APPENDIX 8.1-C

Dispersion Modeling and Climate Information

APPENDIX 8.1-C

Dispersion Modeling and Climate Information

Tables presented in this Appendix are as follows:

Table 8.1C-1	Stack parameters for ISCST3 Input
Table 8.1C-2	Building Parameters for ISCST3 Input
Table 8.1C-3	Operational Modeling Parameters - Screening
Table 8.1C-4	Operational Modeling Parameters – PM_{10}
Table 8.1C-5	Operational Modeling Results Summary - Screening
Table 8.1C-6	Operational Modeling Results Summary – PM_{10}
Table 8.1C-7a	First Quarter Wind Table
Table 8.1C-7b	Second Quarter Wind Table
Table 8.1C-7c	Third Quarter Wind Table
Table 8.1C-7d	Fourth Quarter Wind Table
Table 8.1C-7e	Annual Wind Table
Figure 8.1C-1a	First Quarter Wind Rose
Figure 8.1C-1b	Second Quarter Wind Rose
Figure 8.1C-1c	Third Quarter Wind Rose
Figure 8.1C-1d	Fourth Quarter Wind Rose
Figure 8.1C-1e	Annual Wind Rose
Table 8.1C-8	AAQS Summary
Table 8.1C-9a-b	Climatic Summaries for Richmond, CA
Table 8.1C-10a-c	Ambient Air Quality Monitoring Summaries, 2004-2006
Figures 8.1C-2a-b	ISC Model Setup
Figure 8.1C-3	Coarse and Fine Receptor Grids

Chevron Power Plant Replacement Project
Chevron Richmond Refinery
Table 8.1C-1
Summary Table of Stack Parameters (ISCST3 Input)

Point Source

Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (m)	Stack Diameter (m)	Temperature (K)	Exit Velocity (m/s)
4473	Cogen	553690.84	4199213.93	4.9	50.6	3.66	366.48	14.41

Volume Source

Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Release Height (m)	Horizontal Dimension (m)	Vertical Dimension (m)
4465	STG Cooling Tower	553343.5	4199728	4.3	25	3.54	12.41

Chevron Power Plant Replacement Project
Chevron Richmond Refinery
Table 8.1C-2
Summary Table of Building Parameters (ISCST3 Input)

Building Name	Number of Tiers	Tier Number	Base Elevation (ft)	Tier Height (m)	Number of Corners	Corner 1 East (X) (m)	Corner 1 North (Y) (m)	Corner 2 East (X) (m)	Corner 2 North (Y) (m)	Corner 3 East (X) (m)	Corner 3 North (Y) (m)	Corner 4 East (X) (m)	Corner 4 North (Y) (m)	Corner 5 East (X) (m)	Corner 5 North (Y) (m)	Corner 6 East (X) (m)	Corner 6 North (Y) (m)	Corner 7 East (X) (m)	Corner 7 North (Y) (m)	Corner 8 East (X) (m)	Corner 8 North (Y) (m)	Corner 9 East (X) (m)	Corner 9 North (Y) (m)	Corner 10 East (X) (m)	Corner 10 North (Y) (m)	Corner 11 East (X) (m)	Corner 11 North (Y) (m)	Corner 12 East (X) (m)	Corner 12 North (Y) (m)	Corner 13 East (X) (m)	Corner 13 North (Y) (m)	Corner 14 East (X) (m)	Corner 14 North (Y) (m)	Corner15 East (X) (m)	Corner 15 North (Y) (m)	Corner 16 East (X) (m)	Corner 16 North (Y) (m)
B1	1	1	3.4	14	8	552326	4200432	552339	4200422	552342	4200426	552341	4200427	552351	4200440	552354	4200437	552357	4200440	552343	4200452															
B2	1	1	3.4	15	16	552585	4200443	552577	4200449	552576	4200448	552548	4200472	552549	4200473	552543	4200477	552546	4200481	552544	4200482	552547	4200486	552549	4200484	552552	4200487	552564	4200477	552564	4200476	552583	4200460	552584	4200461	552593	4200453
B3	1	1	3.4	14	4	552599	4200477	552585	4200488	552577	4200479	552592	4200467																								
B4	1	1	3.4	15	4	552535	4200421	552542	4200429	552556	4200417	552550	4200409																								
B5	1	1	3.4	13	8	552532	4200380	552542	4200392	552527	4200404	552526	4200403	552511	4200416	552508	4200413	552523	4200400	552517	4200392																
B6	1	1	3.4	15	14	552625	4200347	552606	4200325	552560	4200361	552551	4200369	552559	4200379	552564	4200374	552572	4200384	552576	4200381	552578	4200384	552594	4200370	552599	4200375	552615	4200360	552612	4200357	552618	4200353				
B7	1	1	3.4	20	4	552646	4200313	552660	4200330	552635	4200350	552621	4200334																								
B8	1	1	3.4	12	10	552278	4200390	552280	4200392	552272	4200400	552274	4200403	552284	4200395	552285	4200396	552303	4200381	552307	4200384	552310	4200383	552300	4200373												
B9	1	1	2.1	20	5	552964	4200513	552964	4200514	553003	4200482	552982	4200456	552943	4200488																						
B10A	1	1	3.2	18	4	553115	4200191	553120	4200186	553108	4200171	553102	4200176																								
B10B	1	1	2.7	12	4	553209	4200283	553197	4200293	553184	4200278	553197	4200268																								
B11	1	1	2.8	25	4	553035	4200296	553023	4200306	553018	4200299	553030	4200289																								
B12	1	1	3.5	35	4	552834	4200397	552846	4200386	552859	4200403	552847	4200413																								
B13	1	1	2.5	35	6	552868	4200393	552880	4200384	552888	4200393	552875	4200404	552870	4200398	552871	4200397																				
B14	1	1	3.4	12	4	552939	4200009	552947	4200018	552939	4200024	552932	4200016																								
B18	1	1	4.9	25	4	553498	4199465	553473	4199450	553456	4199477	553482	4199492																								
B19	1	1	5.1	10	4	553460	4199503	553469	4199508	553460	4199523	553451	4199518																								
B20	1	1	4.6	30	8	553412	4199304	553440	4199321	553401	4199386	553356	4199361	553379	4199320	553384	4199323	553387	4199319	553399	4199327																
B21	1	1	4.6	20	6	553449	4199273	553469	4199285	553462	4199297	553457	4199294	553444	4199315	553430	4199307																				
B22	1	1	5.2	15	4	553489	4199275	553493	4199268	553462	4199249	553458	4199256																								
B23	1	1	6	15	4	553453	4199210	553485	4199229	553477	4199242	553445	4199222																								
B24	1	1	4.6	30	4	553570	4199402	553565	4199412	553590	4199427	553595	4199418																								
B25	1	1	4.3	15	4	553711	4199134	553694	4199124	553711	4199097	553727	4199106																								
B26	1	1	4.6	18	4	553797	4198991	553770	4199017	553748	4198993	553775	4198968																								
B27	1	1	5.2	45	4	553667	4198904	553657	4198892	553609	4198937	553620	4198949																								
B28	1	1	5.1	13	13	553589	4198836	553601	4198824	553603	4198826	553607	4198822	553607	4198820	553592	4198803	553585	4198809	553593	4198819	553591	4198821	553589	4198819	553585	4198823	553587	4198825	553583	4198829						
B29	1	1	4.3	15	4	553562	4198752	553606	4198711	553593	4198697	553550	4198738																								
B30	1	1	4.4	15	4	553635	4198765	553648	4198753	553607	4198711	553594	4198722																								
B31	1	1	4.9	15	4	553528	4198622	553489	4198659	553502	4198673	553541	4198636																								
B33	1	1	3.4	15	4	552735	4200051	552764	4200027	552753	4200012	552723	4200035																								
CWT1	1	1	5.5	90	6	552534	4200320	552543	4200314	552598	4200270	552583	4200253	552528	4200297	552519	4200303																				
CWT2	1	1	2.1	90	4	553084	4200438	553152	4200382	553164	4200397	553097	4200454																								
CWT2b	1	1	2.1	90	4	553056	4200462	553072	4200449	553085	4200464	553070	4200477																								
CWT3	1	1	4.6	50	8	553593	4199401	553682	4199455	553688	4199445	553624	4199406	553625	4199401	553615	4199395	553611	4199401	553597	4199393																
s1a	1	1	4.8	12	6	553783	4199482	553816	4199454	553819	4199457	553828	4199449	553837	4199461	553795	4199496																				
S2A	1	1	4	12	7	553903	4199141	553958	4199142	553957	4199156	553919	4199155	553919	4199159	553903	4199159	553903	4199155																		
S2B	1	1	4	12	6	553904	4199134	553958	4199135	553959	4199120	553954	4199120	553954	4199117	553904	4199117																				
firebox4	1	1	2.7	108	4	553108	4200264	553129	4200290	553143	4200280	553123	4200253																								
fireboxY	1	1	2.7	108	4	553132	4200248	553154	4200274	553167	4200263	553147	4200237																								
firebox4161	1	1	2.6	47	4	552939	4200351	552947	4200345	552953	4200353	552945	4200359																								
fb4350	1	1	4	40	4	553733	4199166	553765	4199184	553770	4199175	553737	4199157																								
fb4352	1	1	4.2	40	4	553747	4199212	553752	4199203	553719	4199185	553715	4199193																								
fb4475	1	1	4.2	40	4	553667	4199180	553672	4199171	553639	4199153	553635	4199161																								
FB4038	1	1	4.6	67	4	553650	4199366	553668	4199378	553675	4199368	553657	4199356																								
fb4159	1	1	4.6	60	4	552905	4200308	552912	4200302	552916	4200308	552909	4200314																								
fb4167	1	1	4.5	54	4	552899	4200282	552906	4200291	552903	4200294	552896	4200284																								
HRSG	1	1	4.9	37.3	6	553691	4199215	553692	4199217	553715	4199227	553717	4199224	553694	4199213	553692	4199214																				
HRSG/con	1	1	4.9	22.8	4	553715	4199227	553722	4199230	553723	4199227	553717	4199224																								
Connecti	1	1	4.9	8.3	4	553722	4199230	553725	4199231	553726	4199229	553723	4199227																								
MainUnit	1	1	4.9	52.875	4	553723	4199235	553737	4199241	553744	4199230	553729	4199223																								
htr4477	1	1	4.6	125	4	553397	4199601	553406	4199585	553367	4199555	553359	4199571																								
RegenSys	1	1	4.8	270	6	553403	4199539	553397	4199534	553391	4199545	553388	4199542	553386	4199547	553395	4199554																				

Chevron Power Plant Replacement Project
Chevron Richmond Refinery
Table 8.1C-3
Screening Operational Modeling Parameters

Chevron SPPE Emission Rates for 1-hr, 3-hr, 8-hr, and 24-hr modeling

	NOx		CO		SO2		PM10/PM2.5	
	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s
COGEN	7.741	0.975	7.539	0.950	0.378	0.048	6.259	0.789
STG Cooling Tower	*	*	*	*	*	*	4.50	0.567

Chevron SPPE Emission Rates for annual concentration modeling

	NOx		CO		SO2		PM10/PM2.5	
	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s
COGEN	7.741	0.975	7.539	0.950	0.378	0.048	6.259	0.7886
STG Cooling Tower	*	*	*	*	*	*	4.50	0.5674

* Not Applicable

Chevron Power Plant Replacement Project
Chevron Richmond Refinery
Table 8.1C-4
Detailed Operational Modeling Parameters (PM10 Only)

Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	PM10 (24-hr) (lb/hr)	PM10 (24-hr) (g/s)	PM10 Annual (lb/hr)	PM10 Annual (g/s)
4473	Cogen	553691	4199214	4.9	50.6	3.66	366.48	14.41	6.262	0.789	6.262	0.789

Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Release Height (m)	Horizontal Dimension (m)	Vertical Dimension (m)	PM10 (24-hr) (lb/hr)	PM10 (24-hr) (g/s)	PM10 Annual (lb/hr)	PM10 Annual (g/s)
4465	STG Cooling Tower	553344	4199728	4.3	25	3.54	12.41	4.50	0.567	4.50	0.567

Chevron Power Plant Replacement Project
Chevron Richmond Refinery
Table 8.1C-5
Operational Modeling Results Summary (Cogen Only)
Concentrations DO NOT Include Background.

Averaging Period	NOx (ug/m3)					CO (ug/m3)					SO2 (ug/m3)				
	1999	**2000**	**2001**	**2002**	**2003**	**1999**	**2000**	**2001**	**2002**	**2003**	**1999**	**2000**	**2001**	**2002**	**2003**
Annual	0.268	**0.298**	0.229	0.254	0.286	*	*	*	*	*	0.013	**0.015**	0.011	0.012	0.014
24-hour	*	*	*	*	*	*	*	*	*	*	**0.258**	0.232	0.197	0.179	0.205
8-hour	*	*	*	*	*	**13.625**	11.024	11.788	9.014	12.277	*	*	*	*	*
3-hour	*	*	*	*	*	*	*	*	*	*	**1.089**	0.890	0.965	0.846	1.011
1-hour	**24.979**	24.656	24.603	24.529	24.705	**24.327**	24.012	23.960	23.888	24.059	**1.220**	1.204	1.201	1.198	1.206

Results show highest modeled concentration for each year of modeling. Highest of the five years is bold faced.

* Not Applicable

Chevron Power Plant Replacement Project
Chevron Richmond Refinery
Table 8.1C-6
Operational Modeling Results Summary (Detailed - PM10 Only)

	Maximum Annual PM10 Concentration (ug/m3)					Maximum 24-Hour PM10 Concentration (ug/m3)				
Emission Source	**1999**	**2000**	**2001**	**2002**	**2003**	**1999**	**2000**	**2001**	**2002**	**2003**
All	1.126	1.236	1.038	1.129	**1.369**	15.346	17.776	15.966	**17.886**	16.030
COGEN	0.217	**0.241**	0.186	0.205	0.231	**4.275**	3.848	3.265	2.963	3.399
STG Cooling Tower	0.924	1.074	0.896	0.976	**1.143**	14.353	**17.776**	14.686	17.764	16.030

Results show highest modeled concentration for each year of modeling. Highest of the five years is bold faced.

TABLE 8.1C.7a: FIRST QUARTER FREQUENCY DISTRIBUTION (HOURS)

Date Range: Jan 1 - Mar 31

Wind Speed (m/s) Wind Direction (from)	0.5-2.1	2.1-3.6	3.6-5.7	5.7-8.8	8.8-11.1	>=11	Totals
N	388	590	255	47	3	0	1283
NNE	401	263	126	23	4	0	817
NE	433	197	136	18	0	0	784
ENE	410	146	166	32	0	0	754
E	314	40	11	0	0	0	365
ESE	196	28	5	0	0	0	229
SE	164	157	74	21	7	0	423
SSE	135	358	398	244	30	2	1167
S	116	360	429	124	36	10	1075
SWS	75	167	251	114	10	1	618
SW	63	126	218	59	3	1	470
WSW	54	94	63	6	0	0	217
W	57	171	194	76	1	0	499
WNW	101	238	183	91	11	0	624
NW	149	207	102	92	11	0	561
NNW	212	408	210	45	5	2	882
Totals	3268	3550	2821	992	121	16	

Count of calm winds: 56

Source: BAAQMD 1999 – 2003 Chevron Refinery Meteorological Data

TABLE 8.1C.7b: SECOND QUARTER FREQUENCY DISTRIBUTION (HOURS)

Date Range: Apr 1 - Jun 30

Wind Speed (m/s) Wind Direction (from)	0.5-2.1	2.1-3.6	3.6-5.7	5.7-8.8	8.8-11.1	>=11	Totals
N	58	59	32	38	10	0	197
NNE	53	30	3	4	2	0	92
NE	77	8	2	2	0	0	89
ENE	89	5	4	7	1	0	106
E	100	2	2	0	0	0	104
ESE	70	18	5	3	0	0	96
SE	75	240	333	135	0	0	783
SSE	78	506	847	501	38	0	1970
S	70	514	1259	549	13	0	2405
SWS	64	221	490	237	3	0	1015
SW	69	190	472	229	9	0	969
WSW	50	134	208	20	0	0	412
W	90	241	546	470	25	0	1372
WNW	72	203	251	126	26	0	678
NW	58	114	64	63	17	7	323
NNW	50	103	71	31	1	0	256
Totals	1123	2588	4589	2415	145	7	

Count of calm winds: 53

Source: BAAQMD 1999 – 2003 Chevron Refinery Meteorological Data

TABLE 8.1C.7c: THIRD QUARTER FREQUENCY DISTRIBUTION (HOURS)

Date Range: Jul 1 - Sep 30

Wind Speed (m/s) Wind Direction (from)	0.5-2.1	2.1-3.6	3.6-5.7	5.7-8.8	8.8-11.1	>=11	Totals
N	44	23	2	0	0	0	69
NNE	37	4	1	0	0	0	42
NE	44	4	6	1	0	0	55
ENE	58	4	8	1	0	0	71
E	76	3	1	0	0	0	80
ESE	78	22	7	1	0	0	108
SE	84	264	449	241	0	0	1038
SSE	72	502	1053	620	79	1	2327
S	63	500	1727	998	42	0	3330
SWS	64	320	875	290	7	0	1556
SW	74	252	444	217	6	0	993
WSW	51	165	175	20	0	0	411
W	55	120	204	66	2	0	447
WNW	48	73	81	24	0	0	226
NW	40	46	3	0	0	0	89
NNW	34	42	2	0	0	0	78
Totals	922	2344	5038	2479	136	1	

Count of calm winds: 120

Source: BAAQMD 1999 – 2003 Chevron Refinery Meteorological Data

TABLE 8.1C.7d: FOURTH QUARTER FREQUENCY DISTRIBUTION (HOURS)

Date Range: Oct 1 - Dec 31

Wind Speed (m/s) Wind Direction (from)	0.5-2.1	2.1-3.6	3.6-5.7	5.7-8.8	8.8-11.1	>=11	Totals
N	383	578	148	19	12	2	1142
NNE	438	251	60	19	1	1	770
NE	532	267	119	14	0	0	932
ENE	504	237	287	17	0	0	1045
E	330	48	15	0	0	0	393
ESE	212	31	6	0	0	0	249
SE	184	276	113	27	1	1	602
SSE	113	501	522	244	67	20	1467
S	92	343	451	121	14	9	1030
SWS	77	201	210	83	4	2	577
SW	40	149	241	63	12	2	507
WSW	43	117	73	7	1	0	241
W	57	126	111	19	3	1	317
WNW	83	185	94	27	4	0	393
NW	133	169	97	73	4	0	476
NNW	212	428	183	51	1	0	875
Totals	3433	3907	2730	784	124	38	

Count of calm winds: 24

Source: BAAQMD 1999 – 2003 Chevron Refinery Meteorological Data

TABLE 8.1C.7e: FIVE-YEAR FREQUENCY DISTRIBUTION (HOURS)

Date Range: Jan 1 - Dec 31

Wind Speed (m/s) Wind Direction (from)	0.5-2.1	2.1-3.6	3.6-5.7	5.7-8.8	8.8-11.1	>=11	Totals
N	873	1250	437	104	25	2	2691
NNE	929	548	190	46	7	1	1721
NE	1086	476	263	35	0	0	1860
ENE	1061	392	465	57	1	0	1976
E	820	93	29	0	0	0	942
ESE	556	99	23	4	0	0	682
SE	507	937	969	424	8	1	2846
SSE	398	1867	2820	1609	214	23	6931
S	341	1717	3866	1792	105	19	7840
SWS	280	909	1826	724	24	3	3766
SW	246	717	1375	568	30	3	2939
WSW	198	510	519	53	1	0	1281
W	259	658	1055	631	31	1	2635
WNW	304	699	609	268	41	0	1921
NW	380	536	266	228	32	7	1449
NNW	508	981	466	127	7	2	2091
Totals	8746	12389	15178	6670	526	62	

Count of calm winds: 253

Source: BAAQMD 1999 – 2003 Chevron Refinery Meteorological Data

Figure 8.1C-1a: First Quarter Wind Rose
Date Range: Jan 1 – Mar 31

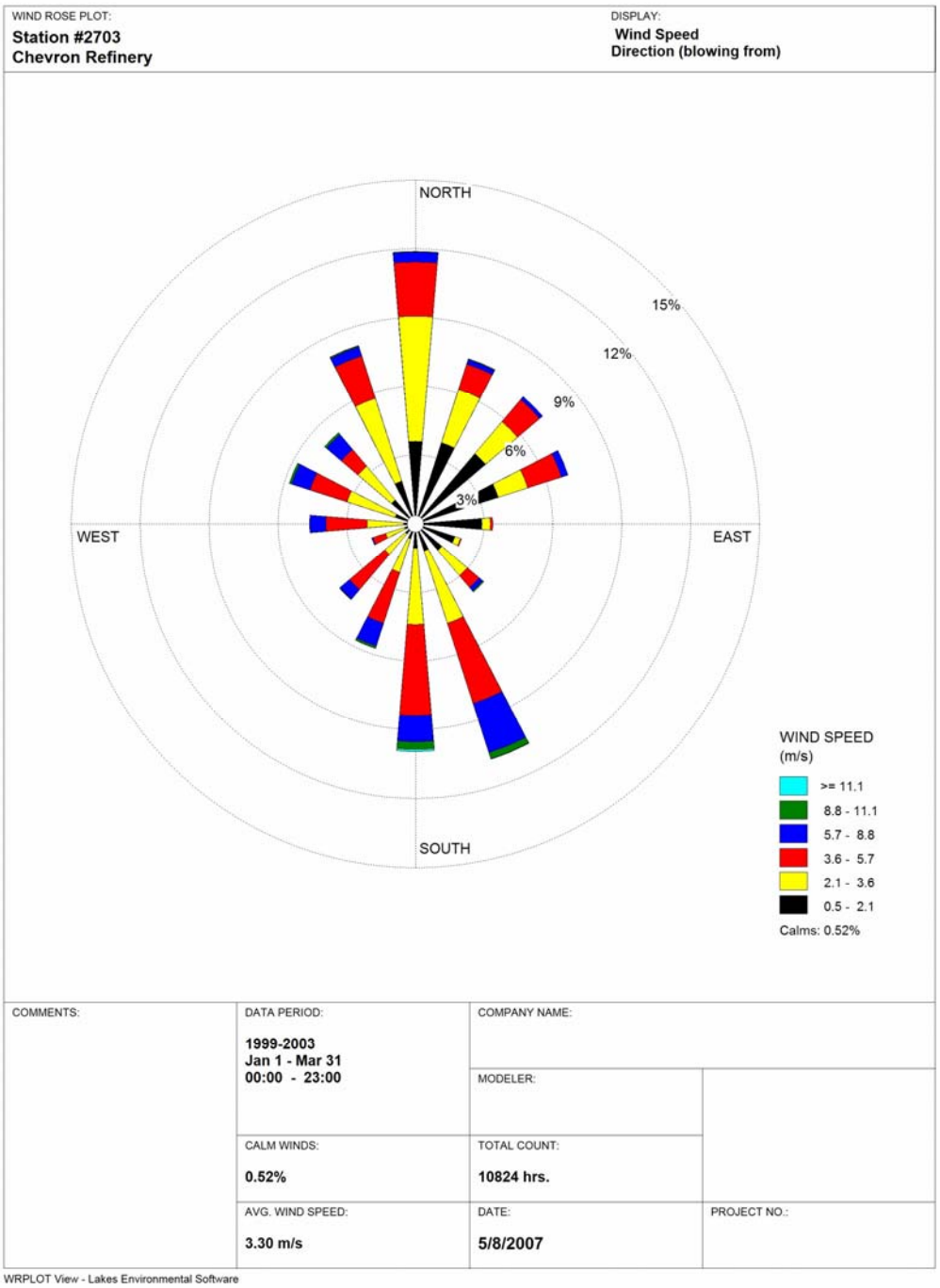


Figure 8.1C-1b: Second Quarter Wind Rose
Date Range: Apr 1 – June 30

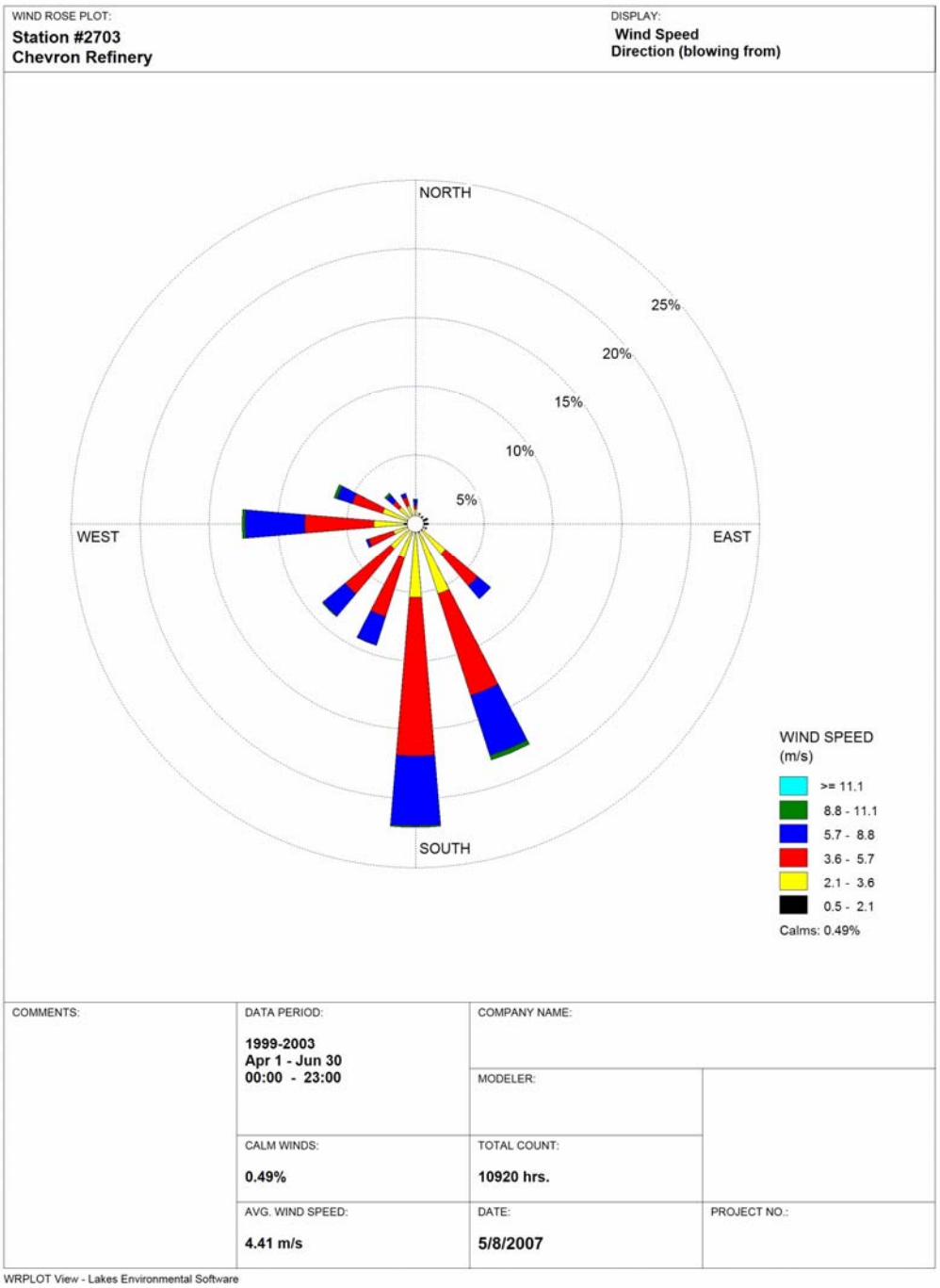


Figure 8.1C-1c: Third Quarter Wind Rose
Date Range: July 1 – Sep 30

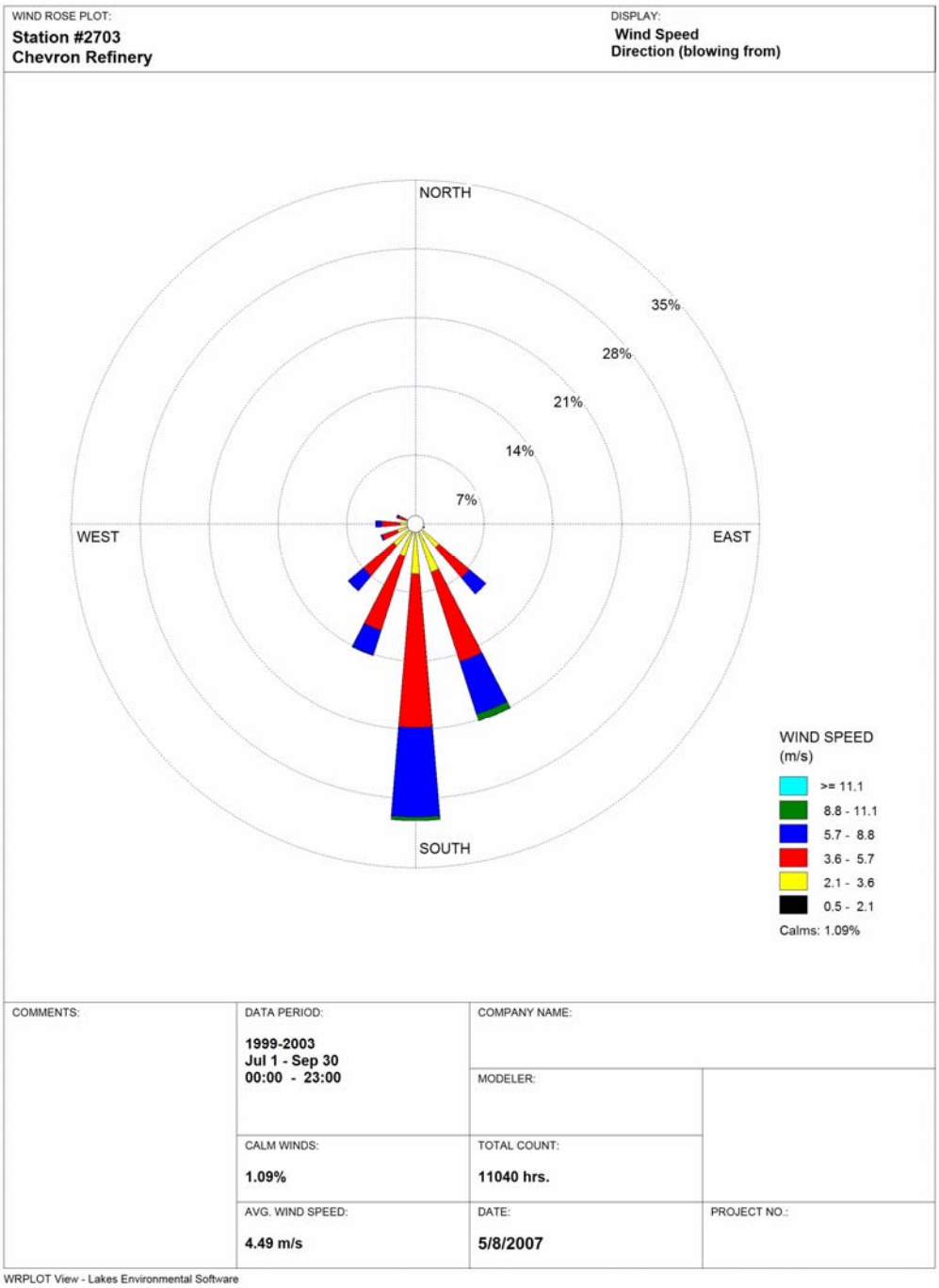


Figure 8.1C-1d: Fourth Quarter Wind Rose
Date Range: Oct 1 – Dec 31

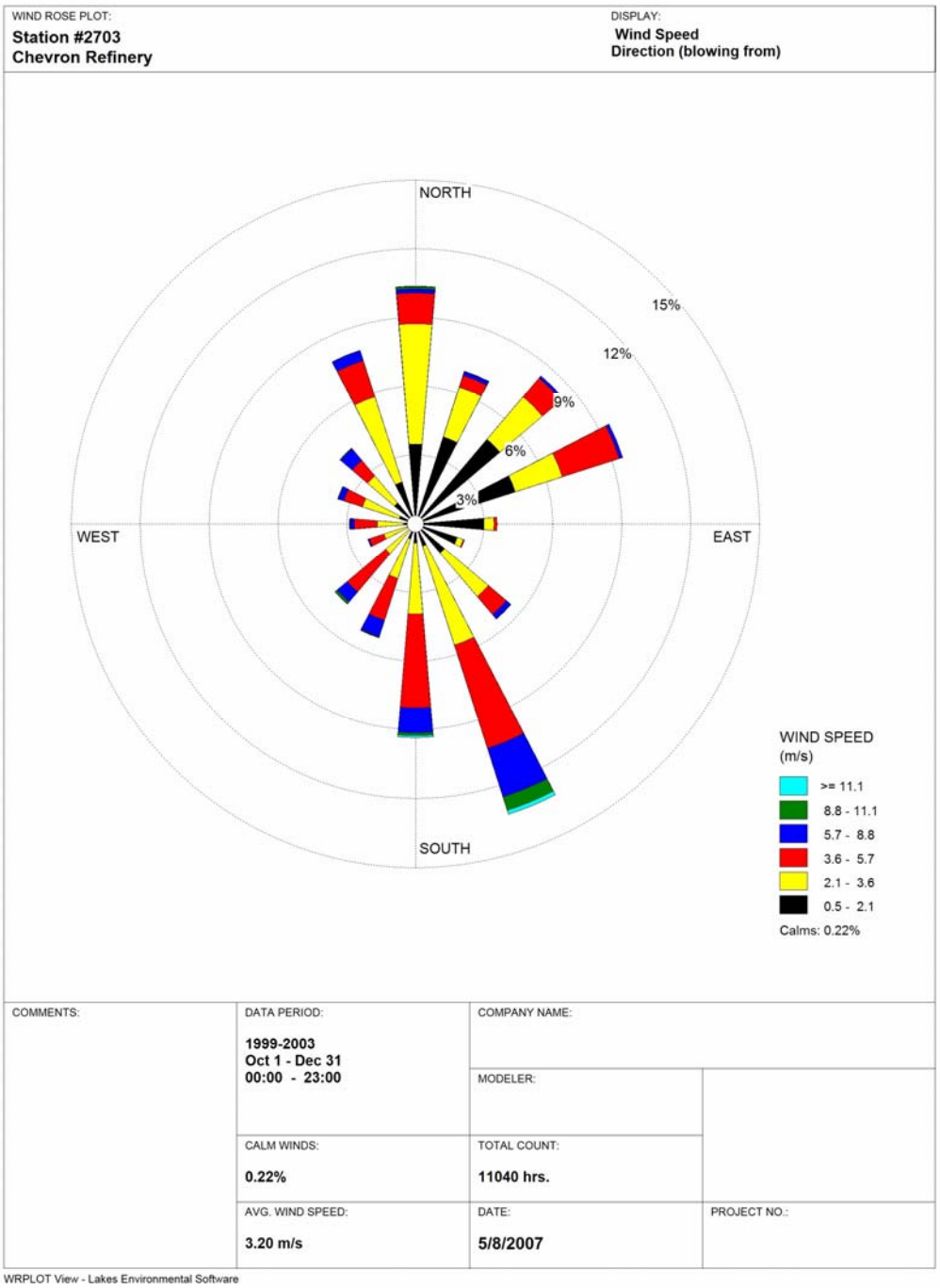
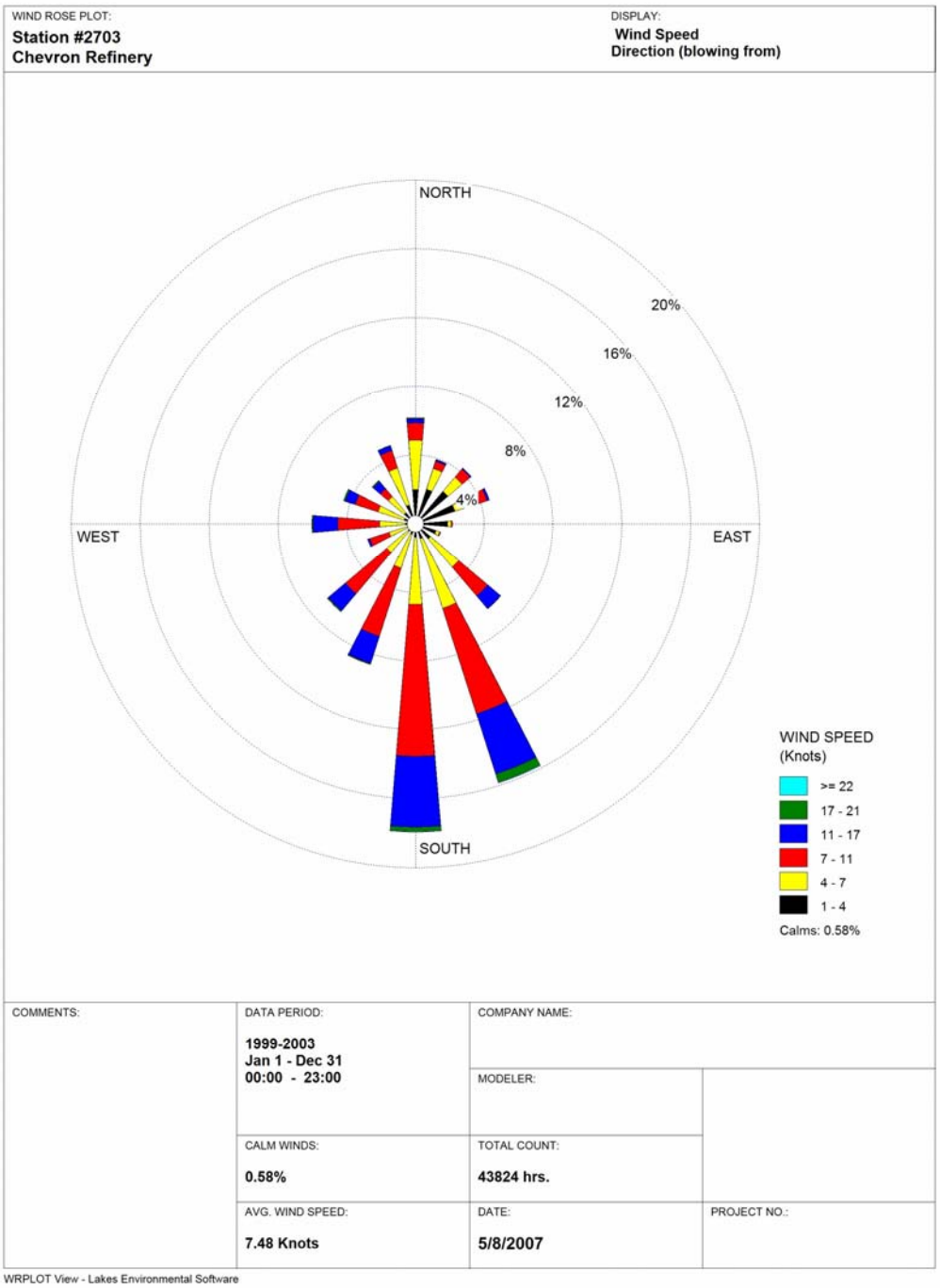


Figure 8.1C-1e: Five Year Wind Rose
Date Range: Jan 1 –Dec 31



Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		Federal Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.08 ppm (157 µg/m^3)		
Respirable Particulate Matter (PM10)	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)	24 Hour	No Separate State Standard		35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	15 µg/m^3		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-Dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	—
Nitrogen Dioxide (NO_2) *	Annual Arithmetic Mean	0.030 ppm (56 µg/m3)	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m^3)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.18 ppm (338 µg/m^3)		—		
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	—	Ultraviolet Fluorescence	0.030 ppm (80 µg/m^3)	—	Spectrophotometry (Pararosaniline Method)
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (365 µg/m^3)	—	
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	1 Hour	0.25 ppm (655 µg/m^3)		—	—	—
Lead[8]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	—
	Calendar Quarter	—		1.5 µg/m^3	Same as Primary Standard	High Volume Sampler and Atomic Absorption
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		No Federal Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[8]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

* The Nitrogen Dioxide ambient air quality standard was amended on February 22, 2007, to lower the 1-hr standard to 0.18 ppm and establish a new annual standard of 0.030 ppm. These changes become effective after regulatory changes are submitted and approved by the Office of Administrative Law, expected later this year.

See footnotes on next page …

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM10, PM2.5, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calender year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the EPA.

8. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

RICHMOND, CALIFORNIA (047414)

Period of Record Monthly Climate Summary

Period of Record : 12/1/1950 to 12/31/2005

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	57.5	61.5	63.8	66.6	69.0	71.0	70.4	71.0	74.1	72.2	64.6	58.1	66.7
Average Min. Temperature (F)	42.5	45.3	46.9	48.9	51.8	54.5	55.4	56.1	56.3	53.3	47.9	43.4	50.2
Average Total Precipitation (in.)	4.84	3.83	3.21	1.56	0.53	0.19	0.04	0.08	0.22	1.23	3.00	4.50	23.23
Average Total SnowFall (in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 97.5% Min. Temp.: 97.4% Precipitation: 98.8% Snowfall: 99% Snow Depth: 99%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

RICHMOND, CALIFORNIA

NCDC 1971-2000 Monthly Normals

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Monthly
Mean Max. Temperature (F)	57.1	60.9	63.2	66.3	68.3	70.7	70.5	71.0	73.4	71.8	63.6	57.3	66.2
Highest Mean Max. Temperature (F)	61.5	64.9	67.4	71.1	73.8	76.9	74.7	73.8	81.9	76.9	68.2	62.0	81.9
Year Highest Occurred	1996	1991	1988	1992	1978	1993	1995	1998	1984	1995	1995	1999	1984
Lowest Mean Max. Temperature (F)	53.7	54.9	58.0	60.2	64.2	66.4	67.3	66.6	68.1	67.7	58.9	52.1	52.1
Year Lowest Occurred	1982	1989	1999	1975	1995	1982	1994	1986	1986	1971	1994	1972	1972
Mean Temperature (F)	50.0	53.2	55.0	57.4	59.6	62.2	62.7	63.5	64.8	62.5	55.6	50.2	58.1
Highest Mean Temperature (F)	54.6	57.0	58.2	61.7	64.0	66.9	66.5	65.8	69.4	65.7	59.9	54.1	69.4
Year Highest Occurred	1995	1992	1993	1992	1997	1993	1995	1997	1984	1995	1995	1995	1984
Lowest Mean Temperature (F)	45.8	47.9	51.2	51.7	56.2	59.0	60.1	59.8	61.6	57.3	51.2	44.9	44.9
Year Lowest Occurred	1982	1989	1999	1975	1971	1975	1971	1973	1986	1971	1994	1972	1972
Mean Min. Temperature (F)	42.9	45.4	46.8	48.4	50.9	53.6	54.9	55.9	56.1	53.1	47.6	43.0	49.9
Highest Mean Min. Temperature (F)	50.7	49.4	50.3	52.3	55.1	56.8	58.4	59.2	59.6	56.2	52.3	48.3	59.6
Year Highest Occurred	1995	1986	1993	1992	1992	1993	1992	1990	1997	1992	1997	1996	1997
Lowest Mean Min. Temperature (F)	37.9	40.9	42.5	43.3	47.6	50.8	52.5	52.8	54.1	46.9	43.4	37.7	37.7
Year Lowest Occurred	1972	1989	1977	1975	1977	1975	1975	1973	1985	1971	1994	1978	1978
Mean Precipitation (in.)	4.91	4.41	3.52	1.35	0.54	0.17	0.07	0.09	0.27	1.25	3.47	3.30	23.35
Highest Precipitation (in.)	11.68	16.40	12.24	4.98	3.74	1.46	1.41	1.10	1.65	4.57	10.55	9.71	16.40
Year Highest Occurred	1973	1998	1983	1982	1998	1993	1974	1997	1989	1972	1973	1996	1998
Lowest Precipitation (in.)	0.30	0.17	0.01	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00
Year Lowest Occurred	1984	1995	1988	1987	1999	1996	2000	2000	1997	1995	1995	1989	1999
Heating Degree Days (F)	464.	332.	311.	234.	181.	111.	93.	71.	71.	107.	285.	460.	2720.
Cooling Degree Days (F)	0.	0.	1.	5.	13.	26.	23.	23.	63.	27.	3.	0.	184.

Western Regional Climate Center, wrcc@dri.edu

BAY AREA AIR POLLUTION SUMMARY — 2004

—See NOTES on back of this page

MONITORING STATIONS	OZONE							CARBON MONOXIDE			NITROGEN DIOXIDE			SULFUR DIOXIDE			PM_{10}				$PM_{2.5}$				
	Max 1-Hr	Nat Days	Cal Days	3-Yr Avg	Max 8-Hr	Nat Days	3-Yr Avg	Max 1-Hr	Max 8-Hr	Nat/Cal Days	Max 1-Hr	Ann Avg	Nat/Cal Days	Max 24-Hr	Ann Avg	Nat/Cal Days	Ann Avg	Max 24-Hr	Nat Days	Cal Days	Max 24-Hr	Nat Days	3-Yr Avg	Ann Avg	3-Yr Avg
North Counties	(pphm)				(pphm)			(ppm)			(pphm)			(ppb)			($\mu g/m^3$)				($\mu g/m^3$)			($\mu g/m^3$)	
Napa	9	0	0	0.0	7	0	6.6	3.7	2.0	0	6	1.1	0	-	-	-	20.7	60	0	1	-	-	-	-	-
San Rafael	9	0	0	0.0	6	0	4.9	3.2	2.0	0	6	1.5	0	-	-	-	17.9	52	0	1	-	-	-	-	-
Santa Rosa	8	0	0	0.0	6	0	5.1	2.7	1.6	0	5	1.1	0	-	-	-	18.0	48	0	0	27	0	32	8.3	9
Vallejo	10	0	1	0.0	7	0	6.5	4.0	3.4	0	5	1.2	0	5	1.3	0	19.6	51	0	1	40	0	39	11.1	11
Coast & Central Bay																									
Oakland	8	0	0	0.0	6	0	4.0	3.5	2.6	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Richmond	-	-	-	-	-	-	-	-	-	-	-	-	-	5	1.6	0	-	-	-	-	-	-	-	-	-
San Francisco	9	0	0	0.0	6	0	4.7	2.9	2.2	0	6	1.7	0	8	1.4	0	22.5	52	0	1	46	0	41	9.9	11
San Pablo	11	0	1	0.0	7	0	5.2	3.2	1.8	0	6	1.3	0	5	1.6	0	21.2	64	0	1	-	-	-	-	-
Eastern District																									
Bethel Island	10	0	1	0.0	8	0	7.5	1.2	0.9	0	3	0.8	0	6	1.6	0	19.5	42	0	0	-	-	-	-	-
Concord	10	0	1	0.0	8	0	7.9	2.7	2.0	0	7	1.2	0	10	1.0	0	18.6	51	0	1	74	1	40*	10.7*	11*
Crockett	-	-	-	-	-	-	-	-	-	-	-	-	-	7	1.7	0	-	-	-	-	-	-	-	-	-
Fairfield	10	0	1	0.0	8	0	7.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Livermore	11	0	5	1.0	8	0	8.3	3.5	1.8	0	6	1.4	0	-	-	-	20.0	49	0	0	41	0	37	10.3	11
Martinez	-	-	-	-	-	-	-	-	-	-	-	-	-	7	1.5	0	-	-	-	-	-	-	-	-	-
Pittsburg	9	0	0	0.0	8	0	7.3	4.1	1.9	0	5	1.1	0	7	2.0	0	21.7	64	0	1	-	-	-	-	-
South Central Bay																									
Fremont	9	0	0	0.0	7	0	6.4	3.0	1.7	0	6	1.5	0	-	-	-	18.6	49	0	0	40	0	32	9.4	10
Hayward	9	0	0	0.0	7	0	6.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Redwood City	10	0	1	0.0	7	0	6.0	4.8	2.1	0	6	1.5	0	-	-	-	20.5	65	0	1	36	0	32	9.3	9
San Leandro	10	0	1	0.0	7	0	5.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Santa Clara Valley																									
Gilroy	9	0	0	0.0	8	0	7.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Los Gatos	9	0	0	0.0	8	0	7.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Jose Central*	9	0	0	*	7	0	*	4.4	3.0	0	7	1.9	0	-	-	-	23.1	58	0	4	52	0	*	11.6	*
San Jose East	9	0	0	0.0	7	0	6.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Jose, Tully Road	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26.0	65	0	3	45	0	35	10.4	10
San Martin	9	0	0	0.0	8	0	8.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunnyvale	10	0	1	0.0	8	0	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Bay Area Days over Standard		0	7			0				0			0			0			0	7		1			

*See notes of explanation on back of this page

2004 NOTES

The annual Bay Area Air Pollution Summary summarizes measurements for the national and California pollutant standards.

*Station Information (see asterisks on front page)

The **San Jose 4th Street** station was closed on April 30, 2002. It was relocated to **San Jose Central** on October 5, 2002. Three-year average ozone statistics and three-year average $PM_{2.5}$ statistics for San Jose Central have been omitted from this summary.

Due to roof damage at the Concord station during the fourth quarter of 2004, the $PM_{2.5}$ sampler could not be operated on some of the required sampling days. The $PM_{2.5}$ annual average and three-year average $PM_{2.5}$ statistics are based on available data.

Explanation of Terms

State and national excesses occur when pollutant concentrations surpass the indicated standards, with values in most cases rounded to the same number of decimal places.

MAX HR / MAX 8-HR / MAX 24-HR
The highest average contaminant concentration over a one-hour period, an eight-hour period (on any given day), or a 24-hour period (from midnight to midnight).

ANN AVG
The yearly average (arithmetic mean) of the readings taken at a given monitoring station.

NAT DAYS
The number of days during the year for which the monitoring station recorded contaminant concentrations in excess of the national standard.

CAL DAYS
The number of days during the year for which the station recorded contaminant levels in excess of the California standard.

TOTAL BAY AREA DAYS OVER STANDARD is not a sum of excesses at individual stations, but rather a sum of the number of days for which excesses occurred at any one or more stations.

3-YR AVG (1-hr ozone standard)
The average number of days per year during which ozone levels were in excess of the national 1-hour standard, based on the most recent three-year period. *An average higher than 1.0 at any monitoring station means the region will be considered out of attainment by the EPA.*

3-YR AVG (8-hr ozone standard)
The 3-year average of the fourth highest 8-hour average ozone concentration for each monitoring station. *A 3-year average greater than 8.4 at any monitoring station means that the region will be considered out of attainment by the EPA.*

PM_{10}
Particulate matter ten microns or smaller in size. (PM_{10} is only sampled every sixth day. *Actual* days over standard can be estimated to be six times the number shown.)

$PM_{2.5}$
Particulate matter 2.5 microns or smaller in size. $PM_{2.5}$ is a sub-category of PM_{10}.

PM_{10} ANN AVG and MAX 24-HR
California PM_{10} Annual Average and Maximum 24-Hour concentrations are reported at local temperature and pressure conditions. National PM_{10} Annual Average and Maximum 24-Hour concentrations are reported at standard temperature and pressure conditions. This table shows the California readings for PM_{10} Ann Avg and Max 24-Hr, which are generally slightly higher than the national readings.

3-YR AVG ($PM_{2.5}$ 24-hour standard)
The 3-year average of the annual 98th percentiles of the individual 24-hour concentrations of $PM_{2.5}$. *A 3-year average greater than 65 $\mu g/m^3$ at any monitoring station means that the region will be considered out of attainment by the EPA.*

3-YR AVG ($PM_{2.5}$ annual standard)
The 3-year average of the quarterly averages of $PM_{2.5}$. *A 3-year average greater than 15 $\mu g/m^3$ at any monitoring station means that the region will be considered out of attainment by the EPA.*

HEALTH-BASED AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Std	National Std
Ozone	1 Hour*	9 pphm	12 pphm*
	8 Hour	—	8 pphm
Carbon Monoxide	1 Hour	20 ppm	35 ppm
	8 Hour	9.0 ppm	9 ppm
Nitrogen Dioxide	1 Hour	25 pphm	—
	Annual	—	5.3 pphm
Sulfur Dioxide	24 Hour	40 ppb	140 ppb
	Annual	—	30 ppb
Particulates < 10 microns –	24 Hour	50 $\mu g/m^3$	150 $\mu g/m^3$
	Annual	20 $\mu g/m^3$	50 $\mu g/m^3$
Particulates < 2.5 microns –	24 Hour	—	65 $\mu g/m^3$
	Annual	12 $\mu g/m^3$	15 $\mu g/m^3$

*The U.S. EPA revoked the national 1-hour ozone standard on June 15, 2005.

Concentrations

ppm	pphm	ppb	$\mu g/m^3$
parts per million	parts per hundred million	parts per billion	micrograms per cubic meter

TEN-YEAR BAY AREA AIR QUALITY SUMMARY

DAYS OVER STANDARDS

YEAR	OZONE			CARBON MONOXIDE				Nitrogen Dioxide	Sulfur Dioxide		PM_{10}		$PM_{2.5}$
	1-Hr		8-Hr	1-Hr		8-Hr		1-Hr	24-Hr		24-Hr*		24-Hr**
	Nat	Cal	Nat	Nat	Cal	Nat	Cal	Cal	Nat	Cal	Nat	Cal	Nat
1995	11	28	-	0	0	0	0	0	0	0	0	7	-
1996	8	34	-	0	0	0	0	0	0	0	0	3	-
1997	0	8	-	0	0	0	0	0	0	0	0	4	-
1998	8	29	16	0	0	0	0	0	0	0	0	5	-
1999	3	20	9	0	0	0	0	0	0	0	0	12	-
2000	3	12	4	0	0	0	0	0	0	0	0	7	1
2001	1	15	7	0	0	0	0	0	0	0	0	10	5
2002	2	16	7	0	0	0	0	0	0	0	0	6	7
2003	1	19	7	0	0	0	0	0	0	0	0	6	0
2004	0	7	0	0	0	0	0	0	0	0	0	7	1

*PM_{10} is sampled every sixth day—*actual* days over standard can be estimated to be six times the numbers listed.

**2000 is the first full year for which the Air District measured $PM_{2.5}$ levels.

BAY AREA AIR POLLUTION SUMMARY — 2005

—See NOTES on back of this page

MONITORING STATIONS	OZONE						CARBON MONOXIDE			NITROGEN DIOXIDE			SULFUR DIOXIDE			PM_{10}				$PM_{2.5}$				
	Max 1-Hr	Cal Days	Max 8-Hr	Nat Days	Cal Days	3-Yr Avg	Max 1-Hr	Max 8-Hr	Nat/Cal Days	Max 1-Hr	Ann Avg	Nat/Cal Days	Max 24-Hr	Ann Avg	Nat/Cal Days	Ann Avg	Max 24-Hr	Nat Days	Cal Days	Max 24-Hr	Nat Days	3-Yr Avg	Ann Avg	3-Yr Avg
North Counties	(ppb)		(ppb)				(ppm)			(ppb)			(ppb)			($\mu g/m^3$)				($\mu g/m^3$)			($\mu g/m^3$)	
Napa	91	0	67	0	0	61	3.2	2.0	0	60	10	0	-	-	-	18.0	40	0	0	-	-	-	-	-
San Rafael	81	0	59	0	0	51	3.0	1.7	0	54	13	0	-	-	-	16.5	39	0	0	-	-	-	-	-
Santa Rosa	72	0	51	0	0	49	2.5	2.0	0	47	11	0	-	-	-	15.9	39	0	0	33.6	0	28.2	7.6	8.2
Vallejo	90	0	70	0	0	60	3.9	3.1	0	70	11	0	5	1.2	0	17.3	52	0	1	43.8	0	32.5	9.7	10.0
Coast & Central Bay																								
Oakland*	68	0	45	0	0	39	3.4	2.4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Richmond	-	-	-	-	-	-	-	-	-	-	-	-	6	1.1	0	-	-	-	-	-	-	-	-	-
San Francisco	58	0	54	0	0	48	2.5	2.1	0	66	16	0	7	1.4	0	20.1	46	0	0	43.6	0	32.6	9.5	9.9
San Pablo	66	0	57	0	0	52	2.8	1.3	0	54	12	0	6	1.7	0	19.0	42	0	0	-	-	-	-	-
Eastern District																								
Bethel Island	89	0	77	0	2	72	1.1	0.9	0	38	7	0	6	2.0	0	18.5	64	0	1	-	-	-	-	-
Concord	98	1	80	0	2	73	2.2	1.5	0	55	12	0	7	1.0	0	16.4	42	0	0	48.9	0	35.1	9.0	9.8
Crockett*	-	-	-	-	-	-	-	-	-	-	-	-	*	*	0	-	-	-	-	-	-	-	-	-
Fairfield	90	0	73	0	2	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Livermore	120	6	90	1	7	78	3.4	1.8	0	72	14	0	-	-	-	18.8	49	0	0	32.1	0	29.4	9.0	9.4
Martinez	-	-	-	-	-		-	-	-	-	-	-	7	1.7	0	-	-	-	-	-	-	-	-	-
Pittsburg	94	0	78	0	2	69	3.3	1.7	0	58	11	0	9	2.4	0	20.1	57	0	1	-	-	-	-	-
South Central Bay																								
Fremont	105	1	78	0	1	60	3.2	2.0	0	69	15	0	-	-	-	17.8	54	0	1	33.4	0	27.6	9.0	9.0
Hayward*	*	*	*	*	*	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Redwood City	84	0	61	0	0	57	4.5	2.3	0	62	15	0	-	-	-	20.9	81	0	2	30.9	0	27.8	8.8	9.0
San Leandro	99	1	61	0	0	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Santa Clara Valley																								
Gilroy	87	0	67	0	0	71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Los Gatos	110	3	87	1	3	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Jose Central	113	1	80	0	1	61	4.3	3.1	0	74	19	0	-	-	-	22.3	54	0	2	54.6	0	39.0	11.8	11.7
San Jose East*	110	1	83	0	1	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Jose, Tully Road	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.2	71	0	4	50.6	0	35.9	10.5	10.3
San Martin	108	2	77	0	3	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunnyvale	97	1	73	0	1	64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Bay Area Days over Standard		9		1	9				0			0			0			0	6		0			

*See notes of explanation on back of this page

2005 NOTES

The annual Bay Area Air Pollution Summary summarizes measurements for the national and California pollutant standards. Note that measurements given in parts per hundred million (pphm) in prior years are now given in parts per billion (ppb).

*Station Information (see asterisks on front page)

The Hayward station was inoperative until July 19, 2005, due to construction on site.

The Crockett station was inoperative after March 27, 2005 due to construction on site.

The Oakland and San Jose East stations were closed on November 30, 2005.

Due to roof damage at the Concord station during the fourth quarter of 2004, the $PM_{2.5}$ sampler could not be operated on some of the required sampling days. The $PM_{2.5}$ annual average and three-year average $PM_{2.5}$ statistics are based on available data.

Explanation of Terms

State and national excesses occur when pollutant concentrations surpass the indicated standards. For comparison, values in ppb must be converted to ppm and rounded to the same number of decimal places as the original standard.

MAX HR / MAX 8-HR / MAX 24-HR
The highest average contaminant concentration over a one-hour period, an eight-hour period (on any given day), or a 24-hour period (from midnight to midnight).

ANN AVG
The yearly average (arithmetic mean) of the readings taken at a given monitoring station.

NAT DAYS
The number of days during the year for which the monitoring station recorded contaminant concentrations in excess of the national standard.

CAL DAYS
The number of days during the year for which the station recorded contaminant levels in excess of the California standard.

TOTAL BAY AREA DAYS OVER STANDARD is not a sum of excesses at individual stations, but rather a sum of the number of days for which excesses occurred at any one or more stations.

3-YR AVG (8-hr ozone standard)
The 3-year average of the fourth highest 8-hour average ozone concentration for each monitoring station. *A 3-year average greater than 84 ppb at any monitoring station means that the region will be considered out of attainment by the EPA.*

PM_{10}
Particulate matter ten microns or smaller in size. (PM_{10} is only sampled every sixth day. *Actual* days over standard can be estimated to be six times the number shown.)

$PM_{2.5}$
Particulate matter 2.5 microns or smaller in size. $PM_{2.5}$ is a sub-category of PM_{10}.

PM_{10} ANN AVG and MAX 24-HR
California PM_{10} Annual Average and Maximum 24-Hour concentrations are reported at local temperature and pressure conditions. National PM_{10} Annual Average and Maximum 24-Hour concentrations are reported at standard temperature and pressure conditions. This table shows the California readings for PM_{10} Ann Avg and Max 24-Hr, which are generally slightly higher than the national readings.

3-YR AVG ($PM_{2.5}$ 24-hour standard)
The 3-year average of the annual 98th percentiles of the individual 24-hour concentrations of $PM_{2.5}$. *A 3-year average greater than 65 $\mu g/m^3$ at any monitoring station means that the region will be considered out of attainment by the EPA.*

3-YR AVG ($PM_{2.5}$ annual standard)
The 3-year average of the quarterly averages of $PM_{2.5}$. *A 3-year average greater than 15 $\mu g/m^3$ at any monitoring station means that the region will be considered out of attainment by the EPA.*

HEALTH-BASED AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Std	National Std
Ozone	1 Hour[1]	0.09 ppm	
	8 Hour[2]	0.070 ppm	0.08 ppm
Carbon Monoxide	1 Hour	20 ppm	35 ppm
	8 Hour	9.0 ppm	9 ppm
Nitrogen Dioxide	1 Hour	0.25 ppm	—
	Annual	—	0.053 ppm
Sulfur Dioxide	24 Hour	0.04 ppm	0.14 ppm
	Annual	—	0.03 ppm
Particulates < 10 microns –	24 Hour	50 $\mu g/m^3$	150 $\mu g/m^3$
	Annual	20 $\mu g/m^3$	50 $\mu g/m^3$
Particulates < 2.5 microns –	24 Hour	—	65 $\mu g/m^3$
	Annual	12 $\mu g/m^3$	15 $\mu g/m^3$

[1]The U.S. EPA revoked the national 1-hour ozone standard on June 15, 2005.
[2]The California 8-hour ozone standard was implemented on May 17, 2005.

Concentrations

ppm	ppb	$\mu g/m^3$
parts per million	parts per billion	micrograms per cubic meter

TEN-YEAR BAY AREA AIR QUALITY SUMMARY

DAYS OVER STANDARDS

YEAR	OZONE			CARBON MONOXIDE				Nitrogen Dioxide	Sulfur Dioxide		PM_{10}		$PM_{2.5}$
	8-Hr	1-Hr	8-Hr	1-Hr		8-Hr		1-Hr	24-Hr		24-Hr*		24-Hr**
	Nat	Cal		Nat	Cal	Nat	Cal	Cal	Nat	Cal	Nat	Cal	Nat
1996	-	34	-	0	0	0	0	0	0	0	0	3	-
1997	-	8	-	0	0	0	0	0	0	0	0	4	-
1998	16	29	-	0	0	0	0	0	0	0	0	5	-
1999	9	20	-	0	0	0	0	0	0	0	0	12	-
2000	4	12	-	0	0	0	0	0	0	0	0	7	1
2001	7	15	-	0	0	0	0	0	0	0	0	10	5
2002	7	16	-	0	0	0	0	0	0	0	0	6	7
2003	7	19	-	0	0	0	0	0	0	0	0	6	0
2004	0	7	-	0	0	0	0	0	0	0	0	7	1
2005	1	9	9	0	0	0	0	0	0	0	0	6	0

*PM_{10} is sampled every sixth day—*actual* days over standard can be estimated to be six times the numbers listed.

**2000 was the first complete year of $PM_{2.5}$ data.

Welcome to California

Air Resources Board

iADAM

Highest 4 Daily Maximum Hourly Nitrogen Dioxide Measurements

San Pablo-Rumrill Blvd

FAQs

Year:	2004		2005		2006	
	Date	Measurement	Date	Measurement	Date	Measurement
First High:	Oct 12	0.055	Oct 13	0.054	Oct 28	0.055
Second High:	Oct 14	0.051	Nov 23	0.048	Jun 22	0.050
Third High:	Sep 23	0.048	Mar 11	0.047	Oct 21	0.050
Fourth High:	Nov 24	0.045	Nov 20	0.046	Feb 24	0.049
# Days Above State Standard:		0		0		0
Annual Average:		0.013		0.012		0.013
Year Coverage:		98		98		96

Go Backward One Year | New Top 4 Summary | Go Forward One Year

Notes: All concentrations are expressed in parts per million.
State exceedances are shown in **yellow** . National exceedances are shown in **orange** .
An exceedance is not necessarily a violation.
Year Coverage indicates how complete monitoring was during the time of the year when concentrations are highest. 0 means there was no coverage; 100 means there was complete coverage.
* There was insufficient (or no) data available to determine the value.

Switch: Hourly Ozone | 8-Hour Ozone | PM10 | PM2.5 | Carbon Monoxide | Sulfur Dioxide | Hydrogen Sulfide

Go to: Data Statistics Home Page | Top 4 Summaries Start Page

U.S. Environmental Protection Agency

AirData

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EPA Home > Air & Radiation > AirData > Reports and Maps > Select Geography > Select Report/Map > Monitor Values Report Criteria > Monitor Values Report

Monitor Values Report - Criteria Air Pollutants

Geographic Area: Contra Costa Co, CA
Pollutant: Carbon Monoxide
Year: 2006

EPA Air Quality Standards:
Carbon Monoxide: 35 ppm (1-hour average), 9 ppm (8-hour average)

ppm = parts per million

4 Rows
See Disclaimer

	CO (ppm)													
	1-Hour Values				8-Hour Values			Monitor Number						
Row #	# Obs	1st Max	2nd Max	# Exceed	1st Max	2nd Max	# Exceed		Site ID	Site Address	City	County	State	EPA Region
SORT														
1	8,342	1.7	1.6	0	1.3	1.1	0	1	060130002	2956-A Treat Boulevard	Concord	Contra Costa Co	CA	09
2	8,349	1.3	1.2	0	1.0	1.0	0	1	060131002	5551 Bethel Island Rd, Bethel Island	Bethel Island	Contra Costa Co	CA	09
3	8,291	2.5	2.3	0	1.4	1.3	0	1	060131004	1865 D Rumrill Blvd, San Pablo, Ca	San Pablo	Contra Costa Co	CA	09
4	8,302	3.3	3.2	0	1.9	1.5	0	1	060133001	583 W. 10th St., Pittsburg	Pittsburg	Contra Costa Co	CA	09
Grand Total				0			0							

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Monitor Values Report - Criteria Air Pollutants

Geographic Area: Contra Costa Co, CA
Pollutant: Sulfur Dioxide
Year: 2006

EPA Air Quality Standards:
Sulfur Dioxide: 0.5 ppm (3-hour average), 0.14 ppm (24-hour average), 0.030 ppm (annual mean)

ppm = parts per million

7 Rows
See Disclaimer

	SO2 (ppm)																	
	1-Hour Values			3-Hour Values			24-Hour Values			Annual		Monitor Number						
Row #	# Obs	1st Max	2nd Max	1st Max	2nd Max	# Exceed	1st Max	2nd Max	# Exceed	Mean	# Exceed		Site ID	Site Address	City	County	State	EPA Region
SORT																		
1	7,980	0.025	0.022	0.018	0.018	0	0.007	0.005	0	0.001	0	1	060130002	2956-A Treat Boulevard	Concord	Contra Costa Co	CA	09
2	8,633	0.026	0.025	0.014	0.014	0	0.006	0.006	0	0.002	0	1	060130006	1065 7th St., Richmond	Richmond	Contra Costa Co	CA	09
3	7,202	0.034	0.033	0.021	0.019	0	0.008	0.007	0	0.002	0	1	060131001	Kendall Ave., Crockett	Crockett	Contra Costa Co	CA	09
4	7,979	0.017	0.016	0.011	0.010	0	0.007	0.006	0	0.002	0	1	060131002	5551 Bethel Island Rd, Bethel Island	Bethel Island	Contra Costa Co	CA	09

U.S. Environmental Protection Agency

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EPA Home > Air & Radiation > AirData > Reports and Maps > Select Geography > Select Report/Map > Monitor Values Report Criteria > Monitor Values Report

Monitor Values Report - Criteria Air Pollutants

Geographic Area: Contra Costa Co, CA
Pollutant: Particulate (size < 10 micrometers)
Year: 2006

EPA Air Quality Standards:
Particulate (diameter < 10 micrometers): 150 µg/m3 (24-hour average), 50 µg/m3 (annual mean)

µg/m3 = micrograms per cubic meter

4 Rows
See Disclaimer

	PM10 (µg/m3)															
	24-Hour Values							Annual								
Row #	# Obs	1st Max	2nd Max	3rd Max	4th Max	# Exceed-Actual	# Exceed-Estimated	Mean	# Exceed	Monitor Number	Site ID	Site Address	City	County	State	EPA Region
SORT																
1	61	84	61	53	36	0	0.0	18	0	1	060130002	2956-A Treat Boulevard	Concord	Contra Costa Co	CA	09
2	60	82	48	47	46	0	0.0	19	0	1	060131002	5551 Bethel Island Rd, Bethel Island	Bethel Island	Contra Costa Co	CA	09
3	61	58	52	44	42	0	0.0	21	0	1	060131004	1865 D Rumrill Blvd, San Pablo, Ca	San Pablo	Contra Costa Co	CA	09
												583 W.		Contra		

U.S. Environmental Protection Agency

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EPA Home > Air & Radiation > AirData > Reports and Maps > Select Geography > Select Report/Map > Monitor Values Report Criteria > Monitor Values Report

Monitor Values Report - Criteria Air Pollutants

Geographic Area: Contra Costa Co, CA
Pollutant: Particulate (size < 2.5 micrometers)
Year: 2006

EPA Air Quality Standards:
Particulate (diameter < 2.5 micrometers): 65 µg/m3 (24-hour average), 15.0 µg/m3 (annual mean)

µg/m3 = micrograms per cubic meter

2 Rows
See Disclaimer

	PM2.5 (µg/m3)															
	24-Hour Values							Annual		Monitor Number						
Row #	# Obs	1st Max	2nd Max	3rd Max	4th Max	98th Pct	# Exceed	Mean	# Exceed		Site ID	Site Address	City	County	State	EPA Region
SORT																
1	62	60	39	29	27	39	0	10.0	0	2	060130002	2956-A Treat Boulevard	Concord	Contra Costa Co	CA	09
2	201	62	49	44	39	34	0	9.5	0	1	060130002	2956-A Treat Boulevard	Concord	Contra Costa Co	CA	09
Grand Total							0		0							

Page 1 of 1

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Create comma-delimited or tab-delimited values, compatible with PC spreadsheets and databases.

Comma Tab About exporting

Figure 8.1C-2a

Chevron Richmond Refinery Facility Layout used for ISCST3 Modeling

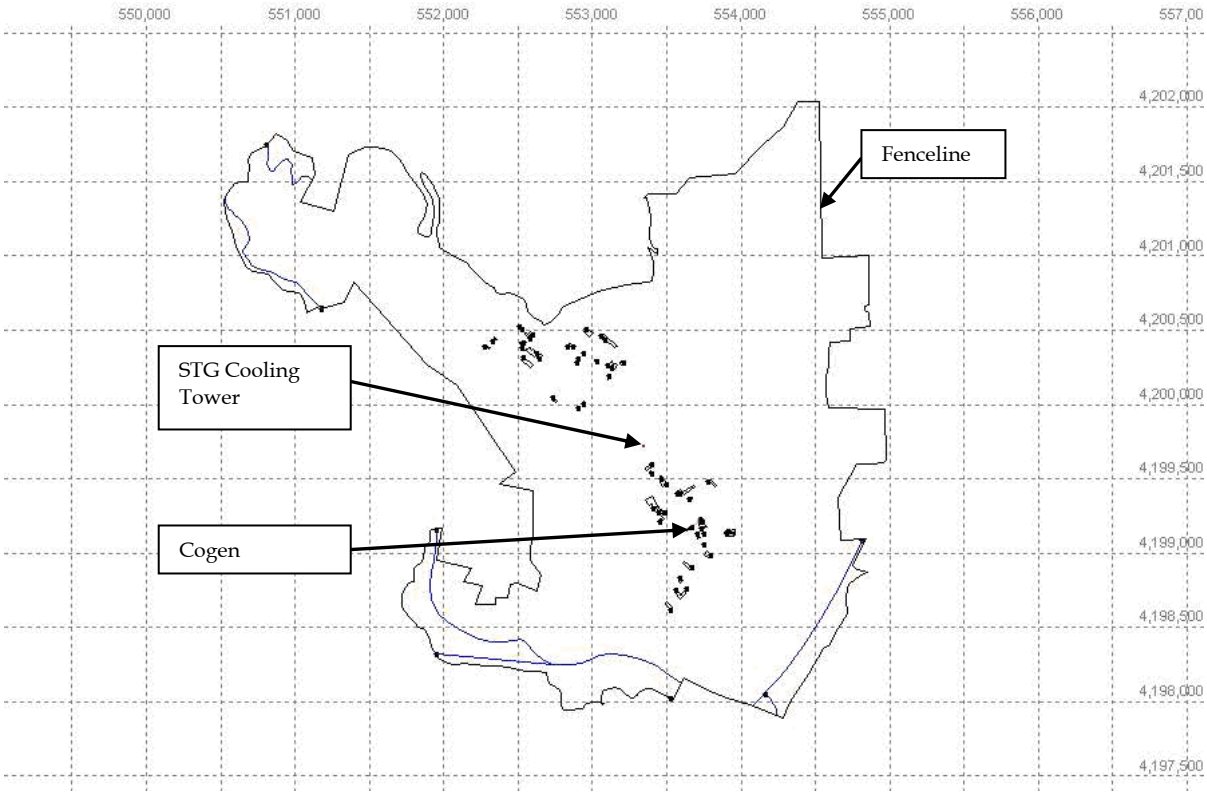

Figure 8.1C-2b

Chevron Richmond Refinery Source Layout used for ISCST3 Modeling

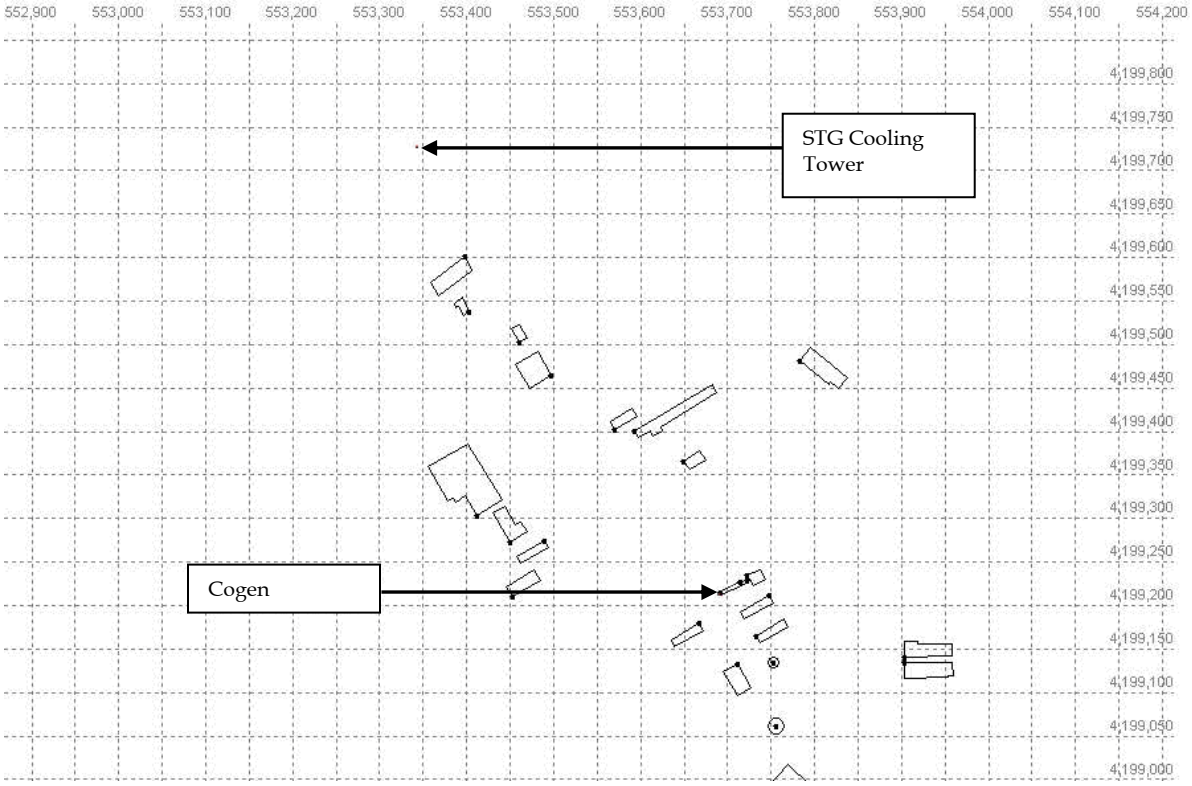
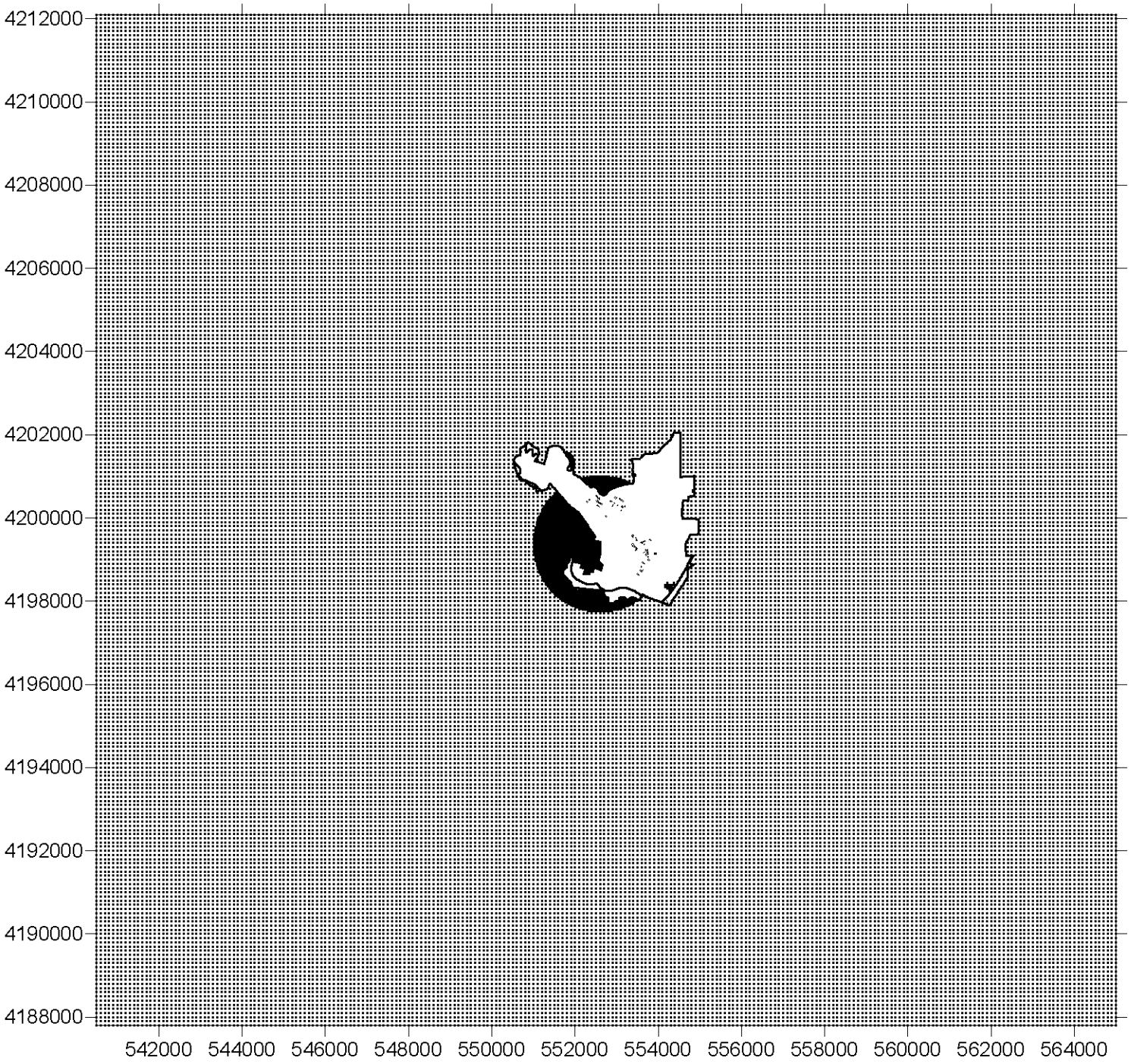
Figure 8.1C-3
Coarse and Fine Receptor Grids