



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
RESEARCH TRIANGLE PARK, NC 27711

MAR 25 2009

OFFICE OF  
AIR QUALITY PLANNING  
AND STANDARDS

**MEMORANDUM**

**SUBJECT:** Sulfur Dioxide (SO<sub>2</sub>) Descriptive Statistics Tables

**FROM:** Rhonda Thompson, Air Quality Analysis Group

A handwritten signature in blue ink, appearing to read "Rhonda Thompson".

**TO:** SO<sub>2</sub> NAAQS Review Docket

Sulfur Dioxide (SO<sub>2</sub>) monitoring data for 2004-2006 was pulled from the Air Quality System (AQS). Alternative SO<sub>2</sub> design values were calculated for monitors that were at least 75 percent complete for hours in a day and days in a quarter and had all four quarters and all 3 years. Table 1 shows the percent of U.S. counties with monitors (and percent of population in counties with monitors) that did exceed alternative SO<sub>2</sub> standards. The alternative forms are the 3-year average of either the 99<sup>th</sup> or 98<sup>th</sup> percentiles of the daily 1-hour maximum. The alternative levels for either form are 0.20, 0.15, 0.10, or 0.05 ppm. Population is in millions and the number of counties is in the top row and percentages are in the tables.

For the 40 counties in Tables 2 and 3, the monitoring data were aggregated to the county level. The monitoring site within a county that had the highest 1-hour design value on a given metric was chosen as the source of that metric value for the area. Table 2 has the 2<sup>nd</sup> through 9<sup>th</sup> highest and the 99<sup>th</sup> and 98<sup>th</sup> percentiles of the daily maximums for each of the counties. Table 3 shows the ratios of the proposed metrics (the 99<sup>th</sup> percentiles of both the daily maximum and daily average) with each other and the current metric (annual average) for the 40 counties. Each ratio is rounded to the nearest hundredth. For the alternative daily metrics, the statistics were computed for each year and then averaged over 2004-2006, while the form of the current metric, the annual average, is the maximum of the annual averages over 2005-2006. Three of the 40 counties did not meet all completeness requirements above. For Gibson County, Indiana, there were enough sites for county level maximums in Table 2. However, no site was complete for all 3 years so the design value, which is calculated at the site level, was not complete. For Iron County, Missouri, all sites were incomplete for 2005 and 2006 so no design values were complete and 2004 numbers only were used in Table 2 maximums. For Wayne County, West Virginia, all sites were incomplete for 2006 so no design values were complete and 2004 and 2005 numbers only were used in Table 2 maximums.

Attachment (Tables 1-3)

cc: Phil Lorang

Table 1 Predicted percent of counties with monitors (and percent of population in counties with monitors) exceeding alternative SO<sub>2</sub> standards.

Alternative Standards and Levels (ppm)	Number of counties with monitors (population in 1000s)								
	Total counties (population in millions)	Northeast	Southeast	Industrial Midwest	Upper Midwest	Southwest	Northwest	Southern CA	Outside Regions**
	211 (96.5)	52	40	75	19	7	9	6	3
Percent of counties, total and by region, (and total population) not likely to meet standard and level*									
3 year 99th percentile daily 1 hour max:									
0.25	1 (0.4)	0	0	1	0	14	0	0	33
0.20	3 (0.8)	0	3	4	0	14	0	0	33
0.15	10 (2.4)	2	5	20	5	14	0	0	33
0.10	22 (13.5)	8	13	47	5	14	0	0	33
0.05	54 (43.5)	38	55	81	37	14	22	0	33
3 year 98th percentile daily 1 hour max:									
0.25	.5 (0.2)	0	0	0	0	0	0	0	33
0.20	1 (0.4)	0	0	1	0	14	0	0	33
0.15	3 (0.7)	0	3	4	0	14	0	0	33
0.10	16 (7.2)	4	8	35	5	14	0	0	33
0.05	44 (37.9)	23	50	69	21	14	22	0	33

\* Based on 2004-2006 data for sites that are at least 75% complete for hours in a day and days in a quarter and has all 4 quarters and all 3 years. As such, these estimates are not based on the same air quality data that would be used to determine whether an area would attain a given standard or set of standards. These estimates can only approximate the number counties that are exceeding the given standards and should be used with caution.

\*\* "Outside Resions" include Hawaii.

Table 2. SO<sub>2</sub> Daily Maximums and Percentiles for 2004-2006.

2004-2006	stateabbr	countycode	county	SO <sub>2</sub> Daily Maximums (ppm)								Percentiles	
				2nd	3rd	4th	5th	6th	7th	8th	9th	99th	98th
04	AZ	007	Gila	0.362	0.329	0.276	0.260	0.247	0.228	0.219	0.211	0.276	0.219
10	DE	003	New Castle	0.169	0.150	0.147	0.132	0.129	0.123	0.123	0.117	0.147	0.123
12	FL	057	Hillsborough	0.129	0.121	0.117	0.112	0.109	0.095	0.090	0.085	0.117	0.090
17	IL	119	Madison	0.163	0.149	0.144	0.138	0.131	0.127	0.123	0.120	0.144	0.123
17	IL	185	Wabash	0.213	0.190	0.173	0.165	0.152	0.133	0.129	0.123	0.153	0.127
18	IN	043	Floyd	0.208	0.186	0.170	0.157	0.145	0.140	0.129	0.123	0.170	0.130
18	IN	051	Gibson	0.256	0.232	0.215	0.201	0.195	0.185	0.184	0.179	*	*
18	IN	089	Lake	0.152	0.116	0.107	0.105	0.099	0.095	0.088	0.085	0.107	0.091
18	IN	167	Vigo	0.152	0.132	0.125	0.120	0.113	0.110	0.102	0.099	0.125	0.102
19	IA	113	Linn	0.107	0.098	0.096	0.094	0.103	0.088	0.097	0.090	0.096	0.080
19	IA	139	Muscatine	0.154	0.146	0.135	0.132	0.128	0.122	0.120	0.119	0.135	0.120
26	MI	163	Wayne	0.138	0.131	0.127	0.121	0.120	0.116	0.114	0.106	0.127	0.115
29	MO	077	Greene	0.096	0.088	0.081	0.073	0.065	0.064	0.063	0.059	0.081	0.063
29	MO	093	Iron	**0.022	**0.02	**0.02	**0.02	**0.02	**0.02	**0.019	**0.018	**	**
29	MO	099	Jefferson	0.503	0.428	0.413	0.338	0.312	0.293	0.280	0.266	0.346	0.250
33	NH	013	Merrimack	0.164	0.161	0.151	0.144	0.141	0.132	0.127	0.125	0.151	0.127
34	NJ	017	Hudson	0.064	0.062	0.059	0.056	0.052	0.050	0.048	0.047	0.059	0.048
34	NJ	039	Union	0.071	0.065	0.057	0.053	0.049	0.047	0.047	0.045	0.057	0.047
36	NY	005	Bronx	0.082	0.073	0.070	0.066	0.063	0.062	0.060	0.060	0.063	0.056
36	NY	013	Chautauqua	0.108	0.107	0.101	0.098	0.088	0.087	0.084	0.079	0.101	0.084
36	NY	029	Erie	0.165	0.153	0.129	0.125	0.123	0.119	0.114	0.111	0.129	0.114
39	OH	035	Cuyahoga	0.093	0.087	0.080	0.075	0.073	0.070	0.067	0.066	0.077	0.067
39	OH	085	Lake	0.192	0.186	0.175	0.167	0.164	0.148	0.146	0.142	0.175	0.146
39	OH	153	Summit	0.170	0.161	0.150	0.141	0.140	0.136	0.133	0.127	0.150	0.133
40	OK	143	Tulsa	0.108	0.094	0.081	0.076	0.074	0.071	0.070	0.066	0.081	0.070
42	PA	003	Allegheny	0.127	0.117	0.111	0.102	0.096	0.092	0.089	0.088	0.111	0.089
42	PA	007	Beaver	0.302	0.250	0.227	0.216	0.200	0.189	0.188	0.179	0.130	0.106
42	PA	095	Northampton	0.186	0.172	0.146	0.143	0.124	0.099	0.092	0.086	0.146	0.092

42	PA	123	Warren	0.265	0.244	0.226	0.220	0.190	0.182	0.180	0.177	0.226	0.180
42	PA	125	Washington	0.120	0.108	0.102	0.096	0.091	0.090	0.089	0.085	0.102	0.089
47	TN	009	Blount	0.208	0.200	0.194	0.188	0.182	0.175	0.167	0.162	0.194	0.169
47	TN	157	Shelby	0.118	0.096	0.085	0.081	0.078	0.077	0.072	0.070	0.085	0.072
47	TN	163	Sullivan	0.237	0.218	0.208	0.190	0.164	0.153	0.145	0.143	0.208	0.145
48	TX	245	Jefferson	0.152	0.140	0.129	0.121	0.116	0.113	0.109	0.105	0.129	0.109
51	VA	059	Fairfax	0.049	0.045	0.041	0.039	0.039	0.038	0.037	0.035	0.041	0.037
54	WV	009	Brooke	0.213	0.178	0.158	0.143	0.138	0.134	0.125	0.120	0.158	0.125
54	WV	029	Hancock	0.183	0.170	0.159	0.147	0.145	0.139	0.134	0.131	0.159	0.134
54	WV	061	Monongalia	0.225	0.217	0.178	0.170	0.163	0.152	0.141	0.135	0.168	0.139
54	WV	099	Wayne	***0.089	***0.079	***0.075	***0.0715	***0.0695	***0.068	***0.067	***0.0645	***	***
78	VI	010	St Croix	0.156	0.126	0.086	0.077	0.054	0.049	0.046	0.044	0.050	0.036

These are the 40 counties in the Draft REA.

\* Design values are calculated at the site level (not county). There were enough sites for county level maxes but at site level, incomplete for all 3 years.

\*\*All site in county incomplete in 2005 and 2006.

\*\*\* All site in county incomplete in 2006.

Based on 2004-2006 data for sites that are at least 75% complete for hours in a day and days in a quarter and has all 4 quarters and all 3 years. As such, these estimates are not based on the same air quality data that would be used to determine whether an area would attain a given standard or set of standards. These estimates can only approximate the number counties that are exceeding the given standards and should be used with caution.

Table 3. Ratios of proposed alternatives and the current SO<sub>2</sub> standards.

statecode	STATEAbbr	countycode	COUNTYname	2004-2006 Daily			2004- 2006	2005- 2006	Rat	2004- 2006	2005- 2006	Rat
				Max	24 hr avg	Rat	Daily Max	Ann		Rat	24 hr avg	
				99th	99th		99th			99th		
04	AZ	007	Gila	0.276	0.036	7.63	0.276	0.009	32.47	0.036	0.009	4.25
10	DE	003	New Castle	0.147	0.036	4.06	0.147	0.007	21.69	0.036	0.007	5.34
12	FL	057	Hillsborough	0.117	0.026	4.54	0.117	0.004	28.00	0.026	0.004	6.16
17	IL	119	Madison	0.144	0.031	4.67	0.144	0.005	27.10	0.031	0.005	5.80
17	IL	185	Wabash	0.153	0.025	6.20	0.153	0.004	39.51	0.025	0.004	6.37
18	IN	043	Floyd	0.170	0.028	6.11	0.170	0.008	22.20	0.028	0.008	3.64
18	IN	051	Gibson	*	*	*	*	*	*	*	*	*
18	IN	089	Lake	0.107	0.025	4.23	0.107	0.004	26.22	0.025	0.004	6.20
18	IN	167	Vigo	0.125	0.022	5.74	0.125	0.005	24.75	0.022	0.005	4.31
19	IA	113	Linn	0.096	0.031	3.10	0.096	0.005	20.96	0.031	0.005	6.77
19	IA	139	Muscatine	0.135	0.044	3.11	0.135	0.006	21.91	0.044	0.006	7.05
26	MI	163	Wayne	0.127	0.039	3.21	0.127	0.006	20.36	0.039	0.006	6.34
29	MO	077	Greene	0.081	0.022	3.71	0.081	0.003	27.54	0.022	0.003	7.42
29	MO	093	Iron	**	**	**	**	**	**	**	**	**
29	MO	099	Jefferson	0.346	0.055	6.24	0.346	0.010	33.54	0.055	0.010	5.37
33	NH	013	Merrimack	0.151	0.043	3.51	0.151	0.007	20.96	0.043	0.007	5.97
34	NJ	017	Hudson	0.059	0.024	2.51	0.059	0.008	7.14	0.024	0.008	2.84
34	NJ	039	Union	0.057	0.020	2.83	0.057	0.007	7.76	0.020	0.007	2.74
36	NY	005	Bronx	0.063	0.032	2.00	0.063	0.009	6.76	0.032	0.009	3.39
36	NY	013	Chautauqua	0.101	0.020	5.13	0.101	0.004	23.42	0.020	0.004	4.57
36	NY	029	Erie	0.129	0.028	4.55	0.129	0.006	22.12	0.028	0.006	4.87
39	OH	035	Cuyahoga	0.077	0.022	3.53	0.077	0.007	10.42	0.022	0.007	2.95
39	OH	085	Lake	0.175	0.046	3.78	0.175	0.010	17.58	0.046	0.010	4.65
39	OH	153	Summit	0.150	0.035	4.27	0.150	0.008	18.56	0.035	0.008	4.35
40	OK	143	Tulsa	0.081	0.027	2.99	0.081	0.007	12.22	0.027	0.007	4.09
42	PA	003	Allegheny	0.111	0.036	3.12	0.111	0.010	11.14	0.036	0.010	3.57

42	PA	007	Beaver	0.130	0.029	4.45	0.130	0.009	14.42	0.029	0.009	3.24
42	PA	095	Northampton	0.146	0.037	3.92	0.146	0.011	13.65	0.037	0.011	3.48
42	PA	123	Warren	0.226	0.063	3.58	0.226	0.015	15.42	0.063	0.015	4.31
42	PA	125	Washington	0.102	0.031	3.30	0.102	0.010	10.71	0.031	0.010	3.25
47	TN	009	Blount	0.194	0.065	2.98	0.194	0.012	16.75	0.065	0.012	5.62
47	TN	157	Shelby	0.085	0.029	2.99	0.085	0.006	13.39	0.029	0.006	4.47
47	TN	163	Sullivan	0.208	0.032	6.52	0.208	0.007	28.06	0.032	0.007	4.30
48	TX	245	Jefferson	0.129	0.025	5.21	0.129	0.004	35.45	0.025	0.004	6.80
51	VA	059	Fairfax	0.041	0.016	2.51	0.041	0.006	6.45	0.016	0.006	2.57
54	WV	009	Brooke	0.158	0.043	3.68	0.158	0.014	11.19	0.043	0.014	3.04
54	WV	029	Hancock	0.159	0.038	4.14	0.159	0.014	11.57	0.038	0.014	2.80
54	WV	061	Monongalia	0.168	0.035	4.80	0.168	0.008	20.07	0.035	0.008	4.18
54	WV	099	Wayne	***	***	***	***	***	***	***	***	***
78	VI	010	St Croix	0.050	0.014	3.58	0.050	0.002	29.33	0.014	0.002	8.20

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