM disposal area was 1,1,53,667 people, based upon the population profile used in the Carbon Monoxide Plan.[3] The Regional Transportation Commission developed population estimates for 2003 for the BLM disposal area of 1,541,672.[4] The growth ratio from 1998 to 2003 is 1.34. The emissions from the 1998 emission inventory was multiplied by this factor to predict the 2003 emission levels for the following emission categories:

- 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.

A detailed description of how the emission levels from these source categories relate to the valley's population is presented in Appendix E. The 2003 valley-wide 24-hour emission levels for the source categories listed above are presented in Table M-3.

[3] *Carbon Monoxide Air Quality Implementation Plan,* Clark County Department of Comprehensive Planning, September, 1999.
[4] *Clark County & Las Vegas Metropolitan Area Population Forecast and Growth Rate: 1997-2035.* Regional Transportation Commission of Clark County, Nevada, July, 2000.

Table M-3

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

Emission Category	2003 24-Hour PM_{10} Emissions (tons/day)
Residential Natural Gas Combustion	0.24
Residential Firewood Combustion	1.09
Structural/Vehicle Fires/Wild Fires	0.06
Charbroiling/Meat Cooking	2.75
Airport Support Equipment	0.14
Commercial Equipment	0.00
Construction & Mining Equipment	1.33
Lawn & Garden Equipment	0.05
Railroad Equipment	0.05
Recreational Equipment	0.00

Sources With Emission Changes Based Upon Land Use

Construction activity from 1998 through 2020 was estimated by the Clark County Department of Comprehensive Planning. An increase of 25 percent was predicted from 1998 to 2000. Construction acreage was predicted to decline by 40 percent between 2000 and 2006 because available housing would begin to meet housing demands and the percentage of new jobs created in the valley will decline.[5] Additionally, the number of new residents per year are predicted to decline by over 30 percent by the year 2006.[6] A 15 percent decrease is predicted between 2006 and 2010, and another 15 percent decrease between 2010 and 2020. These percentages of construction acres are based on the same indicators.

As presented in Table E-5, there are 19,448 acres estimated to be under active construction in 2003. There will be 82,817 acres of vacant land: 55,204 acres of native desert, 20,337 acres of stabilized land, and 7,276 acres of unstable land. The acreage of active construction was used to calculate construction emissions, including track out and wind erosion emissions for the valley-wide 24-hour emission inventory. 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 and resulting emission factors were used for wind erosion calculations. Land use acreage was used for the following emission categories:

[5] 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.
[6] Op. Cit.

- Disturbed vacant land/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 emissions were calculated on an annual basis and then divided by 365 days for the 24-hour inventory. The 2003 24-hour valley-wide emission levels for the source categories listed above are presented in Table M-4.

Table M-4

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

Emission Category	2003 24-Hour PM_{10} Emissions (tons/day)
Disturbed Vacant Land/Unpaved Parking Lots	144.00
Native Desert Fugitive Dust	0.00
Stabilized Vacant Land Dust	15.50
Construction Activity Fugitive Dust	54.27
Windblown Construction Dust	120.44
Highway Construction Project Activities	6.53
Highway Construction Projects – Wind Erosion	9.61

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.[7] Emissions were calculated for 1998 and 2006, but not for 2003. Without estimates from Clark County Department of Aviation for 2003, it was assumed airplane traffic and resulting emissions would increase by the same ratio as the population, 1.34. The following emission categories were based upon airport activity:

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

[7] *PM-10 Emissions Inventory: McCarran International Airport, North Las Vegas Airport, Henderson Executive Airport*, Clark County Department of Aviation, February, 2000.

The estimates provided were annual estimates. The valley-wide 24-hour estimate was made by dividing the 2003 projected annual emissions by 365 days. The emission levels for the categories listed above for 2003 are presented in Table M-5.

Table M-5

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

Emission Category	2003 24-Hour PM_{10} Emissions (tons/day)
McCarran International Airport	0.92
Henderson Executive Airport	0.02
North Las Vegas Municipal Airport	0.08

Sources With Emission Changes Based Upon Vehicle Miles Traveled (VMT)

The following emission categories were based upon 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 BLM disposal area for 2003 are presented in Table M-6.

Table M-6

Daily Vehicle Miles Traveled in the BLM Disposal Area

Roadway Category	2003 Daily VMT
Connectors	904,047.5
Freeway Ramps	121,784.5
Minor Arterial	11,602,900

Table M-6

Daily Vehicle Miles Traveled in the BLM Disposal Area

(continued)

Major Arterial	2,711,738
Ramps	361,224.9
Interstate	5,224,251
Freeway	2,268,668
Collector	5,309,838
Local	3,091,347
Intrazonal Trips	76,670.3
Public Transit	105,840
VMT Total	**31,778,309.2**

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 1.27 from 1998 to 2003. The unpaved road emissions were increased by the same factor.

The emission factors for the vehicular 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 the 2003 inventory are listed in Table M-7.

Table M-7

Vehicle Emission Factors for 2003 (g/mile)

Emission Category	2003 Emission Factor
Vehicular Sulfate PM	0.038 – 0.039
Vehicular Tire Wear	0.008
Vehicular Brake Wear	0.013
Vehicular Exhaust	
PM	0.024 – 0.025
Sulfate	0.037 – 0.038
NOx	
64.5	2.55
31.9	1.55
32.9	1.55
42.0	1.58
24.1	1.54
51.5	1.80
52.6	1.85
29.4	1.54
14.8	1.60
10.0	1.70
13.5	1.62

Using the VMT numbers and emission factors presented above, the 2003 valley-wide 24-hour emission levels for the affected categories were calculated. The emission levels are presented in Table M-8.

Table M-8

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

Emission Category	2003 24-Hour PM_{10} Emissions (tons/day)
Paved Road Dust	152.65
Unpaved Road Dust	52.28
Vehicular Sulfate PM	1.36
Vehicular Tire Wear	0.28
Vehicular Brake Wear	0.45
Vehicular Exhaust	0.89

Summary Of Uncontrolled 2003 24-Hour Emission Levels

The valley-wide 24-hour emission inventory for 2003 is summarized in Table M-9 below. This inventory is based upon the changes in emission levels between 1998 and 2003. None of the control measures adopted as part of the PM_{10} SIP is included.

Table M-9

2003 Valley-Wide 24-Hour Uncontrolled PM_{10} Emission Inventory (tons/day)

Emission Category	2003 24-Hour PM_{10} Emissions (tons/day)
Sand & Gravel Operations	1.72
Utilities – Natural Gas	0.55
Asphalt Concrete Manufacture	0.47
Industrial Processes	0.22
Other Sources (Stationary Point Sources)	0.34
Small Point Sources	0.50
Residential Firewood	1.09
Residential Natural Gas	0.24
Commercial Natural Gas	0.09
Industrial Natural Gas	0.04
NG – Purchased at the source – Carried by SWG	0.58
Structural/Vehicle Fires/Wild Fires	0.06
Charbroiling/Meat Cooking	2.75
Disturbed Vacant Land/Unpaved Parking Lots	144.00
Native Desert Fugitive Dust	0.00
Stabilized Vacant Land Dust	15.50
Construction Activity Fugitive Dust	54.27
Windblown Construction Dust	120.44
Airport Support Equipment	0.14
Commercial Equipment	0.00
Construction & Mining Equipment	1.33
Lawn & Garden Equipment	0.05
Railroad Equipment	0.05
Recreational Equipment	0.00
McCarran International Airport	0.92
Henderson Executive Airport	0.02
North Las Vegas Municipal Airport	0.08
Nellis Air Force Base	0.09
Paved Road Dust (Includes Const. Track Out)	152.65
Unpaved Road Dust	52.28
Highway Construction Projects Activities	6.53
Highway Construction Projects – Wind Erosion	9.61

Table M-9

2003 Valley-Wide 24-Hour Uncontrolled PM_{10} Emission Inventory (tons/day) (continued)

Vehicular Sulfate PM	1.36
Vehicular Tire Wear	0.28
Vehicular Brake Wear	0.45
Vehicular Exhaust	0.89
Total	**569.58**

CONTROLLED 2003 EMISSION INVENTORY

The overall control measure reductions applied to the 2003 inventory are the same control measure reductions applied to the 2006 emission inventory except for unimproved shoulders on paved roads. These control measure reductions are described in detail in Appendix L. The same overall control measure reductions apply in 2003 as 2006 because all but one of the control measures will be fully implemented by 2003.

The rule effectiveness for improving shoulders was set at 50 percent for 2002 through 2005 as discussed in Appendix L. A commitment has been made to develop a detailed plan for the improvement of unimproved shoulders in 2001 for roadways without improved shoulders as described in Section 93 of the Clark County Air Quality Regulations (See Appendix G). Some roadways without improved shoulders are already scheduled for improvement and have been listed in the Clark County Transportation Improvement Plan (TIP).[8] These committed improvements for roadways without improved shoulders include 22.31 miles of minor arterial roadways and 10.87 miles of collector roadways. Therefore, the controls applied for the improvement of unimproved shoulders was the improvement to the roadways committed to in the TIP. The emission reduction realized by these improvements is presented in Table M-10.

[8] Op. Cit.

Table M-10

Emission Reduction from Improving Shoulders in 2003 (tons/day)

Roadway Classification	Emission Factor (g/mile)	Miles with Unimproved Shoulders		VMT		PM_{10} Emissions (tons/day)	
		Without TIP	With TIP	Without TIP	With TIP	Without TIP	With TIP
Minor Arterial	5.63	57.18	34.87	1,160,675.67	707,813.23	7.2	4.4
Major Arterial	5.63	21	21	692,611.26	692,611.26	4.3	5.5
Collector	37.4	30.3	19.43	254,364.5	163,112.29	10.5	6.7
Local	37.4	335.7	335.7	361,361.5	361,361.5	14.9	15.6
Total						**36.9**	**32.2**

Applying the overall control reductions as described above, the 2003 valley-wide 24-hour emission inventory is reduced by almost 300 tons per day. The 2003 24-hour emission inventory with and without controls is presented in Table M-11.

Table M-11

2003 Valley-Wide 24-Hour PM_{10} Emission Inventory (tons/day)

Emission Category	Uncontrolled PM_{10} Emissions (tons/day)	Controlled PM_{10} Emissions (tons/day)	Percent Reduction
Sand & Gravel Operations	1.72	1.72	-
Utilities – Natural Gas	0.55	0.55	-
Asphalt Concrete Manufacture	0.47	0.47	-
Industrial Processes	0.22	0.22	-
Other Sources (Stationary Point Sources)	0.34	0.34	-
Small Point Sources	0.50	0.50	-
Residential Firewood	1.09	1.09	-
Residential Natural Gas	0.24	0.24	-
Commercial Natural Gas	0.09	0.09	-
Industrial Natural Gas	0.04	0.04	-
NG – Purchased at the source – Carried by SWG	0.58	0.58	-
Structural/Vehicle Fires/Wild Fires	0.06	0.06	-
Charbroiling/Meat Cooking	2.75	2.75	-
Disturbed Vacant Land/Unpaved Parking Lots	144.00	40.32	72
Native Desert Fugitive Dust	0.00	0.00	-
Stabilized Vacant Land Dust	15.50	15.50	-
Construction Activity Fugitive Dust	54.27	17.37	68
Windblown Construction Dust	120.44	36.20	70
Airport Support Equipment	0.14	0.14	-
Commercial Equipment	0.00	0.00	-
Construction & Mining Equipment	1.33	1.33	-
Lawn & Garden Equipment	0.05	0.05	-
Railroad Equipment	0.05	0.05	-
Recreational Equipment	0.00	0.00	-

Table M-11

2003 Valley-Wide 24-Hour PM_{10} Emission Inventory (tons/day) (continued)

McCarran International Airport	0.92	0.92	-
Henderson Executive Airport	0.02	0.02	-
North Las Vegas Municipal Airport	0.08	0.08	-
Nellis Air Force Base	0.09	0.09	-
Paved Road Dust (Includes Const. Track Out)	152.65	132.35	13
Unpaved Road Dust	52.28	15.06	72
Highway Construction Projects Activities	6.53	2.42	63
Highway Construction Projects – Wind Erosion	9.61	2.96	70
Vehicular Sulfate PM	1.36	1.36	-
Vehicular Tire Wear	0.28	0.28	-
Vehicular Brake Wear	0.45	0.45	-
Vehicular Exhaust	0.89	0.89	-
Total	**569.58**	**276.48**	