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WRAP INTERIM 2002 POINT AND AREA SOURCE EMISSION ESTIMATES:

TECHNICAL MEMORANDUM

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I. APPROACH SUMMARY

The Western Regional Air Partnership (WRAP) Forum was interested in having a surrogate 2002 emissions database in order to perform some preliminary atmospheric modeling for the WRAP region that would allow judgments to be made about the sources whose emissions potentially affect Class I areas in the west. A surrogate emissions database was of interest because 2002 emission estimates are not expected to be available for the region until sometime after June 2004, when States provide their submittals to the U.S. Environmental Protection Agency (EPA) (and the WRAP). This technical memorandum describes the methods that were used to produce interim 2002 criteria pollutant plus ammonia (NH₃) emission estimates for the WRAP plus the Central States Regional Air Planning Association (CENRAP) State Point and Area Source Inventory. Table I-1 summarizes the point and area interim 2002 emission estimation approaches.

For point sources, the 2002 estimates begin with the 1996 WRAP point source database - version 3. For electricity generating units (EGUs), the emission estimates are based on 2002 Emissions Tracking System/Continuous Emissions Monitoring (ETS/CEM) data, and 2002 EIA-767 based estimates for the larger plants/units that submit emission estimates to this system. However, the incorporation of emission data updates was limited to the WRAP Region States. CENRAP State emissions estimates were retained at 1996 levels.

For copper smelters, 2002 sulfur dioxide (SO₂) emission estimates were obtained from Asarco and Phelps Dodge for their Arizona and New Mexico facilities and incorporated in this emission database. The Kennecott, Utah copper smelter SO₂ emission estimates are based on 2000 estimates provided earlier for the emission milestone report.

For non-smelter, non-utility point sources, the WRAP 1996 point source emissions database was used as the starting point for a six-year projection to 2002 using growth factors and Integrated Assessment System (IAS) model algorithms. For the top 100 emitting SO₂ facilities, the year 2002 SO₂ emissions were estimated using the year 2000 facility-level emission estimates from the milestone report (Pechan, 2002a). In other words, the IAS model-estimated 2002 values for SO₂ were replaced with actual 2000 SO₂ emission estimates provided earlier by the State air pollution control agencies. In addition, for facilities that were indicated as shutdown/closed in either the milestone report, or the floor allocation report (Pechan, 2002b), the emissions of all pollutants at these facilities were set to zero.

For area sources, the 1999 EPA National Emission Inventory (NEI) Version 3 was used as a starting point for a three-year projection to 2002 using growth factors from the Economic Growth Analysis System (EGAS) 4.0 for the 1999 to 2002 period to represent 2002 emission levels.

Table I-1. Approach Summary by Sector and Geographic Area

Sector	WRAP States	CENRAP States
Point Sources		
EGUs	ETS/CEM data and EIA-767 based estimates for 2002	WRAP 1996 point source file
Copper smelters	SO ₂ emissions provided by smelter companies	Not applicable
Non-utilities, non-smelter	IAS model projections from 1996 to 2002 Year 2000 facility-level SO ₂ emissions substituted for major 9-State emitters	IAS model projection from 1996 to 2002
Area Sources	Applied 1999-2002 growth factors to 1999 NEI area source emission estimates	Applied 1999-2002 growth factors to 1999 NEI area source emission estimates

II. RESULTS SUMMARY

Table II-1 summarizes the WRAP and CENRAP State point source emissions estimates for 2002, and compares them with the estimates from version 3 of the WRAP 1996 point source database.

Point source SO₂ emissions in 2002 in the western States continue the declining trends observed previously with the 1990 to 2000 data used in emission milestone tracking. Compared with 1996 emissions, significant SO₂ emission reductions are estimated for EGUs and for copper smelters. The western States with the largest EGU SO₂ emission reductions between 1996 and 2002 are Arizona and Washington. Within the Grand Canyon Visibility Transport Commission (GCVTC) States, the EGU-associated SO₂ emission reduction from 1996 to 2002 was about 69,000 tons.

The 2002 copper smelter SO₂ emissions in the region are about 24,000 tons. Of the copper smelters included in the Annex, only three smelters had positive SO₂ emissions in 2002: Asarco-Hayden, Phelps Dodge-Miami, and Kennecott-Salt Lake. To put this in perspective, the current year SO₂ allocation for the six copper smelters in the 9-State region is 86,000 tons.

Non-utility, non-smelter SO₂ emissions in 2002 are estimated to be about 5 percent lower than they were in 1996. Because no actual 2002 emission estimates are available yet for this sector, these results will have to be verified by the 2002 point source data now being collected by the States. The 2002 SO₂ emission estimates here are based on either 2000 facility-level SO₂ emission estimates, or IAS model algorithm-based projections from 1996 to 2002.

Point source oxides of nitrogen (NO_x) emissions are also estimated to decline between 1996 and 2002 across the modeling region (WRAP plus CENRAP States). However, the pattern of where the point source NO_x emission reductions occur is distinctly different from the SO₂ emission reduction pattern. The majority of the expected modeling region NO_x emissions change is estimated to occur in Texas. Other States with significant estimated NO_x emission reductions include California and North Dakota. The NO_x emission reductions in Texas and California result, in part, from ozone State Implementation Plan (SIP) control strategies to add point source NO_x controls in ozone nonattainment areas in those States.

Point source emissions of all of the other pollutants in this study (criteria pollutants plus NH₃) show slight increases from 1996 to 2002. Note that the 2002 estimates for the non-utility point sources are the product of applying IAS model algorithms to estimate 1996 to 2002 emission changes and the EGU point source NH₃ estimates were not updated from 1996 levels. Therefore, except for source categories where retirements are expected during this six-year period, some emissions growth will be expected for most sectors in this time frame.

Table II-2 summarizes the WRAP and CENRAP State point source emission estimates for 2002, and compares them with the estimates from the WRAP 1996 area source database. As expected, for most States, the 2002 area source emissions are slightly higher than the 1996 values. The two noteworthy exceptions are volatile organic compound (VOC) emissions for California and Idaho, which are significantly higher than the area source VOC emission estimates for 1996.

More information about the uncertainties associated with these values is provided in Section V of this technical memorandum.

**Table II-1. WRAP and CENRAP State Point Source Emissions (Annual Tons)
Interim 2002 Estimates Compared with WRAP 1996 Point Source File**

State Name	2002 Emissions							1996 Emissions						
	VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	NH ₃	VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	NH ₃
Arizona	7,901	119,097	22,985	98,164	20,637	8,170	20	6,656	108,207	18,946	180,945	16,332	6,549	19
Arkansas	15,860	72,477	108,200	110,937	32,298	18,991	17,657	14,863	72,439	101,790	112,096	31,855	19,324	15,032
California	80,091	98,478	109,544	41,712	34,749	19,640	18,530	69,564	134,844	96,397	44,090	30,135	17,535	15,304
Colorado	38,825	120,812	41,136	100,589	21,704	12,632	223	37,790	130,551	34,324	106,337	19,932	11,943	246
Idaho	426	6,453	4,917	24,288	9,941	5,849	2	482	6,292	4,522	22,438	12,976	8,035	2
Iowa	11,588	107,635	12,842	234,717	12,087	6,761	9,581	11,087	106,310	11,724	243,494	11,333	6,314	8,122
Kansas	27,750	195,505	81,754	129,325	15,634	10,789	14,232	26,548	195,309	81,756	131,192	14,632	9,900	12,593
Louisiana	132,338	340,113	665,518	250,797	37,494	27,640	64,802	127,270	349,255	700,613	262,458	37,308	27,690	62,797
Minnesota	40,015	171,931	83,233	124,003	86,896	39,158	1,030	39,138	169,842	82,626	127,067	81,954	36,691	1,006
Missouri	68,215	217,692	127,471	477,745	56,538	22,082	25,764	60,194	214,365	107,127	482,636	49,385	19,407	21,884
Montana	7,738	52,314	51,671	47,083	15,611	8,238	379	7,683	42,517	48,553	45,925	14,366	7,635	405
Nebraska	11,721	61,975	16,062	72,857	9,677	4,141	20	11,221	61,532	13,933	72,303	8,976	3,867	19
Nevada	1,913	50,197	17,248	50,015	4,173	2,744	55	1,835	48,966	14,091	51,689	8,686	8,218	54
New Mexico	18,211	144,899	41,076	85,894	10,552	5,387	87	16,496	147,130	38,412	159,756	10,326	3,044	83
North Dakota	1,451	87,172	14,061	200,993	5,388	3,296	23	1,398	118,878	16,004	238,249	5,424	3,325	22
Oklahoma	61,668	207,494	228,963	137,561	12,341	7,562	19,200	56,948	208,955	221,065	140,950	11,882	7,490	16,614
Oregon	17,888	29,405	82,039	19,762	11,409	8,311	16	16,161	25,345	74,129	9,888	10,747	7,891	16
South Dakota	1,350	20,028	97	12,846	755	397	1	1,387	21,613	366	16,077	906	485	1
Texas	288,515	751,257	484,772	942,271	59,513	41,408	3,045	272,913	920,366	470,866	962,042	57,873	40,596	2,907
Utah	10,219	94,432	41,367	44,068	14,792	8,555	1,117	9,388	86,826	36,409	43,947	13,610	7,789	1,124
Washington	21,961	54,462	182,362	57,520	11,582	8,277	4,991	21,242	56,493	171,065	120,360	12,457	8,890	4,618
Wyoming	24,319	127,255	59,011	124,126	26,002	15,897	1,056	23,460	131,552	57,827	128,425	32,565	19,610	1,050
	889,961	3,131,085	2,476,329	3,387,274	509,773	285,926	181,832	833,722	3,357,588	2,402,547	3,702,365	493,662	282,230	163,918

**Table II-2. WRAP and CENRAP State Area Source Emissions (Annual Tons)
Interim 2002 Estimates Compared with WRAP 1996 Area Source File**

State Name	2002 Emissions							1996 Emissions						
	VOC	NO _x	SO ₂	CO	PM ₁₀	PM _{2.5}	NH ₃	VOC	NO _x	SO ₂	CO	PM ₁₀	PM _{2.5}	NH ₃
Arizona	114,110	58,488	3,514	120,427	135,819	37,993	28,355	113,657	49,080	3,145	50,483	43,811	13,492	30,955
Arkansas	110,706	37,473	18,574	66,047	202,423	48,056	142,691	129,404	37,353	19,786	147,802	185,762	51,116	136,364
California	518,438	152,383	10,159	637,089	403,318	174,893	176,489	247,664	103,859	10,407	376,801	202,441	69,678	166,172
Colorado	104,585	11,084	1,903	74,943	159,926	40,773	106,797	47,500	10,280	1,800	3,101	99,693	20,220	96,298
Idaho	217,755	35,435	1,698	51,426	93,620	32,102	67,343	42,049	12,033	7,443	8,337	93,469	19,849	14,002
Iowa	139,984	30,232	23,815	75,041	346,322	76,348	288,767	135,830	29,501	13,389	58,448	325,425	70,895	290,042
Kansas	98,943	14,692	3,630	58,330	449,802	95,829	223,842	118,183	67,658	3,342	52,234	399,371	83,842	214,661
Louisiana	122,129	97,482	85,759	87,766	128,328	36,931	64,961	126,004	97,326	93,427	74,302	97,762	27,394	64,138
Minnesota	184,292	22,881	5,429	138,019	334,026	83,676	186,456	192,029	23,802	6,064	113,601	287,701	69,860	182,796
Missouri	264,273	38,757	34,101	220,082	258,096	67,717	192,545	153,524	13,710	31,949	184,620	210,832	59,193	178,939
Montana	47,883	11,025	1,217	32,401	170,720	36,773	92,976	49,217	11,279	1,166	56,637	164,605	37,187	88,879
Nebraska	77,055	14,095	9,549	18,866	269,178	55,051	240,270	77,840	14,496	9,848	24,782	250,600	51,386	228,155
Nevada	39,072	7,920	3,273	38,211	75,669	18,759	14,873	37,509	6,976	3,483	12,925	18,576	4,910	14,777
New Mexico	54,689	25,998	7,745	38,997	81,868	20,684	47,038	54,974	24,634	7,830	42,221	39,354	11,723	46,126
North Dakota	64,138	18,661	55,163	23,987	307,263	62,833	89,900	56,844	18,497	56,879	12,117	264,946	53,249	87,778
Oklahoma	140,329	31,333	4,918	51,722	243,440	54,517	205,352	100,693	30,141	5,020	79,002	197,356	46,287	186,173
Oregon	319,868	23,372	20,666	90,288	125,010	67,337	59,485	321,624	14,777	2,201	381,626	109,905	65,511	58,643
South Dakota	42,997	6,327	20,147	20,725	242,963	49,891	143,504	38,801	6,469	19,272	19,477	227,058	46,176	128,807
Texas	587,819	42,916	6,498	196,520	786,079	174,650	482,540	513,720	30,810	8,366	90,563	487,229	104,712	456,508
Utah	67,943	20,738	10,291	96,489	120,505	33,623	34,484	35,634	5,067	8,148	58,529	35,179	11,217	4,033
Washington	129,742	18,745	2,894	193,699	144,418	51,530	47,514	149,925	18,990	3,347	209,281	114,437	43,393	45,729
Wyoming	20,706	63,708	14,794	29,384	56,441	13,066	52,613	19,745	64,100	15,877	28,479	39,003	8,944	48,430
	3,467,455	783,745	345,738	2,360,458	5,135,234	1,333,033	2,988,794	2,762,368	690,838	332,188	2,085,370	3,894,514	970,235	2,768,403

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III. POINT SOURCE METHODS DESCRIPTIONS

Development of the surrogate 2002 inventory for point sources was divided into two components: the EGU and the non-EGU point sources. Methodological approaches for both are treated separately below.

A. ELECTRICITY GENERATING UNITS

The EGU component of the surrogate 2002 inventory was prepared by updating the 1996 WRAP 22-State inventory's EGU units; updates were further restricted to the WRAP States. Development of the EGU component of the surrogate 2002 inventory was then limited to updating 1996 annual emissions (SO₂, NO_x, VOC, carbon monoxide [CO], particulate matter with an aerodynamic diameter of 10 microns or less [PM₁₀], and particulate matter with an aerodynamic diameter of 2.5 microns or less and [PM_{2.5}]), stack parameters, and latitude/longitude coordinates for the most significant boilers, which were defined as those with at least 250 tons of annual NO_x or SO₂ as reported to (1) EPA's ETS/CEM and included in EPA's EGU component of 2002 projected NEI at the Source Classification Code (SCC) level; or (2) calculated, using 2001 EIA-767 fuel quantity and quality and control device information in conjunction with emission factors (EF) and a 2001 to 2002 growth factor.

There were 132 boilers in 12 of the 13 WRAP States (Idaho has no EGU records) that were determined to be significant. Note that data for all boilers in a given plant are usually, but not necessarily, updated; if all the boilers in a plant do not meet the criteria (for example, boilers 1 and 2 do, but 3 and 4 do not, from Arizona's Irvington [ORISPL=126]), then they are not included in the update). Of the 132 boilers, 10 contain emissions data based solely on EIA-767/AP-42 EFs, 120 contain NO_x and SO₂ emissions from the ETS/CEM file and other emissions based on EIA-767/AP-42 EFs, and 10 contain NO_x and SO₂ emissions from the ETS/CEM file and other emissions based on the ETS/CEM file heat input/AP-42 EFs. Note that California's Los Medanos (ORISPL=55217) has 2 boilers that were originally considered significant, but were removed since EPA confirmed that they have aberrantly high 2002 NO_x ETS/CEM emissions (over 1,700 tons each) and should not be included with those emissions as representative in a modeling inventory. Of the 132 boilers, four were not in the original 1996 WRAP file, so five SCC records were added (one boiler had two SCCs).

Four boiler level stack parameters (stack height, diameter, velocity, and temperature) were updated, and then stack flow was recalculated for boilers with other stack parameter updates. Only those records in which either the stack height (16 records) or diameter (26 records) differs by 10 percent, or the stack temperature (67 records) differs by 25 degrees, or the stack velocity (51 records) differs by 10 feet per second were updated. Note that if one stack parameter at a record is updated, all were updated. Stack flows were then recalculated to be mathematically consistent with diameter and velocity. A total of 109 records were updated.

For plant level coordinates, updates were made only if reported values were available now and there were county centroids in the 1996 file, or if the coordinates are significantly different between the 1996 and 2002 files and the States didn't reply to the 1996 WRAP quality assurance/quality control issue raised at review time. This resulted in two plants (Cherokee (ORISPL=469) and Black Hills Power & Lgt-Simpson 2 (ORISPL=7504) with coordinates; this accounted for 20 records updated.

The original State level 1996 WRAP inventory EGU emissions are shown in Figure III-1, the updated State level 2002 surrogate WRAP inventory EGU emissions are shown in Figure III-2, and the absolute and percent differences between these sets of emissions are shown in Figures III-3 and III-4. Also note that Figure III-2 contains a summary of the number of records updated in each of the previously documented steps.

Comparing EGU emissions from the 1996 and surrogate 2002 WRAP inventories, SO₂ emissions decreased overall by 163,228 tons (28 percent) and NO_x decreased overall by 7,562 tons (only 1 percent). Highlights include:

- Washington had the greatest decrease in SO₂ (59,096 tons, 306 percent), almost entirely due to the 59,141 ton decrease at Pacific Power (Centralia) (ORISPL=3845)], the result of a scrubber added to one of its two boilers.
- Arizona had a 51,215 SO₂ ton (72 percent) decrease due mostly to a 59,871 ton drop at Navajo (ORISPL=4941) because of scrubbers added to all three boilers.
- North Dakota had a 36,049 SO₂ ton (25 percent) decrease due mostly to a 27,441 ton drop at Coal Creek (ORISPL=6030), whose two boilers' SO₂ control efficiencies almost doubled from 1996 to 2002 , while the coal sulfur contents decreased; and a 16,937 ton drop at Milton R Young (ORISPL=2823) because of a decrease in the two boilers' total heat input.
- For California and Oregon, which had large SO₂ percent differences, the changes each resulted from one plant - California's Moss Landing (ORISPL=260), whose SO₂ decreased because they switched from an oil/gas mixture to solely gas; and Oregon's Boardman (ORISPL=6106), whose SO₂ (and all other emissions) increased because the heat input doubled.
- For NO_x, there were increases and decreases among the States that generally cancelled each other out as a whole, although North Dakota had a NO_x decrease of 30,351 tons (40 percent), mainly because of Milton R Young's decreased heat input; and Coal Creek's added NO_x controls.

Figure III-1. 1996 WRAP Point Sources (EGU Only) Inventory

State Name	FIPSSST	Facilities Count	Record Count	VOC Annual Emissions (Tons)	NO _x Annual Emissions (Tons)	CO Annual Emissions (Tons)	SO ₂ Annual Emissions (Tons)	PM ₁₀ Annual Emissions (Tons)	PM _{2.5} Annual Emissions (Tons)	NH ₃ Annual Emissions (Tons)
Arizona	04	13	173	491	76,099	4,570	121,907	3,572	1,764	18
California	06	27	124	1,029	12,994	11,072	1,752	79	77	492
Colorado	08	18	163	391	81,799	4,507	92,301	2,798	1,808	8
Idaho	16	0	0	0	0	0	0	0	0	0
Montana	30	5	61	605	25,602	2,038	18,368	4,179	2,083	37
Nevada	32	6	24	316	44,013	2,658	50,146	7,283	7,283	47
New Mexico	35	9	59	1,512	73,531	8,653	72,754	7,308	2,072	49
North Dakota	38	7	25	822	106,578	9,582	177,617	3,590	2,088	9
Oregon	41	1	3	31	4,201	265	5,525	108	74	0
South Dakota	46	3	9	77	17,209	366	14,801	53	38	1
Utah	49	5	104	273	64,484	3,353	28,582	2,678	1,044	3
Washington	53	2	12	166	18,777	1,378	78,387	3,091	2,121	0
Wyoming	56	8	63	743	86,227	6,812	86,130	12,526	7,826	0
13 WRAP States Totals:		104	820	6,455	611,513	55,253	748,270	47,264	28,279	665
Arkansas	05	9	25	563	50,571	4,449	95,427	2,026	1,329	60
Iowa	19	19	95	573	80,976	5,185	158,556	3,303	1,898	11
Kansas	20	22	163	722	93,798	5,568	117,120	5,152	2,527	40
Louisiana	22	24	133	1,290	77,126	10,691	101,211	3,095	1,899	403
Minnesota	27	23	268	624	90,989	5,758	87,628	4,922	2,351	13
Missouri	29	21	304	1,281	186,468	8,517	364,407	6,004	2,823	17
Nebraska	31	11	122	406	48,348	2,609	65,751	1,653	998	5
Oklahoma	40	17	54	996	86,852	9,738	106,588	2,282	1,578	196
Texas	48	85	842	6,730	399,390	75,430	665,464	21,322	14,869	1,645
CENRAP States Totals:		231	2,006	13,185	1,114,518	127,945	1,762,152	49,760	30,271	2,391
Inventory (EGU Only) Grand Totals:				19,640	1,726,031	183,199	2,510,423	97,025	58,549	3,055
9 GCVTC States Subtotals:				4,785	443,347	41,890	459,098	36,352	21,949	618

**Figure III-2. 2002 WRAP Point Sources (EGU Only) Inventory
(Summary by State)**

State Name	FIPSST	Facilities Count	Record Count	VOC Annual Emissions (Tons)	NO _x Annual Emissions (Tons)	CO Annual Emissions (Tons)	SO ₂ Annual Emissions (Tons)	PM ₁₀ Annual Emissions (Tons)	PM _{2.5} Annual Emissions (Tons)	NH ₃ Annual Emissions (Tons)	Added Records	Records with Updated Latitude/Longitude Coordinates	Records with Updated Stack Parameters	Records with Updated Emissions
Arizona	04	13	185	712	85,062	5,661	70,692	5,750	2,848	18	12	0	26	40
California	06	27	125	1,081	13,206	11,476	624	155	142	492	1	0	0	8
Colorado	08	18	197	611	74,135	8,469	89,862	2,778	1,668	8	34	17	36	63
Idaho	16	0	0	0	0	0	0	0	0	0	0	0	0	0
Montana	30	5	65	674	35,261	2,702	21,874	5,277	2,649	37	4	0	0	14
Nevada	32	7	32	342	44,498	3,147	49,231	2,611	1,699	47	8	0	8	31
New Mexico	35	9	61	1,548	78,607	7,357	50,996	7,889	4,604	49	2	0	22	32
North Dakota	38	7	32	867	76,227	7,213	141,567	3,467	1,989	9	7	0	0	32
Oregon	41	1	3	62	8,406	523	12,280	274	187	0	0	0	0	2
South Dakota	46	3	9	18	15,708	97	12,470	13	8	1	0	0	0	5
Utah	49	5	109	449	71,413	3,728	32,132	2,658	1,087	3	5	0	13	23
Washington	53	3	16	217	16,127	3,047	19,291	2,116	1,462	0	4	0	4	6
Wyoming	56	8	86	772	85,300	6,423	84,022	6,992	4,682	0	23	3	0	48
13 WRAP States Totals:		106	920	7,352	603,951	59,844	585,042	39,980	23,025	665	100	20	109	304
Arkansas	05	9	25	563	50,571	4,449	95,427	2,026	1,329	60	0	0	0	0
Iowa	19	19	95	573	80,976	5,185	158,556	3,303	1,898	11	0	0	0	0
Kansas	20	22	163	722	93,798	5,568	117,120	5,152	2,527	40	0	0	0	0
Louisiana	22	24	133	1,290	77,126	10,691	101,211	3,095	1,899	403	0	0	0	0
Minnesota	27	23	268	624	90,989	5,758	87,628	4,922	2,351	13	0	0	0	0
Missouri	29	21	304	1,281	186,468	8,517	364,407	6,004	2,823	17	0	0	0	0
Nebraska	31	11	122	406	48,348	2,609	65,751	1,653	998	5	0	0	0	0
Oklahoma	40	17	54	996	86,852	9,738	106,588	2,282	1,578	196	0	0	0	0
Texas	48	85	842	6,730	399,390	75,430	665,464	21,322	14,869	1,645	0	0	0	0
CENRAP States Totals:		231	2,006	13,185	1,114,518	127,945	1,762,152	49,760	30,271	2,391	0	0	0	0
Inventory (EGU Only) Grand Totals:				20,537	1,718,468	187,789	2,347,194	89,741	53,295	3,055	100	20	109	304
9 GCVTC States Subtotals:				5,576	460,627	46,784	389,840	29,107	16,917	618	85	20	105	247

**Figure III-3. 2002 versus 1996 Absolute Difference – WRAP Point Sources (EGU Only) Inventory
(Summary by State)**

State Name	FIPSST	Facilities Count	Record Count	VOC Annual Emissions (Tons)	NO _x Annual Emissions (Tons)	CO Annual Emissions (Tons)	SO ₂ Annual Emissions (Tons)	PM ₁₀ Annual Emissions (Tons)	PM _{2.5} Annual Emissions (Tons)	NH ₃ Annual Emissions (Tons)
Arizona	04	0	12	221	8,963	1,091	-51,215	2,178	1,084	0
California	06	0	1	52	212	404	-1,128	76	66	0
Colorado	08	0	34	220	-7,664	3,962	-2,439	-20	-140	0
Idaho	16	0	0	0	0	0	0	0	0	0
Montana	30	0	4	70	9,659	664	3,506	1,098	566	0
Nevada	32	1	8	26	485	489	-915	-4,672	-5,584	0
New Mexico	35	0	2	36	5,077	-1,296	-21,758	582	2,532	0
North Dakota	38	0	7	44	-30,351	-2,368	-36,049	-123	-100	0
Oregon	41	0	0	31	4,205	257	6,756	165	112	0
South Dakota	46	0	0	-59	-1,501	-268	-2,331	-40	-30	0
Utah	49	0	5	176	6,929	376	3,550	-20	43	0
Washington	53	1	4	51	-2,650	1,669	-59,096	-975	-659	0
Wyoming	56	0	23	28	-926	-389	-2,108	-5,535	-3,144	0
13 WRAP States Totals:		2	100	897	-7,562	4,590	-163,228	-7,284	-5,254	0
Arkansas	05	0	0	0	0	0	0	0	0	0
Iowa	19	0	0	0	0	0	0	0	0	0
Kansas	20	0	0	0	0	0	0	0	0	0
Louisiana	22	0	0	0	0	0	0	0	0	0
Minnesota	27	0	0	0	0	0	0	0	0	0
Missouri	29	0	0	0	0	0	0	0	0	0
Nebraska	31	0	0	0	0	0	0	0	0	0
Oklahoma	40	0	0	0	0	0	0	0	0	0
Texas	48	0	0	0	0	0	0	0	0	0
CENRAP States Totals:		0	0	0	0	0	0	0	0	0
Inventory (EGU Only) Grand Totals:				897	-7,562	4,590	-163,228	-7,284	-5,254	0
9 GCVTC States Subtotals:				790	17,280	4,894	-69,257	-7,245	-5,031	0

**Figure III-4. 2002 versus 1996 Percent Difference – WRAP Point Sources (EGU Only) Inventory
(Summary by State)**

State Name	FIPSST	Facilities Count	Record Count	VOC Annual Emissions (Tons)	NO _x Annual Emissions (Tons)	CO Annual Emissions (Tons)	SO ₂ Annual Emissions (Tons)	PM ₁₀ Annual Emissions (Tons)	PM _{2.5} Annual Emissions (Tons)	NH ₃ Annual Emissions (Tons)
Arizona	04	0%	6%	31%	11%	19%	-72%	38%	38%	0%
California	06	0%	1%	5%	2%	4%	-181%	49%	46%	0%
Colorado	08	0%	17%	36%	-10%	47%	-3%	-1%	-8%	0%
Idaho	16	0%	0%	0%	0%	0%	0%	0%	0%	0%
Montana	30	0%	6%	10%	27%	25%	16%	21%	21%	0%
Nevada	32	14%	25%	8%	1%	16%	-2%	-179%	-329%	0%
New Mexico	35	0%	3%	2%	6%	-18%	-43%	7%	55%	0%
North Dakota	38	0%	22%	5%	-40%	-33%	-25%	-4%	-5%	0%
Oregon	41	0%	0%	50%	50%	49%	55%	60%	60%	0%
South Dakota	46	0%	0%	-321%	-10%	-276%	-19%	-307%	-402%	0%
Utah	49	0%	5%	39%	10%	39%	1%	4%	4%	0%
Washington	53	33%	25%	24%	-16%	55%	-306%	-46%	-45%	0%
Wyoming	56	0%	27%	4%	-1%	-6%	-3%	-79%	-67%	0%
13 WRAP States Totals:		2%	11%	12%	-1%	8%	-28%	-18%	-23%	0%
Arkansas	05	0%	0%	0%	0%	0%	0%	0%	0%	0%
Iowa	19	0%	0%	0%	0%	0%	0%	0%	0%	0%
Kansas	20	0%	0%	0%	0%	0%	0%	0%	0%	0%
Louisiana	22	0%	0%	0%	0%	0%	0%	0%	0%	0%
Minnesota	27	0%	0%	0%	0%	0%	0%	0%	0%	0%
Missouri	29	0%	0%	0%	0%	0%	0%	0%	0%	0%
Nebraska	31	0%	0%	0%	0%	0%	0%	0%	0%	0%
Oklahoma	40	0%	0%	0%	0%	0%	0%	0%	0%	0%
Texas	48	0%	0%	0%	0%	0%	0%	0%	0%	0%
CENRAP States Totals:		0%	0%	0%	0%	0%	0%	0%	0%	0%
Inventory (EGU Only) Grand Totals:				4%	0%	2%	-7%	-8%	-10%	0%
9 GCVTC States Subtotals:				14%	4%	10%	-18%	-25%	-30%	0%

Quality assurance/quality control of the file was performed at each step along the way, ensuring that data updates were added correctly and in a consistent manner. Additionally, the 2001 EIA-767 and annual 2002 ETS/CEM files were reviewed and updated prior to development of the EGU component of the 2002 projected NEI. Emissions totals in the EGU records for both the 1996 and surrogate 2002 WRAP inventories were compared to see that all emission updates were included.

B. COPPER SMELTERS

There are six primary copper smelters in the GCVTC States whose SO₂ emissions are addressed individually and collectively in the Annex. The 2002 SO₂ emission estimates for these facilities were obtained from the companies that own and operate these smelters. Because emissions data for the Kennecott-Salt Lake smelter were not provided, the 2002 estimates for that facility are based on 2000 calendar year operations. Facility-specific SO₂ emission estimates used in the 2002 inventory are listed below. Note that the Kennecott-Salt Lake SO₂ emission estimate below is a smelter-only value. Power boiler emissions are accounted for separately.

<u>State</u>	<u>Smelter</u>	<u>Annual SO₂ Emissions (tons)</u>
Arizona	Asarco-Hayden	17,582
Arizona	BHP-San Manuel	0
Arizona	Phelps Dodge-Miami	5,567
New Mexico	Phelps Dodge-Chino	0
New Mexico	Phelps Dodge-Hidalgo	0
Utah	Kennecott-Salt Lake	<u>937</u>
	Total Copper Smelter	24,086

C. NON-UTILITIES (NON-SMELTERS)

The base year for the 2002 emissions forecast was 1996 WRAP version 3 point source inventory that was revised from the 1996 WRAP point source database since its original development by Pacific Environmental Services, Inc. (PES) in 2001. The 1996 Point source file used in this analysis had the file name “Wrap96pointv3_022803.dbf” and was retrieved from the WRAPAIR website.

1. Year of Initial Operation Analyses

Pechan used the Initial Date of Operation data from 2018 emissions forecast (Pechan, 2002c). This initial year of operation is used along with estimated unit lifetimes to estimate when each facility reaches its life expectancy. It is assumed that once a facility reaches its life expectancy, it is

retired and replaced with a new facility/unit, at the same location, but equipped with new control technology that meets New Source Performance Standards (NSPS)/best available control technology (BACT) emission limits for that source category and location.

2. New Source Technology Analysis

The IAS model that was developed for the GCVTC study, with some updates since the original study to incorporate more detail for certain source categories, provides the basic logic and algorithms that are used in this project to develop a 2002 emissions forecast. However, the IAS model uses a 1990 inventory as a base, and then makes every 10 year forecasts through 2040. The objective in this project is to make a 2002 emissions forecast from a 1996 base. The IAS algorithms and structure were therefore adapted to forecast 2002 emissions. The retirement rates were adjusted to 1996 base to project the 2002 emissions. Six (6) year retirement rates were calculated from values developed for 2018 forecast (Pechan, 2002c).

SO₂ emissions for the top 100 emitting SO₂ facilities were estimated using the year 2000 facility-level emission estimates from the milestone report. In other words, the IAS model-estimated 2002 values for SO₂ were replaced with actual 2000 SO₂ emission estimates provided earlier by the State air pollution control agencies. In addition, for facilities that were indicated as shutdown/closed in either the milestone report, or the floor allocation report, the emissions of all pollutants at these facilities were set to zero (Pechan, 2002a).

EGAS growth factors were used to forecast the 2002 emissions from the 1996 base values. Detailed information on growth factors is discussed in section D below.

Example Calculation

The IAS model algorithms are applied to estimate 2002 emissions given the primary variables affecting emissions in that year, which are: 1996 emissions, unit date of initial operation, expected unit lifetime or retirement rate, new source control efficiency, and growth rates/factors. The base IAS algorithm for performing emission forecasts to 2002 at the unit level is shown in the equation below.

$$2002 \text{ Emissions} = 1996 \text{ Emissions} (1 - \text{Fraction Retired}) + 1996 \text{ Emissions} (\text{New Source Control Efficiency}) (\text{Growth Factor} - (1 - \text{Fraction Retired}))$$

Example calculations of 2002 emissions are provided below:

Example : Dakota Gasification Company - 1996 SO₂ emissions = 17,530.292 tpy
 Start Date: 1984
 Retirement Rate 2002: 0.125
 Growth Factor 2002 = 1.10083
 2002 Emissions = 17,530.292 tpy (1 - 0.125) + 17,530.292 tpy
 (1.10083-(1-0.125) (1-0))

2018 Emissions = 19,297.871 tpy

Table III-1 displays the 2002 State-level point source emissions by major source sector. The major source sectors in this instance are utilities, smelters, and other non-utility point sources.

Allocations among these three major sectors are performed using the EPA SCCs and IAS model source categories (SCC_Id).

D. GROWTH FACTORS

The purpose of this section is to document the 1996-2002 point source emission activity growth factors compiled for the 13 original WRAP States and the 9 Tier 1/Tier 2 States. The 1996-2002 growth factors were compiled from the 1996-2018 growth surrogate database developed to support the WRAP 2018 emission projections. The following provides an overview of the development of the 1996-2018 growth surrogate database. Further details on these data are available in the WRAP 2018 emission forecast report (Pechan, 2002c).

Table III-2 lists the IAS sector designations for which point source emission activity growth data were developed for this effort. For most source categories, the point source growth data were derived from industry sector constant dollar output projections compiled from regional economic models developed by Regional Economic Models, Inc. (REMI).

Growth factors for sectors 1 through 30, 32, 33, and 49 were based on constant dollar output data that correspond directly with REMI industry sectors. Sectors 54 and 61 through 65 represent composites of output data for individual REMI industry sectors. Sector 54 is a weighted average composite of REMI industry sectors and was weighted by the constant dollar output in each sector (i.e., the growth factors were calculated from the summation of the REMI constant dollar output data for the identified industry sectors). Industrial fuel combustion growth factors (sectors 61-65), were calculated by compiling data for each of the relevant REMI sectors, multiplying the data for these sectors by the weights provided in the IAS User's Guide (DFI, 1995), summing across sectors, and then applying a -0.5 percent per year energy adjustment factor. Sector 58, which was applied to copper smelter-related emission sectors, represents a no growth assumption. In addition, oil and gas production sector (IASCode 22) growth factors were developed from the smaller of (1) the REMI Mining sector output projection growth rate and (2) the U.S. Department of Energy (DOE)'s oil and gas production projection growth rate.

Growth surrogate data for the IAS sectors in Table III-2 were compiled from contacts with States, REMI economic models incorporated into Version 4.0 of EGAS (Pechan, 2001), and DOE's *Annual Energy Outlook 2001* (DOE, 2000). Each of the 13 original WRAP States and the 9 Tier 1/Tier 2 States were contacted to request the constant dollar output data identified in Table III-2. With a few exceptions, all data that were supplied by the States were used in this effort. The WRAP 2018 emission projections report provides further details on the State data that were supplied and incorporated into the 1996-2018 growth factor data set (Pechan, 2001). Although growth factors were developed at the county-level, in most cases, these factors do not differ within a State. This limitation results from the level of geographic detail available from DOE's *Annual*

Energy Outlook 2001 and the REMI economic models incorporated into EGAS. The DOE data are supplied at the Census Division level, while the REMI economic models are generally defined by State boundaries. However, some of the EGAS 4.0 REMI economic models

Table III-1. Emissions Summary by Sectors – 22 States

No.	Sectors	State Name	FIPSST	2002 Emissions							1996 Emissions						
				VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	NH ₃	VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	NH ₃
1	Utility	Arizona	04	712	85,062	5,661	70,692	5,750	2,848	18	491	76,099	4,570	121,908	3,572	1,764	18
1	Utility	Arkansas	05	563	50,571	4,449	95,427	2,026	1,329	60	563	50,571	4,449	95,427	2,026	1,329	60
1	Utility	California	06	1,081	13,206	11,476	624	155	142	492	1,029	12,994	11,072	1,752	79	77	492
1	Utility	Colorado	08	611	74,135	8,469	89,862	2,778	1,668	8	391	81,799	4,507	92,301	2,798	1,808	8
1	Utility	Iowa	19	573	80,976	5,185	158,556	3,303	1,898	11	573	80,976	5,185	158,556	3,303	1,898	11
1	Utility	Kansas	20	724	95,497	5,584	117,126	5,154	2,529	40	1,163	95,876	5,870	117,128	5,164	2,538	40
1	Utility	Louisiana	22	1,344	78,592	11,468	101,221	3,133	1,938	632	1,406	78,877	12,006	101,221	3,130	1,935	602
1	Utility	Minnesota	27	639	91,514	5,878	87,643	4,936	2,364	13	647	91,617	5,904	87,646	4,942	2,369	13
1	Utility	Missouri	29	1,285	186,762	8,530	364,493	6,012	2,831	17	1,302	187,052	8,605	364,509	6,027	2,845	17
1	Utility	Montana	30	677	35,326	2,722	21,874	5,279	2,652	37	623	25,679	2,098	18,368	4,181	2,086	37
1	Utility	Nebraska	31	407	48,748	2,616	65,764	1,655	999	5	420	48,837	2,688	65,766	1,665	1,008	5
1	Utility	Nevada	32	342	44,498	3,147	49,231	2,611	1,699	47	316	44,013	2,658	50,146	7,283	7,283	47
1	Utility	New Mexico	35	1,548	78,607	7,357	50,996	7,889	4,604	49	1,512	73,531	8,653	72,754	7,308	2,072	49
1	Utility	North Dakota	38	867	76,227	7,213	141,567	3,467	1,989	9	822	106,578	9,582	177,617	3,590	2,088	9
1	Utility	Oklahoma	40	1,010	87,990	9,883	106,592	2,334	1,631	196	1,085	88,213	10,130	106,593	2,332	1,628	196
1	Utility	Oregon	41	62	8,406	523	12,280	274	187	0	31	4,201	265	5,525	108	74	0
1	Utility	South Dakota	46	18	15,708	97	12,470	13	8	1	77	17,209	366	14,801	53	38	1
1	Utility	Texas	48	7,349	407,000	81,944	666,285	22,885	16,432	1,645	7,512	425,423	84,476	666,433	22,724	16,270	1,645
1	Utility	Utah	49	449	71,413	3,728	32,132	2,658	1,087	3	273	64,484	3,353	28,582	2,678	1,044	3
1	Utility	Washington	53	219	16,463	3,062	19,310	2,129	1,474	0	170	19,182	1,455	78,406	3,106	2,136	0
1	Utility	Wyoming	56	772	85,300	6,423	84,022	6,992	4,682	0	743	86,227	6,812	86,130	12,526	7,826	0
				21,250	1,731,999	195,415	2,348,168	91,435	54,989	3,283	21,149	1,759,435	194,703	2,511,567	98,595	60,116	3,255
2	Smelters	Arizona	04	231	1,345	407	23,149	2,401	1,340	0	231	1,346	407	55,539	2,446	1,361	0
2	Smelters	New Mexico	35	7	758	105	0	1,375	271	0	6	753	90	46,930	1,424	280	0
2	Smelters	Utah	49	7	181	67	937	380	148	33	7	170	59	1,555	404	156	30
				246	2,285	578	24,086	4,155	1,759	34	244	2,268	555	104,024	4,273	1,797	30
3	ALL Others	Arizona	04	6,958	32,690	16,917	4,323	12,486	3,982	2	5,934	30,763	13,969	3,498	10,314	3,424	2
3	ALL Others	Arkansas	05	15,297	21,906	103,751	15,510	30,272	17,663	17,596	14,300	21,869	97,341	16,669	29,829	17,995	14,971
3	ALL Others	California	06	79,010	85,272	98,068	41,087	34,594	19,498	18,037	68,535	121,850	85,325	42,338	30,057	17,459	14,812
3	ALL Others	Colorado	08	38,214	46,677	32,668	10,727	18,926	10,964	215	37,399	48,752	29,817	14,036	17,134	10,135	238

			2002 Emissions								1996 Emissions							
3	ALL Others	Idaho	16	426	6,453	4,917	24,288	9,941	5,849	2	482	6,292	4,522	22,438	12,976	8,035	2	
3	ALL Others	Iowa	19	11,015	26,660	7,658	76,161	8,784	4,864	9,570	10,514	25,335	6,539	84,938	8,030	4,416	8,111	
3	ALL Others	Kansas	20	27,026	100,009	76,170	12,199	10,480	8,260	14,193	25,385	99,433	75,887	14,064	9,468	7,363	12,552	
3	ALL Others	Louisiana	22	130,994	261,521	654,050	149,577	34,360	25,702	64,171	125,864	270,378	688,607	161,236	34,178	25,755	62,195	
3	ALL Others	Minnesota	27	39,377	80,417	77,355	36,360	81,960	36,794	1,016	38,491	78,225	76,722	39,421	77,012	34,321	993	
3	ALL Others	Missouri	29	66,930	30,931	118,941	113,252	50,526	19,251	25,747	58,892	27,314	98,522	118,128	43,358	16,562	21,868	
3	ALL Others	Montana	30	7,061	16,988	48,949	25,209	10,331	5,586	342	7,059	16,839	46,455	27,557	10,185	5,549	368	
3	ALL Others	Nebraska	31	11,314	13,227	13,446	7,093	8,022	3,142	15	10,801	12,696	11,245	6,537	7,312	2,859	14	
3	ALL Others	Nevada	32	1,571	5,699	14,101	784	1,562	1,045	8	1,519	4,953	11,434	1,543	1,403	935	7	
3	ALL Others	New Mexico	35	16,655	65,534	33,614	34,898	1,287	511	38	14,978	72,846	29,669	40,072	1,594	692	33	
3	ALL Others	North Dakota	38	584	10,944	6,848	59,425	1,921	1,308	14	576	12,300	6,422	60,633	1,834	1,237	13	
3	ALL Others	Oklahoma	40	60,658	119,504	219,080	30,969	10,006	5,931	19,003	55,864	120,741	210,935	34,358	9,551	5,861	16,418	
3	ALL Others	Oregon	41	17,826	20,999	81,516	7,482	11,135	8,124	16	16,129	21,144	73,864	4,363	10,639	7,817	15	
3	ALL Others	South Dakota	46	1,332	4,320	0	377	742	390	0	1,309	4,404	0	1,276	853	447	0	
3	ALL Others	Texas	48	281,165	344,257	402,828	275,986	36,628	24,976	1,400	265,401	494,943	386,390	295,610	35,149	24,326	1,262	
3	ALL Others	Utah	49	9,763	22,838	37,572	10,999	11,754	7,320	1,081	9,109	22,172	32,998	13,809	10,529	6,589	1,092	
3	ALL Others	Washington	53	21,741	37,999	179,300	38,210	9,453	6,803	4,991	21,072	37,311	169,610	41,954	9,351	6,754	4,618	
3	ALL Others	Wyoming	56	23,547	41,954	52,588	40,103	19,010	11,215	1,056	22,716	45,326	51,015	42,295	20,039	11,785	1,050	
				868,465	1,396,802	2,280,336	1,015,020	414,183	229,178	178,515	812,328	1,595,885	2,207,289	1,086,773	390,794	220,317	160,633	
				889,961	3,131,085	2,476,329	3,387,274	509,773	285,926	181,832	833,722	3,357,588	2,402,547	3,702,365	493,662	282,230	163,918	

Table III-2. IAS Point Source Growth Factor Designations

IASCode	Growth Factor Description
1	Lumber and wood products sector output
2	Furniture and fixtures sector output
3	Stone, clay, and glass products sector output
4	Primary metal industries sector output
5	Fabricated metal products sector output
6	Nonelectrical machinery sector output
7	Electric and electronic equipment sector output
8	Motor vehicles and equipment sector output
9	Transportation equipment except motor vehicles sector output
10	Instruments and related products sector output
11	Miscellaneous manufacturing industries sector output
12	Food and kindred products sector output
13	Tobacco manufacturing sector output
14	Textile mill products sector output
15	Apparel and other textile products sector output
16	Paper and allied products sector output
17	Printing and publishing sector output
18	Chemical and allied products sector output
19	Petroleum and coal products sector output
20	Rubber and miscellaneous plastic products sector output
21	Leather and leather products sector output
22	Mining sector output or DOE oil and gas production projections
23	Construction sector output
24	Railroad transportation sector output
25	Trucking and warehousing sector output
26	Local and interurban passenger transit sector output
27	Air transportation sector output
28	Other transportation and transportation services sector output
29	Communication sector output
30	Electric, gas, and sanitary services sector output
32	Insurance sector output
33	Brokers, credit, and other investment sector output
49	Agricultural services, forestry, fisheries, and other sector output
54	Weighted average across IASCodes 1-30 (total output of IASCodes 1-30)
58	Constant over time (no growth)
61	Weighted average of IASCodes 10-13 (0.646), 20 (0.113), 24 (0.038), 26 (0.074), 28 (0.002), 33 (0.004), & 49 (0.123) with energy intensity adjustment (-0.5 per year) applied
62	Weighted average of IASCodes 10-13 (0.122), 20 (0.033), 24 (0.001), 26 (0.039), 28 (0.292), 29 (0.239), 32 (0.002), 33 (0.057), & 49 (0.214) with energy intensity adjustment (-0.5 per year) applied
63	Weighted average of IASCodes 10-13 (0.012), 20 (0.034), 24 (0.006), 26 (0.717), 28 (0.022), 29 (0.175), 32 (0.002), & 49 (0.031) with energy intensity adjustment (-0.5 per year) applied
64	Weighted average of IASCodes 10-13 (0.011), 20 (0.001), 24 (0.004), 28 (0.127), 29 (0.071), 32 (0.786), & 49 (0.001) with energy intensity adjustment (-0.5 per year) applied
65	Weighted average of IASCodes 20 (0.014), 24 (0.598), 26 (0.252), & 49 (0.136) with energy intensity adjustment (-0.5 per year) applied

are defined by ozone nonattainment area boundaries. In addition, some States provided county-level data that were incorporated into the growth surrogate database. Pechan calculated the 1996-2002 point source growth factors for this effort from the 1996-2018 growth surrogate database compiled to support the WRAP 2018 emission forecasts. The 1996-2002 growth factors were computed by dividing 2002 growth surrogate values by 1996 growth surrogate values.

Because the IAS uses SCC_IDs to aggregate SCCs into similar emission processes, the growth factor sectors identified in Table III-2 were linked to point SCCs in the 1996 WRAP inventory based on the point SCC to SCC_ID assignments developed in performing the WRAP 2018 emission projections (Pechan, 2002c). Table III-3 displays the link between each growth factor sector and the point source SCC_ID. The SCC to SCC_ID crosswalk that was used in the WRAP 2018 emission forecast was also used in this effort because both forecasts are derived from the same 1996 base year inventory.

**Table III-3. Match Between Growth Factor Sectors (IASCodes)
and Point Source SCC_IDs**

IASCode	SCC_ID	SCC_ID Description
3	ptnmpuc	Nonmetallic Minerals Processing (Cement, Glass, Lime, etc.)
4	ptcokeuc	Coke Oven Plants
4	ptpmtpuc	Primary Metal Production (Steel, Molybdenum, Titanium, Aluminum Ore)
4	ptsmtpuc	Secondary Metal Production
16	ptkrftuc	Sulfate (Kraft) Pulping
18	inchem	Industrial Chemicals and Allied Products
18	ptescluc	Sulfur Recovery Plant--Elemental Sulfur Production (Claus: 2 Stage w/o Control (92-95% Removal))
18	ptescluc	Sulfur Recovery Plant--Elemental Sulfur Production (Claus: 3 Stage w/o Control (95-96% Removal))
18	ptincmuc	Inorganic Chemical Manufacture
18	ptsapluc	Sulfuric Acid Plant--Contact Absorber (99.9% Conversion)
18	ptsap2uc	Sulfuric Acid Plant--Contact Absorber (99% Conversion)
18	ptsap3uc	Sulfuric Acid Plant--Contact Absorber (98% Conversion)
18	ptsap4uc	Sulfuric Acid Plant--Contact Absorber (97% Conversion)
18	ptsec3uc	Sulfur Recovery Plant--Elemental Sulfur Production (Claus: 3 Stage w/o Control (96-97% Removal))
18	ptsencuc	Sulfur Recovery Plant--Elemental Sulfur Production (Not Classified)
18	ptsrmpuc	Sulfur Recovery Plant--Sulfur Removal Process (99.9% Removal)
19	inagpe	Industrial All Gasoline Processes
19	inpepr	Industrial Petroleum Process Fuel Use
19	inpere	Industrial Petroleum Refineries
19	ptrfnruc	Refinery Sources (Process Heaters, TCCUs, etc.)
22	ingspr	Industrial Natural Gas Production Other
22	inngfl	Industrial Natural Gas Production, Flares
22	inngsw	Industrial Natural Gas Production, Gas Sweetening
22	inoipr	Industrial Oil Production
22	ptprhtuc	Process Heaters
30	utcoal	Utility Coal Combustion
30	utcogn	Utility Cogeneration
30	utliqu	Utility Liquid Fuels
30	utngas	Utility Gas Combustion
30	utngre	Utility Natural Gas Reciprocating
30	utrenw	Utility Renewables Combustion
30	utturbng	Utility Natural Gas Turbine
30	utturboi	Utility Oil-Fired Turbine
54	insolv	Industrial Solvent Use
54	pticibuc	Industrial, Commercial, & Institutional Boilers
54	ptothrnc	Other Point Sources With No Control
58	incop2	Industrial Copper Smelters - Fugitive
58	incopp	Industrial Copper Smelters - Captured
61	incobo	Industrial Coal Boilers

IASCCode	SCC_ID	SCC_ID Description
61	incochp	Industrial Boiler--Cogen. Coal
62	incoboil	Industrial CO Boiler--Natural Gas
62	ingbo	Industrial Natural Gas Boilers
62	ingchp	Industrial Boiler--Cogen.--Natural or Process Gas
62	ingcm	Industrial Natural Gas Production, Compressors
62	ingre	Industrial Natural Gas Reciprocating
62	inturbng	Industrial Natural Gas Turbine
63	inoibo	Industrial Oil Boilers
63	inturboi	Industrial Oil-Fired Turbine
64	inothr	Industrial Other Combustion
65	inwobo	Industrial Wood Boilers

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IV. AREA SOURCE METHODS DESCRIPTIONS

For this analysis, area sources include all source categories traditionally inventoried as area sources by the States, with the following exceptions: highway vehicles, nonroad engines/vehicles, dust from either paved or unpaved roads, or emissions from wildfire, prescribed burning, and agricultural burning.

A. GROWTH FACTORS

This section describes the 1999-2002 area source emission activity growth factors compiled for the 13 original WRAP States and the 9 Tier 1/Tier 2 States. The 1999-2002 growth factors were compiled from the 1996-2018 growth surrogate database developed earlier to support the WRAP 2018 emission projections. The following provides an overview of the development of the 1996-2018 growth surrogate database. Further details on these data are available in the WRAP 2018 emission forecast report (Pechan, 2002c).

Table IV-1 lists the IAS sector designations for which area source emission activity growth data were developed for this effort. For most source categories, the area source growth data were derived from industry sector constant dollar output, population, and personal income projections compiled from regional economic models developed by REMI.

Growth factors for sectors 1 through 49 are based on constant dollar output data that correspond directly with REMI industry sectors. Sector 53 growth factors were developed from the national number of cattle, hogs, and pigs as projected by the U.S. Department of Agriculture (USDA, 2001). Sectors 54, 55, and 61 through 65 represent composites of output data for individual REMI industry sectors. Sectors 54 and 55 are weighted average composites of REMI industry sectors and were weighted by the constant dollar output in each sector (i.e., the growth factors were calculated from the summation of the REMI constant dollar output data for the identified industry sectors). Industrial fuel combustion growth factors (sectors 61-65), were calculated by compiling data for each of the relevant REMI sectors, multiplying the data for these sectors by the weights provided in the IAS User's Guide (DFI, 1995), summing across sectors, and then applying a -0.5 percent per year energy adjustment factor. Sector 56 growth factors were developed as the average of each area's population and personal income growth factors. Sector 58 represents a no growth assumption, and the sector 59 growth factor is based on population forecasts. In addition, oil and gas production sector (IASCode 22) growth factors are based on the smaller of: (1) the REMI Mining sector output projection growth rate, and (2) DOE's oil and gas production projection growth rate.

Growth surrogate data for the IAS sectors in Table IV-1 were compiled from contacts with States, REMI economic models incorporated into Version 4.0 of EGAS (Pechan, 2001), and DOE's

Annual Energy Outlook 2001 (DOE, 2000). Each of the 13 original WRAP States and the 9 Tier 1/Tier 2 States were contacted to request the constant dollar output, population, and personal income data identified in Table IV-1. With a few exceptions, all data that were supplied by the States were used in this effort. The WRAP 2018 emission projections report provides

Table IV-1. IAS Area Source Growth Factor Designations

IASCode	Growth Factor Description
1	Lumber and wood products sector output
2	Furniture and fixtures sector output
3	Stone, clay, and glass products sector output
4	Primary metal industries sector output
5	Fabricated metal products sector output
6	Nonelectrical machinery sector output
7	Electric and electronic equipment sector output
8	Motor vehicles and equipment sector output
9	Transportation equipment except motor vehicles sector output
10	Instruments and related products sector output
11	Miscellaneous manufacturing industries sector output
12	Food and kindred products sector output
13	Tobacco manufacturing sector output
14	Textile mill products sector output
15	Apparel and other textile products sector output
16	Paper and allied products sector output
17	Printing and publishing sector output
18	Chemical and allied products sector output
19	Petroleum and coal products sector output
20	Rubber and miscellaneous plastic products sector output
21	Leather and leather products sector output
22	Mining sector output or DOE oil and gas production projections
23	Construction sector output
24	Railroad transportation sector output
25	Trucking and warehousing sector output
26	Local and interurban passenger transit sector output
27	Air transportation sector output
28	Other transportation and transportation services sector output
29	Communication sector output
30	Electric, gas, and sanitary services sector output
31	Banking sector output
32	Insurance sector output
33	Brokers, credit, and other investment sector output
34	Real estate sector output
35	Eating and drinking places sector output
36	Other retail trade sector output
37	Wholesale trade sector output
38	Hotels and other lodging places sector output

IASCode	Growth Factor Description
39	Personal and repair services sector output
40	Private households sector output
41	Auto repair, services, and garage sector output
42	Miscellaneous business services sector output
43	Amusement and recreation services not elsewhere classified sector output
44	Motion pictures sector output
45	Medical and other health services sector output
46	Legal and miscellaneous services sector output
47	Private educational services sector output
48	Nonprofit membership organizations and museums sector output
49	Agricultural services, forestry, fisheries, and other sector output
53	Total projected count of cattle, hogs, and pigs
54	Weighted average across IASCodes 1-30 (total output of IASCodes 1-30)
55	Weighted average across IASCodes 31-48 (total output of IASCodes 31-48)
56	Average of population and personal income growth factors
58	Constant over time (no growth)
59	Population
61	Weighted average of IASCodes 10-13 (0.646), 20 (0.113), 24 (0.038), 26 (0.074), 28 (0.002), 33 (0.004), & 49 (0.123) with energy intensity adjustment (-0.5 per year) applied
62	Weighted average of IASCodes 10-13 (0.122), 20 (0.033), 24 (0.001), 26 (0.039), 28 (0.292), 29 (0.239), 32 (0.002), 33 (0.057), & 49 (0.214) with energy intensity adjustment (-0.5 per year) applied
63	Weighted average of IASCodes 10-13 (0.012), 20 (0.034), 24 (0.006), 26 (0.717), 28 (0.022), 29 (0.175), 32 (0.002), & 49 (0.031) with energy intensity adjustment (-0.5 per year) applied
64	Weighted average of IASCodes 10-13 (0.011), 20 (0.001), 24 (0.004), 28 (0.127), 29 (0.071), 32 (0.786), & 49 (0.001) with energy intensity adjustment (-0.5 per year) applied
65	Weighted average of IASCodes 20 (0.014), 24 (0.598), 26 (0.252), & 49 (0.136) with energy intensity adjustment (-0.5 per year) applied

further details on the State data that were supplied and incorporated into the 1996-2018 growth factor data set (Pechan, 2001). Although growth factors were developed at the county-level, in most cases, these factors do not differ within a State. This limitation results from the level of geographic detail available from DOE's *Annual Energy Outlook 2001* and the REMI economic models incorporated into EGAS. The DOE data are supplied at the Census Division level, while the REMI economic models are generally defined by State boundaries. However, some of the EGAS 4.0 REMI economic models are defined by ozone nonattainment area boundaries. In addition, some States provided county-level data that were incorporated into the growth surrogate database. Pechan calculated the 1999-2002 area source growth factors for this effort from the 1996-2018 growth surrogate database compiled to support the WRAP 2018 emission forecasts. The 1999-2002 growth factors were computed by dividing 2002 growth surrogate values by 1999 growth surrogate values.

Because the IAS uses SCC_IDs to aggregate SCCs into similar emission processes, the growth factor sectors identified in Table IV-1 were linked to area SCCs in the 1999 NEI using the area SCC to SCC_ID assignments developed in performing the WRAP 2018 emission projections (Pechan, 2002c). New area SCCs (i.e., NEI SCCs that were not in the 1996 base year inventory used in the WRAP 2018 emission forecast) were identified and assigned to an existing SCC_ID based on similarities in the emission process. Table IV-2 displays the link between each growth factor sector and area source SCC_IDs. Table IV-3 presents the crosswalk between area SCCs and SCC_IDs that was used to project 1999 area source emissions to 2002.

B. APPLICATION

The base year for the 2002 emissions forecast was the 1999 NEI version 3 file from EPA. Data processing steps included removing the non-western States from the 1999 area source emissions file, as well as removing the area source categories whose interim 2002 emissions are being covered elsewhere (on-road, non-road, and fire). Identifying on-road and non-road area source categories to remove was straightforward. Performing the same operation for fire source categories required some judgment, so the procedure used is described below. In general, we excluded emissions from wildfires, prescribed burns, or agricultural burns.

The relevant area source SCC codes begin with 28015 for agricultural production-crops and 28100 for other combustion.

Of these area source SCCs, we excluded all of the SCCs beginning with 28015 from this area source file, except for orchard heaters. There are 4 SCCs with orchard heater emissions.

For the SCCs that represent other combustion, we excluded the following from the area source file:

2810001000 Forest wildfires
2810005000 Managed burning, slash (logging debris)

2810015000 Prescribed burning for forest management

**Table IV-2. Match Between Growth Factor Sectors (IASCodes)
and Area Source SCC_IDs**

IASCode	SCC_ID	SCC_ID Description
19	aigaspuc	All Gasoline Processes With Unknown Control
22	aiogpruc	Oil & Gas Production, Natural Gas With Unknown Control
53	aragpruc	Agricultural Production - Livestock With Unknown Control
54	aisolvuc	Industrial Solvents With Unknown Control
55	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
56	arfiluc	Landfills With Unknown Control
56	arrsoluc	Misc. Consumer Solvent Use With Unknown Control
56	arsarcuc	Architectural Surface Coating With Unknown Control
56	arrwoduc	Residential Wood Combustion With Unknown Control
58	armisanc	Miscellaneous Area Source With No Control
58	arothrnc	Other Area Sources With No Control
59	arobrnuc	Open Burning With Unknown Control
61	aicobouc	Bituminous & Pulverized Coal Boilers With Unknown Control
62	aingbouc	Natural Gas, Total: Boilers & IC Engine With Unknown Control
63	aioibouc	Distillate Oil, Total: Boilers & IC With Unknown Control

Table IV-3. Match Between Area SCCs and SCC_IDs

SCC	SCC_ID	SCC_ID Description
2101006000	aingbouc	Natural Gas, Total: Boilers & IC Engine With Unknown Control
2102002000	aicobouc	Bituminous & Pulverized Coal Boilers With Unknown Control
2102004000	aioibouc	Distillate Oil, Total: Boilers & IC With Unknown Control
2102005000	aioibouc	Distillate Oil, Total: Boilers & IC With Unknown Control
2102006000	aingbouc	Natural Gas, Total: Boilers & IC Engine With Unknown Control
2102006002	aingbouc	Natural Gas, Total: Boilers & IC Engine With Unknown Control
2102007000	armisanc	Miscellaneous Area Source With No Control
2102008000	armisanc	Miscellaneous Area Source With No Control
2102011000	aicobouc	Bituminous & Pulverized Coal Boilers With Unknown Control
2103001000	armisanc	Miscellaneous Area Source With No Control
2103002000	armisanc	Miscellaneous Area Source With No Control
2103004000	armisanc	Miscellaneous Area Source With No Control
2103005000	armisanc	Miscellaneous Area Source With No Control
2103006000	armisanc	Miscellaneous Area Source With No Control
2103007000	armisanc	Miscellaneous Area Source With No Control
2103008000	armisanc	Miscellaneous Area Source With No Control
2103011000	armisanc	Miscellaneous Area Source With No Control
2104001000	armisanc	Miscellaneous Area Source With No Control
2104002000	armisanc	Miscellaneous Area Source With No Control
2104004000	armisanc	Miscellaneous Area Source With No Control
2104005000	armisanc	Miscellaneous Area Source With No Control
2104006000	armisanc	Miscellaneous Area Source With No Control
2104006010	armisanc	Miscellaneous Area Source With No Control
2104007000	armisanc	Miscellaneous Area Source With No Control
2104008000	arrwodic	Residential Wood Combustion With Unknown Control
2104008001	arrwodic	Residential Wood Combustion With Unknown Control
2104008002	arrwodic	Residential Wood Combustion With Unknown Control
2104008003	arrwodic	Residential Wood Combustion With Unknown Control
2104008004	arrwodic	Residential Wood Combustion With Unknown Control
2104008010	arrwodic	Residential Wood Combustion With Unknown Control
2104008030	arrwodic	Residential Wood Combustion With Unknown Control
2104008050	arrwodic	Residential Wood Combustion With Unknown Control
2104008051	arrwodic	Residential Wood Combustion With Unknown Control
2104008052	arrwodic	Residential Wood Combustion With Unknown Control
2104008053	arrwodic	Residential Wood Combustion With Unknown Control
2104011000	armisanc	Miscellaneous Area Source With No Control

SCC	SCC_ID	SCC_ID Description
2199001000	aicobouc	Bituminous & Pulverized Coal Boilers With Unknown
2199004000	armisanc	Miscellaneous Area Source With No Control
2199004002	aioibouc	Distillate Oil, Total: Boilers & IC With Unknown Control
2199011000	armisanc	Miscellaneous Area Source With No Control
2301000000	armisanc	Miscellaneous Area Source With No Control
2301010000	armisanc	Miscellaneous Area Source With No Control
2301010010	armisanc	Miscellaneous Area Source With No Control
2301020000	armisanc	Miscellaneous Area Source With No Control
2301030000	armisanc	Miscellaneous Area Source With No Control
2301040000	armisanc	Miscellaneous Area Source With No Control
2302000000	armisanc	Miscellaneous Area Source With No Control
2302002000	armisanc	Miscellaneous Area Source With No Control
2302003000	armisanc	Miscellaneous Area Source With No Control
2302050000	armisanc	Miscellaneous Area Source With No Control
2302070001	armisanc	Miscellaneous Area Source With No Control
2302070005	armisanc	Miscellaneous Area Source With No Control
2302080000	armisanc	Miscellaneous Area Source With No Control
2303000000	armisanc	Miscellaneous Area Source With No Control
2304000000	armisanc	Miscellaneous Area Source With No Control
2305000000	armisanc	Miscellaneous Area Source With No Control
2305070000	armisanc	Miscellaneous Area Source With No Control
2305080000	armisanc	Miscellaneous Area Source With No Control
2306000000	armisanc	Miscellaneous Area Source With No Control
2306010000	armisanc	Miscellaneous Area Source With No Control
2307000000	armisanc	Miscellaneous Area Source With No Control
2307060000	armisanc	Miscellaneous Area Source With No Control
2308000000	armisanc	Miscellaneous Area Source With No Control
2309000000	armisanc	Miscellaneous Area Source With No Control
2310000000	aioqpruc	Oil & Gas Production, Petroleum With Unknown Control
2310010000	aioqpruc	Oil & Gas Production, Petroleum With Unknown Control
2310020000	aioqpruc	Oil & Gas Production, Petroleum With Unknown Control
2310030000	aioqpruc	Oil & Gas Production, Petroleum With Unknown Control
2311000100	armisanc	Miscellaneous Area Source With No Control
2311010000	armisanc	Miscellaneous Area Source With No Control
2311010070	armisanc	Miscellaneous Area Source With No Control
2311020000	armisanc	Miscellaneous Area Source With No Control
2311030000	armisanc	Miscellaneous Area Source With No Control
2312000000	armisanc	Miscellaneous Area Source With No Control
2325000000	armisanc	Miscellaneous Area Source With No Control
2325030000	armisanc	Miscellaneous Area Source With No Control

SCC	SCC_ID	SCC_ID Description
2399000000	armisanc	Miscellaneous Area Source With No Control
2401001000	arsarcuc	Architectural Surface Coating With Unknown Control
2401001999	arsarcuc	Architectural Surface Coating With Unknown Control
2401002000	arsarcuc	Architectural Surface Coating With Unknown Control
2401003000	arsarcuc	Architectural Surface Coating With Unknown Control
2401005000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401008000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401008030	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401008999	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401010000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401015000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401015999	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401020000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401025000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401030000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401035000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401035999	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401040000	aisolvuc	Industrial Solvents With Unknown Control
2401045000	aisolvuc	Industrial Solvents With Unknown Control
2401050000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401055000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401055999	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401060000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401065000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401065999	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401070000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401075000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401075999	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401080000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401085000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401090000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401100000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2401200000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2415000000	aisolvuc	Industrial Solvents With Unknown Control
2415000999	aisolvuc	Industrial Solvents With Unknown Control
2415005000	aisolvuc	Industrial Solvents With Unknown Control
2415005999	aisolvuc	Industrial Solvents With Unknown Control
2415010000	aisolvuc	Industrial Solvents With Unknown Control
2415010999	aisolvuc	Industrial Solvents With Unknown Control
2415020000	aisolvuc	Industrial Solvents With Unknown Control

SCC	SCC_ID	SCC_ID Description
2415020999	aisolvuc	Industrial Solvents With Unknown Control
2415025000	aisolvuc	Industrial Solvents With Unknown Control
2415025999	aisolvuc	Industrial Solvents With Unknown Control
2415030000	aisolvuc	Industrial Solvents With Unknown Control
2415030999	aisolvuc	Industrial Solvents With Unknown Control
2415035000	aisolvuc	Industrial Solvents With Unknown Control
2415035999	aisolvuc	Industrial Solvents With Unknown Control
2415040000	aisolvuc	Industrial Solvents With Unknown Control
2415040999	aisolvuc	Industrial Solvents With Unknown Control
2415045000	aisolvuc	Industrial Solvents With Unknown Control
2415045999	aisolvuc	Industrial Solvents With Unknown Control
2415050000	aisolvuc	Industrial Solvents With Unknown Control
2415050999	aisolvuc	Industrial Solvents With Unknown Control
2415055000	aisolvuc	Industrial Solvents With Unknown Control
2415055999	aisolvuc	Industrial Solvents With Unknown Control
2415060000	aisolvuc	Industrial Solvents With Unknown Control
2415060999	aisolvuc	Industrial Solvents With Unknown Control
2415065000	aisolvuc	Industrial Solvents With Unknown Control
2415065999	aisolvuc	Industrial Solvents With Unknown Control
2415100000	aisolvuc	Industrial Solvents With Unknown Control
2415100999	aisolvuc	Industrial Solvents With Unknown Control
2415105000	aisolvuc	Industrial Solvents With Unknown Control
2415105999	aisolvuc	Industrial Solvents With Unknown Control
2415110000	aisolvuc	Industrial Solvents With Unknown Control
2415110999	aisolvuc	Industrial Solvents With Unknown Control
2415120000	aisolvuc	Industrial Solvents With Unknown Control
2415120999	aisolvuc	Industrial Solvents With Unknown Control
2415125000	aisolvuc	Industrial Solvents With Unknown Control
2415125999	aisolvuc	Industrial Solvents With Unknown Control
2415130000	aisolvuc	Industrial Solvents With Unknown Control
2415130999	aisolvuc	Industrial Solvents With Unknown Control
2415135000	aisolvuc	Industrial Solvents With Unknown Control
2415135999	aisolvuc	Industrial Solvents With Unknown Control
2415140000	aisolvuc	Industrial Solvents With Unknown Control
2415140999	aisolvuc	Industrial Solvents With Unknown Control
2415145000	aisolvuc	Industrial Solvents With Unknown Control
2415145999	aisolvuc	Industrial Solvents With Unknown Control
2415150000	aisolvuc	Industrial Solvents With Unknown Control
2415150999	aisolvuc	Industrial Solvents With Unknown Control
2415155000	aisolvuc	Industrial Solvents With Unknown Control

SCC	SCC_ID	SCC_ID Description
2415155999	aisolvuc	Industrial Solvents With Unknown Control
2415160000	aisolvuc	Industrial Solvents With Unknown Control
2415160999	aisolvuc	Industrial Solvents With Unknown Control
2415165000	aisolvuc	Industrial Solvents With Unknown Control
2415165999	aisolvuc	Industrial Solvents With Unknown Control
2415200000	aisolvuc	Industrial Solvents With Unknown Control
2415205000	aisolvuc	Industrial Solvents With Unknown Control
2415210000	aisolvuc	Industrial Solvents With Unknown Control
2415220000	aisolvuc	Industrial Solvents With Unknown Control
2415225000	aisolvuc	Industrial Solvents With Unknown Control
2415230000	aisolvuc	Industrial Solvents With Unknown Control
2415235000	aisolvuc	Industrial Solvents With Unknown Control
2415240000	aisolvuc	Industrial Solvents With Unknown Control
2415245000	aisolvuc	Industrial Solvents With Unknown Control
2415250000	aisolvuc	Industrial Solvents With Unknown Control
2415255000	aisolvuc	Industrial Solvents With Unknown Control
2415265000	aisolvuc	Industrial Solvents With Unknown Control
2415300000	aisolvuc	Industrial Solvents With Unknown Control
2415300999	aisolvuc	Industrial Solvents With Unknown Control
2415305000	aisolvuc	Industrial Solvents With Unknown Control
2415305999	aisolvuc	Industrial Solvents With Unknown Control
2415310000	aisolvuc	Industrial Solvents With Unknown Control
2415310999	aisolvuc	Industrial Solvents With Unknown Control
2415320000	aisolvuc	Industrial Solvents With Unknown Control
2415320999	aisolvuc	Industrial Solvents With Unknown Control
2415325000	aisolvuc	Industrial Solvents With Unknown Control
2415325999	aisolvuc	Industrial Solvents With Unknown Control
2415330000	aisolvuc	Industrial Solvents With Unknown Control
2415330999	aisolvuc	Industrial Solvents With Unknown Control
2415335000	aisolvuc	Industrial Solvents With Unknown Control
2415335999	aisolvuc	Industrial Solvents With Unknown Control
2415340000	aisolvuc	Industrial Solvents With Unknown Control
2415340999	aisolvuc	Industrial Solvents With Unknown Control
2415345000	aisolvuc	Industrial Solvents With Unknown Control
2415345999	aisolvuc	Industrial Solvents With Unknown Control
2415350000	aisolvuc	Industrial Solvents With Unknown Control
2415350999	aisolvuc	Industrial Solvents With Unknown Control
2415355000	aisolvuc	Industrial Solvents With Unknown Control
2415355999	aisolvuc	Industrial Solvents With Unknown Control
2415360000	aisolvuc	Industrial Solvents With Unknown Control

SCC	SCC_ID	SCC_ID Description
2415360999	aisolvuc	Industrial Solvents With Unknown Control
2415365000	aisolvuc	Industrial Solvents With Unknown Control
2415365999	aisolvuc	Industrial Solvents With Unknown Control
2420000000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2420000055	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2420000370	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2420000999	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2420010000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2420010055	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2420010370	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2420010999	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2420020000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2420020055	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2425000000	aisolvuc	Industrial Solvents With Unknown Control
2425010000	aisolvuc	Industrial Solvents With Unknown Control
2425010055	aisolvuc	Industrial Solvents With Unknown Control
2425040000	aisolvuc	Industrial Solvents With Unknown Control
2430000000	arothrnc	Other Area Sources With No Control
2440000000	aisolvuc	Industrial Solvents With Unknown Control
2440020000	aisolvuc	Industrial Solvents With Unknown Control
2460000000	arrsoluc	Misc. Consumer Solvent Use With Unknown Control
2460100000	arrsoluc	Misc. Consumer Solvent Use With Unknown Control
2460110000	arrsoluc	Misc. Consumer Solvent Use With Unknown Control
2460120000	arrsoluc	Misc. Consumer Solvent Use With Unknown Control
2460130000	arrsoluc	Misc. Consumer Solvent Use With Unknown Control
2460150000	arrsoluc	Misc. Consumer Solvent Use With Unknown Control
2460160000	arrsoluc	Misc. Consumer Solvent Use With Unknown Control
2460180000	arrsoluc	Misc. Consumer Solvent Use With Unknown Control
2460190000	arrsoluc	Misc. Consumer Solvent Use With Unknown Control
2460200000	arrsoluc	Misc. Consumer Solvent Use With Unknown Control
2460220000	arrsoluc	Misc. Consumer Solvent Use With Unknown Control
2460400000	arrsoluc	Misc. Consumer Solvent Use With Unknown Control
2460500000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2460600000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2460610000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2460800000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2460900000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2461020000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2461021000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2461022000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control

SCC	SCC_ID	SCC_ID Description
2461023000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2461800000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2461850000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2465000000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2465100000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2465200000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2465400000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2465600000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2465800000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2465900000	arcsoluc	Misc. Commercial Solvent Use With Unknown Control
2495000000	arothrnc	Other Area Sources With No Control
2501000000	aigaspuc	All Gasoline Processes With Unknown Control
2501050000	aigaspuc	All Gasoline Processes With Unknown Control
2501050120	aigaspuc	All Gasoline Processes With Unknown Control
2501060000	aigaspuc	All Gasoline Processes With Unknown Control
2501060050	aigaspuc	All Gasoline Processes With Unknown Control
2501060052	aigaspuc	All Gasoline Processes With Unknown Control
2501060053	aigaspuc	All Gasoline Processes With Unknown Control
2501060100	aigaspuc	All Gasoline Processes With Unknown Control
2501060101	aigaspuc	All Gasoline Processes With Unknown Control
2501060102	aigaspuc	All Gasoline Processes With Unknown Control
2501060103	aigaspuc	All Gasoline Processes With Unknown Control
2501060200	aigaspuc	All Gasoline Processes With Unknown Control
2501060201	aigaspuc	All Gasoline Processes With Unknown Control
2501995000	aigaspuc	All Gasoline Processes With Unknown Control
2501995120	aigaspuc	All Gasoline Processes With Unknown Control
2505000120	aigaspuc	All Gasoline Processes With Unknown Control
2505010000	aigaspuc	All Gasoline Processes With Unknown Control
2505020000	aigaspuc	All Gasoline Processes With Unknown Control
2505020030	aigaspuc	All Gasoline Processes With Unknown Control
2505020060	aigaspuc	All Gasoline Processes With Unknown Control
2505020090	aigaspuc	All Gasoline Processes With Unknown Control
2505020120	aigaspuc	All Gasoline Processes With Unknown Control
2505020121	aigaspuc	All Gasoline Processes With Unknown Control
2505020150	aigaspuc	All Gasoline Processes With Unknown Control
2505030000	aigaspuc	All Gasoline Processes With Unknown Control
2505030120	aigaspuc	All Gasoline Processes With Unknown Control
2505030180	aigaspuc	All Gasoline Processes With Unknown Control
2515020000	armisanc	Miscellaneous Area Source With No Control
2601000000	armisanc	Miscellaneous Area Source With No Control

SCC	SCC_ID	SCC_ID Description
2601010000	armisanc	Miscellaneous Area Source With No Control
2601020000	armisanc	Miscellaneous Area Source With No Control
2610000100	armisanc	Miscellaneous Area Source With No Control
2610000300	armisanc	Miscellaneous Area Source With No Control
2610000400	armisanc	Miscellaneous Area Source With No Control
2610000500	armisanc	Miscellaneous Area Source With No Control
2610030000	arobrnuc	Open Burning With Unknown Control
2620000000	arlfiluc	Landfills With Unknown Control
2620030000	arlfiluc	Landfills With Unknown Control
2630000000	armisanc	Miscellaneous Area Source With No Control
2630020000	armisanc	Miscellaneous Area Source With No Control
2640000000	arothrnc	Other Area Sources With No Control
2640000004	arothrnc	Other Area Sources With No Control
2660000000	arothrnc	Other Area Sources With No Control
2801000000	armisanc	Miscellaneous Area Source With No Control
2801000003	armisanc	Miscellaneous Area Source With No Control
2801000005	armisanc	Miscellaneous Area Source With No Control
2801000008	armisanc	Miscellaneous Area Source With No Control
2801520000	armisanc	Miscellaneous Area Source With No Control
2801520004	armisanc	Miscellaneous Area Source With No Control
2801520010	armisanc	Miscellaneous Area Source With No Control
2801600000	armisanc	Miscellaneous Area Source With No Control
2801700001	armisanc	Miscellaneous Area Source With No Control
2801700002	armisanc	Miscellaneous Area Source With No Control
2801700003	armisanc	Miscellaneous Area Source With No Control
2801700004	armisanc	Miscellaneous Area Source With No Control
2801700005	armisanc	Miscellaneous Area Source With No Control
2801700006	armisanc	Miscellaneous Area Source With No Control
2801700007	armisanc	Miscellaneous Area Source With No Control
2801700008	armisanc	Miscellaneous Area Source With No Control
2801700009	armisanc	Miscellaneous Area Source With No Control
2801700010	armisanc	Miscellaneous Area Source With No Control
2805001000	aragpruc	Agricultural Production - Livestock With Unknown Control
2805005000	aragpruc	Agricultural Production - Livestock With Unknown Control
2805015000	aragpruc	Agricultural Production - Livestock With Unknown Control
2805020000	aragpruc	Agricultural Production - Livestock With Unknown Control
2805025000	aragpruc	Agricultural Production - Livestock With Unknown Control
2805030000	aragpruc	Agricultural Production - Livestock With Unknown Control
2805035000	aragpruc	Agricultural Production - Livestock With Unknown Control
2805040000	aragpruc	Agricultural Production - Livestock With Unknown Control

SCC	SCC_ID	SCC_ID Description
2805045001	aragpruc	Agricultural Production - Livestock With Unknown Control
2810010000	armisanc	Miscellaneous Area Source With No Control
2810025000	armisanc	Miscellaneous Area Source With No Control
2810030000	armisanc	Miscellaneous Area Source With No Control
2810050000	armisanc	Miscellaneous Area Source With No Control
2830000000	arothrnc	Other Area Sources With No Control
2999001001	arothrnc	Other Area Sources With No Control
2801501000	armisanc	Miscellaneous Area Source With No Control
2801502000	armisanc	Miscellaneous Area Source With No Control

The Other combustion area source SCCs that we retained in the area source file include:

2810003000 Cigarette smoke
2810010000 Human perspiration
2810025000 Charcoal grilling
2810030000 Structure fires
2810035000 Firefighter training
2810040000 Aircraft/rocket engine firing and testing
2810050000 Motor vehicle fires

WRAP and CENRAP States that submitted 1999 area source emissions data to EPA that are included in the 1999 NEI area source file, and hence, these 2002 emission estimates, are listed below.

California
Colorado
Colorado - Tribal (Ute)
Idaho
Kansas
New Mexico - Tribal (Laguna)
Oregon - Statewide, except for Washington County
Texas
Utah
Washington - Puget Sound

Area source emission estimates for the States in the modeling region not listed above are based on previous year's estimates (likely 1996) projected to 1999.

V. QUALITY CONTROL AND UNCERTAINTY ANALYSIS

For the point source 2002 emission estimates, the most certain values are those for the largest EGUs in the WRAP States, especially where emission estimates are based on ETS/CEM data. We also have a high level of confidence in the copper smelter SO₂ emission estimates. Estimates of emission levels for other sectors and other pollutants are more uncertain.

The approach used to estimate 2002 emissions for non-utility, non-smelter point sources does not account for all of the plant closures, new unit start-ups, and new installations of air pollution control equipment that have occurred since 1996. Complete information about these point source emission changes will not be available until States submit their 2002 point source files to the WRAP Emission Data Management System.

When the project work scope was developed, it was decided to limit the EGU emission updates to the WRAP States. This decision was made, in part, because it was found that for the first Tier of States east of the WRAP region (Nebraska, Kansas, Oklahoma, and Texas), only Texas had significant emission changes from 1996 to 2002. (And the Texas change was an emission reduction.) It appears that west Texas has about 20 percent of the generation in the State, and somewhat less than 20 percent of the SO₂ emissions. It is estimated that between 1996 and 2002, west Texas EGU emissions declined by 14,000 tpy SO₂ and 23,000 tpy NO_x. These are changes that are not captured in the current analysis.

Another work scope limiting decision was to not incorporate some changes to the 1996 point source emissions inventory for New Mexico that were received by the Emissions Forum after version 3 of the 1996 WRAP point source file was complete. This decision is expected to have very little influence on the 2002 point source emission estimates (especially those for SO₂). The 2002 emission estimates for New Mexico show that 60 percent of the point source SO₂ is from EGUs, while 40 percent is from non-utilities. (There were negligible copper smelter emissions in New Mexico in 2002.) Only a few percent of the point source SO₂ emissions are based on information from the 1996 database. This percentage may be higher for other pollutants (NO_x), though.

In comparisons of the 1999 area source emission estimates (submitted by the States to the EPA NEI) with those in the 1996 WRAP area source file, we noticed that VOC emissions for California and Idaho are now significantly higher than they were previously, and that if these emission values are used in new regional modeling exercises, the results may be different than before. It is not clear from our initial evaluations that these are “improvements” in emission estimates. In fact, it appears that the 1999 area source emission estimates for these States overestimate VOC emissions (and to a lesser extent emissions of other pollutants). As an example, Idaho VOC emissions from area sources are now more than 200,000 tpy. The 1996 estimate for this State was 54,000 tpy.

Our initial review of the Idaho Department of Environmental Quality 1999 area source emission calculation methods revealed that the State neglected to reconcile their 1999 point and area source emission files before submitting them to EPA. This means that fuel combustion emissions will be counted twice for the sources that appear in the point source file. The 1999 Idaho VOC emission estimates include about 60,000 tpy of VOC from cutback asphalt paving. It is expected that this overestimates VOC emissions for this activity.

The California VOC emissions differences are more difficult to diagnose because the Air Resources Board (ARB) uses its own Emission Inventory Codes. Then, a crosswalk between these Emission Inventory Codes and EPA SCC codes is used to enable the ARB to submit data to the EPA system. This translation makes it more difficult to diagnose potential data problems. In any event, the 1999 California area source VOC emissions in the 1999 NEI appear to be higher than the estimates for similar years that the ARB is currently reporting on its website.

VI. DATA FORMAT

Table VI-1 describes the structure of the point source inventory provided in IDA/SMOKE format.
Table VI-2 describes the structure of the area source inventory provided in IDA/SMOKE format.

Table VI-1. Structure of 1996 Version 3 WRAP Point Source File (IDA/SMOKE)

Field	Field Name	Type	Width	Decimals	Nulls
1	STID	Numeric	2		No
2	CYID	Numeric	3		No
3	PLANTID	Character	15		No
4	POINTID	Character	15		No
5	STACKID	Character	12		No
6	ORISID	Character	6		No
7	BLRID	Character	6		No
8	SEGMENT	Character	2		No
9	PLANT	Character	40		No
10	SCC	Character	10		No
11	BEGYR	Numeric	4		No
12	ENDYR	Numeric	4		No
13	STKHGT	Numeric	4		No
14	STKDIAM	Numeric	6	2	No
15	STKTEMP	Numeric	4		No
16	STKFLOW	Numeric	10	2	No
17	STKVEL	Numeric	9	2	No
18	BOILCAP	Numeric	8	2	No
19	CAPUNITS	Character	1		No
20	WINTHRU	Numeric	2		No
21	SPRTHRU	Numeric	2		No
22	SUMTHRU	Numeric	2		No
23	FALTHRU	Numeric	2		No
24	HOURS	Numeric	2		No
25	START	Numeric	2		No
26	DAYS	Numeric	1		No
27	WEEKS	Numeric	2		No
28	THRUPUT	Numeric	11	1	No
29	MAXRATE	Numeric	12	3	No
30	HEATCON	Numeric	8	2	No
31	SULFCON	Numeric	5	2	No
32	ASHCON	Numeric	5	2	No
33	NETDC	Numeric	9	3	No
34	SIC	Numeric	4		No
35	LATC	Numeric	9	4	No
36	LONC	Numeric	9	4	No
37	OFFSHORE	Character	1		No
38	VOC_ANN	Numeric	13	4	No
39	VOC_QSD	Numeric	13	4	No
40	VOC_CE	Numeric	7	2	No

Field	Field Name	Type	Width	Decimals	Nulls
41	VOC_RE	Numeric	3		No
42	VOC_EMF	Numeric	10	4	No
43	VOC_CPRI	Numeric	3		No
44	VOC_CSEC	Numeric	3		No
45	NOX_ANN	Numeric	13	4	No
46	NOX_OSD	Numeric	13	4	No
47	NOX_CE	Numeric	7	2	No
48	NOX_RE	Numeric	3		No
49	NOX_EMF	Numeric	10	4	No
50	NOX_CPRI	Numeric	3		No
51	NOX_CSEC	Numeric	3		No
52	CO_ANN	Numeric	13	4	No
53	CO_OSD	Numeric	13	4	No
54	CO_CE	Numeric	7	2	No
55	CO_RE	Numeric	3		No
56	CO_EMF	Numeric	10	4	No
57	CO_CPRI	Numeric	3		No
58	CO_CSEC	Numeric	3		No
59	SO2_ANN	Numeric	13	4	No
60	SO2_OSD	Numeric	13	4	No
61	SO2_CE	Numeric	7	2	No
62	SO2_RE	Numeric	3		No
63	SO2_EMF	Numeric	10	4	No
64	SO2_CPRI	Numeric	3		No
65	SO2_CSEC	Numeric	3		No
66	PM10_ANN	Numeric	13	4	No
67	PM10_OSD	Numeric	13	4	No
68	PM10_CE	Numeric	7	2	No
69	PM10_RE	Numeric	3		No
70	PM10_EMF	Numeric	10	4	No
71	PM10_CPRI	Numeric	3		No
72	PM10_CSEC	Numeric	3		No
73	PM25_ANN	Numeric	13	4	No
74	PM25_OSD	Numeric	13	4	No
75	PM25_CE	Numeric	7	2	No
76	PM25_RE	Numeric	3		No
77	PM25_EMF	Numeric	10	4	No
78	PM25_CPRI	Numeric	3		No
79	PM25_CSEC	Numeric	3		No
80	NH3_ANN	Numeric	13	4	No
81	NH3_OSD	Numeric	13	4	No
82	NH3_CE	Numeric	7	2	No
83	NH3_RE	Numeric	3		No
84	NH3_EMF	Numeric	10	4	No
85	NH3_CPRI	Numeric	3		No
86	NH3_CSEC	Numeric	3		No

Table VI-2. Area Sources - SMOKE File Structure

Field	Field Name	Type	Width	Decimals	Nulls
1	STID	Numeric	2		No
2	CYID	Numeric	3		No
3	SCC	Character	10		No
4	VOC_ANN	Numeric	10	3	No
5	VOC_OSD	Numeric	10	3	No
6	VOC_EMF	Numeric	11	3	No
7	VOC_CE	Numeric	7	3	No
8	VOC_RE	Numeric	3		No
9	VOC_RP	Numeric	6		No
10	NOX_ANN	Numeric	10	3	No
11	NOX_OSD	Numeric	10	3	No
12	NOX_EMF	Numeric	11	3	No
13	NOX_CE	Numeric	7	3	No
14	NOX_RE	Numeric	3		No
15	NOX_RP	Numeric	6		No
16	CO_ANN	Numeric	10	3	No
17	CO_OSD	Numeric	10	3	No
18	CO_EMF	Numeric	11	3	No
19	CO_CE	Numeric	7	3	No
20	CO_RE	Numeric	3		No
21	CO_RP	Numeric	6		No
22	SO2_ANN	Numeric	10	3	No
23	SO2_OSD	Numeric	10	3	No
24	SO2_EMF	Numeric	11	3	No
25	SO2_CE	Numeric	7	3	No
26	SO2_RE	Numeric	3		No
27	SO2_RP	Numeric	6		No
28	PM10_ANN	Numeric	10	3	No
29	PM10_OSD	Numeric	10	3	No
30	PM10_EMF	Numeric	11	3	No
31	PM10_CE	Numeric	7	3	No
32	PM10_RE	Numeric	3		No
33	PM10_RP	Numeric	6		No
34	PM25_ANN	Numeric	10	3	No
35	PM25_OSD	Numeric	10	3	No
36	PM25_EMF	Numeric	11	3	No
37	PM25_CE	Numeric	7	3	No
38	PM25_RE	Numeric	3		No
39	PM25_RP	Numeric	6		No
40	NH3_ANN	Numeric	10	3	No
41	NH3_OSD	Numeric	10	3	No
42	NH3_EMF	Numeric	11	3	No
43	NH3_CE	Numeric	7	3	No
44	NH3_RE	Numeric	3		No
45	NH3_RP	Numeric	6		No

VII. REFERENCES

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