Appendix A:

Baseline Emissions for Non-BLM-Related Sources

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NOTE:

Baseline (2000) emissions presented in Appendix A were estimated primarily on the basis of population changes from the emissions data used in the PM_{10} and CO SIPs (see Table 4.2), for which the base years are 1998 and 1996, respectively. These emissions implicitly include population growth associated with BLM land sales. For non-BLM- and BLM-related contributions, these emissions were disaggregated on the basis of population growth associated with BLM land sales, as discussed on Page 4-1, Section 4 of the report.

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TABLE A.1 Non-BLM Annual Total Anthropogenic Emissions Inventory by Source Category in the Nonattainment Area for Base Year 2000

Emission Source Category	Emissions (tons/year)						Table No.
	SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	
Stationary Major Point Sources [a]	**248.8**	**6,812.0**	**1,973.5**	**419.8**	**916.0**	**NA** [b]	A.2
Stationary Area Sources							
Small Point Sources [c]	121.6	1,247.3	887.7	761.1	1,227.7	NA	A.3
Natural Gas Combustion							
Residential Use	6.1	954.9	406.3	55.9	77.2	77.2	A.4
Commercial Use	3.0	615.2	421.2	27.6	38.1	38.1	A.4
Industrial Use	1.1	182.2	151.8	9.9	13.7	13.7	A.4
Purchased at the Source (Carried by SWG)	16.6	2,767.3	2,324.5	152.2	210.3	210.3	A.4
Residential Firewood Combustion	1.0	6.6	637.4	577.8	87.3	NA	A.5
Structure Fires/Vehicle Fires/Wildfires	NA	2.6	110.6	20.3	19.9	18.1	A.6
Charbroiling/Meat Cooking	NA	NA	NA	83.3	868.4	NA	A.7
Windblown Dust - Vacant Lots [d]							
Disturbed Vacant Lands/Unpaved Parking Lots	NA	NA	NA	NA	NA	NA	
Native Desert	NA	NA	NA	NA	NA	NA	
Stabilized Vacant Land	NA	NA	NA	NA	NA	NA	
Construction Fugitive Dust							
Construction Activities	NA	NA	NA	NA	20,712.0	NA	A.8
Windblown Dust [d]	NA	NA	NA	NA	NA	NA	
Subtotal	**149.4**	**5,776.0**	**4,939.5**	**1,688.1**	**23,254.7**	**357.4**	
Nonroad Mobile Sources							
Nonroad Engines and Vehicles							
Agricultural Equipment	0.1	9.2	11.0	1.4	1.2	1.1	A.9
Airport Equipment	0.6	52.2	58.5	6.1	3.9	3.8	A.9
Commercial Equipment	3.2	356.0	10,786.7	506.9	31.8	30.6	A.9
Construction and Mining Equipment	123.9	10,524.1	15,671.8	2,014.0	968.5	938.0	A.9
Industrial Equipment	3.6	484.3	1,436.6	108.7	26.4	25.6	A.9
Lawn and Garden Equipment (Commercial)	9.4	708.3	64,816.4	4,649.6	172.3	159.9	A.9
Lawn and Garden Equipment (Residential)	1.2	64.8	11,758.3	834.1	13.4	12.4	A.9
Logging Equipment	0.0	0.0	0.0	0.0	0.0	0.0	A.9
Pleasure Craft	1.3	89.5	2,505.7	1,229.1	48.8	45.0	A.9
Railroad Equipment (Maintenance)	0.1	13.2	36.8	3.4	2.0	1.9	A.9
Recreational Equipment	0.5	24.4	3,351.5	614.9	20.1	18.5	A.9
Railroad Equipment (Line-Haul and Switching)	8.9	759.2	75.4	29.9	18.9	NA	A.10
Airport Operations (Landings and Takeoffs)							
McCarran International Airport	106.8	2,384.6	5,160.3	658.7	286.8	NA	A.11
Henderson Executive Airport	0.6	6.5	698.4	35.3	6.3	NA	A.11
North Las Vegas Municipal Airport	1.7	21.9	3,452.9	105.8	26.1	NA	A.11
Nellis Air Force Base	396.5	268.6	1,043.1	128.4	31.9	NA	A.11
Subtotal	**658.5**	**15,766.8**	**120,863.3**	**10,926.6**	**1,658.5**	**1,236.8**	
On-road Mobile Sources							
Paved-Road Dust (Includes Construction Trackout)	NA	NA	NA	NA	38,951.4	NA	A.12/A.13
Unpaved-Road Dust	NA	NA	NA	NA	17,784.1	NA	A.14
Highway Construction Fugitive Dust							
Highway Construction Activities	NA	NA	NA	NA	2,342.9	NA	A.8
Windblown Dust [d]	NA	NA	NA	NA	NA	NA	
On-road Vehicles							
Vehicular Sulfate PM	NA	NA	NA	NA	14.0	14.0	A.15
Vehicular Tire Wear	NA	NA	NA	NA	81.8	20.5	A.15
Vehicular Brake Wear	NA	NA	NA	NA	121.4	51.5	A.15
Vehicular Exhaust	229.1	15,772.6	164,397.2	14,846.2	176.5	159.1	A.15
Subtotal	**229.1**	**15,772.6**	**164,397.2**	**14,846.2**	**59,472.1**	**245.0**	
Stationary Power Plant Sources Regulated by the State							
Clark Station	2.4	1,127.7	215.4	24.6	3.1	3.1	A.16
Mohave Generating Station	42,749.6	21,736.6	1,203.3	145.6	1,395.9	689.7	A.16
Reid Gardner Station	2,976.0	9,585.0	505.0	60.6	1,194.5	736.2	A.16
Sunrise Station	22.4	1,175.1	177.5	14.2	0.8	0.8	A.16
Subtotal	**45,750.4**	**33,624.5**	**2,101.2**	**244.9**	**2,594.3**	**1,429.8**	
Total	**47,036.3**	**77,751.8**	**294,274.8**	**28,125.5**	**87,895.6**	**3,269.1**	

[a] "Stationary major point sources" are permitted major sources modeled as point sources.

[b] NA = not applicable, not available, or not estimated because of a lack of data.

[c] "Small point sources" are permitted nonmajor sources modeled as area sources.

[d] Windblown dust emissions were calculated internally during the CMAQ modeling by using the surface wind data at each grid cell.

TABLE A.2 Emissions Inventory for Stationary Major Point Sources for Base Year 2000

				Emissions (tons/year)					Location		Stack Data				
Facility ID	Facility Name	SCC	SIC	SO_2	NO_x	CO	VOCs	PM_{10}	Lat	Long	H_{stk} (ft)	D_{stk} (ft)	T_{stk} (°F)	Q_{stk} (ft^3/s)	V_{stk} (ft/s)
3	Chemical Lime Company - Apex	30501604	3274	17.27	698.66	470.25	11.52	0.00	36.3564	-114.9107	100.5	8.14	384.5	2,814.7	54.1
3	Chemical Lime Company - Apex	30501604	3274	192.73	831.34	266.75	8.48	238.00	36.3562	-114.9110	60.1	5.51	308.9	1,013.8	42.5
4	BPB Gypsum, Inc.	30504001	3275	0.38	19.97	0.51	0.16	42.27	36.0832	-115.4057	15.0	0.67	893.0	77.6	220.0
4	BPB Gypsum, Inc.	30501520	3275	0.57	46.41	88.91	11.52	40.70	36.0533	-115.3830	30.0	5.50	220.0	1,187.9	50.0
5	Chemical Lime Company - Henderson	30501619	3274	0.00	0.16	0.03	2.46	29.00	36.0431	-115.0032	60.1	5.51	308.9	1,013.8	42.5
7	Nevada Power Company - Clark Station	20100201	4911	7.29	3,718.00	93.14	13.00	150.20	36.0856	-115.0498	60.0	20.90	219.7	27,460.8	80.1
8	Nevada Power Company - Sunrise Station	20100201	4911	0.54	297.00	4.30	1.35	11.67	36.1387	-115.0365	60.0	20.90	219.7	27,460.8	80.1
11	Pabco Gypsum Wallboard Plant	30501505	3275	0.05	9.05	2.68	0.21	30.10	36.2184	-114.8734	32.8	9.84	77.0	249.6	3.3
11	Pabco Gypsum Wallboard Plant	30501520	3275	2.47	125.12	219.20	43.27	23.26	36.2242	-114.8791	35.1	4.00	302.8	805.0	64.0
13	CALNEV Pipe Line Company	40400132	5171	0.19	0.49	0.75	189.24	0.00	36.2490	-115.0438	27.1	81.34	77.0	5,196.3	1.0
19	Titanium Metals Corporation (TIMET)	30301201	3339	1.58	1.91	379.24	0.00	0.25	36.0411	-114.9951	70.0	4.44	116.0	221.8	14.3
19	Titanium Metals Corporation (TIMET)	30301240	3339	0.00	18.48	1.66	3.42	51.55	36.0406	-114.9955	72.0	6.00	77.0	1,571.0	55.6
75	Lasco Bathware	30800722	3089	0.00	1.49	0.25	24.80	0.05	36.6918	-114.6081	60.0	2.83	90.0	400.0	63.3
95	KERR McGEE - BMI FACILITY	10201402	2819	0.00	5.50	121.00	0.00	0.00	36.0419	-115.0039	32.8	9.84	77.0	249.6	3.3
114	USAF - 99 CES/CEV	20400199	9711	4.17	34.26	18.87	17.29	42.27	36.2337	-115.0432	32.8	3.28	77.0	249.6	3.3
138	SIMPLOT SILICA PRODUCTS	30502508	1446	8.77	28.25	0.46	0.86	17.10	36.5107	-114.4227	75.0	4.99	155.9	1,129.1	57.8
154	ROYAL CEMENT CO., INC.	30500606	3241	1.20	233.00	15.47	0.05	35.38	36.6465	-114.5062	20.0	4.92	1,199.9	1,685.0	88.6
329	Las Vegas Cogeneration LP	20100201	4911	3.50	39.10	7.36	0.33	5.66	36.2297	-115.2225	100.0	8.99	300.0	5,570.2	87.8
360	Nevada Cogeneration Associates #1	20100203	4931	0.95	90.80	45.10	0.00	15.80	36.3415	-114.9194	69.9	6.89	299.9	3,131.3	84.0
391	Nevada Cogeneration Associates #2	20100203	4931	1.68	84.80	35.90	0.02	21.40	36.2230	-114.8790	69.9	6.89	299.8	3,131.3	84.0
393	SAGUARO POWER COMPANY	20100201	4911	0.04	103.83	15.62	7.11	5.59	36.0421	-115.0119	69.9	9.84	287.3	5,317.0	69.9
395	REPUBLIC DUMPCO, INC.	30502504	1442	1.00	42.81	19.98	3.35	76.85	36.3764	-114.8791	30.0	10.00	77.0	78.5	1.0
423	NV Sun-Peak Ltd Partnership/NP Sunrise Stn CTG 3	20200102	4911	0.00	207.47	8.18	0.00	0.00	36.1375	-115.0353	65.0	15.42	991.0	23,037.1	123.4
468	Kern River Gas Trans. Co - Goodsprings Compr Stn	20300202	4922	1.82	33.00	1.69	0.86	0.71	35.8075	-115.4113	55.0	8.50	913.0	2,765.2	48.7
482	Capital Cabinets Corporation	40202106	2434	0.00	0.00	0.00	66.72	0.00	36.2264	-115.1208	32.0	3.00	80.0	20.0	2.8
533	Nevada Power Company - Harry Allen Station	20100201	4911	0.60	25.91	10.94	0.01	10.37	36.4265	-114.9002	123.4	11.48	982.1	6,119.2	59.1
593	G-P Gypsum Corporation	30501520	3275	0.93	34.25	143.84	9.35	33.29	36.3430	-114.9184	37.01	4.99	334.1	301.2	15.4
652	EL DORADO ENERGY	20100201	4911	1.11	80.90	1.40	4.41	34.57	35.7867	-114.9930	100.00	19.00	232.0	17,657.4	62.3
1520	MIRANT LAS VEGAS, LLC [a]	20100201	4911	0.00	0.00	0.00	0.00	0.00	36.4145	-114.9598	170.01	16.77	360.4	15,419.2	69.8
1520	MIRANT LAS VEGAS, LLC [a]	20100201	4911	0.00	0.00	0.00	0.00	0.00	36.4168	-114.9592	170.01	16.77	360.4	15,419.2	69.8
15033	REPUBLIC SERVICES OF SO. NV/Sunrise Landfill [b]	50100410	4953	0.00	0.00	0.00	0.00	0.00	36.1337	-115.0074	27.17	1.00	1,450.0	23.2	29.7
Total				**248.8**	**6,812.0**	**1,973.5**	**419.8**	**916.0**							

[a] The units started to operate in 2003.

[b] As of 2000, the site had negligible emissions of criteria pollutants, with trace amounts of VOCs from the landfill. In 2002, installation of a gas collection and control system, including a flare and diesel emergency generator, was proposed.

Sources: David Hoch (Clark County DAQEM, Las Vegas, NV) via diskette to Y.-S. Chang (ANL, Argonne, IL) on May 30, 2003, for actual emissions data.
David Hoch (Clark County DAQEM, Las Vegas, NV) via e-mail to M. Lazaro (ANL, Argonne, IL) on Sept. 23, 2003, for source classification codes (SCC) and standard industrial classification (SIC) data.
Vasant Rajagopalan (Clark County DAQEM, Las Vegas, NV) via diskette to Y.-S. Chang (ANL, Argonne, IL) on May 30, 2003, for location and stack data.

TABLE A.3 Emissions Inventory for Small Point Sources for Base Year 2000

Facility ID	Type[a]	Class	Company Name	Facility Name	Year of Data[b]	SCC[c]	Actual Emissions (tons/year) SO_2	NO_x	CO	VOCs	PM_{10}
1	SS	Minor	AIRWAY ROCK PRODUCTS, INC.	AIRWAY ROCK PRODUCTS	2000	30502510	0.67	10.04	2.18	0.80	11.63
6	SS	Minor	GOOD HUMOR-BREYERS ICE CREAM	GOOD HUMOR-BREYERS ICE CREAM	2002	10100604	0.01	1.70	2.70	0.57	0.17
12	SS	Synthetic Minor	WELLS CARGO, INC.	WELLS CARGO, INC.	2000	30500205	0.60	4.70	23.00	11.10	35.60
15	SS	Minor	WHITING BROTHERS, INC.	WHITING BROTHERS, INC.	2000	30502504	0.00	0.00	0.00	0.00	3.36
22	SS	Minor	PAYLESS/ALLSTATE CAR RENTAL	PAYLESS/ALLSTATE CAR RENTAL	2002	50410313	0.00	0.00	0.00	0.08	0.00
26	SS	Minor	ALADDIN HOTEL/CASINO--Northwind Aladdin	ALADDIN HOTEL & CASINO (H/C)	2000	10300602	0.10	0.80	0.30	0.10	2.40
29	SS	Minor	ANDERSON DAIRY, INC.	ANDERSON DAIRY, INC.	2000	10300603	0.01	1.54	1.29	0.08	0.12
36	SS	Minor	VALENCE TECHNOLOGY, INC.	VALENCE TECHNOLOGY, INC.	2002	20100101	0.10	1.46	0.32	0.12	3.43
38	SS	Minor	SOUTHERN NEVADA CABINETS, INC.	SOUTHERN NEVADA CABINETS	2002	40200101	0.00	0.00	0.00	8.25	0.00
40	SS	Minor	SUNBURST CONSTRUCTION CO., INC.	SUNBURST CONSTRUCTION CO., INC.	2002	40201901	0.00	0.00	0.00	1.78	0.00
44	SS	Minor	THATCHER COMPANY	THATCHER COMPANY	2002	30100999	0.00	0.00	0.00	0.00	0.01
47	SS	Minor	CIRCUS CIRCUS HOTEL/CASINO--Mandalay Resort Group	CIRCUS CIRCUS HOTEL (H/C)	2000	10300602	0.71	16.20	7.22	0.77	1.90
54	SS	Minor	CLARK COUNTY WATER RECLAMATION DISTRICT	CLARK COUNTY SANITATION DISTRICT	2002	50100707	0.00	0.00	0.00	1.80	0.90
59	SS	Minor	DESERT SPRINGS HOSPITAL	DESERT SPRINGS HOSPITAL	2002	10300602	0.07	2.98	2.35	0.19	0.43
65	SS	Minor	U.S. DEPARTMENT OF ENERGY	U.S. DEPARTMENT OF ENERGY	2002	20200102	0.01	0.21	0.05	0.02	0.02
67	SS	Minor	KOCH PERFORMANCE ASPHALT COMPANY	KOCH PERFORMANCE ASPHALT COMPANY	2000	30500206	0.04	3.76	0.96	0.40	0.55
70	SS	Minor	LAS VEGAS PAVING CORPORATION	LAS VEGAS PAVING CORPORATION	2000	30502503	0.08	0.23	0.06	0.00	24.10
73	SS	Significant Minor	FLAMINGO HILTON HOTEL/CASINO	FLAMINGO HILTON HOTEL/CASINO (H/C)	2000	10200603	0.09	5.90	9.28	1.38	3.73
74	SS	Minor	MONTE CARLO RESORT & CASINO	MONTE CARLO RESORT & CASINO (H/C)	2000	10300602	0.03	4.08	4.08	0.26	0.37
76	SS	Minor	FOUR QUEENS HOTEL & CASINO	FOUR QUEENS HOTEL & CASINO (H/C)	2002	10300603	0.00	3.64	0.30	0.23	0.26
77	SS	Minor	FREMONT HOTEL & CASINO	FREMONT HOTEL & CASINO (H/C)	2002	10300602	0.06	4.93	7.98	0.53	0.93
81	SS	Minor	GOLDEN NUGGET HOTEL & CASINO	GOLDEN NUGGET HOTEL & CASINO (H/C)	2002	10300603	0.13	1.72	1.09	0.32	0.74
83	SS	Minor	QUARRY 187 INC	QUARRY 187 INC	2000	30502510	0.00	0.00	0.00	0.00	13.86
85	SS	Minor	HORSESHOE HOTEL & CASINO	HORSESHOE HOTEL & CASINO (H/C)	2000	10300602	0.00	0.05	0.01	0.00	0.00
86	SS	Minor	RIVIERA HOTEL & CASINO	RIVIERA HOTEL & CASINO (H/C)	2000	10300602	0.08	8.94	5.89	0.41	0.55
99	SS	Minor	NEVADA READY MIX	NEVADA READY MIX	2002	30501106	0.00	0.10	0.00	0.01	1.49
100	SS	Minor	LAS VEGAS CONVENTION/Visitors Authority	LAS VEGAS CONVENTION/Visitors Authority	2001	10300602	0.09	2.24	1.78	0.20	0.93
101	SS	Minor	LAS VEGAS HILTON HOTEL	LAS VEGAS HILTON HOTEL (H/C)	2000	10300602	0.00	0.20	0.00	0.00	0.00
102	SS	Minor	LAS VEGAS COUNTRY CLUB	LAS VEGAS COUNTRY CLUB	2002	10200603	0.00	0.72	0.18	0.04	0.04
104	SS	Minor	LAS VEGAS PAVING CORPORATION	LAS VEGAS PAVING CORPORATION	2000	30500202	0.19	12.77	13.62	2.01	12.83
105	SS	Synthetic Minor	LAS VEGAS PAVING CORPORATION	LAS VEGAS PAVING CORPORATION	2000	30500202	1.10	28.98	6.70	0.51	21.58
109	SS	Minor	BUNKERS'S MEMORY GARDENS MEMORIAL PARK	BUNKERS'S MEMORY GARDENS MEMORIAL PARK	2002	31502101	0.21	0.32	0.15	0.00	0.00
125	SS	Significant Minor	RINKER MATERIALS CORPORATION	RINKER MATERIALS CORPORATION	2001	30502510	0.00	0.00	0.00	0.00	36.12
126	SS	Unknown	PALM MORTUARY	Palm Mortuary	2002	30502101	0.12	0.69	0.32	0.15	0.06
128	SS	Unknown	WORTHINGTON ARMSTRONG VENTURE (WAVE)	WORTHINGTON ARMSTRONG VENTURE (WAVE)	2002	10500106	0.01	0.11	0.09	2.84	0.01
129	SS	Unknown	REBEL OIL COMPANY	REBEL OIL COMPANY	2002	40400178	0.00	0.00	0.00	1.82	0.00
130	SS	Minor	READY MIX, INC.	READY MIX, INC./Delhi Plant	2002	30500711	0.00	0.00	0.00	0.00	0.84
131	SS	Minor	ST. ROSE DOMINICAN HOSPITAL	ST. ROSE DOMINICAN HOSPITAL	2002	10300602	0.02	1.43	2.18	0.10	1.70
137	SS	Unknown		REGENCY SERVICE CARTS, INC.	2002	10300603	0.00	0.00	0.00	0.20	0.00
143	SS	Minor	STARDUST RESORT & CASINO	STARDUST RESORT & CASINO (H/C)	2002	10300602	0.37	4.41	4.73	0.84	1.98
147	SS	Minor	SUNRISE HOSPITAL/MEDICAL CTR., LLC	SUNRISE HOSPITAL/MEDICAL CTR., LLC	2002	10200602	0.03	1.29	1.64	0.12	1.07
149	SS	Minor	LAUGHLIN CLASS I MUNICIPAL LANDFILL/DUMPCO	LAUGHLIN CLASS I MUNICIPAL LANDFILL	2002	20200102	1.53	23.08	4.98	4.56	6.55
153	SS	Minor	TROPICANA HOTEL & CASINO (RAMADA INN)	TROPICANA HOTEL & CASINO (RAMADA INN) (H/C)	2000	10300602	0.10	11.60	9.40	0.64	0.86
155	SS	Minor	UNION PLAZA HOTEL/CASINO--Operating Co.,Inc.	UNION PLAZA HOTEL & CASINO (H/C)	2002	10200602	0.17	8.26	9.80	0.78	1.22
158	SS	Synthetic Minor	RINKER MATERIALS CORPORATION	RINKER MATERIALS WEST, LLC	2000	30502510	0.14	4.95	1.32	0.08	35.05
162	SS	Synthetic Minor	MCC-UNIFLEX, LLC	MCC-UNIFLEX, LLC	2002	40500301	0.00	0.75	0.16	6.48	0.00
176	SS	Unknown	VALLEY HOSPITAL MEDICAL CENTER	VALLEY HOSPITAL MEDICAL CENTER	2002	10300603	0.08	4.66	6.53	0.47	0.62
183	SS	Unknown	E.L.K. INVESTMENTS/White Beauty Gypsum Mine	E.L.K. INVESTMENTS/White Beauty Gypsum Mine	2002	30502513	0.00	0.00	0.00	0.00	0.00
186	SS	Minor	LAS VEGAS PAVING CORPORATION	LAS VEGAS PAVING CORPORATION/Sunset Asphalt Plant	2000	30500205	0.50	8.18	7.00	0.24	14.51
187	SS	Minor	LAS VEGAS PAVING CORPORATION	LAS VEGAS PAVING CORPORATION (APEX)	2000	30500208	0.04	2.13	1.80	0.07	1.11
189	SS	Minor	SIERRA MOULDING & MILLWORK/Austin Hardwoods	SIERRA MOULDING & MILLWORK	2002	30700804	0.00	0.00	0.00	0.00	0.14
195	SS	Minor	INTERMEC MEDIA PRODUCTS	INTERMEC MEDIA PRODUCTS	2002	40500301	0.00	0.00	0.00	0.18	0.00
196	SS	Minor	OWENS PRECISION FABRICATORS	OWENS PRECISION FABRICATORS	2002	40200101	0.00	0.04	0.07	5.44	0.01
199	SS	Minor	ERGON ASPHALT PRODUCTS, INC.	ERGON ASPHALT PRODUCTS, INC.--Las Vegas	2002	30500206	0.02	0.88	2.30	0.56	0.21
208	SS	Minor	NEVADA DEPT. OF TRANSPORTATION	REGIONAL MATERIAL SITE - PIT CL02-01	2002	30502507	0.00	0.00	0.00	0.00	0.01
215	SS	Minor	NEVADA DEPT. OF TRANSPORTATION	REGIONAL MATERIAL SITE - PIT # CL32-02	2002	30502507	0.00	0.00	0.00	0.00	0.00
252	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	ERNEST A. BECKER MIDDLE SCHOOL	2002	10300603	0.00	0.11	0.18	0.01	0.02
253	SS	Minor	SUNROC CORPORATION	SUNROC CORPORATION	2000	30502510	0.06	0.75	0.16	0.06	2.64
254	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	H. P. FITZGERALD ELEMENTARY SCHOOL	2002	10300603	0.00	0.01	0.01	0.00	0.00
255	SS	Minor	HOTEL SAN REMO	HOTEL SAN REMO (H/C)	2002	10300602	0.01	2.48	1.99	0.14	0.18
257	SS	Minor	HARRAH'S LAS VEGAS HOTEL/CASINO	HARRAH'S LAS VEGAS HOTEL/CASINO (H/C)	2002	10300602	0.04	3.91	0.89	0.23	0.61
258	SS	Minor	AMERICAN SAND & GRAVEL	AMERICAN SAND & GRAVEL	2000	30502510	0.02	1.17	0.11	0.08	4.98
259	SS	Minor	SPARKLETTS WATER CORPORATION	SPARKLETTS WATER CORPORATION	2002	10300603	0.01	0.55	0.05	0.01	0.00
261	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	LOIS CRAIG SCHOOL	2002	10300603	0.00	0.02	0.04	0.00	0.00
262	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	CRESTWOOD SCHOOL	2002	10300603	0.00	0.01	0.02	0.00	0.00
263	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	PAUL E. CULLEY SCHOOL	2002	10300603	0.00	0.02	0.03	0.00	0.00
264	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	E. W. GRIFFITH SCHOOL	2002	10300603	0.00	0.01	0.02	0.00	0.00
265	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	LOMIE C. HEARD SCHOOL	2002	10300603	0.00	0.04	0.07	0.00	0.01

TABLE A.3 (Cont.)

Facility ID	Type [a]	Class	Company Name	Facility Name	Year of Data [b]	SCC [c]	Actual Emissions (tons/year) SO_2	NO_x	CO	VOCs	PM_{10}
266	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	ROBERT E. LAKE SCHOOL	2002	10300603	0.00	0.02	0.03	0.00	0.00
269	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	LINCOLN SCHOOL	2002	10300603	0.00	0.03	0.06	0.00	0.01
271	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	J. E. MANCH SCHOOL	2002	10300603	0.00	0.01	0.02	0.00	0.00
272	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	GORDON McCAW SCHOOL	2002	10300603	0.00	0.01	0.02	0.00	0.00
273	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	J. T. McWILLIAMS SCHOOL	2002	10300603	0.00	0.03	0.04	0.00	0.00
276	SS	Significant Minor	CAESARS PALACE	CAESARS PALACE (H/C)	2000	10300602	1.35	40.66	22.55	2.61	3.81
278	SS	Minor	A T & T Wireless	A T & T Wireless	2002	20200102	0.00	0.15	0.00	0.00	0.00
280	SS	Minor	SPRINT	SPRINT	2002	10300603	0.00	0.76	0.15	0.05	0.05
281	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	MOUNTAIN VIEW SCHOOL	2002	10300603	0.00	0.03	0.04	0.00	0.00
282	SS	Minor	MIRAGE/TREASURE ISLAND HOTEL & CASINO	MIRAGE/TREASURE ISLAND HOTEL & CASINO (H/C)	2000	10300602	0.23	33.06	25.46	1.61	5.53
283	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	PARADISE SCHOOL	2002	10300603	0.00	0.04	0.07	0.00	0.01
284	SS	Unknown	CALIFORNIA HOTEL/CASINO (H/C)	CALIFORNIA HOTEL & CASINO (H/C)	2002	10300603	0.08	7.21	11.33	0.77	1.21
285	SS	Minor	PRECAST CONCRETE CO.	PRECAST CONCRETE CO.	2002	30500618	0.00	0.00	0.00	0.00	0.40
286	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	RED ROCK SCHOOL	2002	10300603	0.00	0.02	0.04	0.00	0.00
288	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	SUNRISE ACRES SCHOOL	2002	10300603	0.00	0.04	0.07	0.00	0.01
289	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	ROBERT L. TAYLOR SCHOOL	2002	10300603	0.00	0.03	0.05	0.00	0.00
291	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	TWIN LAKES SCHOOL	2002	10300603	0.00	0.02	0.03	0.00	0.00
293	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	J. M. ULLOM SCHOOL	2002	10300603	0.00	0.02	0.03	0.00	0.00
294	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	HOWARD WASDEN SCHOOL	2002	10300603	0.00	0.03	0.05	0.00	0.00
297	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	KIT CARSON SCHOOL	2002	10300603	0.00	0.00	0.00	0.00	0.00
299	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	MABEL HOGGARD SCHOOL	2002	10300603	0.00	0.01	0.02	0.00	0.00
303	SS	Minor	RINKER MATERIALS CORPORATION	RINKER MATERIALS WEST, LLC	2002	30501106	0.00	0.00	0.00	0.00	3.56
304	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	MATT KELLY SCHOOL	2002	10300603	0.00	0.02	0.03	0.00	0.00
306	SS	Minor	BOULEVARD SHOPPING CENTER	BOULEVARD SHOPPING CENTER	2002	10300602	0.00	0.00	0.00	0.00	0.00
308	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	MADISON SCHOOL	2002	10300603	0.00	0.03	0.04	0.00	0.00
310	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	JIM BRIDGER SCHOOL	2002	10300603	0.00	0.05	0.09	0.01	0.01
311	SS	Minor	FIBERGLASS SPECIALTIES	FIBERGLASS SPECIALTIES	2002	40200101	0.00	0.00	0.00	2.17	0.00
313	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	J. HAROLD BRINLEY	2002	10300603	0.00	0.07	0.12	0.01	0.01
314	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	LYAL BURKHOLDER SCHOOL	2002	10300603	0.00	0.05	0.08	0.01	0.01
315	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	JAMES E. CASHMAN SCHOOL	2002	10300603	0.00	0.03	0.05	0.00	0.00
316	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	JOHN C. FREMONT SCHOOL	2002	10300603	0.00	0.04	0.06	0.01	0.01
318	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	FRANK F. GARSIDE SCHOOL	2002	10300603	0.00	0.07	0.13	0.01	0.01
319	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	ROBERT O. GIBSON SCHOOL	2002	10300603	0.00	0.04	0.07	0.00	0.01
322	SS	Minor	BRADY LINEN SERVICES, LLC	BRADY LINEN SERVICES	2002	10300602	0.13	11.63	9.80	0.63	0.92
323	SS	Minor	CATALINA PLASTICS & COATING CORP.	CATALINA PLASTICS & COATING CORP.	2002	40200701	0.00	0.23	0.39	11.12	0.03
327	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	GREENSPUN SCHOOL	2002	10300603	0.00	0.12	0.20	0.01	0.02
328	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	HYDE PARK SCHOOL	2002	10300603	0.00	0.04	0.07	0.00	0.01
330	SS	Minor	PARADISE VALLEY CHAPEL, INC.	PARADISE VALLEY CHAPEL, INC.	2002	50200505	0.15	0.87	0.40	0.01	0.01
331	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	WALTER JOHNSON SCHOOL	2002	10300603	0.00	0.08	0.13	0.01	0.01
333	SS	Unknown	D. L. DENMAN CONSTRUCTION COMPANY	DENMAN CONSTRUCTION COMPANY	2000	30502510	0.00	0.00	0.00	0.00	0.10
340	SS	Minor	BOARDWALK HOTEL & CASINO	BOARDWALK HOTEL & CASINO (H/C)	2002	10300602	0.06	1.27	0.83	0.10	0.16
341	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	ROY W. MARTIN SCHOOL	2002	10300603	0.00	0.03	0.06	0.00	0.01
344	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	WILLIAM E. ORR SCHOOL	2002	10300603	0.00	0.03	0.06	0.00	0.01
346	SS	Minor	MONIER LIFETILE, LLC	MONIER LIFETILE, LLC	2002	40299995	0.01	0.30	0.26	8.99	2.58
347	SS	Synthetic Minor	MORGAN ADHESIVES COMPANY / MACtac	MORGAN ADHESIVES COMPANY/MACtac Nellis	2000	40200803	0.01	2.31	0.49	25.37	0.07
348	SS	Minor	U.S. DEPARTMENT OF ENERGY	U.S. DEPARTMENT OF ENERGY	2002	10300603	0.01	0.60	0.33	0.03	0.04
350	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	DELL H. ROBISON SCHOOL	2002	10300603	0.00	0.06	0.10	0.01	0.10
351	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	J. D. SMITH SCHOOL	2002	10300603	0.00	0.06	0.11	0.01	0.01
353	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	ED VON TOBEL SCHOOL	2002	10300603	0.00	0.05	0.08	0.01	0.01
355	SS	Minor	FLAMINGO HILTON, LAUGHLIN	FLAMINGO HILTON, LAUGHLIN (H/C)	2000	10300602	0.07	5.64	9.47	0.89	6.79
356	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	C. W. WOODBURY SCHOOL	2002	10300603	0.00	0.05	0.08	0.01	0.01
357	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	BASIC SCHOOL	2002	10300603	0.00	0.14	0.23	0.02	0.02
359	SS	Minor	BANK OF AMERICA PLAZA/Bridger & Associates	BANK OF AMERICA PLAZA	2002	10300603	0.00	0.53	0.34	0.00	0.05
361	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	BONANZA SCHOOL	2002	10300603	0.00	0.05	0.09	0.01	0.01
363	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	CHAPPARAL SCHOOL	2002	10300602	0.00	0.06	0.10	0.01	0.01
364	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	CHEYENNE SCHOOL	2002	10300603	0.00	0.09	0.15	0.01	0.01
366	SS	Minor	BORAL MATERIAL TECHNOLOGIES, INC.	BORAL MATERIAL TECHNOLOGIES, INC.	2002	30510299	0.00	0.30	0.07	0.00	21.67
368	SS	Unknown			2000	10300602	0.26	17.94	94.76	0.42	5.67
369	SS	Minor	NEW YORK - NEW YORK HOTEL/CASINO, LLC	NEW YORK - NEW YORK HOTEL/CASINO, LLC (H/C)	2000	10300602	0.05	7.80	6.60	0.42	0.59
371	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	ED W. CLARK SCHOOL	2002	10300603	0.00	0.09	0.15	0.01	0.01
372	SS	Synthetic Minor	FREHNER CONSTRUCTION CO., INC.	FREHNER CONSTRUCTION CO., INC.	2000	30500205	3.00	45.02	9.80	3.60	19.30
373	SS	Significant Minor	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING COMPANY, INC.	2002	30502510	0.00	0.00	0.00	0.00	0.00
375	SS	Minor	BULLDOG EQUIPMENT	BULLDOG EQUIPMENT	2002	30502513	0.01	0.74	0.16	0.06	6.43
376	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	ELDORADO SCHOOL	2002	10300603	0.00	0.07	0.12	0.01	0.01
378	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	GREEN VALLEY SCHOOL	2002	10300603	0.00	0.10	0.17	0.01	0.02
381	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	LV ACADEMY OF INT'L. STUDIES/PERFORMING ARTS	2002	10300603	0.00	0.08	0.14	0.01	0.01
383	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	CIMARRON-MEMORIAL SCHOOL	2002	10300603	0.00	0.08	0.13	0.01	0.01
384	SS	Significant Minor	SOUTHWEST GAS CORPORATION	SOUTHWEST GAS CORPORATION	2001	20200201	0.02	21.16	3.56	0.10	0.68

TABLE A.3 (Cont.)

Facility ID	Type[a]	Class	Company Name	Facility Name	Year of Data[b]	SCC[c]	Actual Emissions (tons/year) SO_2	NO_x	CO	VOCs	PM_{10}
387	SS	Minor	U.S. DEPARTMENT OF ENERGY	U.S. DEPARTMENT OF ENERGY	2002	20200102	0.01	0.12	0.03	0.01	0.01
400	SS	Significant Minor	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING COMPANY, INC.	2000	30502510	0.54	8.09	1.76	0.65	14.56
401	SS	Minor	BASIC FOOD FLAVORS, INC.	BASIC FOOD FLAVORS, INC.	2000	30200789	0.00	0.64	0.54	2.70	0.33
402	SS	Significant Minor	CITY OF LAS VEGAS/DEPT. OF PUBLIC WORKS	CITY OF LAS VEGAS, WWTP	2002	50100765	12.02	23.93	58.17	38.41	3.89
404	SS	Minor	NIKKISO CRYO, INC.	NIKKISO CRYO, INC.	2002	39000989	0.05	0.14	0.00	0.00	0.00
405	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	RANCHO SCHOOL	2002	10300603	0.00	0.21	0.35	0.02	0.03
406	SS	Minor	SWEETHEART CUP CORP.	SWEETHEART CUP CORP.	2002	30101817	0.00	0.14	1.45	4.23	1.43
407	SS	Minor	DESERT MEMORIAL CREMATORY	DESERT MEMORIAL CREMATORY	2002	31502101	0.26	1.57	0.68	0.02	0.02
408	SS	Minor	ROCKWAY INCORPORATED	ROCKWAY PRECAST	2002	30502503	0.00	0.00	0.00	2.60	1.50
410	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	VALLEY SCHOOL	2002	10300603	0.00	0.08	0.14	0.01	0.01
411	SS	Unknown			2000	10300603	0.00	0.00	0.00	0.00	2.70
412	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	VIRGIN VALLEY SCHOOL	2002	10300603	0.02	0.07	0.02	0.00	0.01
414	SS	Minor	SILVER STATE MATERIALS CORP.	SILVER STATE MATERIALS CORP.	2002	30502511	0.04	0.14	0.03	0.00	2.32
415	SS	Unknown	ETHEL M. CHOCOLATES	ETHEL M. CHOCOLATES	2002	10300603	0.02	3.75	3.13	0.20	1.52
416	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	VO TECH SCHOOL	2002	10300603	0.00	0.08	0.13	0.01	0.01
417	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	WESTERN SCHOOL	2002	10300603	0.00	0.14	0.23	0.01	0.02
418	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	HELEN J. STEWART SCHOOL	2002	10300603	0.00	0.05	0.08	0.01	0.01
425	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	ED CENTER SCHOOL	2002	10300603	0.00	0.09	0.15	0.01	0.01
428	SS	Minor	RINKER MATERIALS CORPORATION	RINKER MATERIALS WEST, LLC	2002	30501106	0.00	0.00	0.00	0.00	3.66
429	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	KNUDSON JR. HIGH SCHOOL	2002	10300603	0.00	0.06	0.09	0.01	0.01
430	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	SWAINSTON JR. HIGH SCHOOL	2002	10300603	0.00	0.10	0.17	0.01	0.02
432	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	WHITE JR. HIGH SCHOOL	2002	10300603	0.00	0.08	0.13	0.01	0.01
434	SS	Minor	FITZGERALDS HOTEL & CASINO	FITZGERALDS HOTEL & CASINO (H/C)	2002	10300603	0.06	3.76	4.30	0.27	0.35
436	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	BOULDER CITY HIGH SCHOOL	2002	10300603	0.00	0.05	0.09	0.01	0.01
439	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	DURANGO HIGH SCHOOL	2002	10300603	0.00	0.08	0.14	0.01	0.01
440	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	LAS VEGAS HIGH SCHOOL	2002	10300603	0.00	0.10	0.17	0.01	0.02
442	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	WILLIAM R. LUMMIS ELEMENTARY SCHOOL	2002	10300603	0.00	0.00	0.00	0.00	0.00
443	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	SILVERADO HIGH SCHOOL	2002	10300603	0.00	0.08	0.14	0.01	0.01
445	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	GRANT SAWYER MIDDLE SCHOOL	2002	10300603	0.00	0.09	0.16	0.01	0.01
446	SS	Minor	CLARK COUNTY SCHOOL DISTRICT	ACADEMY FOR ADVANCED TECHNOLOGY	2002	10300603	0.01	0.05	0.09	0.01	0.01
447	SS	Unknown		LEVI STRAUSS & COMPANY	2002	10300603	0.00	0.30	0.10	0.04	0.40
448	SS	Minor	CARBON BLOCK TECHNOLOGY/dba C. B. Tech	CARBON BLOCK TECHNOLOGY/dba C. B. Tech	2002	39990003	0.09	2.22	1.85	0.14	2.99
449	SS	Minor	SILVER STATE MATERIALS CORP.	SILVER STATE MATERIALS/Sloan Plant	2001	30501106	0.62	9.35	2.03	0.75	1.38
464	SS	Minor	DEWEY ANIMAL CARE CENTER	DEWEY VETERINARY HOSPITAL	2002	31502101	0.12	0.70	0.30	0.00	0.00
473	SS	Unknown	USAF - 99 CES/CEV	USAF - 99 CES/CEV	2002	30502510	1.01	1.78	0.38	0.00	13.54
474	SS	Unknown		MC NEIL BROTHERS, INC.	2002	10300603	0.00	0.00	0.00	0.00	0.00
480	SS	Minor	DeLUCA LIQUOR & WINE, LTD.	DeLUCA LIQUOR & WINE, LTD.	2002	50410313	0.00	0.00	0.00	0.05	0.00
486	SS	Minor	LAS VEGAS ROCK, INC	LAS VEGAS ROCK, INC	2000	30502510	0.14	9.65	2.14	0.78	9.15
488	SS	Significant Minor	LAS VEGAS PAVING CORPORATION	LAS VEGAS PAVING CORPORATION	2000	30500208	0.08	3.20	3.70	0.30	1.58
500	SS	Minor	SIERRA READY MIX, LLC	SIERRA READY MIX, LLC (Concrete Batch Plant)	2002	30501106	0.00	0.00	0.00	0.00	2.31
505	SS	Minor	BUREAU OF RECLAMATION	BUREAU OF RECLAMATION/Visitors Facility	2002	20200102	0.05	1.00	0.05	0.00	0.00
507	SS	Minor	NEVADA READY MIX	NEVADA READY MIX	2002	30501114	0.01	1.26	1.06	0.07	1.34
508	SS	Minor	BOULDER SAND & GRAVEL, INC.	BOULDER SAND & GRAVEL, INC.	2000	30502510	0.03	1.75	0.46	0.04	4.03
510	SS	Minor	HARD ROCK HOTEL & CASINO	HARD ROCK HOTEL & CASINO (H/C)	2002	10200603	0.04	5.18	6.94	0.49	10.27
512	SS	Synthetic Minor	NEVADA READY MIX	NEVADA READY MIX	2000	30502510	0.00	0.07	0.02	0.03	44.32
516	SS	Unknown		R. L. MC VANE, INC.	2002	10300603	0.00	0.00	0.00	0.00	0.00
517	SS	Unknown		R. L. MC VANE, INC.	2002	10300603	0.00	0.12	0.02	0.00	0.85
523	SS	Minor	CIND-R-LITE COMPANY	CIND-R-LITE COMPANY	2002	30501109	0.00	0.00	0.00	0.00	1.80
528	SS	Unknown			2002	10300603					
536	SS	Minor	CITY OF HENDERSON ANIMAL CONTROL	CITY OF HENDERSON ANIMAL CONTROL	2002	31502101	0.04	0.12	0.01	0.00	0.02
538	SS	Minor	Seven-Eleven (7-11)/Secor Int'l, Inc.	SOUTHLAND 7-11 STORE #20826	2002	A2660000000	0.00	0.00	0.00	0.00	0.00
539	SS	Minor	Seven-Eleven (7-11)/Secor Int'l, Inc.	SOUTHLAND 7-11 STORE #29644	2002	2662222222	0.00	0.00	0.00	0.00	0.00
540	SS	Significant Minor	SOUTHERN NEVADA LITEWEIGHT, INC.	SOUTHERN NEVADA LITEWEIGHT	2002	30502510	0.87	20.81	4.09	1.46	22.68
545	SS	Minor	Seven-Eleven (7-11)/Secor Int'l, Inc.	SOUTHLAND 7-11 STORE #20687	2002	50410406	0.00	0.00	0.00	0.10	0.00
547	SS	Minor	EXXON/ MILLER BROOKS ENVIRONMENTAL, INC.	EXXON STATION #76-3868 (Former)	2002	2660000000	0.00	0.00	0.00	0.00	0.00
551	SS	Minor	RAINBOW ROCK OF LAS VEGAS, INC.	RAINBOW ROCK OF LAS VEGAS, INC.	2002	30502504	0.00	0.00	0.00	0.00	0.10
555	SS	Minor	RIO SUITES HOTEL & CASINO	RIO SUITES HOTEL & CASINO (H/C)	2002	10300602	0.07	5.64	8.73	0.61	0.82
556	SS	Minor	AHERN RENTALS, INC.	AHERN RENTALS, INC.	2002	40200101	0.00	0.00	0.00	1.22	0.01
557	SS	Unknown		R. L. McVANE, INC./BLM East Community Pit	2000	30502510	0.02	0.29	0.06	0.02	2.52
558	SS	Minor	CITY OF HENDERSON	CITY OF HENDERSON/Water Reclamation Fac.	2002	50100760	0.01	0.54	0.03	0.32	0.01
564	SS	Significant Minor	STRATOSPHERE HOTEL & CASINO	STRATOSPHERE HOTEL & CASINO (H/C)	2002	10300602	0.49	22.08	24.78	3.95	5.13
568	SS	Minor	JT3 LLC	JT3 LLC	2002	40202201	0.00	0.00	0.00	0.41	0.00
569	SS	Minor	LETICA CORPORATION	LETICA CORPORATION	2002	40500802	0.00	0.12	0.02	9.92	2.09
571	SS	Unknown		MAYAN READY MIX	2002	10300603	0.01	0.19	0.04	0.02	0.01
572	SS	Minor	BAKER COMMODITIES, INC.	BAKER COMMODITIES, INC./Las Vegas Div.	2002	30299998	0.00	0.07	0.11	0.01	0.02
584	SS	Significant Minor	SANDIA AGGREGATES	SANDIA AGGREGATES	2002	30500201	11.88	57.56	9.22	14.54	58.01
585	SS	Unknown	INFINITON, LLC	INFINITON, LLC	2000	30502510	1.17	17.59	3.82	1.41	18.64
586	SS	Minor	SILVER STATE MATERIALS CORP.	SILVER STATE MATERIALS/Henderson Plant	2000	30501106	0.00	0.00	0.00	0.00	1.25

TABLE A.3 (Cont.)

Facility ID	Type [a]	Class	Company Name	Facility Name	Year of Data [b]	SCC [c]	Actual Emissions (tons/year) SO_2	NO_x	CO	VOCs	PM_{10}
587	SS	Significant Minor	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING COMPANY, INC.	2000	30500208	20.76	30.36	13.11	17.82	28.70
588	SS	Minor	LAS VEGAS REVIEW JOURNAL	LAS VEGAS REVIEW JOURNAL	2002	40202103	0.01	0.20	0.10	7.48	0.22
592	SS	Unknown	GEORGIA PACIFIC COMPANY	GEORGIA PACIFIC (Weiser Quarry)	2000	30502510	0.00	0.00	0.00	0.00	1.21
599	SS	Minor	MERILLAT CORPORATION	MERILLAT CORPORATION	2002	30700808	0.00	0.09	0.04	2.38	0.16
601	SS	Minor	JERRY'S NUGGET	JERRY'S NUGGET (H/C)	2002	10200603	0.00	0.38	0.31	0.00	0.20
602	SS	Minor	LADY LUCK HOTEL & CASINO	LADY LUCK HOTEL & CASINO (H/C)	2002	10300603	0.04	7.98	6.01	0.41	1.72
603	SS	Minor	LAS VEGAS CLUB HOTEL/CASINO (EG&H)	LAS VEGAS CLUB HOTEL/CASINO (EG&H) (H/C)	2002	10300602	0.02	1.99	1.62	0.10	0.21
604	SS	Minor	CALIFORNIA HOTEL/CASINO (H/C)	MAIN STREET STATION HOTEL/CASINO (H/C)	2002	10300603	0.01	1.17	0.55	0.00	1.60
606	SS	Minor	GOLD COAST HOTEL & CASINO	GOLD COAST HOTEL & CASINO (H/C)	2002	10200602	0.06	1.37	1.05	0.12	0.59
609	SS	Minor	EXCALIBUR HOTEL & CASINO	EXCALIBUR HOTEL & CASINO (H/C)	2000	10300602	0.09	14.10	11.00	0.73	1.00
610	SS	Minor	WESTWARD HO HOTEL & CASINO	WESTWARD HO HOTEL & CASINO (H/C)	2001	10300603	0.01	0.70	0.34	0.04	0.56
611	SS	Minor	BARBARY COAST HOTEL & CASINO	BARBARY COAST HOTEL & CASINO (H/C)	2002	10300603	0.00	0.18	0.11	0.02	0.05
613	SS	Minor	IMPERIAL PALACE HOTEL & CASINO	IMPERIAL PALACE HOTEL & CASINO (H/C)	2000	10200602	10.00	0.08	12.30	0.64	0.90
616	SS	Minor	SAM'S TOWN HOTEL & CASINO	SAM'S TOWN HOTEL /CASINO (H/C)	2002	10300603	0.01	1.22	1.34	0.11	0.78
617	SS	Unknown	PRIMM VALLEY RESORTS, INC.	PRIMM VALLEY RESORTS, INC. (H/C)	2001	10300603	0.17	0.01	0.63	0.01	0.02
619	SS	Minor	NEVADA LANDING HOTEL & CASINO	NEVADA LANDING HOTEL & CASINO (H/C)	2002	10200603	0.00	0.50	0.07	0.00	0.01
620	SS	Minor	GOLD STRIKE HOTEL & GAMBLING HALL	GOLD STRIKE HOTEL & GAMBLING HALL (H/C)	2002	10300603	0.00	0.62	0.08	0.00	0.00
621	SS	Minor	SANTA FE STATION (HC)	SANTA FE STATION (H/C)	2002	10300603	0.46	4.57	3.37	0.49	0.83
625	SS	Unknown	UniFIRST CORPORATION	UniFIRST CORPORATION	2002	10300603	0.01	0.62	1.65	0.11	0.15
628	SS	Minor	GOLDEN NUGGET HOTEL & CASINO	GOLDEN NUGGET/ LAUGHLIN (H/C)	2002	10300603	0.22	0.66	0.21	0.53	0.16
629	SS	Minor	RIVER PALMS RESORT/CASINO--Gold River Op.Corp.	RIVER PALMS RESORT/CASINO (H/C)	2002	10300603	0.00	3.96	2.53	0.19	0.23
630	SS	Minor	COLORADO BELLE HOTEL/CASINO	COLORADO BELLE HOTEL/CASINO (H/C)	2002	10300603	0.02	3.72	5.76	0.43	1.24
631	SS	Minor	EDGEWATER HOTEL & CASINO	EDGEWATER HOTEL & CASINO (H/C)	2002	10300603	0.12	1.80	2.51	1.27	0.65
632	SS	Minor	RIVERSIDE RESORT/CASINO	RIVERSIDE RESORT/CASINO (H/C)	2002	10300603	0.19	5.54	8.19	0.69	1.50
633	SS	Minor	RAMADA EXPRESS HOTEL & CASINO	RAMADA EXPRESS HOTEL & CASINO (H/C)	2000	10300602	0.14	2.47	2.07	0.10	0.19
637	SS	Minor	Thermo Fluids, Inc.	Thermo Fluids, Inc. Antifreez	2002	10200603	0.00	0.42	0.09	0.00	0.06
638	SS	Unknown		REX MOBILE MIX, INC.	2002	10300603	0.00	0.00	0.00	0.00	0.36
639	SS	Minor	SIERRA SPG. WATER CO./Suntory Water Group, Inc.	SIERRA SPRING WATER COMPANY	2002	50410312	0.00	0.16	0.27	0.00	0.00
641	SS	Minor	ORLEANS HOTEL/CASINO, THE/Coast Resorts, Inc.	ORLEANS HOTEL/CASINO, THE (H/C)	2002	10200602	0.03	2.55	4.15	0.28	1.65
642	SS	Minor	CONSTRUX EXCAVATORS, LLC	CONSTRUX EXCAVATORS, LLC	2000	30502510	2.23	20.86	1.81	0.96	12.39
645	SS	Minor	HEALTHSOUTH REHAB. HOSPITAL OF HENDERSON	HEALTHSOUTH REHAB. HOSPITAL OF HENDERSON	2002	10300603	0.02	0.54	0.51	0.05	0.06
648	SS	Unknown		FNF CONSTRUCTION, INC.	2002	10300603	0.00	0.00	0.00	0.00	0.00
654	SS	Minor	CHARLIE BROWN CONSTRUCTION CO.	CHARLIE BROWN CONSTRUCTION, INC.	2002	2660000000	0.00	0.00	0.00	2.00	0.00
655	SS	Minor	SILVERTON HOTEL & CASINO/Majestic Resorts LLC	SILVERTON HOTEL & CASINO (H/C)	2002	10200602	0.00	0.75	0.63	0.04	0.43
656	SS	Minor	CIRCLE K CORPORATION/ATC Associates, Inc.	CIRCLE K UNIT NO. 00695	2002	50410406	0.00	0.00	0.00	0.00	0.00
657	SS	Minor	U.S. DEPARTMENT OF ENERGY	U.S. DOE / NV SUPPORT FACILITY	2002	20100102	0.01	0.09	0.02	0.01	0.01
659	SS	Minor	Seven-Eleven (7-11)/Secor Int'l, Inc.	SOUTHLAND 7-11 STORE #25586	2002	50410406	0.00	0.00	0.00	0.07	0.00
661	SS	Minor	DESERT DODGE, INC.	DESERT DODGE, INC./dba Desert Auto Body & Paint	2002	40200101	0.00	0.24	0.05	8.70	0.03
664	SS	Minor	NEVADA DEPT. OF TRANSPORTATION	REGIONAL MATERIAL SITE - PIT CL47-05	2002	30502507	0.00	0.00	0.00	0.00	0.00
666	SS	Minor	RINKER MATERIALS CORPORATION	RINKER MATERIALS CORPORATION	2002	30501114	0.00	0.00	0.00	0.00	1.43
671	SS	Minor	FED. AVIATION ADMIN./LV Air Traffic Control Tower	FED. AVIATION ADMIN./L.V. Air Traffic Control Tower	2002	20200102	0.01	0.14	0.03	0.01	0.01
673	SS	Minor	WESTERN MINING & MINERALS, INC.	WESTERN MINING & MINERALS/Apex	2002	30501502	0.01	1.36	0.18	0.05	2.90
674	SS	Minor	SERVICE ROCK PRODUCTS CORPORATION	SERVICE ROCK PRODUCTS CORPORATION	2002	30501106	0.71	8.90	1.94	0.71	1.72
676	SS	Minor	TRI-DELTA, INC.	TRI-DELTA, INC.	2002	30501106	0.00	0.39	0.66	0.04	0.73
677	SS	Minor	RINKER MATERIALS CORPORATION	RINKER MATERIALS WEST, LLC	2002	30501106	0.00	0.05	0.08	0.00	1.12
678	SS	Unknown			2000	10300602	1.44	18.07	3.93	1.20	11.16
679	SS	Minor	CUSTOM CRUSHING, INC.	CUSTOM CRUSHING, INC./Goldstrike Mine	2002	30502510	0.07	1.13	0.24	0.09	5.23
680	SS	Minor	KMI ZEOLITE, INC.	KMI ZEOLITE, INC.	2000	30502510	0.00	0.00	0.00	0.00	0.40
681	SS	Unknown			2000	10300603	0.18	2.78	0.60	0.23	3.90
683	SS	Minor	SOUTHWEST GAS CORPORATION	SOUTHWEST GAS CORPORATION	2002	20200401	0.01	1.25	0.26	0.09	0.12
684	SS	Minor	CASINO READY MIX, INC.	CASINO READY MIX, INC.	2002	30501106	0.00	0.00	0.00	0.00	1.91
685	SS	Significant Minor	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING COMPANY	2001	30502510	0.05	3.20	0.70	0.25	5.43
686	SS	Minor	SOUTHERN NEVADA PAVING COMPANY	Southern Nevada Paving	2000	30500205	4.92	10.65	3.57	1.81	19.22
689	SS	Minor	AMERICAN SAND & GRAVEL	AMERICAN SAND & GRAVEL	2000	30502510	0.24	3.05	0.66	0.20	7.40
690	SS	Unknown	CITY OF LAS VEGAS/DEPT. OF PUBLIC WORKS	CITY OF LAS VEGAS/NW WATER RESOURCE CENTER	2002	50100765	0.00	0.00	0.00	0.58	0.00
693	SS	Significant Minor	IMPACT SAND & GRAVEL	IMPACT SAND & GRAVEL	2000	30502510	0.53	7.90	1.72	0.63	20.50
695	SS	Minor	FIESTA HENDERSON/Station Casinos	FIESTA HENDERSON	2002	10500206	0.12	4.09	3.75	0.27	0.41
696	SS	Minor	SPRINT	SPRINT PCS	2002	10200603	0.00	0.30	0.06	0.00	0.00
697	SS	Minor	VENETIAN H/C-- Sempra Energy	VENETIAN HOTEL/CASINO (H/C)	2000	10300602	0.03	1.58	0.01	0.28	2.36
698	SS	Minor	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING COMPANY	2000	30502510	0.00	0.00	0.00	0.00	4.81
700	SS	Minor	AVIS RENT-A-CAR SYSTEM, INC.	AVIS RENT-A-CAR SYSTEM, INC.	2002	50410313	0.00	0.00	0.00	0.47	0.00
701	SS	Minor	RESTORATION COLLISION SPECIALISTS, INC.	RESTORATION COLLISION SPECIALISTS, INC.	2002	40200101	0.00	0.00	0.00	0.25	0.00
708	SS	Unknown		RINKER MATERIALS WEST, LLC - Tunnel River MountainTreatment Plant	2002	10300603	0.00	0.00	0.00	0.00	0.42
710	SS	Minor	FALCONI'S TROPICANA HONDA	FALCONI'S TROPICANA HONDA	2002	50410313	0.00	0.00	0.00	0.01	0.00
712	SS	Minor	BOB'S CONSTRUCTION	BOB'S CONSTRUCTION	2000	30502510	0.06	0.87	0.19	0.07	1.18
717	SS	Minor	LAS VEGAS VALLEY WATER DISTRICT	LAS VEGAS VALLEY WATER DIST.	2002	20200102	0.08	0.72	0.11	0.03	0.03
718	SS	Unknown	INTERNATIONAL PLATING, INC.	INTERNATIONAL PLATING, INC.	2002	30901014	0.00	0.00	0.00	0.60	0.80
724	SS	Unknown			2000	10300602	0.06	3.97	0.86	0.31	7.83

TABLE A.3 (Cont.)

Facility ID	Type[a]	Class	Company Name	Facility Name	Year of Data[b]	SCC[c]	Actual Emissions (tons/year)				
							SO_2	NO_x	CO	VOCs	PM_{10}
727	SS	Minor	HITES CREMATORY	HITES CREMATORY	2002	31502101	0.19	1.09	0.49	0.01	0.24
734	SS	Unknown	VALLEY BLUEPRINT & SUPPLY COMPANY	VALLEY BLUEPRINT & SUPPLY COMPANY	2001	40500431	0.00	0.00	0.00	2.50	0.00
736	SS	Minor	READY MIX, INC.	READY MIX, INC.	2000	30502510	0.00	0.00	0.00	0.00	16.84
737	SS	Minor	MANDALAY CORPORATION	MANDALAY BAY RESORT/CASINO (H/C)	2000	10300602	0.19	29.10	23.70	1.59	4.05
740	SS	Minor	Spanish Gate Holdings, Inc.	Spanish Gate Holdings, Inc.	2002	20200102	0.00	0.00	0.00	0.00	0.00
742	SS	Minor	MARRIOTT RESIDENCE INN/W.E. O'Neil Const.Co.of AZ	MARRIOTT RESIDENCE INN (H/C)	2002	10200603	0.00	0.69	0.47	0.00	0.06
745	SS	Unknown		GES EXPOSITION SERVICES	2002	10300603	0.00	0.00	0.00	0.56	0.00
746	SS	Minor	STONEWALL PRODUCTS	STONEWALL PRODUCTS	2002	30501107	0.00	0.00	0.00	0.00	0.64
747	SS	Minor	LAS VEGAS CONVENTION/Visitors Authority	CASHMAN CENTER	2002	10300603	0.01	0.30	0.21	0.02	0.18
749	SS	Minor	PARIS CASINO CORPORATION	PARIS CASINO RESORT (H/C)	2000	10300602	0.10	13.43	10.45	1.70	2.90
752	SS	Minor	GAMBRO HEALTH SVCS./PDG BUILDERS	GAMBRO HEALTH SERVICES	2002	20100102	0.00	0.00	0.00	0.00	0.00
753	SS	Unknown	READY MIX, INC.	READY MIX, INC.	2002	30501106	0.03	0.11	0.03	0.00	2.78
754	SS	Minor	NEVADA COLOR LITHO	NEVADA COLOR LITHO	2002	40500431	0.00	0.00	0.00	10.30	0.00
755	SS	Unknown	J W MARRIOTT LAS VEGAS/Hotspur Resorts NV, Inc.	J W MARRIOTT LAS VEGAS (H/C)	2002	10300603	0.10	4.59	6.74	0.61	1.42
756	SS	Minor	BELLAGIO HOTEL/CASINO	BELLAGIO HOTEL/CASINO (H/C)	2000	10300602	0.23	8.92	8.55	0.83	0.94
760	SS	Unknown			2000	20200202	0.13	8.86	1.93	0.71	8.71
762	SS	Minor	CIRCLE K CORPORATION/ATC Associates, Inc.	CIRCLE K, UNIT 1366	2002	50410530	0.00	0.00	0.00	0.00	0.00
763	SS	Minor	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING COMPANY	2000	30502510	0.19	2.91	0.63	0.23	5.47
764	SS	Minor	Las Vegas Vac./HILTON GRAND VACATIONS DEVELOP.CO..	LAS VEGAS VACATION SUITES	2002	10300306	0.04	1.60	2.16	0.17	1.13
765	SS	Minor	RINKER MATERIALS CORPORATION	RINKER MATERIALS CORPORATION	2002	30501114	0.00	0.00	0.00	0.00	0.00
766	SS	Significant Minor	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING COMPANY	2000	30502510	0.05	0.73	0.16	0.06	1.66
767	SS	Minor	DARLING INTERNATIONAL, INC.	DARLING INTERNATIONAL, INC.	2002	30299998	0.01	0.47	0.79	0.08	0.28
768	SS	Minor	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING COMPANY	2000	30502510	0.20	2.98	0.65	0.24	6.48
769	SS	Minor	DISCO (Drip Irrigation Supply Co.,Inc.)	DISCO (Drip Irrigation Supply Co.,Inc.)	2002	30805006	0.00	0.00	0.00	3.43	0.00
771	SS	Minor	RED ROCK MINIMART (former)	RED ROCK MINIMART (former)	2002	50410530	0.00	0.00	0.00	0.85	0.00
775	SS	Minor	SUNCOAST HOTEL/CASINO / Coast Resorts	SUNCOAST HOTEL/CASINO (H/C)	2002	10300603	0.13	2.54	2.63	0.20	2.98
779	SS	Unknown		LAS VEGAS VALLEY WATER DIST.	2002	10300603	0.10	4.10	3.40	0.90	0.10
780	SS	Minor	EV-CON RECYCLING	EV-CON RECYCLING	2002	50410313	0.00	0.00	0.00	0.00	0.00
781	SS	Minor	CITY OF N. LAS VEGAS	CITY OF N. LAS VEGAS/Robinson Pumping Sta.	2002	20200102	0.01	0.37	0.08	0.01	0.01
782	SS	Minor	CITY OF N. LAS VEGAS	CITY OF N. LAS VEGAS/Elster Estates Well Site	2002	20200102	0.01	0.23	0.05	0.01	0.01
783	SS	Minor	CITY OF N. LAS VEGAS	CITY OF N. LAS VEGAS/P2-B Pumping Sta.	2002	20200102	0.01	0.15	0.03	0.01	0.01
784	SS	Minor	CITY OF N. LAS VEGAS	CITY OF N. LAS VEGAS/Sun Valley Well Site	2002	20200102	0.01	0.23	0.05	0.01	0.01
788	SS	Minor	Can Cun Resort	Can Cun Resort	2002	10300603	0.02	0.09	0.10	0.02	0.02
789	SS	Minor	CIND-R-LITE COMPANY	CIND-R-LITE BLOCK CO.	2002	30501107	0.00	0.05	0.05	0.00	0.60
790	SS	Minor	CLARK COUNTY WATER RECLAMATION DISTRICT	CLARK COUNTY WATER RECLAMATION DISTRICT	2002	50100707	0.01	0.01	0.01	0.31	0.01
791	SS	Minor	GREEK ISLES H/C /Convention Ctr. Dr.LLC	GREEK ISLES HOTEL & CASINO (H/C)	2002	10300603	0.07	2.27	1.92	0.13	0.24
793	SS	Minor	ROYAL PRINTING CO., INC.	ROYAL PRINTING CO., INC.	2002	40500411	0.00	0.00	0.00	2.62	0.00
795	SS	Minor	Star R Foam	Star R Foam	2002	30101817	0.00	0.08	0.14	4.11	0.01
796	SS	Minor	CENTRAL CHRISTIAN CHURCH	CENTRAL CHRISTIAN CHURCH	2002	10300603	0.02	0.27	0.09	0.03	0.04
799	SS	Minor	HACIENDA HOTEL/CASINO; Lakeview Company	HACIENDA HOTEL/CASINO (H/C)	2002	10300603	0.49	1.78	0.43	0.57	0.23
809	SS	Unknown		DIAMOND CONSTRUCTION COMPANY	2000	30502510	0.35	5.30	1.15	0.42	5.47
811	SS	Minor	CLARK COUNTY SANITATION DIST.	CLARK COUNTY SANITATION DISTRICT	2002	50100765	0.00	0.00	0.00	1.32	0.00
821	SS	Minor	Seven-Eleven (7-11)/Secor Int'l, Inc.	SOUTHLAND 7-11 STORE #21850	2002	50410420	0.00	0.00	0.00	0.00	0.00
824	SS	Unknown	POLO TOWERS / Nevada Resort Properties	POLO TOWERS / Nevada Resort Properties	2002	10300603	0.01	0.36	0.60	0.04	0.35
825	SS	Minor	MGM GRAND HOTEL/CASINO, INC.	MGM GRAND HOTEL/CASINO, INC. (H/C)	2000	10300602	0.18	29.71	24.70	0.08	8.13
827	SS	Minor	HARLAN MACHINERY COMPANY	HARLAN MACHINERY COMPANY	2002	40201625	0.00	0.00	0.00	0.05	0.00
836	SS	Minor	LAS VEGAS VALLEY WATER DISTRICT	LAS VEGAS VALLEY WATER DISTRICT/Corp. Offices	2002	10300603	0.83	1.66	1.86	1.52	1.23
837	SS	Synthetic Minor	LAS VEGAS VALLEY WATER DISTRICT	LAS VEGAS VALLEY WATER DISTRICT/Campbell Station	2002	20200202	0.20	5.90	13.10	4.30	0.10
843	SS	Minor	QWEST COMMUNICATIONS INT'L.	QWEST COMMUNICATION	2002	20100102	0.04	0.80	0.06	0.00	0.00
852	SS	Unknown	OCEAN SPRAY CRANBERRIES, INC.	OCEAN SPRAY CRANBERRIES, INC.	2002	10500106	0.00	0.70	0.12	2.75	0.10
854	SS	Minor	LV FINISHING, LLC	LV FINISHING, LLC	2002	30901104	0.01	0.05	0.08	0.00	0.12
856	SS	Minor	LUXOR HOTEL & CASINO/Ramparts, Inc.	LUXOR HOTEL & CASINO/Ramparts, Inc. (H/C)	2000	10200602	0.10	11.68	9.42	0.65	6.98
859	SS	Synthetic Minor	UNIVERSAL URETHANE, INC.	UNIVERSAL URETHANE, INC.	2002	30800802	0.00	0.00	0.00	39.70	0.00
864	SS	Minor	NEXTLINK NV, LLC /Telecommunications of NV, LLC	NEXTLINK NV, LLC /Telecommunications of NV, LLC	2002	20200102	0.03	0.50	0.11	0.04	0.02
866	SS	Minor	HOLLYWOOD GRAVEL COMPANY	HOLLYWOOD GRAVEL COMPANY	2000	30502510	0.31	4.77	1.03	0.39	9.54
868	SS	Minor	D. L. DENMAN CONSTRUCTION COMPANY	DENMAN CONSTRUCTION COMPANY	2000	30502510	0.74	9.27	2.02	0.62	3.39
869	SS	Minor	SUNSET STATION HOTEL/CASINO	SUNSET STATION HOTEL/CASINO (H/C)	2000	10300602	0.00	0.12	0.10	0.00	3.32
871	SS	Minor	HYATT CORP./MONTELAGO HOTEL INVESTORS, LLC	HYATT REGENCY.LAKE LAS VEGAS (H/C)	2002	10300602	0.01	1.21	1.57	0.16	0.47
874	SS	Minor	REGENCY SERVICE CARTS, INC.	REGENCY SERVICE CARTS, INC.	2002	40200101	0.00	0.00	0.00	1.99	0.00
875	SS	Minor	LEVI STRAUSS & COMPANY	LEVI STRAUSS & COMPANY/Sky Harbor C.S.C.	2000	10200602	0.00	0.52	0.29	0.00	2.13
877	SS	Minor	NEVADA FOREST PRODUCTS, INC.	NEVADA FOREST PRODUCTS, INC.	2002	30799998	0.05	3.28	0.72	0.26	0.74
879	SS	Unknown	TAB CONTRACTORS, INC.	TAB CONTRACTORS, INC./Concrete Barch Plant	2002	30501107	0.00	0.00	0.00	0.00	0.20
883	SS	Unknown		ECHO BAY RESORT	2002	10300603	0.00	0.00	0.00	0.12	0.00
884	SS	Minor	DIAMOND AUTO PAINTING OF HEND., INC.	DIAMOND AUTO PAINTING OF HEND., INC.	2002	40200101	0.00	0.00	0.00	0.85	0.00
886	SS	Minor	APPLIED HARDCOATING TECHNOLOGIES, INC.	APPLIED HARDCOATING TECHNOLOGIES, INC.	2002	40202201	0.00	0.00	0.00	22.11	0.00
888	SS	Minor	GREATER NEVADA AUTO AUCTION	GREATER NEVADA AUTO AUCTION	2002	40201601	0.00	0.50	0.42	4.05	0.04
889	SS	Minor	FRITKIN-JONES DESIGN GROUP, INC	FRITKIN-JONES DESIGN GROUP, INC.	2002	40202501	0.00	0.00	0.00	0.31	0.00
890	SS	Minor	BRYAN PAINTING & SANDBLASTING, INC.	BRYAN PAINTING & SANDBLASTING, INC.	2002	20200102	1.00	2.00	2.00	2.00	1.00

TABLE A.3 (Cont.)

Facility ID	Type[a]	Class	Company Name	Facility Name	Year of Data[b]	SCC[c]	Actual Emissions (tons/year)				
							SO_2	NO_x	CO	VOCs	PM_{10}
891	SS	Unknown	UNIQUE RV & AUTO WORKS	UNIQUE RV & AUTO WORKS	2002	40200101	0.00	0.00	0.00	1.85	0.00
897	SS	Significant Minor	BERLIN INDUSTRIES, INC.	BERLIN INDUSTRIES, INC.	2002	40500411	0.00	0.74	0.62	10.75	0.06
898	SS	Minor	HENDERSON CHEVROLET, INC.	HENDERSON CHEVROLET, INC.	2002	40200101	0.00	0.00	0.00	1.75	0.00
900	SS	Minor	CHAPMAN'S LAS VEGAS DODGE	CHAPMAN'S LAS VEGAS DODGE	2002	40201625	0.00	0.00	0.00	1.23	0.00
902	SS	Minor	DIAMOND AUTO PAINTING OF LAS VEGAS, INC.	DIAMOND AUTO PAINTING OF LAS VEGAS, INC./Econo Auto	2002	40200101	0.00	0.00	0.00	0.59	0.00
905	SS	Unknown	INTERNATIONAL AUTO PAINTING & BODY	INTERNATIONAL AUTO PAINTING & BODY	2002	40201620	0.00	0.00	0.00	0.38	0.00
906	SS	Minor	CADILLAC OF LAS VEGAS/SONIC AUTOMOTIVE	CADILLAC OF LAS VEGAS	2002	40200101	0.00	0.00	0.00	1.61	0.00
907	SS	Unknown		AUTO MAGIC PAINT & BODY	2002	40201625	0.00	0.00	0.00	3.07	0.00
910	SS	Minor	ONE-DAY PAINT & BODY CENTERS, INC.	ONE-DAY PAINT & BODY	2002	40201625	0.00	0.00	0.00	3.15	0.00
911	SS	Minor	ONE-DAY PAINT & BODY CENTERS, INC.	ONE-DAY PAINT & BODY	2002	40201625	0.00	0.00	0.00	5.70	0.00
913	SS	Minor	DESERT CHRYSLER PLYMOUTH, INC.	DESERT CHRYSLER PLYMOUTH, INC.	2002	40201625	0.00	0.00	0.00	3.70	0.00
914	SS	Minor	DESERT DODGE, INC.	DESERT DODGE (Willden's Pride Dodge, Inc.)	2002	40200101	0.00	0.00	0.00	3.09	0.00
915	SS	Minor	IMPERIAL IRON, INC.	IMPERIAL IRON, INC.	2002	40202501	0.00	0.00	0.00	7.08	0.00
918	SS	Minor	BILL HEARD CHEVROLET	BILL HEARD CHEVROLET	2002	40200101	0.00	0.00	0.00	3.20	0.00
926	SS	Minor	FAIRWAY CHEVROLET COMPANY	FAIRWAY CHEVROLET COMPANY	2002	40200101	0.00	0.30	0.06	6.29	0.03
927	SS	Minor	SPRAY GUN AUTO BODY	SPRAY GUN AUTO BODY	2002	40200101	0.00	0.00	0.00	2.45	0.00
928	SS	Minor	ACURA-HONDA PAINT & BODY	ACURA-HONDA PAINT & BODY	2002	40200101	0.00	0.38	0.08	2.46	0.05
937	SS	Minor	CUSTOM ORNAMENTAL IRON	CUSTOM ORNAMENTAL IRON	2002	40200101	0.00	0.00	0.00	1.07	0.00
938	SS	Minor	DOUMANI DESERT INN BODY SHOP, INC.	DOUMANI DESERT INN BODY SHOP, INC.	2002	40200101	0.00	0.00	0.00	0.30	0.00
939	SS	Minor	COURTESY OLDSMOBILE, INC.	COURTESY OLDSMOBILE, INC.	2002	40202501	0.00	0.00	0.00	2.38	0.00
940	SS	Minor	C & S BODY SHOP	C & S BODY SHOP	2002	40200101	0.00	0.00	0.00	0.54	0.00
941	SS	Minor	PRO-ACTION PERFORMANCE AUTO BODY	PRO-ACTION PERFORMANCE AUTO BODY	2002	40200101	0.00	0.00	0.00	0.77	0.00
943	SS	Minor	FRIENDLY FORD	FRIENDLY FORD	2002	40201601	0.00	0.00	0.00	5.14	0.00
944	SS	Minor	SAM'S AUTO BODY LLC	SAM'S AUTO BODY LLC	2002	40201620	0.00	0.00	0.00	0.85	0.00
954	SS	Unknown	EXOTICAR PAINTWORKS, INC.	EXOTICAR PAINTWORKS, INC.	2002	40200101	0.00	0.00	0.00	6.14	0.00
956	SS	Minor	EWING BROTHERS, INC.	EWING BROTHERS, INC.	2002	40200101	0.00	0.00	0.00	2.27	0.00
957	SS	Minor	AUTO QUEST WEST COLLISION & FRAME	AUTO QUEST WEST COLLISION & FRAME	2002	40200101	0.00	0.00	0.00	1.71	0.00
959	SS	Minor	ALL CITY AUTO BODY, INC.	ALL CITY AUTO BODY, INC.	2002	40200101	0.00	0.00	0.00	1.09	0.00
961	SS	Minor	EXCLUSIVE AUTO BODY, INC.	EXCLUSIVE AUTO BODY, INC.	2002	40201625	0.00	0.00	0.00	0.13	0.00
962	SS	Minor	TRI CITY MOTORS	TRI CITY MOTORS	2002	40201625	0.00	0.00	0.00	0.50	0.00
964	SS	Minor	FRANK'S AUTO BODY, INC.	FRANK'S AUTO BODY, INC.	2002	40200101	0.00	0.00	0.00	1.24	0.00
967	SS	Unknown	VISION SIGN, INC.	VISION SIGN, INC.	2002	40200101	0.00	0.00	0.00	1.79	0.00
968	SS	Minor	PARSON'S CUSTOM AUTO BODY	PARSON'S CUSTOM AUTO BODY	2002	40200101	0.00	0.00	0.00	0.29	0.00
970	SS	Unknown		SIMICICH ENTERPRISE, INC.	2002	10300603	0.00	0.00	0.00	1.50	0.00
971	SS	Minor	B & J BODY SHOP	B & J BODY SHOP	2002	40201625	0.00	0.40	0.34	0.36	0.00
972	SS	Minor	PRO-TECH AUTO BODY/AMPB Acquisition Corp.	PRO-TECH AUTO BODY	2002	40201625	0.00	0.12	0.00	2.04	0.00
974	SS	Minor	YOUNG ELECTRIC SIGN COMPANY	YOUNG ELECTRIC SIGN COMPANY	2002	40200101	0.00	0.00	0.00	3.60	0.00
975	SS	Minor	Sudden Impact Auto Body & Collision Repair	Sudden Impact Auto Body & Collision Repair	2002	40202501	0.00	0.00	0.00	0.21	0.00
979	SS	Minor	THREE-STAR AUTO BODY & PAINT	THREE-STAR AUTO BODY & PAINT	2002	40200101	0.00	0.00	0.00	0.66	0.00
981	SS	Minor	DUN-RITE AUTO BODY	DUN-RITE AUTO BODY	2002	40202501	0.00	0.00	0.00	1.52	0.00
984	SS	Minor	Precision Paint	Precision Paint	2002	40201625	0.00	0.00	0.00	0.02	0.00
985	SS	Minor	DIVERSIFIED/NEVADA TRUCK EQUIPMENT SLS, INC.	NEVADA TRUCK EQUIPMENT SALES, INC.	2002	40200101	0.00	0.00	0.00	1.05	0.00
986	SS	Minor	FISCHERS AUTO SHOP, INC.	FISCHERS AUTO SHOP, INC.	2002	40201625	0.00	0.00	0.00	3.84	0.00
992	SS	Minor	SIGNATURE LINCOLN MERCURY	SIGNATURE LINCOLN MERCURY	2002	40201625	0.00	0.00	0.00	1.40	0.00
994	SS	Minor	NUNCIO AUTO BODY/Nuncio, Inc.	NUNCIO AUTO BODY	2002	40201601	0.00	0.00	0.00	0.34	0.00
997	SS	Minor	J.M.B Body & Paint	JMB Body & Paint	2002	40202501	0.00	0.00	0.00	0.07	0.00
1008	SS	Minor	AAA COLLISION REPAIR/MICHAEL KABOLI	AAA COLLISION REPAIR/MICHAEL KABOLI	2002	40201601	0.00	0.00	0.00	1.22	0.00
1011	SS	Minor	AMERICAN AUTO BODY	AMERICAN AUTO BODY	2002	40201606	0.00	0.00	0.00	0.45	0.00
1014	SS	Unknown		QUALITY AUTO BODY	2002	10300603	0.00	0.00	0.00	0.23	0.00
1016	SS	Minor	BLACK DIAMOND AUTO BODY	BLACK DIAMOND AUTO BODY	2002	40200101	0.00	0.00	0.00	0.61	0.00
1018	SS	Minor	CHICAGO/LA PAINT & BODY	CHICAGO/LA PAINT & BODY	2002	40202501	0.00	0.00	0.00	1.14	0.00
1019	SS	Unknown		QUADRIGA PRODUCTIONS, LLC	2002	10300603	0.00	0.00	0.00	3.15	0.00
1020	SS	Minor	PROFICIENT AUTO BODY	PROFICIENT AUTO BODY	2002	40200101	0.00	0.00	0.00	1.30	0.00
1023	SS	Minor	AMERICA WEST AIRLINES	AMERICA WEST AIRLINES	2002	40200101	0.00	0.00	0.00	0.06	0.00
1028	SS	Minor	ACE CAB COMPANY	ACE CAB COMPANY	2002	40202501	0.00	0.00	0.00	1.13	0.00
1030	SS	Minor	NISAN AUTO COLLISION	NISAN AUTO COLLISION	2002	40201606	0.00	0.00	0.00	0.46	0.00
1031	SS	Minor	HARDWOOD KAFE'	HARDWOOD KAFE'	2002	40200101	0.00	0.00	0.00	0.38	0.00
1036	SS	Minor	LAS VEGAS SHUTTER COMPANY	LAS VEGAS SHUTTER COMPANY	2002	40200101	0.00	0.00	0.00	2.29	0.00
1037	SS	Minor	DEECO AUTO PAINTING & BODY WORKS	DEECO AUTO PAINTING & BODY WORKS	2002	40201606	0.00	0.00	0.00	1.20	0.00
1039	SS	Minor	AUTO MAGIC PAINT & BODY/AMPB Acquisition	AUTO MAGIC PAINT & BODY CENTER	2002	40201601	0.00	0.00	0.00	3.07	0.00
1043	SS	Minor	DECO WEST, INC.	DECO WEST, INC	2002	40200101	0.00	0.29	0.06	0.68	0.00
1045	SS	Minor	LIGHTS OF LAS VEGAS, INC.	LIGHTS OF LAS VEGAS, INC.	2002	40200101	0.00	0.00	0.00	0.00	0.00
1046	SS	Minor	EFFECTS NETWORK, The	EFFECTS NETWORK, The	2002	40201901	0.00	0.00	0.00	0.21	0.00
1048	SS	Minor	DENTPRO OF LAS VEGAS, INC.	DENTPRO COLLISION CENTER	2002	40200101	0.00	0.00	0.00	0.73	0.00
1049	SS	Minor	CLASSIC COLLISION CENTER	CLASSIC COLLISION CENTER	2002	40200101	0.01	0.32	0.27	3.90	0.02
1053	SS	Unknown		BUD JONES COMPANY, THE	2002	10300603	0.00	0.00	0.00	0.25	0.00
1055	SS	Minor	ADERA CORPORATION	ADERA CORPORATION	2002	40500801	0.00	0.00	0.00	6.54	0.00
1056	SS	Minor	ATLAS AUTO BODY & PAINT, INC.	ATLAS AUTO BODY & PAINT, INC.	2002	40201601	0.00	0.00	0.00	0.78	0.00

TABLE A.3 (Cont.)

Facility ID	Type [a]	Class	Company Name	Facility Name	Year of Data [b]	SCC [c]	Actual Emissions (tons/year) SO_2	NO_x	CO	VOCs	PM_{10}
1057	SS	Unknown		CUSTOM BUSINESS INTERIORS	2002	10300603	0.00	0.00	0.00	0.00	0.08
1058	SS	Unknown	PARADISE AUTO BODY	PARADISE AUTO BODY	2002	40200101	0.00	0.00	0.00	0.94	0.00
1059	SS	Minor	CZARNOWSKI EXHIBIT SERVICES	CZARNOWSKI EXHIBIT SERVICES	2002	40202106	0.00	0.00	0.00	1.67	0.42
1062	SS	Minor	GREEN VALLEY BODY SHOP/J.O.M. & Associates	GREEN VALLEY BODY SHOP	2002	40202501	0.00	0.00	0.00	0.66	0.00
1065	SS	Minor	McCANDLESS INTERNATIONAL TRUCKS	McCANDLESS INTERNATIONAL TRUCKS	2002	40201601	0.00	0.00	0.00	1.20	0.00
1066	SS	Minor	SAME DAY PAINT & BODY	SAME DAY PAINT & BODY	2002	40202501	0.00	0.00	0.00	1.73	0.00
1068	SS	Minor	JACK OF DIAMONDS AUTO BODY, INC.	JACK OF DIAMONDS AUTO BODY, INC.	2002	40202501	0.00	0.00	0.00	0.29	0.00
1070	SS	Minor	CARLOS BODY SHOP	CARLOS BODY SHOP	2002	40201601	0.00	0.00	0.00	0.37	0.00
1071	SS	Minor	SUMMERLIN AUTO BODY	SUMMERLIN AUTO BODY	2002	40201601	0.00	0.00	0.00	1.08	0.00
1072	SS	Minor	METROPOLITAN AUTO PAINTING/ BODY, INC.	METROPOLITAN AUTO PAINTING/ BODY, INC.	2002	40201601	0.00	0.00	0.00	0.18	0.00
1073	SS	Minor	CUSTOM CABINET FACTORY OF NY, INC.	CUSTOM CABINET FACTORY OF NY, INC.	2002	40201901	0.00	0.00	0.00	1.02	0.00
1074	SS	Minor	AR ORNAMENTAL IRON, INC.	AR ORNAMENTAL IRON, INC.	2002	40202501	0.00	0.00	0.00	4.01	0.00
1080	SS	Minor	MIKOHN LIGHTING & SIGN	MIKOHN LIGHTING & SIGN	2002	40202501	0.00	0.00	0.00	0.39	0.00
1081	SS	Unknown		MIKOHN GAMING CORPORATION	2002	10300603	0.00	0.00	0.00	0.65	0.00
1082	SS	Minor	QUALITY IRON, INC.	QUALITY IRON, INC.	2002	40202501	0.00	0.00	0.00	0.69	0.00
1083	SS	Minor	CEDCO IRON, INC.	CEDCO IRON, INC.	2002	40200101	0.01	0.78	1.32	7.53	0.01
1084	SS	Minor	D & N AUTO COLLISION	D & N AUTO COLLISION	2002	40200101	0.00	0.00	0.00	0.70	0.00
1088	SS	Minor	H & E Equipment Services LLC	H & E Equipment Services LLC	2002	40200101	0.00	0.00	0.00	1.15	0.00
1094	SS	Minor	BODY SYNDICATE,The /JMG Auto Body	BODY SYNDICATE,The	2002	40201601	0.00	0.00	0.00	0.20	0.00
1098	SS	Minor	SIMONE'S AUTO PLAZA	SIMONE'S AUTO PLAZA	2002	40201620	0.00	0.00	0.00	2.20	0.00
1100	SS	Minor	AUTOMOTIVE REFINISH TECHNOLOGIES	AUTOMOTIVE REFINISH TECHNOLOGIES	2002	40200101	0.00	0.00	0.00	0.06	0.00
1102	SS	Minor	GE CAPITAL MODULAR SPACE	GE CAPITAL MODULAR SPACE/LV Br. #460	2002	40200201	0.00	0.00	0.00	0.26	0.00
1104	SS	Minor	D & D COLLISION CENTER	D & D COLLISION CENTER	2002	40201606	0.00	0.00	0.00	0.00	0.00
1105	SS	Minor	BOULDER AUTO BODY	BOULDER AUTO BODY	2002	40201606	0.00	0.00	0.00	1.00	0.00
1107	SS	Unknown	VALLEY AUTOBODY	VALLEY AUTOBODY	2002	40201601	0.00	0.00	0.00	0.39	0.00
1108	SS	Minor	TOWBIN INFINITI	TOWBIN INFINITI	2002	40201601	0.00	0.08	0.00	1.27	0.01
1110	SS	Minor	TEN TEN CUSTOM PAINT, INC.	TEN TEN CUSTOM PAINT, INC.	2002	40201601	0.00	0.00	0.00	0.20	0.00
1112	SS	Unknown	WINNERS CIRCLE KUSTOM AUTO BODY	WINNERS CIRCLE KUSTOM AUTO BODY	2002	40201601	0.00	0.00	0.00	0.55	0.00
1114	SS	Minor	Metro Collision Center	Metro Collision Center	2002	40201901	0.00	0.00	0.00	3.40	0.00
1119	SS	Minor	J & K CONSULTANTS, INC.	J & K CONSULTANTS, INC.	2002	40201601	0.00	0.00	0.00	0.64	0.00
1120	SS	Minor	KUSTOMOTIVE 2000	KUSTOMOTIVE 2000	2002	40201601	0.00	0.00	0.00	0.52	0.00
1121	SS	Minor	NEVADA AUTO COLLISION CENTER	NEVADA AUTO COLLISION CENTER	2002	40201601	0.00	0.00	0.00	0.82	0.00
1122	SS	Unknown	Car Convenience Club	Car Convenience Club	2002	40200101	0.00	0.00	0.00	0.43	0.00
1123	SS	Minor	General Dynamics Aviation Services	General Dynamics Aviation Services	2002	40200501	0.00	0.00	0.00	0.00	0.00
1124	SS	Minor	American Iron Craftsman	American Iron Craftsman	2002	40202501	0.00	0.00	0.00	0.56	0.00
1125	SS	Minor	FLYING COLORS OF LAS VEGAS	FLYING COLORS OF LAS VEGAS	2002	40202401	0.00	0.00	0.00	0.00	0.00
1127	SS	Minor	FIRST (1st) CLASS FLEET & AUTOBODY,--North, LLC	FIRST (1st) CLASS FLEET & AUTOBODY--North, LLC	2002	40201601	0.00	0.00	0.00	0.39	0.00
1128	SS	Unknown	EXPRESS COLLISION CENTER	EXPRESS COLLISION CENTER	2002	40200101	0.00	0.00	0.00	1.86	0.00
1130	SS	Unknown		SIERRA TRUCK BODY & EQUIPMENT	2002	10300603	0.00	0.00	0.00	0.00	0.00
1135	SS	Minor	PERFECT BODY, THE	PERFECT BODY, THE	2002	40201901	0.00	0.00	0.00	1.00	0.00
1138	SS	Minor	LAS VEGAS PRESS	LAS VEGAS PRESS	2002	40500431	0.00	0.00	0.00	2.07	0.00
1141	SS	Minor	COURTESY GMC / PONTIAC	COURTESY GMC	2002	40200101	0.00	0.00	0.00	2.09	0.00
1143	SS	Minor	PREMIER AUTO BODY	PREMIER AUTO BODY	2002	40200101	0.00	0.00	0.00	0.29	0.00
1146	SS	Minor	RAM PRO-LINE LLC	RAM PRO-LINE LLC	2002	40200101	0.00	0.00	0.00	0.02	0.02
1148	SS	Minor	GILL'S PRINTING & COLOR GRAPHICS	GILL'S PRINTING & COLOR GRAPHICS	2002	40500411	0.00	0.00	0.00	6.51	0.00
1149	SS	Minor	LAS VEGAS COLOR GRAPHICS, INC.	LAS VEGAS COLOR GRAPHICS, INC.	2002	40500411	0.00	0.00	0.00	3.83	0.00
1150	SS	Minor	TRUCK COLLISION REPAIR CENTER, INC.	TRUCK COLLISION REPAIR CENTER, INC.	2002	40200101	0.00	0.00	0.00	1.14	0.00
1151	SS	Minor	SILVER LAKE AUTO BODY & PAINT	SILVER LAKE AUTO BODY & PAINT	2002	40200101	0.00	0.00	0.00	0.66	0.00
1152	SS	Minor	SPEEDWAY TRUCK & PAINT CENTER	SPEEDWAY TRUCK & PAINT CENTER	2002	40201620	0.00	0.00	0.00	0.42	0.00
1153	SS	Minor	BRYARWOOD	BRYARWOOD	2002	40201620	0.00	0.00	0.00	0.60	0.00
1154	SS	Minor	COLLINGS, INC. OF NEVADA	COLLINGS, INC. OF NEVADA	2002	40200301	0.00	0.00	0.00	8.17	0.00
1155	SS	Minor	GARY'S AUTO BODY, INC.	GARY'S AUTO BODY, INC.	2002	40200101	0.00	0.00	0.00	0.31	0.00
1156	SS	Unknown		AFFORDABLE AUTOBODY	2002	10300603	0.00	0.00	0.00	0.57	0.00
1157	VLP	Minor	Clark Co. Armory/NV ARMY NAT'L GUARD	CLARK COUNTY ARMORY	2002	10300603	0.02	0.52	0.14	0.42	0.14
1160	HP VLP	Minor	ARVILLE BODY & PAINT	ARVILLE BODY & PAINT	2002	40200101	0.00	0.00	0.00	0.32	0.00
1161	VLP	Minor	VARGAS AUTO BODY	VARGAS AUTO BODY	2002	40201620	0.00	0.00	0.00	0.37	0.00
1163	VLP	Minor	FLEET BODY & PAINT INC	FLEET BODY & PAINT INC	2002	40200101	0.00	0.00	0.00	4.60	0.00
1165	VLP	Minor	CERIO'S OF LAS VEGAS	CERIO'S OF LAS VEGAS	2002	40201901	0.00	0.00	0.00	3.66	0.00
1166	VLP	Unknown	EXCALIBUR AUTO BODY & PAINT	EXCALIBUR AUTO BODY & PAINT	2002	40200101	0.00	0.00	0.00	0.98	0.00
1168	VLP	Minor	EL AZTECA CUSTOM IRON	EL AZTECA CUSTOM IRON	2002	40200101	0.00	0.00	0.00	1.05	0.00
1170	VLP	Minor	CASTLE CABINETS, INC.	CASTLE CABINETS, INC.	2002	40200101	0.00	0.00	0.00	1.42	0.00
1171	VLP	Minor	MONTEREY WOODWORKING	MONTEREY WOODWORKING	2002	40200101	0.00	0.00	0.00	0.67	0.00
1173	VLP	Minor	SUNSET COLLISION CENTER, INC.	SUNSET COLLISION CENTER, INC.	2002	40201620	0.00	0.00	0.00	0.99	0.00
1176	VLP	Unknown	EXTREME CYCLE WORKS/Beyond Extreme, LLC	EXTREME CYCLE WORKS	2002	10300603	0.00	0.00	0.00	0.04	0.00
1177	VLP	Minor	E & L FURNITURE REFINISHING & UPHOLSTRY	E & L FURNITURE REFINISHING & UPHOLSTRY	2002	40202132	0.00	0.00	0.00	0.56	0.00
1178	VLP	Minor	ARTISTIC FURNITURE SERVICE	ARTISTIC FURNITURE SERVICE	2002	40202132	0.00	0.00	0.00	0.19	0.00
1179	VLP	Minor	KISS CABINET COMPANY	KISS CABINET COMPANY	2002	40202132	0.00	0.00	0.00	3.65	0.00
1181	VLP	Minor	BARTH'S FAUX EFFECTS/Whale Enterprises, Inc.	BARTH'S FAUX EFFECTS	2002	40202199	0.00	0.00	0.00	0.20	0.00

TABLE A.3 (Cont.)

Facility ID	Type [a]	Class	Company Name	Facility Name	Year of Data [b]	SCC [c]	Actual Emissions (tons/year) SO_2	NO_x	CO	VOCs	PM_{10}
1186	VLP	Minor	LOS ANGELES/LAS VEGAS FREIGHTLINER	LOS ANGELES/LAS VEGAS FREIGHTLINER	2002	40200101	0.00	0.00	0.00	0.12	0.00
1187	VLP	Minor	TRUCK PARTS & EQUIPMENT COMPANY	TRUCK PARTS & EQUIPMENT COMPANY	2002	40200101	0.01	0.01	0.01	0.38	0.01
1190	VLP	Minor	DESIGNER & DECORATOR SERVICES	DESIGNER & DECORATOR SERVICES	2002	40200101	0.00	0.00	0.00	0.39	0.00
1192	VLP	Minor	JZL DESIGNS INC	JZL DESIGNS INC	2002	40200101	0.00	0.00	0.00	0.30	0.00
1193	VLP	Minor	CUSTOM LANDAU	CUSTOM LANDAU	2002	40200101	0.00	0.00	0.00	2.39	0.00
1194	VLP	Minor	KALCO LIGHTING, LLC	KALCO LIGHTING, LLC	2002	40200101	0.00	0.00	0.00	6.30	0.00
1195	VLP	Minor	ACCIDENT REBUILDING	ACCIDENT REBUILDING	2002	40200101	0.00	0.00	0.00	0.16	0.00
1196	VLP	Minor	ACCU WOOD, INC.	ACCU WOOD, INC.	2002	30700805	0.00	0.00	0.00	3.19	0.00
1197	VLP	Minor	MARCHAN'S AUTO BODY SHOP	MARCHAN'S AUTO BODY SHOP	2002	40200101	0.00	0.00	0.00	0.19	0.00
1201	VLP	Minor	ADVANCED ARCHITECTURAL METALS, INC.	ADVANCED ARCHITECTURAL METALS, INC.	2002	40200101	0.00	0.00	0.00	1.15	0.00
1205	VLP	Minor	WALKER FURNITURE	WALKER FURNITURE	2002	40200101	0.00	0.00	0.00	0.14	0.00
1206	VLP	Unknown	INTEREX OF NEVADA, INC.	INTEREX OF NEVADA, INC.	2002	40200101	0.00	0.00	0.00	0.08	0.00
1207	VLP	Unknown	POWDER COATING PLUS	POWDER COATING PLUS	2002	10500206	0.00	0.03	0.05	0.01	0.27
1208	VLP	Minor	LARSEN ENTERPRISES, INC.	LARSEN ENTERPRISES, INC.	2002	40200101	0.00	0.00	0.00	1.97	0.00
1210	VLP	Unknown	IMAGE MAKERS AUTOMOTIVE	IMAGE MAKERS AUTOMOTIVE	2002	40201620	0.00	0.00	0.00	0.29	0.00
1211	VLP	Unknown	RANDY'S CUSTOM AUTO PAINT	RANDY'S CUSTOM AUTO PAINT	2002	40200101	0.00	0.00	0.00	0.29	0.00
1212	VLP	Minor	CUSTOM POWDER COAT/Capco Enterprises, Inc.	CUSTOM POWDER COAT	2002	10200603	0.00	0.13	0.11	1.03	0.05
1213	VLP	Minor	REBAR MACHINE SERVICE, INC.	REBAR MACHINE SERVICE, INC.	2002	40299995	0.00	0.00	0.00	0.47	0.00
1215	VLP	Unknown	ACCENT AUTO BODY, INC.	ACCENT AUTO BODY, INC.	2002	40200101	0.01	0.07	0.06	0.50	0.01
1216	VLP	Minor	B MANUFACTURING COMPANY	B MANUFACTURING COMPANY	2002	30904010	0.00	0.75	0.63	2.47	0.06
1218	VLP	Minor	FOUR(4)WALL ENTERTAINMENT/4Wall Enterprises	FOUR(4)WALL ENTERTAINMENT/4Wall Enterprises	2002	40201620	0.00	0.00	0.00	0.08	0.00
1219	VLP	Minor	SUPER STRIPES	SUPER STRIPES	2002	40201620	0.00	0.00	0.00	0.20	0.00
1221	VLP	Minor	MASTER CRAFTSMEN BODY & PAINT	MASTER CRAFTSMEN BODY & PAINT	2002	40200101	0.00	0.00	0.00	0.07	0.00
1222	VLP	Minor	CLASSIC IRON DESIGNS	CLASSIC IRON DESIGNS	2002	40200101	0.00	0.00	0.00	0.34	0.00
1224	VLP	Minor	L & M WELDING L.L.C.	L & M WELDING L.L.C.	2002	40200101	0.00	0.00	0.00	1.98	0.00
1227	VLP	Minor	OASIS KITCHENS	OASIS KITCHENS	2002	40200101	0.00	0.00	0.00	0.50	0.00
1228	VLP	Minor	G.L.M. CABINETS	G.L.M. CABINETS	2002	40200101	0.00	0.00	0.00	0.11	0.00
1500	VLP	Minor	ST. ROSE DOMINICAN HOSPITAL	ST. ROSE DOMINICAN HOSPITAL/Siena Campus	2002	10300603	0.07	4.58	5.92	1.04	0.86
1501	VLP	Minor	RESORT AT GREEN VALLEY RANCH, The	RESORT AT GREEN VALLEY RANCH, The (H/C)	2002	10300602	0.56	4.52	9.15	0.56	0.82
1503	VLP	Unknown		SPRINT (SOUTH SOUTH BLDG.)	2002	10300603	0.01	0.17	0.04	0.01	0.01
1512	VLP	Significant Minor	Del Webb Corporation/Nevada Communities	DEL WEBB ANTHEM	2002	30500201	10.00	49.00	65.00	49.00	69.00
1516	VLP	Minor	HIGH DESERT STATE PRISON/St. Public Works Bd.	HIGH DESERT STATE PRISON/St. Public Works Bd.	2002	10300502	2.10	3.70	1.50	0.10	1.10
1522	VLP	Minor	PALMS CASINO RESORT	PALMS CASINO RESORT (H/C)	2002	10300602	0.10	4.87	6.76	0.49	1.50
1524	VLP	Minor	BOULDER STATION CASINO	BOULDER STATION CASINO (H/C)	2000	10300602	0.21	1.47	0.79	0.06	0.53
1526	VLP	Minor	EUREKA CASINO HOTEL/Rancho Mesquite Casino LLC	EUREKA CASINO HOTEL	2002	10300603	0.53	2.37	0.56	0.10	0.10
1528	VLP	Unknown	ISG RESOURCES, INC.	ISG RESOURCES/Fly Ash Transfer Terminal	2002	30501110	0.00	0.00	0.00	0.00	0.18
1531	VLP	Minor	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING	2002	30500205	5.76	20.33	7.20	2.76	7.38
1532	VLP	Minor	RINKER MATERIALS CORPORATION	RINKER MATERIALS, INC. (Turnberry Project)	2002	30501106	0.00	0.00	0.00	0.00	0.57
1534	VLP	Minor	MEDICAL OFFICE BUILDINGS OF NEVADA LLC	MEDICAL OFFICE BUILDINGS OF NEVADA LLC	2002	10200603	0.08	0.08	0.57	0.05	7.05
1536	HP VLP	Minor	CREEL PRINTING & PUBLISHING CO.	CREEL PRINTING & PUBLISHING COMPANY	2002	40500421	0.35	0.93	0.01	28.36	0.08
1537	VLP	Minor	LAS VEGAS PAVING CORPORATION	LAS VEGAS PAVING CORPORATION/"Racetrack Pit"	2000	30502511	0.18	2.73	0.59	0.22	5.49
1540	VLP	Unknown		TSUDA SURFACE TECHNOLOGIES, INC.	2002	40200701	0.05	3.60	1.45	10.50	0.26
1541	VLP	Minor	LAKE MEAD HOSPITAL	LAKE MEAD HOSPITAL	2002	10300603	0.03	1.83	1.59	0.36	0.16
1547	VLP	Minor	Degussa Construction Chemicals Operations, Inc.	Degussa Construction Chemicals	2002	30501107	0.00	0.00	0.00	0.00	0.13
1548	VLP	Minor	LAS VEGAS ANIMAL FOUNDATION, The	LAS VEGAS ANIMAL FOUNDATION, The	2002	50300109	0.40	2.28	1.04	0.01	0.01
1551	VLP	Unknown	POWERTRUSION INT'L, INC.	POWERTRUSION 2000 OF NEVADA, INC.	2002	30800720	0.00	0.00	0.00	0.14	0.00
1553	SS	Minor	BLACK MTN COMMUNICATIONS CTR (KNPR)	BLACK MTN COMMUNICATIONS CTR (KNPR)	2002	20100102	0.00	0.00	0.00	0.00	0.00
1554	SS	Minor	LEVEL 3 COMMUNICATIONS	LEVEL 3 COMMUNICATIONS	2002	20100102	0.00	0.46	0.08	0.00	0.00
1557	VLP	Unknown	AMERICAN CEMENT & AGGREGATE	AMERICAN CEMENT & AGGREGATE	2002	30501107	0.00	0.00	0.00	0.00	0.07
1561	SS	Minor	Clear Channel Outdoor Advertising	Clear Channel Outdoor Advertising	2002	40201606	0.01	0.01	0.57	1.44	0.01
1562	SS	Minor	COMMERCIAL CABINET COMPANY	COMMERCIAL CABINET COMPANY	2002	40200101	0.00	0.00	0.00	6.00	0.00
1567	SS	Minor	LAS VEGAS CULTURED MARBLE, INC.	LAS VEGAS CULTURED MARBLE, INC.	2002	40202201	0.00	0.00	0.00	4.20	0.00
1568	VLP	Minor	FED. AVIATION ADMIN./Sierra NV SMO	FED. AVIATION ADMIN./Airport Traffic Control Tower	2002	20200102	0.02	0.00	0.07	0.00	0.00
1569	VLP	Minor	MOUNTAIN VIEW HOSPITAL	MOUNTAIN VIEW HOSPITAL	2001	10300602	0.00	0.90	0.70	0.05	3.90
1570	SS	Minor	LEVEL 3 COMM / KIEWIT WESTERN	LEVEL 3 COMMUNICATIONS /LEVEL 3 JEAN	2002	20100102	0.00	0.25	0.11	0.00	0.00
1572	SS	Minor	SBC TELECOM	SBC TELECOM	2002	20100102	0.04	0.10	0.02	0.01	0.01
1573	VLP	Minor	SUMMERLIN HOSPITAL MEDICAL CENTER	SUMMERLIN HOSPITAL MEDICAL CENTER	2002	10300603	0.10	4.90	7.75	0.49	0.90
1574	VLP	Unknown			2001	10300602	1.44	7.18	3.44	4.67	32.20
1575	SS	Unknown			2001	10300603	0.04	0.58	0.13	0.05	3.90
1576	SS	ATC Only	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING	2001	30502510	0.02	1.23	0.27	0.10	3.70
1577	SS	Minor	SIERRA READY MIX, LLC	SIERRA READY MIX, LLC (South Plant)	2002	30501106	0.00	0.00	0.00	0.00	1.13
1579	SS	Unknown		NEWMARK SIGNS	2002	10300603	0.00	0.00	0.00	0.70	0.00
1580	SS	Minor	SUNRISE CREMATION & BURIAL SOCIETY LLC	SUNRISE CREMATION & BURIAL SOCIETY LLC	2002	31502101	0.00	0.30	0.08	0.01	0.07
1581	SS	Minor	R. L. MC VANE, INC.	R L McVANE INC	2002	10300603	0.00	0.00	0.00	0.00	0.00
1585	SS	Minor	NEVADA LINEN SUPPLY	NEVADA LINEN SUPPLY	2002	10300603	0.00	0.00	0.08	0.00	0.00
1586	VLP	Unknown		FREHNER CONSTRUCTION CO., INC.	2002	10300603	0.01	0.07	0.01	0.01	0.04
1587	SS	Unknown	QUALCOMM, INC.	QUALCOMM, INC.	2002	20100102	0.00	0.18	0.00	0.00	0.00
1588	SS	Minor	NEIGHBORHOOD SHOPPER/Donrey Media Group	NEIGHBORHOOD SHOPPER	2002	40500305	0.00	0.00	0.00	0.41	0.00

TABLE A.3 (Cont.)

Facility ID	Type[a]	Class	Company Name	Facility Name	Year of Data[b]	SCC[c]	Actual Emissions (tons/year) SO_2	NO_x	CO	VOCs	PM_{10}
1589	SS	Minor	LASFUELS CORPORATION	LASFUELS CORPORATION (McCarran Airport)	2002	40600306	0.00	0.18	0.07	3.45	0.00
1591	SS	Minor	LEGACY ROCK, INC.	LEGACY ROCK, INC.	2000	30502510	0.00	0.06	0.01	0.00	0.12
1592	SS	Minor	LAS VEGAS PAVING CORPORATION	LAS VEGAS PAVING CORPORATION	2001	30502511	0.03	0.49	0.12	0.04	4.55
1595	SS	Minor	KINDRED HEALTHCARE	KINDRED HEALTHCARE	2002	10300603	0.06	4.10	3.15	0.22	0.38
1598	SS	Minor	MEDCO HEALTH SOLUTIONS OF HENDERSON, NV, LLC	MEDCO HEALTH SOLUTIONS OF HENDERSON, NV, LLC	2002	20200102	0.01	0.14	0.03	0.01	0.01
1600	SS	Minor	CITY OF NORTH LAS VEGAS	CITY OF NORTH LAS VEGAS/DEER SPRINGS PUMP.STN.	2002	20200102	0.01	0.28	0.06	0.02	0.02
1601	VLP	Minor	CITY OF NORTH LAS VEGAS	CITY OF NORTH LAS VEGAS/CITY HALL	2002	10300603	0.01	0.06	0.09	0.01	0.01
1602	SS	Minor	CITY OF NORTH LAS VEGAS	CITY OF NORTH LAS VEGAS/DETENTION CTR	2002	10300603	0.02	1.03	0.36	0.08	0.10
1604	VLP	Minor	FIRST NATIONAL BANK OF MARIN	FIRST NATIONAL BANK OF MARIN	2002	20200102	0.01	0.55	0.43	0.02	0.02
1605	SS	Minor	PAVER MODULE OF NEVADA LLC	PAVER MODULE OF NEVADA LLC	2002	30501106	0.00	0.00	0.00	0.00	0.05
1607	SS	Minor	ARIZONA CHARLIE'S WEST	ARIZONA CHARLIE'S WEST	2002	10300603	0.04	2.56	3.38	0.27	2.06
1608	SS	Minor		JETCO MILL/JETCO ENTERPRISES INC	2002	30502510	0.00	0.73	0.16	0.06	1.56
1609	SS	Unknown		VALLEY HYUNDAI	2002	40200101	0.00	0.00	0.00	2.82	0.00
1613	SS	Unknown		FREHNER CONSTRUCTION CO., INC.	2002	30502510	0.01	0.52	0.10	0.04	4.04
1615	SS	Minor	AVESTOR LLC	AVESTOR LLC	2002	10300603	0.01	0.40	0.08	0.04	0.02
1617	SS	Minor	CUSTOM ASPHALT PAVING, INC.	CUSTOM ASPHALT PAVING, INC./Sealcoat Plant	2002	30699998	0.00	0.00	0.00	0.13	0.00
1618	SS	Minor	AVIS/PAYLESS REMEDIATION SYSTEM	AVIS/PAYLESS REMEDIATION SYSTEM	2002	50410313	0.00	0.00	0.00	0.47	0.00
1620	HP VLP	Minor	NORTH AMERICAN POWER COMPANY	N. AMERICAN. POWER CO./Demo Plant	2002	10300603	0.18	0.06	0.00	0.00	0.04
1621	SS	Unknown		K & G FOAM DESIGN	2002	40200101	0.00	0.00	0.00	0.00	0.00
1624	SS	Minor	WYNN DESIGN AND DEVELOPMENT, LLC	WYNN RESORTS	2002	10300602	0.04	0.78	0.68	0.06	0.28
7002	SS	Minor	RINKER MATERIALS CORPORATION	RINKER MATERIALS WEST, LLC	2000	30502510	0.13	4.48	1.19	0.07	9.06
7003	SS	Minor	INSUL-CRETE	INSUL-CRETE	2002	30501109	0.01	0.01	0.01	0.01	0.02
7005	SS	Minor	CHARLIE BROWN CONSTRUCTION CO.	CHARLIE BROWN CONSTRUCTION, INC.	2000	30502510	0.13	1.92	0.42	0.15	0.99
7008	SS	Unknown	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING COMPANY	2002	30500205	0.00	0.00	0.00	0.00	0.00
7009	SS	Minor	REES'S ENTERPRISE	REES'S ENTERPRISE	2002	30502510	0.03	2.82	0.60	0.24	6.70
7012	SS	Minor	AIRWAY ROCK PRODUCTS, INC.	AIRWAY ROCK PRODUCTS, INC.	2000	30502510	0.00	0.16	0.04	0.01	0.31
7013	SS	Minor	AIRWAY ROCK PRODUCTS, INC.	AIRWAY ROCK PRODUCTS, INC.	2000	30502510	0.00	0.00	0.00	0.00	0.00
7017	SS	Minor	CHEMICAL LIME COMPANY	CHEMICAL LIME COMPANY	2002	30501615	0.00	0.00	0.00	0.00	0.00
7018	SS	Minor	CHEMICAL LIME COMPANY	CHEMICAL LIME COMPANY	2002	30501615	0.00	0.00	0.00	0.00	0.00
7019	SS	Minor	CHEMICAL LIME COMPANY	CHEMICAL LIME COMPANY	2002	30501615	0.00	0.00	0.00	0.00	0.00
7022	SS	Unknown	REES'S ENTERPRISE	REES'S ENTERPRISE	2001	30502510	0.10	1.57	0.34	0.13	3.32
7027	SS	Unknown		RINKER MATERIALS WEST, LLC / Plant 29	2002	10300603	0.00	0.00	0.00	0.00	0.00
7028	SS	Unknown		RINKER MATERIALS WEST, LLC / Plant 80	2002	10300603	0.00	0.00	0.00	0.00	0.00
7029	SS	Minor	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING/PLANT A	2002	30502510	0.00	0.00	0.00	0.00	0.00
7030	SS	Minor	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING/PLANT B	2002	30502510	0.02	1.08	0.23	0.09	3.66
7037	SS	Minor	FNF CONSTRUCTION, INC	FNF CONSTRUCTION, INC.	2002	30500201	0.00	0.00	0.00	0.00	0.00
7042	SS	Minor	LAWRIMORE TRUCKING, INC.	LAWRIMORE TRUCKING, INC.	2002	30502510	0.02	1.40	0.30	0.11	3.65
7047	SS	Unknown		SUNSTATE LANDSCAPE & LAWN, INC.	2002	10300603	0.00	0.00	0.00	0.00	0.00
7050	SS	Minor	VISTA LANDSCAPE CENTERS, INC.	VISTA LANDSCAPE CENTERS	2002	10300603	0.05	0.80	0.20	1.01	3.40
7056	SS	Unknown		NEVADA READY MIX	2000	30501114	0.08	1.04	0.23	0.07	1.27
7061	SS	Unknown			2000	10300603	0.10	1.58	0.34	0.13	2.98
7067	SS	Minor	WESTERN STATES CONTRACTING, INC.	WESTERN STATES CONTRACTING, INC.	2000	30502511	0.02	0.28	0.06	0.02	0.76
7072	SS	Minor	DIAMOND CONSTRUCTION COMPANY	DIAMOND CONSTRUCTION COMPANY	2002	30502511	0.00	0.00	0.00	0.00	0.00
7073	SS	Minor	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING COMPANY	2000	30502510	0.04	0.64	0.14	0.05	1.20
7076	SS	Unknown	JIM WILKIN TRUCKING	JIM WILKIN TRUCKING	2001	30502510	0.00	0.00	0.00	0.00	1.30
7077	Unknown	Minor	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING COMPANY, INC.	2000	30502510	0.05	0.83	0.18	0.07	0.81
7084	Unknown	Unknown	PIPES PAVING	PIPES PAVING	2000	30502510	0.22	2.70	0.59	0.18	9.80
7087	Unknown	Minor	BREAK-EM EXCAVATION, L.L.C.	BREAK-EM EXCAVATION, L.L.C.	2002	30502510	0.00	0.00	0.00	0.00	0.01
7090	Unknown	Minor	BARTHOLOMEW ENTERPRISES	BARTHOLOMEW ENTERPRISES	2002	30501106	0.01	0.35	0.08	0.03	0.50
7102	Unknown	Minor	AIRWAY ROCK PRODUCTS, INC.	AIRWAY ROCK PRODUCTS, INC.	2002	30502701	0.01	0.45	0.10	0.04	0.37
7104	Unknown	Unknown		MORRISON KNUDSEN CORPORATION	2002	10300603	0.00	0.00	0.00	0.00	0.00
7105	Unknown	Unknown		RINKER MATERIALS WEST, LLC / Plant 81	2002	10300603	0.00	0.00	0.00	0.00	0.00
7106	Unknown	Minor	SAGUARO POWER COMPANY	SAGUARO POWER CO./@ Ocean Spray Cranberries, Inc.	2002	10300602	0.00	0.00	0.00	0.00	0.00
7107	Unknown	Minor	APCO EQUIPMENT RENTALS	APCO EQUIPMENT RENTALS	2000	30502511	0.02	0.25	0.51	0.02	1.03
7121	Unknown	Unknown		NEVADA READY MIX	2002	10300603	0.00	0.00	0.00	0.00	0.00
7123	Unknown	Minor	WHITING BROTHERS, INC.	WHITING BROTHERS, INC.	2000	30502510	0.11	1.70	0.37	0.14	2.26
7126	Unknown	Minor	MS CONCRETE COMPANY, INC.	MS CONCRETE COMPANY, INC.	2002	30502511	0.01	0.14	0.03	0.01	0.21
7127	Unknown	Minor	SOUTHERN NEVADA PAVING COMPANY	SOUTHERN NEVADA PAVING COMPANY	2001	30502510	0.04	1.11	0.24	0.09	0.80
7128	Unknown	Unknown			2001	10300603	0.03	2.06	0.45	0.16	1.21
7129	Unknown	Unknown		KUKURIN CONCRETE, INC.	2002	10300603	0.00	0.00	0.00	0.00	0.00
7132	Unknown	Minor	NEVADA READY MIX	NEVADA READY MIX	2002	30501106	0.02	0.81	0.18	0.06	0.25
7140	Unknown	Unknown			2001	10300603	0.08	1.19	0.26	0.10	2.52
7141	Unknown	Unknown		DIAMOND CONSTRUCTION COMPANY	2000	30502510	0.18	2.71	0.59	0.22	7.72
7144	Unknown	Minor	LAS VEGAS PAVING CORPORATION	LAS VEGAS PAVING CORPORATION	2001	30502511	0.06	0.98	0.21	0.08	0.15
7149	Unknown	Minor	ROCKY MOUNTAIN CRUSHING, INC.	ROCKY MOUNTAIN CRUSHING, INC.	2000	30502510	0.25	3.77	0.82	0.30	1.74
7155	Unknown	Minor	UNDERGROUND, INC.	UNDERGROUND, INC.	2002	30502511	0.00	0.06	0.00	0.00	0.13
7169	Unknown	Minor	MMC, Inc.	MMC, Inc	2000	30501106	0.02	0.24	0.05	0.03	0.02
7171	Unknown	Minor	CHEMICAL LIME COMPANY	CHEMICAL LIME COMPANY	2002	30201688	0.00	0.00	0.00	0.00	0.00

TABLE A.3 (Cont.)

Facility ID	Type [a]	Class	Company Name	Facility Name	Year of Data [b]	SCC [c]	Actual Emissions (tons/year) SO_2	NO_x	CO	VOCs	PM_{10}
7172	Unknown	Unknown		R. L. MC VANE/Portable Crush/Screen Plant	2002	30502510	0.00	0.77	0.17	0.06	1.63
7191	Unknown	Minor	CTC CRUSHING	CTC CRUSHING	2000	30502510	0.07	4.93	1.07	0.39	6.65
7194	Unknown	Unknown			2000	10300603	0.01	0.09	0.02	0.01	1.23
7195	Unknown	Unknown		MORRISON KNUDSEN CORPORATION	2002	10300603	0.00	0.00	0.00	0.00	0.00
7196	Unknown	Unknown			2000	10300603	0.00	0.13	0.03	0.00	0.09
7202	Unknown	Minor	RINKER MATERIALS CORPORATION	RINKER MATERIALS, INC. /Plant 82	2002	30501107	0.00	0.00	0.00	0.00	0.58
7209	Unknown	Minor	LEAVITT READY MIX, INC.	LEAVITT READY MIX	2001	30502510	0.00	0.00	0.00	0.00	1.20
7212	Unknown	Unknown			2000	10300602	0.35	5.21	1.14	0.41	6.58
7213	Unknown	Minor	CASINO READY MIX, INC.	CASINO READY MIX	2002	30501106	0.09	2.69	0.52	0.20	1.43
7220	Unknown	Unknown			2000	10300602	0.39	5.92	1.28	0.48	3.54
7222	Unknown	Unknown			2000	10300603	0.05	0.71	0.16	0.06	0.86
7224	Unknown	Unknown		FREHNER CONSTRUCTION CO., INC.	2002	10300603	0.00	0.00	0.00	0.00	0.00
7230	Unknown	Minor	CTC CRUSHING	CTC CRUSHING	2001	30501114	0.02	1.49	0.32	0.12	4.05
7233	Unknown	Unknown		AMERICAN ASPHALT & GRADING	2000	30501106	0.07	5.10	1.10	0.04	2.37
7235	Unknown	Unknown			2000	10300603	0.14	2.10	0.46	0.17	4.64
7240	Unknown	Unknown			2000	10300603	0.10	1.36	0.30	0.11	3.63
7242	Unknown	Minor	TAB CONTRACTORS, INC.	TAB CONTRACTORS, INC.	2000	30502701	0.00	0.08	0.02	0.00	1.95
7244	Unknown	Unknown			2000	10300603	0.00	0.96	0.21	0.00	0.81
7246	Unknown	Minor	DIAMOND CONSTRUCTION COMPANY	DIAMOND CONSTRUCTION COMPANY	2001	30502510	0.04	1.83	0.32	0.06	3.54
7247	Unknown	Minor	CHARLIE BROWN CONSTRUCTION CO.	CHARLIE BROWN CONSTRUCTION	2000	30502510	0.14	2.09	0.45	0.17	1.93
7248	Unknown	Minor	FREHNER CONSTRUCTION CO., INC.	FREHNER CONSTRUCTION CO. INC.	2001	30502510	0.13	3.92	0.78	0.41	10.92
7249	Unknown	Unknown		FREHNER CONSTRUCTION CO. INC.	2001	30502510	0.00	0.00	0.00	0.00	16.50
7250	Unknown	Minor	CUSTOM CRUSHING, INC.	CUSTOM CRUSHING, INC.	2002	30502513	0.00	0.00	0.00	0.00	0.00
7256	Unknown	Minor	MEADOW VALLEY CONTRACTORS INC	MEADOW VALLEY CONTRACTORS INC	2002	30500205	0.00	0.00	0.00	0.00	0.00
7257	Unknown	Unknown			2001	10300603	0.01	1.10	0.24	0.88	0.07
7259	Unknown	Unknown		LAS VEGAS PAVING CORPORATION	2001	30502510	0.26	3.83	0.83	0.31	7.08
7260	Unknown	Minor	MMC, Inc.	MMC, Inc.	2002	30501107	0.02	1.38	0.30	0.11	1.19
7261	Unknown	Minor	Q. C. WORKS, INC.	Q. C. WORKS, INC.	2002	30502511	0.00	0.28	0.06	0.00	0.77
7262	Unknown	Minor	HARBER COMPANY, INC.	HARBER COMPANY, INC.	2000	30502510	0.00	0.10	0.02	0.00	0.17
7263	Unknown	Minor	DIAMOND CONSTRUCTION COMPANY	DIAMOND CONSTRUCTION	2001	30502510	0.01	0.39	0.09	0.03	0.43
7265	Unknown	Minor	AMERICAN ASPHALT & GRADING COMPANY	AMERICAN ASPHALT & GRADING CO	2001	30502510	0.50	6.24	1.36	0.41	7.61
7266	Unknown	Minor	NEVADA READY MIX	NEVADA READY MIX	2002	30502503	0.02	0.22	0.05	0.00	0.09
7269	Unknown	Minor	TAB CONTRACTORS, INC.	Tab Contractors	2001	30502510	0.08	5.25	1.14	0.42	9.72
7270	Unknown	Unknown	UNDERGROUND, INC.	UNDERGROUND, INC.	2002	30502503	0.00	0.00	0.00	0.00	0.00
7271	Unknown	Minor		LAS VEGAS PAVING CORPORATION	2001	30502510	0.06	0.78	0.17	0.06	1.77
7272	Unknown	Unknown		LAWRIMORE TRUCKING, INC.	2002	30502510	0.01	0.09	0.02	0.01	0.92
7273	Unknown	Minor	SILVER STATE TRANSPORTATION FUNDING, INC.	SILVER STATE TRANSPORTATION	2002	30502510	0.10	0.98	0.16	0.04	4.41
7274	Unknown	Minor	Terra Contracting Inc./Screening Plant	Terra Contracting Inc./Screening Plant	2002	30502511	0.01	0.15	0.03	0.01	2.96
7275	Unknown	Minor	MEL CLARK, INC.	MEL CLARK, INC.	2001	30502510	0.05	0.55	0.12	0.37	0.46
7276	Unknown	Minor	LAS VEGAS PAVING CORPORATION	LAS VEGAS PAVING CORPORATION	2002	30502510	0.05	3.38	0.73	0.27	3.38
7277	Unknown	Unknown			2001	10300603	0.00	0.30	0.00	0.00	0.70
7279	Unknown	Minor	AMERICAN ASPHALT & GRADING COMPANY	AMERICAN ASPHALT & GRADING CO INC	2001	30502510	0.04	0.52	0.11	0.03	0.55
7280	Unknown	Unknown		AMERICAN ASPHALT & GRADING CO	2002	30502510	0.04	0.67	0.15	0.05	0.54
7281	Unknown	Unknown		AMERICAN ASPHALT & GRADING CO INC	2002	30502510	0.03	0.38	0.08	0.03	0.32
7285	Unknown	Minor	AMERICAN ASPHALT & GRADING COMPANY	AMERICAN ASPHALT & GRADING COMPANY	2002	30502510	0.02	0.24	0.05	0.02	0.30
7287	Unknown	Unknown		NEVADA READY MIX	2002	30502510	0.14	9.48	2.06	0.76	13.00
7288	Unknown	Minor	SILVER STATE MATERIALS CORP.	SILVER STATE MATERIALS	2002	30501106	0.04	1.89	0.82	0.19	0.48
7291	Unknown	Minor	KBI Action Crushing	KBI Action Crushing	2002	30502510	0.14	9.47	2.06	0.76	2.24
7292	Unknown	Minor	DIAMOND CONSTRUCTION COMPANY	DIAMOND CONSTRUCTION COMPANY	2002	30502510	0.06	3.86	0.84	0.31	6.18
7293	Unknown	Minor	M & M CONSTRUCTION, INC.	M & M CONSTRUCTION, INC.	2002	30502510	0.05	3.34	0.73	0.27	3.63
7295	Unknown	Minor	CACTUS MINING CORPORATION	CACTUS MINING CORPORATION	2002	30301301	0.02	1.13	0.25	0.03	0.02
7296	Unknown	Unknown		AMERICAN ASPHALT & GRADING CO.	2002	30502510	0.03	0.46	0.10	0.04	0.42
7760	Unknown	Unknown		AMERICAN ASPHALT & GRADING CO.	2002	30502510	0.05	3.54	0.77	0.28	8.87
15002	Unknown	Minor	MAXIMUM AUTO BODY	MAXIMUM AUTO BODY	2002	40201620	0.00	0.06	0.10	0.47	0.00
15005	Unknown	Minor	PIONEER HOTEL & GAMBLING HALL	PIONEER HOTEL & GAMBLING HALL	2002	10300603	0.19	2.17	1.43	1.22	0.21
15007	Unknown	Minor	DIRECT GRADING & PAVING	DIRECT GRADING & PAVING	2002	30502510	0.00	0.38	0.08	0.03	0.27
15010	Unknown	Unknown		COKER EQUIPMENT CO., INC.	2002	10300603	0.00	0.00	0.00	0.60	0.00
15012	Unknown	Minor	ASH MEADOWS, LLC	ASH MEADOWS, LLC	2002	10300603	0.00	0.00	0.00	0.00	0.01
15015	Unknown	Unknown			2002	10300603					
15016	Unknown	Minor	AVW-TELAV AUDIO VISUAL SOLUTIONS	AVW-TELAV AUDIO VISUAL SOLUTIONS	2002	40200101	0.00	0.00	0.00	0.00	0.00
15019	Unknown	Minor	LAMAR GRAPHICS WEST	LAMAR GRAPHICS WEST	2002	40500597	0.00	0.00	0.00	2.49	0.00
15020	Unknown	Minor	RINKER MATERIALS CORPORATION	RINKER MATERIALS CORPORATION	2002	30502510	0.00	0.00	0.00	0.00	0.00
15021	Unknown	Minor	SUNRISE MATERIALS, LLC	SUNRISE MATERIALS, LLC	2002	30502511	0.00	0.00	0.00	0.00	0.00
15023	Unknown	Unknown		AMERICAN ASPHALT & GRADING	2002	30502510	0.16	2.47	0.54	0.20	1.35
15025	Unknown	Minor	HALLMARK TRUCK CENTER	HALLMARK TRUCK CENTER	2002	40201606	0.00	0.00	0.00	0.00	0.00
15026	Unknown	Minor	HOLLYWOOD GRAVEL COMPANY	HOLLYWOOD GRAVEL COMPANY	2002	30502510	0.36	5.52	1.19	0.45	7.33
15028	Unknown	Minor	CTC CRUSHING	CTC CRUSHING	2002	30502511	0.00	0.00	0.00	0.00	0.00
15032	Unknown	Minor	AMERICAN ASPHALT & GRADING CO	AMERICAN ASPHALT & GRADING CO.	2002	30502510	0.26	2.30	0.86	0.31	4.34

TABLE A.3 (Cont.)

Facility ID	Type[a]	Class	Company Name	Facility Name	Year of Data[b]	SCC[c]	Actual Emissions (tons/year)				
							SO_2	NO_x	CO	VOCs	PM_{10}
15035	Unknown	Minor	SOUTHWEST IRON WORKS, LLC	SOUTHWEST IRON WORKS, LLC	2002	40299995	0.00	0.00	0.00	4.50	0.00
15036	Unknown	Minor	ULTIMATE COLLISION REPAIR	ULTIMATE COLLISION REPAIR	2002	40200101	0.00	0.00	0.00	0.05	0.00
15037	Unknown	Minor	GIBSON CONSTRUCTION OF NEVADA	GIBSON CONSTRUCTION OF NEVADA	2002	10300603	0.00	0.00	0.00	0.30	0.00
15043	Unknown	Minor	FLOCK GRAPHICS	FLOCK GRAPHICS	2002	40500801	0.00	0.00	0.00	1.73	0.00
15047	Unknown	Minor	TERRIBLE'S HOTEL & CASINO	TERRIBLE'S HOTEL & CASINO	2002	10300602	0.01	0.19	0.26	0.03	0.03
15050	Unknown	Unknown		CONEVA HOLDINGS LIMITED LLC	2002	10300603	0.00	0.00	0.00	0.00	0.00
15052	Unknown	Minor	SOUTHWEST STEEL	SOUTHWEST STEEL	2002	40200601	0.00	0.00	0.00	0.54	0.00
15054	Unknown	Minor	Boulder City Hospital	Boulder City Hospital	2002	10300602	0.02	0.34	0.23	0.03	0.05
15058	Unknown	Minor	LAWRIMORE TRUCKING, INC.	Lawrimore Trucking Crushing/Screening Plant	2002	30502505	0.02	1.40	0.30	0.11	1.59
15064	Unknown	Unknown		Sysco Food Services of Las Vegas, Inv.	2002	10300603	0.01	0.22	0.06	0.01	0.02
15065	Unknown	Unknown		Bumper Medic	2002	10300603	0.00	0.00	0.00	0.00	0.00
15069	Unknown	Minor	Steinberg Diagnostic Medical Imaging	Steinberg Diagnostic Med. Imaging - Anthem	2002	10100602	0.00	0.00	0.00	0.00	0.00
15073	Unknown	ATC Only		Hilton Grand Vacations Club - Las Vegas	2002	10300602	0.01	0.26	0.43	0.04	0.32
15075	Unknown	Minor	SPRINT	SPRINT (EAST 1 BLDG)	2002	20100202	0.00	0.00	0.00	0.00	0.00
15076	Unknown	Minor	SPRINT	SPRINT (EAST 7 BLDG.)	2002	20100202	0.00	0.00	0.00	0.00	0.00
15077	Unknown	Minor	Western Rock & Landscape Supply LLC	Western Rock & Landscape Supply LLC	2002	30502503	0.00	0.00	0.00	0.08	0.00
15086	Unknown	Minor	Community College of Southern Nevada	Community College of Southern Nevada	2002	10300602	0.04	1.44	1.14	0.08	0.35
15087	Unknown	Minor	Community College of Southern Nevada	Community College of Southern Nevada	2002	10300602	0.13	2.61	2.69	0.21	1.11
15088	Unknown	Minor	Community College of Southern Nevada	Community College of Southern Nevada	2002	10300602	0.27	3.25	2.60	0.27	0.64
15090	Unknown	Minor	Creative Industrial Fiberglass Design	Creative Industrial Fiberglass Design	2002	30800723	0.00	0.00	0.00	0.00	0.00
15092	Unknown	Minor	Matthew Roylance Co LLC	Matthew Roylance Co LLC	2002	30502510	0.00	0.00	0.00	0.00	0.00
15099	Unknown	Minor	Cannery Hotel and Casino	Cannery Hotel and Casino	2002	10300603	0.00	0.00	0.00	0.00	0.00
15100	Unknown	Minor	Northern Pipeline Construction	Northern Pipeline Construction	2002	30502511	0.01	0.76	0.17	0.06	3.15
15102	Unknown	Minor	GES Expositions Services	GES Expositions Services	2002	40201001	0.00	0.00	0.00	0.00	0.00
15103	Unknown	Minor	R&D Safeworks / GTR Designs, LLC	R&D Safeworks	2002	10300603	0.00	0.00	0.00	0.00	0.00
15104	Unknown	Minor	Nextel Partners, Inc.	Nextel Partners, Inc.	2002	20100102	0.00	0.00	0.00	0.00	0.00
15108	Unknown	Minor	Fantastic Finishes Auto Body LLC	Fantastic Finishes Auto Body LLC	2002	40200101	0.00	0.00	0.00	0.16	0.00
15110	Unknown	Minor	Lasfuels Corporation	Lasfuels Facility	2002	50410313	0.00	0.00	0.00	0.00	0.00
15111	Unknown	Unknown		CARMAX STORE #7157	2002	10300603	0.00	0.00	0.00	0.00	0.00
15113	Unknown	Minor	SPRINT	SPRINT (SOUTH 5)	2002	20200102	0.00	0.00	0.00	0.00	0.00
15115	Unknown	Minor	Las Vegas Container	Las Vegas Container	2002	40500301	0.00	0.00	0.00	0.00	0.00
15117	Unknown	Unknown	Silver State Steel Group, Inc.	Silver State Steel Group, Inc.	2002	10500206	0.00	0.00	0.00	0.00	0.00
15119	Unknown	Minor	Callville Bay Marina	Callville Bay Marina	2002	50410313	0.00	0.00	0.00	0.00	0.00
15131	Unknown	Minor	AMERICAN ASPHALT & GRADING CO	American Asphalt & Grading Co.	2002	30502511	0.01	0.11	0.02	0.01	0.18
15137	Unknown	Minor	CarMax Auto Superstores, Inc. (7157)	CarMax Auto Superstore (7157)	2002	40200101	0.00	0.00	0.00	0.00	0.00
					Total		121.6	1,247.3	887.7	761.1	1,227.7

[a] DC = Dry Cleaner; SS = Stationary Source; GDF = Gasoline Dispensing Facility; VLP = Various Locations Permit; and HP VLP = Highly Portable VLP.

[b] Year of Data indicates the year during which actual emissions data were collected.

[c] Source classification codes (SCC) were determined based on the Clark County database. If not available, SCC for similar industries were used.

Sources: David Hoch (Clark County DAQEM, Las Vegas, NV) via diskette to Y.-S. Chang (ANL, Argonne, IL) on May 30, 2003, for actual emissions data.
David Hoch (Clark County DAQEM, Las Vegas, NV) via e-mail to M. Lazaro (ANL, Argonne, IL) on Sept. 23, 2003, for SCC data.

TABLE A.4 Emissions Inventory for Natural Gas Combustion Sources for Base Year 2000

Combustor Type	Inventory Category	SCC	Natural Gas Sales (MMBtu)		Emission Factors (lb/10^6 scf) [c]						Emissions (tons/year)					
			1998 [a]	2000 [b]	SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$
Residential	Residential	2104006000	18,075,634	20,722,695	0.6	94	40	5.5	7.6	7.6	6.1	954.9	406.3	55.9	77.2	77.2
Small Commercial	Commercial	2103006000	6,628,926	7,599,690	0.6	100	84	5.5	7.6	7.6	2.2	372.5	312.9	20.5	28.3	28.3
Large Commercial	Commercial	2103006000	2,250,844	2,580,466	0.6	190	84	5.5	7.6	7.6	0.8	240.3	106.3	7.0	9.6	9.6
Industrial	Industrial	2102006000	33,614	33,614	0.6	190	84	5.5	7.6	7.6	0.0	3.1	1.4	0.1	0.1	0.1
Compressed Natural Gas	Commercial	2103006000	31,439	36,043	0.6	100	84	5.5	7.6	7.6	0.0	1.8	1.5	0.1	0.1	0.1
Irrigation/Water Pumping	Commercial	2103006000	10,708	12,276	0.6	100	84	5.5	7.6	7.6	0.0	0.6	0.5	0.0	0.0	0.0
Other Gas Sales	Industrial	2102006000	3,653,123	3,653,123	0.6	100	84	5.5	7.6	7.6	1.1	179.1	150.4	9.8	13.6	13.6
Transportation	Purchased at the Source (Carried by SWG)	2030020200	56,452,728	56,452,728	0.6	100	84	5.5	7.6	7.6	16.6	2,767.3	2,324.5	152.2	210.3	210.3
Subtotal	Residential	2104006000	18,075,634	20,722,695							6.1	954.9	406.3	55.9	77.2	77.2
Subtotal	Commercial	2103006000	8,921,917	10,228,475							3.0	615.2	421.2	27.6	38.1	38.1
Subtotal	Industrial	2102006000	3,686,737	3,686,737							1.1	182.2	151.8	9.9	13.7	13.7
Subtotal	Purchased at the Source (Carried by SWG)	2030020200	56,452,728	56,452,728							16.6	2,767.3	2,324.5	152.2	210.3	210.3
Total			**87,137,016**	**91,090,635**							**26.8**	**4,519.6**	**3,303.8**	**245.6**	**339.4**	**339.4**

[a] Source: Clark County, 2001, "Natural Gas Combustion Emissions," Table B-59, *PM_{10} SIP*, June. Available at http://www.co.clark.nv.us/Air_Quality/PM10SIP.htm.

[b] It is assumed that natural gas sales for residential and commercial uses would change based upon population and those for other categories would not change. Natural gas sales for residential and commercial uses were estimated by multiplying sales in 1998, taken from the *PM_{10} SIP*, by a growth factor of 1.1464 (=1,374,222/1,198,683) for population changes from 1998 to 2000.

[c] Source: EPA, 2003, "1.4 Natural Gas Combustion," Tables 1.4-1 and 1-4.2 (7/98), *AP-42*, accessed July 2003. Available at http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf.

TABLE A.5 Emissions Inventory for Residential Firewood Combustion Sources [a] for Base Year 2000

Wood Consumed (tons)		Emission Factors (lb per ton burned) [d]						Emissions (tons/year)					
1998 [b]	2000 [c]	SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$
4,402	5,047	0.4	2.6	252.6	229	34.6	NA [e]	1.0	6.6	637.4	577.8	87.3	NA
Total								**1.0**	**6.6**	**637.4**	**577.8**	**87.3**	**NA**

[a] Source classification codes (SCC) = 2104008000.

[b] Wood consumed in the nonattainment area was estimated based on the 2,316 cords of wood sold in the BLM disposal boundary area and an average cord weight of 3,763 pounds, while reflecting 1% higher population than that in the BLM disposal boundary (see page B-21 in *PM_{10} SIP*).

[c] Activity levels for wood consumption were taken from the *PM_{10} SIP* and multiplied by a growth factor of 1.1464 (=1,374,222/1,198,683) for population changes from 1998 to 2000.

[d] EPA, 2003, "1.9 Residential Fireplaces," Table 1.9-1 (10/96), AP-42, accessed July. Available at http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s09.pdf.

[e] NA = not available.

TABLE A.6 Emissions Inventory for Structure Fires/Vehicle Fires/Wildfires Sources [a] for Base Year 2000

Material Consumed (tons)		Emission Factors (lb per ton material burned) [d]						Emissions (tons/year)					
1998 [b]	2000 [c]	SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$
3,217	3,688	NA [e]	1.4	60	11	10.8	9.8	NA	2.6	110.6	20.3	19.9	18.1
Total								**NA**	**2.6**	**110.6**	**20.3**	**19.9**	**18.1**

[a] Source classification codes (SCC) = 2810030000.

[b] Estimated based on the Federal Emergency Management Agency (FEMA) statistics of 2.3 fires per year per 1,000 people, 1.17 million residents in 1998, and 1.15 tons of material consumed (loading factor) during each fire incidence (see pages B-9, B-49, and B-106 in *PM_{10} SIP*).

[c] Activity levels for material consumed were taken from the *PM_{10} SIP* and multiplied by a growth factor of 1.1464 (=1,374,222/1,198,683) for population changes from 1998 to 2000.

[d] Sources: Eastern Research Group, Inc., 2001, "Structure Fires," *Volume III: Chapter 18, Emission Inventory Improvement Program*, EPA. Available at http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii18_apr2001.pdf.
For $PM_{2.5}$, Strait, R., and Kirstin Thesing, Undated, "Area Source Inventory Development." Available at http://www.epa.gov/ttnchie1/eidocs/partsec5_opbrn.pdf.

[e] NA = not available.

TABLE A.7 Emissions Inventory for Charbroiling/Meat Cooking Sources [a] for Base Year 2000

Cooking Equipment	Type of Meat	Amount of Meat (lb)		Emission Factors (lb per 1,000 lb meat cooked) [d]						Emissions (tons/year)					
		1998 [b]	2000 [c]	SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$
Chain-driven charbroiler with controls	Hamburger	3,708,720	4,251,838	NA [e]	NA	NA	0.32	1.29	NA	NA	NA	NA	0.7	2.7	NA
Chain-driven charbroiler, No controls	Hamburger	1,564,959	1,794,137	NA	NA	NA	2.27	7.42	NA	NA	NA	NA	2.0	6.7	NA
Underfired Charbroiler, No controls	Hamburger	27,274,826	31,269,050	NA	NA	NA	3.94	32.65	NA	NA	NA	NA	61.6	510.5	NA
	Steak	29,492,000	33,810,915	NA	NA	NA	0.86	17.19	NA	NA	NA	NA	14.5	290.6	NA
	Chicken	3,429,960	3,932,256	NA	NA	NA	1.82	10.48	NA	NA	NA	NA	3.6	20.6	NA
	Fish	1,766,888	2,025,637	NA	NA	NA	0.38	3.3	NA	NA	NA	NA	0.4	3.3	NA
Flat-top Griddle and Grooved Griddle	Hamburger	11,673,851	13,383,412	NA	NA	NA	0.07	5.08	NA	NA	NA	NA	0.5	34.0	NA
Total		**78,911,204**	**90,467,245**							**NA**	**NA**	**NA**	**83.3**	**868.4**	**NA**

[a] Source classification codes (SCC) = 2810025000.

[b] Source: Clark County, 2001, "PM_{10} Emissions from Charbroiling/Meat Cooking," Table B-61, *PM_{10} SIP*, June.

[c] Activity levels for 2000 were estimated on the basis of those for 1998 in the *PM_{10} SIP*, which were then multiplied by a growth factor of 1.1464 (=1,374,222/1,198,683) for population changes from 1998 to 2000.

[d] Source: Patel, Raman C. (South Coast Air Quality Management District, Diamond Bar, CA), e-mail to Hetal Patel (ANL, Argonne, IL) on June 25, 2003.

[e] NA = not available.

TABLE A.8 Emissions Inventory for Construction (Including Highway Construction) Sources for Base Year 2000

Type No.	Type of Construction [a]	SCC	Number of Acres Permitted in 2000 [a]	Number of Acres under Construction in 2000 [a,b]	Months under Active Construction [c]	Percent of Sites Implementing Controls [c]	Overall Control Efficiency (%) [c,d]	PM_{10} Emission Factors (tons/acre/mo) [c,e]	PM_{10} Emissions (TPY) [f]
1	Highway	2311020000	743.5	1,520.5	12	80	40	0.420	2,342.9
2	Flood Detention	2311020000	370.0	778.8	12	70	35	0.420	1,815.7
3	Airport	2311020000	331.4	356.5	12	80	40	0.420	688.5
4	Public Schools/Libraries/ Churches/Hospitals [g]	2311010000	537.0	595.0	3	50	25	0.265	305.3
5	Public Parks	2311010000	254.4	217.1	6	80	40	0.265	163.0
6	Underground Utilities	2311020000	709.3	800.7	1	20	10	0.420	302.7
7	Public Works	2311020000	1,071.6	1,520.7	3	70	35	0.420	989.8
8	Miscellaneous	2311010000	1,147.1	1,691.2	6	80	40	0.265	1,179.8
9	Commercial	2311010000	3,022.0	4,088.5	3	50	25	0.265	2,038.2
10	Residential	2311010000	10,854.2	15,726.3	6	50	25	0.265	13,228.9
	Total		**19,040.5**	**27,295.3**					**23,054.9**

[a] Construction type classification and database were provided by Jim Davis (Clark County DAQEM, Las Vegas, NV) to Y.-S. Chang (ANL, Argonne, IL) via e-mail on July 30 and August 7, 2003, respectively.

[b] Included all disturbed areas in 2000, considering months under active construction (5th column in the table above). Construction was assumed to begin in the month following issuance of the permit.

[c] Months under active construction, percent of sites implementing controls, overall control efficiency, and emission factors were taken from Table B-65, *PM_{10} SIP*.

[d] Total overall control efficiency was estimated by multiplying compliance rates provided by Clark County Health District (CCHD) enforcement officers by a 50% control efficiency to watering for control of particulate emissions from construction sites (see page B-59, *PM_{10} SIP*).

Source for 50% control efficiency: EPA, 1988, *Control of Open Fugitive Dust Sources*, EPA-450/3-88-008, Sept.

[e] For general construction sites with any cut-and-fill areas, large-scale earthmoving operations, or heavy traffic volumes (e.g., all airport, flood detention, highway, public works, underground utility operations, etc.), an emission factor of 0.42 tons/acre/month was applied. For general construction sites without any cut-and-fill areas, large-scale earthmoving operations, or heavy traffic volumes, an emission factor of 0.11 tons/acre/month was applied. Construction projects, such as commercial, public parks, public buildings, and residential homes, may or may not include heavy activities. To account for this variation, an average emission factor of 0.265 tons/acre/month ([0.11+0.42]/2) was used (see pages B-58 and B-59, *PM_{10} SIP*).

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

[f] Emissions were estimated based on acres under active construction, not on acres permitted in 2000.

[g] This construction type (not listed in the *PM_{10} SIP*) was assumed to be represented by the "Commercial" construction type.

TABLE A.9a Emissions Inventory for Nonroad Engine and Vehicle Sources for Base Year 2000 [a]

Season	Day	Emissions (tons/day)						
		SO_x	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	CO_2
Winter	Weekday	0.25	23.38	110.23	13.05	2.29	2.20	1,910.89
Winter	Weekend	0.13	12.42	74.16	10.27	1.33	1.27	1,053.27
Summer	Weekday	0.65	54.49	536.58	42.51	5.61	5.39	4,880.19
Summer	Weekend	0.36	29.31	426.72	42.01	3.63	3.46	2,914.01
Winter	Average	0.22	20.24	99.92	12.25	2.02	1.94	1,665.86
Summer	Average	0.57	47.29	505.19	42.37	5.04	4.84	4,318.43
Annual	**Average**	**0.39**	**33.77**	**302.56**	**27.31**	**3.53**	**3.39**	**2,992.14**
Annual [b]	**Average**	**144.0**	**12,325.9**	**110,433.4**	**9,968.4**	**1,288.4**	**1,236.8**	**1,092,131.9**

[a] Nonroad engine and vehicle emissions were estimated using the NONROAD2004 model. The four scenario runs (winter/weekday, winter/weekend, summer/weekday, and summer weekend) were made and averaged to estimate annual total emissions. (The NONROAD2004 model outputs for the summer/weekday scenario are listed on the following pages.) The parameter values used in the model are tabulated below:

Season	Day	Fuel RVP for Gas	Sulfur Content (ppm)		Temperature (°F)		
			Gas	Diesel	Minimum	Maximum	Average
Winter	Weekday	9	30	250	36	64	50
Winter	Weekend	9	30	250	36	64	50
Summer	Weekday	9	100	250	76	106	91
Summer	Weekend	9	100	250	76	106	91

Source: EPA, 2002, *User's Guide for the EPA Nonroad Emissions Model Draft NONROAD2002*, EPA420-P-02-013, Dec. (used the Draft NONROAD2004 program released on April 23, 2004.) Available at http://www.epa.gov/otaq/models/nonrdmdl/usergd/nrug2002.pdf.

[b] Units are tons/year.

TABLE A.9b NONROAD2004 Model Outputs for the Summer/Weekday Scenario for Base Year 2000

Source Classification	Equipment	Engine Type	SCC	Emissions (tons/day)						
				SO_x	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	CO_2
Agricultural Equipment	2-Wheel Tractors	4 Stroke	2265005010	7.406E-08	3.931E-06	7.098E-04	1.512E-05	1.535E-07	1.412E-07	1.219E-03
Agricultural Equipment	2-Wheel Tractors	Diesel	2270005010	1.036E-08	1.035E-06	9.403E-07	1.861E-07	1.557E-07	1.510E-07	6.762E-05
Agricultural Equipment	Agricultural Mowers	4 Stroke	2265005030	6.186E-08	2.825E-06	5.732E-04	1.452E-05	1.186E-07	1.091E-07	1.018E-03
Agricultural Equipment	Agricultural Mowers	Diesel	2270005030	4.415E-08	3.892E-06	3.027E-06	6.403E-07	6.466E-07	6.272E-07	2.882E-04
Agricultural Equipment	Agricultural Tractors	4 Stroke	2265005015	3.054E-07	3.833E-05	1.497E-03	5.054E-05	4.467E-07	4.109E-07	5.025E-03
Agricultural Equipment	Agricultural Tractors	Diesel	2270005015	4.567E-04	4.304E-02	2.753E-02	5.771E-03	5.287E-03	5.129E-03	2.981E+00
Agricultural Equipment	Balers	4 Stroke	2265005025	1.865E-07	2.665E-05	6.986E-04	6.033E-05	2.438E-07	2.243E-07	3.069E-03
Agricultural Equipment	Balers	Diesel	2270005025	2.315E-07	1.904E-05	1.519E-05	5.504E-06	4.441E-06	4.308E-06	1.511E-03
Agricultural Equipment	Combines	4 Stroke	2265005020	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Agricultural Equipment	Combines	Diesel	2270005020	4.104E-05	4.916E-03	1.722E-03	4.562E-04	8.553E-04	8.297E-04	2.679E-01
Agricultural Equipment	Hydro Power Units	2 Stroke	2260005050	3.470E-09	3.079E-08	3.032E-05	1.465E-05	5.961E-07	5.484E-07	5.843E-05
Agricultural Equipment	Hydro Power Units	4 Stroke	2265005050	4.457E-07	2.403E-05	4.296E-03	1.172E-04	1.061E-06	9.765E-07	7.340E-03
Agricultural Equipment	Hydro Power Units	LPG	2267005050	2.510E-09	2.313E-06	9.303E-06	6.291E-07	1.088E-08	1.088E-08	1.293E-04
Agricultural Equipment	Hydro Power Units	CNG	2268005050	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Agricultural Equipment	Hydro Power Units	Diesel	2270005050	1.035E-06	8.185E-05	4.126E-05	1.301E-05	9.085E-06	8.813E-06	6.758E-03
Agricultural Equipment	Irrigation Sets	4 Stroke	2265005060	5.081E-07	7.091E-05	2.052E-03	8.841E-05	7.165E-07	6.591E-07	8.362E-03
Agricultural Equipment	Irrigation Sets	LPG	2267005060	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Agricultural Equipment	Irrigation Sets	CNG	2268005060	1.455E-07	1.604E-04	6.703E-04	2.647E-06	7.767E-07	7.767E-07	6.613E-03
Agricultural Equipment	Irrigation Sets	Diesel	2270005060	6.579E-06	5.510E-04	2.377E-04	7.856E-05	5.685E-05	5.515E-05	4.294E-02
Agricultural Equipment	Other Agricultural Equipment	4 Stroke	2265005055	4.317E-07	4.992E-05	2.266E-03	9.452E-05	6.399E-07	5.887E-07	7.104E-03
Agricultural Equipment	Other Agricultural Equipment	LPG	2267005055	1.039E-09	9.568E-07	3.833E-06	2.595E-07	4.488E-09	4.488E-09	5.350E-05
Agricultural Equipment	Other Agricultural Equipment	CNG	2268005055	1.266E-09	1.394E-06	5.800E-06	2.293E-08	6.728E-09	6.728E-09	5.755E-05
Agricultural Equipment	Other Agricultural Equipment	Diesel	2270005055	8.899E-06	9.100E-04	5.600E-04	1.339E-04	1.361E-04	1.320E-04	5.809E-02
Agricultural Equipment	Sprayers	2 Stroke	2260005035	2.456E-08	2.410E-07	2.007E-04	9.936E-05	3.669E-06	3.376E-06	4.128E-04
Agricultural Equipment	Sprayers	4 Stroke	2265005035	6.358E-07	4.245E-05	4.960E-03	2.318E-04	1.461E-06	1.344E-06	1.047E-02
Agricultural Equipment	Sprayers	Diesel	2270005035	3.461E-06	3.069E-04	2.269E-04	8.475E-05	6.710E-05	6.509E-05	2.260E-02
Agricultural Equipment	Swathers	4 Stroke	2265005045	2.938E-07	4.199E-05	1.100E-03	7.859E-05	3.840E-07	3.533E-07	4.835E-03
Agricultural Equipment	Swathers	Diesel	2270005045	3.223E-06	3.521E-04	1.380E-04	3.613E-05	6.261E-05	6.073E-05	2.103E-02
Agricultural Equipment	Tillers > 6 HP	4 Stroke	2265005040	1.381E-06	3.839E-05	1.284E-02	4.055E-04	1.903E-06	1.751E-06	2.274E-02
Agricultural Equipment	Tillers > 6 HP	Diesel	2270005040	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Airport Equipment	Airport Ground Support Equipment	4 Stroke	2265008005	1.646E-05	1.950E-03	9.373E-02	3.900E-03	3.039E-05	2.796E-05	2.710E-01
Airport Equipment	Airport Ground Support Equipment	LPG	2267008005	3.492E-06	3.212E-03	1.276E-02	8.656E-04	1.497E-05	1.497E-05	1.798E-01
Airport Equipment	Airport Ground Support Equipment	Diesel	2270008005	1.495E-03	1.353E-01	6.607E-02	1.223E-02	1.058E-02	1.027E-02	9.759E+00
Commercial Equipment	Air Compressors	2 Stroke	2260006015	2.174E-08	1.928E-07	1.899E-04	9.244E-05	3.734E-06	3.435E-06	3.660E-04
Commercial Equipment	Air Compressors	4 Stroke	2265006015	2.588E-04	1.970E-02	2.080E+00	7.557E-02	6.237E-04	5.738E-04	4.262E+00
Commercial Equipment	Air Compressors	LPG	2267006015	1.792E-05	1.644E-02	4.498E-02	3.404E-03	7.654E-05	7.654E-05	9.228E-01
Commercial Equipment	Air Compressors	CNG	2268006015	1.434E-06	1.492E-03	4.091E-03	1.824E-05	6.957E-06	6.957E-06	6.503E-02
Commercial Equipment	Air Compressors	Diesel	2270006015	2.141E-03	1.689E-01	8.368E-02	2.267E-02	1.682E-02	1.631E-02	1.397E+01
Commercial Equipment	Gas Compressors	CNG	2268006020	4.452E-05	5.015E-02	2.244E-01	8.718E-04	2.558E-04	2.558E-04	2.024E+00
Commercial Equipment	Gas Compressors	Diesel	2270006020	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Commercial Equipment	Generator Sets	2 Stroke	2260006005	8.164E-06	6.871E-05	6.236E-02	3.084E-02	1.206E-03	1.110E-03	1.370E-01
Commercial Equipment	Generator Sets	4 Stroke	2265006005	2.008E-03	8.996E-02	1.878E+01	6.501E-01	3.895E-03	3.583E-03	3.307E+01
Commercial Equipment	Generator Sets	LPG	2267006005	5.992E-05	5.494E-02	1.495E-01	1.133E-02	2.548E-04	2.548E-04	3.085E+00
Commercial Equipment	Generator Sets	CNG	2268006005	1.957E-05	2.034E-02	5.553E-02	2.479E-04	9.455E-05	9.455E-05	8.880E-01
Commercial Equipment	Generator Sets	Diesel	2270006005	3.267E-03	2.874E-01	1.751E-01	4.859E-02	3.475E-02	3.370E-02	2.132E+01
Commercial Equipment	Pressure Washers	4 Stroke	2265006030	8.483E-04	4.099E-02	8.082E+00	3.197E-01	2.247E-03	2.068E-03	1.398E+01
Commercial Equipment	Pressure Washers	LPG	2267006030	2.932E-07	2.695E-04	1.065E-03	7.236E-05	1.251E-06	1.251E-06	1.510E-02
Commercial Equipment	Pressure Washers	Diesel	2270006030	1.042E-04	9.675E-03	5.843E-03	1.641E-03	1.118E-03	1.084E-03	6.804E-01
Commercial Equipment	Pumps	2 Stroke	2260006010	5.038E-05	5.106E-04	4.742E-01	2.322E-01	8.841E-03	8.134E-03	8.498E-01
Commercial Equipment	Pumps	4 Stroke	2265006010	4.686E-04	2.818E-02	4.227E+00	1.798E-01	1.316E-03	1.211E-03	7.721E+00
Commercial Equipment	Pumps	LPG	2267006010	1.471E-05	1.349E-02	3.680E-02	2.787E-03	6.267E-05	6.267E-05	7.576E-01
Commercial Equipment	Pumps	CNG	2268006010	8.297E-07	8.626E-04	2.358E-03	1.052E-05	4.013E-06	4.013E-06	3.764E-02
Commercial Equipment	Pumps	Diesel	2270006010	7.706E-04	6.783E-02	3.925E-02	1.040E-02	7.993E-03	7.754E-03	5.030E+00
Commercial Equipment	Welders	4 Stroke	2265006025	5.758E-04	3.784E-02	5.118E+00	1.279E-01	1.172E-03	1.078E-03	9.478E+00
Commercial Equipment	Welders	LPG	2267006025	2.310E-05	2.125E-02	8.412E-02	5.711E-03	9.878E-05	9.878E-05	1.190E+00
Commercial Equipment	Welders	Diesel	2270006025	1.080E-03	8.347E-02	1.302E-01	3.521E-02	1.978E-02	1.919E-02	7.051E+00
Construction and Mining Equipment	Bore/Drill Rigs	4 Stroke	2265002033	1.469E-04	9.437E-03	1.257E+00	6.814E-02	4.497E-04	4.138E-04	2.421E+00
Construction and Mining Equipment	Bore/Drill Rigs	LPG	2267002033	8.111E-06	7.461E-03	2.961E-02	2.009E-03	3.475E-05	3.475E-05	4.176E-01
Construction and Mining Equipment	Bore/Drill Rigs	Diesel	2270002033	8.058E-03	8.963E-01	3.749E-01	8.877E-02	7.323E-02	7.103E-02	5.260E+01
Construction and Mining Equipment	Cement & Mortar Mixers	4 Stroke	2265002042	4.765E-04	1.856E-02	4.506E+00	1.968E-01	1.277E-03	1.175E-03	7.850E+00
Construction and Mining Equipment	Cement & Mortar Mixers	Diesel	2270002042	3.149E-04	3.514E-02	1.663E-02	4.212E-03	3.326E-03	3.226E-03	2.055E+00
Construction and Mining Equipment	Concrete/Industrial Saws	2 Stroke	2260002039	4.280E-04	1.556E-02	3.980E+00	1.505E+00	8.873E-02	8.163E-02	7.180E+00
Construction and Mining Equipment	Concrete/Industrial Saws	4 Stroke	2265002039	1.017E-03	6.218E-02	1.011E+01	2.239E-01	2.314E-03	2.129E-03	1.674E+01
Construction and Mining Equipment	Concrete/Industrial Saws	LPG	2267002039	2.340E-05	2.157E-02	8.718E-02	5.889E-03	1.018E-04	1.018E-04	1.205E+00
Construction and Mining Equipment	Concrete/Industrial Saws	Diesel	2270002039	6.630E-04	4.845E-02	4.451E-02	9.033E-03	7.020E-03	6.809E-03	4.328E+00
Construction and Mining Equipment	Cranes	4 Stroke	2265002045	3.818E-05	4.960E-03	1.773E-01	7.069E-03	5.464E-05	5.027E-05	6.282E-01
Construction and Mining Equipment	Cranes	LPG	2267002045	8.646E-06	7.955E-03	3.163E-02	2.145E-03	3.710E-05	3.710E-05	4.452E-01
Construction and Mining Equipment	Cranes	Diesel	2270002045	1.829E-02	1.704E+00	4.917E-01	1.375E-01	9.881E-02	9.585E-02	1.194E+02
Construction and Mining Equipment	Crawler Tractor/Dozers	Diesel	2270002069	7.977E-02	6.699E+00	3.218E+00	5.718E-01	4.575E-01	4.437E-01	5.207E+02
Construction and Mining Equipment	Crushing/Proc. Equipment	2 Stroke	2260002054	2.113E-06	1.875E-05	1.846E-02	8.889E-03	3.630E-04	3.340E-04	3.558E-02
Construction and Mining Equipment	Crushing/Proc. Equipment	4 Stroke	2265002054	6.367E-05	3.789E-03	5.974E-01	1.739E-02	1.522E-04	1.400E-04	1.049E+00
Construction and Mining Equipment	Crushing/Proc. Equipment	LPG	2267002054	1.428E-06	1.314E-03	5.223E-03	3.543E-04	6.127E-06	6.127E-06	7.351E-02
Construction and Mining Equipment	Crushing/Proc. Equipment	Diesel	2270002054	3.231E-03	2.997E-01	1.149E-01	2.816E-02	2.103E-02	2.040E-02	2.109E+01
Construction and Mining Equipment	Dumpers/Tenders	4 Stroke	2265002078	7.566E-05	3.042E-03	7.040E-01	2.653E-02	1.635E-04	1.504E-04	1.246E+00
Construction and Mining Equipment	Dumpers/Tenders	Diesel	2270002078	1.110E-04	9.780E-03	1.020E-02	3.125E-03	2.028E-03	1.967E-03	7.248E-01
Construction and Mining Equipment	Excavators	Diesel	2270002036	8.017E-02	6.231E+00	2.813E+00	5.336E-01	4.385E-01	4.253E-01	5.233E+02
Construction and Mining Equipment	Graders	Diesel	2270002048	1.995E-02	1.578E+00	6.622E-01	1.309E-01	1.029E-01	9.986E-02	1.302E+02
Construction and Mining Equipment	Off-Highway Tractors	Diesel	2270002075	8.586E-03	8.090E-01	4.869E-01	7.846E-02	6.363E-02	6.172E-02	5.604E+01
Construction and Mining Equipment	Off-highway Trucks	Diesel	2270002051	6.847E-02	5.943E+00	2.917E+00	4.771E-01	3.586E-01	3.479E-01	4.469E+02
Construction and Mining Equipment	Other Construction Equipment	4 Stroke	2265002081	5.169E-05	7.366E-03	1.974E-01	9.449E-03	6.834E-05	6.287E-05	8.505E-01
Construction and Mining Equipment	Other Construction Equipment	LPG	2267002081	1.306E-05	1.202E-02	4.774E-02	3.239E-03	5.601E-05	5.601E-05	6.725E-01
Construction and Mining Equipment	Other Construction Equipment	CNG	2268002081	3.920E-07	4.261E-04	1.693E-03	6.769E-06	1.986E-06	1.986E-06	1.781E-02
Construction and Mining Equipment	Other Construction Equipment	Diesel	2270002081	8.229E-03	7.986E-01	4.712E-01	7.349E-02	6.931E-02	6.723E-02	5.371E+01
Construction and Mining Equipment	Other Underground Mining Equipment	Diesel	2270009010	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Construction and Mining Equipment	Pavers	4 Stroke	2265002003	1.569E-04	1.099E-02	1.345E+00	3.353E-02	3.184E-04	2.930E-04	2.582E+00
Construction and Mining Equipment	Pavers	LPG	2267002003	8.042E-06	7.402E-03	2.952E-02	2.001E-03	3.460E-05	3.460E-05	4.141E-01
Construction and Mining Equipment	Pavers	Diesel	2270002003	7.893E-03	6.242E-01	3.410E-01	6.421E-02	5.334E-02	5.174E-02	5.152E+01
Construction and Mining Equipment	Paving Equipment	2 Stroke	2260002021	1.124E-05	9.514E-05	8.889E-02	4.282E-02	1.732E-03	1.594E-03	1.887E-01
Construction and Mining Equipment	Paving Equipment	4 Stroke	2265002021	5.342E-04	2.565E-02	5.040E+00	1.669E-01	1.260E-03	1.159E-03	8.799E+00
Construction and Mining Equipment	Paving Equipment	LPG	2267002021	2.121E-06	1.951E-03	7.757E-03	5.261E-04	9.099E-06	9.099E-06	1.092E-01
Construction and Mining Equipment	Paving Equipment	Diesel	2270002021	1.184E-03	9.863E-02	6.229E-02	1.164E-02	9.566E-03	9.279E-03	7.729E+00

TABLE A.9b (Cont.)

Source Classification	Equipment	Engine Type	SCC	Emissions (tons/day)						
				SO_x	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	CO_2
Construction and Mining Equipment	Plate Compactors	2 Stroke	2260002009	9.443E-06	7.946E-05	7.368E-02	3.554E-02	1.434E-03	1.320E-03	1.586E-01
Construction and Mining Equipment	Plate Compactors	4 Stroke	2265002009	2.630E-04	1.212E-02	2.570E+00	1.095E-01	8.226E-04	7.568E-04	4.335E+00
Construction and Mining Equipment	Plate Compactors	Diesel	2270002009	2.115E-04	2.187E-02	1.264E-02	3.888E-03	2.526E-03	2.450E-03	1.380E+00
Construction and Mining Equipment	Rollers	4 Stroke	2265002015	2.787E-04	1.943E-02	2.508E+00	5.796E-02	5.803E-04	5.339E-04	4.587E+00
Construction and Mining Equipment	Rollers	LPG	2267002015	1.353E-05	1.246E-02	4.987E-02	3.377E-03	5.841E-05	5.841E-05	6.968E-01
Construction and Mining Equipment	Rollers	Diesel	2270002015	1.975E-02	1.551E+00	9.710E-01	1.846E-01	1.525E-01	1.479E-01	1.289E+02
Construction and Mining Equipment	Rough Terrain Forklifts	4 Stroke	2265002057	6.032E-05	8.544E-03	2.345E-01	1.040E-02	8.036E-05	7.393E-05	9.926E-01
Construction and Mining Equipment	Rough Terrain Forklifts	LPG	2267002057	1.573E-05	1.448E-02	5.766E-02	3.909E-03	6.761E-05	6.761E-05	8.100E-01
Construction and Mining Equipment	Rough Terrain Forklifts	Diesel	2270002057	2.562E-02	1.958E+00	1.411E+00	2.580E-01	2.282E-01	2.214E-01	1.672E+02
Construction and Mining Equipment	Rubber Tire Loaders	4 Stroke	2265002060	1.473E-04	2.110E-02	5.615E-01	2.437E-02	1.952E-04	1.796E-04	2.424E+00
Construction and Mining Equipment	Rubber Tire Loaders	LPG	2267002060	3.906E-05	3.596E-02	1.437E-01	9.736E-03	1.684E-04	1.684E-04	2.011E+00
Construction and Mining Equipment	Rubber Tire Loaders	Diesel	2270002060	8.718E-02	7.653E+00	3.726E+00	6.507E-01	5.780E-01	5.607E-01	5.690E+02
Construction and Mining Equipment	Scrapers	Diesel	2270002018	2.151E-02	1.816E+00	8.742E-01	1.366E-01	1.207E-01	1.171E-01	1.404E+02
Construction and Mining Equipment	Signal Boards/Light Plants	2 Stroke	2260002027	7.837E-08	6.953E-07	6.847E-04	3.291E-04	1.346E-05	1.239E-05	1.320E-03
Construction and Mining Equipment	Signal Boards/Light Plants	4 Stroke	2265002027	1.108E-05	5.533E-04	1.136E-01	4.106E-03	3.368E-05	3.099E-05	1.826E-01
Construction and Mining Equipment	Signal Boards/Light Plants	Diesel	2270002027	2.175E-03	1.902E-01	1.215E-01	4.006E-02	2.247E-02	2.180E-02	1.420E+01
Construction and Mining Equipment	Skid Steer Loaders	4 Stroke	2265002072	2.297E-04	2.289E-02	1.479E+00	4.607E-02	3.766E-04	3.465E-04	3.781E+00
Construction and Mining Equipment	Skid Steer Loaders	LPG	2267002072	2.803E-05	2.579E-02	1.027E-01	6.961E-03	1.204E-04	1.204E-04	1.443E+00
Construction and Mining Equipment	Skid Steer Loaders	Diesel	2270002072	3.602E-02	3.006E+00	3.892E+00	1.103E+00	6.258E-01	6.070E-01	2.352E+02
Construction and Mining Equipment	Surfacing Equipment	4 Stroke	2265002024	2.242E-04	1.203E-02	2.201E+00	6.396E-02	5.659E-04	5.206E-04	3.692E+00
Construction and Mining Equipment	Surfacing Equipment	LPG	2267002024	1.392E-06	1.282E-03	5.124E-03	3.471E-04	6.002E-06	6.002E-06	7.169E-02
Construction and Mining Equipment	Surfacing Equipment	Diesel	2270002024	7.155E-04	6.595E-02	4.667E-02	8.137E-03	7.094E-03	6.881E-03	4.671E+00
Construction and Mining Equipment	Tampers/Rammers	2 Stroke	2260002006	1.742E-04	6.564E-03	1.467E+00	5.411E-01	3.284E-02	3.021E-02	2.915E+00
Construction and Mining Equipment	Tampers/Rammers	4 Stroke	2265002006	1.165E-06	5.747E-05	1.093E-02	2.532E-04	2.298E-06	2.114E-06	1.919E-02
Construction and Mining Equipment	Tampers/Rammers	Diesel	2270002006	3.164E-05	1.400E-03	7.751E-04	2.281E-04	1.413E-04	1.370E-04	2.065E-01
Construction and Mining Equipment	Tractors/Loaders/Backhoes	4 Stroke	2265002066	3.336E-04	1.910E-02	3.145E+00	6.737E-02	6.913E-04	6.360E-04	5.492E+00
Construction and Mining Equipment	Tractors/Loaders/Backhoes	LPG	2267002066	4.060E-06	3.739E-03	1.498E-02	1.014E-03	1.754E-05	1.754E-05	2.090E-01
Construction and Mining Equipment	Tractors/Loaders/Backhoes	Diesel	2270002066	5.271E-02	4.630E+00	4.359E+00	1.092E+00	6.909E-01	6.702E-01	3.441E+02
Construction and Mining Equipment	Trenchers	4 Stroke	2265002030	4.731E-04	3.284E-02	4.153E+00	1.285E-01	1.116E-03	1.027E-03	7.791E+00
Construction and Mining Equipment	Trenchers	LPG	2267002030	2.472E-05	2.275E-02	9.079E-02	6.152E-03	1.064E-04	1.064E-04	1.273E+00
Construction and Mining Equipment	Trenchers	Diesel	2270002030	9.361E-03	7.172E-01	5.728E-01	1.099E-01	9.103E-02	8.830E-02	6.110E+01
Industrial Equipment	AC\Refrigeration	4 Stroke	2265003060	4.575E-06	2.411E-04	4.442E-02	1.024E-03	9.646E-06	8.875E-06	7.532E-02
Industrial Equipment	AC\Refrigeration	CNG	2268003060	3.921E-07	4.270E-04	1.708E-03	6.817E-06	2.000E-06	2.000E-06	1.782E-02
Industrial Equipment	AC\Refrigeration	Diesel	2270003060	6.339E-03	4.568E-01	2.504E-01	7.017E-02	5.043E-02	4.892E-02	4.138E+01
Industrial Equipment	Aerial Lifts	4 Stroke	2265003010	3.707E-05	4.193E-03	2.119E-01	8.277E-03	5.806E-05	5.341E-05	6.101E-01
Industrial Equipment	Aerial Lifts	LPG	2267003010	7.603E-06	6.993E-03	2.774E-02	1.882E-03	3.255E-05	3.255E-05	3.915E-01
Industrial Equipment	Aerial Lifts	Diesel	2270003010	8.270E-05	9.211E-03	7.863E-03	2.448E-03	1.568E-03	1.521E-03	5.400E-01
Industrial Equipment	Forklifts	4 Stroke	2265003020	1.214E-04	1.743E-02	4.732E-01	2.044E-02	1.637E-04	1.506E-04	1.998E+00
Industrial Equipment	Forklifts	LPG	2267003020	7.044E-04	6.483E-01	2.582E+00	1.750E-01	3.027E-03	3.027E-03	3.627E+01
Industrial Equipment	Forklifts	CNG	2268003020	4.468E-05	4.863E-02	1.941E-01	7.752E-04	2.275E-04	2.275E-04	2.030E+00
Industrial Equipment	Forklifts	Diesel	2270003020	1.208E-03	7.938E-02	4.863E-02	8.476E-03	8.371E-03	8.120E-03	7.882E+00
Industrial Equipment	Other General Industrial Eqp	2 Stroke	2260003040	2.014E-08	1.787E-07	1.760E-04	8.554E-05	3.460E-06	3.184E-06	3.392E-04
Industrial Equipment	Other General Industrial Eqp	4 Stroke	2265003040	5.089E-05	3.024E-03	5.107E-01	2.121E-02	1.652E-04	1.520E-04	8.388E-01
Industrial Equipment	Other General Industrial Eqp	Diesel	2270003040	5.340E-04	4.893E-02	1.658E-02	4.682E-03	3.309E-03	3.210E-03	3.485E+00
Industrial Equipment	Other General Industrial Equipm	LPG	2267003040	1.628E-06	1.498E-03	5.969E-03	4.047E-04	6.998E-06	6.998E-06	8.382E-02
Industrial Equipment	Other General Industrial Equipment	CNG	2268003040	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Industrial Equipment	Other Material Handling Eqp	4 Stroke	2265003050	3.043E-06	3.413E-04	1.770E-02	6.440E-04	4.841E-06	4.454E-06	5.008E-02
Industrial Equipment	Other Material Handling Eqp	Diesel	2270003050	2.036E-05	2.775E-03	1.663E-03	5.187E-04	4.003E-04	3.883E-04	1.329E-01
Industrial Equipment	Other Material Handling Equipment	LPG	2267003050	4.037E-07	3.713E-04	1.472E-03	9.989E-05	1.728E-06	1.728E-06	2.079E-02
Industrial Equipment	Other Oil Field Equipment	4 Stroke	2265010010	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Industrial Equipment	Other Oil Field Equipment	CNG	2268010010	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Industrial Equipment	Other Oil Field Equipment	Diesel	2270010010	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Industrial Equipment	Sweepers/Scrubbers	2 Stroke	2260003030	2.593E-07	2.300E-06	2.265E-03	1.110E-03	4.454E-05	4.097E-05	4.365E-03
Industrial Equipment	Sweepers/Scrubbers	4 Stroke	2265003030	3.047E-05	3.245E-03	1.990E-01	6.660E-03	5.597E-05	5.149E-05	5.016E-01
Industrial Equipment	Sweepers/Scrubbers	LPG	2267003030	5.421E-06	4.993E-03	2.002E-02	1.355E-03	2.344E-05	2.344E-05	2.791E-01
Industrial Equipment	Sweepers/Scrubbers	CNG	2268003030	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Industrial Equipment	Sweepers/Scrubbers	Diesel	2270003030	5.263E-04	4.291E-02	1.568E-02	4.488E-03	3.042E-03	2.951E-03	3.435E+00
Industrial Equipment	Terminal Tractors	4 Stroke	2265003070	1.260E-05	1.810E-03	4.934E-02	2.091E-03	1.705E-05	1.569E-05	2.073E-01
Industrial Equipment	Terminal Tractors	LPG	2267003070	3.351E-06	3.086E-03	1.236E-02	8.366E-04	1.447E-05	1.447E-05	1.725E-01
Industrial Equipment	Terminal Tractors	CNG	2268003070	1.011E-07	1.102E-04	4.424E-04	1.764E-06	5.177E-07	5.177E-07	4.595E-03
Industrial Equipment	Terminal Tractors	Diesel	2270003070	7.590E-04	5.468E-02	2.206E-02	4.591E-03	3.939E-03	3.821E-03	4.954E+00
Lawn and Garden Equipment (Com)	Chain Saws < 6 HP	2 Stroke	2260004021	8.776E-04	3.024E-02	8.127E+00	3.463E+00	1.798E-01	1.654E-01	1.473E+01
Lawn and Garden Equipment (Com)	Chippers/Stump Grinders	4 Stroke	2265004066	9.947E-04	9.156E-02	7.182E+00	1.917E-01	1.783E-03	1.640E-03	1.637E+01
Lawn and Garden Equipment (Com)	Chippers/Stump Grinders	LPG	2267004066	1.092E-04	1.005E-01	4.013E-01	2.719E-02	4.702E-04	4.702E-04	5.622E+00
Lawn and Garden Equipment (Com)	Chippers/Stump Grinders	Diesel	2270004066	7.632E-03	6.891E-01	3.701E-01	9.181E-02	7.537E-02	7.310E-02	4.982E+01
Lawn and Garden Equipment (Com)	Commercial Turf Equipment	2 Stroke	2260004071	4.643E-07	3.862E-06	3.531E-03	1.684E-03	6.856E-05	6.307E-05	7.792E-03
Lawn and Garden Equipment (Com)	Commercial Turf Equipment	4 Stroke	2265004071	1.744E-02	1.023E+00	1.693E+02	4.080E+00	3.674E-02	3.380E-02	2.871E+02
Lawn and Garden Equipment (Com)	Commercial Turf Equipment	Diesel	2270004071	8.999E-04	6.997E-02	3.606E-02	1.100E-02	6.672E-03	6.472E-03	5.874E+00
Lawn and Garden Equipment (Com)	Front Mowers	4 Stroke	2265004046	4.980E-04	1.987E-02	4.616E+00	1.233E-01	9.292E-04	8.548E-04	8.199E+00
Lawn and Garden Equipment (Com)	Front Mowers	Diesel	2270004046	5.589E-03	4.632E-01	3.055E-01	9.922E-02	5.652E-02	5.482E-02	3.648E+01
Lawn and Garden Equipment (Com)	Lawn & Garden Tractors	4 Stroke	2265004056	5.830E-03	3.075E-01	5.431E+01	1.178E+00	1.161E-02	1.068E-02	9.597E+01
Lawn and Garden Equipment (Com)	Lawn & Garden Tractors	Diesel	2270004056	1.153E-03	1.043E-01	6.609E-02	2.197E-02	1.233E-02	1.196E-02	7.523E+00
Lawn and Garden Equipment (Com)	Lawn mowers	4 Stroke	2265004011	3.204E-03	1.387E-01	3.193E+01	2.026E+00	1.282E-02	1.179E-02	5.286E+01
Lawn and Garden Equipment (Com)	Leafblowers/Vacuums	2 Stroke	2260004031	1.098E-03	2.249E-02	8.721E+00	3.800E+00	1.807E-01	1.662E-01	1.840E+01
Lawn and Garden Equipment (Com)	Leafblowers/Vacuums	4 Stroke	2265004031	3.703E-03	2.597E-01	3.116E+01	8.834E-01	7.328E-03	6.742E-03	6.095E+01
Lawn and Garden Equipment (Com)	Leafblowers/Vacuums	Diesel	2270004031	8.358E-07	7.704E-05	4.977E-05	1.665E-05	9.107E-06	8.834E-06	5.456E-03
Lawn and Garden Equipment (Com)	Other Lawn & Garden Eqp.	4 Stroke	2265004076	5.465E-04	2.003E-02	4.990E+00	3.106E-01	2.339E-03	2.152E-03	9.009E+00
Lawn and Garden Equipment (Com)	Other Lawn & Garden Eqp.	Diesel	2270004076	2.134E-05	1.809E-03	1.102E-03	3.100E-04	2.233E-04	2.166E-04	1.393E-01
Lawn and Garden Equipment (Com)	Rear Engine Riding Mowers	4 Stroke	2265004041	4.195E-04	2.184E-02	4.048E+00	8.531E-02	8.215E-04	7.558E-04	6.905E+00
Lawn and Garden Equipment (Com)	Rotary Tillers < 6 HP	2 Stroke	2260004016	1.133E-04	1.016E-03	9.004E-01	4.349E-01	1.634E-02	1.504E-02	1.903E+00
Lawn and Garden Equipment (Com)	Rotary Tillers < 6 HP	4 Stroke	2265004016	1.692E-03	6.885E-02	1.576E+01	1.109E+00	8.274E-03	7.612E-03	2.791E+01
Lawn and Garden Equipment (Com)	Shredders < 6 HP	4 Stroke	2265004051	1.977E-04	7.699E-03	1.814E+00	1.386E-01	1.156E-03	1.063E-03	3.263E+00
Lawn and Garden Equipment (Com)	Snowblowers	2 Stroke	2260004036	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Lawn and Garden Equipment (Com)	Snowblowers	4 Stroke	2265004036	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Lawn and Garden Equipment (Com)	Snowblowers	Diesel	2270004036	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Lawn and Garden Equipment (Com)	Trimmers/Edgers/Brush Cutter	2 Stroke	2260004026	1.119E-03	1.349E-02	8.775E+00	4.224E+00	1.686E-01	1.551E-01	1.877E+01
Lawn and Garden Equipment (Com)	Trimmers/Edgers/Brush Cutter	4 Stroke	2265004026	8.135E-05	3.896E-03	7.855E-01	4.401E-02	2.530E-04	2.328E-04	1.341E+00

TABLE A.9b (Cont.)

Source Classification	Equipment	Engine Type	SCC	Emissions (tons/day)						
				SO_x	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	CO_2
Lawn and Garden Equipment (Res)	Chain Saws < 6 HP	2 Stroke	2260004020	4.886E-05	4.242E-04	3.821E-01	2.128E-01	7.026E-03	6.464E-03	8.200E-01
Lawn and Garden Equipment (Res)	Lawn & Garden Tractors	4 Stroke	2265004055	3.204E-03	1.505E-01	2.953E+01	1.004E+00	5.728E-03	5.270E-03	5.273E+01
Lawn and Garden Equipment (Res)	Lawn mowers	4 Stroke	2265004010	1.074E-03	3.901E-02	9.432E+00	8.430E-01	4.264E-03	3.923E-03	1.771E+01
Lawn and Garden Equipment (Res)	Leafblowers/Vacuums	2 Stroke	2260004030	6.932E-05	6.203E-04	5.502E-01	3.207E-01	1.002E-02	9.222E-03	1.164E+00
Lawn and Garden Equipment (Res)	Leafblowers/Vacuums	4 Stroke	2265004030	1.094E-05	4.435E-04	1.003E-01	9.389E-03	3.909E-05	3.597E-05	1.805E-01
Lawn and Garden Equipment (Res)	Other Lawn & Garden Eqp.	4 Stroke	2265004075	1.061E-04	3.843E-03	9.715E-01	6.731E-02	4.557E-04	4.192E-04	1.750E+00
Lawn and Garden Equipment (Res)	Rear Engine Riding Mowers	4 Stroke	2265004040	2.348E-04	1.097E-02	2.216E+00	9.548E-02	4.138E-04	3.807E-04	3.866E+00
Lawn and Garden Equipment (Res)	Rotary Tillers < 6 HP	2 Stroke	2260004015	5.694E-06	5.540E-05	4.866E-02	2.429E-02	8.060E-04	7.415E-04	9.566E-02
Lawn and Garden Equipment (Res)	Rotary Tillers < 6 HP	4 Stroke	2265004015	9.203E-05	3.327E-03	7.968E-01	7.135E-02	2.709E-04	2.492E-04	1.518E+00
Lawn and Garden Equipment (Res)	Snowblowers	2 Stroke	2260004035	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Lawn and Garden Equipment (Res)	Snowblowers	4 Stroke	2265004035	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Lawn and Garden Equipment (Res)	Trimmers/Edgers/Brush Cutter	2 Stroke	2260004025	1.060E-04	1.051E-03	8.816E-01	4.630E-01	1.533E-02	1.410E-02	1.781E+00
Lawn and Garden Equipment (Res)	Trimmers/Edgers/Brush Cutter	4 Stroke	2265004025	5.700E-06	2.312E-04	5.245E-02	4.467E-03	1.991E-05	1.832E-05	9.402E-02
Logging Equipment	Chain Saws > 6 HP	2 Stroke	2260007005	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Logging Equipment	Forest Eqp - Feller/Bunch/Skidder	4 Stroke	2265007015	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Logging Equipment	Forest Eqp - Feller/Bunch/Skidder	Diesel	2270007015	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Logging Equipment	Shredders > 6 HP	4 Stroke	2265007010	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Logging Equipment	Shredders > 6 HP	Diesel	2270007010	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pleasure Craft	Inboard/Sterndrive	4 Stroke	2282010005	5.354E-04	4.352E-02	1.676E+00	4.903E-01	6.085E-04	5.598E-04	8.809E+00
Pleasure Craft	Inboard/Sterndrive	Diesel	2282020005	1.153E-03	9.569E-02	1.519E-02	3.597E-03	1.776E-03	1.722E-03	7.524E+00
Pleasure Craft	Outboard	2 Stroke	2282005010	7.544E-04	2.694E-02	2.442E+00	2.206E+00	6.476E-02	5.958E-02	1.251E+01
Pleasure Craft	Outboards	Diesel	2282020010	4.126E-06	3.119E-04	2.363E-04	8.387E-05	3.955E-05	3.836E-05	2.693E-02
Pleasure Craft	Personal Water Craft	2 Stroke	2282005015	3.472E-04	4.781E-03	1.060E+00	7.149E-01	3.076E-02	2.830E-02	5.768E+00
Railroad Equipment	Railway Maintenance	Diesel	2285002015	4.432E-04	4.403E-02	3.913E-02	8.992E-03	6.793E-03	6.589E-03	2.893E+00
Railroad Equipment	Railway Maintenance	4 Stroke	2285004015	1.102E-05	5.924E-04	1.011E-01	3.073E-03	2.355E-05	2.167E-05	1.814E-01
Railroad Equipment	Railway Maintenance	LPG	2285006015	1.052E-07	9.684E-05	3.848E-04	2.607E-05	4.517E-07	4.517E-07	5.419E-03
Recreational Equipment	ATVs	2 Stroke	2260001030	8.174E-05	1.773E-03	7.013E-01	7.459E-01	2.725E-02	2.507E-02	1.413E+00
Recreational Equipment	ATVs	4 Stroke	2265001030	9.518E-04	2.395E-02	3.849E+00	3.314E-01	4.431E-03	4.076E-03	1.567E+01
Recreational Equipment	Golf Carts	4 Stroke	2265001050	5.259E-04	2.808E-02	5.599E+00	1.216E-01	1.263E-03	1.162E-03	8.659E+00
Recreational Equipment	Motorcycles: Off-Road	2 Stroke	2260001010	1.799E-04	2.308E-03	9.175E-01	9.777E-01	3.565E-02	3.280E-02	3.048E+00
Recreational Equipment	Motorcycles: Off-Road	4 Stroke	2265001010	1.014E-04	2.702E-03	4.356E-01	3.739E-02	5.012E-04	4.611E-04	1.669E+00
Recreational Equipment	Snowmobiles	2 Stroke	2260001020	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Recreational Equipment	Speciality Vehicle Carts	Diesel	2270001060	1.369E-04	1.196E-02	1.713E-02	4.410E-03	2.618E-03	2.539E-03	8.940E-01
Recreational Equipment	Specialty Vehicle Carts	LPG	2267001060	1.229E-06	1.132E-03	4.524E-03	3.064E-04	5.299E-06	5.299E-06	6.330E-02
Recreational Equipment	Specialty Vehicles/Carts	2 Stroke	2260001060	7.024E-05	3.316E-03	5.442E-01	2.271E-02	1.379E-04	1.269E-04	1.156E+00
Recreational Equipment	Specialty Vehicles/Carts	4 Stroke	2265001060	5.819E-05	2.295E-03	5.197E-01	1.861E-02	1.090E-04	1.002E-04	9.581E-01

Total by Source Classification

Source Classification	Equipment	Engine Type	SCC	Emissions (tons/day)						
				SO_x	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	CO_2
Agricultural Equipment				0.001	0.051	0.062	0.008	0.006	0.006	3.481
Airport Equipment				0.002	0.140	0.173	0.017	0.011	0.010	10.209
Commercial Equipment				0.012	1.014	39.856	1.759	0.101	0.097	126.536
Construction and Mining Equipment				0.566	47.881	75.259	9.243	4.415	4.276	3,752.484
Industrial Equipment				0.010	1.439	4.717	0.337	0.075	0.073	105.365
Lawn and Garden Equipment (Com)				0.053	3.459	353.637	22.345	0.781	0.726	729.156
Lawn and Garden Equipment (Res)				0.005	0.210	44.959	3.116	0.044	0.041	81.716
Logging Equipment				0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pleasure Craft				0.003	0.171	5.193	3.415	0.098	0.090	34.638
Railroad Equipment				0.000	0.045	0.141	0.012	0.007	0.007	3.080
Recreational Equipment				0.002	0.078	12.587	2.260	0.072	0.066	33.529
Total				**0.65**	**54.49**	**536.58**	**42.51**	**5.61**	**5.39**	**4,880.19**

TABLE A.10 Emissions Inventory for Railroad Equipment (Line-Haul and Switching) Sources for Base Year 2000

Type of Locomotive	SCC	Diesel Consumed (gal)		Baseline In-Use Emission Factors (g/gal) [c]						Emissions (tons/year)					
		1998 [a]	2000 [b]	SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$
Line-Haul	2285002005	1,980,504	2,270,536	3.27	270	26.6	10	6.7	NA [d]	8.2	675.8	66.6	25.0	16.8	NA
Switch	2285002010	182,500	209,226	3.27	362	38.1	21	9.2	NA	0.8	83.5	8.8	4.8	2.1	NA
Total		**2,163,004**	**2,479,762**							**8.9**	**759.2**	**75.4**	**29.9**	**18.9**	**NA**

[a] Source: Clark County, 2001, "Railroad Equipment Emissions," Table B-69, *PM_{10} SIP*, June 2001. Available at http://www.co.clark.nv.us/Air_Quality/PM10SIP.htm.

[b] Activity levels for diesel consumed were taken from Table B-69, *PM_{10} SIP,* and multiplied by the growth factor of 1.1464 (=1,374,222/1,198,683) for population changes from 1998 to 2000.

[c] EPA, 1997, Emission Factors for Locomotives, EPA420-F-97-051, Office of Mobile Sources, Dec. Available at http://www.epa.gov/otaq/regs/nonroad/locomotv/frm/42097051.pdf.
The SO_2 emission factor was estimated based on an emission factor of 0.0360 lb/gal for a fuel sulfur content of 0.25% (EPA, 1992, *Procedures for Emission Inventory Preparation – Volume IV: Mobile Sources*, EPA420-R-92-009, Dec.) and a fuel sulfur content of 0.05% set forth in the Clark County Health District Air Quality Regulations, Section 26.
For the year 2000, baseline in-use emission factors were conservatively used.

[d] NA = not available.

TABLE A.11 Emissions Inventory for Airport Operations (Landings and Takeoffs) Sources for Base Year 2000

Airfields	SCC	Emissions in 1997 or 1998 (tons/year) [a]						Emissions in 2000 (tons/year) [b]						Location	
		SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	Lat	Long
McCarran International Airport	2275020000	93.2	2,080.0	4,226.3	539.5	250.2	NA [c]	106.8	2,384.6	5,160.3	658.7	286.8	NA	-115.1523	36.0804
Henderson Executive Airport	2275020000	0.5	5.7	572.0	29.0	5.5	NA	0.6	6.5	698.4	35.3	6.3	NA	-115.1328	35.9764
North Las Vegas Municipal Airport	2275020000	1.5	19.1	2,827.9	86.7	22.8	NA	1.7	21.9	3,452.9	105.8	26.1	NA	-115.1958	36.2117
Nellis Air Force Base	2275001000	396.5	268.6	1,043.1	128.4	31.9	NA	396.5	268.6	1,043.1	128.4	31.9	NA	-115.0343	36.2362
Total		**491.7**	**2,373.4**	**8,669.3**	**783.5**	**310.4**	**NA**	**505.6**	**2,681.6**	**10,354.6**	**928.3**	**351.2**	**NA**		

[a] Emission rates for SO_2, NO_x, and PM_{10} were taken from Table B-70, *PM_{10} SIP* (June 2001) for 1998. Those for CO and VOCs were taken from Appendix D, *CO SIP* (Aug. 2000) for 1997. Emission rates for VOCs at Nellis Air Force Base are not available, so VOC emissions were estimated based on a CO/VOC emission ratio for the F-15 fighter (Seitchek, Nov. 1985).

Source: Seitchek, G.D., 1985, "Aircraft Engine Emissions Estimator," ESL-TR-85-14, Engineering & Services Laboratory, Tyndall Air Force Base, FL, Nov.

[b] For the Nellis Air Force Base, no operation-level changes would be anticipated and, accordingly, emissions for 2000 would be the same as those for the previous years (see Table E-1, *PM_{10} SIP*). Emissions for SO_2, NO_x, and PM_{10} were estimated on the basis of those for 1998 from Table B-70, *PM_{10} SIP,* applying the population growth factor of 1.1464 (=1,374,222/1,198,683) from 1998 to 2000. Emissions for CO and VOCs were estimated on the basis of those for 1997 from Appendices A and D of the *CO SIP,* applying the population growth factor of 1.2210 (=1,374,222/1,125,503) from 1997 to 2000.

[c] NA = not available.

TABLE A.12 Emissions Inventory for Paved-Road Dust Sources [a] for Base Year 2000

2000 RTC Data			*PM_{10} SIP* [c]		Improved Shoulders			Without Improved Shoulders			Total
Group Code	Functional Class	Daily VMT [b]	Roadway Category	% of Roadways with Unimproved Shoulders	Daily VMT	Emission Factors (g/mi) [c]	PM_{10} Emissions (tons/year)	Daily VMT	Emission Factors (g/mi) [c]	PM_{10} Emissions (tons/year)	PM_{10} Emissions (tons/year)
0	External Links	358,326	Ext. Connector		358,326	2.93	422.4				422.4
1	System to System Ramp	186,211	Freeway Ramps		186,211	4.22	316.2				316.2
2	Minor Arterial	8,824,212	Minor Arterial	10.00	7,941,791	4.77	15,241.5	882,421	5.63	1,998.8	17,240.3
3	Major Arterial	2,391,363	Major Arterial	25.54	1,780,609	2.93	2,099.1	610,754	5.63	541.7	2,640.7
4	Ramp	698,226	Ramps		698,226	4.22	1,185.5				1,185.5
5	Interstate	5,170,295	Interstate		5,170,295	0.37	769.7				769.7
6	Freeway	1,816,941	Freeway		1,816,941	0.37	270.5				270.5
7	Expressway/Beltway	171,140	Expressway		171,140	2.93	201.7				201.7
8	Collector	2,697,822	Collector	4.79	2,568,596	4.22	4,361.1	129,226	37.4	4,059.5	8,420.6
9	Centroid Connector [d]	1,809,440	Local	11.69	1,597,917	6.57	4,223.9	211,524	37.4	2,722.7	6,946.6
10	Local Road	7,230	Local	11.69	6,385	6.57	16.9	845	37.4	10.9	27.8
Total		**24,131,206**			**22,296,436**		**29,108.3**	**1,834,770**		**9,333.6**	**38,442.0**

[a] Source classification codes (SCC) = 2294000000.

[b] VMT data for the year 2000 were provided in an e-mail from B. Hoeft (RTC, Las Vegas, NV) to M. Lazaro (ANL, Argonne, IL) on June 26, 2003.

[c] Emission factors and data for the percent of roadways with unimproved shoulders were taken from Tables B-50 and B-16, respectively, of the *PM_{10} SIP*.

[d] The "Centroid Connector" was assumed to be represented by "Local Road," according to an e-mail from B. Hoeft (RTC, Las Vegas, NV) to Y.-S. Chang (ANL, Argonne, IL) on Aug. 5, 2003.

TABLE A.13 Emissions Inventory for Construction Trackout Sources for Base Year 2000

Type No.	Type of Construction [a]	SCC	Number of Acres Permitted in 2000 [a]	Number of Acres under Construction in 2000 [a,b]	Months under Active Construction [c]	Access Point Rates [c]			Number of Access Points	Total VMT [d]	Emission Factors (g/mi) [e]	PM_{10} Emissions (TPY) [f]
1	Highway	2311020000	743.5	1,520.5	12	1 per	10	acres	152	8,033,951	9.15	81.00
2	Flood Detention	2311020000	370.0	778.8	12	1 per	30	acres	26	1,915,674	9.15	19.31
3	Airport	2311020000	331.4	356.5	12	1 per	30	acres	12	786,994	9.15	7.93
4	Public Schools/ Libraries/Churches/ Hospitals [g]	2311010000	537.0	595.0	3	1 per	10	acres	59	1,327,247	9.15	13.38
5	Public Parks	2311010000	254.4	217.1	6	1 per	10	acres	22	886,067	9.15	8.93
6	Underground Utilities	2311020000	709.3	800.7	1	no access				0	9.15	0.00
7	Public Works	2311020000	1,071.6	1,520.7	3	1 per	10	acres	152	3,133,056	9.15	31.59
8	Miscellaneous	2311010000	1,147.1	1,691.2	6	1 per	10	acres	169	6,411,807	9.15	64.64
9	Commercial	2311010000	3,022.0	4,088.5	3	1 per	10	acres	409	8,861,651	9.15	89.34
10	Residential	2311010000	10,854.2	15,726.3	6	1 per	30	acres	524	19,171,925	9.15	193.29
Total			**19,040.5**	**27,295.3**					**1,525**	**50,528,372**		**509.4**

[a] Construction type and database were provided in an e-mail from J. Davis (Clark County DAQEM, Las Vegas, NV) to Y.-S. Chang (ANL, Argonne, IL) on July 30 and August 7, 2003, respectively.

[b] Included all disturbed areas in 2000, considering months under active construction (5th column in the table above). Construction was assumed to begin in the month following issuance of the permit.

[c] Months under active construction and access point rates were taken from Tables B-9 and B-18, *PM_{10} SIP*, respectively.

[d] Total VMT was estimated with the assumption that track-out distance is 150 ft and an average of 10,000 vehicles per day travel over the paved roads with track out (see page B-32, *PM_{10} SIP*).

[e] Emission factor for "Paved Roads" in EPA's *AP-42* was used in the formula below. A value for silt loading was calculated by multiplying an average silt loading value for paved roads of 0.86 g/m^2 by a factor of 3.29, which was developed by Dames & Moore (see page B-32, *PM_{10} SIP*). A mean vehicle weight of three tons was assumed (see page B-66, *PM_{10} SIP*).

$$EF\ (g/mi) = k\ (sL/2)^{0.65}\ (W/3)^{1.5}$$

where:
k = particulate emission factor (k = 7.3 for PM_{10})
sL = road surface silt loading (g/m2)
W = average weight of vehicles (tons)

Source: EPA, 2003, "13.2.1 Paved Roads," *AP-42* (10/97), accessed July 2003.

[f] Emissions were estimated based on acres under construction, not on acres permitted in 2000.

[g] This construction type (not listed in the *PM_{10} SIP*) was assumed to be represented by the "Commercial" construction type.

TABLE A.14 Emissions Inventory for Unpaved-Road Dust Sources [a] for Base Year 2000

Average Daily Traffic (ADT) Range	Miles of Unpaved Roads [b]	Emission Factors (lb/mi) [b,c]	PM_{10} Emissions in 1998 (TPY) [b]	PM_{10} Emissions in 2000 (TPY) [d]
ADT = 150	64	3.27	9,905.0	11,622.5
125 = ADT < 150	7	3.27	557.0	653.6
100 = ADT < 125	12	3.27	715.0	839.0
75 = ADT < 100	20	3.27	935.0	1,097.1
50 = ADT < 75	13	3.27	420.0	492.8
ADT < 50	147	3.27	2,624.0	3,079.0
Total	**263**		**15,156.0**	**17,784.1**

[a] Source classification codes (SCC) = 2296000000.

[b] Miles of unpaved roads, emission factors, and annual PM_{10} emissions were from Table B-73, *PM_{10} SIP*.

[c] The emission factor for "Unpaved Roads" in EPA's *AP-42* was used in the formula below. A value for silt content was assumed to be about 16%, and a mean vehicle weight of three tons was assumed (see *PM_{10} SIP*). For moisture content, an EPA conservative default value of 0.2% was used.

$$EF_{PM10}\ (lb/VMT) = \frac{k\,(s/12)^{0.8}\,(W/3)^{0.4}}{(M/0.2)^{0.3}}$$

where:
- k = particle size multiplier (k = 2.6 for PM_{10})
- s = surface material silt content (%)
- W = mean vehicle weight (tons)
- M = surface material moisture content (%)

Source: EPA, 2003, "13.2.2 Unpaved Roads," *AP-42* (09/98), accessed July 2003.

[d] Changes in average daily trips on unpaved roads were based upon the predicted change in VMT for local roads. Per page E-14 in the *PM_{10} SIP*, the local road traffic changed by a factor of 1.26 from 1998 to 2001; by a factor of 1.26 from 1998 to 2001; and by a factor of 1.34 from 1998 to 2006. A factor of 1.17 from 1998 to 2000 estimated by interpolation was used for emission estimation in 2000.

TABLE A.15a Emissions Inventory for On-Road Vehicle Sources for Base Year 2000 [a]

Season	Source Category	Emissions (tons/day)					
		SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$
Winter	Vehicular Sulfate PM	NA [b]	NA	NA	NA	0.02	0.02
	Vehicular Tire Wear	NA	NA	NA	NA	0.22	0.06
	Vehicular Brake Wear	NA	NA	NA	NA	0.33	0.14
	Vehicular Exhaust	0.38	43.62	433.45	33.54	0.50	0.45
	Total	**0.38**	**43.62**	**433.45**	**33.54**	**1.08**	**0.67**
Summer	Vehicular Sulfate PM	NA	NA	NA	NA	0.05	0.05
	Vehicular Tire Wear	NA	NA	NA	NA	0.22	0.06
	Vehicular Brake Wear	NA	NA	NA	NA	0.33	0.14
	Vehicular Exhaust	0.87	42.80	467.36	47.81	0.47	0.43
	Total	**0.87**	**42.80**	**467.36**	**47.81**	**1.08**	**0.67**
Average of Winter/Summer	Vehicular Sulfate PM	NA	NA	NA	NA	0.04	0.04
	Vehicular Tire Wear	NA	NA	NA	NA	0.22	0.06
	Vehicular Brake Wear	NA	NA	NA	NA	0.33	0.14
	Vehicular Exhaust	0.63	43.21	450.40	40.67	0.48	0.44
	Total	**0.63**	**43.21**	**450.40**	**40.67**	**1.08**	**0.67**
Annual [c]	Vehicular Sulfate PM	NA	NA	NA	NA	14.0	14.0
	Vehicular Tire Wear	NA	NA	NA	NA	81.8	20.5
	Vehicular Brake Wear	NA	NA	NA	NA	121.4	51.5
	Vehicular Exhaust	229.1	15,772.6	164,397.2	14,846.2	176.5	159.1
	Total	**229.1**	**15,772.6**	**164,397.2**	**14,846.2**	**393.7**	**245.0**

[a] On-road vehicle emissions were estimated by using the MOBILE6 model. Seasonal (summer and winter) emission factors were calculated by functional class and multiplied by VMT data provided by RTC to estimate daily emissions. Annual total emissions were estimated by averaging seasonal daily emissions. (The MOBILE6.2 model inputs for the summer [for PM_{10}] scenario are listed in the following pages.) The parameter values used in the model were the same as those for the nonroad engines and vehicles (see Table A.9a).

[b] NA = not applicable.

[c] Units are in tons/year.

TABLE A.15b MOBILE6.2 Model Inputs for the Summer (for PM_{10}) Scenario for Base Year 2000

```
MOBILE6 INPUT FILE :
PARTICULATES        : S04 OCARBON ECARBON GASPM SO2 Brake Tire
RUN DATA
MIN/MAX TEMP        : 76. 106.
EXPAND BUS EFS      :
EXPAND HDDV EFS     :
I/M PROGRAM         : 1 1968 2000 1 TRC 2500/IDLE
I/M MODEL YEARS     : 1 1968 2000
I/M VEHICLES        : 1 22222 22222222 1
I/M STRINGENCY      : 1 20.0
I/M COMPLIANCE      : 1 096.0
I/M WAIVER RATES    : 1 01.0 1.0
I/M EFFECTIVENESS   : 0.50 0.50 0.50
ANTI-TAMP PROG      :
83 81 00 22222 22222222 1 11 096. 22212112
FUEL PROGRAM        : 4
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
*OXYGENATED FUELS    : .000 1.000 .000 0.035 1
FUEL RVP            :  9.0
STAGE II REFUELING :
92 3 95. 95.
REG DIST            : LV_REG02.YSM
SCENARIO REC        : Scenario Title Text - CLARK CO. MYR AND VMT DISTS.--SUMMER
PARTICLE SIZE       : 10.0
PARTICULATE EF      : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
GASOLINE SULFUR     : 100.0
DIESEL SULFUR       : 250.0
ALTITUDE            : 1
CALENDAR YEAR       : 2000
EVALUATION MONTH    : 7
VMT FRACTIONS       :
0.507 0.077 0.256 0.078 0.038 0.011 0.001 0.001
0.001 0.002 0.003 0.003 0.011 0.003 0.001 0.007
AVERAGE SPEED       : 21.7 areawide
END OF RUN

MIN/MAX TEMP        : 76. 106.
EXPAND BUS EFS      :
EXPAND HDDV EFS     :
I/M PROGRAM         : 1 1968 2000 1 TRC 2500/IDLE
I/M MODEL YEARS     : 1 1968 2000
I/M VEHICLES        : 1 22222 22222222 1
I/M STRINGENCY      : 1 20.0
I/M COMPLIANCE      : 1 096.0
I/M WAIVER RATES    : 1 01.0 1.0
I/M EFFECTIVENESS   : 0.50 0.50 0.50
ANTI-TAMP PROG      :
83 81 00 22222 22222222 1 11 096. 22212112
FUEL PROGRAM        : 4
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
*OXYGENATED FUELS    : .000 1.000 .000 0.035 1
FUEL RVP            :  9.0
STAGE II REFUELING :
92 3 95. 95.
REG DIST            : LV_REG02.YSM
SCENARIO REC        : Scenario Title Text - CLARK CO. MYR AND VMT DISTS.--SUMMER
PARTICLE SIZE       : 10.0
PARTICULATE EF      : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
GASOLINE SULFUR     : 100.0
DIESEL SULFUR       : 250.0
ALTITUDE            : 1
CALENDAR YEAR       : 2000
EVALUATION MONTH    : 7
VMT FRACTIONS       :
0.507 0.077 0.256 0.078 0.038 0.011 0.001 0.001
0.001 0.002 0.003 0.003 0.011 0.003 0.001 0.007
AVERAGE SPEED       : 46.9 arterial
END OF RUN
```

TABLE A.15b (Cont.)

```
MIN/MAX TEMP        : 76. 106.
EXPAND BUS EFS      :
EXPAND HDDV EFS     :
I/M PROGRAM         : 1 1968 2000 1 TRC 2500/IDLE
I/M MODEL YEARS     : 1 1968 2000
I/M VEHICLES        : 1 22222 22222222 1
I/M STRINGENCY      : 1 20.0
I/M COMPLIANCE      : 1 096.0
I/M WAIVER RATES    : 1 01.0 1.0
I/M EFFECTIVENESS   : 0.50 0.50 0.50
ANTI-TAMP PROG      :
83 81 00 22222 22222222 1 11 096. 22212112
FUEL PROGRAM        : 4
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
*OXYGENATED FUELS    : .000 1.000 .000 0.035 1
FUEL RVP            :  9.0
STAGE II REFUELING :
92 3 95. 95.
REG DIST            : LV_REG02.YSM
SCENARIO REC        : Scenario Title Text - CLARK CO. MYR AND VMT DISTS.--SUMMER
PARTICLE SIZE       : 10.0
PARTICULATE EF      : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
GASOLINE SULFUR     : 100.0
DIESEL SULFUR       : 250.0
ALTITUDE            : 1
CALENDAR YEAR       : 2000
EVALUATION MONTH    : 7
VMT FRACTIONS       :
0.507 0.077 0.256 0.078 0.038 0.011 0.001 0.001
0.001 0.002 0.003 0.003 0.011 0.003 0.001 0.007
AVERAGE SPEED       : 34.9 arterial
END OF RUN

MIN/MAX TEMP        : 76. 106.
EXPAND BUS EFS      :
EXPAND HDDV EFS     :
I/M PROGRAM         : 1 1968 2000 1 TRC 2500/IDLE
I/M MODEL YEARS     : 1 1968 2000
I/M VEHICLES        : 1 22222 22222222 1
I/M STRINGENCY      : 1 20.0
I/M COMPLIANCE      : 1 096.0
I/M WAIVER RATES    : 1 01.0 1.0
I/M EFFECTIVENESS   : 0.50 0.50 0.50
ANTI-TAMP PROG      :
83 81 00 22222 22222222 1 11 096. 22212112
FUEL PROGRAM        : 4
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
*OXYGENATED FUELS    : .000 1.000 .000 0.035 1
FUEL RVP            :  9.0
STAGE II REFUELING :
92 3 95. 95.
REG DIST            : LV_REG02.YSM
SCENARIO REC        : Scenario Title Text - CLARK CO. MYR AND VMT DISTS.--SUMMER
PARTICLE SIZE       : 10.0
PARTICULATE EF      : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
GASOLINE SULFUR     : 100.0
DIESEL SULFUR       : 250.0
ALTITUDE            : 1
CALENDAR YEAR       : 2000
EVALUATION MONTH    : 7
VMT FRACTIONS       :
0.507 0.077 0.256 0.078 0.038 0.011 0.001 0.001
0.001 0.002 0.003 0.003 0.011 0.003 0.001 0.007
AVERAGE SPEED       : 36.1 arterial
END OF RUN
```

TABLE A.15b (Cont.)

```
MIN/MAX TEMP        : 76. 106.
EXPAND BUS EFS      :
EXPAND HDDV EFS     :
I/M PROGRAM         : 1 1968 2000 1 TRC 2500/IDLE
I/M MODEL YEARS     : 1 1968 2000
I/M VEHICLES        : 1 22222 22222222 1
I/M STRINGENCY      : 1 20.0
I/M COMPLIANCE      : 1 096.0
I/M WAIVER RATES    : 1 01.0 1.0
I/M EFFECTIVENESS   : 0.50 0.50 0.50
ANTI-TAMP PROG      :
83 81 00 22222 22222222 1 11 096. 22212112
FUÈL PROGRAM        : 4
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
*OXYGENATED FUELS    : .000 1.000 .000 0.035 1
FUEL RVP            :  9.0
STAGE II REFUELING :
92 3 95. 95.
REG DIST            : LV_REG02.YSM
SCENARIO REC        : Scenario Title Text - CLARK CO. MYR AND VMT DISTS.--SUMMER
PARTICLE SIZE       : 10.0
PARTICULATE EF      : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
GASOLINE SULFUR     : 100.0
DIESEL SULFUR       : 250.0
ALTITUDE            : 1
CALENDAR YEAR       : 2000
EVALUATION MONTH    : 7
VMT FRACTIONS       :
0.507 0.077 0.256 0.078 0.038 0.011 0.001 0.001
0.001 0.002 0.003 0.003 0.011 0.003 0.001 0.007
AVERAGE SPEED       : 28.2 freeway   1.0   0.0   0.0  99.0
END OF RUN

MIN/MAX TEMP        : 76. 106.
EXPAND BUS EFS      :
EXPAND HDDV EFS     :
I/M PROGRAM         : 1 1968 2000 1 TRC 2500/IDLE
I/M MODEL YEARS     : 1 1968 2000
I/M VEHICLES        : 1 22222 22222222 1
I/M STRINGENCY      : 1 20.0
I/M COMPLIANCE      : 1 096.0
I/M WAIVER RATES    : 1 01.0 1.0
I/M EFFECTIVENESS   : 0.50 0.50 0.50
ANTI-TAMP PROG      :
83 81 00 22222 22222222 1 11 096. 22212112
FUEL PROGRAM        : 4
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
*OXYGENATED FUELS    : .000 1.000 .000 0.035 1
FUEL RVP            :  9.0
STAGE II REFUELING :
92 3 95. 95.
REG DIST            : LV_REG02.YSM
SCENARIO REC        : Scenario Title Text - CLARK CO. MYR AND VMT DISTS.--SUMMER
PARTICLE SIZE       : 10.0
PARTICULATE EF      : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
GASOLINE SULFUR     : 100.0
DIESEL SULFUR       : 250.0
ALTITUDE            : 1
CALENDAR YEAR       : 2000
EVALUATION MONTH    : 7
VMT FRACTIONS       :
0.507 0.077 0.256 0.078 0.038 0.011 0.001 0.001
0.001 0.002 0.003 0.003 0.011 0.003 0.001 0.007
AVERAGE SPEED       : 53.6 non-ramp
END OF RUN
```

TABLE A.15b (Cont.)

```
MIN/MAX TEMP        : 76. 106.
EXPAND BUS EFS      :
EXPAND HDDV EFS     :
I/M PROGRAM         : 1 1968 2000 1 TRC 2500/IDLE
I/M MODEL YEARS     : 1 1968 2000
I/M VEHICLES        : 1 22222 22222222 1
I/M STRINGENCY      : 1 20.0
I/M COMPLIANCE      : 1 096.0
I/M WAIVER RATES    : 1 01.0 1.0
I/M EFFECTIVENESS   : 0.50 0.50 0.50
ANTI-TAMP PROG      :
83 81 00 22222 22222222 1 11 096. 22212112
FUEL PROGRAM        : 4
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
*OXYGENATED FUELS    : .000 1.000 .000 0.035 1
FUEL RVP            :  9.0
STAGE II REFUELING :
92 3 95. 95.
REG DIST            : LV_REG02.YSM
SCENARIO REC        : Scenario Title Text - CLARK CO. MYR AND VMT DISTS.--SUMMER
PARTICLE SIZE       : 10.0
PARTICULATE EF      : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
GASOLINE SULFUR     : 100.0
DIESEL SULFUR       : 250.0
ALTITUDE            : 1
CALENDAR YEAR       : 2000
EVALUATION MONTH    : 7
VMT FRACTIONS       :
0.507 0.077 0.256 0.078 0.038 0.011 0.001 0.001
0.001 0.002 0.003 0.003 0.011 0.003 0.001 0.007
AVERAGE SPEED       : 48.9 non-ramp
END OF RUN

MIN/MAX TEMP        : 76. 106.
EXPAND BUS EFS      :
EXPAND HDDV EFS     :
I/M PROGRAM         : 1 1968 2000 1 TRC 2500/IDLE
I/M MODEL YEARS     : 1 1968 2000
I/M VEHICLES        : 1 22222 22222222 1
I/M STRINGENCY      : 1 20.0
I/M COMPLIANCE      : 1 096.0
I/M WAIVER RATES    : 1 01.0 1.0
I/M EFFECTIVENESS   : 0.50 0.50 0.50
ANTI-TAMP PROG      :
83 81 00 22222 22222222 1 11 096. 22212112
FUEL PROGRAM        : 4
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
*OXYGENATED FUELS    : .000 1.000 .000 0.035 1
FUEL RVP            :  9.0
STAGE II REFUELING :
92 3 95. 95.
REG DIST            : LV_REG02.YSM
SCENARIO REC        : Scenario Title Text - CLARK CO. MYR AND VMT DISTS.--SUMMER
PARTICLE SIZE       : 10.0
PARTICULATE EF      : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
GASOLINE SULFUR     : 100.0
DIESEL SULFUR       : 250.0
ALTITUDE            : 1
CALENDAR YEAR       : 2000
EVALUATION MONTH    : 7
VMT FRACTIONS       :
0.507 0.077 0.256 0.078 0.038 0.011 0.001 0.001
0.001 0.002 0.003 0.003 0.011 0.003 0.001 0.007
AVERAGE SPEED       : 48.1 non-ramp
END OF RUN
```

TABLE A.15b (Cont.)

```
MIN/MAX TEMP        : 76. 106.
EXPAND BUS EFS      :
EXPAND HDDV EFS     :
I/M PROGRAM         : 1 1968 2000 1 TRC 2500/IDLE
I/M MODEL YEARS     : 1 1968 2000
I/M VEHICLES        : 1 22222 22222222 1
I/M STRINGENCY      : 1 20.0
I/M COMPLIANCE      : 1 096.0
I/M WAIVER RATES    : 1 01.0 1.0
I/M EFFECTIVENESS   : 0.50 0.50 0.50
ANTI-TAMP PROG      :
83 81 00 22222 22222222 1 11 096. 22212112
FUEL PROGRAM        : 4
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
*OXYGENATED FUELS    : .000 1.000 .000 0.035 1
FUEL RVP            :  9.0
STAGE II REFUELING :
92 3 95. 95.
REG DIST            : LV_REG02.YSM
SCENARIO REC        : Scenario Title Text - CLARK CO. MYR AND VMT DISTS.--SUMMER
PARTICLE SIZE       : 10.0
PARTICULATE EF      : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
GASOLINE SULFUR     : 100.0
DIESEL SULFUR       : 250.0
ALTITUDE            : 1
CALENDAR YEAR       : 2000
EVALUATION MONTH    : 7
VMT FRACTIONS       :
0.507 0.077 0.256 0.078 0.038 0.011 0.001 0.001
0.001 0.002 0.003 0.003 0.011 0.003 0.001 0.007
AVERAGE SPEED       : 34.9 arterial
END OF RUN

MIN/MAX TEMP        : 76. 106.
EXPAND BUS EFS      :
EXPAND HDDV EFS     :
I/M PROGRAM         : 1 1968 2000 1 TRC 2500/IDLE
I/M MODEL YEARS     : 1 1968 2000
I/M VEHICLES        : 1 22222 22222222 1
I/M STRINGENCY      : 1 20.0
I/M COMPLIANCE      : 1 096.0
I/M WAIVER RATES    : 1 01.0 1.0
I/M EFFECTIVENESS   : 0.50 0.50 0.50
ANTI-TAMP PROG      :
83 81 00 22222 22222222 1 11 096. 22212112
FUEL PROGRAM        : 4
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
*OXYGENATED FUELS    : .000 1.000 .000 0.035 1
FUEL RVP            :  9.0
STAGE II REFUELING :
92 3 95. 95.
REG DIST            : LV_REG02.YSM
SCENARIO REC        : Scenario Title Text - CLARK CO. MYR AND VMT DISTS.--SUMMER
PARTICLE SIZE       : 10.0
PARTICULATE EF      : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
GASOLINE SULFUR     : 100.0
DIESEL SULFUR       : 250.0
ALTITUDE            : 1
CALENDAR YEAR       : 2000
EVALUATION MONTH    : 7
VMT FRACTIONS       :
0.507 0.077 0.256 0.078 0.038 0.011 0.001 0.001
0.001 0.002 0.003 0.003 0.011 0.003 0.001 0.007
AVERAGE SPEED       : 24.9 arterial
END OF RUN
```

TABLE A.15b (Cont.)

```
MIN/MAX TEMP        : 76. 106.
EXPAND BUS EFS      :
EXPAND HDDV EFS     :
I/M PROGRAM         : 1 1968 2000 1 TRC 2500/IDLE
I/M MODEL YEARS     : 1 1968 2000
I/M VEHICLES        : 1 22222 22222222 1
I/M STRINGENCY      : 1 20.0
I/M COMPLIANCE      : 1 096.0
I/M WAIVER RATES    : 1 01.0 1.0
I/M EFFECTIVENESS   : 0.50 0.50 0.50
ANTI-TAMP PROG      :
83 81 00 22222 22222222 1 11 096. 22212112
FUEL PROGRAM        : 4
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
*OXYGENATED FUELS   : .000 1.000 .000 0.035 1
FUEL RVP            :  9.0
STAGE II REFUELING :
92 3 95. 95.
REG DIST            : LV_REG02.YSM
SCENARIO REC        : Scenario Title Text - CLARK CO. MYR AND VMT DISTS.--SUMMER
PARTICLE SIZE       : 10.0
PARTICULATE EF      : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
GASOLINE SULFUR     : 100.0
DIESEL SULFUR       : 250.0
ALTITUDE            : 1
CALENDAR YEAR       : 2000
EVALUATION MONTH    : 7
VMT FRACTIONS       :
0.507 0.077 0.256 0.078 0.038 0.011 0.001 0.001
0.001 0.002 0.003 0.003 0.011 0.003 0.001 0.007
AVERAGE SPEED       : 23.9 arterial
END OF RUN

MIN/MAX TEMP        : 76. 106.
EXPAND BUS EFS      :
EXPAND HDDV EFS     :
I/M PROGRAM         : 1 1968 2000 1 TRC 2500/IDLE
I/M MODEL YEARS     : 1 1968 2000
I/M VEHICLES        : 1 22222 22222222 1
I/M STRINGENCY      : 1 20.0
I/M COMPLIANCE      : 1 096.0
I/M WAIVER RATES    : 1 01.0 1.0
I/M EFFECTIVENESS   : 0.50 0.50 0.50
ANTI-TAMP PROG      :
83 81 00 22222 22222222 1 11 096. 22212112
FUEL PROGRAM        : 4
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
 100. 100. 100. 100. 100. 100. 100. 100.
*OXYGENATED FUELS   : .000 1.000 .000 0.035 1
FUEL RVP            :  9.0
STAGE II REFUELING :
92 3 95. 95.
REG DIST            : LV_REG02.YSM
SCENARIO REC        : Scenario Title Text - CLARK CO. MYR AND VMT DISTS.--SUMMER
PARTICLE SIZE       : 10.0
PARTICULATE EF      : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
GASOLINE SULFUR     : 100.0
DIESEL SULFUR       : 250.0
ALTITUDE            : 1
CALENDAR YEAR       : 2000
EVALUATION MONTH    : 7
VMT FRACTIONS       :
0.507 0.077 0.256 0.078 0.038 0.011 0.001 0.001
0.001 0.002 0.003 0.003 0.011 0.003 0.001 0.007
AVERAGE SPEED       : 13.5 arterial
END OF RUN
```

TABLE A.16 Emissions Inventory for Stationary Power Plant Sources Regulated by the State for Base Year 2000

Facility Name	Unit ID	ID	SCC	SIC	Heat Input (mmBtu) [a]	Emissions (tons/year) [a]							Location [b]		Stack Data [c]				
						SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	NH_3	Lat	Long	H_{stk} (ft)	D_{stk} (ft)	T_{stk} (°F)	Q_{stk} (ft^3/min)	V_{stk} (ft/s)
Clark	1	23221	10100601	4911	1,877,142	0.6	305.4	72.7	5.8	0.3	0.3	2.8	36.0867	-115.0469	100	8.5	230	157,000	46.1
Clark	2	23222	10100601	4911	2,664,389	0.8	545.3	106.3	8.5	0.5	0.5	4.0	36.0867	-115.0469	100	9	290	200,000	52.4
Clark	3	23223	10100604	4911	3,302,056	1.0	277.0	36.4	10.2	2.3	2.3	4.8	36.0867	-115.0469	156	11	286	261,000	45.8
Mohave	1	23411	10100212	4911	50,285,402	20,299.9	10,731.5	606.0	73.4	705.6	348.7	1.2	35.1458	-114.5912	500	32	300	3,000,000	62.2
Mohave	2	23412	10100212	4911	55,511,409	22,449.7	11,005.1	597.3	72.2	690.3	341.1	1.1	35.1458	-114.5912	500	32	300	3,000,000	62.2
Reid Gardner	1	23241	10100202	4911	9,234,146	714.0	1,909.1	83.1	10.0	351.5	218.9	0.1	36.6575	-114.6321	200	13.3	140	456,000	54.7
Reid Gardner	2	23242	10100202	4911	9,622,271	768.8	2,085.5	79.1	9.5	341.2	212.5	0.1	36.6575	-114.6321	240	13.3	140	562,000	67.4
Reid Gardner	3	23243	10100202	4911	10,502,573	728.7	2,294.5	93.2	11.2	400.7	249.6	0.1	36.6575	-114.6321	270	12.9	140	527,000	67.2
Reid Gardner	4	23244	10100202	4911	23,315,078	764.6	3,296.0	249.7	30.0	101.1	55.2	0.3	36.6575	-114.6321	500	21	140	1,164,000	56.0
Sunrise	1	23261	10100601	4911	3,618,824	22.4	1,175.1	177.5	14.2	0.8	0.8	6.8	36.1387	-115.0365	135	12	270	256,500	37.8
Clark Total	1-3	2322			7,843,587	2.4	1,127.7	215.4	24.6	3.1	3.1	11.6	36.0867	-115.0469					
Mohave Total	1	2341			105,796,811	42,749.6	21,736.6	1,203.3	145.6	1,395.9	689.7	2.4	35.1458	-114.5912					
Reid Gardner Total	1-4	2324			52,674,069	2,976.0	9,585.0	505.0	60.6	1,194.5	736.2	0.7	36.6575	-114.6321					
Sunrise Total	1	2326			3,618,824	22.4	1,175.1	177.5	14.2	0.8	0.8	6.8	36.1387	-115.0365					
Total					**169,933,291**	**45,750.4**	**33,624.5**	**2,101.2**	**244.9**	**2,594.3**	**1,429.8**	**21.5**							

[a] Heat input and emissions for SO_2 and NO_x were taken from EPA's Clean Air Markets web site; emissions for other pollutants were estimated based on 1999 and 2000 heat input data from EPA's Clean Air Markets web site and NEI 1999 emission data, which include emissions for all criteria pollutants, VOCs, and NH_3.
Source for the Clean Air Markets: http://cfpub.epa.gov/gdm/index.cfm?CFID=12901683&CFTOKEN=95402783&fuseaction=createqueries.timeframe.
Source for the 1999 NEI database: http://www.epa.gov/ttn/chief/net/1999inventory.html.

[b] Source: ANL-EAD (Argonne, IL) database provided by J. Adduci to Y.-S. Chang on Sept. 11, 2003.

[c] Source: G. Remer (Nevada Bureau of Air Quality Planning, Carson City, NV) e-mail to M. Lazaro (ANL, Argonne, IL) on June 26, 2003.

Appendix B:

Development of a BLM Land Conveyance GIS Layer Spanning the Period from October 1998 through December 2018

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Appendix B:

Development of a BLM Land Conveyance GIS Layer Spanning the Period from October 1998 through December 2018

Lands patented by the U.S. Bureau of Land Management (BLM) from October 1998 through December 31, 2003, were mapped with BLM LR2000 data (BLM 2004a) by using township, range, section, and aliquot part or lot descriptions. Aliquot parts were mapped by identifying the section in a geographic information system (GIS) layer and using a tool developed by Argonne National Laboratory to compute the location of the parcel. Lots were mapped by obtaining a scanned master title plat, georeferencing it by using section corners, and screen-digitizing the lots into a GIS layer.

Lands from the BLM public auction of November 2003 were not yet registered in LR2000 since the patents would not be issued until 2004. Locations of these parcels were provided by BLM (BLM 2003a) and were checked against the parcel descriptions in the final auction announcement (Fry 2003) and the sale report (BLM 2003b). Parcels listed in the sale report as having no bid or being defaulted were omitted.

Some information on planned or anticipated conveyances for 2004 and 2005 were provided by BLM. Parcels for the planned spring 2004 sale (BLM 2003c) were checked against the BLM auction announcement (BLM 2004b) for consistency, and some adjustments were made by Argonne where parcel acreages showed a difference or when a serial number was missing or added. Parcel descriptions for a planned spring 2004 direct sale for Lake Las Vegas (DiPinto 2004) and a planned 2005 sale for Kyle Canyon (Fry 2004a) were also provided by BLM and mapped by Argonne. Finally, a planned North Las Vegas sale was provided as a general land description and map (Fry 2004b). These lands were mapped by Argonne by using boundaries in the BLM land status layer (BLM 2003a) and section boundaries.

The specific planned land conveyance information described above totaled 3,898 acres for 2004 and 3,964 acres for 2005. These totals may not include all the lands that the BLM will convey in those years (such as in fall 2004 or spring 2005 public auctions), but they are close to the target disposal rate of 4,000 acres per year. Information about expected future development areas was also obtained from contacts at planning agencies in the Las Vegas area. This information either agreed with the BLM information or was too general or speculative to allow specific lands to be mapped in the GIS. The lands as described above were used to represent projected 2004 and 2005 BLM land conveyances.

No specific information was obtained that could be used as a basis for mapping planned land conveyances for 2006 or later. BLM indicated (Fry 2004b) that lands totaling 3,295 acres located east of the planned 2005 North Las Vegas sale would likely be sold in the near future, but not until after the lands planned for 2005 had been substantially developed. When the lag times associated with issuing patents, obtaining permits, and construction are taken into account, it is doubtful that the area will be patented by the end of 2006. Furthermore, a planner from North Las

Vegas indicated that development would likely proceed north rather than east. For these reasons, the available information was deemed to be too general and speculative to use for the study.

The GIS layers described above provided a map of existing and planned BLM land conveyances coded by date. To complete the layer, it was necessary to determine the remaining land administered by BLM. This was obtained by intersecting the BLM December 2003 status layer (BLM 2003a) with the land conveyance layers.

Note that the agreement between the Argonne-developed land conveyance layers and the BLM status layer is good but not exact in terms of land boundaries and land status. This resulted in some unavoidable "sliver" polygons, where boundaries did not match up exactly. There were some cases where lands shown in LR2000 as being conveyed before December 2003 were shown as BLM land in the BLM status layer. The areas involved in these discrepancies were insignificant for the purposes of this study, and resolving them would have required a prohibitive amount of work.

Figure 4.3 shows BLM land conveyances from October 1998 through December 31, 2000, used for the baseline. Figure 4.5 shows the locations and relative sizes of BLM land conveyances from January 1, 2001, to December 31, 2003; expected conveyances for 2004 and 2005; and BLM lands remaining after 2005.

References for Appendix B

BLM (U.S. Bureau of Land Management), 2003a, status_1203.e00, file showing GIS layer of land administration status in the Las Vegas area, provided by FTP file transfer, Dec.

BLM, 2003b, nov62003AuctionResults.pdf, file of November 2003 auction report. Available at www.nv.blm.gov/snplma/pdf/Results/nov62003AuctionResults.pdf.

BLM, 2003c, land_sold.e00, file showing GIS layer of land parcels conveyed in the disposal area, provided by FTP file transfer, Dec.

BLM, 2004a, *LR2000 Database*. Available at www.blm.gov/lr2000. Accessed 2003 and 2004.

BLM, 2004b, *Southern Nevada Public Land Management Act June 2, 2004 Auction Properties*. Available at www.nv.blm.gov/snplma/pdf/Sale/june04matrixfinal.pdf.

DiPinto, S., 2004, *Legal Description and Map of Lake at Las Vegas Sale*, facsimile from DiPinto (U.S. Bureau of Land Management, Las Vegas, NV) to J. Kuiper (Argonne National Laboratory, Argonne, IL), Jan. 9.

Fry, J., 2003, *Final Nov 03 Matrix FMV 4.xls*, e-mail with spreadsheet of November 2003 auction with parcel descriptions, from Fry (U.S. Bureau of Land Management, Las Vegas, NV) to M. Lazaro (Argonne National Laboratory, Argonne, IL), Oct. 8.

Fry, J., 2004a, *Legals for Large Disposal Areas*, e-mail with descriptions of parcels associated with the Gateway to Kyle Canyon planned land sale and information about the North Las Vegas planned land sale, from Fry (U.S. Bureau of Land Management, Las Vegas, NV) to J. Kuiper (Argonne National Laboratory, Argonne, IL), Feb. 9.

Fry, J., 2004b, *Nomination for BLM Land Sale Phase II — November 2004, City of North Las Vegas*, facsimile from Fry (U.S. Bureau of Land Management, Las Vegas, NV) to J. Kuiper (Argonne National Laboratory, Argonne, IL), Jan 9.

Appendix C:

Development of GIS Layers for Existing and Planned Land Use

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Appendix C:

Development of GIS Layers for Existing and Planned Land Use

Current and planned land use layers developed by the Regional Transportation Commission of Southern Nevada (RTC 2002) were used to designate land uses for the U.S. Bureau of Land Management (BLM) lands and were a basis for spatially locating land-use-related airborne emissions for modeling. Figure C.1 shows this layer, symbolized by the current land use type. For the baseline analysis, this layer was intersected with a layer containing the BLM lands patented between October 1998 and December 31, 2000, which yielded a layer coded with the patent date and current land use. This combined layer was then intersected with the modeling grid to allow statistics to be calculated on a grid cell basis.

Preparation of data for the future dates of 2006, 2012, and 2018 required designating a future land use. The RTC provided 10 planned land use layers (RTC 2003), which were developed for subregions in the Las Vegas area by using vacant parcels from the 2002 current land use layer. Collectively, these 10 layers covered most of the disposal area. They were combined into one planned land use layer by Argonne National Laboratory staff. In a small number of cases, the original layers overlapped and listed different planned land use codes for the same location. In these cases, the land use type having the highest emission rate was used. Figure C.2 shows the combined planned land use layer resulting from this work.

The current and planned land use layers were then combined into one layer, and areas not owned by BLM on January 1, 2001, were eliminated. A final land use designation then was made for each area that had either a current or future land use code, depending on the conveyance date (if available) and depending on whether the land was shown as vacant in the current land use codes. Some BLM land areas, particularly in the northwest, lacked current and planned land use designations. These areas were added to the combined land use map and designated as having no land use data. Figure C.3 shows the product of this work: a land use map for all lands in the disposal area still owned by BLM on January 1, 2001. Finally, the modeling grid was intersected, and the land use types were summed up on a grid cell and date basis. This process reduced the volume of information while still providing the data needed to produce an emissions inventory for the 2006, 2012, and 2018 modeling runs.

References for Appendix C

RTC (Regional Transportation Commission of Southern Nevada), 2002, *Las Vegas Area Current Land Use as of June 2002*, GIS layer on CD-ROM, Las Vegas, NV.

RTC, 2003, *Las Vegas Area Planned Land Use*, 10 GIS layers on CD-ROM, Las Vegas, NV.

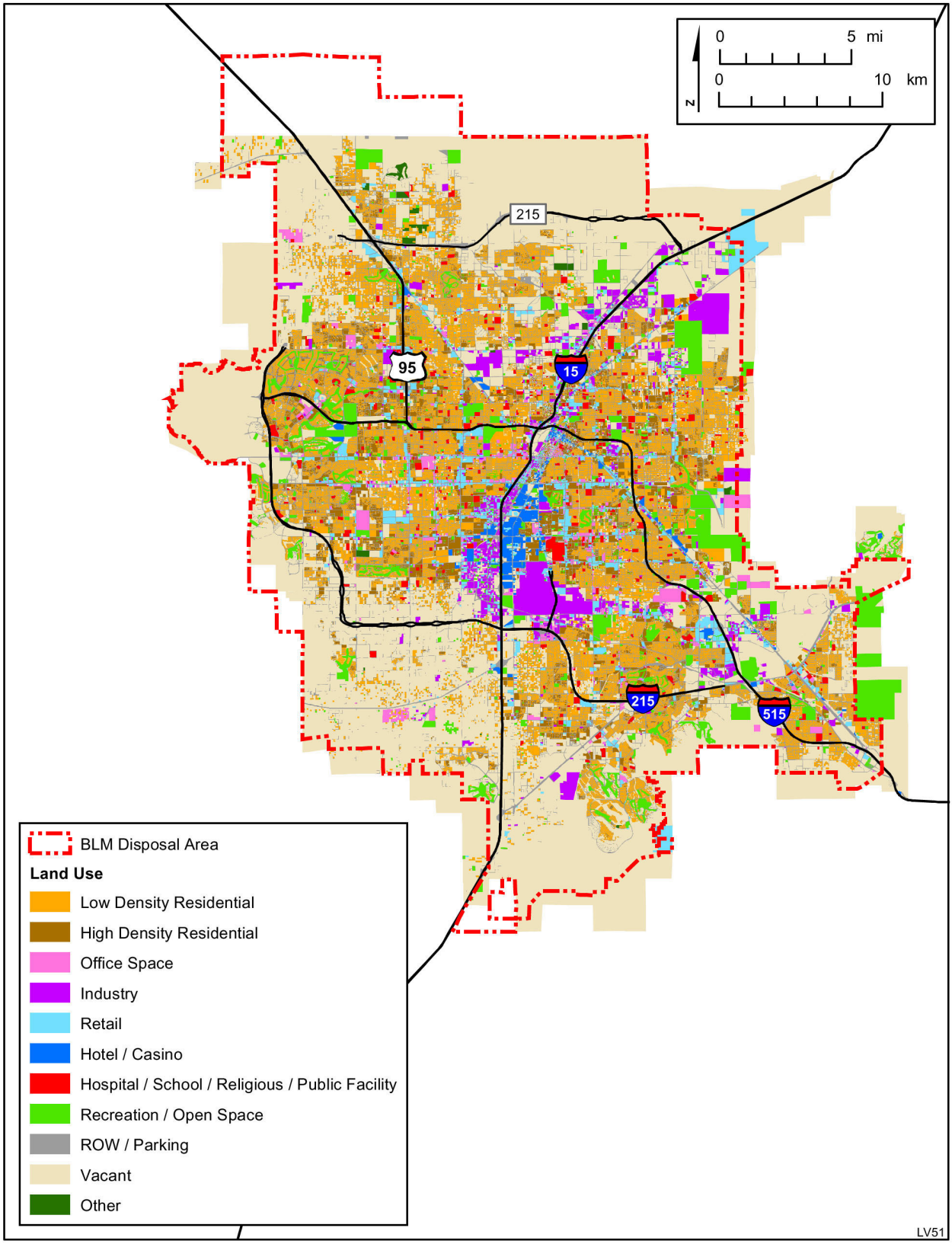

FIGURE C.1 Current Land Use for the Las Vegas Area as of June 2002 (RTC 2002)

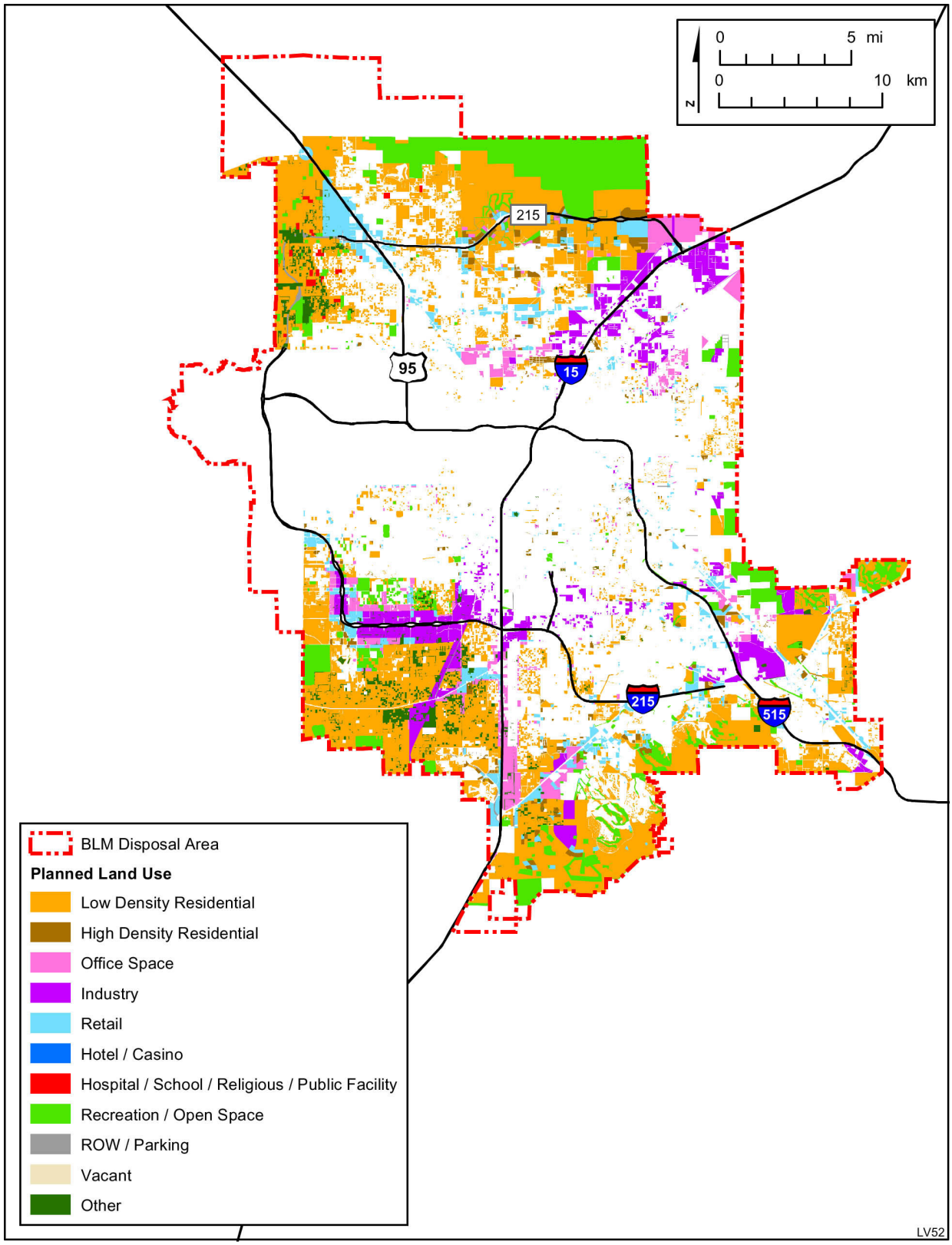

FIGURE C.2 Composite of 10 Planned Land Use GIS Layers for Lands that Were Vacant in June 2002 (RTC 2003)

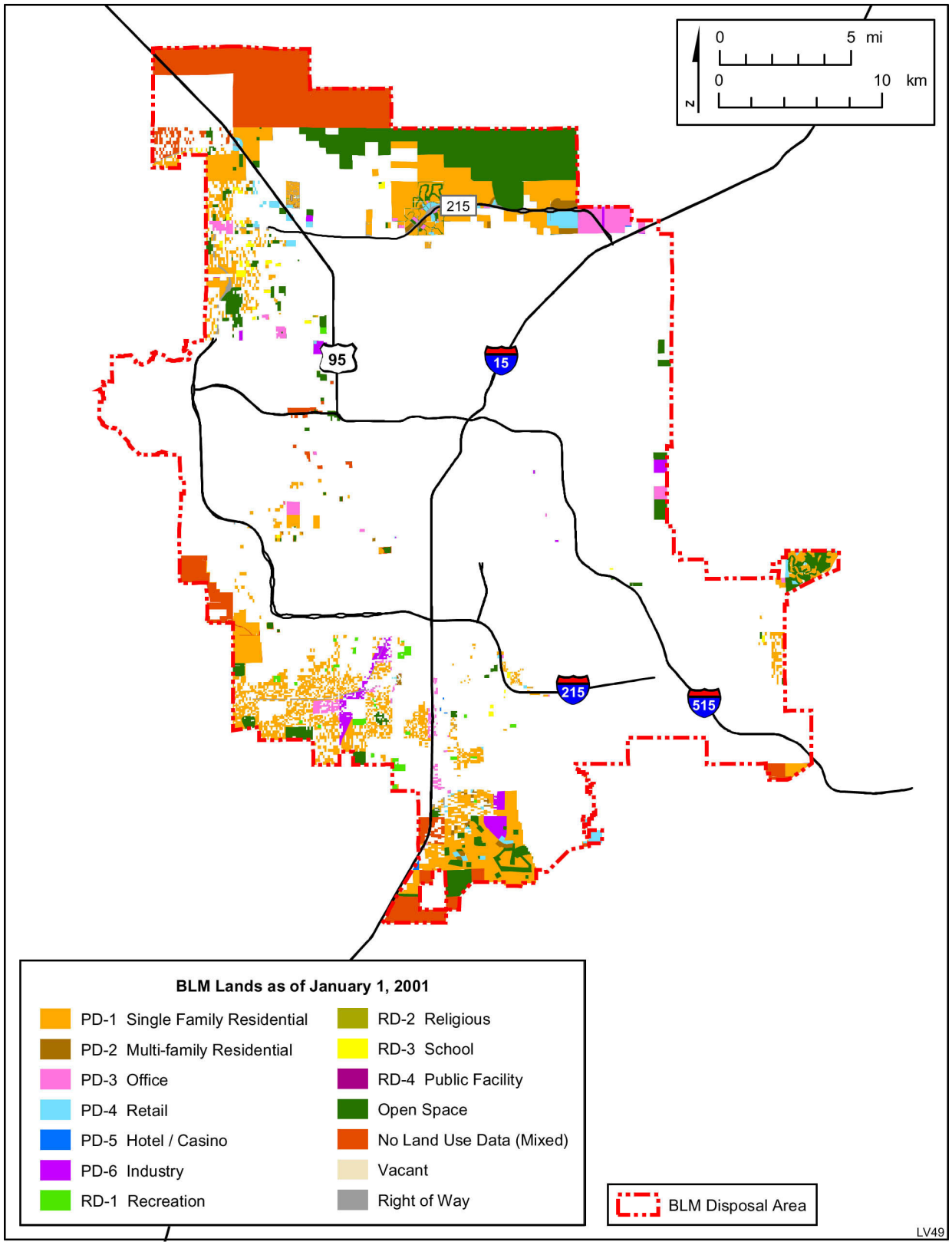

FIGURE C.3 Current and Planed Land Use for All Lands in the Disposal Area Still Owned by BLM on January 1, 2001

Appendix D:

BLM-Related Land End-Use Assumptions and Emission Factors

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TABLE D.1 Composite BLM Land Disposal Emission Factors [a]

Source Type	Final Land Use Source Group	LU Code	Year	Composite Emission Factor ([tons/yr]/acre or [tons/yr]/[mi/d])							VMT Factor ([mi/d]/acre) [b]
				SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$	CO_2	
Energy use and wind erosion	**Private Development Uses**										
	Single-family housing	PD-1	2000	0.24	0.23	0.02	0.003	0.08	0.04	137	214
			2009/2018	0.01	0.08	0.03	0.004	0.07	0.03	115	
	Multifamily housing	PD-2	2000	0.61	0.56	0.05	0.01	0.10	0.05	328	900
			2009/2018	0.02	0.18	0.06	0.01	0.08	0.05	271	
	Office buildings	PD-3	2000	0.48	0.40	0.03	0.003	0.09	0.04	210	125
			2009/2018	0.02	0.11	0.03	0.01	0.08	0.04	167	
	Retail	PD-4	2000	1.27	1.06	0.07	0.01	0.14	0.07	541	1,763
			2009/2018	0.04	0.27	0.08	0.01	0.10	0.06	424	
	Moderate-sized casinos/hotels	PD-5	2000	1.06	0.90	0.06	0.01	0.13	0.06	478	2,118
			2009/2018	0.04	0.24	0.07	0.01	0.10	0.05	381	
	Industry	PD-6	2000	0.02	0.02	0.001	0.0001	0.06	0.03	8.4	20
			2009/2018	0.001	0.004	0.001	0.0002	0.06	0.02	6.7	
	R&PP Development Uses										
	Recreation	PP-1	2000	0.01	0.01	0.0004	0.0001	0.06	0.02	3.2	26
			2009/2018	0.0002	0.002	0.0005	0.0001	0.06	0.02	2.5	
	Religious	PP-2	2000	0.24	0.20	0.01	0.002	0.08	0.03	105	119
			2009/2018	0.01	0.05	0.02	0.003	0.07	0.03	83	
	Public facilities	PP-3	2000	0.14	0.12	0.01	0.001	0.07	0.03	63	60
			2009/2018	0.01	0.03	0.01	0.002	0.07	0.03	50	
On-road vehicle exhaust	All [c]	All	2000	9.49E-06	6.54E-04	6.81E-03	6.15E-04	1.63E-05	1.02E-05	NA [d]	
	All	All	2009	3.32E-06	2.93E-04	3.87E-03	2.50E-04	1.18E-05	6.11E-06	NA	
	All	All	2018	3.32E-06	1.34E-04	2.88E-03	1.37E-04	1.05E-05	4.93E-06	NA	
Paved-road dust	All	All	2000	NA	NA	NA	NA	1.61E-03	NA	NA	
	All	All	2009	NA	NA	NA	NA	1.53E-03	NA	NA	
	All	All	2018	NA	NA	NA	NA	1.55E-03	NA	NA	

[a] Total emission rates for each source type were estimated by using the following methods:

(1) Energy use and wind erosion – composite emission factors (in [tons/yr]/acre) were multiplied by non-vacant and non-right-of-way acreages that were disposed from Oct. 1998 to the year of interest.
(2) On-road vehicle exhaust – composite emission factors (in [tons/yr]/[mi/d]), which were derived from the MOBILE62 model for non-BLM on-road sources, were multiplied by VMT factors ([mi/d]/acre) and non-vacant and non-right-of-way acreages that were disposed of from Oct. 1998 to the year of interest.
(3) Paved-road dust – composite emission factors (in [tons/yr]/[mi/d]), which were derived for non-BLM on-road sources, were multiplied by VMT factors (in [mi/d]/acre) and non-vacant and non-right-of-way acreages that were disposed of from Oct. 1998 to the year of interest.

[b] Calculated based on daily vehicle-miles-traveled (VMT) and parcel lot size (see Table D.2).

[c] Applied to all land use source groups.

[d] NA = not available or not applicable.

TABLE D.2 BLM Land Disposal Development Assumptions (for Operating Emissions Calculations)

Final Land Use Source Group	LU Code	Parcel Lot Size (acres)	Building Data: Unit Size (ft^2)	Building Data: Units	No. of People	No. of Vehicles	Vehicle Use: (VMT/d)	Vehicle Use: (VMT/yr)	Energy Use: Heating (therms/yr)	Energy Use: Electricity (KWh/yr)
Private Development Uses										
Single-Family Housing	**PD-1**	**0.14**	**2,000**	**1**	**3**	**2**	**30**	**10,950**	**900**	**16,000**
No. of round trips/day							1.5			
Distance (mi)							10			
Multifamily Housing	**PD-2**	**5**	**900**	**200**	**400**	**300**	**4,500**	**1,642,500**	**65,000**	**1,440,000**
per unit					2	1.5			325	7,200
No. of round trips/day							1.5			
Distance (mi)							10			
Office Buildings	**PD-3**	**1**	**10,000**	**1**	**50**	**50**	**125**	**45,625**	**2,200**	**225,000**
No. of round trips/day							0.25			
Distance (mi)							10			
Retail	**PD-4**	**2**	**20,000**	**1**	**705**	**705**	**3,525**	**1,286,625**	**4,800**	**1,200,000**
No. of employees					5					
No. of customers/day					700					
No. of round trips/day							1			
Distance (mi)							5			
Moderate-Sized Casinos/Hotels	**PD-5**	**40**	**450,000**	**1**	**8,470**	**8,470**	**84,700**	**30,915,500**	**270,000**	**20,000,000**
No. of employees					820					
No. of hotel guests/day					200					
No. of casino guests/day					7,450					
No. of round trips/day							1			
Distance (mi)							10			
Industry	**PD-6**	**5**	**2,000**	**1**	**10**	**10**	**100**	**36,500**	**440**	**45,000**
No. of round trips/day							1			
Distance (mi)							10			
R&PP Development Uses										
Recreation	**PP-1**	**100**	**20,000**	**1**	**260**	**260**	**2,600**	**949,000**	**4,900**	**330,000**
No. of employees					10					
No. of public users/day					250					
No. of round trips/day							1			
Distance (mi)							10			
Religious	**PP-2**	**10**	**50,000**	**1**	**119**	**119**	**1,193**	**435,393**	**11,000**	**1,125,000**
No. of employees					5					
No. of worshippers/day					400					
No. of employee round trips/day							1			
No. of worshipper round trips/week							2			
Distance (mi)							10			
Public Facilities [a]	**PP-3**	**40**	**120,000**	**1**	**240**	**240**	**2400**	**876,000**	**26,400**	**2,700,000**
No. of teachers					150					
No. of other employees					50					
No. of students-parents					40					
No. of round trips/day							1			
Distance (mi)							10			

[a] Assumed a school as representative of public facilities.

TABLE D.3 Emission Factors for Energy Use and Wind Erosion

Space and Water Heating (natural gas use)

Pollutant	Emission Factor ton/therm	Emission Factor lb/Mscf [a]
SO_2	2.86E-08	0.6
NO_x	4.48E-06	94
CO	1.90E-06	40
VOC	2.62E-07	5.5
PM_{10}	3.62E-07	7.6
$PM_{2.5}$	3.62E-07	7.6
CO_2	5.71E-03	120,000

Conversion Factors	
5.00E-04	ton/lb
1.00E-03	Mscf/Kscf
9.52E-02	Kscf/therm

[a] Source: EPA, *AP-42*, Section 1.4-1, 7/1998.

Note: Assumed a heating value of 1,050 Btu/scf for natural gas (EPA, *AP-42*, Appendix A, 01/1995).

Electricity Use [a]

Pollutant	Emissions (tons/yr) – State Controlled [b]				Emissions (tons/yr) – County Controlled [c]		USBR	Total Emissions (tons/yr)	Emission Factor (ton/KWh)
	Clark (gas)	Mohave (coal)	Reid Gardner (coal)	Sunrise (gas)	Clark (gas)	Sunrise (gas)	Hoover Dam (hydro)		
SO_2	2.4	42,749.6	2,976.0	22.4	7.3	0.5	0.0	45,758	2.12E-06
NO_x	1,127.7	21,736.6	9,585.0	1,175.1	3,718.0	297.0	0.0	37,639	1.75E-06
CO	215.4	1,203.3	505.0	177.5	93.1	4.3	0.0	2,199	1.02E-07
VOC	24.6	145.6	60.6	14.2	13.0	1.4	0.0	259	1.20E-08
PM_{10}	3.1	1,395.9	1,194.5	0.8	150.2	11.7	0.0	2,756	1.28E-07
$PM_{2.5}$	3.1	689.7	736.2	0.8	150.2	11.7	0.0	1,592	7.38E-08
CO_2	466,155.1	10,848,287.1	5,343,704.8	216,947.2	1,993,680.6	88,023.7	0	18,956,799	8.80E-04
Power Gen. (MWh) [d]	699,618	10,769,396	4,238,122	345,070	2,992,169	140,008	2,369,423	21,553,806	

[a] Composite emission factor for the base year (2000) was estimated based on emissions data and power generation data in 2000 for two gas-fired power plants (Clark and Sunrise), two coal-fired power plants (Mohave and Reid Gardner), and hydroelectric Hoover Dam in Clark County.

[b] Heat input and continuous emissions monitoring (CEM) data for SO_2, NO_x, and CO_2 were taken from EPA's Clean Air Markets web site, and emissions for other pollutants were estimated on the basis of heat input data and NEI 1999 emission data.
Source for the Clean Air Markets: http://cfpub.epa.gov/gdm/index.cfm?CFID=12901683&CFTOKEN=95402783&fuseaction=createqueries.timeframe.
Source for the 1999 NEI database: http://www.epa.gov/ttn/chief/net/1999inventory.html.

[c] Source: David Hoch (Clark County DAQEM, Las Vegas, NV) via diskette to Y.-S. Chang (ANL, Argonne, IL) on May 30, 2003, for actual emissions data.

[d] Source: Energy Information Administration (EIA), "Form EIA-906 Database Monthly Utility Power Plant Database."
Available at http://www.eia.doe.gov/cneaf/electricity/page/eia906u.html.

Wind Erosion

Pollutant	Emission Factor Controlled [a] ton/acre/yr	Emission Factor Uncontrolled ton/acre/yr
SO_2	0	0
NO_x	0	0
CO	0	0
VOC	0	0
PM_{10}	6.08E-02	0.19 [b]
$PM_{2.5}$	2.43E-02	0.076 [b]
CO_2	0	0
TSP	1.22E-01	0.38 [c]

[a] Assumed a control efficiency of 68%.

[b] Assumed that PM_{10} and $PM_{2.5}$ are 1/2 times and 1/5 of total suspended particulates (TSP), respectively.

[c] Source: EPA, *AP-42*, Table 11.9-4, 10/1998.

TABLE D.4 Composite Emission Factors for Energy Use and Wind Erosion by Land Use Source Group

Pollutant	Composite Emission Factors (tons/acre/yr)								
	Single-Family Housing (PD-1)	Multifamily Housing (PD-2)	Office Buildings (PD-3)	Retail (PD-4)	Moderate-Sized Casinos/Hotels (PD-5)	Industry (PD-6)	Recreation (PP-1)	Religious (PP-2)	Public Facilities (PP-3)
SO_2	0.24	0.61	0.48	1.27	1.06	0.02	0.01	0.24	0.14
NO_x	0.23	0.56	0.40	1.06	0.90	0.02	0.01	0.20	0.12
CO	0.02	0.05	0.03	0.07	0.06	0.001	0.0004	0.01	0.01
VOC	0.003	0.01	0.003	0.01	0.01	0.0001	0.0001	0.002	0.001
PM_{10}	0.08	0.10	0.09	0.14	0.13	0.06	0.06	0.08	0.07
$PM_{2.5}$	0.04	0.05	0.04	0.07	0.06	0.03	0.02	0.03	0.03
CO_2	137	328	210	541	478	8.4	3.2	105	63

Private Development Uses

PD-1 Single-Family Housing

Pollutant	Emissions (tons/yr)				Emis. Factors (tons/acre/yr)
	Gas	Electricity	Fugitive	Total	
SO_2	2.57E-05	3.40E-02	0.00E+00	3.40E-02	0.24
NO_x	4.03E-03	2.79E-02	0.00E+00	3.20E-02	0.23
CO	1.71E-03	1.63E-03	0.00E+00	3.35E-03	0.02
VOC	2.36E-04	1.92E-04	0.00E+00	4.28E-04	0.003
PM_{10}	3.26E-04	2.05E-03	8.51E-03	1.09E-02	0.08
$PM_{2.5}$	3.26E-04	1.18E-03	3.40E-03	4.91E-03	0.04
CO_2	5.14E+00	1.41E+01	0.00E+00	1.92E+01	137

PD-2 Multifamily Housing

Pollutant	Emissions (tons/yr)				Emis. Factors (tons/acre/yr)
	Gas	Electricity	Fugitive	Total	
SO_2	1.86E-03	3.06E+00	0.00E+00	3.06E+00	0.61
NO_x	2.91E-01	2.51E+00	0.00E+00	2.81E+00	0.56
CO	1.24E-01	1.47E-01	0.00E+00	2.71E-01	0.05
VOC	1.70E-02	1.73E-02	0.00E+00	3.43E-02	0.01
PM_{10}	2.35E-02	1.84E-01	3.04E-01	5.12E-01	0.10
$PM_{2.5}$	2.35E-02	1.06E-01	1.22E-01	2.51E-01	0.05
CO_2	3.71E+02	1.27E+03	0.00E+00	1.64E+03	328

PD-3 Office Buildings

Pollutant	Emissions (tons/yr)				Emis. Factors (tons/acre/yr)
	Gas	Electricity	Fugitive	Total	
SO_2	6.29E-05	4.78E-01	0.00E+00	4.78E-01	0.48
NO_x	9.85E-03	3.93E-01	0.00E+00	4.03E-01	0.40
CO	4.19E-03	2.30E-02	0.00E+00	2.71E-02	0.03
VOC	5.76E-04	2.71E-03	0.00E+00	3.28E-03	0.003
PM_{10}	7.96E-04	2.88E-02	6.08E-02	9.04E-02	0.09
$PM_{2.5}$	7.96E-04	1.66E-02	2.43E-02	4.17E-02	0.04
CO_2	1.26E+01	1.98E+02	0.00E+00	2.10E+02	210

PD-4 Retail

Pollutant	Emissions (tons/yr)				Emis. Factors (tons/acre/yr)
	Gas	Electricity	Fugitive	Total	
SO_2	1.37E-04	2.55E+00	0.00E+00	2.55E+00	1.27
NO_x	2.15E-02	2.10E+00	0.00E+00	2.12E+00	1.06
CO	9.14E-03	1.22E-01	0.00E+00	1.32E-01	0.07
VOC	1.26E-03	1.44E-02	0.00E+00	1.57E-02	0.01
PM_{10}	1.74E-03	1.53E-01	1.22E-01	2.77E-01	0.14
$PM_{2.5}$	1.74E-03	8.86E-02	4.86E-02	1.39E-01	0.07
CO_2	2.74E+01	1.06E+03	0.00E+00	1.08E+03	541

PD-5 Moderate-Sized Casinos/Hotels

Pollutant	Emissions (tons/yr)				Emis. Factors (tons/acre/yr)
	Gas	Electricity	Fugitive	Total	
SO_2	7.71E-03	4.25E+01	0.00E+00	4.25E+01	1.06
NO_x	1.21E+00	3.49E+01	0.00E+00	3.61E+01	0.90
CO	5.14E-01	2.04E+00	0.00E+00	2.55E+00	0.06
VOC	7.07E-02	2.41E-01	0.00E+00	3.11E-01	0.01
PM_{10}	9.77E-02	2.56E+00	2.43E+00	5.09E+00	0.13
$PM_{2.5}$	9.77E-02	1.48E+00	9.73E-01	2.55E+00	0.06
CO_2	1.54E+03	1.76E+04	0.00E+00	1.91E+04	478

PD-6 Industry

Pollutant	Emissions (tons/yr)				Emis. Factors (tons/acre/yr)
	Gas	Electricity	Fugitive	Total	
SO_2	1.26E-05	9.55E-02	0.00E+00	9.55E-02	0.02
NO_x	1.97E-03	7.86E-02	0.00E+00	8.06E-02	0.02
CO	8.38E-04	4.59E-03	0.00E+00	5.43E-03	0.001
VOC	1.15E-04	5.41E-04	0.00E+00	6.57E-04	0.0001
PM_{10}	1.59E-04	5.75E-03	3.04E-01	3.10E-01	0.06
$PM_{2.5}$	1.59E-04	3.32E-03	1.22E-01	1.25E-01	0.03
CO_2	2.51E+00	3.96E+01	0.00E+00	4.21E+01	8.4

R&PP Development Uses

PP-1 Recreation

Pollutant	Emissions (tons/yr)				Emis. Factors (tons/acre/yr)
	Gas	Electricity	Fugitive	Total	
SO_2	1.40E-04	7.01E-01	0.00E+00	7.01E-01	0.01
NO_x	2.19E-02	5.76E-01	0.00E+00	5.98E-01	0.01
CO	9.33E-03	3.37E-02	0.00E+00	4.30E-02	0.0004
VOC	1.28E-03	3.97E-03	0.00E+00	5.25E-03	0.0001
PM_{10}	1.77E-03	4.22E-02	6.08E+00	6.12E+00	0.06
$PM_{2.5}$	1.77E-03	2.44E-02	2.43E+00	2.46E+00	0.02
CO_2	2.80E+01	2.90E+02	0.00E+00	3.18E+02	3.2

PP-2 Religious

Pollutant	Emissions (tons/yr)				Emis. Factors (tons/acre/yr)
	Gas	Electricity	Fugitive	Total	
SO_2	3.14E-04	2.39E+00	0.00E+00	2.39E+00	0.24
NO_x	4.92E-02	1.96E+00	0.00E+00	2.01E+00	0.20
CO	2.10E-02	1.15E-01	0.00E+00	1.36E-01	0.01
VOC	2.88E-03	1.35E-02	0.00E+00	1.64E-02	0.002
PM_{10}	3.98E-03	1.44E-01	6.08E-01	7.56E-01	0.08
$PM_{2.5}$	3.98E-03	8.31E-02	2.43E-01	3.30E-01	0.03
CO_2	6.29E+01	9.89E+02	0.00E+00	1.05E+03	105

PP-3 Public Facilities

Pollutant	Emissions (tons/yr)				Emis. Factors (tons/acre/yr)
	Gas	Electricity	Fugitive	Total	
SO_2	7.54E-04	5.73E+00	0.00E+00	5.73E+00	0.14
NO_x	1.18E-01	4.72E+00	0.00E+00	4.83E+00	0.12
CO	5.03E-02	2.75E-01	0.00E+00	3.26E-01	0.01
VOC	6.91E-03	3.25E-02	0.00E+00	3.94E-02	0.001
PM_{10}	9.55E-03	3.45E-01	2.43E+00	2.79E+00	0.07
$PM_{2.5}$	9.55E-03	1.99E-01	9.73E-01	1.18E+00	0.03
CO_2	1.51E+02	2.37E+03	0.00E+00	2.53E+03	63

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Appendix E:

Methods and Procedures Used and Quantification of Uncertainty in Wind Tunnel Field Experiments

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Contents

E.1 Soil Type and Condition Classification E-1
E.1.1 Methods for Selecting Sites and Determining Sampling Site Locations E-1
E.1.2 Methods for Determining Site Stability E-1
E.1.3 Site Stability Characterization Decision Tree Using Geology Only E-6
E.1.4 Site Stability Characterization Using Geology Plus Biology E-7
E.1.5 Methods for Determining Site Disturbance E-7

E.2 Portable Wind Tunnel Field Measurements E-8
E.2.1 Description of Wind Tunnel E-8
E.2.2 Wind Tunnel Airflow Balance E-11
E.2.3 Wind Tunnel PM_{10} Mass Balance and PM_{10} Flux Calculation E-11
E.2.4 Methods for Determining the Erosion Velocity at Each Site E-14
E.2.5 Methods for Determining TFVs by Using Particle Masses Captured in the Elutriation Chamber Cyclonic Separator E-19
E.2.6 Methods for Calculating Horizontal Fluxes E-22
E.2.7 Procedure for Removing Spikes from the Data to Correct Short-Term Fluxes for Use in Long-Term Calculations E-22
E.2.8 Wind Tunnel Test Procedure for the 2003 Field Study E-28
E.2.9 Uncertainty Analysis of Wind Tunnel Measurements E-32
E.2.10 1995 Field Repeatability Study E-41

E.3 References for Appendix E E-41

Tables

E.1a Wind Tunnel Field Study Site Locations E-2
E.1b Wind Tunnel Field Study Conditions and Soil Erodibility Condition Class Classifications E-4
E.2 Airflow Balance Equations E-12
E.3 Mass Balance Equations for PM_{10} E-13
E.4 Flux Calculation: Uncertainty Analysis Scenarios for Low Riser Flow Uncertainty and Several Riser Concentrations E-15
E.5 Example Data for a Set of Three Wind Tunnel Runs at a Selected Wind Tunnel Site E-19
E.6 Example Data for a Set of Three Wind Tunnel Runs for an Elutriation-Chamber-Captured Particulate Mass at a Selected Wind Tunnel Site E-20
E.7 Summary of Instrumental Uncertainties E-33
E.8 Source of Uncertainty in Air Density Calculations E-35
E.9 Sources of Uncertainty in Centerline and 10-m Velocities E-36

Tables (Cont.)

E.10 Sources of Uncertainty in Averaging Pitot Velocity and Tunnel Volumetric Flow Rate E-37
E.11 Sources of Uncertainty in Flux Calculations E-38
E.12 Uncertainty Analysis of Flux Calculations for High-Riser-Flow Scenarios Stabilized and Several Riser Concentrations E-39
E.13 Results Summary for 4% Riser Flow Uncertainty and +10 μg/m^3 Background PM_{10} Uncertainty E-40
E.14 Results Summary for 9% Riser Flow Uncertainty and +10 μg/m^3 Background PM_{10} Uncertainty E-40
E.15 Results of 1995 Experimental Repeatability Study E-42

Figures

E.1 Approximate Major Street Locations of Wind Tunnel Test Sites, Las Vegas Valley, Clark County, Nevada, in 2003 ..... E-5
E.2 Wind Tunnel Component Diagram E-9
E.3 Wind Tunnel Processes Diagram E-9
E.4 Wind Tunnel Airflow Balance E-12
E.5 Wind Tunnel PM_{10} Mass Balance E-13
E.6 Example of TFV from the Saltation Particle Mass Captured in the UNLV Portable Wind Tunnel EC E-20
E.7 Sample Plot of PM_{10} Concentration versus Time, Showing an Initial Spike of 49 Seconds, Followed by a 551-Second Trace of Lower Concentration E-21
E.8 Example of a Standard Analytical Plot of Velocity versus Ln and the Regression Line for Site WT 103, Run 1, Stable E-23
E.9 Example of a Log-Transformed Velocity Profile Showing Extrapolation to Zero Velocity from Regression to Obtain z_o = 0.0083 cm for Site WT 103, Run 1 ..... E-27
E.10 Final Form of Computed Logarithmic Velocity Profile $U(z) = U_*/k \ln (z/z_o)$ E-31
E.11a Example of Using One z_o and k to Estimate the U_* and U centerline for Three 10-m Velocities: 25, 32, and 40 mph E-31
E.11b Logarithmic Transformation of Figure E.12a to Show U_* and U Data Point Where Curves Cross z at 8.21 cm, Pitot Tube Centerline Velocity E-32
E.12 Example of Determining the Threshold Friction Velocity E-33

Appendix E:

Methods and Procedures Used and Quantification of Uncertainty in Wind Tunnel Field Experiments

E.1 Soil Type and Condition Classification

E.1.1 Methods for Selecting Sites and Determining Sampling Site Locations

The wind tunnel field study was conducted from August 11 to October 7, 2003. The selection of wind tunnel soil test areas was made to correspond with U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS), Wind Erodibility Groups (WEGs) 2 through 8, which were physically available in the Las Vegas Valley.

Major cross streets and compass directions relative to the nearest intersection (i.e., north of Buffalo and West of Washington) were recorded, and uncorrected global positioning system (GPS) coordinates were determined for sites WT 081 to WT 083, WT 085 to WT 088, and WT 090 to WT 094 by a Magellan Trailblazer® hand-held GPS unit. They were generally accurate to ±2 seconds of latitude and longitude (±3 hundredths of a minute, approximately ±50 m). For sites WT 079, WT 079R, WT 080, WT 084, WT 089, and WT 095 to WT 110, a Garmin eTrex® hand-held GPS unit was used. It was accurate to 15-m RMS for position accuracy (Table 4.2.4.1 and Tables E.1a and E.1b). To determine site locations relative to major soil group boundaries, site GPS coordinates were sent to the University of Nevada, Las Vegas (UNLV) Transportation Research Center for site mapping by using ESRI ArcInfo© software and a database of WEG boundaries. The approximate locations of the sites across the Las Vegas Valley are shown relative to major cross streets in Figure E.1.

Tables E.1a and E.1b depict 2003 wind tunnel test data, site numbers, test names, GPS coordinates, stability classifications, and major soil group information, sorted by wind tunnel site designation. Disturbance and stability designations in these tables are shown as a one (1 = stable) or a zero (0 = unstable) and as a one (1 = disturbed) or a zero (0 = undisturbed).

A total of 22 different sites were tested. Two sites (WT 079R and WT 082R) were revisited after a rain event. Ten of the twenty-two sites were also revisited during the last part of the study to conduct a slightly different erosion procedure. (See Section E.2.8.4 for an explanation of the progressive runs.)

E.1.2 Methods for Determining Site Stability

In 2003, the site stability was determined by the presence or absence of intact crust, the predominant size fraction in surface soils, and the proportion of vegetation present (by using an

TABLE E.1a Wind Tunnel Field Study Site Locations

Site Number	Same Site As	Test Name	East Longitude	North Latitude	Date Checked	Date of Test	Cross Street	Corner
079[a]		Sunset Park	115.113	36.063	8/8/2003	08/11/03	Eastern & Warm Springs	NE
079R[a]	79	Sunset Park Revisited	115.113	36.063	8/19/2003	08/19/03	Eastern & Warm Springs	NE
080[a]		Sunset Hell Lot	115.113	36.063	8/11/2003	08/11/03	Eastern & Warm Springs	NE
081[b]		Pebble Stable	115.135	36.030	8/12/2003	08/12/03	Maryland & Pebble	NE
082[b]		Pebble Unstable	115.135	36.030	8/13/2003	08/13/03	Maryland & Pebble	NE
082R[b]	82	Pebble Revisited	115.135	36.030	8/18/2003	08/18/03	Maryland & Pebble	NE
083[b]		Washington Undisturbed	115.272	36.179	8/14/2003	08/14/03	Washington & Buffalo	NW
084[a]		Washington Disturbed	115.276	36.180	8/15/2003	08/15/03	Washington & Buffalo	NW
085[b]		Losee	115.106	36.277	8/21/2003	08/21/03	Losee & Centennial	NE
086[b]		Next to Walgreens	115.079	36.175	8/21/2003	08/21/03	Lamb & Bonanza	NE
087[b]		Lamb & 215	115.081	36.288	8/22/2003	08/22/03	Lamb & 215	SW
088[b]		Alexander	115.281	36.235	8/14/2003	08/25/03	Durango & Alexander	NW
089[a]		Craig	115.281	36.242	9/5/2003	08/28/03	Durango & Craig	NW
090[b]		Bermuda	115.154	36.043	8/29/2003	08/29/03	Bermuda & Windmill	NE
091[b]		Amigo	115.150	36.049	8/29/2003	08/29/03	Amigo & Warm Springs	
092[b]		Cheyenne	115.195	36.219	9/3/2003	9/3/2003	N Valley Drive & Cheyenne	NE
093[b]		Gibson	115.029	36.053	9/4/2003	9/4/2003	Gibson & Kelso Dunes	NW
094[b]		Hollywood	115.014	36.104	9/5/2003	9/5/2003	Hollywood & Treatment Plant	
095[a]		Pueblo	114.950	36.034	9/8/2003	9/10/2003	S Pueblo & W Burkholder/Racetrack	SW
096[a]		Carey	115.016	36.203	9/8/2003	9/11/2003	N Hollywood & E Carey	0.6 mi on Carey
097[a]		Las Vegas Blvd	115.072	36.230	9/9/2003	9/12/2003	NW Las Vegas Blvd. & N Lamb	
098[a]		Fifth Street	115.136	36.277	9/9/2003	9/15/2003	N Fifth Street & E Centennial Pk	NE
099[a]		Buffalo	115.261	36.015	9/9/2003	9/18/2003	S Buffalo & W Blue Diamond	0.3 mi S Buffalo
100[a]		Pyle	115.171	36.003	9/19/2003	9/19/2003	LV Blvd & Pyle	
101	85	Losee Revisited	115.106	36.277	8/21/2003	9/22/2003	Losee & Centennial	NE
101Unst	85	Losee Revisited	115.106	36.277	8/21/2003	9/22/2003	Losee & Centennial	NE
102	89	Craig Revisited	115.281	36.242	9/5/2003	9/23/2003	Durango & Craig	NW
102Unst	89	Craig Revisited	115.281	36.242	9/5/2003	9/23/2003	Durango & Craig	NW

TABLE E.1a (Cont.)

Site Number	Same Site As	Test Name	East Longitude	North Latitude	Date Checked	Date of Test	Cross Street	Corner
103	88	Alexander Revisited	115.281	36.235	8/14/2003	9/24/2003	Durango & Alexander	NW
103Unst	88	Alexander Revisited	115.281	36.235	8/14/2003	9/24/2003	Durango & Alexander	NW
104	91	Amigo Revisited	115.150	36.049	8/29/2003	9/25/2003	Amigo & Warm Springs	
104Unst	91	Amigo Revisited	115.150	36.049	8/29/2003	9/25/2003	Amigo & Warm Springs	
105	96	Carey Revisited	115.016	36.203	9/8/2003	9/26/2003	N Hollywood & E Carey	0.6 mi on Carey
105Unst	96	Carey Revisited	115.016	36.203	9/8/2003	9/26/2003	N Hollywood & E Carey	0.6 mi on Carey
106	95	Pueblo Revisited	114.950	36.034	9/8/2003	9/29/2003	S Pueblo & W Burkholder/Racetrack	SW
106Unst	95	Pueblo Revisited	114.950	36.034	9/8/2003	9/29/2003	S Pueblo & W Burkholder/Racetrack	SW
107	86	Next to Walgreens Revisited	115.079	36.175	8/21/2003	9/30/2003	Lamb & Bonanza	NE
108	90	Bermuda Revisited	115.154	36.043	8/29/2003	10/1/2003	Bermuda & Windmill	NE
108Unst	90	Bermuda Revisited	115.154	36.043	8/29/2003	10/1/2003	Bermuda & Windmill	NE
109	87	Lamb & 215 Revisited	115.081	36.288	8/22/2003	10/7/2003	Lamb & 215	SW
109Unst	87	Lamb & 215 Revisited	115.081	36.288	8/22/2003	10/7/2003	Lamb & 215	SW
110	92	Cheyenne Revisited	115.195	36.219	9/3/2003	10/7/2003	N Valley Drive & Cheyenne	NE
110Unst	92	Cheyenne Revisited	115.195	36.219	9/3/2003	10/7/2003	N Valley Drive & Cheyenne	NE

[a] Garmin eTrex GPS was used to get site coordinates (longitude and latitude).

[b] Magellan Trailblazer GPS was used to get site coordinates (longitude and latitude).

TABLE E.1b Wind Tunnel Field Study Conditions and Soil Erodibility Condition Class (SECC) Classifications

Site No.	SECC	Same Site As	Test WEG	Disturbed	Geo Stable	Geo & Bio Stable	Rain Date	No. of Days Since Rain	Wet or Dry?
079	2SU		2	0	1	1	7/31/2003	11	Dry
079R	2SUw	79	2	0	1	1	8/16/2003	3	Wet
080	2UU		2	0	0	0	7/31/2003	12	Dry
081	3SD		3	1	1	1	7/31/2003	13	Dry
082	3UD		3	1	0	0	7/31/2003	14	Dry
082R	3SDw	82	3	1	1	1	8/16/2003	2	Wet
083	4SD		4	1	1	1	7/31/2003	14	Dry
084	4SD		4	1	1	1	7/31/2003	15	Dry
085	7SU		7	0	1	1	8/19/2003	2	Dry
086	4LUD		4L	1	0	1	8/19/2003	2	Dry
087	6SU		6	0	1	1	8/19/2003	3	Dry
088	4SU		4	0	1	1	8/19/2003	6	Dry
089	5SUw		5	0	1	1	8/26/2003	2	Wet
090	UnSD		U	1	1	1	8/26/2003	3	Dry
091	2SD		2	1	1	1	8/26/2003	3	Dry
092	3UU		3	0	0	1	8/26/2003	8	Dry
093	8SD		8	1	1	1	8/26/2003	9	Dry
094	5SD		5	1	1	1	8/26/2003	10	Dry
095	8SU		8	0	1	1	9/5/2003	5	Dry
096	6SU		6	0	1	1	9/5/2003	6	Dry
097	7SD		7	1	1	1	9/5/2003	7	Dry
098	4LSD		4L	1	1	1	9/5/2003	10	Dry
099	4SU		4	0	1	1	9/5/2003	13	Dry
100	3UD		3	1	0	0	9/5/2003	14	Dry
101	7SU	85	7	0	1	1	9/5/2003	15	Dry
101Unst	7UD	85	7	1	0	0	9/5/2003	15	Dry
102	5SU	89	5	0	1	1	9/5/2003	16	Dry
102Unst	5UD	89	5	1	0	0	9/5/2003	16	Dry
103	4SD	88	4	1	1	1	9/5/2003	17	Dry
103Unst	4UD	88	4	1	0	0	9/5/2003	17	Dry
104	2SD	91	2	1	1	1	9/5/2003	18	Dry
104Unst	2UD	91	2	1	0	0	9/5/2003	18	Dry
105	6SD	96	6	1	1	1	9/5/2003	19	Dry
105Unst	6UD	96	6	1	0	0	9/5/2003	19	Dry
106	8SD	95	8	1	1	1	9/5/2003	20	Dry
106Unst	8UD	95	8	1	0	0	9/5/2003	20	Dry
107	4LUD	86	4L	1	0	1	9/5/2003	21	Dry
108	UnSD	90	U	1	1	1	9/5/2003	22	Dry
108Unst	UnUD	90	U	1	0	0	9/5/2003	22	Dry
109	6SD	87	6	1	1	1	9/5/2003	23	Dry
109Unst	6UD	87	6	1	0	0	9/5/2003	23	Dry
110	3SD	92	3	1	1	1	9/5/2003	24	Dry
110Unst	3UD	92	3	1	0	0	9/5/2003	24	Dry

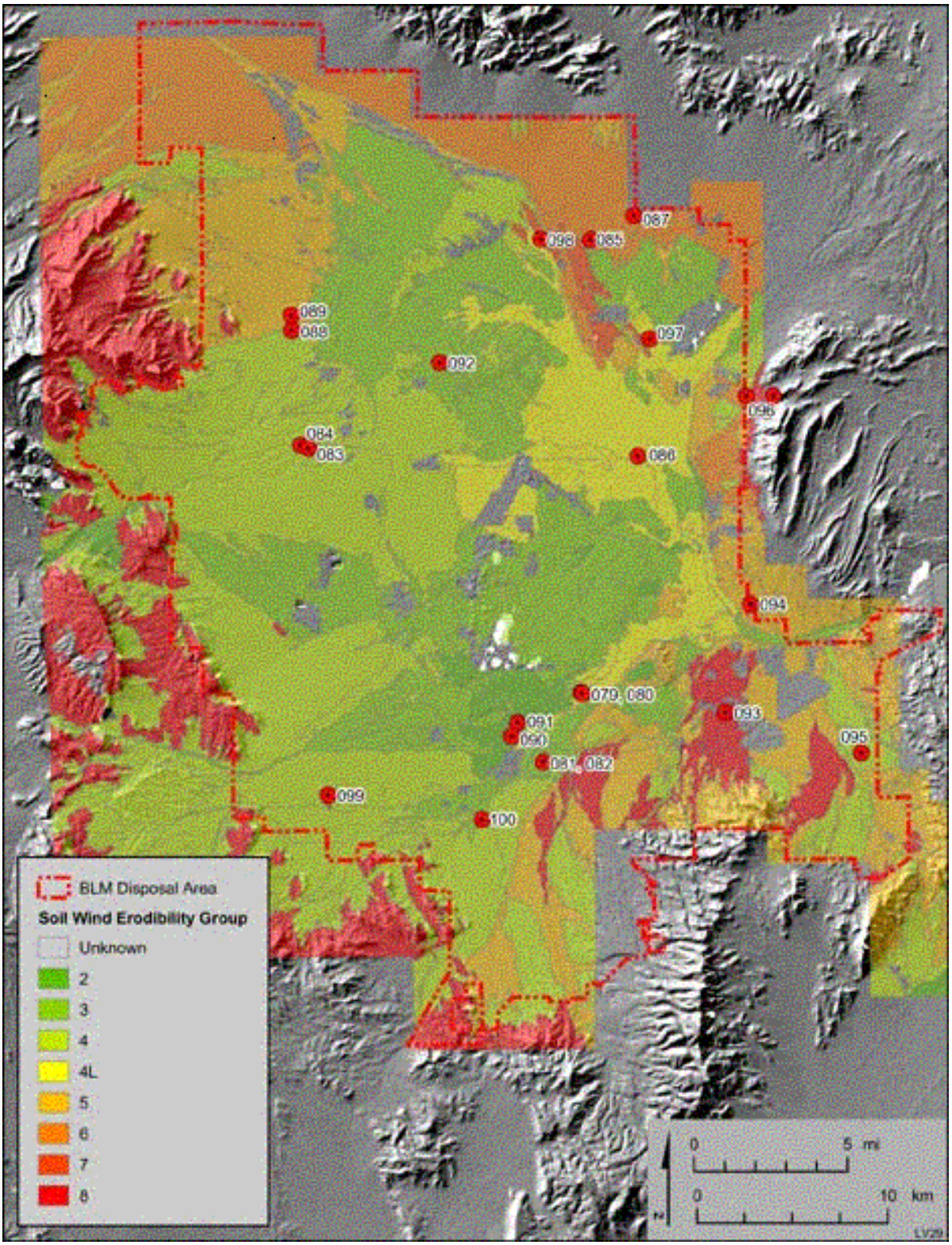

FIGURE E.1 Approximate Major Street Locations of Wind Tunnel Test Sites, Las Vegas Valley, Clark County, Nevada, in 2003

average of three 100-ft transects, and by counting the vegetation at every interval of 1 ft). The site condition (disturbed or undisturbed) was determined by the presence or absence of evidence of human disturbance (tire tracks, trash, litter, evidence of recent earthmoving) and by an evaluation of site photographs. The following procedures (geology and geology plus biology) were used to characterize the sites.

E.1.3 Site Stability Characterization Decision Tree (Flowchart) Using Geology Only

This procedure classifies the soil surface with no regard for the absence or presence of vegetative cover (such cover could shelter an otherwise erodible [unstable] surface and render it stable). This "geology only" classification scheme is valid for use on small length scales (on the order of 0.15 to 5 m [between the plants] when emissions are measured with the portable wind tunnel).

1. A 1-ft sampling square made of 1/8-in. steel rod was randomly cast five times at each site.

2. A "ball drop" test (in which a stainless steel ball that was 3/8 in. [1 cm] in diameter was dropped from a height of 1 ft) was performed five times within each sampling square. If a majority of the drops produced no visible crack or dent in the soil surface, the surface was considered stable. If a majority of the drops produced a crack or dent, the surface was considered unstable. If the majority of the results were stable, the site was considered stable.

3. If the site failed the ball drop test, the percentage of rock cover was measured in a 1-ft^2 area (UNLV cake pan test). All materials that were 3/8 in. (1 cm) in diameter and sampled to a depth of 1 cm were placed in a metal cake pan and squared with a straight edge, then measured with a ruler. The test was repeated for two more samples. If the average used was ≥10% of one square test, the site was considered stable.

4. If the site failed the rock cover test, a threshold friction velocity (TFV) test was done by using soil sieves. The sieve stack consisted of 4-mm, 2-mm, 1-mm, 0.500-mm, and 0.25-mm sieves. A soil sample was poured into the top sieve, the stack was covered, and 10 rapid circular swirls were applied in a clockwise direction, followed by 10 counterclockwise swirls. The stack was disassembled, and the volume retained in each sieve was measured in a plastic graduated cylinder. A TFV for initiation of soil movement was assigned; it was based on the sieve size with the largest retained volume. If the average uncorrected TFV was >100 cm/s, the site was considered stable.

5. If the uncorrected TFV was <100 cm/s, a corrected TFV was calculated by using data from the rock test (cake pan correction factor multiplied by TFV). If the average TFV was >100 cm/s, the site was considered stable.

E.1.4 Site Stability Characterization Using Geology Plus Biology (All Sheltering Elements)

Numerical criteria and the flow scheme from the Nevada Department of Air Quality Management, Clark County Air Quality Regulations, Section 41 — Fugitive Dust; Section 41.7.2.2 — Stabilization Criteria (Clark County 2004) were used to determine the site stability characterization that would be used in a macroscopic windblown dust modeling study.

1. A ball drop test was performed five times in each of five random casts of a 1-ft sampling square. If the average result in three of five sites was "passing," the site was considered stable.

2. If the site failed the ball drop test, the flat "vegetative" density was measured ("vegetative" means all sheltering elements on the ground were >1 cm in diameter) by using 100-ft transects (string count). Three tests were performed. If the average of the three tests was >50%, the site was considered stable.

3. If a tested site had a vegetative density of <50%, the nonerodible density was measured. The rock cover test described in section 4.2.4.1.3 was performed. Three tests were performed. If the average value was ≥10%, the site was considered stable.

4. If the average value of the rock test was <10%, the TFV test described in section 4.2.4.1.3 was done. If the average uncorrected TFV was >100 cm/s, the the site was considered stable.

5. If the uncorrected TFV was <100 cm/s, the corrected TFV was calculated by using the rock test result (cake pan correction factor multiplied by the TFV). If the average was >100 cm/s, the site was considered stable.

E.1.5 Methods for Determining Site Disturbance

Photographs of each site were taken, including area photographs showing the nearest landmarks and close-up photographs showing the soil surface under the working section of the tunnel before each run. Site photographs were evaluated for large-scale vegetative density and evidence of the disturbance or removal of desert soil by human traffic or construction. The removal of vegetation and desert soil generally results in an increase in the albedo of the surface. Sites with high albedo relative to the surrounding desert were classified as disturbed.

E.2 Portable Wind Tunnel Field Measurements

E.2.1 Description of Wind Tunnel

The UNLV wind tunnel used in the 2003 field study was a modification of the draw-through design developed in the early 1990s by Duane Ono at the Great Basin Unified Air Pollution Control District, Bishop, California, and by Chatten Cowherd at the Midwest Research Institute, Kansas City, Missouri. Modifications included a 6-in.-diameter working section instead of a 4-in. section and the addition of a TSI Incorporated DUSTTRACK™ PM_{10} monitor in the riser section. (PM_{10} is particulate matter with a mean aerodynamic diameter of 10 μm or less.) Three-inch-wide heavy-gauge plastic flaps, open cell foam, and 2-in.-diameter, 6-ft-long cloth draft tubes filled with coarse sand were used to seal the tunnel to the soil surface. A rear air bypass and constant-speed motor were used to control the average flow instead of a venturi and an electronic motor-speed controller. Major components of the tunnel are shown schematically in Figure E.2. Wind tunnel processes are diagrammed in Figure E.3.

The working section of the tunnel is 6 in. wide × 6 in. high × 60 in. long. In addition (not shown in the figure), there is a 60-in.-long flow-conditioning section installed ahead of the working section of tunnel. It has a honeycomb flow diffuser at the front end, which gives the incoming air 10 tunnel diameters in which to develop a turbulent profile before it passes into the tunnel working section.

A Dwyer Model 160-12 90° pitot tube (labeled "profiling pitot tube" in Figure E.2) is located in the working section. It is attached to a height-adjusting system that allows the tube to be set at a logarithmic series of elevations above the soil surface. The pitot tube is connected in parallel to two Magnehelic® pressure gauges, one reading from 0.00 to 0.25 in. of water, and the other reading from 0.00 to 1.00 in. of water. These allow the pressure drop to be measured over the range of expected flow conditions.

As air passes through the working section of the tunnel, it entrains particulates from the soil surface (Figure E.3). The particulates are then conveyed in the air flow through the working section to the divergence section. The divergence section contains a front bypass air inlet, located on top of the section. The size of the front bypass opening is controlled by a sliding damper (Figure E.3). The purpose of this front bypass air inlet is to control the volumetric flow rate of air in the working section and to thus control the erosion velocity. The rate of the air flow in the working section is lowest when the damper is wide open and highest when the damper is closed. In field work, the damper is adjusted to give a specified centerline pitot tube reading for a particular erosion run.

The divergence section is connected to a rectangular metallic box called the elutriation chamber (Figure E.2). As air flow enters the elutriation chamber and slows down, the chamber captures particles with physical diameters that are >70 μm (Figure E.3). A door at the back of the elutriation chamber allows it to be cleaned after each wind tunnel run. Air flow leaves the

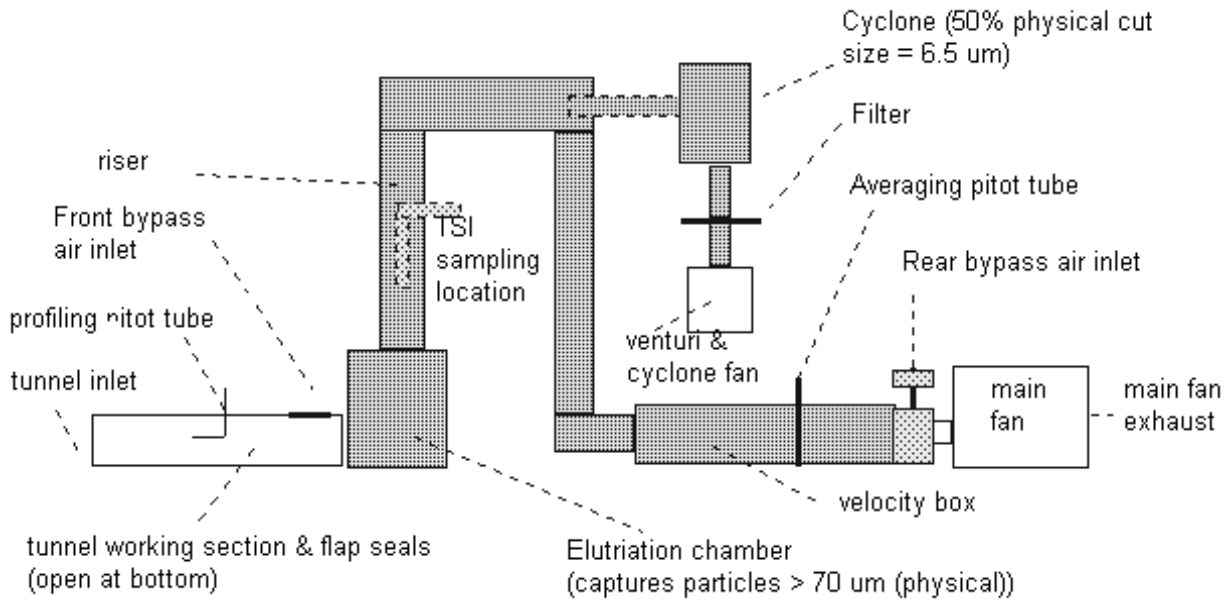

FIGURE E.2 Wind Tunnel Component Diagram

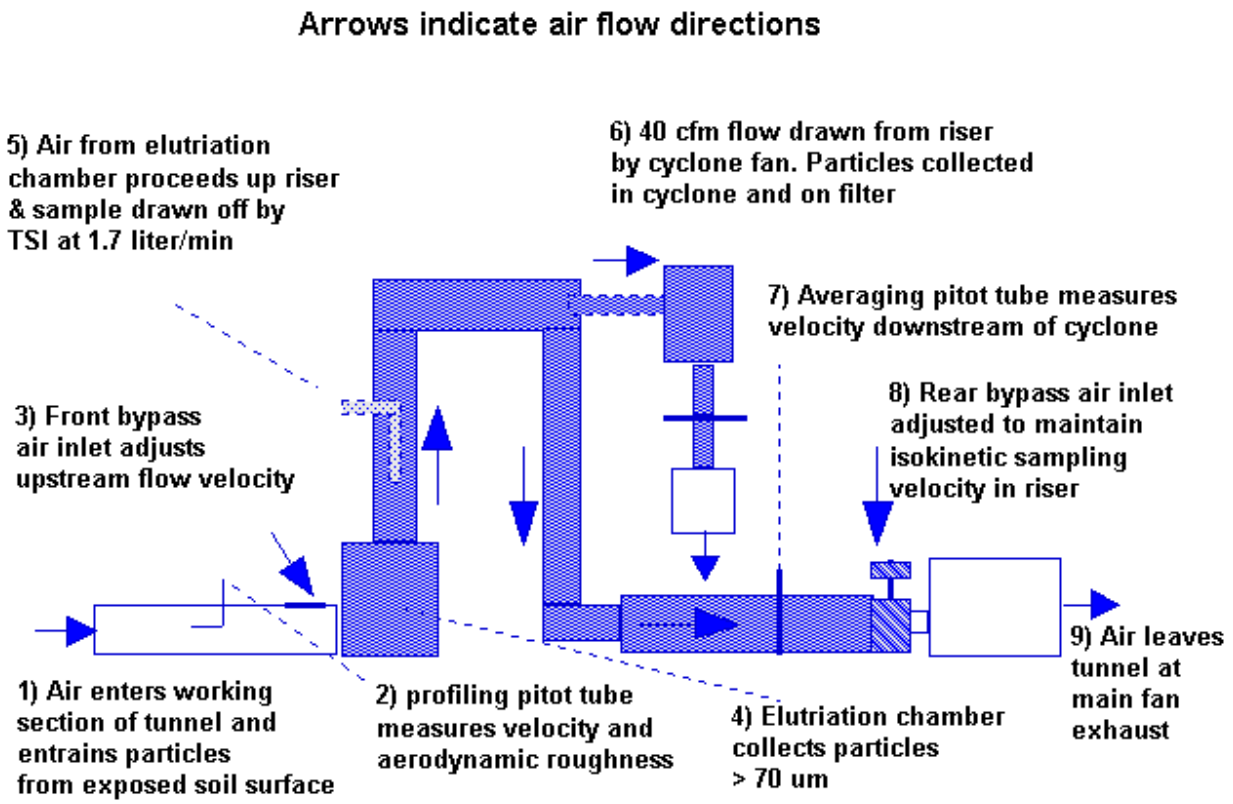

FIGURE E.3 Wind Tunnel Processes Diagram

elutriation chamber through a 6-in.-diameter polyvinyl chloride (PVC) pipe section called the riser (Figure E.2). Air velocity in the riser is generally sufficient to suspend soil particles with physical diameters that are <70 μm (Figure E.3).

As air and particulates proceed up the riser, a small sample is pulled off by the TSI DUSTTRAK PM_{10} monitor. The monitor measures PM_{10} concentrations in a range of 0.000 to 19.99 mg/m^3. The instrument uses the scattering of an infrared laser diode light beam to estimate the PM_{10} concentration. Air is drawn into the unit at a fixed rate of 1.7 L/min by a positive displacement pump. The air passes through a built-in impacting head (50% aerodynamic cut size, 10 μm) before proceeding into a chamber where the suspended particle stream breaks the light beam. The units are factory-calibrated against a standard dust suspension. The monitor used in this study was factory-calibrated in late July 2003, just before the start of the field testing.

After passing the TSI sampling port, particle-laden air in the riser makes a 90° turn and passes by the sampling orifice of the cyclone, filter, venturi, and fan system (Figure E.2). The venturi, fan motor, and filter housing — from a standard General Metal Works (GMW) PM_{10} atmospheric sampler — is equipped with a venturi orifice designed to choke the air flow through sonic velocity, thus making the air flow independent of temperature and pressure. The design flow rate of the sampler is 40 ft^3/min (cfm).

The cyclone was built by UNLV to have a 50% physical cut size of 6.5 μm for approximately spherical particulates with a density of about 2.5 g/cm^3. This physical diameter corresponds to an aerodynamic diameter of 10 μm for particles with a density of 1.0 g/cm^3 settling in Stokesian flow. After passing through the cyclone, air is drawn through a glass fiber filter to trap particles before it is exhausted to the atmosphere (Figure E.3).

After passing the cyclone orifice, the remaining flow proceeds through a reducing coupling into a 4-in.-diameter ribbed plastic tube. Then it enters the velocity box (Figure E.2). The velocity box is a 6-ft-long, 4-in.-diameter PVC pipe that is used for measuring the total volumetric flow rate in the wind tunnel. A Dwyer Model 300-4 flow sensor (averaging pitot tube) is located 40 in. (10 tube diameters) downstream of the entrance to the velocity box. The pressure drop across flow sensor is measured by a Dwyer Model 475 Mark II solid-state manometer with a range of 0.00-19.99 in. water, a resolution of 0.01 in. water, and an accuracy of ±2%.

After passing the flow sensor, the flow enters the rear bypass air inlet (Figures E.2 and E.3). The rear bypass air inlet is adjusted to give a specified pressure drop in the flow sensor, so that the flow sampling at the TSI monitor inlet and the cyclone are nearly isokinetic. Typical flow sensor drop values were usually in the range of 3.00 to 3.30 in. water.

After leaving the rear bypass, air is drawn into the fan section and exhausted from the system (Figures E.2 and E.3). The Dayton Model 5K901C fan has a diameter of 10-5/8 in. and is powered by a 120-VAC 1-hp Dayton electric motor, turning at approximately 3,250 revolutions per minute (rpm). At field sites, the electric motor is powered by a 5.5-hp Coleman portable AC generator.

E.2.2 Wind Tunnel Airflow Balance

Intakes and withdrawals of air in the wind tunnel are graphically depicted in Figure E.4. Air is drawn into the wind tunnel at the front end of the working section and at the front bypass air inlet. The combined flow proceeds through the riser, where a small subsample is withdrawn at 1.7 L/min by the TSI monitor. A 40-cfm sample is then withdrawn from the riser by the sampling tube connected to the cyclone, filter, venturi, and filter fan subsystem. The flow proceeds down the flexible PVC tube to the velocity box, where it is measured by the averaging pitot tube. Then it is blended with air drawn in from the rear bypass air inlet before entering the fan and being exhausted from the system.

Given that the maximum airflow in the tunnel is 100 ft/s (or about 0.1 Mach), one can assume that changes in the air density in the tunnel are negligible and that air mass-flow-rate balances can be converted into air volumetric-flow-rate balances. The corresponding equations for the volumetric-air-flow balances are shown in Table E.2. The key result in Table E.2 is equation 1, which shows that the sum of two unknown flow rates $Q_{dil} + Q_{work}$ is equal to the sum of two known or measured flows $Q_{avg} + Q_{cyc}$:

$$Q_{dil} + Q_{work} = Q_{avg} + Q_{cyc} \,, \tag{1}$$

where

Q_{dil} = flow rate entering at the front bypass air inlet,

Q_{work} = flow rate entering through the working section of the tunnel,

Q_{avg} = flow rate measured by the averaging pitot tube in the velocity box, and

Q_{cyc} = known flow rate passing through the venturi in the cyclone-filter set.

This relationship is used to compute flux rates from the soil surface from wind tunnel measurements for each site and run, as described in Appendix F.

E.2.3 Wind Tunnel PM_{10} Mass Balance and PM_{10} Flux Calculation

Intakes and withdrawals of particulates are graphically depicted in Figure E.5. The corresponding mass balance equations are shown in Table E.3. The term mdot in Figure E.5 and Table E.3 corresponds to a particulate mass flow rate in the system.

The purpose of Table E.3 is to lead the reader through the mathematics of the derivation of the PM_{10} mass flow rate (shown as mdotsoil) from the soil surface in the tunnel working section. PM_{10} mass balances and air flow balances from Table E.3 are used to develop an equation that estimates the PM_{10} flux rate from the soil surface in terms of known or measured

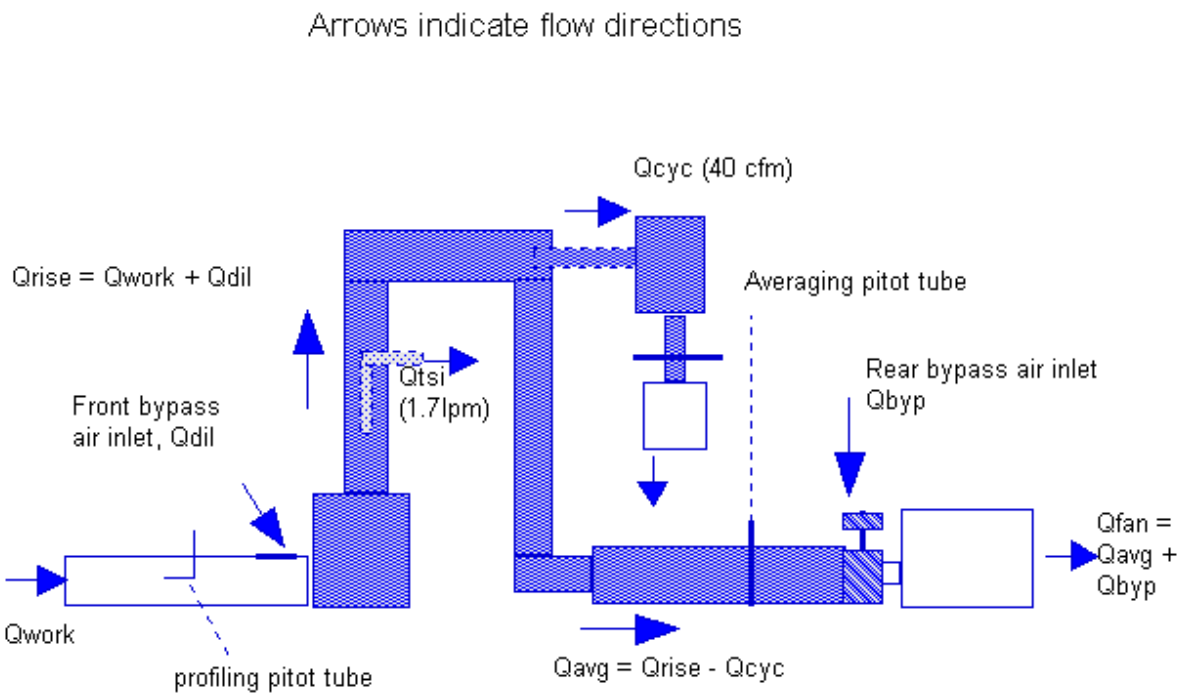

FIGURE E.4 Wind Tunnel Airflow Balance

TABLE E.2 Airflow Balance Equations

Assuming changes in air density are negligible, then mass flow = volumetric flow

Primary equations:

(a) $Q_{rise} = Q_{dil} + Q_{work}$

(b) $Q_{avg} = Q_{rise} - Q_{cyc}$

(c) $Q_{fan} = Q_{avg} + Q_{byp}$

Measured or known values:

Q_{avg} = measured with averaging pitot just before fan

Q_{cyc} = known, 40 ft^3/min

Q_{tsi} = known, 1.8 L/min, assumed negligible in gas flow balance

Unknown values:

Q_{dil} = airflow in bypass inlet, cannot be measured

Q_{work} = not known but could be estimated from profiling pitot and aerodynamic roughness height

Derived equations:

(d) From (b), $Q_{rise} = Q_{avg} + Q_{cyc}$

(e) From (a), $Q_{dil} = Q_{rise} - Q_{work}$

(f) Substitute (d) into (e) to obtain $Q_{dil} = Q_{avg} + Q_{cyc} - Q_{work}$

(g) Rearrange (f) to obtain $Q_{dil} + Q_{work} = Q_{avg} + Q_{cyc}$

With Q_{avg} measured and Q_{cyc} known, then $Q_{dil} + Q_{work}$ can be computed

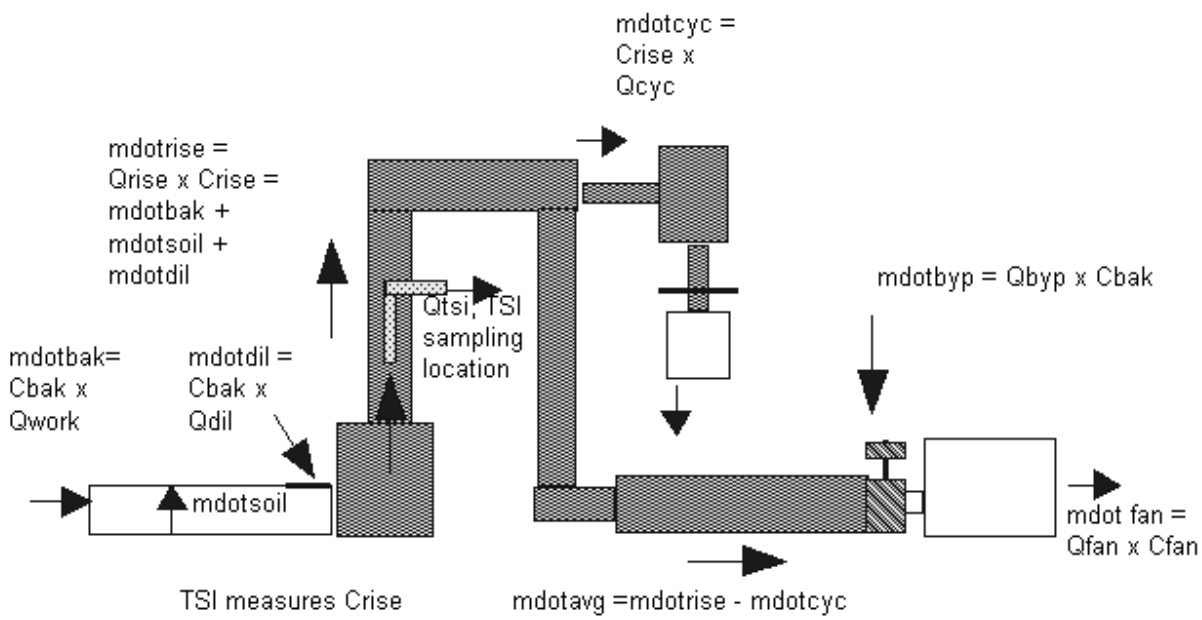

FIGURE E.5 Wind Tunnel PM_{10} Mass Balance (arrows indicate PM_{10} mass fluxes)

TABLE E.3 Mass Balance Equations for PM_{10} (mdot = mass flow rate)

Primary equations:

(a) $mdotfan = mdotbyp + mdotavg$
(b) $mdot\ avg = mdotrise - mdotcyc$
(c) $mdotrise = mdotdil + mdotsoil + mdotbak$
(d) $mdotbak = Q_{work} \times C_{bak}$
(e) $mdotdil = Q_{dil} \times C_{bak}$
(f) $mdotrise = Q_{rise} \times C_{rise}$

Measured, assumed, or known values:

C_{rise} = measured with TSI DUSTRAK monitor
C_{bak} = measured with TSI DUSTRAK monitor
Tunnel floor area = 0.5 ft wide by 5 ft long = 2.5 ft^2

Derived equations:

(g) From (c), $mdotsoil = mdotrise - (mdotdil + mdotbak)$
(h) From (d) and (e), $mdotdil + mdotbak = (Q_{dil} + Q_{work}) \times C_{bak}$
(i) From Figure E.5 and equation (g), $Q_{dil} + Q_{work} = Q_{avg} + Q_{cyc}$
(j) Substitute (i) into (h) and (h) into (g)

To obtain $mdotsoil = mdotrise - (Q_{avg} + Q_{cyc}) \times C_{bak}$

(k) From (c), $mdotrise = Q_{rise} \times C_{rise}$
(l) From Figure E.5, equation (d), $Q_{rise} = Q_{avg} + Q_{cyc}$
(m) Therefore, $mdotrise = (Q_{avg} + Q_{cyc}) \times C_{rise}$
(n) Therefore, $mdotsoil = (Q_{avg} + Q_{cyc}) \times (C_{rise} - C_{bak})$
(o) $fluxsoil = mdotsoil/Tunnel\ floor\ area$
(p) Therefore, $fluxsoil = [(Q_{avg} + Q_{cyc}) \times (C_{rise} - C_{bak})]/Tunnel\ floor\ area$

quantities. Table E.3, equation p, shows the key relationship that is derived from the mass balance:

$$G = [(Q_{avg} + Q_{cyc}) \times (C_{rise} - C_{bak})]/A_T \,, \tag{2}$$

where

G = horizontal flux expressed as the mass rate per unit area of PM_{10} eroded from the soil surface in units of mass per area per time ($\mu g/m^2$–s),

Q_{avg} = flow rate measured by the averaging pitot tube in the velocity box (m^3/s),

Q_{cyc} = known flow rate passing through the venturi in the cyclone-filter set (m^3/s),

C_{rise} = PM_{10} concentration measured by the TSI monitor in the tunnel riser ($\mu g/m^3$),

C_{bak} = PM_{10} atmospheric background concentration measured either just before or just after the erosion run ($\mu g/m^3$), and

A_T = tunnel floor area (i.e., the exposed area under the working section of the tunnel, which is 2.5 ft^2), (m^2).

Measured, known, or assumed quantities from each wind tunnel run are substituted into equation 2 to compute the horizontal wind tunnel flux. An example flux calculation is shown in Table E.4. Fluxes computed by using this methodology are tabulated in Appendix F, Tables F.2, F.5, and F.6.

E.2.4 Methods for Determining the Erosion Velocity at Each Site

At each tested wind tunnel site, three wind tunnel erosion runs were performed; each run was performed at a higher 10-m wind speed. Desired 10-m velocities were usually set at 20 miles per hour (mph) for run 1, 30 mph for run 2, and 40 mph for run 3. Each wind tunnel run was performed at a separate location.

Prior to a 10-minute erosion run, the aerodynamic roughness for each erosion run was determined during a 5-minute profiling run that was carried out at a low tunnel erosion velocity (tunnel damper wide open), generally corresponding to a 10-m velocity of about 20 mph. In the profiling run, the longitudinal velocity was measured by using a pitot-static tube at a series of 11 elevations above the ground surface, ranging from 0.4 to 8.21 cm. The pitot-static tube velocity measurements were plotted against a log of elevation by using a Microsoft Excel™ version 5.0 spreadsheet on a Toshiba Satellite Pro 75-MHz 486 laptop in the field. A linear

TABLE E.4 Flux Calculation: Uncertainty Analysis Scenarios for Low Riser Flow Uncertainty and Several Riser Concentrations

Parameter[a]	1	2	3	4	5	6	7	8	9
Riser conc.	High	High	High	Medium	Medium	Medium	Low	Low	Low
Riser conc. uncert.	High	Medium	Low	High	Medium	Low	High	Medium	Low
Typical site	Unstable lands	Unstable lands		Stable lands	Stable lands		Stabilized lands	Stabilized lands	Stabilized lands
Surface condition							Torn up		Not torn up
Riser flow uncert.	Low	Low	Low	Low	Low	Low	Low	Low	Low
Area, ft^2	2.500	2.500	2.500	2.500	2.500	2.500	2.500	2.500	2.500
ωArea, ft^2	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
ωArea/Area	5.23E-03	5.23E-03	5.23E-03	5.23E-03	5.23E-03	5.23E-03	5.23E-03	5.23E-03	5.23E-03
Q_{avg}, cfm	468	468	468	468	468	468	468	468	468
Q_{cyc}, cfm	40	40	40	40	40	40	40	40	40
$Q_{avg} + Q_{cyc}$, cfm	508	508	508	508	508	508	508	508	508
ωQ_{avg}, cfm	21	21	21	21	21	21	21	21	21
$\omega Q_{avg}/(Q_{avg} + Q_{cyc})$	4.13E-02	4.13E-02	4.13E-02	4.13E-02	4.13E-02	4.13E-02	4.13E-02	4.13E-02	4.13E-02
ωQ_{cyc}, cfm	1	1	1	1	1	1	1	1	1
$\omega Q_{cyc}/(Q_{avg} + Q_{cyc})$	1.97E-03	1.97E-03	1.97E-03	1.97E-03	1.97E-03	1.97E-03	1.97E-03	1.97E-03	1.97E-03
C_{rise}, $\mu g/m^3$	1000	1000	1000	200	200	200	40	40	40
C_{bak}, $\mu g/m^3$	20	20	20	20	20	20	20	20	20
$C_{rise} - C_{bak}$, $\mu g/m^3$	980	980	980	180	180	180	20	20	20
ωC_{rise}, $\mu g/m^3$	200	100	50	50	20	10	10	6	2
$\omega C_{rise} /(C_{rise} - C_{bak})$	2.04E-01	1.02E-01	5.10E-02	2.78E-01	1.11E-01	5.56E-02	5.00E-01	3.00E-01	1.00E-01
ωC_{bak}, $\mu g/m^3$	10	10	10	10	10	10	10	10	10
$\omega C_{bak} /(C_{rise} - C_{bak})$	1.02E-02	1.02E-02	1.02E-02	5.56E-02	5.56E-02	5.56E-02	5.00E-01	5.00E-01	5.00E-01
$S(\omega X/X)^2$	4.35E-02	1.23E-02	4.45E-03	8.20E-02	1.72E-02	7.91E-03	5.02E-01	3.42E-01	2.62E-01
rms uncert. $[S(\omega X/X)^2]^{1/2}$	2.09E-01	1.11E-01	6.67E-02	2.86E-01	1.31E-01	8.90E-02	7.08E-01	5.85E-01	5.12E-01
rms uncert., %	21	11	7	29	13	9	71	58	51
Flux, tons/acre/h	1.63E-02	1.63E-02	1.63E-02	2.99E-03	2.99E-03	2.99E-03	3.32E-04	3.32E-04	3.32E-04
rms uncert., tons/acre/h	0.34E-02	0.18E-02	0.11E-02	0.86E-03	0.39E-03	0.27E-03	2.35E-04	1.94E-04	1.7E-04

[a] Conc. = concentration, uncert. = uncertainty, rms = root mean square.

regression was performed on the pitot-static tube velocity measurements, by regressing velocity (dependent) on the natural logarithm of height (independent), to fit the equation

$$u(z) = (u_*/k)\ \ln(z/z_o), \tag{3}$$

where

$u(z)$ = velocity measured at height z, (m/s),

u_* = friction velocity (m/s),

k = von Karman constant of 0.40 (unitless)

z = height of the velocity measurement (cm) , and

z_o = aerodynamic roughness height (cm).

The aerodynamic roughness corresponds to an elevation above the ground at which the net longitudinal velocity reaches zero. The term u_*/k is the "slope" of the plot of velocity versus height. The u_*/k term depends strongly on the velocity field imposed on the ground by regional pressure differences and depends weakly on the aerodynamic roughness height.

Equation 3 can be rearranged to form

$$u(z) = \frac{u_*}{k}\ln(z) - \frac{u_*}{k}\ln(z_o)\ , \tag{4}$$

which is similar in form to

$$y = mx + b\ , \tag{5}$$

where

$$m = \text{slope of the curve} = (u_*/k) \text{ and} \tag{6}$$

$$b = y\text{-intercept} = -\ (u_*/k)\ \ln(z_o)\ . \tag{7}$$

A computed 11-point regression of $u(z)$ on $\ln(z)$ will produce numerical values for slope m and intercept b.

Friction velocity u_* and aerodynamic roughness z_o can be computed from the numerical values by the following procedure. Rearrange equation 6 as follows:

$$u_* = mk\ . \tag{8}$$

Then substitute the result of equation 8 into equation 9 and rearrange, as follows:

$$z_o = \exp(-bk/u_*) \ . \tag{9}$$

A numerical example follows. A regression from a profiling run produces a slope m of 0.75 and a slope b of 5.87. By using equation 8, the friction velocity for the run is computed to be

$$u_* = mk = 0.75 \times 0.40 = 0.30 \text{ m/s} \ .$$

By using $k/u_* = 0.40/0.30 = 1.33$ and equation 9, the aerodynamic roughness height is computed to be

$$z_o = \exp(-bk/u_*) = \exp(-5.87 \times 1.33) = 0.0004 \text{ cm.}$$

The friction velocity u_* also corresponds to a longitudinal velocity that occurs at a height where $\ln(z/z_o) = k$, the von Karman constant. This can be seen by setting $u(z) = u_*$ and $z = z_*$ in equation 3 and solving for z:

$$u_* = (u_*/k) \ln(z_*/z_o) \ , \tag{10}$$

$$k = \ln(z_*/z_o) \ , \tag{11}$$

$$\exp(k) = z_*/z_o \ ,$$

$$z_* = z_o \exp(k) = z_o \exp(0.40) = 1.49 \ z_o \ . \tag{12}$$

As a result, u_* corresponds to the velocity at a height that is 1.49 times the aerodynamic roughness height. This relationship will be used to set the wind tunnel to a value of u_* that corresponds to a desired 10-m velocity.

Computed profiling run results were used to set the desired u_* for each erosion run by using the desired wind speed at 10 m. For example, if a 30-mph erosion run was desired, the regression developed for the tested plot of land was used to compute the desired velocity (and pitot-static tube pressure drop) at the centerline of the wind tunnel corresponding to $z = 8.21$ cm, which is the centerline of the wind tunnel. The pitot-static tube is set at this elevation during the PM_{10} erosion run to monitor the flow rate in the wind tunnel working section.

The following algebraic and numerical procedure was employed:

1. Determine a desired value for a 10-m velocity. For example, $u(10) = 30$ mph = 13.4 m/s.

2. Substitute the desired value, along with numerical values of z and z_o, into equation 3:

$$u(10) = (u_*/k) \ln(10/z_o) \ . \tag{13}$$

3. Rearrange equation 13 to form

$$u_* = ku(10)/[\ln(10/z_o)] \ . \tag{14}$$

4. Compute the numerical value of u_*.

For our numerical example above, with z_o = 0.0004 cm (4×10^{-6} m) and with the desired 10-m velocity = 13.4 m/s, substituting all the numerical values into equation 14 results in the following:

$$u_* = 0.40\ (13.4\ \text{m/s})/[\ln(10/4.00 \times 10^{-6})] \ , \tag{15}$$

$$= 5.36/[14.73] = 0.364\ \text{m/s} \ . \tag{16}$$

The computed u_* value was then used in equation 3 to set the velocity at a wind tunnel elevation of z = 0.0821 m, corresponding to the location of the pitot-static tube during the erosion run:

$$u(0.0821) = (u_*/k)\ \ln[0.0821/z_o] \ , \tag{17}$$

$$= (0.364/0.40)\ \ln[0.0821/4 \times 10^{-6}] \ , \tag{18}$$

$$= (0.91)\ \ln[20{,}525] \ , \tag{19}$$

$$= 0.91 \times 9.929 = 9.04\ \text{m/s} \ . \tag{20}$$

The pitot-static tube equation was then used to convert the 0.0821-m velocity into a measured pressure drop at z = 0.0821 m, which could be used to set the tunnel velocity for the erosion run. The pitot-static tube equation is

$$u = [2\ \Delta P/\rho_o]^{\ 0.50} \ , \tag{21}$$

where

u = velocity (m/s),

ρ_o = ambient gas density (kg/m^3), and

ΔP = pitot tube pressure drop, Pa (N/m^2).

Rearranging equation 21 yields the pitot-static pressure drop

$$\Delta P = (u^2\ \rho_o)/2 \ . \tag{22}$$

For the given numerical example, when one assumes typical summer conditions in Las Vegas — ambient temperature = 104°F (40°C), ambient atmospheric pressure = 0.92 atm, and gas density = 1.10 kg/m^3 — substituting all numerical values into equation 22 yields

$$\Delta P = (9.04^2 \times 1.10)/2 = 45 \text{ Pa}/249 \text{ (Pa/in. } H_2O) = 0.181 \text{ in. } H_2O. \quad (23)$$

The above procedure (equations 3 through 23) was used for each wind tunnel run at a wind tunnel site. The outcome for a set of three runs at a wind tunnel site is a table that gives values for z_o measured during the profiling run, the desired nominal wind velocities at a 10-m elevation, the corresponding u_* at the measured z_o, the corresponding $u(z)$ = 0.0821 m at the wind tunnel centerline, and the pitot-static tube pressure drops used to obtain the desired nominal 10-m wind tunnel velocity. An example of such a table is shown below for a fictitious wind tunnel site (Table E.5).

E.2.5 Methods for Determining TFVs by Using Particle Masses Captured in the Elutriation Chamber Cyclonic Separator

The TFV for each wind tunnel run was estimated by plotting the captured particle mass from the elutriation chamber (EC) for each of the three wind tunnel runs at each site against the computed friction velocity u_* set for each wind tunnel run.

If the slope in a plot of captured mass versus u_* showed a large increase between two of the pre-set u_* values, the increase was interpreted as a passing of the threshold for saltation-sized particles (>70 µm physical diameter). An example table and plot are shown in Table E.6, which gives example data for an EC-captured particulate mass obtained at three different values of u_*. Tabulated data are plotted in Figure E.6.

Figure E.7 shows that a significant increase in the slope of the plot of captured mass versus u_* occurred between the second and third run. Classical theory would thus indicate that a sudden increase in the flux of saltating-size particles occurred between 0.364 and 0.499 m/s.

TABLE E.5 Example Data for a Set of Three Wind Tunnel Runs at a Selected Wind Tunnel Site

WT Site No.	Run No.	z_o (m)	Nominal u_{10} (mph)	u_* (m/s)	u (0.0821) (m/s)	ΔP in. H_2O
XYZ	1	5×10^{-5}	20	0.293	5.42	0.065
XYZ	2	4×10^{-6}	30	0.364	9.04	0.181
XYZ	3	6×10^{-6}	40	0.499	11.89	0.313

TABLE E.6 Example Data for a Set of Three Wind Tunnel Runs for an Elutriation-Chamber-Captured Particulate Mass at a Selected Wind Tunnel Site

WT Site No.	Run No.	u_* (m/s)	Elutriation Mass (g)
XYZ	1	0.293	2.49
XYZ	2	0.364	5.13
XYZ	3	0.499	50.22

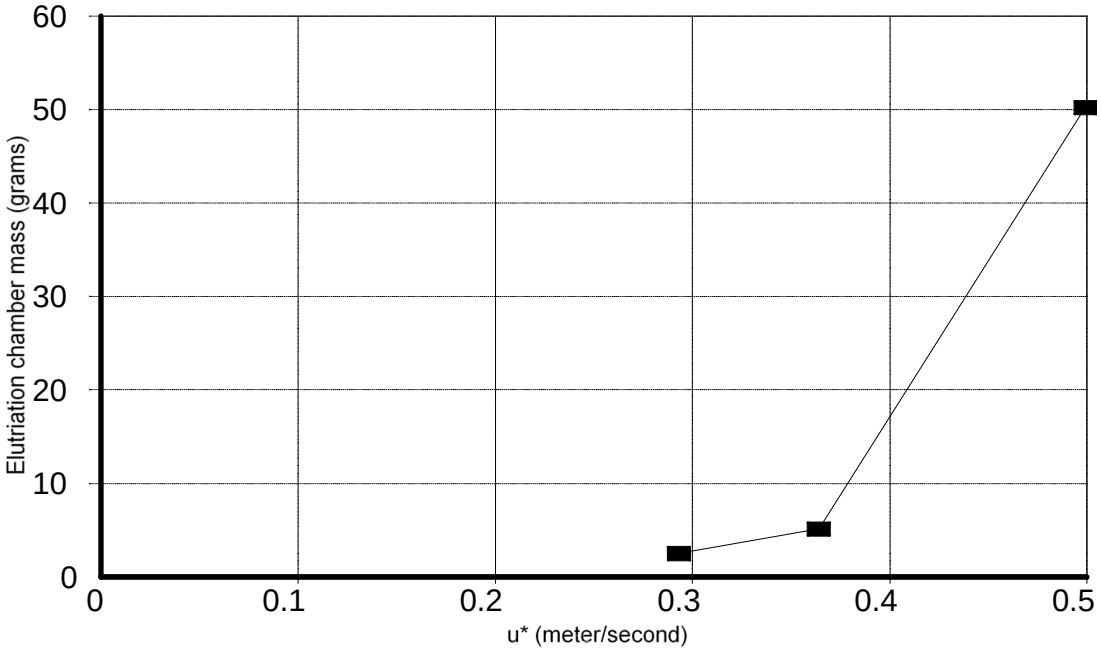

FIGURE E.6 Example of TFV from the Saltation Particle Mass Captured in the UNLV Portable Wind Tunnel EC (The sudden increase in captured mass between the u_* of 0.364 m/s and u_* of 0.499 m/s indicates the onset of soil movement. TFV is estimated as the average of the two u_* values.)

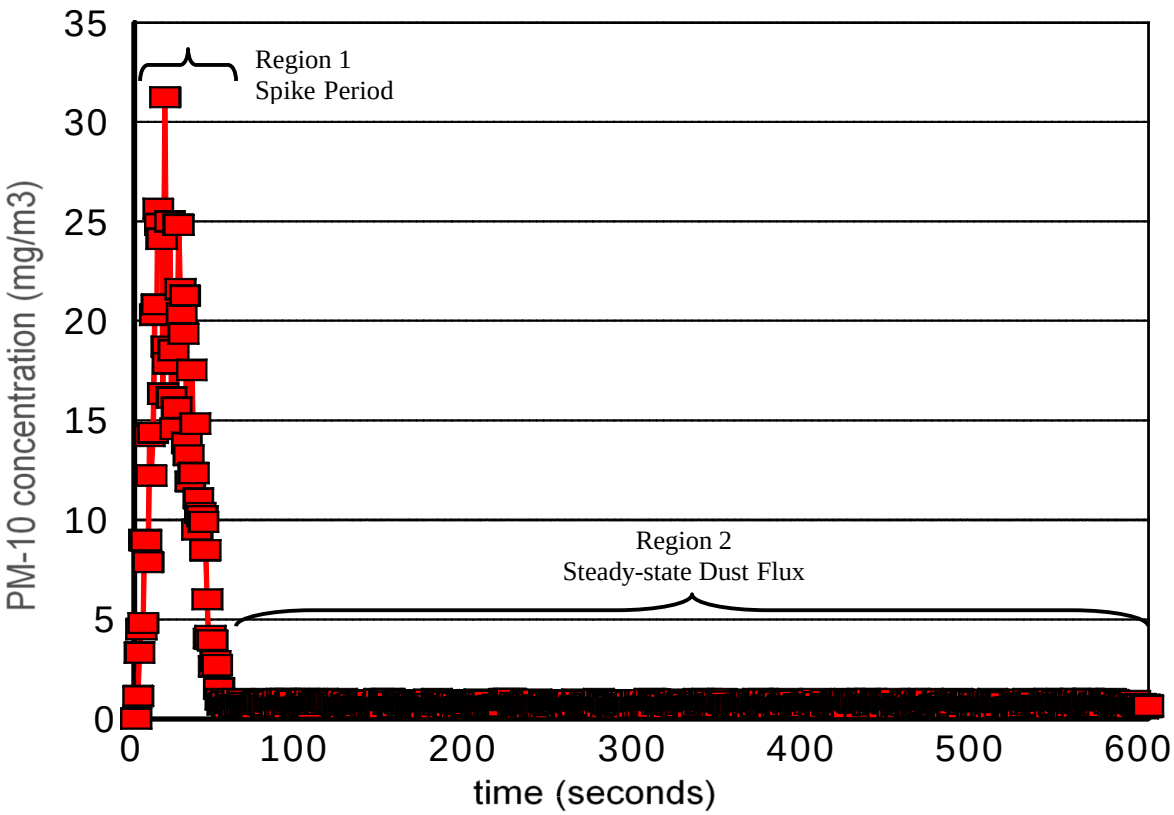

FIGURE E.7 Sample Plot of PM_{10} Concentration versus Time, Showing an Initial Spike of 49 Seconds, Followed by a 551-Second Trace of Lower Concentration

For the data in Table E.6 and Figure E.6, the TFV u_{*t} (defined as the value of u_* at which the threshold for onset of soil movement occurred) was computed as the arithmetic average of the u_* values for run 2 and run 3. In this case, the TFV would be computed as

$$\text{TFV} = (u_{*\,run\,2} + u_{*\,run\,3})/2 \tag{24}$$

$$= (0.364 \text{ m/s} + 0.499 \text{ m/s})/2 = (0.863 \text{ m/s})/2 = 0.432 \text{ m/s} .$$

At most of the wind tunnel sites, adequate EC masses were available to estimate TFV values. At a few tested sites, the EC-captured mass was very low, and masses captured in the wind-tunnel's cyclonic separator (physical size range of 6 to 70 µm) were used instead. A similar procedure was employed for estimating TFV, plotting the cyclone-captured mass against u_*, and examining the result for a sudden slope increase.

E.2.6 Methods for Calculating Horizontal Fluxes

Horizontal fluxes of saltating size particles (captured in the EC) were computed via the following equation: horizontal flux = mass of particles collected/sampling time/tunnel floor length. The units of measure employed for the raw calculation were as follows: the mass of particles was in grams, the sampling time was in minutes (usually 10 or 15 minutes), and the floor length was in feet (5.00 ft). After the raw rate was computed in grams per foot per minute, the data were converted to micrograms per meter per second on the basis of the following conversion factors: (1) 10^6 micrograms = 1 gram and (2) 3.281 feet = 1 meter. An example calculation is shown below for a hypothetical wind tunnel run:

Captured saltation mass = 12.47 g

Sampling time = 15 min

Floor length = 5 ft

Horizontal flux = 12.47 g/5 ft/15 min = 0.166 g/ft/min

Horizontal flux = 0.166 g/ft/min $\times$ 10^6 μg/g $\times$ 3.281 ft/m $\times$ 1 min/60 s

Horizontal flux = 9,092 μg/m/s

Horizontal fluxes were tabulated in Tables F.2 through F.7 in Appendix F. Their values were used to compute the ratios of horizontal saltation flux to vertical PM_{10} flux and to compare the results to literature values reported by Gillette et al. (1996). These ratios were used as a check on the quality of the data produced by the UNLV wind tunnel for Las Vegas area desert soils.

E.2.7 Procedure for Removing Spikes from the Data to Correct Short-Term Fluxes for Use in Long-Term Calculations

Measurements of wind-tunnel-eroded PM_{10} concentrations versus time, recorded every second with TSI DustTrak, showed a pattern of an initial spike in the concentration data that typically lasted from 15 seconds to 2-3 minutes. A typical example is shown in Figure E.8. After the spike, the PM_{10} concentration values were lower for the remainder of the 10-minute erosion run.

It is necessary to correctly account for the PM_{10} spike when computing the fluxes of PM_{10} mass versus time that will be used in the longer-term, 1-hour average model calculations. UNLV initially computed PM_{10} vertical fluxes that included the spike. These are defined as "uncorrected" fluxes. These uncorrected PM_{10} fluxes were converted to corrected fluxes by removing the spike from the data set and recomputing the flux as the remaining PM_{10} mass per area per time. The numerical methodology for computing spike masses can be described by considering the chart shown below in Figure E.7. The figure can be considered to have two

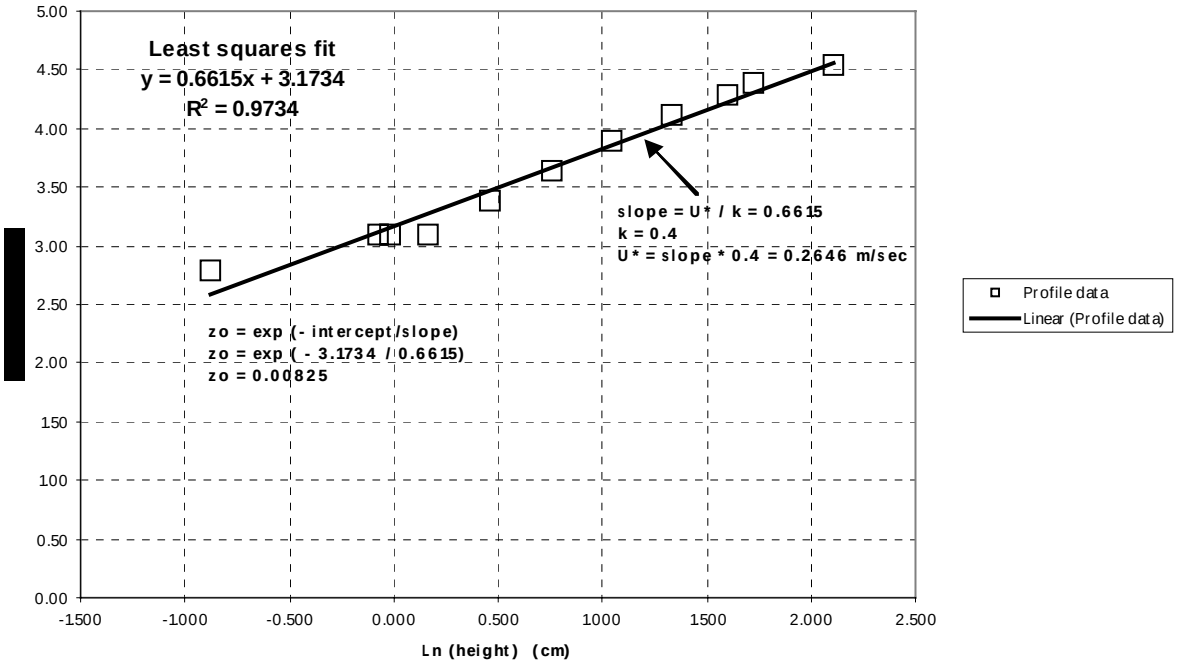

FIGURE E.8 Example of a Standard Analytical Plot of Velocity versus Ln (height) and the Regression Line for Site WT 103, Run 1, Stable [Fit to data is $U(z) = U_*/k \ln(z/z_o)$.]

distinct flux regions. Region 1, the spike period, lasts from 0 to 49 seconds. Region 2, the "nonspike" portion or steady-state period, lasts from 49 to 600 seconds. The total sampling period of spike plus steady-state lasts 600 seconds.

For the case where PM_{10} data are collected every second, the average PM_{10} concentration in any region may be computed as follows:

$$\bar{c}_R = 1/t_R \times \sum_{i=t}^{t_n} C_i \ . \tag{25}$$

As shown elsewhere in the wind tunnel mass balance, the horizontal flux of PM_{10} emitted from the surface can be computed as

$$G = Q_T / A_T \left[\left(\bar{C}_{PM_{10}} - \bar{C}_{bg} \right) \right] , \tag{26}$$

where

G = horizontal flux (μg/m^2-s),

Q_T = tunnel volumetric flow rate (ft^3/min),

A_T = tunnel floor area (ft^2),

$C_{PM_{10}}$ = TSI measure PM_{10} concentration (mg/m^3), and

C_{bg} = background concentration (mg/m^3).

Equation 25 can be used to compute average concentrations for each of the regions of Figure E.8. Equation 26 can then be used to estimate the spike-corrected flux emitted from the nonspike region (Region 2) of Figure E.8.

Data and calculations for the above two regions in Figure E.8 follow here.

- Average measured tunnel volumetric flow rate Q_T for duration of run = 445 ft^3/min

- Ambient average background PM_{10} concentration C_{bg} prior to run = 0.047 mg/m^3

- Spike:

  Spike PM_{10} total concentration C_1 = 647 mg/m^3

  Spike duration t_1 = 49 seconds

  Average PM_{10} concentration for the spike portion of Figure E.3, C_1/t_1 = 647 mg/m^3/49 = 13.20 mg/m^3

- Entire signal:

  PM_{10} concentration for the entire run C_2 = 1,057 mg/m^3

  Duration of total run t_2 = 600 s

  For both regions in Figure E.8, the estimated average PM_{10} concentration C_2/t_2 = (1057 mg/m^3)/600 = 1.762 mg/m^3

- Nonspike signal:

  Nonspike PM_{10} total $C_3 = C_2 - C_1$ = 410 mg/m^3

Nonspike duration $t_3 = (t_2 - t_1) = 551$ seconds

Average PM_{10} concentration for the nonspike portion of Figure E.7
$C_3/t_3 = (410\ mg/m^3)/551 = 0.744\ mg/m^3$

Uncorrected PM_{10} Flux

The uncorrected PM_{10} wind tunnel flux corresponding to the entire Figure E.8 is computed as follows. Substituting the numerical values corresponding to the totals for the entire Figure E.8, including the spike, yields

$$\text{Uncorrected flux} = (1.762\ mg/m^3 - 0.047\ mg/m^3) \times 445\ ft^3/min/2.5\ ft^2$$
$$= 305\ mg\text{-}ft/m^3/min.$$

Dividing by 3.281 ft/m yields

$$\text{Uncorrected flux} = 305\ mg\text{-}ft/m^3/min \times 1\ m/3.281\ ft = 93\ mg/m^2/min.$$

Corrected PM_{10} Flux

The spike-corrected PM_{10} wind tunnel flux corresponding to the nonspike portion of Figure E.7 is computed as follows.

$$\text{Corrected flux} = (0.744\ mg/m^3 - 0.047\ mg/m^3) \times 445\ ft^3/min/2.5\ ft^2$$
$$= 124\ mg\text{-}ft/m^3/min.$$

Dividing by 3.281 ft/m yields

$$\text{Corrected flux} = 124\ mg\text{-}ft/m^3/min \times 1\ m/3.281\ ft = 38\ mg/m^2/min.$$

PM_{10} Spike Mass

To properly account for the contribution of PM_{10} spikes to air pollution estimates, the average concentration of PM_{10} in the spike is multiplied by the volumetric flow rate and spike duration, then divided by the tunnel floor area to produce a spike mass per unit area that would be emitted into the atmosphere at the start of a wind erosion event. The relevant equation is

$$m'_{spike} = \frac{Q_T t_1}{A_T}\left(\overline{C}_1 - C_{bg}\right), \tag{27}$$

where

m_{spike} = m_1 minus normalized spike mass (mass/area),

C_1 = average spike concentration C_{bg} minus background concentration, and

Q_T = tunnel volumetric flow rate multiplied by time A_T minus tunnel floor area.

Applying equation 27 to the data shown in Figure E.8 yields

$$m_{spike} = (13.20 \text{ mg/m}^3 - 0.047 \text{ mg/m}^3) \times 445 \text{ ft}^3\text{/min} \times (49 \text{ s})/2.5 \text{ ft}^2$$

$$m_{spike} = \text{spike mass/area} = 114{,}720 \text{ mg-ft-s/m}^3\text{/min}$$

Dividing the above result by 60 s/min and by 3.281 ft/m yields m_{spike} = 583 mg/m^2.

Using Spikes to Model PM_{10} Emissions to the Atmosphere

It is arbitrarily assumed that a spike is emitted only once at the start of a wind erosion event. The rationale for this assumption is that the reservoir of loose PM_{10} that is present on the surface at the start of the event is limited and that the further generation of PM_{10} results from the impacts of saltating particles on the ground surface and with each other. It is further arbitrarily (and conservatively) assumed that weathering of the surface will occur fast enough to regenerate the reservoir of loose PM_{10} after a 24-hour resting period between erosion events. If two events are separated by less than 24 hours, the spike is not included in the estimated emissions to the atmosphere at the start of the next event. If two events are separated by more than 24 hours, the spike is included in the estimated emissions to the atmosphere at the start of the next event.

Several illustrative cases can be developed by using the above data and a general equation for estimating spike mass:

$$\text{Emitted } PM_{10}\text{/area} = \text{spike mass/area} + \text{spike-corrected } PM_{10} \text{ flux} \times \text{duration of event}$$

Case 1: Single 2-hour event in wind speed range similar to u_*, at which the tunnel created Figure E.9

$$\text{Emitted } PM_{10} \text{ /area} = (583 \text{ mg/m}^2) + (38 \text{ mg/m}^2\text{/min}) \times (120 \text{ min}) = 5{,}143 \text{ mg/m}^2$$

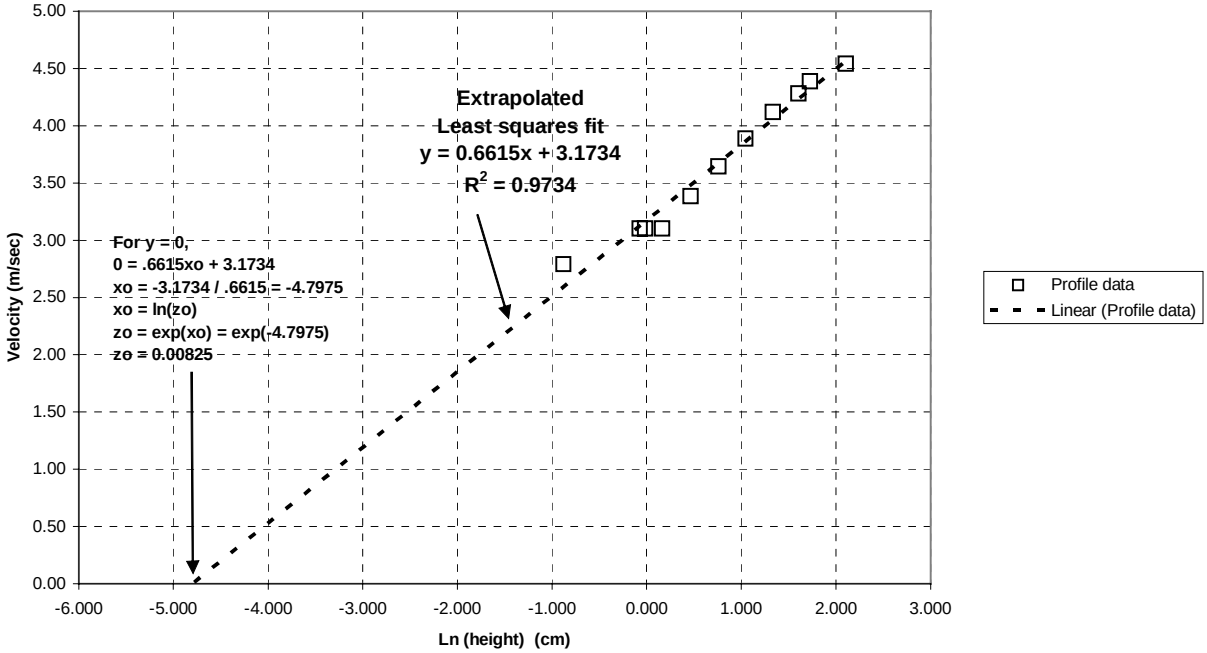

FIGURE E.9 Example of a Log-Transformed Velocity Profile Showing Extrapolation (dashed line) to Zero Velocity from Regression to Obtain z_o = 0.0083 cm for Site WT 103, Run 1

Case 2: Two 1-hour events separated by 2 days of calm weather that allow sufficient time for the PM_{10} reservoir to weather and regenerate a spike

Emitted PM_{10}/area = (first event: spike + continuous) +

(Second event: Spike + continuous)

= (583 mg/m^2 + 38 mg/m^2/min $\times$ 60 min) +

(583 mg/m^2 + 38 mg/m^2/min $\times$ 60 min) = 5,726 mg/m^2

Case 3: Two 1-hour events separated by only 12 hours of calm. PM_{10} reservoir does not have sufficient time to weather and regenerate, so the spike does not appear at the start of the second event

Emitted PM_{10}/area = (583 mg/m^2 + 38 mg/m^2/min $\times$ 60 min) + (38 mg/m^2/min $\times$ 60 min)

= 2,863 mg/m^2 + 2,280 mg/m^2 = 5,143 mg/m^2

E.2.8 Wind Tunnel Test Procedure for the 2003 Field Study

E.2.8.1 Tunnel Setup

The disassembled wind tunnel was transported in the back of a standard Ford F 150 pick-up truck and assembled at each site. A flat area approximately 15 ft long by 5 ft wide was needed to assemble the four rigidly connected units, tunnel flow conditioning section, tunnel working section, elutriation chamber, and support stand for the cyclone-filter combination. Other components, attached with flexible PVC, could be arranged in a variety of locations behind the rigidly connected units. The TSI monitor was turned on and set to measure the ambient PM_{10} concentration for 10 minutes. The result was recorded in the field data sheet. After the wind tunnel was assembled, the ambient barometric pressure, atmospheric temperature, and relative humidity were recorded, and the pressure gauges were "zeroed."

E.2.8.2 Estimating a Velocity Profile

The TSI monitor was turned on and set to measure the instantaneous PM_{10} concentration in order to log profiling data to memory at 1-second intervals for the 5-minute profiling period. At the same time, the tunnel fans and cyclone were turned on. The rear bypass air inlet was set to measure a pressure drop of about 3.20 in. of water, giving a riser section flow velocity that was nearly isokinetic with the flow velocities of the cyclone and TSI monitor sampling ports. During the profiling run, pressure readings were taken for 10 different pitot-tube height positions. The tunnel fans and cyclone were turned off after the 5-minute period.

The recorded barometric pressure, air temperature, and profiling pitot pressure drop data were entered into a Microsoft Excel spreadsheet on a laptop computer. A log transformation and linear regression routine were used to estimate the aerodynamic roughness height, a pitot tube centerline pressure drop that would correspond to the desired 10-m erosion velocity, and a U_* value corresponding to the desired erosion velocity. Examples of the velocity profile data reductions are shown in Figures E.8 through E.11b.

E.2.8.3 Erosion Runs

After the profiling run, the TSI monitor was set to a 10-minute data-logging mode, the tunnel fans were turned on, and the bypass damper was closed until the indicated pressure drop from the pitot tube reached the first designated 10-m erosion velocity. At this point, the monitor was set to begin the logging concentration each second for 10 minutes.

The TSI monitor display went blank at the end of the 10-minute period, and the fans were turned off. Dust samples captured in the elutriation chamber and cyclone were brushed into new, preweighed ziplock plastic bags, and the glass fiber filter was changed. The tunnel was

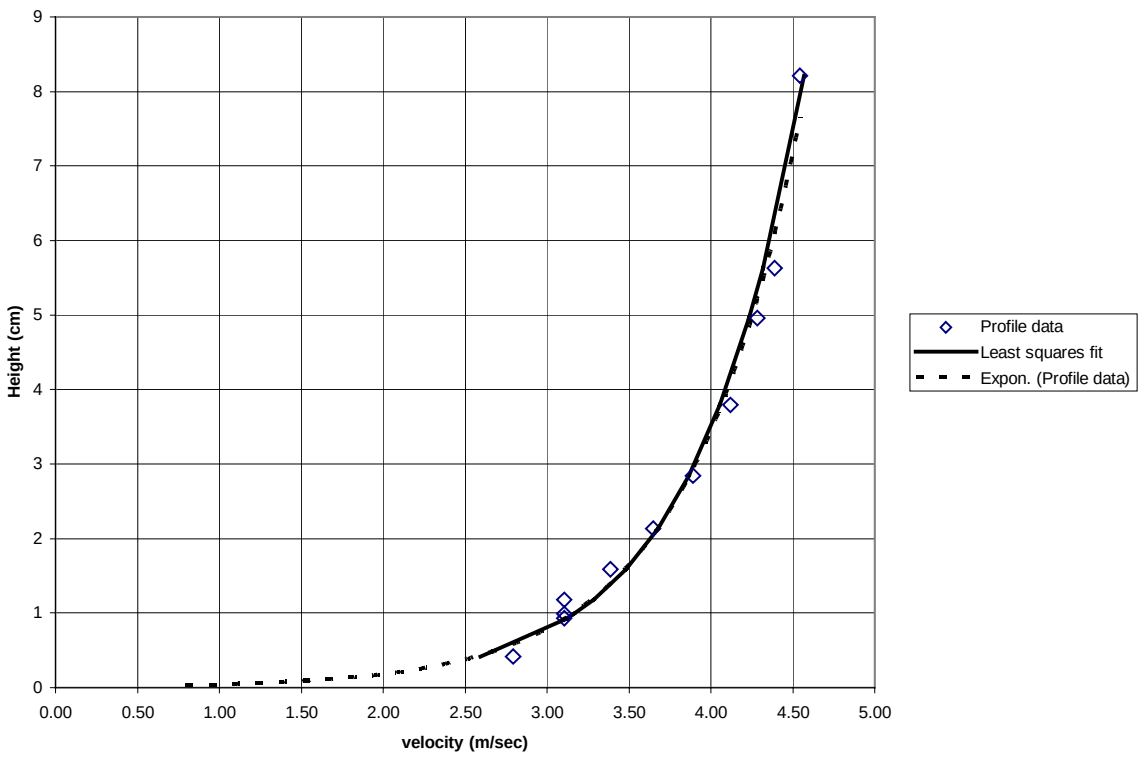

FIGURE E.10 Final Form of Computed Logarithmic Velocity Profile $U(z) = U_*/k \ln (z/z_O)$ (Dashed line is extrapolation.)

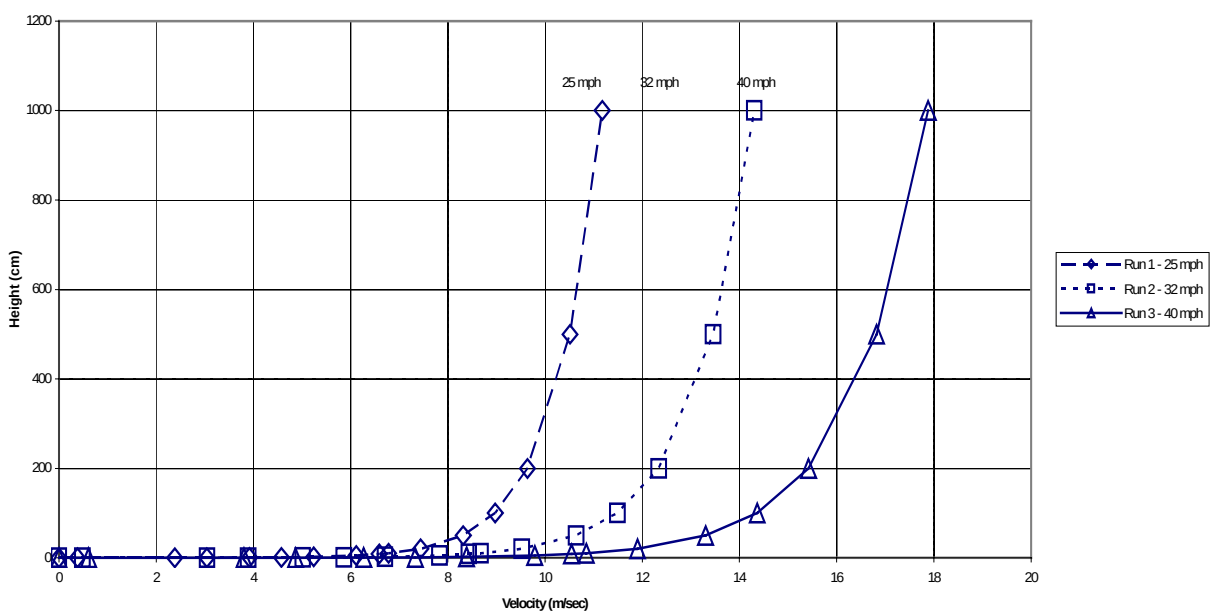

FIGURE E.11a Example of Using One z_O and k to Estimate the U_* and U centerline for Three 10-m Velocities: 25, 32, and 40 mph

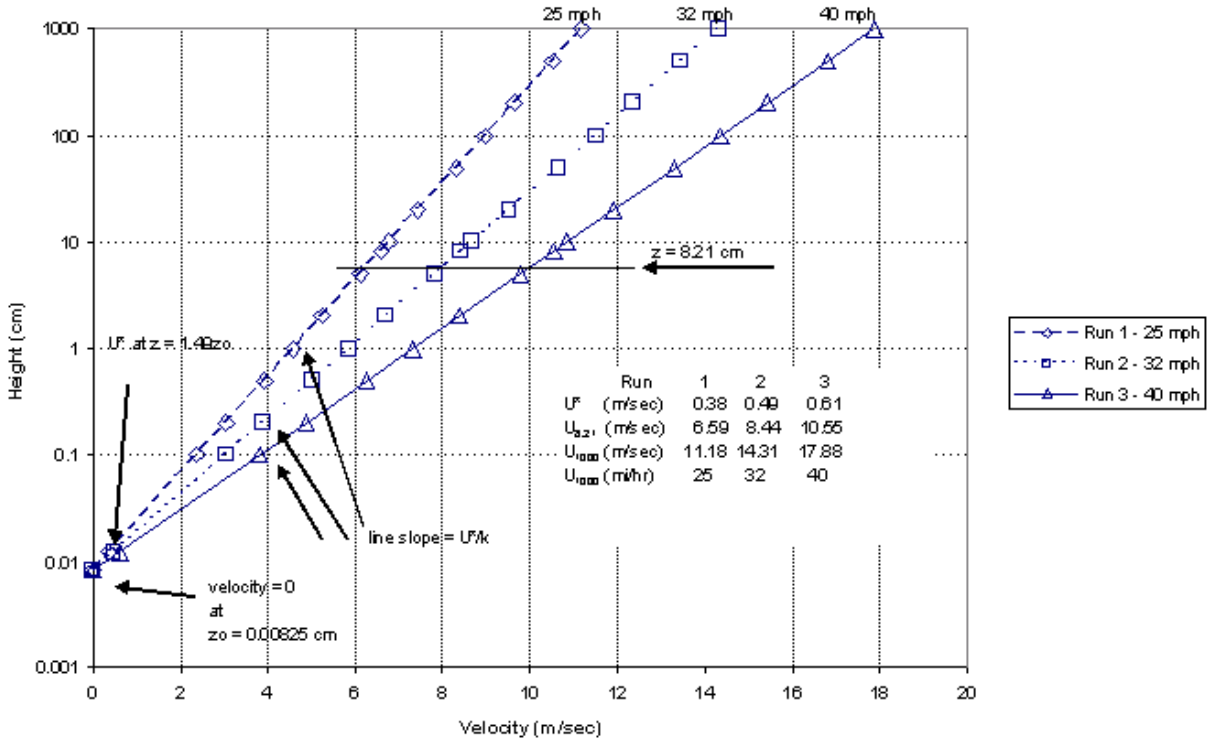

FIGURE E.11b Logarithmic Transformation of Figure E.12a to Show U_* and U (8.21 cm) Data Point Where Curves Cross z at 8.21 cm, Pitot Tube Centerline Velocity

disassembled, cleaned, and reassembled at a different area. The entire procedure was repeated at the new location at a higher indicated wind speed. After the second run was completed, the entire procedure was repeated a third time.

The tunnel was run three times at each site. The first run was done at about 20 mph, the second was run at about 30 mph, and the third was run at about 40 mph. For the first 24 wind tunnel sites (WT 079 through WT 100), the goal was to conduct three sampling runs per location (every run in a different spot) at three different, successively higher wind speeds. For sites WT 101 through WT 110, a fourth run was added. It corresponded to an increasing, step-by-step progression of wind speeds, all done in one place within one run.

Samples collected from the elutriation chamber and the cyclone were returned to the laboratory for weighing. Weight changes were determined with a Sargent-Welch electronic analytical balance with resolution of ±0.1 mg.

Elutriation chamber and flux data were used to estimate TFVs for the tested sites. The elutriation chamber data were plotted against u_*. A sharp increase in the slope of the flux curve was interpreted as an indication of exceeding the TFV for that site (Figure E.12).

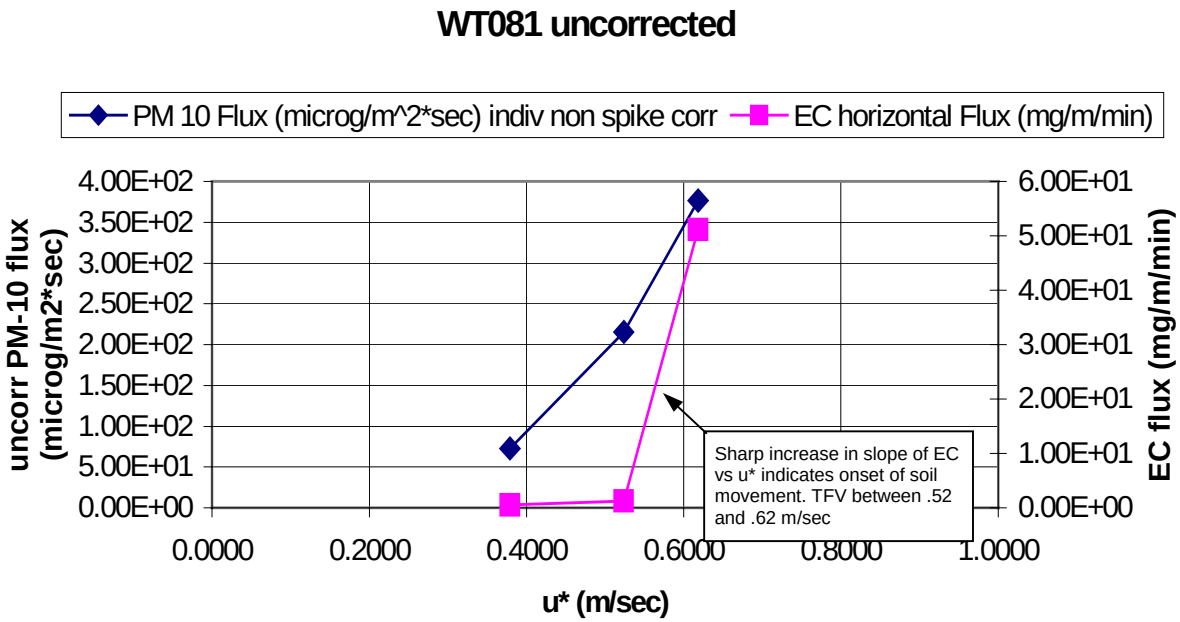

FIGURE E.12 Example of Determining the Threshold Friction Velocity

Glass fiber filters were preconditioned in a constant humidity of 15% ±2%, chamber weighed, sealed flat in large plastic ziplock bags, and handled with latex gloves when installed in the PM_{10} sampler and removed from the PM_{10} filter mount in the field. After sampling, they were returned to the laboratory and reconditioned to the same relative humidity and temperature, then reweighed. The weights of the filter were determined to be within ±0.1 mg in a Sargent-Welch electronic balance. The 2003 wind tunnel studies showed that unless an unusually high PM_{10} concentration was eroded from the soil surface, the 10-minute wind tunnel sampling runs were not long enough to detect weight changes in the glass fiber filters. For this reason, TSI monitor PM_{10} data were used to estimate PM_{10} fluxes.

E.2.8.4 Spatial and Temporal Variability Field Studies

Ten locations tested early in the study period were revisited later, and a slightly different procedure was performed. A progressive velocity run was also added to the field tests at sites WT 101 to WT 110. During this part of the experiment, the tunnel was assembled on the soil surface to perform a "stable run." After each run, the soil was disturbed. A metal-tined yard rake was used to make the surface unstable, and the "unstable run" was performed. The tunnel was then moved to another area, and the second run was performed, using the same procedure as that described above. After the third run, another location was chosen to perform the fourth progressive-velocity run. In this fourth run, three progressively increasing velocities (nominally 20, 30, and 40 mph at 10 m) were used in the same spot. Each velocity was held for 200 seconds.

E.2.9 Uncertainty Analysis of Wind Tunnel Measurements

The uncertainties of individual instruments, tabulated from manufacturers' specifications, are shown in Table E.7. Spatial variations and short-term temporal fluctuations in field data were usually larger than individual instrument uncertainties. The approximate magnitudes of the short-term temporal fluctuations and spatial variations were determined in the uncertainty analyses presented below. Uncertainties for derived quantities were determined as the square root of the sum of the squares of uncertainties of directly measured values by using the following formulas (Bevington 1969, Holman 1989).

For a quantity X that is a function of parameters A, B, C . . ., $X = f\,(A,B,C,\ldots)$

$$\omega X = \left\{ [(\delta X/\delta A)\omega A]^2 + [(\delta X/\delta B)\omega B]^2 + [(\delta X/\delta C)\omega C]^2 + \ldots \right\}^{1/2} \tag{28}$$

where

$\delta X/\delta A$, $\delta X/\delta B$, $\delta X/\delta C$, etc. = partial derivatives of X with respect to A, B, C, etc., respectively. (The partial derivatives represent the rate of change of the quantity X with respect to each parameter, and can be thought of as "weights" on the uncertainties.

ωA, ωB, ωC, etc. = experimental uncertainties of the parameters A, B, C, etc., respectively.

For example, to compute the gas density $\rho = [PMW]/[RT]$,

$$\omega\rho = \left\{ [(\delta\rho/\delta P)\omega P]^2 + [(\delta\rho/\delta MW)\omega MW]^2 + [(\delta\rho/\delta T)\omega T]^2 + [(\delta\rho/\delta R)\omega R]^2 \right\}^{1/2}. \tag{29}$$

When the partial derivatives are symbolically determined and substituted into equation 29 and the result is divided by the formula for ρ, the following symbolic relationship for the relative uncertainty of δ is obtained:

$$\omega\rho/\rho = \left\{ [\omega\rho/\delta PP]^2 + [\omega MW/MW]^2 + [-\omega T/T]^2 + [-\omega R/R]^2 \right\}^{1/2}. \tag{30}$$

The values of P, MW, R, and T and the values of the uncertainties ωP, ωMW, ωR, and ωT may be substituted into equation 30 to compute the relative uncertainty of gas density. For example, for

P = 0.920 atm	Uncertainty ωP = 0.00167 atm
(from P = 27.53 in. Hg)	(Uncertainty ωP = 0.05 in. Hg)
MW = 28.9 g/gmol	Uncertainty ωMW = 0.2 g/gmol
R = 0.08206 atm-L/mol/K	Uncertainty ωR = 0.0001 atm-L/mol/K
T = 294K	Uncertainty ωT = 0.55K

TABLE E.7 Summary of Instrumental Uncertainties

Instrument Name	Manufacturer	Model No. and Name	Accuracy	Readability/ Precision
Differential pressure gauge	Dwyer Magnehelic	2000-00	±4% of reading at 21°C	±0.005 in. H_2O
Differential pressure gauge	Dwyer Magnehelic	2001AV	±2% reading at 21°C	±0.02 in. H_2O
Pitot tube profiling	Dwyer	160–12	See differential pressure gauge	See differential pressure gauge
Wind gauge	Nielsen-Kellerman	Kestrel 4000	±3 of reading	±0.1 mph
Thermometer	VWR	Electronic digital barometer	±1°C	±0.1°C
Barometer	VWR	Electronic digital barometer	±0.1477 in. Hg	± 0.01 in. Hg
Relative humidity	VWR	Electronic digital barometer	±5%	±1%
Balance	Sargent Welch	TLA 100	±1.0 mg	±0.1 mg
DUSTTRAK aerosol monitor	TSI	8520	NA[a]	±0.1% reading or ±0.001 mg/m^3, whichever is greater
GPS	Garmin	eTrex	NA	NA
GPS	Magellan	Trailblazer	NA	NA
Electronic manometer	Dwyer	475-1-Mark II	±0.5% full scale at 15-25°C ±1.5% full scale at 0-15 and 25-40°C	±0.01 in. H_2O
Flow sensor	Dwyer	DS-200-4	See electronic manometer	See electronic manometer

[a] NA = not available.

$$\omega\rho/\rho = \{[0.00167/0.920]^2 + [0.2/28.9]^2 + [-0.0001/0.08206]^2 + [-0.55/294)]^2\}^{1/2}$$

$$= 5.62 \times 10^{-5}\}^{1/2} = 7.50 \times 10^{-3}$$

$$\rho = [(0.92)\ (28.9)]/[(0.08206)\ (294)] = 1.100\ \text{kg/m}^3\text{, yielding}$$

$$\omega\rho = 7.50 \times 10^{-3} \times 1.100\ \text{kg/m}^3 = 0.008\ \text{kg/m}^3\ .$$

In this study, uncertainties were computed for gas density, centerline velocity, 10-m velocity, averaging pitot velocity, tunnel volumetric flow rate, and PM_{10} flux. Tables E.8 through E.14 (shown at the end of Section E.2.9) present uncertainty results for the quantities used in determining the PM_{10} emission factors. Tables E.13 and E.14 also present uncertainty results for PM_{10} emission factors (flux in tons/acre/h) for several combinations of riser flow uncertainty and PM_{10} concentrations. A summary of the table contents is given here:

		Estimated Relative Uncertainty (%)	
Table	Parameter	Worst Case	Best Case
E.8	Air density	0.75	0.75
E.9	Centerline velocity	13	4
E.10	10-m velocity	17	12
E.10	Tunnel volumetric flow rate	6	4
E.11	Tunnel floor area, flux calculations	0.50	0.50
E.12	Others, flux calculations	See Tables E.13-E.15 for both cases	
E.13	PM_{10} flux, low riser flow uncertainty	71	7
E.14	PM_{10} flux, high riser flow uncertainty	71	10

When the relative uncertainty of the riser flow rate is low (4%) and the PM_{10} background uncertainty is ±10 μg/m^3, the emission factor uncertainty results shown in Table E.13 are obtained. Corresponding combinations displayed in Table E.13 are underlined. When the relative uncertainty of the riser flow rate is high (9%) and the PM_{10} background uncertainty is ±10 μg/m^3, the emission factor uncertainty results shown in Table E.14 are obtained.

Tables E.13 and E.14 show that flux (emission factor) relative uncertainties tend to plateau at the riser flow rate uncertainty for the conditions at which the relative uncertainty in the PM_{10} riser concentration is small (low fluctuations and a high average PM_{10} concentration). This corresponds to physical conditions where the stochastic fluctuations in the TSI-measured PM_{10} signal are small. Relative uncertainties in flux estimates are highest for the conditions at which the riser PM_{10} concentration is low and the uncertainties in the riser and background PM_{10} concentrations are high. Physically, this corresponds to occasions when the tunnel is measuring fluxes from stabilized surfaces that generate low amounts of PM_{10}.

TABLE E.8 Sources of Uncertainty in Air Density Calculations

Formula[a]	Scenario 1 Low temp, low press r = m/V = $P\ MW/RT$	Scenario 2 High temp, high press r = m/V = $P\ MW/RT$	Source of Uncertainty
P, in. Hg	27.53	28.43	
ωP, in. Hg	0.05	0.05	Last digit of display
$\omega P/P$	1.82E-03	1.76E-03	
T, °R	530.0	570.0	
ωT, °R	1.0	1.0	Resolution of thermometer
$\omega T/T$	1.89E-03	1.75E-03	
MW, g/gmol	28.9	28.7	
ωMW, g/gmol	0.2	0.2	Variation in composition with relative humidity changes
$\omega MW/MW$	6.92E-03	6.97E-03	
°R, atm-L/gmol-K	0.08206	0.08206	
ω°R	0.0001	0.0001	±1 in last digit
ω°R/°R	1.22E-03	1.22E-03	
Sum of squares	5.62E-05	5.62E-05	
rms uncertainty $\omega r/r$	7.50E-03	7.50E-03	
rms, %	0.750	0.750	
Density r, kg/m^3	1.100	1.049	
rms $\omega r/2$, ±kg/m^3	0.004	0.004	

a rms = root mean square.

TABLE E.9 Sources of Uncertainty in Centerline and 10-m Velocities

Scenario	1	2	Source of Uncertainty
Instrument	Profiling pitot tube	Profiling pitot tube	
Measurement	Centerline Δp	Centerline Δp	
Conditions	Best case	Worst case	
Formula	$V = k[2\Delta P/r]^{1/2}$	$V = k[2\Delta P/r]^{1/2}$	
Typical data			
ΔP, in. H_2O	0.160	0.160	
$\pm$ Uncertainty in meter reading	0.005	0.020	
Cause	Meter readability	Cross-wind fluctuation	See "cause" in each column
$\omega\Delta P$, in. H_2O (= 2$\times$ fluct)	0.010	0.040	
$\omega\Delta P/\Delta P$	6.25E-02	2.50E-01	
ρ, kg/m^3	1.06	1.06	
$\omega\ \rho$, kg/m^3	0.008	0.008	Density calculation, Table E.3
$\omega\ \rho/\rho$	7.55E-03	7.55E-03	
k (pitot constant)	1.000	1.000	
ωk	0.020	0.020	Variation in k for $\pm$5º alignment error
$\omega k/k$	0.020	0.020	
Sum of squares $S(\omega X/X)^2$	1.39E-03	1.60E-02	
$\omega V/V = [S(\omega X/X)^2]^{1/2}$	3.73E-02	1.27E-01	
rms uncert $\omega V/V$, %	3.7	12.7	V = centerline velocity at z_1 = 7.6 cm

Scenario for U_{10}	1	2	Unit and Source of Uncertainty
Computed centerline velocity	9.2	9.2	m/s
Uncertainty, ωV	0.3	1.2	m/s
Computed centerline velocity	20.6	20.6	mph
Uncertainty, ωV	0.8	2.6	mph
Sample aerodynamic roughness, z_o	0.100	0.100	cm
Uncertainty, ωz_o	0.010	0.010	cm, estimate from regression
Centerline height, z_1	7.60	7.60	cm
Uncertainty, ωz_1	0.10	0.10	cm, wobble in pitot adjustment
Wind measurement height, z_2	1000	1000	cm
(rms term ωrt $z_o)^2$	1.27E-02	1.27E-02	
(rms term ωrt $z_1)^2$	9.23E-06	9.23E-06	
(rms term ωrt V, $\omega V/V)^2$	1.39E-03	1.60E-02	
rms uncert $\omega(u_{10})/(u_{10})$, %	11.9	17.0	
Extrapolated (u_{10})	43.7	43.7	mph
Uncertainty $\omega(u_{10})$	5.2	7.4	mph

TABLE E.10 Sources of Uncertainty in Averaging Pitot Velocity and Tunnel Volumetric Flow Rate

Scenario	1	2	Source of Uncertainty
Instrument	Averaging pitot tube	Averaging pitot tube	
Measurement	ΔP at 4 locations	ΔP at 4 locations	
Conditions	Best case	Worst case	
Formula	$V = k[2\Delta P/r]^{1/2}$	$V = k[2\Delta P/r]^{1/2}$	
Typical data			
ΔP, in. H_2O	3.200	3.200	
± Uncertainty in meter reading	0.050	0.150	
Cause	Fan pulsation	Cross winds	See "cause" in each column
$\omega\Delta P$, in. H_2O (= 2× fluct)	0.100	0.300	
$\omega\Delta P/DP$	3.13E-02	9.38E-02	
r, kg/m^3	1.06	1.06	
ωr, kg/m^3	0.008	0.008	Density calculation, Table E.3
$\omega r/r$	7.55E-03	7.55E-03	
k (pitot constant)	0.600	0.600	
ωk	0.020	0.020	Variation in k for ±5º alignment error
$\omega k/k$	3.33E-02	3.33E-02	
Sum of squares $S(\omega X/X)^2$	1.37E-03	3.32E-03	
$\omega V/V = [S(\omega X/X)^2]^{1/2}$	3.70E-02	5.76E-02	
rms uncert $\omega V/V$, %	3.7	5.8	
Computed velocity, m/s	24.7	24.7	
rms uncertainty, ±m/s	0.9	1.4	
Computed velocity, mph	55.2	55.2	
rms uncertainty, ±mph	2.0	3.2	
Pipe cross section	Round	Round	
Volumetric flow conversion	$Q = V$ (p diam^2/4)	$Q = V$ (p diam^2/4)	
Pipe diam, in.	4.00	4.00	
Pipe diam, ft	0.333	0.333	
Pipe area, ft^2	0.087	0.087	
Velocity, ft/min	4856	4856	
Approximate wall correction	1.00	1.00	
Flow rate, ft^3/min	424	424	
Flow rate uncertainty, ft^3/min	16	24	

TABLE E.11 Sources of Uncertainty in Flux Calculations

Variable	Typical Value	Source of Uncertainty
Working section length, in.	60	
ωLength in.	3.13E-02	Measurement uncertainty, tape
ωLength/Length	5.21E-04	
Working section width, in.	6	
ωWidth, in.	3.13E-02	Measurement uncertainty, tape
ωWidth/Width	5.21E-03	
Area, ft^2	2.500	
ωArea, ft^2	1.31E-02	RMS error computed from length and width uncertainties
ωArea/Area	5.23E-03	
Q_{avg}, cfm	424	
$\omega Q_{avg}/Q_{avg}$	5.76E-02	Max fluctuation in meter reading from cross winds, fan oscillations
ωQ_{avg}, cfm	24	Computed from pitot probe fluctuations (see Table E.10)
Q_{cyc}, cfm	40.0	
ωQ_{cyc}, cfm	1.0	Assumed venturi choke flow uncertainty
$\omega Q_{avg}/(Q_{avg} + Q_{cyc})$	5.26E-02	
$\omega Q_{cyc}/(Q_{avg} + Q_{cyc})$	2.16E-03	
C_{rise}, $\mu g/m^3$	1000	
C_{bak}, $\mu g/m^3$	20	
$C_{rise} - C_{bak}$, $\mu g/m^3$	980	
ωC_{rise}, $\mu g/m^3$	200	If large, RMS error of fluctuating TSI signal. If small, uncertainty in individual TSI measurement. See flux calculation scenarios.
$\omega C_{rise}/(C_{rise} - C_{bak})$	2.04E-01	
ωC_{bak}, $\mu g/m^3$	10	Assumed clean air background PM_{10}
$\omega C_{bak}/(C_{rise} - C_{bak})$	1.02E-02	

TABLE E.12 Uncertainty Analysis of Flux Calculations for High-Riser-Flow Scenarios Stabilized and Several Riser Concentrations

Scenario	1	2	3	4	5	6	7	8	9
Riser concentration	High	High	High	Medium	Medium	Medium	Low	Low	Low
Riser concentration uncertainty	High	Medium	Low	High	Medium	Low	High	Med	Low
Typical site	Unstable lands	Unstable lands		Stable lands	Stable lands		Stabilized lands	Stabilized lands	Stabilized lands
Surface condition							Torn up		Not torn up
Riser flow uncertainty	High	High	High	High	High	High	High	High	High
Data									
Area, ft^2	2.500	2.500	2.500	2.500	2.500	2.500	2.500	2.500	2.500
ωArea, ft^2	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
ωArea/Area	5.23E-03	5.23E-03	5.23E-03	5.23E-03	5.23E-03	5.23E-03	5.23E-03	5.23E-03	5.23E-03
Q_{avg}, cfm	438	438	438	438	438	438	438	438	438
Q_{cyc}, cfm	40	40	40	40	40	40	40	40	40
$Q_{avg} + Q_{cyc}$, cfm	478	478	478	478	478	478	478	478	478
ωQ_{avg}, cfm	43	43	43	43	43	43	43	43	43
$\omega Q_{avg}/(Q_{avg} + Q_{cyc})$	9.00E-02	9.00E-02	9.00E-02	9.00E-02	9.00E-02	9.00E-02	9.00E-02	9.00E-02	9.00E-02
ωQ_{cyc}, cfm	1	1	1	1	1	1	1	1	1
$\omega Q_{cyc}/(Q_{avg} + Q_{cyc})$	2.09E-03	2.09E-03	2.09E-03	2.09E-03	2.09E-03	2.09E-03	2.09E-03	2.09E-03	2.09E-03
C_{rise}, $\mu g/m^3$	1000	1000	1000	200	200	200	40	40	40
C_{bak}, $\mu g/m^3$	20	20	20	20	20	20	20	20	20
$C_{rise} - C_{bak}$, $\mu g/m^3$	980	980	980	180	180	180	20	20	20
ωC_{rise}, $\mu g/m^3$	200	100	50	50	20	10	10	6	2
$\omega C_{rise}/(C_{rise} - C_{bak})$	2.04E-01	1.02E-01	5.10E-02	2.78E-01	1.11E-01	5.56E-02	5.00E-01	3.00E-01	1.00E-01
ωC_{bak}, $\mu g/m^3$	10	10	10	10	10	10	10	10	10
$\omega C_{bak}/(C_{rise} - C_{bak})$	1.02E-02	1.02E-02	1.02E-02	5.56E-02	5.56E-02	5.56E-02	5.00E-01	5.00E-01	5.00E-01
$S(\omega X/X)^2$	4.99E-02	1.86E-02	1.08E-02	8.84E-02	2.36E-02	1.43E-02	5.08E-01	3.48E-01	2.68E-01
RMS uncert $[S(\omega X/X)^2]^{1/2}$	2.23E-01	1.37E-01	1.04E-01	2.97E-01	1.53E-01	1.20E-01	7.13E-01	5.90E-01	5.18E-01
RMS uncertainty, %	22	14	10	30	15	12	71	59	52
Flux, tons/acre/h	1.53E-02	1.53E-02	1.53E-02	2.81E-03	2.81E-03	2.81E-03	3.12E-04	3.12E-04	3.12E-04
RMS uncertainty, tons/acre/h	0.34E-02	0.21E-02	0.16E-02	0.84E-03	0.43E-03	0.34E-03	2.23E-04	1.84E-04	1.62E-04

TABLE E.13 Results Summary for 4% Riser Flow Uncertainty and +10 μg/m^3 Background PM_{10} Uncertainty

Riser PM_{10} Uncertainty (μg/m^3)	PM_{10} Flux Relative Uncertainty (%) per Riser PM_{10} Concentration		
	40 μg/m^3	200 μg/m^3	1000 μg/m^3
10	71	9	4
20	112	13	5
50	[a]	29	7
100	[a]	56	11
200	[a]	[a]	21

[a] Combination is not physically real.

TABLE E.14 Results Summary for 9% Riser Flow Uncertainty and +10 μg/m^3 Background PM_{10} Uncertainty

Riser PM_{10} Uncertainty (μg/m^3)	PM_{10} Flux Relative Uncertainty (%) per Riser PM_{10} Concentration		
	40 μg/m^3	200 μg/m^3	1000 μg/m^3
10	71	12	9
20	112	15	9
50	[a]	30	10
100	[a]	57	14
200	[a]	[a]	22

[a] Combination is not physically real.

E.2.10 1995 Field Repeatability Study

In late 1995, a field repeatability study was conducted with the portable wind tunnel in order to estimate the inherent variability of its particulate measurements. About 3 ft^3 of soil was collected in five 5-gal plastic buckets from 1995 wind tunnel site WT 078. This was an unstable site with one of the highest measured PM_{10} production rates. It was located on the east side of the Las Vegas Valley near the intersection of Mountain Vista and Gold Dust. The bucket contents were thoroughly mixed before the soil was applied to the ground.

A 1-in. thick, 1-ft wide, 8-ft long uniform layer of soil was placed on a level concrete pad in the utility yard of the UNLV College of Engineering, a site partially shielded from the wind by a 10-ft high wall. The top surface was smoothed with flat cardboard and then indented with about 1/8 in. of surface relief with corrugated cardboard. The cardboard was removed, and the portable wind tunnel was placed on the soil. Its flaps were sealed to the surface with more soil from the site. The wind tunnel was operated at a fixed flow rate. Then PM_{10} filter, cyclone, saltation, and TSI measurements were obtained.

Eight controlled runs were conducted at the same tunnel flow rate, with each run conducted on a new batch of soil. (Soil from the previous run was swept up before new soil was applied to the concrete pad.) The results of these eight controlled runs are shown in Table E.15.

The average TSI monitor PM_{10} mass collected was 46.2 μg, with a standard deviation (sd) of 21.0 μg, giving a coefficient of variation (CV) of 21.0/46.2 = 0.45, or 45%, for an average riser concentration of 2.72 mg/m^3 (2,720 $\mu g/m^3$). This CV was lower than the CVs for the other collected size fractions but higher than the theoretical uncertainty estimated for single measurements of high riser PM_{10} concentrations in Tables E.13 and E.14.

E.3 References for Appendix E

Bevington, 1969, to be provided.

Clark County, 2004, *Clark County Air Quality Regulations*, amended Oct. 21, 2003. Pdf files available at http://www.co.clark.nv.us/air_quality/Regs/. Accessed Feb. 3, 2004.

Gillette, D., et al., 1996, “Causes of the Fetch Effect in Wind Errosion,” *Earth Surface Processes and Landforms* 21, 641-659.

Holman, 1989, to be provided.

TABLE E.15 Results of 1995 Experimental Repeatability Study

Parameter	Saltation	Cyclone	Filter	TSI PM_{10}
Mass per run no., mg				
D003	10,086.3	124.5	171.9	0.05949
C001	4,853.3	141.8	36.0	0.03835
C002	7,366.1	353.0	72.0	0.05722
D004	6,137.5	167.0	37.0	0.04166
E001	2,201.3	198.0	108.4	0.02516
E002	10,527.4	644.2	17.3	0.07374
E003 (g)	11,822.9	871.1	123.4	0.06267
E004	594.6	94.4	111.9	0.01115
Avg.	6,698.7	324.3	84.7	0.0462
SD[a]	4,036.3	285.1	53.1	0.0210
Coeff. var., %	60	88	63	45
Avg. – 1 SD, mg	2,662.3	39.2	31.6	0.0252
Avg., mg	6,698.7	324.3	84.7	0.0462
Avg. + 1 SD, mg	10,735.0	609.3	137.9	0.0672
Flow rate, cfm	440	40	40	
Flow rate, L/min				1.7
Avg. conc., mg/m^3	53.77	28.63	7.48	2.72

[a] SD = standard deviation.

Appendix F:

Wind Tunnel Data Analysis, Measurement, Reduction, and Compilation

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Tables

F.1 Results of 2003 Wind Tunnel Field Study: Flow Calculations F-2

F.2 Results of 2003 Wind Tunnel Field Study: Uncorrected PM_{10} Flux Data F-6

F.3 Results of 2003 Wind Tunnel Field Study: PM_{10} Flux Spike Data F-14

F.4 Results of 2003 Wind Tunnel Field Study: Raw TFV Data F-19

F.5 Results of 2003 Wind Tunnel Field Study: Spike-Corrected PM_{10} Flux Data F-24

F.6 Results of 2003 Wind Tunnel Field Study: Corrected PM_{10} Flux and TFV Data Used for Fits — Power Functions F-29

F.7 Results of 2003 Wind Tunnel Field Study: Corrected PM_{10} Flux and TFV Data Used for Fits — Default Functions F-30

F.8 Results of 2003 Wind Tunnel Field Study: Summary Table, Effective TFV, and Effective Aerodynamic Roughness F-32

F.9 Results of 2003 Wind Tunnel Field Study: Ranges of Parameters Used for Model Fits F-34

F.10 Example Showing How Spike Removal Data Are Processed, Taken from Site WT 102, Run 3, 9/23/2003, SECC 5SU F-37

Figures

F.1 Locations of Portable Wind Tunnel Test Sites within Las Vegas Valley F-38

F.2a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 2, Stable Disturbed Soil F-39

F.2b Aerial Photo of Amigo Wind Tunnel Test Site WT 91 ..... F-40

F.2c Ground Surface Photo of Amigo Wind Tunnel Test Site WT 91 ..... F-41

F.2d Closeup Photo of Tunnel Soil at Amigo Wind Tunnel Test Site WT 91 ..... F-42

F.3a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 2, Stable Undisturbed Soil F-43

Figures (Cont.)

F.3b Aerial Photo of Sunset Park Wind Tunnel Test Sites WT 79 and 80 ..... F-44

F.3c Ground Surface Photo of Sunset Park Wind Tunnel Test Sites WT 79 and 80 ..... F-45

F.3d Closeup Photo of Tunnel Soil at Sunset Park Wind Tunnel Test Sites WT 79 and 80 ..... F-46

F.4a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 3, Stable Disturbed Soil F-47

F.4b Ground Surface Photos of Pebble and Cheyenne Wind Tunnel Test Sites WT 81 and 100 ..... F-48

F.4c Aerial Photos of Pebble and Cheyenne Wind Tunnel Test Sites WT 81 and 110 ..... F-49

F.4d Closeup Photos of Tunnel Soil at Pebble and Cheyenne Wind Tunnel Test Sites WT 81 and 100 ..... F-50

F.5a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 3, Unstable Disturbed Soil F-51

F.5b Aerial Photo of Cheyenne Wind Tunnel Test Site WT 110 ..... F-52

F.5c Ground Surface Photo of Arial Photo of Cheyenne Wind Tunnel Test Site WT 110 ..... F-53

F.5d Closeup Photo of Tunnel Soil at Cheyenne Wind Tunnel Test Site WT 110 ..... F-54

F.6a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 4, Stable Disturbed Soil F-55

F.6b Aerial Photos of Durango & Alexander and Washington & Buffalo Wind Tunnel Test Sites WT 103 and 84 ..... F-56

F.6c Ground Surface Photos of Durango & Alexander and Washington & Buffalo Wind Tunnel Test Sites WT 103 and 84 ..... F-57

F.6d Closeup Photos of Tunnel Soil at Durango & Alexander and Washington & Buffalo Wind Tunnel Test Sites WT 103 and 84 ..... F-58

F.7a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 4, Stable Undisturbed Soil F-59

Figures (Cont.)

F.7b Aerial Photos of Durango & Alexander and Buffalo-Blue Wind Tunnel Test Sites WT 88 and 99 ..... F-60

F.7c Ground Surface Photos of Durango & Alexander and Buffalo-Blue Wind Tunnel Test Sites WT 88 and 99 ..... F-61

F.7d Closeup Photos of Tunnel Soil at Durango & Alexander and Buffalo-Blue Wind Tunnel Test Sites WT 88 and 99 ..... F-62

F.8a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 6, Unstable Disturbed Soil F-63

F.8b Aerial Photo of Hollywood Wind Tunnel Test Site WT 105 ..... F-64

F.8c Ground Surface Photo of Hollywood Wind Tunnel Test Site WT 105 ..... F-65

F.8d Closeup Photo of Tunnel Soil at Hollywood Wind Tunnel Test Site WT 105 ..... F-66

F.9a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 6, Stable Disturbed Soil F-67

F.9b Aerial Photo of Lamb Wind Tunnel Test Site WT 109 ..... F-68

F.9c Ground Surface Photo of Lamb Wind Tunnel Test Site WT 109 ..... F-69

F.9d Closeup Photo of Tunnel Soil at Lamb Wind Tunnel Test Site WT 109 ..... F-70

F.10a First Example of TSI PM_{10} Spike Removal F-71

F.10b Second Example of TSI PM_{10} Spike Removal F-72

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Appendix F:

Wind Tunnel Data Analysis, Measurement, Reduction, and Compilation

Compiled results of wind tunnel field measurements at the tested sites are summarized in Tables F.1 through F.10. Figures F.1 to F.9 show the plots, aerial photos, ground surface photos, and closeup photos of tunnel soil for the selected soil erodibility condition class (SECC) fits used in the model. All selected SECC fit data were plotted by using $u_*(u_*^2 - u_*^2)$, measured in cubic meters per cubic second, in the X axis and by using the PM_{10} flux, measured in micrograms per square meter, in the Y axis. (PM_{10} = particulate matter with a mean aerodynamic diameter of 10 μm or less.) Each figure shows the equation that was used for developing the emission factor functions.

Figure F.10 shows the PM_{10} data series versus time for site WT 102, emission run 3, dated September 23, 2003. The highlighted portion of the trace, at the front of the time series, indicates the "spike" that was removed from the sampled mass prior to calculating a spike-corrected PM_{10} flux that would be used over time periods of an hour or more.

TABLE F.1 Results of 2003 Wind Tunnel Field Study: Flow Calculations

This table presents data from measurements taken in the field, such as barometric pressure and temperature measurements, as well as flow results with the isokinetic error percentage for all sites tested during the study period. ACFM = actual cubic feet per minute.

Date	Site	Run	Barometric Pressure (in. Hg)	Temperature (ºF)	Avg. Pitot ΔP (in. H_2O)	Q (ACFM)	Isokinetic Error (%)
8/11/2003	WT079	1	27.70	90.0	3.20	474	0.00
8/11/2003	WT079	2	27.76	99.5	3.20	481	0.00
8/11/2003	WT079	3	27.79	111.2	3.50	513	9.37
8/19/2003	WT079R	1	27.70	83.3	3.20	468	0.00
8/19/2003	WT079R	2	27.73	87.8	3.20	471	0.00
8/19/2003	WT079R	3	27.76	92.3	3.20	474	0.00
8/11/2003	WT080	1	27.79	122.9	3.20	500	0.00
8/11/2003	WT080	2	27.82	128.3	3.70	542	15.63
8/11/2003	WT080	3	27.82	124.7	3.65	535	14.06
8/12/2003	WT081	1	27.58	95.0	3.30	487	3.12
8/12/2003	WT081	2	27.58	99.5	3.20	484	0.00
8/12/2003	WT081	3	27.61	105.8	3.20	489	0.00
8/13/2003	WT082	1	27.64	90.5	3.30	482	3.12
8/13/2003	WT082	2	27.67	94.1	3.60	507	12.50
8/13/2003	WT082	3	27.67	97.7	3.30	488	3.12
8/18/2003	WT082R	1	27.61	84.2	3.31	478	3.44
8/18/2003	WT082R	2	27.52	90.5	3.31	485	3.44
8/18/2003	WT082R	3	27.55	65.0	3.29	461	2.81
8/14/2003	WT083	1	27.34	86.0	3.26	481	1.87
8/14/2003	WT083	2	27.29	88.7	3.35	491	4.69
8/14/2003	WT083	3	27.32	94.1	3.30	491	3.12
8/15/2003	WT084	1	27.82	82.4	3.73	502	16.56
8/15/2003	WT084	2	27.37	81.5	3.30	479	3.12
8/15/2003	WT084	3	27.32	84.2	3.49	496	9.06
8/21/2003	WT085	1	27.61	84.2	3.31	478	3.44
8/21/2003	WT085	2	27.82	84.2	3.30	474	3.12
8/21/2003	WT085	3	27.85	87.8	3.79	511	18.44
8/21/2003	WT086	1	27.85	96.8	3.30	484	3.12
8/21/2003	WT086	2	27.80	97.7	3.30	486	3.12
8/21/2003	WT086	3	27.08	99.5	3.80	537	18.75
8/22/2003	WT087	1	27.73	95.9	2.45	418	-23.44
8/22/2003	WT087	2	27.73	96.8	3.20	479	0.00
8/22/2003	WT087	3	27.70	102.2	3.20	484	0.00
8/25/2003	WT088	1	27.43	83.3	3.21	473	0.31
8/25/2003	WT088	2	27.46	89.6	3.20	477	0.00
8/25/2003	WT088	3	27.49	90.5	3.69	513	15.31
8/28/2003	WT089	1	27.40	77.9	3.20	468	0.00
8/28/2003	WT089	2	27.43	79.7	3.20	469	0.00
8/28/2003	WT089	3	27.43	80.6	3.20	470	0.00

TABLE F.1 (Cont.)

Date	Site	Run	Barometric Pressure (in. Hg)	Temperature (ºF)	Avg. Pitot ΔP (in. H_2O)	Q (ACFM)	Isokinetic Error (%)
8/29/2003	WT090	1	27.58	81.5	3.20	468	0.00
8/29/2003	WT090	2	27.61	86.9	3.20	472	0.00
8/29/2003	WT090	3	27.61	88.7	3.20	474	0.00
8/29/2003	WT091	1	27.67	98.6	3.20	481	0.00
8/29/2003	WT091	2	27.64	99.5	3.20	483	0.00
8/29/2003	WT091	3	28.11	97.7	3.21	474	0.31
9/3/2003	WT092	1	27.64	84.2	3.20	470	0.00
9/3/2003	WT092	2	27.64	89.6	3.20	474	0.00
9/3/2003	WT092	3	26.67	94.1	3.20	496	0.00
9/4/2003	WT093	1	27.91	85.1	3.20	466	0.00
9/4/2003	WT093	2	28.05	86.0	3.20	464	0.00
9/4/2003	WT093	3	28.05	89.6	3.71	503	15.94
9/5/2003	WT094	1	28.26	87.8	2.87	438	-10.31
9/5/2003	WT094	2	28.26	89.6	3.20	464	0.00
9/5/2003	WT094	3	28.26	95.0	2.87	444	-10.31
9/10/2003	WT095	1	27.76	79.7	3.20	464	0.00
9/10/2003	WT095	2	27.82	80.7	3.20	464	0.00
9/10/2003	WT095	3	27.82	82.4	3.20	465	0.00
9/8/2003	WT096	1	27.94	79.7	3.20	461	0.00
9/8/2003	WT096	2	27.96	82.4	3.20	463	0.00
9/8/2003	WT096	3	27.96	85.1	3.20	465	0.00
9/9/2003	WT097	1	27.96	87.8	3.23	469	0.94
9/9/2003	WT097	2	27.96	86.9	3.20	466	0.00
9/9/2003	WT097	3	27.96	89.6	3.20	469	0.00
9/9/2003	WT098	1	27.73	77.90	3.20	463	0.00
9/9/2003	WT098	2	27.76	78.80	3.20	463	0.00
9/9/2003	WT098	3	27.79	83.30	3.20	466	0.00
9/18/2003	WT099	1	27.26	73.40	3.20	467	0.00
9/18/2003	WT099	2	27.26	75.20	3.25	472	1.56
9/18/2003	WT099	3	27.26	77.00	3.20	470	0.00
9/19/2003	WT100	1	27.76	69.8	3.20	455	0.00
9/19/2003	WT100	2	27.76	75.2	3.20	460	0.00
9/19/2003	WT100	3	27.73	78.8	3.20	463	0.00

TABLE F.1 (Cont.)

Date	Site	Run	Barometric Pressure (in. Hg)	Temperature (ºF)	Avg. Pitot ΔP (in. H_2O)	Q (ACFM)	Isokinetic Error (%)
9/22/2003	WT101	1	27.76	82.4	3.20	466	0.00
9/22/2003	WT101	2	27.79	90.5	3.20	472	0.00
9/22/2003	WT101	3	27.79	100.4	3.20	481	0.00
9/22/2003	WT101	4	27.79	104.0	3.20	484	0.00
9/22/2003	WT101	1	27.79	86.9	3.20	469	0.00
9/22/2003	WT101	2	27.79	93.2	3.20	475	0.00
9/22/2003	WT101	3	27.79	101.3	3.20	482	0.00
9/22/2003	WT101	4	27.79	113.0	3.20	492	0.00
9/23/2003	WT102	1	27.34	77.9	3.20	469	0.00
9/23/2003	WT102	2	27.40	83.3	3.20	473	0.00
9/23/2003	WT102	3	27.40	90.5	3.20	479	0.00
9/23/2003	WT102	4	27.40	95.0	3.20	483	0.00
9/23/2003	WT102	1	27.37	82.4	3.20	473	0.00
9/23/2003	WT102	2	27.40	85.1	3.20	474	0.00
9/23/2003	WT102	3	27.40	92.3	3.20	481	0.00
9/23/2003	WT102	4	27.40	95.0	3.20	483	0.00
9/24/2003	WT103	1	27.37	74.3	3.20	466	0.00
9/24/2003	WT103	2	27.43	81.5	3.20	471	0.00
9/24/2003	WT103	3	27.46	90.5	3.20	478	0.00
9/24/2003	WT103	4	27.40	95.9	3.20	484	0.00
9/24/2003	WT103	1	27.40	79.7	3.20	470	0.00
9/24/2003	WT103	2	27.43	85.1	3.20	474	0.00
9/24/2003	WT103	3	27.43	92.3	3.20	480	0.00
9/24/2003	WT103	4	27.43	104.0	3.20	490	0.00
9/25/2003	WT104	1	27.70	78.8	3.20	464	0.00
9/25/2003	WT104	2	27.73	82.4	3.20	466	0.00
9/25/2003	WT104	3	27.73	85.1	3.20	469	0.00
9/25/2003	WT104	4	27.70	88.7	3.20	472	0.00
9/25/2003	WT104	1	27.73	79.7	3.20	464	0.00
9/25/2003	WT104	2	27.73	84.2	3.20	468	0.00
9/25/2003	WT104	3	27.73	86.0	3.20	470	0.00
9/25/2003	WT104	4	27.70	89.6	3.20	473	0.00
9/26/2003	WT105	4	27.82	88.7	3.20	470	0.00
9/26/2003	WT105	1	27.82	89.6	3.20	471	0.00
9/26/2003	WT105	2	27.79	90.5	3.20	472	0.00
9/26/2003	WT105	3	27.79	92.3	3.20	474	0.00
9/26/2003	WT105	4	27.79	100.4	3.20	481	0.00

TABLE F.1 (Cont.)

Date	Site	Run	Barometric Pressure (in. Hg)	Temperature (ºF)	Avg. Pitot ΔP (in. H_2O)	Q (ACFM)	Isokinetic Error (%)
9/29/2003	WT106	4	27.82	88.7	3.20	470	0.00
9/29/2003	WT106	1	27.82	89.6	3.20	471	0.00
9/29/2003	WT106	2	27.82	89.6	3.20	471	0.00
9/29/2003	WT106	3	27.82	91.4	3.20	473	0.00
9/29/2003	WT106	4	27.82	95.0	3.20	476	0.00
9/30/2003	WT107	1	28.08	82.2	3.20	461	0.00
9/30/2003	WT107	2	28.05	84.2	3.20	463	0.00
9/30/2003	WT107	3	28.08	91.4	3.20	468	0.00
10/1/2003	WT108	4	27.67	81.5	3.20	467	0.00
10/1/2003	WT108	1	27.67	84.2	3.20	469	0.00
10/1/2003	WT108	2	27.70	89.6	3.20	473	0.00
10/1/2003	WT108	3	27.70	85.1	3.20	469	0.00
10/1/2003	WT108	4	27.70	91.4	3.20	475	0.00
10/7/2003	WT109	1	27.61	82.4	3.20	469	0.00
10/7/2003	WT109	2	27.64	83.4	3.20	469	0.00
10/7/2003	WT109	3	27.64	84.4	3.20	470	0.00
10/7/2003	WT109	4	27.61	89.6	3.67	508	14.69
10/7/2003	WT109	4	27.61	89.6	3.20	475	0.00
10/7/2003	WT110	1	27.49	93.2	3.20	480	0.00
10/7/2003	WT110	2	27.46	92.3	3.20	480	0.00
10/7/2003	WT110	3	27.43	92.3	3.63	511	13.44
10/7/2003	WT110	4	27.43	91.4	3.20	479	0.00

TABLE F.2 Results of 2003 Wind Tunnel Field Study: Uncorrected PM_{10} Flux Data

This table depicts results for uncorrected PM_{10} flux. It also shows values for the aerodynamic roughness (z_0), erosion velocity at the profiling run (u_* Profile), erosion velocity during each erosion run (u_* Erosion), raw erosion velocity at 10 meters (u_{*t}) by saltation/cyclone flux increase, corrected velocity at 10 meters (Corrected u_{10}) in miles per hour, average TSI concentration during runs, average TSI ambient concentration, vertical PM_{10} dust flux (PM_{10} Flux), horizontal flux in the elutriation chamber (EC Horizontal Flux), and K factor for each run.

Date	Site	Run	Aero-dynamic Roughness, z_0 (cm)	u_* Profile (m/s)	u_* Erosion (m/s)	Raw u_{*t} by Saltation/Cyclone Flux Increase with No Data for Progressive Runs (m/s)	Corrected u_{10} (mph)	Avg. TSI Conc. (mg/m^3)	Avg. TSI Ambient Conc. (mg/m^3)	PM_{10} Flux (Uncorrected) ($\mu g/m^2/s$)	EC Horizontal Flux (mg/m/min)	K Factor = PM_{10} Vertical Flux/ EC Horizontal Flux $(m)^{-1}$
8/11/2003	WT079	1	0.0000	0.0795	0.1200	0.1200	16.27	0.047	0.03	1.78E+01	1.87E+00	5.70E-01
8/11/2003	WT079	2	0.0031	0.2333	0.3898	0.1200	27.67	0.126	0.036	9.53E+01	2.40E+06	2.39E-06
8/11/2003	WT079	3	0.0079	0.2067	0.6372	0.1200	41.84	0.467	0.053	4.65E+02	2.83E+03	9.85E-03
8/19/2003	WT079R	1	0.0073	0.2531	0.3404	0.6200	22.52	0.097	0.024	7.54E+01	1.10E+03	4.12E-03
8/19/2003	WT079R	2	0.0979	0.3303	0.6203	0.6200	32.01	0.29	0.033	2.67E+02	7.74E+03	2.07E-03
8/19/2003	WT079R	3	0.0126	0.2822	0.6530	0.6200	41.19	0.412	0.28	1.38E+02	1.56E+05	5.31E-05
8/11/2003	WT080	1	0.0194	0.3071	0.3522	0.3300	21.36	3.42	0.426	3.29E+03	2.62E+01	7.52E+00
8/11/2003	WT080	2	0.0009	0.2285	0.3303	0.3300	25.76	35.73	0.628	4.16E+04	1.19E+05	2.09E-02
8/11/2003	WT080	3	0.0030	0.2271	0.4170	0.3300	35.27	101.318	0.147	1.18E+05	1.92E+08	3.70E-05
8/12/2003	WT081	1	0.0304	0.3224	0.3788	0.5240	22.03	0.109	0.041	7.29E+01	5.03E+02	8.70E-03
8/12/2003	WT081	2	0.0418	0.3204	0.5237	0.5240	29.52	0.2203	0.018	2.15E+02	1.25E+03	1.04E-02
8/12/2003	WT081	3	0.0081	0.2508	0.6185	0.5240	40.52	0.441	0.091	3.76E+02	5.12E+04	4.41E-04
8/13/2003	WT082	1	0.0071	0.2017	0.2697	0.4590	17.88	0.045	0.051	-6.37E+00	1.46E+03	-2.62E-04
8/13/2003	WT082	2	0.0119	0.2587	0.4589	0.4590	29.09	0.831	0.025	8.96E+02	5.81E+03	9.24E-03
8/13/2003	WT082	3	0.0074	0.2733	0.6042	0.4590	39.90	1.18	0.01	1.26E+03	6.92E+04	1.09E-03
8/18/2003	WT082R	1	0.0130	0.3015	0.3435	0.5920	21.62	0.111	0.038	7.69E+01	4.18E+03	1.10E-03
8/18/2003	WT082R	2	0.8324	0.7445	0.8533	0.5920	33.83	0.089	0.053	3.84E+01	5.69E+02	4.06E-03
8/18/2003	WT082R	3	0.0074	0.2979	0.5920	0.5920	39.10	0.85	0.039	8.26E+02	9.58E+04	5.17E-04

TABLE F.2 (Cont.)

Date	Site	Run	Aero-dynamic Roughness, z_0 (cm)	u_* Profile (m/s)	u_* Erosion (m/s)	Raw u_{*t} by Saltation/Cyclone Flux Increase with No Data for Progressive Runs (m/s)	Corrected u_{10} (mph)	Avg. TSI Conc. (mg/m^3)	Avg. TSI Ambient Conc. (mg/m^3)	PM_{10} Flux (Uncorrected) ($\mu g/m^2/s$)	EC Horizontal Flux (mg/m/min)	K Factor = PM_{10} Vertical Flux/ EC Horizontal Flux $(m)^{-1}$
8/14/2003	WT083	1	0.0292	0.2680	0.4112	0.4210	24.01	0.049	0.029	2.12E+01	2.24E+03	5.66E-04
8/14/2003	WT083	2	0.0052	0.2278	0.4210	0.4210	28.64	0.21	0.032	1.92E+02	6.30E+02	1.83E-02
8/14/2003	WT083	3	0.1708	0.4407	0.9401	0.4210	45.60	0.241	0.022	2.37E+02	4.46E+04	3.18E-04
8/15/2003	WT084	1	0.0000	0.0986	0.1416	0.2790	16.59	0.051	0.024	2.98E+01	7.61E+02	2.35E-03
8/15/2003	WT084	2	0.0104	0.1899	0.4888	0.2790	31.34	0.052	0.016	3.80E+01	1.03E+03	2.21E-03
8/15/2003	WT084	3	0.0000	0.1131	0.2794	0.2790	30.81	0.366	0.014	3.84E+02	5.17E+04	4.46E-04
8/21/2003	WT085	1	0.0152	0.3214	0.3421	0.5080	21.22	0.152	0.078	7.80E+01	4.55E+02	1.03E-02
8/21/2003	WT085	2	0.029	0.305	0.5084	0.5080	29.70	0.11	0.033	8.04E+01	1.31E+03	3.69E-03
8/21/2003	WT085	3	0.0014	0.1929	0.5111	0.5080	38.54	1.78	0.043	1.94E+03	2.12E+05	5.51E-04
8/21/2003	WT086	1	0.004	0.2139	0.2432	0.5060	16.91	0.124	0.01	1.22E+02	3.54E+02	2.06E-02
8/21/2003	WT086	2	0.0474	0.3703	0.5062	0.5060	28.18	0.138	0.044	1.01E+02	7.54E+04	7.99E-05
8/21/2003	WT086	3	0.0015	0.1924	0.5129	0.5060	38.44	0.431	0.032	4.68E+02	4.02E+02	6.98E-02
8/22/2003	WT087	1	0.0251	0.2976	0.2696	0.5150	15.97	0.054	0.014	3.73E+01	2.01E+03	1.11E-03
8/22/2003	WT087	2	0.0535	0.3738	0.5152	0.5150	28.33	0.062	0.018	4.64E+01	8.27E+02	3.37E-03
8/22/2003	WT087	3	0.0294	0.2727	0.7495	0.5150	43.73	0.092	0.019	7.78E+01	7.26E+02	6.43E-03
8/25/2003	WT088	1	0.0003	0.1713	0.1980	0.1980	16.58	0.055	0.025	3.13E+01	1.90E+03	9.87E-04
8/25/2003	WT088	2	0	0.1037	0.2444	0.1980	25.63	0.198	0.102	1.01E+02	8.29E+04	7.31E-05
8/25/2003	WT088	3	0	0.1293	0.3398	0.1980	33.51	0.425	0.023	4.52E+02	8.23E+04	3.29E-04
8/28/2003	WT089	1	0	0.1929	0.2030	0.3400	20.01	0.029	0.028	1.03E+00	1.71E+03	3.62E-05
8/28/2003	WT089	2	0.0186	0.3046	0.4702	0.3400	28.64	0.05	0.061	-1.14E+01	-6.04E+02	1.13E-03
8/28/2003	WT089	3	0.0025	0.2595	0.5343	0.3400	38.56	0.357	0.032	3.37E+02	2.10E+03	9.63E-03
8/29/2003	WT090	1	0	0.1186	0.1747	0.3850	17.04	0.050	0.050	0.00E+00	1.06E+03	0.00E+00
8/29/2003	WT090	2	0.0018	0.1933	0.3852	0.3850	28.49	0.051	0.044	7.29E+00	1.52E+03	2.88E-04
8/29/2003	WT090	3	0.0096	0.2383	0.6191	0.3850	39.98	0.057	0.041	1.67E+01	1.06E+04	9.44E-05

TABLE F.2 (Cont.)

Date	Site	Run	Aero-dynamic Roughness, z_o (cm)	u_* Profile (m/s)	u_* Erosion (m/s)	Raw u_{*t} by Saltation/Cyclone Flux Increase with No Data for Progressive Runs (m/s)	Corrected u_{10} (mph)	Avg. TSI Conc. (mg/m^3)	Avg. TSI Ambient Conc. (mg/m^3)	PM_{10} Flux (Uncorrected) ($\mu g/m^2/s$)	EC Horizontal Flux (mg/m/min)	K Factor = PM_{10} Vertical Flux/ EC Horizontal Flux $(m)^{-1}$
8/29/2003	WT091	1	0.0009	0.1930	0.2110	0.3360	16.40	0.102	0.015	9.22E+01	1.31E+01	4.22E-01
8/29/2003	WT091	2	0.0026	0.3234	0.3357	0.3360	24.14	0.058	0.011	5.00E+01	1.26E+04	2.38E-04
8/29/2003	WT091	3	0.0026	0.2279	0.5486	0.3360	39.49	0.131	0.024	1.12E+02	3.60E+04	1.86E-04
9/3/2003	WT092	1	0.0003	0.1604	0.2031	0.7330	16.96	0.050	0.046	4.14E+00	1.31E+01	1.89E-02
9/3/2003	WT092	2	0.0764	0.3685	0.5611	0.7330	29.74	0.035	0.055	-2.09E+01	-2.39E+03	5.24E-04
9/3/2003	WT092	3	0.0361	0.351	0.7331	0.7330	41.92	0.036	0.035	1.09E+00	6.42E+03	1.02E-05
9/4/2003	WT093	1	0.0815	0.3612	0.4368	0.5180	23.00	0.030	0.021	9.26E+00	4.06E+03	1.37E-04
9/4/2003	WT093	2	0.029	0.2923	0.5176	0.5180	30.24	0.044	0.023	2.15E+01	9.19E+02	1.41E-03
9/4/2003	WT093	3	0.0063	0.2191	0.6252	0.5180	41.87	0.224	0.029	2.15E+02	5.83E+04	2.21E-04
9/5/2003	WT094	1	0.0051	0.3203	0.2934	0.4200	25.00	0.034	0.030	3.89E+00	1.07E+03	2.18E-04
9/5/2003	WT094	2	0.0089	0.3071	0.4203	0.4200	27.34	0.058	0.016	4.30E+01	1.29E+03	2.01E-03
9/5/2003	WT094	3	0.0076	0.3016	0.6002	0.4200	39.54	0.122	0.023	9.73E+01	1.07E+04	5.47E-04
9/10/2003	WT095	1	0.0075	0.2714	0.3344	0.3730	22.05	0.040	0.033	7.17E+00	6.78E+02	6.34E-04
9/10/2003	WT095	2	0.0012	0.185	0.3733	0.3730	28.51	0.113	0.019	9.62E+01	1.98E+03	2.92E-03
9/10/2003	WT095	3	0.0415	0.3209	0.7826	0.3730	44.14	0.151	0.025	1.29E+02	4.43E+04	1.75E-04
9/8/2003	WT096	1	0.008	0.2383	0.2600	0.8240	17.05	0.024	0.070	-4.68E+01	2.38E+03	-1.18E-03
9/8/2003	WT096	2	0.3889	0.3195	0.5289	0.8240	30.03	0.054	0.007	4.80E+01	1.08E+03	2.67E-03
9/8/2003	WT096	3	0.0581	0.3375	0.8237	0.8240	44.92	0.055	0.006	5.03E+01	2.16E+03	1.40E-03
9/9/2003	WT097	1	0.0285	0.3285	0.3758	0.4340	21.99	0.022	0.046	-2.49E+01	1.12E+03	-1.33E-03
9/9/2003	WT097	2	0.1173	0.4335	0.5522	0.4340	27.94	0.027	0.016	1.13E+01	1.99E+03	3.41E-04
9/9/2003	WT097	3	0.0002	0.1841	0.4339	0.4340	37.38	0.093	0.013	8.28E+01	5.85E+04	8.49E-05
9/15/2003	WT098	1	0.0028	0.2499	0.3025	0.4200	21.64	0.024	0.014	1.02E+01	2.66E+03	2.30E-04
9/15/2003	WT098	2	0.0071	0.281	0.4204	0.4200	27.87	0.121	0.100	2.15E+01	2.20E+03	5.87E-04
9/15/2003	WT098	3	0.079	0.3911	0.8363	0.4200	44.17	0.105	0.111	-6.18E+00	7.55E+03	-4.91E-05

TABLE F.2 (Cont.)

Date	Site	Run	Aero-dynamic Roughness, z_o (cm)	u_* Profile (m/s)	u_* Erosion (m/s)	Raw u_{*t} by Saltation/Cyclone Flux Increase with No Data for Progressive Runs (m/s)	Corrected u_{10} (mph)	Avg. TSI Conc. (mg/m^3)	Avg. TSI Ambient Conc. (mg/m^3)	PM_{10} Flux (Uncorrected) ($\mu g/m^2/s$)	EC Horizontal Flux (mg/m/min)	K Factor = PM_{10} Vertical Flux/ EC Horizontal Flux $(m)^{-1}$
9/18/2003	WT099	1	0.0157	0.2376	0.2863	0.5330	17.71	0.037	0.013	2.47E+01	1.05E+03	1.42E-03
9/18/2003	WT099	2	0.0506	0.3487	0.5328	0.5330	29.43	0.051	0.011	4.16E+01	4.29E+02	5.83E-03
9/18/2003	WT099	3	0.0758	0.3412	0.8633	0.5330	45.79	0.330	0.011	3.31E+02	2.32E+04	8.56E-04
9/19/2003	WT100	1	0.0914	0.3917	0.4290	0.7310	22.31	0.084	0.207	-1.24E+02	1.68E+03	-4.42E-03
9/19/2003	WT100	2	0.2489	0.5851	0.7314	0.7310	33.93	0.130	0.109	2.13E+01	9.76E+02	1.31E-03
9/19/2003	WT100	3	0.0567	0.307	0.8430	0.7310	46.08	0.370	0.028	3.50E+02	4.19E+05	5.01E-05
9/22/2003	WT101	1	0.0096	0.2624	0.3503	0.695	22.62	0.098	0.153	-5.66E+01	9.89E+02	-3.43E-03
9/22/2003	WT101	2	0.0778	0.3719	0.5618	0.695	29.02	0.068	0.044	2.50E+01	1.03E+03	1.46E-03
9/22/2003	WT101	3	0.025	0.3353	0.6945	0.695	41.11	0.188	0.044	1.53E+02	4.64E+02	1.97E-02
9/22/2003	WT101	4a	0.0236	0.3136	0.3661		21.81	0.116	0.020	1.02E+02	8.19E+03	7.50E-04
9/22/2003	WT101	4b	0.0236	0.3136	0.4987		29.70	0.166	0.020	1.56E+02		
9/22/2003	WT101	4c	0.0236	0.3136	0.6753		40.22	0.166	0.020	1.56E+02		
9/22/2003	WT101	1	0.0298	0.3135	0.3874	0.5000	22.57	0.081	0.057	2.49E+01	8.31E+02	1.79E-03
9/22/2003	WT101	2	0.0298	0.3317	0.4898	0.5000	28.54	0.153	0.024	1.35E+02	1.10E+03	7.35E-03
9/22/2003	WT101	3	0.0045	0.2687	0.5003	0.5000	34.46	0.425	0.046	4.02E+02	3.02E+02	7.99E-02
9/22/2003	WT101	4a	0.0024	0.2337	0.2944		21.31	1.570	0.046	1.65E+03	4.01E+04	2.46E-03
9/22/2003	WT101	4b	0.0024	0.2337	0.3730		27.00	1.570	0.046	1.65E+03		
9/22/2003	WT101	4c	0.0024	0.2337	0.5302		38.39	1.570	0.046	1.65E+03		
9/23/2003	WT102	1	0.0006	0.1949	0.2159	0.5200	17.36	0.145	0.302	-1.63E+02	4.24E+02	-2.30E-02
9/23/2003	WT102	2	0.1017	0.467	0.5197	0.5200	26.71	0.070	0.070	0.00E+00	3.37E+02	0.00E+00
9/23/2003	WT102	3	0.0134	0.2678	0.6641	0.5200	41.65	0.376	0.035	3.60E+02	4.32E+04	5.00E-04
9/23/2003	WT102	4a	0.0065	0.1984	0.3563		23.79	0.676	0.040	6.76E+02	1.00E+05	4.05E-04
9/23/2003	WT102	4b	0.0065	0.1984	0.4469		29.84	0.676	0.040	6.76E+02		
9/23/2003	WT102	4c	0.0065	0.1984	0.6100		40.73	0.676	0.040	6.76E+02		

TABLE F.2 (Cont.)

Date	Site	Run	Aero-dynamic Roughness, z_0 (cm)	u_* Profile (m/s)	u_* Erosion (m/s)	Raw u_{*t} by Saltation/Cyclone Flux Increase with No Data for Progressive Runs (m/s)	Corrected u_{10} (mph)	Avg. TSI Conc. (mg/m^3)	Avg. TSI Ambient Conc. (mg/m^3)	PM_{10} Flux (Uncorrected) ($\mu g/m^2/s$)	EC Horizontal Flux (mg/m/min)	K Factor = PM_{10} Vertical Flux/ EC Horizontal Flux $(m)^{-1}$
9/23/2003	WT102	1	0.0097	0.2608	0.3491	0.4030	22.83	0.141	0.088	5.52E+01	2.86E+03	1.16E-03
9/23/2003	WT102	2	0.0037	0.2328	0.4029	0.4030	28.15	0.491	0.051	4.60E+02	1.77E+03	1.56E-02
9/23/2003	WT102	3	0.0785	0.3517	0.8521	0.4030	45.03	3.200	0.051	3.33E+03	2.58E+05	7.75E-04
9/23/2003	WT102	4a	0.017	0.276	0.3680		22.60	2.060	0.036	2.15E+03	1.44E+05	8.98E-04
9/23/2003	WT102	4b	0.017	0.276	0.4726		29.03	2.060	0.036	2.15E+03		
9/23/2003	WT102	4c	0.017	0.276	0.6609		40.59	2.060	0.036	2.15E+03		
9/24/2003	WT103	1	0.0083	0.2646	0.3416	0.795	22.35	0.089	0.061	2.88E+01	7.13E+02	2.42E-03
9/24/2003	WT103	2	0.0119	0.2906	0.4448	0.795	28.20	0.054	0.028	2.70E+01	1.12E+03	1.44E-03
9/24/2003	WT103	3	0.0625	0.3795	0.7946	0.795	43.00	0.075	0.027	5.06E+01	1.26E+03	2.41E-03
9/24/2003	WT103	4a	0.0377	0.3952	0.3790		21.58	0.101	0.033	7.24E+01	9.97E+03	4.36E-04
9/24/2003	WT103	4b	0.0377	0.3952	0.4655		26.51	0.101	0.033	7.24E+01		
9/24/2003	WT103	4c	0.0377	0.3952	0.7056		40.18	0.101	0.033	7.24E+01		
9/24/2003	WT103	1	0.1061	0.4245	0.4615	0.462	23.61	0.090	0.042	4.93E+01	9.60E+02	3.08E-03
9/24/2003	WT103	2	0.0053	0.2485	0.4148	0.462	28.37	0.478	0.047	4.50E+02	2.46E+03	1.10E-02
9/24/2003	WT103	3	0.007	0.2023	0.4796	0.462	37.95	6.430	0.050	6.75E+03	7.17E+05	5.65E-04
9/24/2003	WT103	4a	0.0261	0.3054	0.3749		22.12	3.310	0.044	3.52E+03	2.84E+05	7.43E-04
9/24/2003	WT103	4b	0.0261	0.3054	0.4865		28.71	3.310	0.044	3.52E+03		
9/24/2003	WT103	4c	0.0261	0.3054	0.7097		41.88	3.310	0.044	3.52E+03		
9/25/2003	WT104	1	0.1005	0.2577	0.3583	0.506	22.96	0.051	0.041	1.02E+01	1.12E+03	5.47E-04
9/25/2003	WT104	2	0.0281	0.304	0.5062	0.506	29.66	0.046	0.034	1.24E+01	3.52E+03	2.11E-04
9/25/2003	WT104	3	0.0065	0.2488	0.6021	0.506	40.18	0.12	0.02	1.03E+02	2.06E+04	3.02E-04
9/25/2003	WT104	4a	0.0011	0.188	0.2192		16.82	0.179	0.019	1.67E+02	1.24E+05	8.09E-05
9/25/2003	WT104	4b	0.0011	0.188	0.3659		28.07	0.179	0.019	1.67E+02		
9/25/2003	WT104	4c	0.0011	0.188	0.5126		39.32	0.179	0.019	1.67E+02		

TABLE F.2 (Cont.)

Date	Site	Run	Aero-dynamic Roughness, z_0 (cm)	u_* Profile (m/s)	u_* Erosion (m/s)	Raw u_{*t} by Saltation/Cyclone Flux Increase with No Data for Progressive Runs (m/s)	Corrected u_{10} (mph)	Avg. TSI Conc. (mg/m^3)	Avg. TSI Ambient Conc. (mg/m^3)	PM_{10} Flux (Uncorrected) ($\mu g/m^2/s$)	EC Horizontal Flux (mg/m/min)	K Factor = PM_{10} Vertical Flux/ EC Horizontal Flux $(m)^{-1}$
9/25/2003	WT104	1	0.7287	0.504	0.6246	0.625	25.23	0.059	0.032	2.77E+01	-5.69E+01	-2.92E-02
9/25/2003	WT104	2	0.028	0.2789	0.5208	0.625	30.52	0.177	0.032	1.50E+02	1.77E+03	5.08E-03
9/25/2003	WT104	3	0.0449	0.3419	0.7757	0.625	43.42	0.383	0.022	3.74E+02	4.67E+04	4.81E-04
9/25/2003	WT104	4a	0.0027	0.2373	0.3196		22.72	1.31	0.023	1.34E+03	1.97E+05	4.10E-04
9/25/2003	WT104	4b	0.0027	0.2373	0.3847		27.59	1.31	0.023	1.34E+03		
9/25/2003	WT104	4c	0.0027	0.2373	0.5475		39.27	1.31	0.023	1.34E+03		
9/26/2003	WT105	4a	0.0177	0.3339	0.3422		20.94	0.046	0.025	2.18E+01	6.06E+03	2.16E-04
9/26/2003	WT105	4b	0.0177	0.3339	0.4490		27.47	0.046	0.025	2.18E+01		
9/26/2003	WT105	4c	0.0177	0.3339	0.6625		40.53	0.046	0.025	2.18E+01		
9/26/2003	WT105	1	0.0505	0.3412	0.4075	0.382	22.54	0.031	0.019	1.25E+01	3.29E+03	2.27E-04
9/26/2003	WT105	2	0.0014	0.1767	0.3822	0.382	28.73	0.23	0.018	2.21E+02	2.15E+04	6.16E-04
9/26/2003	WT105	3	0.0121	0.3025	0.6381	0.382	40.40	0.474	0.01	4.85E+02	1.12E+05	2.59E-04
9/26/2003	WT105	4a	0.0469	0.3623	0.3832		21.36	0.316	0.018	3.16E+02	8.87E+03	2.13E-03
9/26/2003	WT105	4b	0.0469	0.3623	0.5087		28.35	0.316	0.018	3.16E+02		
9/26/2003	WT105	4c	0.0469	0.3623	0.7597		42.34	0.316	0.018	3.16E+02		
9/29/2003	WT106	4a	0.0504	0.3872	0.4041		22.36	0.108	0.031	7.99E+01	7.65E+03	6.27E-04
9/29/2003	WT106	4b	0.0504	0.3872	0.5045		27.91	0.108	0.031	7.99E+01		
9/29/2003	WT106	4c	0.0504	0.3872	0.7619		42.15	0.108	0.031	7.99E+01		
9/29/2003	WT106	1	0.0127	0.2464	0.2710	0.451	17.08	0.056	0.037	1.97E+01	3.11E+03	3.80E-04
9/29/2003	WT106	2	0.0198	0.3023	0.4755	0.451	28.79	0.517	0.03	5.06E+02	5.27E+03	5.76E-03
9/29/2003	WT106	3	0.006	0.1889	0.4513	0.451	36.26	4.61	0.023	4.78E+03	5.25E+05	5.47E-04
9/29/2003	WT106	4a	0.000	0.1399	0.1720		16.45	2.47	0.019	2.57E+03	1.29E+04	1.20E-02
9/29/2003	WT106	4b	0.000	0.1399	0.2779		26.58	2.47	0.019	2.57E+03		
9/29/2003	WT106	4c	0.000	0.1399	0.3409		32.61	2.47	0.019	2.57E+03		

TABLE F.2 (Cont.)

Date	Site	Run	Aero-dynamic Roughness, z_0 (cm)	u_* Profile (m/s)	u_* Erosion (m/s)	Raw u_{*t} by Saltation/Cyclone Flux Increase with No Data for Progressive Runs (m/s)	Corrected u_{10} (mph)	Avg. TSI Conc. (mg/m^3)	Avg. TSI Ambient Conc. (mg/m^3)	PM_{10} Flux (Uncorrected) ($\mu g/m^2/s$)	EC Horizontal Flux (mg/m/min)	K Factor = PM_{10} Vertical Flux/ EC Horizontal Flux $(m)^{-1}$
9/30/2003	WT107	1	0.0187	0.3003	0.3680	0.402	22.40	0.079	0.174	-9.67E+01	2.23E+03	-2.60E-03
9/30/2003	WT107	2	0.0034	0.2343	0.4024	0.402	28.32	0.105	0.104	1.02E+00	9.41E+02	6.52E-05
9/30/2003	WT107	3	0.0002	0.1842	0.4497	0.402	38.40	0.319	0.082	2.45E+02	2.73E+04	5.39E-04
10/1/2003	WT108	4a	0.0003	0.207	0.2511		21.04	0.223	0.106	1.21E+02	1.88E+04	3.86E-04
10/1/2003	WT108	4b	0.0003	0.207	0.3157		26.46	0.223	0.106	1.21E+02		
10/1/2003	WT108	4c	0.0003	0.207	0.4449		37.28	0.223	0.106	1.21E+02		
10/1/2003	WT108	1	0.0096	0.3009	0.3289	0.396	21.25	0.070	0.071	-7.12E-01	2.47E+03	-1.73E-05
10/1/2003	WT108	2	0.0058	0.2685	0.5699	0.396	38.40	0.715	0.062	6.81E+02	2.50E+04	1.63E-03
10/1/2003	WT108	3	0.0043	0.2648	0.3956	0.396	27.35	0.101	0.034	6.95E+01	9.27E+02	4.50E-03
10/1/2003	WT108	4a	0.0157	0.2845	0.3618		22.38	0.888	0.04	8.88E+02	1.45E+05	3.68E-04
10/1/2003	WT108	4b	0.0157	0.2845	0.4661		28.82	0.888	0.04	8.88E+02		
10/1/2003	WT108	4c	0.0157	0.2845	0.6745		41.72	0.888	0.04	8.88E+02		
10/7/2003	WT109	1	0.0094	0.2942	0.3315	0.778	21.45	0.037	0.31	-2.82E+02	6.54E+03	-2.59E-03
10/7/2003	WT109	2	0.0384	0.3682	0.4918	0.778	27.96	0.033	0.028	5.17E+00	1.22E+02	2.53E-03
10/7/2003	WT109	3	0.0586	0.3974	0.7778	0.778	42.38	0.078	0.019	6.12E+01	1.96E+03	1.88E-03
10/7/2003	WT109	4a	0.0071	0.2572	0.3347		22.19	0.2	0.016	2.05E+02	-8.84E+02	-1.39E-02
10/7/2003	WT109	4b	0.0071	0.2572	0.4272		28.32	0.2	0.016	2.05E+02		
10/7/2003	WT109	4c	0.0071	0.2572	0.6270		41.56	0.2	0.016	2.05E+02		
10/7/2003	WT109	4a	0.0028	0.2355	0.3047		21.80	4.59	0.022	4.78E+03	2.48E+05	1.15E-03
10/7/2003	WT109	4b	0.0028	0.2355	0.3863		27.64	4.59	0.022	4.78E+03		
10/7/2003	WT109	4c	0.0028	0.2355	0.5233		37.45	4.59	0.022	4.78E+03		

TABLE F.2 (Cont.)

Date	Site	Run	Aero-dynamic Roughness, z_0 (cm)	u_* Profile (m/s)	u_* Erosion (m/s)	Raw u_{*t} by Saltation/Cyclone Flux Increase with No Data for Progressive Runs (m/s)	Corrected u_{10} (mph)	Avg. TSI Conc. (mg/m^3)	Avg. TSI Ambient Conc. (mg/m^3)	PM_{10} Flux (Uncorrected) ($\mu g/m^2/s$)	EC Horizontal Flux (mg/m/min)	K Factor = PM_{10} Vertical Flux/ EC Horizontal Flux $(m)^{-1}$
10/7/2003	WT110	1	0.0465	0.3766	0.3734	0.373	20.82	0.022	0.025	-3.17E+00	3.46E+02	-5.51E-04
10/7/2003	WT110	2	0.0008	0.2125	0.3404	0.373	26.77	0.036	0.013	2.43E+01	6.56E+01	2.22E-02
10/7/2003	WT110	3	0.0000	0.133	0.3383	0.373	33.33	0.128	0.011	1.31E+02	5.50E+04	1.43E-04
10/7/2003	WT110	4a	0.053	0.3724	0.4068		22.39	0.095	0.01	8.98E+01	3.44E+04	1.57E-04
10/7/2003	WT110	4b	0.053	0.3724	0.5150		28.35	0.095	0.01	8.98E+01		
10/7/2003	WT110	4c	0.053	0.3724	0.7880		43.37	0.095	0.01	8.98E+01		

TABLE F.3 Results of 2003 Wind Tunnel Field Study: PM_{10} Flux Spike Data

Table F.3 shows results for PM_{10} spike data. Results of TSI total mass and TSI spike mass are given in milligrams, and the duration of the spikes are given in seconds. This table also summarizes the corrected TSI PM_{10} concentrations, in milligrams per cubic meter, after the spike removal.

Date	Site	Run	Uncorrected TSI Average Conc. (mg/m^3)	TSI Total Mass (mg)	TSI Spike Mass (mg)	Spike Duration (s)	Corrected (Spike Removed) TSI PM_{10} Conc. (mg/m^3)
8/11/2003	WT079	1	0.047	0.0512	0.0122	81	0.0411
8/11/2003	WT079	2	0.126	0.1378	0.0670	105	0.0782
8/11/2003	WT079	3	0.467	0.5133	0.2928	92	0.2371
8/19/2003	WT079R	1	0.097	0.1070	0.1070	600	0.0974
8/19/2003	WT079R	2	0.29	0.3190	0.3186	600	0.2901
8/19/2003	WT079R	3	0.412	0.4530	0.2932	158	0.1972
8/11/2003	WT080	1	3.42	3.1990	0.5507	60	2.4881
8/11/2003	WT080	2	35.73	38.9499	3.2862	81	0.0000
8/11/2003	WT080	3	101.318	111.2473	103.2142	58	100.5445
8/12/2003	WT081	1	0.109	0.1010	0.0329	39	0.0668
8/12/2003	WT081	2	0.2203	0.1010	0.0556	134	0.1340
8/12/2003	WT081	3	0.441	0.4840	0.4300	298	0.0984
8/13/2003	WT082	1	0.045	0.0495	0.0133	57	0.0365
8/13/2003	WT082	2	0.831	0.9130	0.7323	155	0.2216
8/13/2003	WT082	3	1.18	1.3000	1.0051	97	0.3154
8/18/2003	WT082R	1	0.111	0.1220	0.1057	46	0.1057
8/18/2003	WT082R	2	0.089	0.0980	0.0383	152	0.0728
8/18/2003	WT082R	3	0.85	0.9330	0.6358	125	0.3461
8/14/2003	WT083	1	0.049	0.0534	0.0332	88	0.0422
8/14/2003	WT083	2	0.21	0.2310	0.1150	35	0.1118
8/14/2003	WT083	3	0.241	0.2390	0.1630	103	0.0945
8/15/2003	WT084	1	0.051	0.0601	0.0196	70	0.0418
8/15/2003	WT084	2	0.052	0.0576	0.0364	66	0.0270
8/15/2003	WT084	3	0.366	0.4050	0.3216	177	0.1069
8/21/2003	WT085	1	0.152	0.1670	0.0407	85	0.1338
8/21/2003	WT085	2	0.11	0.1210	0.0507	70	0.0728
8/21/2003	WT085	3	1.78	1.9600	0.0137	113	1.0377
8/21/2003	WT086	1	0.124	0.0712	0.0183	74	0.1226
8/21/2003	WT086	2	0.138	0.4730	0.2666	66	0.2152
8/21/2003	WT086	3	0.431	0.4730	0.2659	66	0.2156

TABLE F.3 (Cont.)

Date	Site	Run	Uncorrected TSI Average Conc. (mg/m^3)	TSI Total Mass (mg)	TSI Spike Mass (mg)	Spike Duration (s)	Corrected (Spike Removed) TSI PM_{10} Conc. (mg/m^3)
8/22/2003	WT087	1	0.054	0.0593	0.0593	600	0.0540
8/22/2003	WT087	2	0.062	0.0676	0.0676	600	0.0616
8/22/2003	WT087	3	0.092	0.1012	0.0454	66	0.0571
8/25/2003	WT088	1	0.055	0.0599	0.0599	66	0.0559
8/25/2003	WT088	2	0.198	0.2180	0.1427	140	0.0892
8/25/2003	WT088	3	0.425	0.4670	0.3589	123	0.1233
8/28/2003	WT089	1	0.029	0.0314	0.0314	300	0.0286
8/28/2003	WT089	2	0.05	0.0545	0.0163	86	0.0407
8/28/2003	WT089	3	0.357	0.3920	0.4410	93	0.0879
8/29/2003	WT090	1	0.050	0.0547	0.0547	600	0.0498
8/29/2003	WT090	2	0.051	0.0559	0.0559	600	0.0509
8/29/2003	WT090	3	0.057	0.0621	0.0216	95	0.0439
8/29/2003	WT091	1	0.102	0.1120	0.0302	52	0.0818
8/29/2003	WT091	2	0.058	0.0636	0.0180	49	0.0452
8/29/2003	WT091	3	0.131	0.1440	0.0904	140	0.0635
9/3/2003	WT092	1	0.050	0.0545	0.0101	92	0.0477
9/3/2003	WT092	2	0.035	0.0388	0.0087	47	0.0300
9/3/2003	WT092	3	0.036	0.0399	0.0153	61	0.0250
9/4/2003	WT093	1	0.030	0.0326	0.0326	600	0.0297
9/4/2003	WT093	2	0.044	0.0482	0.0482	600	0.0440
9/4/2003	WT093	3	0.224	0.2460	0.1690	87	0.0826
9/5/2003	WT094	1	0.034	0.0375	0.0109	91	0.0290
9/5/2003	WT094	2	0.058	0.0637	0.0449	146	0.0226
9/5/2003	WT094	3	0.122	0.1340	0.1070	99	0.0296
9/10/2003	WT095	1	0.040	0.0443	0.4430	600	0.0404
9/10/2003	WT095	2	0.113	0.1240	0.0768	114	0.0525
9/10/2003	WT095	3	0.151	0.1660	0.1060	46	0.0598
9/11/2003	WT096	1	0.024	0.0259	0.0259	600	0.0236
9/11/2003	WT096	2	0.054	0.0596	0.0596	600	0.0543
9/11/2003	WT096	3	0.055	0.0602	0.0602	600	0.0548
9/12/2003	WT097	1	0.022	0.0243	0.0243	600	0.0221
9/12/2003	WT097	2	0.027	0.0302	0.0102	57	0.0199
9/12/2003	WT097	3	0.093	0.4020	0.0600	104	0.0466
9/15/2003	WT098	1	0.024	0.0267	0.0088	93	0.0193
9/15/2003	WT098	2	0.121	0.1332	0.0232	63	0.1120
9/15/2003	WT098	3	0.105	0.1156	0.0331	46	0.0814

TABLE F.3 (Cont.)

Date	Site	Run	Uncorrected TSI Average Conc. (mg/m^3)	TSI Total Mass (mg)	TSI Spike Mass (mg)	Spike Duration (s)	Corrected (Spike Removed) TSI PM_{10} Conc. (mg/m^3)
9/18/2003	WT099	1	0.037	0.0409	0.0042	36	0.0356
9/18/2003	WT099	2	0.051	0.0558	0.0163	36	0.0383
9/18/2003	WT099	3	0.330	0.3630	0.2334	99	0.1410
9/19/2003	WT100	1	0.084	0.0920	0.0920	600	0.0000
9/19/2003	WT100	2	0.130	0.1430	0.0393	51	0.1032
9/19/2003	WT100	3	0.370	0.4060	0.3170	177	0.1156
9/22/2003	WT101	1	0.098	0.1070	0.0146	39	0.0901
9/22/2003	WT101	2	0.068	0.0752	0.0116	46	0.0627
9/22/2003	WT101	3	0.188	0.2060	0.0549	46	0.1495
9/22/2003	WT101	4a	0.116	0.1040	0.0000	0	0.1040
9/22/2003	WT101	4b	0.166	0.1280	0.0306	69	0.1280
9/22/2003	WT101	4c	0.166	0.1143	0.0237	66	0.1143
9/22/2003	WT101	1	0.081	0.0890	0.0890	600	0.0811
9/22/2003	WT101	2	0.153	0.1680	0.0702	48	0.0969
9/22/2003	WT101	3	0.425	0.4660	0.3300	202	0.0187
9/22/2003	WT101	4a	1.570	0.3154	0.0438	85	0.3354
9/22/2003	WT101	4b	1.570	0.3491	0.0607	67	0.2468
9/22/2003	WT101	4c	1.570	3.9705	1.1400	86	1.5915
9/23/2003	WT102	1	0.145	0.1590	0.0374	101	0.1330
9/23/2003	WT102	2	0.070	0.0768	0.0326	175	0.0568
9/23/2003	WT102	3	0.376	0.4132	0.3553	301	0.1059
9/23/2003	WT102	4a	0.676	0.1003	0.0202	79	0.0709
9/23/2003	WT102	4b	0.676	0.4987	0.1320	86	0.1608
9/23/2003	WT102	4c	0.676	1.2421	0.4344	77	0.3809
9/23/2003	WT102	1	0.141	0.1550	0.0947	185	0.0792
9/23/2003	WT102	2	0.491	0.5390	0.4374	314	0.1942
9/23/2003	WT102	3	3.200	3.5200	3.0300	353	1.0000
9/23/2003	WT102	4a	2.060	0.1164	0.0268	68	0.0715
9/23/2003	WT102	4b	2.060	0.4440	0.1120	61	0.2006
9/23/2003	WT102	4c	2.060	6.2566	1.9206	127	1.4202
9/24/2003	WT103	1	0.089	0.0978	0.0166	90	0.0636
9/24/2003	WT103	2	0.054	0.0593	0.0274	141	0.0380
9/24/2003	WT103	3	0.075	0.0824	0.0563	197	0.0354
9/24/2003	WT103	4a	0.101	0.0438	0.0090	66	0.0295
9/24/2003	WT103	4b	0.101	0.0520	0.0066	67	0.0503
9/24/2003	WT103	4c	0.101	0.1975	0.0595	72	0.0842

TABLE F.3 (Cont.)

Date	Site	Run	Uncorrected TSI Average Conc. (mg/m^3)	TSI Total Mass (mg)	TSI Spike Mass (mg)	Spike Duration (s)	Corrected (Spike Removed) TSI PM_{10} Conc. (mg/m^3)
9/24/2003	WT103	1	0.090	0.0888	0.0342	140	0.0742
9/24/2003	WT103	2	0.478	0.5250	0.4804	353	0.9790
9/24/2003	WT103	3	6.430	7.0700	4.9880	139	2.4642
9/24/2003	WT103	4a	3.310	0.1927	0.0464	70	0.1097
9/24/2003	WT103	4b	3.310	0.6621	0.2130	128	0.2611
9/24/2003	WT103	4c	3.310	9.9387	2.8032	96	3.2180
9/25/2003	WT104	1	0.051	0.0557	0.0106	72	0.0467
9/25/2003	WT104	2	0.046	0.0503	0.0285	174	0.0279
9/25/2003	WT104	3	0.12	0.1310	0.0999	192	0.0421
9/25/2003	WT104	4a	0.179	0.0505	0.0053	43	0.0460
9/25/2003	WT104	4b	0.179	0.1451	0.0379	95	0.0704
9/25/2003	WT104	4c	0.179	0.3342	0.0964	112	0.1754
9/25/2003	WT104	1	0.059	0.0652	0.0347	226	0.0446
9/25/2003	WT104	2	0.177	0.1950	0.1668	298	0.0503
9/25/2003	WT104	3	0.383	0.4210	0.3834	354	0.0825
9/25/2003	WT104	4a	1.31	0.1421	0.0306	86	0.0946
9/25/2003	WT104	4b	1.31	0.2394	0.0646	109	0.1633
9/25/2003	WT104	4c	1.31	3.7226	1.0792	100	1.3331
9/26/2003	WT105	4a	0.046	0.0199	0.0025	57	0.0181
9/26/2003	WT105	4b	0.046	0.0275	0.0070	66	0.0164
9/26/2003	WT105	4c	0.046	0.0746	0.0452	92	0.0338
9/26/2003	WT105	1	0.031	0.0336	0.0219	252	0.0183
9/26/2003	WT105	2	0.23	0.2520	0.2070	219	0.0652
9/26/2003	WT105	3	0.474	0.4210	0.4628	323	0.1140
9/26/2003	WT105	4a	0.316	0.0446	0.0105	86	0.0290
9/26/2003	WT105	4b	0.316	0.1239	0.0335	84	0.0571
9/26/2003	WT105	4c	0.316	0.8179	0.2582	120	0.2019
9/29/2003	WT106	4a	0.108	0.0472	0.0000	0	0.0472
9/29/2003	WT106	4b	0.108	0.0460	0.0071	54	0.0358
9/29/2003	WT106	4c	0.108	0.2452	0.0665	71	0.0801
9/29/2003	WT106	1	0.056	0.0615	0.0615	600	0.0560
9/29/2003	WT106	2	0.517	0.5680	0.5085	353	0.1309
9/29/2003	WT106	3	4.61	5.0700	4.7700	463	1.2022
9/29/2003	WT106	4a	2.47	0.1318	0.0244	80	0.1092
9/29/2003	WT106	4b	2.47	2.0744	0.5741	88	0.8741
9/29/2003	WT106	4c	2.47	5.3086	1.6001	113	2.0166

TABLE F.3 (Cont.)

Date	Site	Run	Uncorrected TSI Average Conc. (mg/m^3)	TSI Total Mass (mg)	TSI Spike Mass (mg)	Spike Duration (s)	Corrected (Spike Removed) TSI PM_{10} Conc. (mg/m^3)
9/30/2003	WT107	1	0.079	0.0870	0.0305	127	0.0655
9/30/2003	WT107	2	0.105	0.1150	0.0624	128	0.0607
9/30/2003	WT107	3	0.319	0.3500	0.3141	307	0.0673
10/1/2003	WT108	4a	0.223	0.1200	0.0221	87	0.1074
10/1/2003	WT108	4b	0.223	0.1158	0.0156	60	0.1041
10/1/2003	WT108	4c	0.223	0.4706	0.1289	120	0.2261
10/1/2003	WT108	1	0.070	0.0772	0.0772	600	0.0703
10/1/2003	WT108	2	0.715	0.7850	0.7270	395	0.1520
10/1/2003	WT108	3	0.101	0.1110	0.0541	166	0.0714
10/1/2003	WT108	4a	0.888	0.1288	0.0277	78	0.0913
10/1/2003	WT108	4b	0.888	0.2527	0.0757	110	0.1133
10/1/2003	WT108	4c	0.888	2.5434	0.7452	126	0.8583
10/7/2003	WT109	1	0.037	0.0402	0.0402	600	0.0366
10/7/2003	WT109	2	0.033	0.0366	0.0094	99	0.0297
10/7/2003	WT109	3	0.078	0.0851	0.0539	167	0.0394
10/7/2003	WT109	4a	0.2	0.0416	0.0091	81	0.0286
10/7/2003	WT109	4b	0.2	0.0524	0.0143	94	0.0305
10/7/2003	WT109	4c	0.2	0.5938	0.1547	98	0.2145
10/7/2003	WT109	4a	4.59	0.8364	0.2591	110	0.3090
10/7/2003	WT109	4b	4.59	2.2270	0.6793	89	0.7421
10/7/2003	WT109	4c	4.59	11.1883	3.1828	100	4.2475
10/7/2003	WT110	1	0.022	0.0242	0.0242	600	0.0220
10/7/2003	WT110	2	0.036	0.0399	0.0188	141	0.0251
10/7/2003	WT110	3	0.128	0.1410	0.1210	305	0.0359
10/7/2003	WT110	4a	0.095	0.0213	0.0043	81	0.0166
10/7/2003	WT110	4b	0.095	0.0420	0.0095	60	0.0420
10/7/2003	WT110	4c	0.095	0.2272	0.0629	88	0.0934

TABLE F.4 Results of 2003 Wind Tunnel Field Study: Raw TFV Data

Date	Site	New Final SECC	Run	$U_{*erosion}$ (m/s)	Revised Raw u_{*t} by Saltation/Cyclone Flux Increase with EC/Cyclone TFV Assigned to Progressive Run (m/s)	$u_* - u_{*t}$ (m/s)
8/11/2003	WT079	2SU	1	0.1200	0.273	–0.1530
8/11/2003	WT079	2SU	2	0.3898	0.273	0.1168
8/11/2003	WT079	2SU	3	0.6372	0.273	0.3642
8/19/2003	WT079R	2SUw	1	0.3404	0.620	–0.2796
8/19/2003	WT079R	2SUw	2	0.6203	0.620	0.0003
8/19/2003	WT079R	2SUw	3	0.6530	0.620	0.0330
8/11/2003	WT080	2UU	1	0.3522	0.292	0.0602
8/11/2003	WT080	2UU	2	0.3303	0.292	0.0383
8/11/2003	WT080	2UU	3	0.4170	0.292	0.1250
8/12/2003	WT081	3SD	1	0.3788	0.454	–0.0752
8/12/2003	WT081	3SD	2	0.5237	0.454	0.0697
8/12/2003	WT081	3SD	3	0.6185	0.454	0.1645
8/13/2003	WT082	3UD	1	0.2697	0.543	–0.2733
8/13/2003	WT082	3UD	2	0.4589	0.543	–0.0841
8/13/2003	WT082	3UD	3	0.6042	0.543	0.0612
8/18/2003	WT082R	3SDw	1	0.3435	0.592	–0.2485
8/18/2003	WT082R	3SDw	2	0.8533	0.592	0.2613
8/18/2003	WT082R	3SDw	3	0.5920	0.592	0.0000
8/14/2003	WT083	4SD	1	0.4112	0.580	–0.1688
8/14/2003	WT083	4SD	2	0.4210	0.580	–0.1590
8/14/2003	WT083	4SD	3	0.9401	0.580	0.3601
8/15/2003	WT084	4SD	1	0.1416	0.580	–0.4384
8/15/2003	WT084	4SD	2	0.4888	0.580	–0.0912
8/15/2003	WT084	4SD	3	0.2794	0.580	–0.3006
8/21/2003	WT085	7SU	1	0.3421	0.486	–0.1439
8/21/2003	WT085	7SU	2	0.5084	0.486	0.0224
8/21/2003	WT085	7SU	3	0.5111	0.486	0.0251
8/21/2003	WT086	4LUD	1	0.2432	0.459	–0.2158
8/21/2003	WT086	4LUD	2	0.5062	0.459	0.0472
8/21/2003	WT086	4LUD	3	0.5129	0.459	0.0539
8/22/2003	WT087	6SU	1	0.2696	0.646	–0.3764
8/22/2003	WT087	6SU	2	0.5152	0.646	–0.1308
8/22/2003	WT087	6SU	3	0.7495	0.646	0.1035

TABLE F.4 (Cont.)

Date	Site	New Final SECC	Run	$U_{*erosion}$ (m/s)	Revised Raw u_{*t} by Saltation/Cyclone Flux Increase with EC/Cyclone TFV Assigned to Progressive Run (m/s)	$u_* - u_{*t}$ (m/s)
8/25/2003	WT088	4SU	1	0.1980	0.443	–0.2450
8/25/2003	WT088	4SU	2	0.2444	0.443	–0.1986
8/25/2003	WT088	4SU	3	0.3398	0.443	–0.1032
8/28/2003	WT089	5SUw	1	0.2030	0.340	–0.1370
8/28/2003	WT089	5SUw	2	0.4702	0.340	0.1302
8/28/2003	WT089	5SUw	3	0.5343	0.340	0.1943
8/29/2003	WT090	UN_SD	1	0.1747	0.502	–0.3273
8/29/2003	WT090	UN_SD	2	0.3852	0.502	–0.1168
8/29/2003	WT090	UN_SD	3	0.6191	0.502	0.1171
8/29/2003	WT091	2SD	1	0.2110	0.403	–0.1920
8/29/2003	WT091	2SD	2	0.3357	0.403	–0.0673
8/29/2003	WT091	2SD	3	0.5486	0.403	0.1456
9/3/2003	WT092	3UU	1	0.2031	0.481	–0.2779
9/3/2003	WT092	3UU	2	0.5611	0.481	0.0801
9/3/2003	WT092	3UU	3	0.7331	0.481	0.2521
9/4/2003	WT093	8SD	1	0.4368	0.625	–0.1882
9/4/2003	WT093	8SD	2	0.5176	0.625	–0.1074
9/4/2003	WT093	8SD	3	0.6252	0.625	0.0002
9/5/2003	WT094	5SD	1	0.2934	0.510	–0.2166
9/5/2003	WT094	5SD	2	0.4203	0.510	–0.0897
9/5/2003	WT094	5SD	3	0.6002	0.510	0.0902
9/10/2003	WT095	8SU	1	0.3344	0.783	–0.4486
9/10/2003	WT095	8SU	2	0.3733	0.783	–0.4097
9/10/2003	WT095	8SU	3	0.7826	0.783	–0.0004
9/11/2003	WT096	6SU	1	0.2600	0.646	–0.3860
9/11/2003	WT096	6SU	2	0.5289	0.646	–0.1171
9/11/2003	WT096	6SU	3	0.8237	0.646	0.1777
9/12/2003	WT097	7SD	1	0.3758	0.525	–0.1492
9/12/2003	WT097	7SD	2	0.5522	0.525	0.0272
9/12/2003	WT097	7SD	3	0.4339	0.525	–0.0911
9/15/2003	WT098	4LSD	1	0.3025	0.669	–0.3665
9/15/2003	WT098	4LSD	2	0.4204	0.669	–0.2486
9/15/2003	WT098	4LSD	3	0.8363	0.669	0.1673

TABLE F.4 (Cont.)

Date	Site	New Final SECC	Run	$U_{*erosion}$ (m/s)	Revised Raw u_{*t} by Saltation/Cyclone Flux Increase with EC/Cyclone TFV Assigned to Progressive Run (m/s)	$u_* - u_{*t}$ (m/s)
9/18/2003	WT099	4SU	1	0.2863	0.443	–0.1567
9/18/2003	WT099	4SU	2	0.5328	0.443	0.0898
9/18/2003	WT099	4SU	3	0.8633	0.443	0.4203
9/19/2003	WT100	3UD	1	0.4290	0.543	–0.1140
9/19/2003	WT100	3UD	2	0.7314	0.543	0.1884
9/19/2003	WT100	3UD	3	0.8430	0.543	0.3000
9/22/2003	WT101	7SU	1	0.3503	0.521	–0.1707
9/22/2003	WT101	7SU	2	0.5618	0.521	0.0408
9/22/2003	WT101	7SU	3	0.6945	0.521	0.1735
9/22/2003	WT101	7SU	4a	0.3661	0.521	–0.1549
9/22/2003	WT101	7SU	4b	0.4987	0.521	–0.0223
9/22/2003	WT101	7SU	4c	0.6753	0.521	0.1543
9/22/2003	WT101	7UD	1	0.3874	0.481	–0.0936
9/22/2003	WT101	7UD	2	0.4898	0.481	0.0088
9/22/2003	WT101	7UD	3	0.5003	0.481	0.0193
9/22/2003	WT101	7UD	4a	0.2944	0.481	–0.1866
9/22/2003	WT101	7UD	4b	0.3730	0.481	–0.1080
9/22/2003	WT101	7UD	4c	0.5302	0.481	0.0492
9/23/2003	WT102	5SU	1	0.2159	0.564	–0.3481
9/23/2003	WT102	5SU	2	0.5197	0.564	–0.0443
9/23/2003	WT102	5SU	3	0.6641	0.564	0.1001
9/23/2003	WT102	5SU	4a	0.3563	0.564	–0.2077
9/23/2003	WT102	5SU	4b	0.4469	0.564	–0.1171
9/23/2003	WT102	5SU	4c	0.6100	0.564	0.0460
9/23/2003	WT102	5UD	1	0.3491	0.724	–0.3749
9/23/2003	WT102	5UD	2	0.4029	0.724	–0.3211
9/23/2003	WT102	5UD	3	0.8521	0.724	0.1281
9/23/2003	WT102	5UD	4a	0.3680	0.724	–0.3560
9/23/2003	WT102	5UD	4b	0.4726	0.724	–0.2514
9/23/2003	WT102	5UD	4c	0.6609	0.724	–0.0631
9/24/2003	WT103	4SD	1	0.3416	0.580	–0.2384
9/24/2003	WT103	4SD	2	0.4448	0.580	–0.1352
9/24/2003	WT103	4SD	3	0.7946	0.580	0.2146

TABLE F.4 (Cont.)

Date	Site	New Final SECC	Run	$U_{*erosion}$ (m/s)	Revised Raw u_{*t} by Saltation/Cyclone Flux Increase with EC/Cyclone TFV Assigned to Progressive Run (m/s)	$u_* - u_{*t}$ (m/s)
9/24/2003	WT103	4SD	4a	0.3790	0.580	–0.2010
9/24/2003	WT103	4SD	4b	0.4655	0.580	–0.1145
9/24/2003	WT103	4SD	4c	0.7056	0.580	0.1256
9/24/2003	WT103	4UD	1	0.4615	0.384	0.0775
9/24/2003	WT103	4UD	2	0.4148	0.384	0.0308
9/24/2003	WT103	4UD	3	0.4796	0.384	0.0956
9/24/2003	WT103	4UD	4a	0.3749	0.384	–0.0091
9/24/2003	WT103	4UD	4b	0.4865	0.384	0.1025
9/24/2003	WT103	4UD	4c	0.7097	0.384	0.3257
9/25/2003	WT104	2SD	1	0.3583	0.403	–0.0447
9/25/2003	WT104	2SD	2	0.5062	0.403	0.1032
9/25/2003	WT104	2SD	3	0.6021	0.403	0.1991
9/25/2003	WT104	2SD	4a	0.2192	0.403	–0.1838
9/25/2003	WT104	2SD	4b	0.3659	0.403	–0.0371
9/25/2003	WT104	2SD	4c	0.5126	0.403	0.1096
9/25/2003	WT104	2UD	1	0.6246	0.543	0.0816
9/25/2003	WT104	2UD	2	0.5208	0.543	–0.0222
9/25/2003	WT104	2UD	3	0.7757	0.543	0.2327
9/25/2003	WT104	2UD	4a	0.3196	0.543	–0.2234
9/25/2003	WT104	2UD	4b	0.3847	0.543	–0.1583
9/25/2003	WT104	2UD	4c	0.5475	0.543	0.0045
9/26/2003	WT105	6SD	4a	0.3422	0.596	NA[a]
9/26/2003	WT105	6SD	4b	0.4490	0.596	NA
9/26/2003	WT105	6SD	4c	0.6625	0.596	NA
9/26/2003	WT105	6UD	1	0.4075	0.542	–0.1345
9/26/2003	WT105	6UD	2	0.3822	0.542	–0.1598
9/26/2003	WT105	6UD	3	0.6381	0.542	0.0961
9/26/2003	WT105	6UD	4a	0.3832	0.542	–0.1588
9/26/2003	WT105	6UD	4b	0.5087	0.542	–0.0333
9/26/2003	WT105	6UD	4c	0.7597	0.542	0.2177
9/29/2003	WT106	8SD	4a	0.4041	0.762	–0.3579
9/29/2003	WT106	8SD	4b	0.5045	0.762	–0.2575
9/29/2003	WT106	8SD	4c	0.7619	0.762	–0.0001

TABLE F.4 (Cont.)

Date	Site	New Final SECC	Run	$U_{*erosion}$ (m/sec)	Revised Raw u_{*t} by Saltation/Cyclone Flux Increase with EC/Cyclone TFV Assigned to Progressive Run (m/s)	$u_* - u_{*t}$ (m/s)
9/29/2003	WT106	8UD	1	0.2710	0.476	–0.2050
9/29/2003	WT106	8UD	2	0.4755	0.476	–0.0005
9/29/2003	WT106	8UD	3	0.4513	0.476	–0.0247
9/29/2003	WT106	8UD	4a	0.1720	0.476	–0.3040
9/29/2003	WT106	8UD	4b	0.2779	0.476	–0.1981
9/29/2003	WT106	8UD	4c	0.3409	0.476	–0.1351
9/30/2003	WT107	4LUD	1	0.3680	0.459	–0.0910
9/30/2003	WT107	4LUD	2	0.4024	0.459	–0.0566
9/30/2003	WT107	4LUD	3	0.4497	0.459	–0.0093
10/1/2003	WT108	UN_SD	4a	0.2511	0.570	–0.2085
10/1/2003	WT108	UN_SD	4b	0.3157	0.570	–0.1042
10/1/2003	WT108	UN_SD	4c	0.4449	0.570	0.1042
10/1/2003	WT108	UN_UD	1	0.3289	0.483	–0.1541
10/1/2003	WT108	UN_UD	2	0.5699	0.483	0.0869
10/1/2003	WT108	UN_UD	3	0.3956	0.483	–0.0874
10/1/2003	WT108	UN_UD	4a	0.3618	0.483	–0.1212
10/1/2003	WT108	UN_UD	4b	0.4661	0.483	–0.0169
10/1/2003	WT108	UN_UD	4c	0.6745	0.483	0.1915
10/7/2003	WT109	6SD	1	0.3315	0.583	–0.2515
10/7/2003	WT109	6SD	2	0.4918	0.583	–0.0912
10/7/2003	WT109	6SD	3	0.7778	0.583	0.1948
10/7/2003	WT109	6SD	4a	0.3347	0.564	–0.2293
10/7/2003	WT109	6SD	4b	0.4272	0.564	–0.1368
10/7/2003	WT109	6SD	4c	0.6270	0.564	–0.0630
10/7/2003	WT109	6UD	4a	0.3047	0.471	–0.1663
10/7/2003	WT109	6UD	4b	0.3863	0.471	–0.0847
10/7/2003	WT109	6UD	4c	0.5233	0.471	0.0523
10/7/2003	WT110	3SD	1	0.3734	0.454	–0.0806
10/7/2003	WT110	3SD	2	0.3404	0.454	–0.1136
10/7/2003	WT110	3SD	3	0.3383	0.454	–0.1157
10/7/2003	WT110	3UD	4a	0.4068	0.591	–0.1842
10/7/2003	WT110	3UD	4b	0.5150	0.591	–0.0760
10/7/2003	WT110	3UD	4c	0.7880	0.591	–0.1970

[a] NA = not available.

TABLE F.5 Results of 2003 Wind Tunnel Field Study: Spike-Corrected PM_{10} Flux Data

Table F.5 depicts results for the spike-corrected PM_{10} fluxes individually corrected, given in micrograms per square meter per second. Values of the average TSI ambient concentration and average spike-corrected TSI concentration are used to calculate the corrected PM_{10} flux.

Wind tunnel data were grouped according to their soil erodibility condition class (SECC). After the results for each wind tunnel run were analyzed, some data were discarded. The criteria for excluding data from the model were outliers and negative fluxes. Outliers were the data that demonstrated disproportionalety high PM_{10} fluxes when compared to erosion velocities. Negative fluxes resulted from a depleted loose soil reservoir. The data used to calculate the functions are presented in Tables F.6 and F.7.

Date	Site	New Final SECC	Run	Spike-Corrected TSI Average Conc. (mg/m^3)	Avg. TSI Ambient Conc.	Q_{actual} (ft^3/min)	PM_{10} Flux ($\mu g/m^2$-s) Indiv. Corrected
8/11/2003	WT079	2SU	1	0.0411	3.00E-02	473.5463	1.16E+01
8/11/2003	WT079	2SU	2	0.0782	3.60E-02	480.6870	4.47E+01
8/11/2003	WT079	2SU	3	0.2371	5.30E-02	512.6761	2.07E+02
8/19/2003	WT079R	2SUw	1	0.0974	2.40E-02	467.7759	7.58E+01
8/19/2003	WT079R	2SUw	2	0.2901	3.30E-02	471.1413	2.67E+02
8/19/2003	WT079R	2SUw	3	0.1972	2.80E-01	474.4994	–8.66E+01
8/11/2003	WT080	2UU	1	2.4881	4.26E-01	500.2561	2.27E+03
8/11/2003	WT080	2UU	2	0.0000	6.28E-01	542.3200	–7.44E+02
8/11/2003	WT080	2UU	3	100.5445	1.47E-01	535.3462	1.17E+05
8/12/2003	WT081	3SD	1	0.0668	4.10E-02	487.3730	2.77E+01
8/12/2003	WT081	3SD	2	0.1340	1.80E-02	483.8242	1.24E+02
8/12/2003	WT081	3SD	3	0.0984	9.10E-02	488.7421	8.00E+00
8/13/2003	WT082	3UD	1	0.0365	5.10E-02	482.3707	–1.54E+01
8/13/2003	WT082	3UD	2	0.2216	2.50E-02	506.5657	2.18E+02
8/13/2003	WT082	3UD	3	0.3154	1.00E-02	488.1517	3.28E+02
8/18/2003	WT082R	3SDw	1	0.1057	3.80E-02	478.0896	7.14E+01
8/18/2003	WT082R	3SDw	2	0.0728	5.30E-02	485.2076	2.11E+01
8/18/2003	WT082R	3SDw	3	0.3461	3.90E-02	460.8229	3.13E+02
8/14/2003	WT083	4SD	1	0.0422	2.90E-02	480.7359	1.40E+01
8/14/2003	WT083	4SD	2	0.1118	3.20E-02	490.6345	8.62E+01
8/14/2003	WT083	4SD	3	0.0945	2.20E-02	491.2131	7.83E+01
8/15/2003	WT084	4SD	1	0.0418	2.40E-02	502.0185	1.96E+01
8/15/2003	WT084	4SD	2	0.0270	1.60E-02	479.1629	1.16E+01
8/15/2003	WT084	4SD	3	0.1069	1.40E-02	496.1280	1.01E+02
8/21/2003	WT085	7SU	1	0.1338	7.80E-02	478.0896	5.88E+01
8/21/2003	WT085	7SU	2	0.0728	3.30E-02	473.7635	4.15E+01
8/21/2003	WT085	7SU	3	1.0377	4.30E-02	510.5291	1.11E+03

TABLE F.5 (Cont.)

Date	Site	New Final SECC	Run	Spike-Corrected TSI Average Conc. (mg/m^3)	Avg. TSI Ambient Conc.	Q_{actual} (ft^3/min)	PM_{10} Flux ($\mu g/m^2$-s) Indiv. Corrected
8/21/2003	WT086	4LUD	1	0.1226	1.00E-02	484.2138	1.20E+02
8/21/2003	WT086	4LUD	2	0.2152	4.40E-02	485.8690	1.83E+02
8/21/2003	WT086	4LUD	3	0.2156	3.20E-02	536.9700	2.15E+02
8/22/2003	WT087	6SU	1	0.0540	1.40E-02	418.3462	3.73E+01
8/22/2003	WT087	6SU	2	0.0616	1.80E-02	478.8842	4.60E+01
8/22/2003	WT087	6SU	3	0.0571	1.90E-02	484.0536	4.06E+01
8/25/2003	WT088	4SU	1	0.0559	2.50E-02	473.1179	3.22E+01
8/25/2003	WT088	4SU	2	0.0892	1.02E-01	477.3376	–1.35E+01
8/25/2003	WT088	4SU	3	0.1233	2.30E-02	512.8619	1.13E+02
8/28/2003	WT089	5SUw	1	0.0286	2.80E-02	468.1959	5.94E-01
8/28/2003	WT089	5SUw	2	0.0407	6.10E-02	469.2494	–2.10E+01
8/28/2003	WT089	5SUw	3	0.0879	3.20E-02	470.0321	5.79E+01
8/29/2003	WT090	UN_SD	1	0.0498	5.00E-02	468.2542	–1.81E-01
8/29/2003	WT090	UN_SD	2	0.0509	4.40E-02	472.4114	7.20E+00
8/29/2003	WT090	UN_SD	3	0.0439	4.10E-02	473.9667	3.01E+00
8/29/2003	WT091	2SD	1	0.0818	1.50E-02	481.4746	7.08E+01
8/29/2003	WT091	2SD	2	0.0452	1.10E-02	482.7739	3.64E+01
8/29/2003	WT091	2SD	3	0.0635	2.40E-02	473.9131	4.13E+01
9/3/2003	WT092	3UU	1	0.0477	4.60E-02	469.5682	1.76E+00
9/3/2003	WT092	3UU	2	0.0300	5.50E-02	474.2290	–2.61E+01
9/3/2003	WT092	3UU	3	0.0250	3.50E-02	495.5023	–1.09E+01
9/4/2003	WT093	8SD	1	0.0297	2.10E-02	465.7949	8.95E+00
9/4/2003	WT093	8SD	2	0.0440	2.30E-02	464.2355	2.15E+01
9/4/2003	WT093	8SD	3	0.0826	2.90E-02	503.1591	5.92E+01
9/5/2003	WT094	5SD	1	0.0290	3.00E-02	437.8193	–9.72E-01
9/5/2003	WT094	5SD	2	0.0226	1.60E-02	463.8249	6.76E+00
9/5/2003	WT094	5SD	3	0.0296	2.30E-02	443.5755	6.49E+00
9/10/2003	WT095	8SU	1	0.0404	3.30E-02	463.6711	7.53E+00
9/10/2003	WT095	8SU	2	0.0525	1.90E-02	463.5286	3.43E+01
9/10/2003	WT095	8SU	3	0.0598	2.50E-02	464.9864	3.57E+01
9/11/2003	WT096	6SU	1	0.0236	7.00E-02	460.6840	–4.72E+01
9/11/2003	WT096	6SU	2	0.0543	7.00E-03	462.6582	4.84E+01
9/11/2003	WT096	6SU	3	0.0548	6.00E-03	464.9619	5.01E+01
9/12/2003	WT097	7SD	1	0.0221	4.60E-02	469.4509	–2.48E+01
9/12/2003	WT097	7SD	2	0.0199	1.60E-02	466.4978	4.02E+00
9/12/2003	WT097	7SD	3	0.0466	1.30E-02	468.8015	3.48E+01

TABLE F.5 (Cont.)

Date	Site	New Final SECC	Run	Spike-Corrected TSI Average Conc. (mg/m^3)	Avg. TSI Ambient Conc.	Q_{actual} (ft^3/min)	PM_{10} Flux ($\mu g/m^2$-s) Indiv. Corrected
9/15/2003	WT098	4LSD	1	0.0193	1.40E-02	462.6242	5.45E+00
9/15/2003	WT098	4LSD	2	0.1120	1.00E-01	462.8976	1.23E+01
9/15/2003	WT098	4LSD	3	0.0814	1.11E-01	466.2610	–3.05E+01
9/18/2003	WT099	4SU	1	0.0356	1.30E-02	466.6622	2.33E+01
9/18/2003	WT099	4SU	2	0.0383	1.10E-02	471.8814	2.84E+01
9/18/2003	WT099	4SU	3	0.1410	1.10E-02	469.8128	1.35E+02
9/19/2003	WT100	3UD	1	0.0000	2.07E-01	455.1631	–2.08E+02
9/19/2003	WT100	3UD	2	0.1032	1.09E-01	459.8038	–5.90E+00
9/19/2003	WT100	3UD	3	0.1156	2.80E-02	463.3984	8.96E+01
9/22/2003	WT101	7SU	1	0.0901	1.53E-01	465.9915	–6.47E+01
9/22/2003	WT101	7SU	2	0.0627	4.40E-02	472.4420	1.95E+01
9/22/2003	WT101	7SU	3	0.1495	4.40E-02	480.9407	1.12E+02
9/22/2003	WT101	7SU	4a	0.1040	2.00E-02	484.0312	8.95E+01
9/22/2003	WT101	7SU	4b	0.1280	2.00E-02	484.0312	1.15E+02
9/22/2003	WT101	7SU	4c	0.1143	2.00E-02	484.0312	1.01E+02
9/22/2003	WT101	7UD	1	0.0811	5.70E-02	469.3515	2.50E+01
9/22/2003	WT101	7UD	2	0.0969	2.40E-02	474.7598	7.63E+01
9/22/2003	WT101	7UD	3	0.0187	4.60E-02	481.7133	–2.90E+01
9/22/2003	WT101	7UD	4a	0.3354	4.60E-02	491.7574	3.13E+02
9/22/2003	WT101	7UD	4b	0.2468	4.60E-02	491.7574	2.17E+02
9/22/2003	WT101	7UD	4c	1.5915	4.60E-02	491.7574	1.67E+03
9/23/2003	WT102	5SU	1	0.1330	3.02E-01	469.2234	–1.75E+02
9/23/2003	WT102	5SU	2	0.0568	7.00E-02	472.8976	–1.38E+01
9/23/2003	WT102	5SU	3	0.1059	3.50E-02	479.1665	7.49E+01
9/23/2003	WT102	5SU	4a	0.0709	4.00E-02	483.0846	3.28E+01
9/23/2003	WT102	5SU	4b	0.1608	4.00E-02	483.0846	1.28E+02
9/23/2003	WT102	5SU	4c	0.3809	4.00E-02	483.0846	3.63E+02
9/23/2003	WT102	5UD	1	0.0792	8.80E-02	472.6314	–9.22E+00
9/23/2003	WT102	5UD	2	0.1942	5.10E-02	474.4648	1.50E+02
9/23/2003	WT102	5UD	3	1.0000	5.10E-02	480.7337	1.00E+03
9/23/2003	WT102	5UD	4a	0.0715	3.60E-02	483.0846	3.78E+01
9/23/2003	WT102	5UD	4b	0.2006	3.60E-02	483.0846	1.75E+02
9/23/2003	WT102	5UD	4c	1.4202	3.60E-02	483.0846	1.47E+03
9/24/2003	WT103	4SD	1	0.0636	6.10E-02	465.5712	2.67E+00
9/24/2003	WT103	4SD	2	0.0380	2.80E-02	470.8149	1.04E+01
9/24/2003	WT103	4SD	3	0.0354	2.70E-02	478.1195	8.85E+00

TABLE F.5 (Cont.)

Date	Site	New Final SECC	Run	Spike-Corrected TSI Average Conc. (mg/m^3)	Avg. TSI Ambient Conc.	Q_{actual} (ft^3/min)	PM_{10} Flux ($\mu g/m^2$-s) Indiv. Corrected
9/24/2003	WT103	4SD	4a	0.0295	3.30E-02	483.8682	–3.71E+00
9/24/2003	WT103	4SD	4b	0.0503	3.30E-02	483.8682	1.84E+01
9/24/2003	WT103	4SD	4c	0.0842	3.30E-02	483.8682	5.46E+01
9/24/2003	WT103	4UD	1	0.0742	4.20E-02	469.7631	3.34E+01
9/24/2003	WT103	4UD	2	0.9790	4.70E-02	473.9459	9.74E+02
9/24/2003	WT103	4UD	3	2.4642	5.00E-02	480.2079	2.55E+03
9/24/2003	WT103	4UD	4a	0.1097	4.40E-02	490.3838	7.08E+01
9/24/2003	WT103	4UD	4b	0.2611	4.40E-02	490.3838	2.34E+02
9/24/2003	WT103	4UD	4c	3.2180	4.40E-02	490.3838	3.42E+03
9/25/2003	WT104	2SD	1	0.0467	4.10E-02	463.9003	5.84E+00
9/25/2003	WT104	2SD	2	0.0279	3.40E-02	466.4956	–6.28E+00
9/25/2003	WT104	2SD	3	0.0421	2.00E-02	468.8185	2.29E+01
9/25/2003	WT104	2SD	4a	0.0460	1.90E-02	472.4267	2.81E+01
9/25/2003	WT104	2SD	4b	0.0704	1.90E-02	472.4267	5.36E+01
9/25/2003	WT104	2SD	4c	0.1754	1.90E-02	472.4267	1.63E+02
9/25/2003	WT104	2UD	1	0.0446	3.20E-02	464.1727	1.29E+01
9/25/2003	WT104	2UD	2	0.0503	3.20E-02	468.0442	1.90E+01
9/25/2003	WT104	2UD	3	0.0825	2.20E-02	469.5927	6.27E+01
9/25/2003	WT104	2UD	4a	0.0946	2.30E-02	473.2018	7.47E+01
9/25/2003	WT104	2UD	4b	0.1633	2.30E-02	473.2018	1.46E+02
9/25/2003	WT104	2UD	4c	1.3331	2.30E-02	473.2018	1.37E+03
9/26/2003	WT105	6SD	4a	0.0181	2.50E-02	470.3889	–7.19E+00
9/26/2003	WT105	6SD	4b	0.0164	2.50E-02	470.3889	–8.92E+00
9/26/2003	WT105	6SD	4c	0.0338	2.50E-02	470.3889	9.16E+00
9/26/2003	WT105	6UD	1	0.0183	1.90E-02	471.1607	–6.81E-01
9/26/2003	WT105	6UD	2	0.0652	1.80E-02	472.4420	4.92E+01
9/26/2003	WT105	6UD	3	0.1140	1.00E-02	473.9872	1.09E+02
9/26/2003	WT105	6UD	4a	0.0290	1.80E-02	480.9407	1.16E+01
9/26/2003	WT105	6UD	4b	0.0571	1.80E-02	480.9407	4.14E+01
9/26/2003	WT105	6UD	4c	0.2019	1.80E-02	480.9407	1.95E+02
9/29/2003	WT106	8SD	4a	0.0472	3.10E-02	470.3889	1.68E+01
9/29/2003	WT106	8SD	4b	0.0358	3.10E-02	470.3889	5.03E+00
9/29/2003	WT106	8SD	4c	0.0801	3.10E-02	470.3889	5.10E+01
9/29/2003	WT106	8UD	1	0.0560	3.70E-02	471.1607	1.97E+01
9/29/2003	WT106	8UD	2	0.1309	3.00E-02	471.1607	1.05E+02
9/29/2003	WT106	8UD	3	1.2022	2.30E-02	472.7043	1.23E+03

TABLE F.5 (Cont.)

Date	Site	New Final SECC	Run	Spike-Corrected TSI Average Conc. (mg/m^3)	Avg. TSI Ambient Conc.	Q_{actual} (ft^3/min)	PM_{10} Flux ($\mu g/m^2$-s) Indiv. Corrected
9/29/2003	WT106	8UD	4a	0.1092	1.90E-02	475.7914	9.46E+01
9/29/2003	WT106	8UD	4b	0.8741	1.90E-02	475.7914	8.97E+02
9/29/2003	WT106	8UD	4c	2.0166	1.90E-02	475.7914	2.10E+03
9/30/2003	WT107	4LUD	1	0.0655	1.74E-01	460.5111	–1.10E+02
9/30/2003	WT107	4LUD	2	0.0607	1.04E-01	462.7046	–4.43E+01
9/30/2003	WT107	4LUD	3	0.0673	8.20E-02	468.3274	–1.52E+01
10/1/2003	WT108	UN_SD	4a	0.1074	1.06E-01	466.7312	1.44E+00
10/1/2003	WT108	UN_SD	4b	0.1041	1.06E-01	466.7312	–2.00E+00
10/1/2003	WT108	UN_SD	4c	0.2261	1.06E-01	466.7312	1.24E+02
10/1/2003	WT108	UN_UD	1	0.0703	7.10E-02	469.0591	–7.12E-01
10/1/2003	WT108	UN_UD	2	0.1520	6.22E-02	473.2018	9.37E+01
10/1/2003	WT108	UN_UD	3	0.0714	3.39E-02	469.3262	3.89E+01
10/1/2003	WT108	UN_UD	4a	0.0913	4.00E-02	474.7521	5.37E+01
10/1/2003	WT108	UN_UD	4b	0.1133	4.00E-02	474.7521	7.67E+01
10/1/2003	WT108	UN_UD	4c	0.8583	4.00E-02	474.7521	8.56E+02
10/7/2003	WT109	6SD	1	0.0366	3.10E-01	468.5231	–2.83E+02
10/7/2003	WT109	6SD	2	0.0297	2.80E-02	468.8777	1.72E+00
10/7/2003	WT109	6SD	3	0.0394	1.90E-02	469.7408	2.12E+01
10/7/2003	WT109	6SD	4a	0.0286	1.60E-02	508.4144	1.40E+01
10/7/2003	WT109	6SD	4b	0.0305	1.60E-02	508.4144	1.61E+01
10/7/2003	WT109	6SD	4c	0.2145	1.60E-02	508.4144	2.21E+02
10/7/2003	WT109	6UD	4a	0.3090	2.20E-02	474.7443	3.00E+02
10/7/2003	WT109	6UD	4b	0.7421	2.20E-02	474.7443	7.54E+02
10/7/2003	WT109	6UD	4c	4.2475	2.20E-02	474.7443	4.42E+03
10/7/2003	WT110	3SD	1	0.0220	2.50E-02	479.9409	–3.17E+00
10/7/2003	WT110	3SD	2	0.0251	1.30E-02	479.6833	1.28E+01
10/7/2003	WT110	3SD	3	0.0359	1.10E-02	511.4553	2.79E+01
10/7/2003	WT110	3UD	4a	0.0166	1.00E-02	479.4252	6.97E+00
10/7/2003	WT110	3UD	4b	0.0420	1.00E-02	479.4252	3.38E+01
10/7/2003	WT110	3UD	4c	0.0934	1.00E-02	479.4252	8.81E+01

TABLE F.6 Results of 2003 Wind Tunnel Field Study: Corrected PM_{10} Flux and TFV Data Used for Fits — Power Functions

Table F.6 presents the raw selected data for the vertical PM_{10} fluxes and erosion velocities used for power function fits. These data were used to run the model. The effective threshold friction velocity (TFV_{eff}) and the average K factor for each SECC in the model are also shown in this table.

Date	Site	Run	New Final SECC	u_{*e} (m/s)	$Final_{rev}$ u_{*t} by Saltation/Cyclone Flux Increase with PM_{10} Increase for Progressive Runs (m/s)	TFV_{eff} (m/s)	K_{avg} Factor	PM_{10} Flux ($mg/m^2/s$)
9/25/2003	WT104	4a	2SD	0.2192	0.359	0.30	1.32E+03	2.81E+01
8/29/2003	WT091	2		0.3357	0.403			3.64E+01
9/25/2003	WT104	4b		0.3659	0.359			5.36E+01
9/25/2003	WT104	4c		0.5126	0.359			1.63E+02
8/11/2003	WT079	1	2SU	0.1200	0.273	0.38	1.22E-03	1.16E+01
8/11/2003	WT079	2		0.3898	0.273			4.47E+01
8/11/2003	WT079	3		0.6372	0.273			2.07E+02
10/7/2003	WT110	3	3SD	0.3383	0.454	0.47	1.63E-03	2.79E+01
10/7/2003	WT110	2		0.3404	0.454			1.28E+01
8/12/2003	WT081	1		0.3788	0.454			2.77E+01
8/12/2003	WT081	2		0.5237	0.454			1.24E+02
10/7/2003	WT110	4a	3UD	0.4068	0.591	0.41	2.16E-04	6.97E+00
10/7/2003	WT110	4b		0.5150	0.591			3.38E+01
10/7/2003	WT110	4c		0.7880	0.591			8.81E+01
9/24/2003	WT103	4b	4SD	0.4655	0.564	0.46	3.11E-04	1.84E+01
8/15/2003	WT084	2		0.4888	0.580			1.16E+01
9/24/2003	WT103	4c		0.7056	0.564			5.46E+01
9/24/2003	WT103	3		0.7946	0.580			8.85E+00
8/14/2003	WT083	3		0.9401	0.580			7.83E+01
8/25/2003	WT088	1	4SU	0.1980	0.443	0.57	6.89E-04	3.22E+01
9/18/2003	WT099	1		0.2863	0.443			2.33E+01
8/25/2003	WT088	3		0.3398	0.443			1.13E+02
9/18/2003	WT099	2		0.5328	0.443			2.84E+01
9/18/2003	WT099	3		0.8633	0.443			1.35E+02
9/26/2003	WT105	4a	6UD	0.3832	0.577	0.45	6.84E-05	1.16E+01
9/26/2003	WT105	4b		0.5087	0.577			4.14E+01
9/26/2003	WT105	3		0.6381	0.542			1.09E+02
9/26/2003	WT105	4c		0.7597	0.577			1.95E+02
10/7/2003	WT109	4a	6SD	0.3347	0.564	0.51	5.09E-04	1.40E+01
10/7/2003	WT109	4b		0.4272	0.564			1.61E+01
10/7/2003	WT109	4c		0.6270	0.564			2.21E+02

TABLE F.7 Results of 2003 Wind Tunnel Field Study: Corrected PM_{10} Flux and TFV Data Used for Fits — Default Functions

Table F.7 depicts the raw selected data for the vertical PM_{10} fluxes and erosion velocities used for default function fits. The effective threshold friction velocity (TFV_{eff}) as well as the average K factor for each SECC in the model are also shown in this table.

Date	Site	Run	New Final SECC	u_{*e} (m/s)	$Final_{rev}$ u_{*t} by Saltation/Cyclone Flux Increase with PM_{10} Increase for Progressive Runs (m/s)	TFV_{eff} (m/s)	K_{avg} Factor	PM_{10} Flux ($mg/m^2/s$)
9/25/2003	WT104	4a	2UD	0.3196	0.383	0.27	1.07E-03	7.47E+01
9/25/2003	WT104	4b		0.3847	0.383			1.46E+02
9/25/2003	WT104	4c		0.5475	0.383			1.37E+03
8/11/2003	WT080	1	2UU	0.3303	0.292	0.34	6.68E-03	4.16+04
8/11/2003	WT080	2		0.3522	0.292			2.27+03
8/11/2003	WT080	3		0.4170	0.292			1.17+05
9/3/2003	WT092	1	3UU	0.2031	0.481	0.53	1.08E-03	1.76E+00
9/15/2003	WT098	1	4_LSD	0.3025	0.669	0.53	2.30E-04	5.45E+00
9/15/2003	WT098	2		0.4204	0.669			1.23E+01
8/21/2003	WT086	1	4_LUD	0.2432	0.459	0.46	4.56E-03	1.20E+02
8/21/2003	WT086	3		0.5129	0.459			2.15E+02
9/24/2003	WT103	4a	4UD	0.3749	0.568	0.40	4.23E-04	7.08E+01
9/24/2003	WT103	2		0.4148	0.384			9.74E+02
9/24/2003	WT103	3		0.4796	0.384			2.55E+03
9/5/2003	WT094	2	5SD	0.4203	0.510	0.50	1.07E-04	6.76E+00
9/5/2003	WT094	3		0.602	0.510			6.49E+00
9/23/2003	WT102	4a	5SU	0.3563	0.519	0.62	1.97E-05	3.28E+01
9/23/2003	WT102	4b		0.4469	0.519			1.28E+02
9/23/2003	WT102	4c		0.6100	0.519			3.63E+02
9/23/2003	WT102	4a	5UD	0.3680	0.562	0.43	2.66E-04	3.78E+01
9/23/2003	WT102	2		0.4029	0.724			1.50E+02
9/23/2003	WT102	3		0.8521	0.724			1.00E+03
8/22/2003	WT087	1	6SU	0.2696	0.646	0.64	2.16E-03	3.73E+01
9/11/2003	WT096	3		0.8237	0.646			5.01E+01
9/12/2003	WT097	3	7SD	0.4339	0.525	0.53	1.22E-04	3.48E+01
9/12/2003	WT097	2		0.5522	0.525			7.11E+00
8/21/2003	WT085	1	7SU	0.3421	0.486	0.53	3.44E-03	5.88E+01
8/21/2003	WT085	2		0.5084	0.486			4.15E+01
9/22/2003	WT101	4a		0.3661	0.507			8.95E+01
9/22/2003	WT101	3		0.6945	0.521			1.12E+02

TABLE F.7 (Cont.)

Date	Site	Run	New Final SECC	u_{*e} (m/s)	$Final_{rev}$ u_{*t} by Saltation/Cyclone Flux Increase with PM_{10} Increase for Progressive Runs (m/s)	TFV_{eff} (m/s)	K_{avg} Factor	PM_{10} Flux ($mg/m^2/s$)
9/22/2003	WT101	4a	7UD	0.2944	0.398	0.37	3.54E-04	3.13E+02
9/22/2003	WT101	4b		0.3730	0.398			2.17E+02
9/22/2003	WT101	4c		0.5302	0.398			1.67E+03
9/29/2003	WT106	4a	8SD	0.4041	0.762	0.62	1.97E-04	1.68E+01
9/4/2003	WT093	1		0.4368	0.625			8.95E+00
9/4/2003	WT093	2		0.5176	0.625			2.15E+01
9/4/2003	WT093	3		0.6252	0.625			5.92E+01
9/10/2003	WT095	1	8SU	0.3344	0.783	0.78	3.23E-04	7.53E+00
9/10/2003	WT095	3		0.7826	0.783			3.57E+01
9/29/2003	WT106	4a	8UD	0.1720	0.341	0.55	2.86E-04	9.46E+01
9/29/2003	WT106	4b		0.2779	0.341			8.97E+02
9/29/2003	WT106	1		0.2710	0.476			1.97E+01
9/29/2003	WT106	3		0.4513	0.476			1.23E+03
10/1/2003	WT108	4a	UN_SD	0.2511	0.445	0.42	1.41E-04	3.75E+01
8/29/2003	WT090	2		0.3852	0.502			7.20E+00
8/29/2003	WT090	3		0.6191	0.502			3.01E+00
10/1/2003	WT108	4a	UN_UD	0.3618	0.570	0.37	2.33E-04	5.37E+01
10/1/2003	WT108	3		0.3956	0.483			3.89E+01
10/1/2003	WT108	2		0.5699	0.483			9.37E+01

TABLE F.8 Results of 2003 Wind Tunnel Field Study: Summary Table, Effective TFV, and Effective Aerodynamic Roughness

Table F.8 presents a summary of the effective threshold friction velocity (TFV_{eff}) and the effective aerodynamic roughness ($Z_{o_{eff}}$) results for the main soil erodibility condition classes (SECCs) tested.

SECC	Function Type	n	TFV_{eff} u_{*t} m/s	TFV_{eff} u_{*t} mph	TFV_{eff} z_o cm	TFV_{eff} z_o m	Threshold Velocity u_{t10} (m/s)	Threshold Velocity u_{t10} (mph)	Data File (spreadsheet/tab ID)	Wind Tunnel Site Data Source (WT Test ID)
2SU	Power	3	0.38	0.85	0.0055	5.50E-05	11.5	25.8	WINDFLUX16 (corrTSIflux)	WT079
2SD	Power	4	0.30	0.68	0.0015	1.47E-05	10.2	22.9	WINDFLUX16 (corrTSIflux)	WT91, WT104progressive
2UD	Default	3	0.27	0.60	0.0090	9.03E-05	7.7	17.3	WINDFLUX16 (corrTSIflux)	WT104progressive
2UU	Default	3	0.34	0.77	0.0078	7.77E-05	10.1	22.5	WINDFLUX16 (corrTSIflux)	WT080
					0.0059	0.0001	9.9	22.1	Average	
3SU	n/a[a]	n/a	No data	n/a	n/a	n/a	n/a	n/a	WINDFLUX16 (corrTSIflux)	
3SD	Power	4	0.47	1.02	0.0243	2.43E-04	12.1	27.1	WINDFLUX16 (corrTSIflux)	WT081, WT110
3UD	Power	3	0.40	0.89	0.0530	5.30E-04	9.8	22.0	WINDFLUX16 (corrTSIflux)	WT110progressive
3UU	Default	1	0.53	1.15	0.0376	3.76E-04	13.1	29.3	WINDFLUX16 (corrTSIflux)	WT092
					0.0383	0.0004	11.7	26.1	Average	
4LSU	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
4LSD	Default	2	0.53	1.18	0.2666	2.67E-03	10.9	24.3	WINDFLUX16 (corrTSIflux)	WT098
4LUD	Default	2	0.46	1.03	0.0176	1.76E-04	12.6	28.3	WINDFLUX16 (corrTSIflux)	WT086
4LUU	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
					0.1421	0.0014	11.8	26.3	Average	
4SU	Power	5	0.57	1.28	0.0356	3.56E-04	14.6	32.7	WINDFLUX16 (corrTSIflux)	WT088, WT099
4SD	Power	5	0.46	1.02	0.0638	6.38E-04	11.0	24.7	WINDFLUX16 (corrTSIflux)	WT084, WT103; WT103progressive
4UD	Default	3	0.40	0.89	0.0328	3.28E-04	10.3	23.1	WINDFLUX16 (corrTSIflux)	WT103; WT103progressive
4UU	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
					0.0441		11.97	26.81	Average	

TABLE F.8 (Cont.)

SECC	Function Type	n	TFV_{eff} u_{*t} m/s	TFV_{eff} u_{*t} mph	TFV_{eff} z_o cm	TFV_{eff} z_o m	Threshold Velocity u_{t10} (m/s)	Threshold Velocity u_{t10} (mph)	Data File (spreadsheet/tab ID)	Wind Tunnel Site Data Source (WT Test ID)
5SU	Default	3	0.62	1.39	0.0065	6.50E-05	18.5	41.5	WINDFLUX16 (corrTSIflux)	WT102; WT102progressive
5SD	Default	2	0.50	1.11	0.0083	8.25E-05	14.5	32.5	WINDFLUX16 (corrTSIflux)	WT094
5UD	Default	3	0.43	0.97	0.0266	2.66E-04	11.4	25.6	WINDFLUX16 (corrTSIflux)	WT102; WT102progressive
5UU	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
					0.0138	1.38E-04	14.82	33.19	Average	
6SU	Default	2	0.64	1.43	0.1110	1.11E-03	14.6	32.6	WINDFLUX16 (corrTSIflux)	WT087; WT096
6SD	Power	3	0.51	1.15	0.0071	7.10E-05	15.2	34.0	WINDFLUX16 (corrTSIflux)	WT109progressive
6UD	Power	4	0.45	1.00	0.0382	3.82E-04	11.4	25.5	WINDFLUX16 (corrTSIflux)	WT105; WT105progressive
6UU	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
					0.0521	5.21E-04	13.71	30.72	Average	
7SU	Default	4	0.53	1.18	0.0240	2.40E-04	14.0	31.3	WINDFLUX16 (corrTSIflux)	WT085; WT101; WT101progressive
7SD	Default	2	0.53	1.18	0.0487	4.87E-04	13.0	29.2	WINDFLUX16 (corrTSIflux)	WT097
7UD	Default	3	0.37	0.82	0.0024	2.40E-05	11.9	26.6	WINDFLUX16 (corrTSIflux)	WT101progressive
7UU	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
					0.0250	2.50E-04	12.96	29.04	Average	
8SU	Default	2	0.78	1.75	0.0167	1.67E-04	21.4	48.0	WINDFLUX16 (corrTSIflux)	WT090
8SD	Default	4	0.62	1.40	0.0447	4.47E-04	15.6	35.0	WINDFLUX16 (corrTSIflux)	WT093; WT106progressive
8UD	Default	4	0.55	1.22	0.0128	1.28E-04	15.4	34.4	WINDFLUX16 (corrTSIflux)	WT106; WT106progressive
8UU	n/a	n/a	n/a	n/a	n/a	n/a	n/a			
					0.0247	2.47E-04	17.48	39.16	Average	
U_SU	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
U_SD	Default	3	0.42	0.95	0.0030	3.00E-05	13.5	30.2	WINDFLUX16 (corrTSIflux)	WT090; 108progressive
U_UD	Default	3	0.37	0.83	0.0114	1.14E-04	10.6	23.6	WINDFLUX16 (corrTSIflux)	WT108; WT108progressive
U_UU	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
					0.0072	7.22E-05	12.02	26.92	Average	

[a] n/a = not available; no measurements were made for this condition.

TABLE F.9 Results of 2003 Wind Tunnel Study Field Study: Ranges of Parameters Used for Model Fits

Table F.9 summarizes ranges of validity for threshold friction velocities for each SECC and compares F factors from the field study (LVWBD model) to data published by Dale Gillette in 1993 (LV-KfG model).

SECC and Model	K_{avg} Factor (1/m)	A 0-3.5	A′	Valid Range u_{*min} (m/s)	Valid Range u_{*max} (m/s)	TFV_{eff} (m/s)	K′=A′×K	K″= K′×ρ/g	LV-KfG Model (Gillete 1993) F_{max} (μg/m²-s)	LV-KfG Model (Gillete 1993) $F_{max}/50$ (μg/m³-s)	LVWDB Model F_{max} (μg/m²-s)	LVWDB Model $F_{max}/50$ (μg/m³-s)	Equation Used in Model
2SD	1.32E-03	3.3	3.3E+06	0.30	0.4101	0.30	4.36E+03	4.75E+02	14.7	0.29	81.0	1.62	$F = 328.43\ [u_*(u_*^2 - u_*^2)]^{0.4032}$
LVWBD										Good		Good	
2SU	1.22E-03	2.9	2.9E+06	0.38	0.5735	0.38	3.54E+03	3.86E+02	40.8	0.82			$F = 374.77\ u_*(u_*^2 - u_{*t}^2)^{0.5178}$
LVWBD										Good			
2UD	1.07E-03	3.5	3.5E+06	0.27	0.6023	0.27	3.74E+03	4.07E+02	71.6	1.43			$F = 4.07E+02\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
2UU	6.68E-03	3.1	3.1E+06	0.34	0.4170	0.34	2.07E+04	2.25E+03	53.5	1.07	n/a	n/a	$F = 2.25E+03\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
3SD	1.63E-03	3.1	3.1E+06	0.47	0.4765	0.47	5.04E+03	5.49E+02	1.1	0.02	7.8	0.16	$F = (989.83 \times u_*^2) - (284.44 \times u_*)$
LVWBD										Good		Good	
3SU													No data
No data													
3UD	2.16E-04	3.3	3.3E+06	0.41	0.7250	0.41	7.13E+02	7.77E+01	20.0	0.40	94	1.88	$F = 334.49\ [u_*(u_*^2 - u_{*t}^2)]^{0.8532}$
LVWBD										Good		Good	
3UU	1.08E-03	2.9	2.9E+06	0.53	0.7521	0.53	3.14E+03	3.42E+02	72.9	1.46			$F = 341.8\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
4LSD	2.30E-04	2.9	2.9E+06	0.53	0.67	0.53	6.66E+02	7.25E+01	8.2	0.2			$F = 72.5\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
4LUD	4.56E-03	3.1	3.1E+06	0.46	0.5129	0.46	1.41E+04	1.54E+03	39.3	0.8			$F = 1541.3\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
4SD	3.11E-04	2.7	2.7E+06	0.46	0.8931	0.46	8.39E+02	9.14E+01	48.1	1.0	38.1	0.76	$F = 47.349\ [u_*(u_*^2 - u_{*t}^2)]^{0.3379}$
LVWBD												Good	

TABLE F.9 (Cont.)

SECC and Model	K_{avg} Factor (1/m)	A 0-3.5	A′	Valid Range u_{*min} (m/s)	Valid Range u_{*max} (m/s)	TFV_{eff} (m/s)	K′=A′×K	K″= K′×ρ/g	LV-KfG Model (Gillete 1993) F_{max} (μg/m²-s)	LV-KfG Model (Gillete 1993) $F_{max}/50$ (μg/m³-s)	LVWDB Model F_{max} (μg/m²-s)	LVWDB Model $F_{max}/50$ (μg/m³-s)	Equation Used in Model
4SU	6.89E-04	2.4	2.4E+06	0.57	0.6474	0.57	1.65E+03	1.80E+02	11.0	0.2	64.4	1.29	$F = 141.53\ [u_*(u^2_* - u^2_*t)]^{0.2818}$
LVWBD												Good	
4UD	4.23E-04	2.9	2.9E+06	0.40	0.7807	0.40	1.23E+03	1.34E+02	47.0	0.94			$F = 134\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
5SD	1.07E-04	2.8	2.8E+06	0.50	0.8402	0.50	3.00E+02	3.27E+01	12.6	0.25			$F = 32.7\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
5SU	1.97E-05	2.8	2.8E+06	0.62	0.7930	0.62	5.50E+01	6.00E+00	1.2	0.02			$F = 6.0\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
5UD	2.66E-04	2.5	2.5E+06	0.43	0.6609	0.43	6.64E+02	7.23E+01	11.9	0.24			$F = 72.3\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
6SD	5.09E-04	2.4	2.4E+06	0.51	0.5768	0.51	1.22E+03	1.33E+02	5.4	0.11	27.2	0.54	$F = 892.4\ [u_*(u_*^2 - u_{*t}^2)]^{1.0911}$
LVWBD										Good		Good	
6SU	2.16E-03	2.2	2.2E+06	0.64	0.7002	0.64	4.74E+03	5.17E+02	29.2	0.58			$F = 657\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
6UD	6.84E-05	2.6	2.6E+06	0.45	0.7065	0.45	1.78E+02	1.94E+01	4.1	0.08	117.5	2.35	$F = 337.73\ [u_*(u_*^2 - u_{*t}^2)]^{0.6785}$
LVWBD										Good		>2	
7SD	1.22E-04	2.2	2.2E+06	0.53	0.8006	0.53	2.69E+02	2.93E+01	8.6	0.17			$F = 29.3\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
7SU	3.44E-03	2	2.0E+06	0.53	0.5417	0.53	6.88E+03	7.50E+02	7.2	0.14			$F = 749.7\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
7UD	3.54E-04	2.4	2.4E+06	0.37	0.7953	0.37	8.49E+02	9.25E+01	36.6	0.73			$F = 92.5\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
8SD	1.97E-04	2	2.0E+06	0.62	0.7238	0.62	3.93E+02	4.28E+01	4.2	0.08			$F = 42.8\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			

TABLE F.9 (Cont.)

SECC and Model	K_{avg} Factor (1/m)	A 0-3.5	A′	Valid Range u_{*min} (m/s)	Valid Range u_{*max} (m/s)	TFV_{eff} (m/s)	K′=A′×K	K″= K′×ρ/g	LV-KfG Model (Gillete 1993) F_{max} (μg/m^2-s)	LV-KfG Model (Gillete 1993) F_{max}/50 (μg/m^3-s)	LVWDB Model F_{max} (μg/m^2-s)	LVWDB Model F_{max}/50 (μg/m^3-s)	Equation Used in Model
8SU	3.23E-04	1.8	1.8E+06	0.78	0.7826	0.78	5.81E+02	6.32E+01	0.2	0.004			$F = 63.2\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
8UD	2.86E-04	2.2	2.2E+06	0.55	0.6544	0.55	6.30E+02	6.86E+01	5.8	0.12			$F = 68.6\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
UN_SD	1.41E-04	2	2.0E+06	0.42	0.7119	0.42	2.81E+02	3.06E+01	7.1	0.14			$F = 30.6\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			
UN_UD	2.33E-04	2.8	2.8E+06	0.37	0.8094	0.37	6.52E+02	7.10E+01	29.7	0.59		8.50	$F = 71.0\ u_*(u_*^2 - u_{*t}^2)$
LV-KfG										Good			

TABLE F.10 Example Showing How Spike Removal Data Are Processed, Taken from Site WT 102, Run 3, 9/23/2003, SECC 5SU

Table F.10 shows an example of the data used to estimate the spike-corrected PM_{10} flux from wind tunnel site WT 102, emission run 3, dated 9/23/2003.

Data	Duration (s)	Avg. Conc. (mg/m^3)	Mass (mg)	Flux ($\mu g/m^2/s$)
Whole signal	600	0.376	0.413	360
Spike	301	0.645	0.355	Not applicable
Nonspike	299	0.106	0.058	74.9

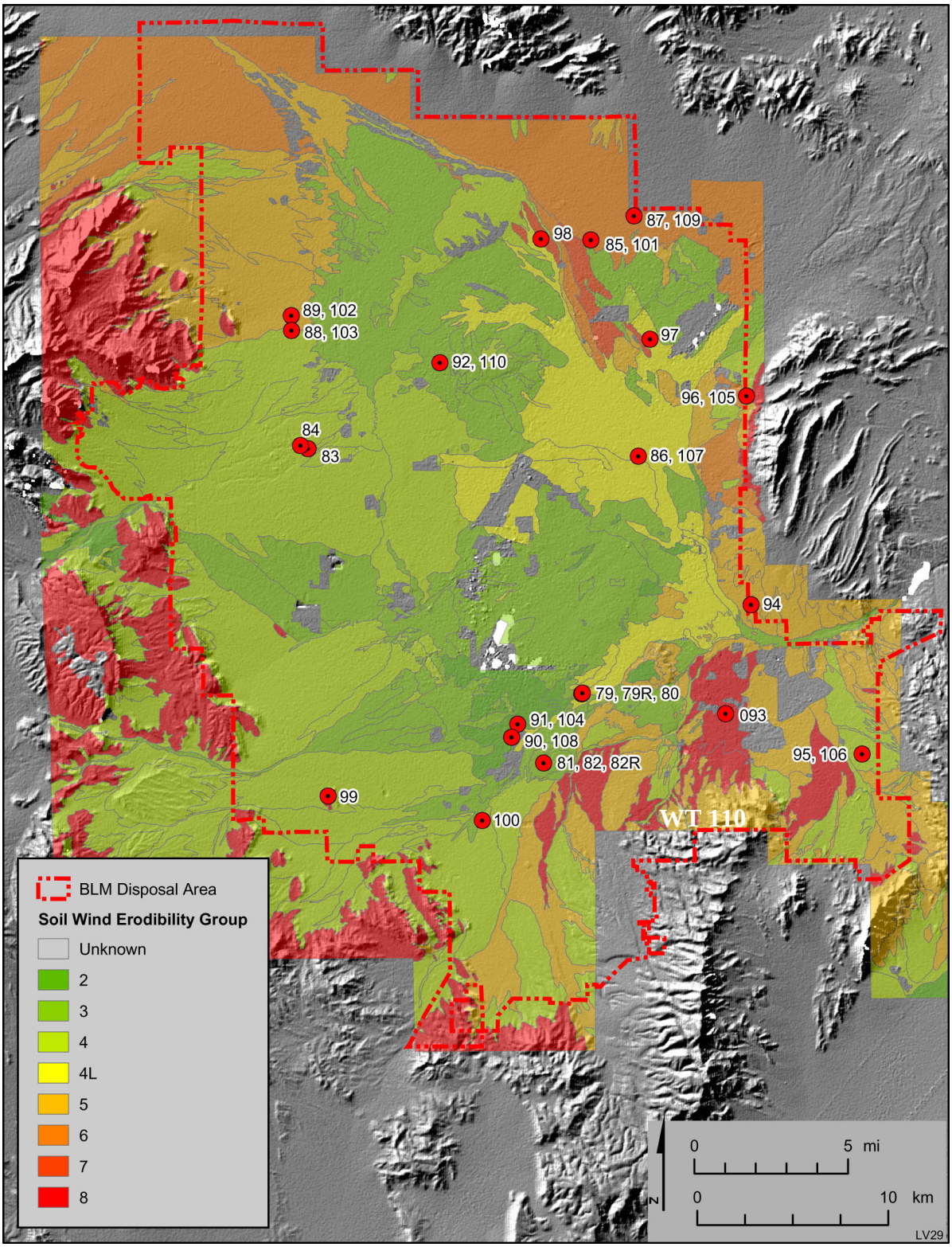

FIGURE F.1 Locations of Portable Wind Tunnel Test Sites within Las Vegas Valley

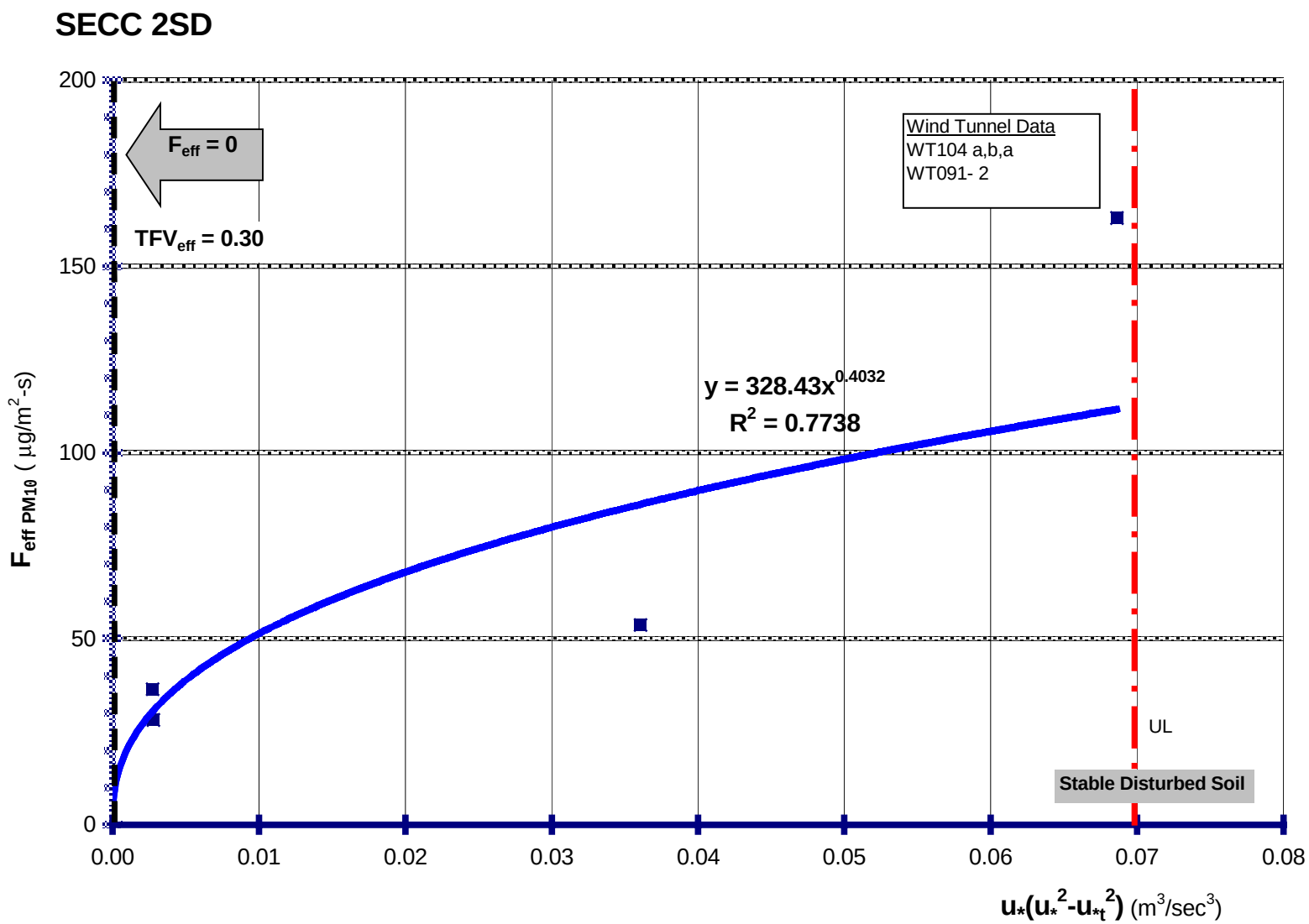

FIGURE F.2a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 2, Stable Disturbed Soil

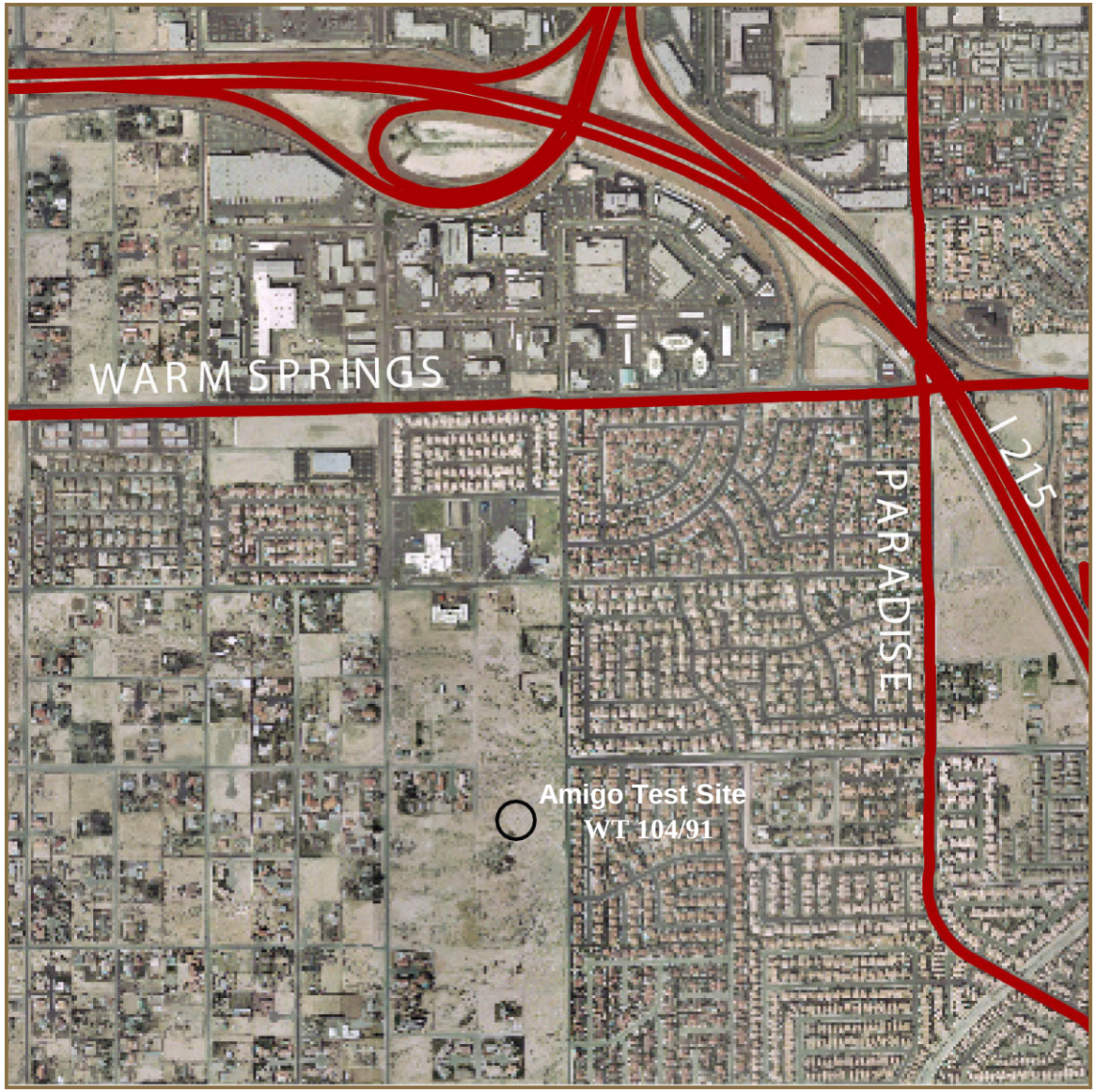

FIGURE F.2b Aerial Photo of Amigo Wind Tunnel Test Site WT 91 (104)

FIGURE F.2c Ground Surface Photo of Amigo Wind Tunnel Test Site WT 91 (104)

FIGURE F.2d Closeup Photo of Tunnel Soil at Amigo Wind Tunnel Test Site WT 91 (104)

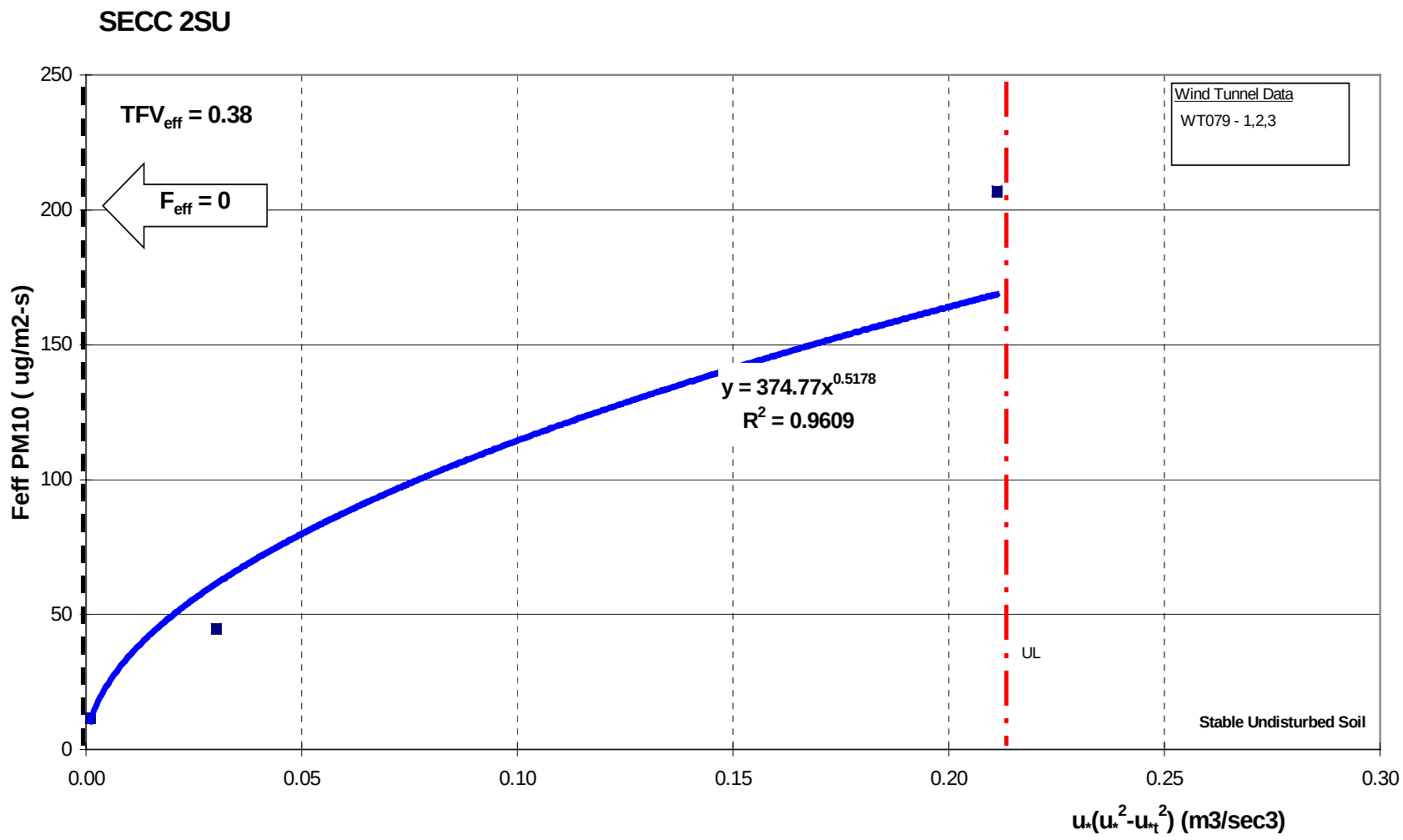

FIGURE F.3a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 2, Stable Undisturbed Soil

FIGURE F.3b Aerial Photo of Sunset Park Wind Tunnel Test Sites WT 79 and 80

FIGURE F.3c Ground Surface Photo of Sunset Park Wind Tunnel Test Sites WT 79 and 80

FIGURE F.3d Closeup Photo of Tunnel Soil at Sunset Park Wind Tunnel Test Sites WT 79 and 80

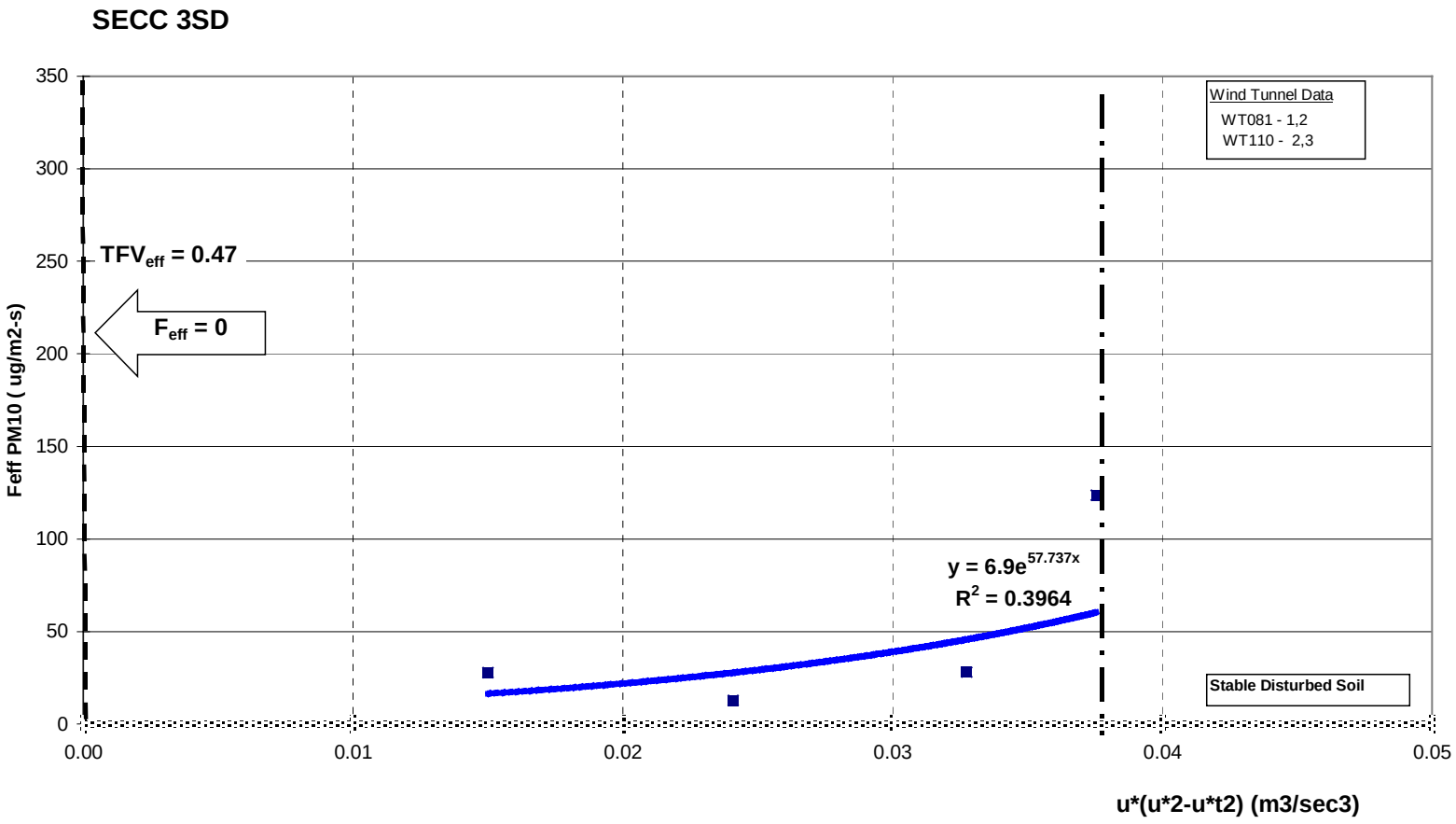

FIGURE F.4a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 3, Stable Disturbed Soil

FIGURE F.4b Ground Surface Photos of Pebble and Cheyenne Wind Tunnel Test Sites WT 81 and 100

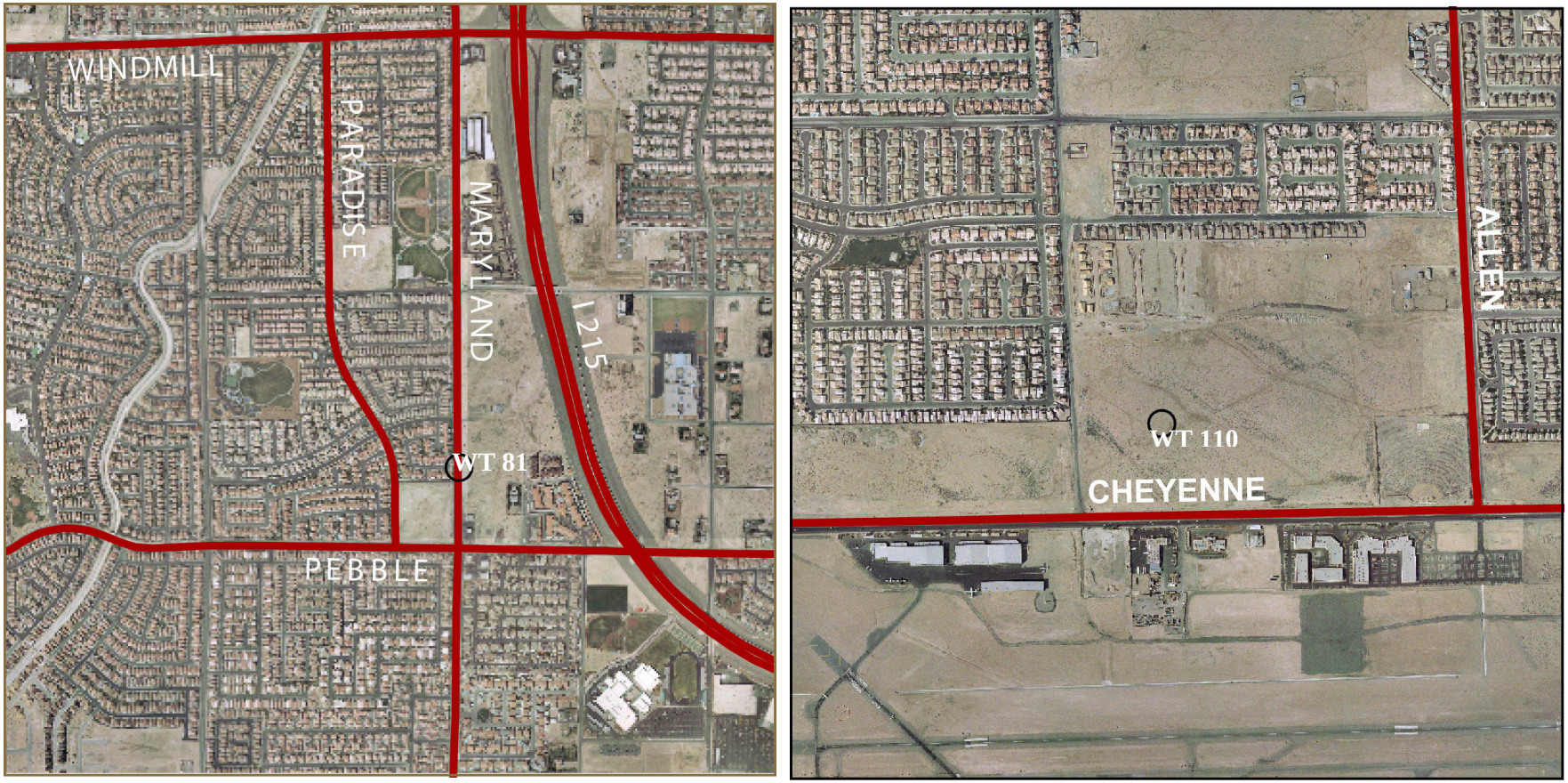

FIGURE F.4c Aerial Photos of Pebble and Cheyenne Wind Tunnel Test Sites WT 81 and 110

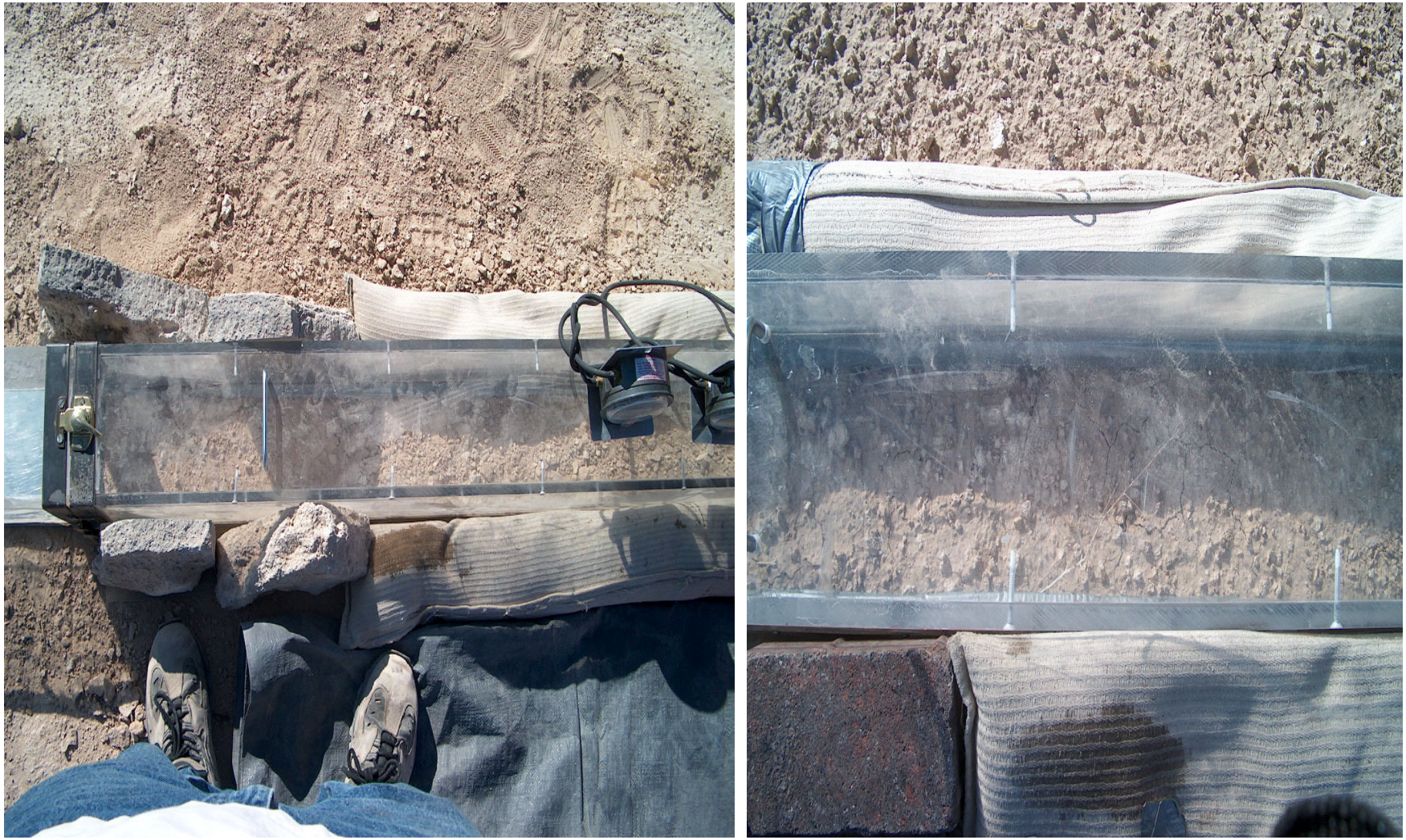

FIGURE F.4d Closeup Photos of Tunnel Soil at Pebble and Cheyenne Wind Tunnel Test Sites WT 81 and 100

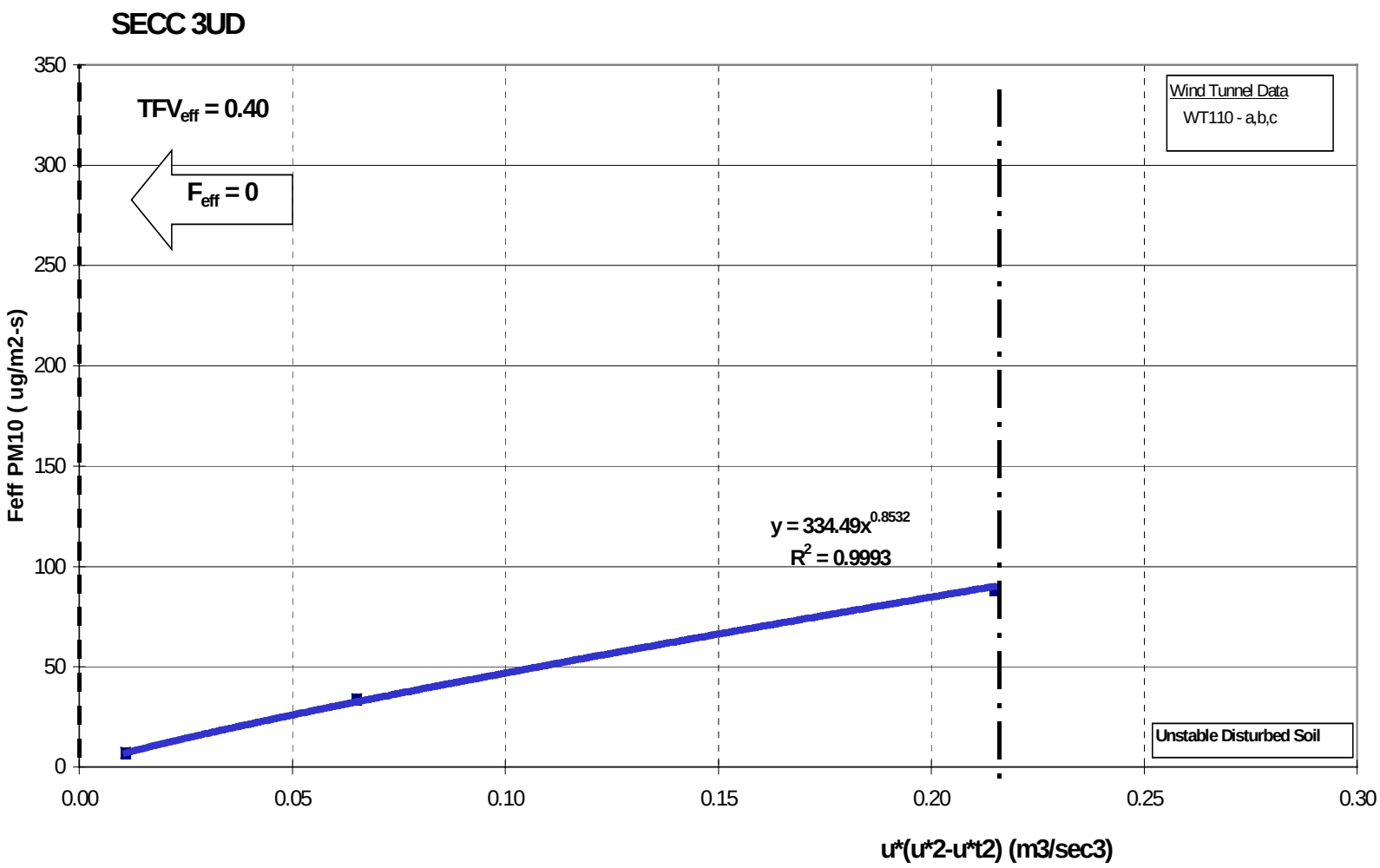

FIGURE F.5a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 3, Unstable Disturbed Soil

FIGURE F.5b Aerial Photo of Cheyenne Wind Tunnel Test Site WT 110

FIGURE F.5c Ground Surface Photo of Aerial Photo of Cheyenne Wind Tunnel Test Site WT 110

FIGURE F.5d Closeup Photo of Tunnel Soil at Cheyenne Wind Tunnel Test Site WT 110

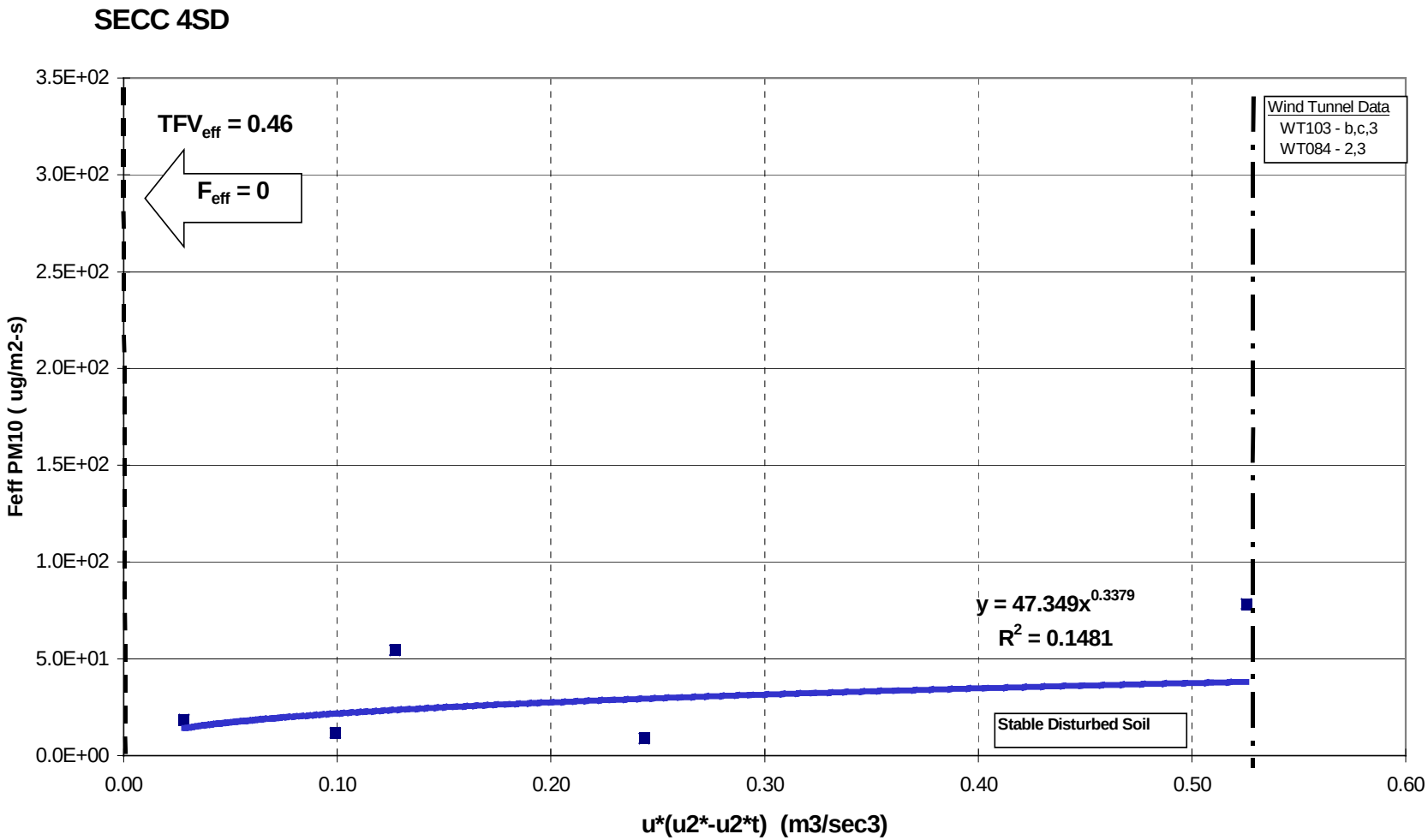

FIGURE F.6a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 4, Stable Disturbed Soil

FIGURE F.6b Aerial Photos of Durango & Alexander and Washington & Buffalo Wind Tunnel Test Sites WT 103 and 84

FIGURE F.6c Ground Surface Photos of Durango & Alexander and Washington & Buffalo Wind Tunnel Test Sites WT 103 and 84

FIGURE F.6d Closeup Photos of Tunnel Soil at Durango & Alexander and Washington & Buffalo Wind Tunnel Test Sites WT 103 and 84

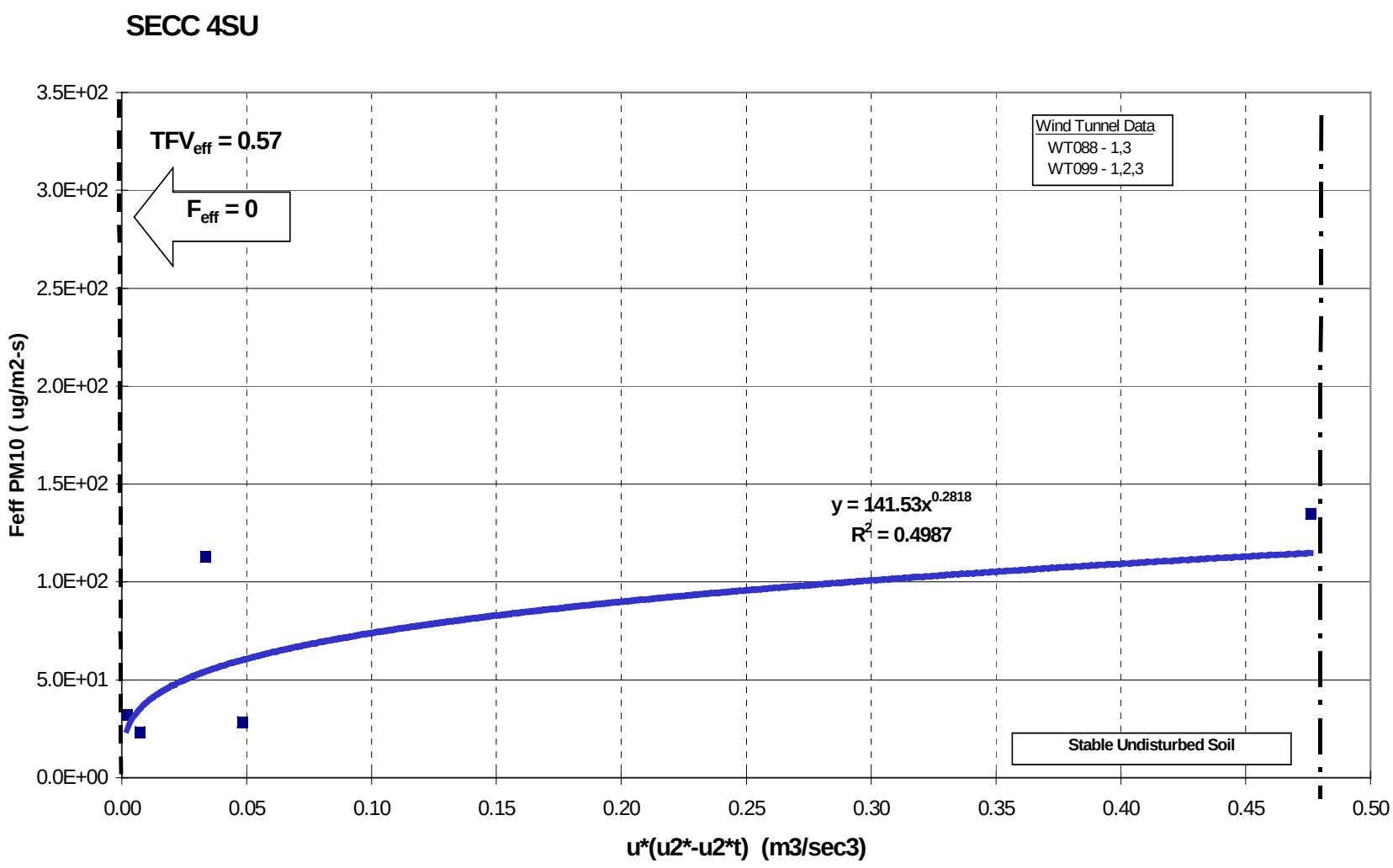

FIGURE F.7a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 4, Stable Undisturbed Soil

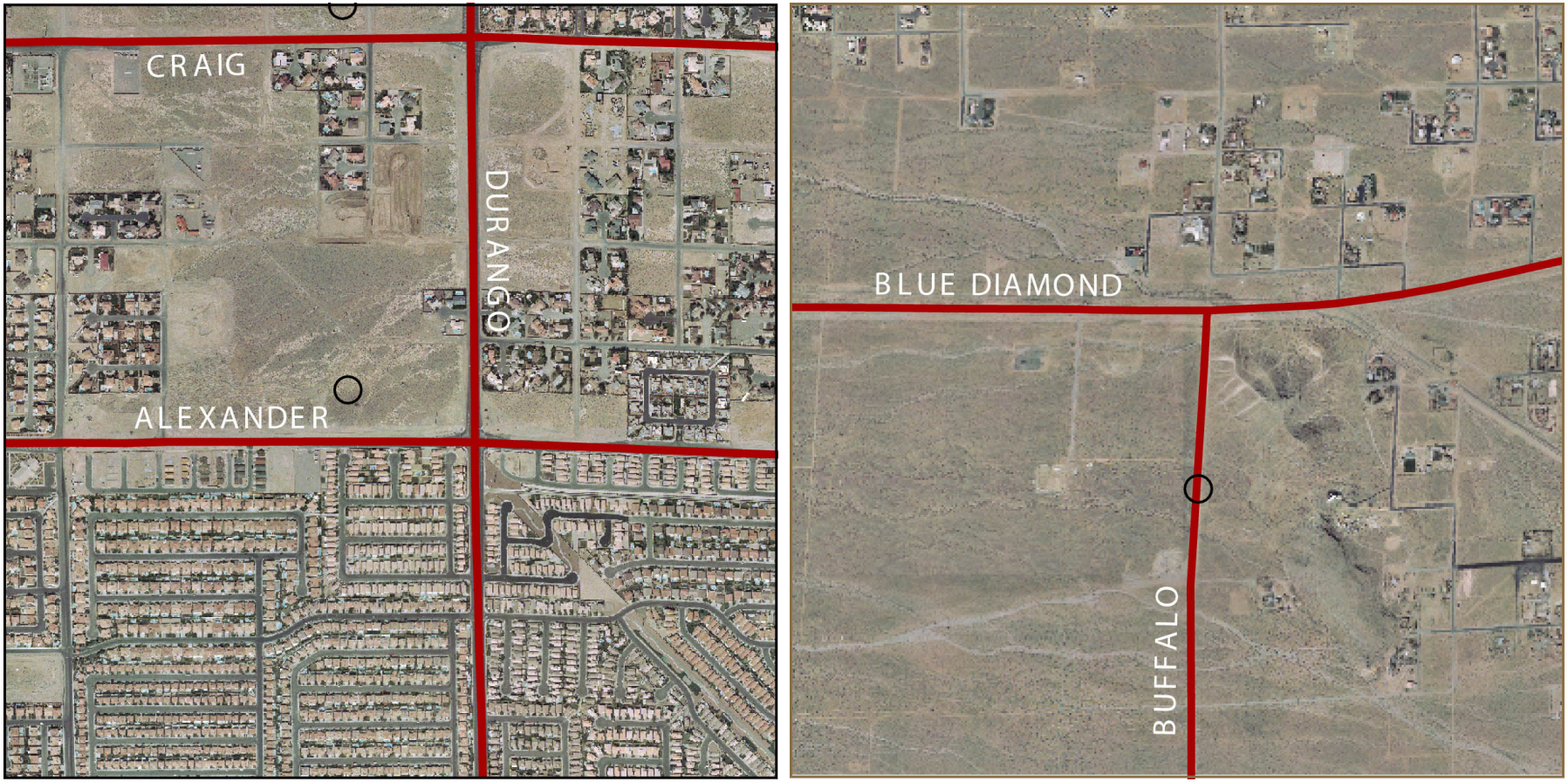

FIGURE F.7b Aerial Photos of Durango & Alexander and Buffalo-Blue Wind Tunnel Test Sites WT 88 and 99

FIGURE F.7c Ground Surface Photos of Durango & Alexander and Buffalo-Blue Wind Tunnel Test Sites WT 88 and 99

FIGURE F.7d Closeup Photos of Tunnel Soil at Durango & Alexander and Buffalo-Blue Wind Tunnel Test Sites WT 88 and 99

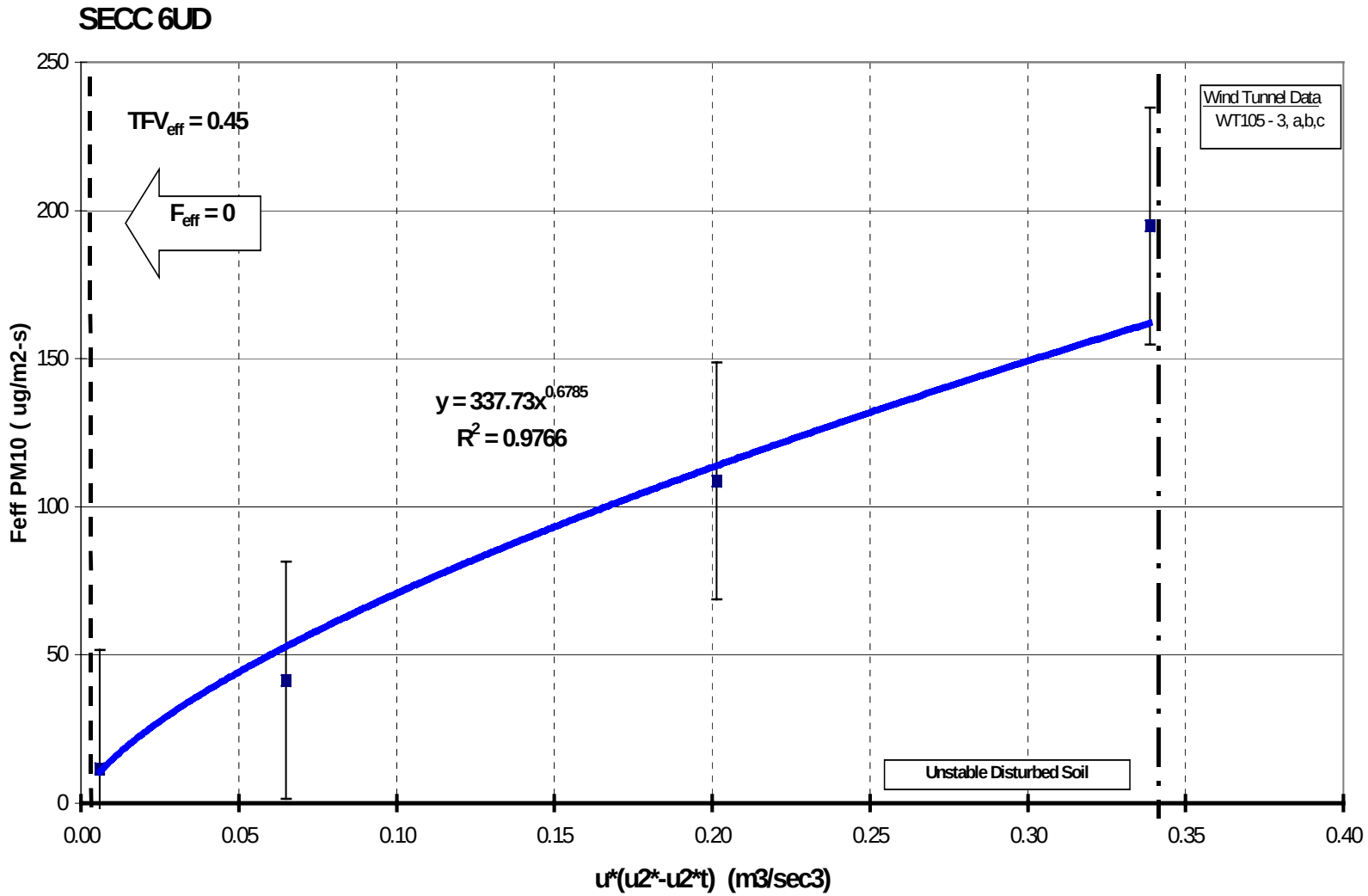

FIGURE F.8a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 6, Unstable Disturbed Soil

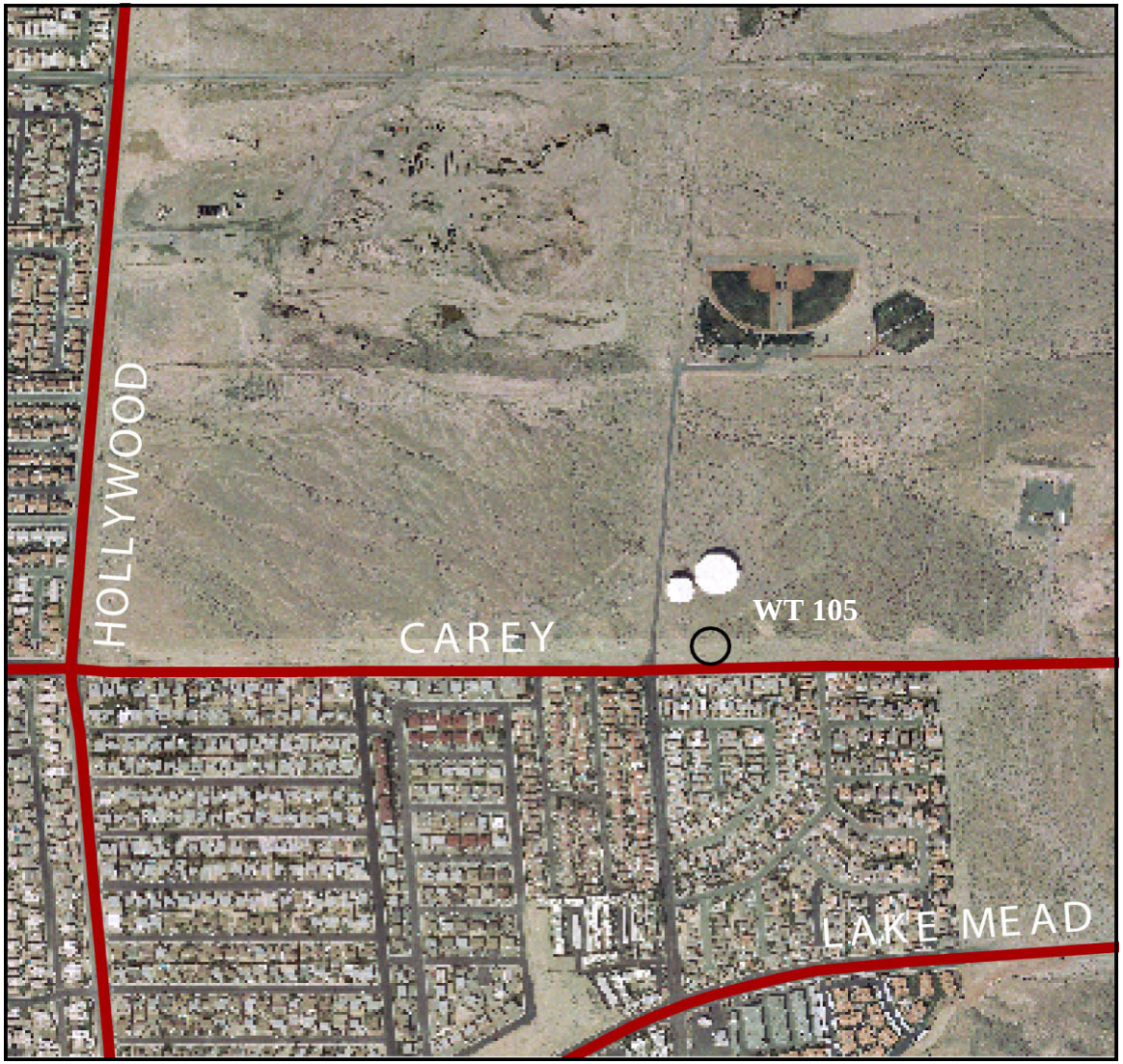

FIGURE F.8b Aerial Photo of Hollywood Wind Tunnel Test Site WT 105

FIGURE F.8c Ground Surface Photo of Hollywood Wind Tunnel Test Site WT 105

FIGURE F.8d Closeup Photo of Tunnel Soil at Hollywood Wind Tunnel Test Site WT 105

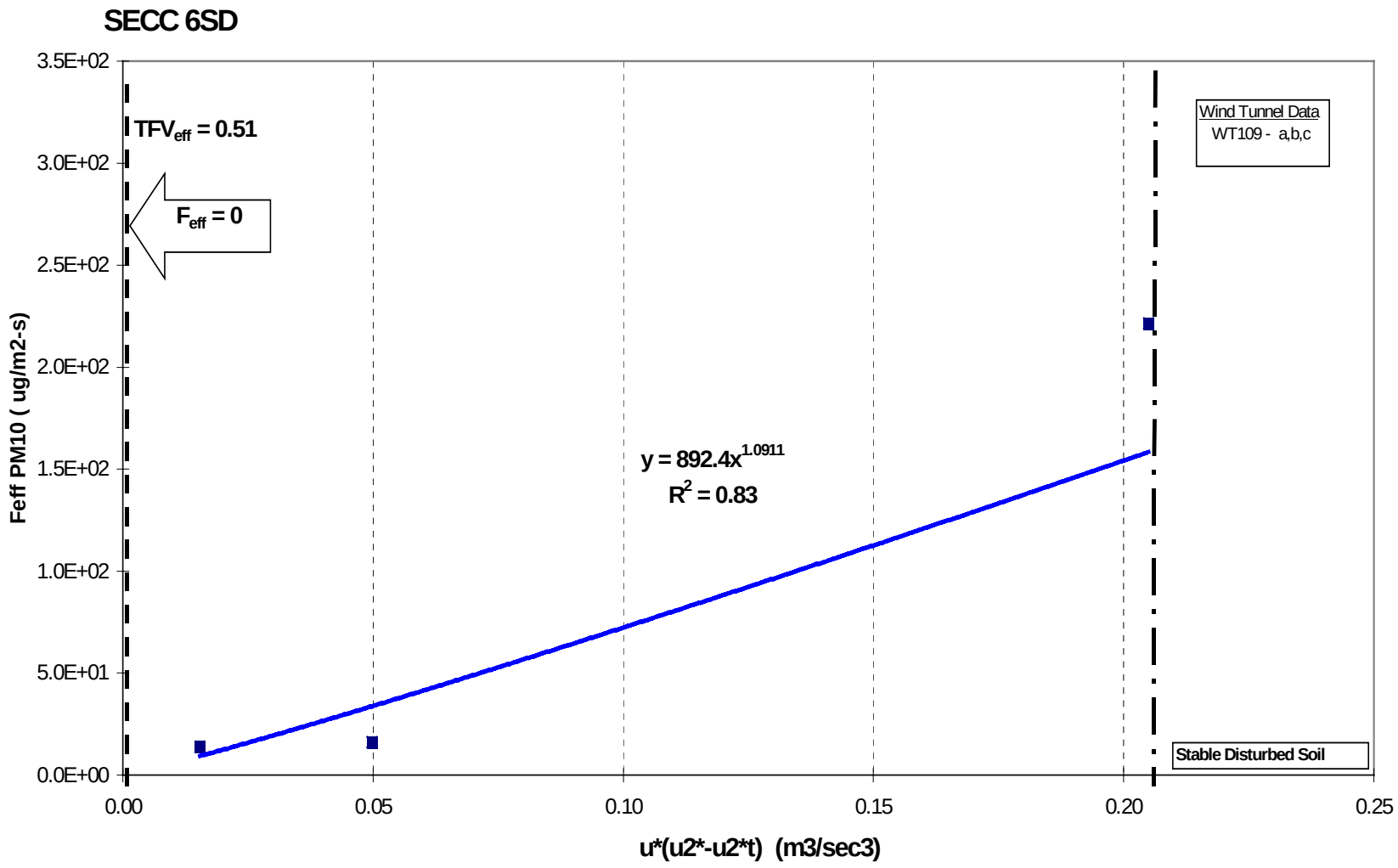

FIGURE F.9a Vertical PM_{10} Soil Flux as Function of the Erosion Friction Velocity Cubed — WEG 6, Stable Disturbed Soil

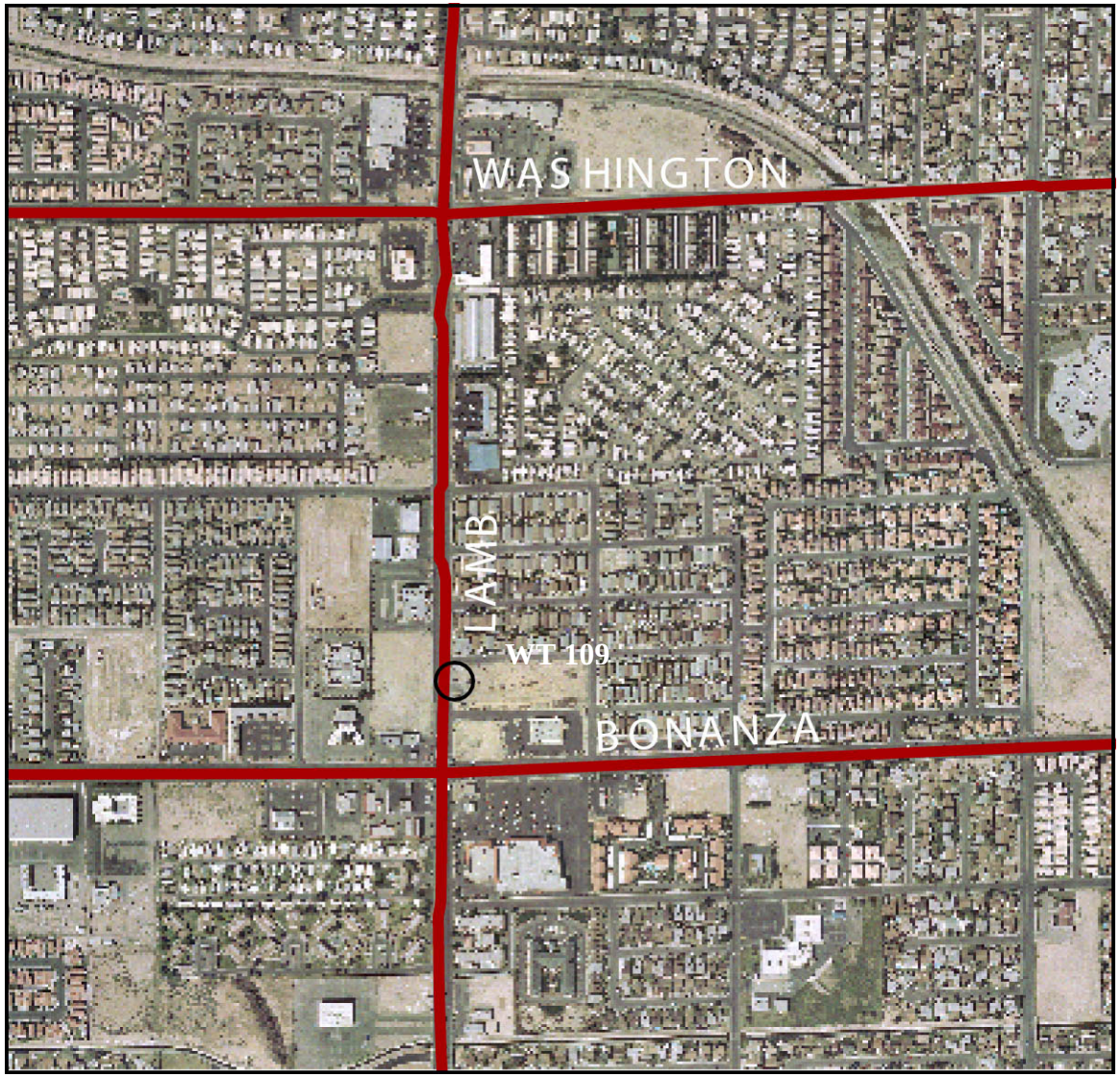

FIGURE F.9b Aerial Photo of Lamb Wind Tunnel Test Site WT 109

FIGURE F.9c Ground Surface Photo of Lamb Wind Tunnel Test Site WT 109

FIGURE F.9d Closeup Photo of Tunnel Soil at Lamb Wind Tunnel Test Site WT 109

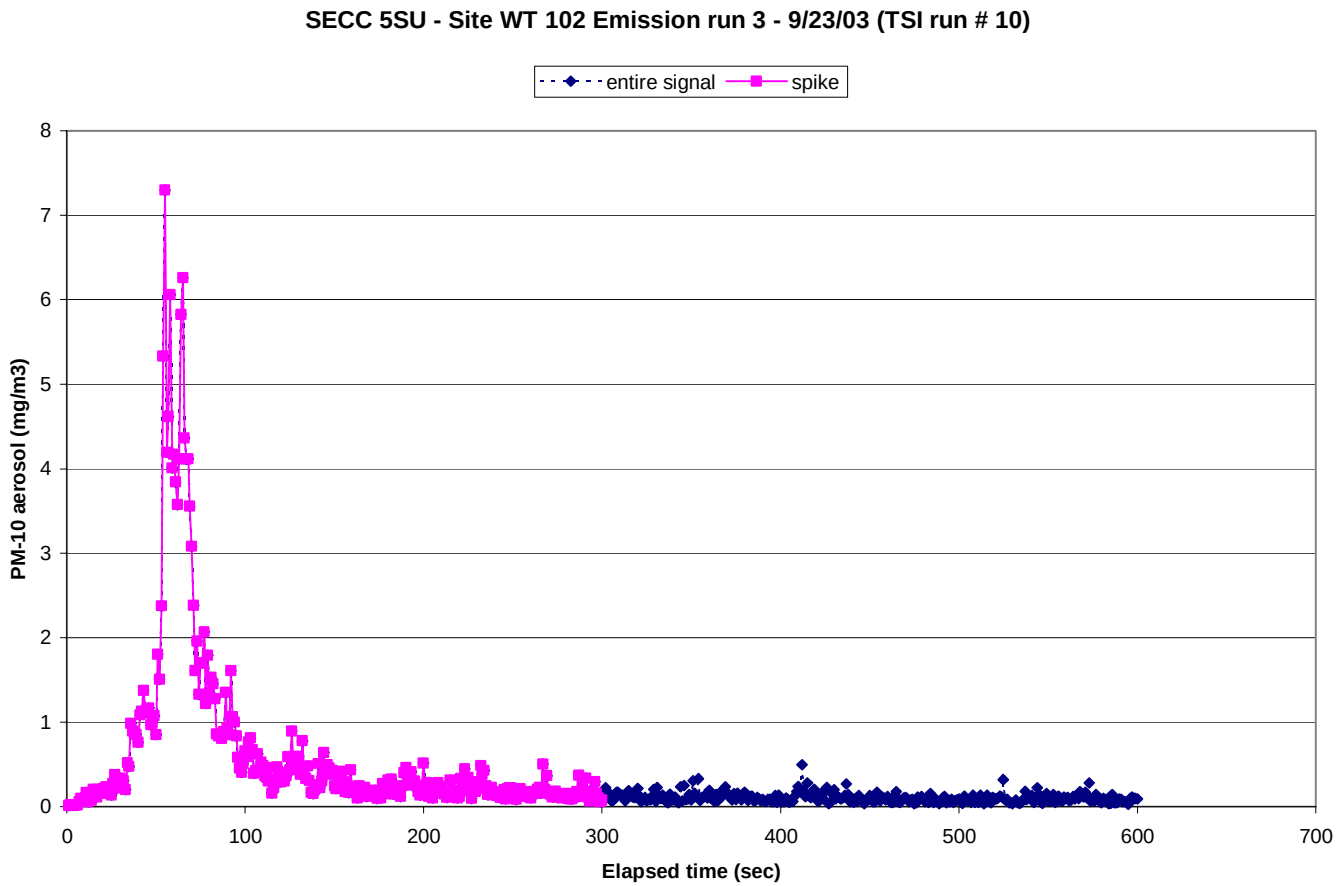

FIGURE F.10a First Example of TSI PM_{10} Spike Removal (Solid lines/square symbols show portion of signal judged to be initial spike, and dashed lines/diamonds show portion of signal judged to be steady-state emission.)

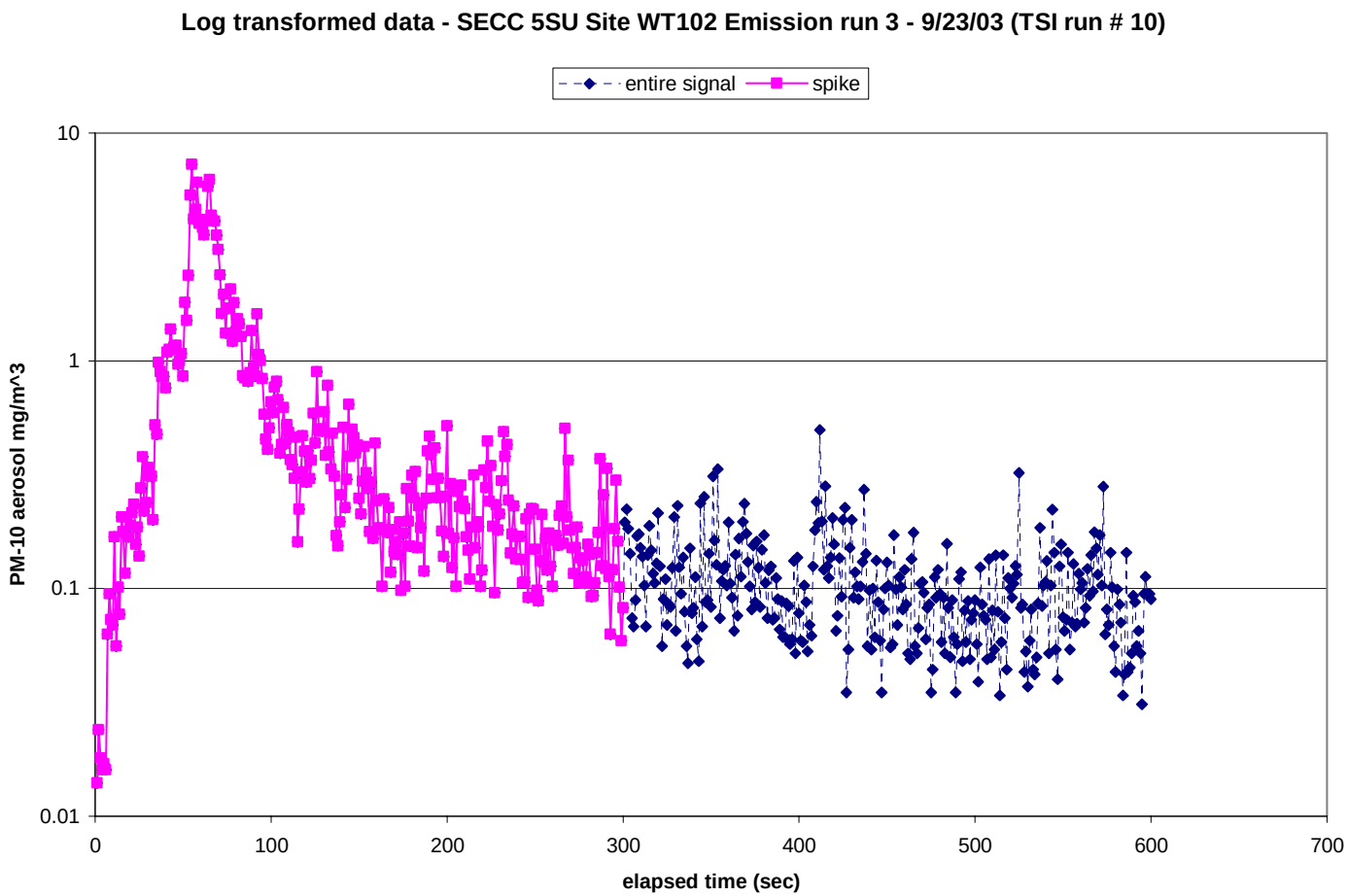

FIGURE F.10b Second Example of TSI PM_{10} Spike Removal (Solid lines/square symbols show portion of signal judged to be initial spike, and dashed lines/diamonds show portion of signal judged to be steady-state emission.)

Appendix G:

Modeling Domain and Surrogate Ratios

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Appendix G:

Modeling Domain and Surrogate Ratios

G.1 Supporting EPA Data Layers

A set of data layers provided by the U.S. Environmental Protection Agency (EPA) were obtained from the site ftp://ftp.epa.gov/EmisInventory/emiss_shp/us2000 in the ESRI Shapefile format. These geographic information system (GIS) layers covered the full extent of the Continental United States and were in a Lambert projection that differed from the modeling projection. To reduce data volume, portions of the layers that extended beyond the large grid were deleted. The layers were then reprojected to the modeling projection. Figure G.1 shows the outer, intermediate, and inner modeling domains used in the model simulations.

A total of 18 land-use variables were added to the gridded modeling domain for use as surrogate ratios in the model. Gridding surrogates are used to spatially allocate emission sources from a coarse geographic area to the finer grid cells that are used for modeling. There can be hundreds of unique source categories in an emissions inventory, which is typically developed for counties, states, or other areas. The exact locations of most major emission sources are known, and their geographic coordinates are usually contained in the inventory. These sources are usually are referred to as "major point sources" and include electric utilities and major industrial facilities. However, other emission sources are estimated for the entire county or some other area in aggregate, since their exact locations are not included in the modeling inventory. "Surrogates" are data on human activities or land use that are used to represent more precise locations for emission source category groups. A gridded surrogate ratio is the ratio of the amount of a surrogate in a modeling grid cell to the total amount of that surrogate in a county. Grid cell emissions are calculated by multiplying the cell's gridded surrogate ratio by the county emissions.

Table G.1 lists each variable along with its units of measurement, source GIS layer, feature type, and input data field. In addition, the Federal Information Processing Standards (FIPS) code for each cell was assigned on the basis of the county in which the cell center occurred.

G.2 GIS Processing

To determine the value for the surrogate ratio in the grid cells, the polygon and line GIS layers were combined with the grids by using an intersection and summation process. Initially this work was done with ESRI ArcView 3.3 GIS software by using the original shapefiles, but this process was time consuming, and it failed to complete correctly for some of the more complex polygon layers. Later work was done by using ESRI ArcGIS 8.2 Toolbox functions, which required that the layers be converted to the coverage GIS data format before processing could occur.

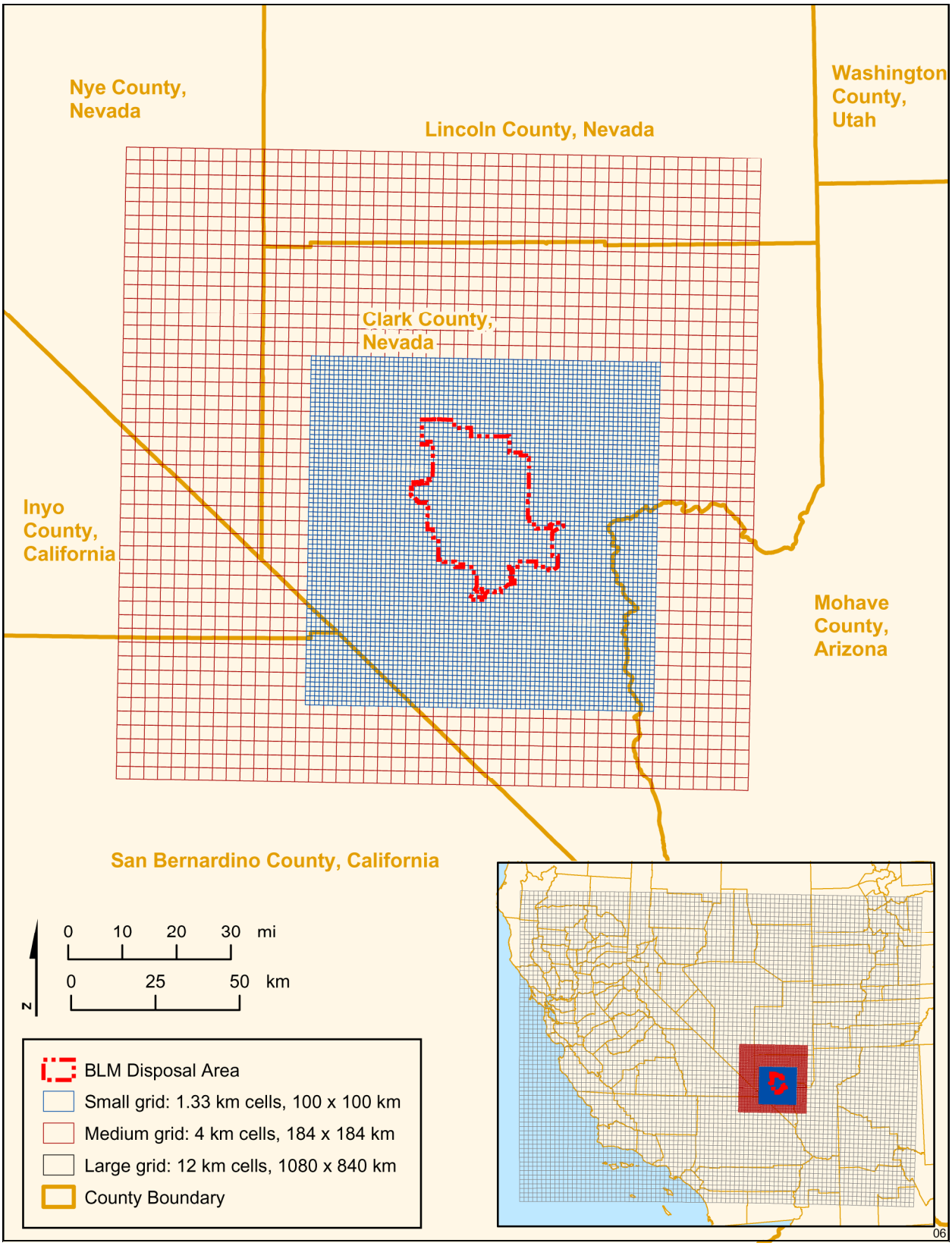

FIGURE G.1 Locations and Extents of the Three Modeling Grids

TABLE G.1 Surrogate Ratio Input Data, Including Variable, Unit of Measure, Source Layer, Feature Type, and Input Field

Variable	Unit of Measure	Source GIS Layer	Feature Type	Input Field
Land area	m^2	us_lw2k	Polygon	h2o-code
Water area	m^2	us_lw2k	Polygon	h20-code
Rural area[a]	m^2	N/A	Polygon	N/A
Urban area	m^2	us_urban	Polygon	area
Agricultural area	m^2	us_ag2k	Polygon	Grid-code
Forested area	m^2	us_for2k_dis	Polygon	forest
Major highways	m	usrds2k_rev	Line	Length
Urban primary roads	m	usrds2k_rev	Line	newrd_clas
Rural primary roads	m	usrds2k_rev	Line	newrd_clas
Urban secondary roads	m	usrds2k_rev	Line	newrd_clas
Rural secondary roads	m	usrds2k_rev	Line	newrd_clas
Railroads[b]	m	us_rail2k	Line	Length
Airports	Count of airports	us_air-pt	Point	N/A
Ports[c,d]	Count of shipping ports	us_port2k	Point	N/A
Total population	Count of population	pophu2k	Polygon	total_sample
Housing units	Count of housing units	pophu2k	Polygon	hse_units
Urban population	Count of population	pophu2k	Polygon	urban
Rural population	Count of population	pophu2k	Polygon	rural
FIPS Code[e]	N/A	esri\dtl_cnty	Polygon	fips

[a] The EPA data layers did not include information on rural areas. Rural areas were estimated by subtracting urban area and forested area from land area. Negative values were set to 0.

[b] Railroad lines coded as abandoned were removed.

[c] Some records were dropped from the us_port2k input layer to eliminate nonshipping ports based on the function field. Records with functions of "MORNG BRTH," "PASSENGER," and "REPAIR FAC" were removed.

[d] The port variable was omitted from the results for the intermediate and small grids because there are no ports within their extents.

[e] FIPS codes were derived from the detailed county (dtl-cnty) layer provided with the GIS software.

[f] N/A = not applicable.

The process in ESRI ArcView 3.3 for a polygon or line layer starts with preparing the input layer with one or more fields to generate the desired statistic. If the desired statistic is a count, such as total population, a density field is added and calculated as population per square meter by dividing the total population by the polygon area. Next, the intersection is performed by using the geoprocessing extension. This process subdivides the polygons in the input layer with the polygons in the grid, and it attributes to each subpolygon the fields from both original layers. The areas of the subpolygons are calculated and then multiplied by the density field to get an estimate of the count for each subpolygon. Finally, a summary operation is performed by using the unique ID of the grid as the key field. In this process, the subpolygons making up each grid cell are merged, and, at the same time, the counts for each subpolygon are summed. This yields a restored version of the original grid with the counts added.

The same process can be performed with line input layers, except that the intersection process splits the lines at the grid cell edges but does not add the grid cell lines to the layer. Because of this, only a tabular file is created during the summation process, which contains the unique grid ID and the summary value. To place the values into the grid layer, the summary table is joined to the grid by using the unique ID to associate the cells with their corresponding statistics. The joined result can be then saved as a new shapefile.

The processing for point layers is different because the intersection process is not needed. In ESRI ArcView 3.3, the tables associated with both layers are opened, and the shape fields are used for a spatial join. The point table is used as the root table, and a point-in-polygon association is used to link it to the grid cell that encompasses it. Then a summary operation is performed on the table by using the grid-unique ID as the key value and counting the number of points for each unique value. As is done for the line layer processing, the new summary table is joined to the original grid by using the unique ID to associate the cells with their corresponding statistics. The joined result can be then saved as a new shapefile.

In many cases, there are cells in the grid that have no data for a particular variable. Examples are when the grid extends into the ocean while the input layer does not, or when no part of a line or point layer falls under a particular cell. The null values for these cells were set to zero.

Processing of the more detailed polygon layers in ArcView 3.3 was very slow and sometimes yielded incomplete and incorrect results. To correct this and reduce computation time, ESRI ArcGIS 8.2 Toolbox functions were used. This required first converting the input layers from shapefile to coverage format by using the SHAPEARC, CLEAN, and REGIONPOLY commands. Then the INTERSECT and STATISTICS functions were used to perform the intersection and summary operations.

FIPS codes presented yet another special case, since they cannot be summed when a cell covers portions of two or more counties, and only one code per cell was to be used. For the processing, it was the county under the cell center that determined the FIPS code for that cell. In ESRI ArcView 3.3, the cell center coordinates were used to generate a point layer. The table from the county layer was joined to the point table by using a spatial join. This table then contained the grid cell ID and the associated FIPS code, and a new layer was produced from it. An additional problem needed to be solved with regard to the 12-km grid, since the centers of some cells fell in the ocean. Those cells were manually coded with the FIPS code of the county that contained the largest part of the cell. Cells fully in the ocean were coded as N/A for their FIPS codes.

G.2.1 Cross Checking

Since the large, intermediate, and small grids were aligned, it was possible to compare the results in order to check for processing errors. A 12-km cell in central Las Vegas was used. Each of the 18 surrogate ratio variables was checked for this location, by summing the 3-by-3 set of 4-km cells and the 9-by-9 set of 1.3-km cells covering the same location. Although there were

some small differences in the values as a result of rounding, the statistics in the layers were consistent.

G.2.2 County Totals and Surrogate Ratios

When the 18 variables are used for modeling input, the total emissions for each county are distributed over the grid extent on the basis of calculated values, by using the ratio of the cell's value to the county total. Thus, one more calculation was needed for each of the 18 variables: to total the values on a county-by-county basis by using the FIPS code as the key, then divide the cell totals by their county totals to get a ratio. These ratios are the surrogate ratios.

For example, the surrogate ratio for total population in 4-km Cell No. 992 is determined as follows: Cell 992 falls in Clark County, Nevada, which has a FIPS code of 32003. The total population calculated for that cell is 34,705. The total population calculated for Clark County is 1,311,888. Therefore, that cell contributes 34,705/1,311,888, or 2.6% of the emissions for that county when related to the total population. Therefore, 0.026 is the total population surrogate ratio for that cell, which is multiplied by the county total population emission value when that cell is processed in the model.

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