May 16, 2006

Base K/Round 4 Strategy Modeling: Emissions

The purpose of this document is to summarize the emission estimates prepared for the latest 2002 base year (Base K) and 2008, 2009, 2012, and 2018 future year (Round 4) modeling. A list of the Round 4 modeling scenarios is provided in Table 1[1]. Sector-level emissions are presented in Figure 1 and Table 2. (For comparison, the sector-level emissions from Round 3 are presented in Figure 2.)

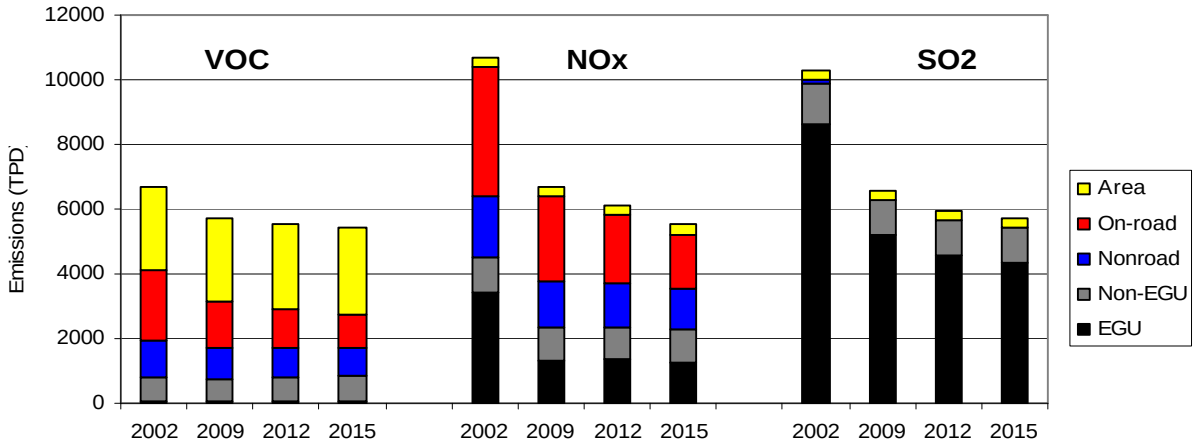

Figure 1. Round 4 Emissions Summary for 5-State LADCO Region (TPD, July weekday)

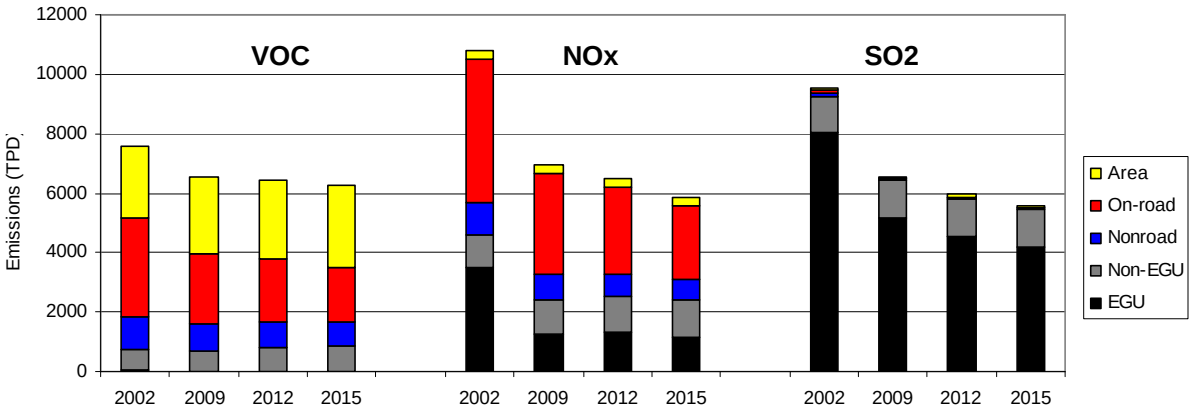

Figure 2. Round 3 Emissions Summary for 5-State LADCO Region (TPD, July weekday)

Base Year Emissions

Updates to the 2002 base year emissions compared to Base J include:

- Revised motor vehicle emissions: The new emission estimates are about 40% lower for VOC and 25% for NOx. This change is due to a correction in the calculation of motor vehicle emissions by EMS. (Previously, EMS was averaging the 25 different vehicle age emission rates in the database output, instead of doing a weighted-average based on mileage accumulation.) EMS was run to generate 36 days (weekday, Saturday, Sunday for each month) at 36 km, and 12 days (weekday, Saturday, Sunday for June – August) at 12 km.

[1] Two additional scenarios were included late in the Round 4 modeling: Scenario 4-reflects control measures under discussion by the MW and NE State Commissioners, and Scenario 5-reflects a control option developed by LADCO Project Team.

- Revised ammonia temporal profile: New temporal profiles were derived by several test runs of the new process based ammonia model. The previous profile was based on Pinder's process based model for dairy farms. The new profile reflects hogs, beef, and dairy. (We used hog farms to define poultry because the process based model does not have a fully functional poultry housing model.) It is probably most critical to see what happens during the colder months, because those are the months where we are generally ammonia limited (see Figure 3). One other change to the ammonia inventory was to remove the point source ammonia emissions from other RPO's inventories, because confined animal operations were included in the point source inventory for some states, which led to double-counting of emissions.

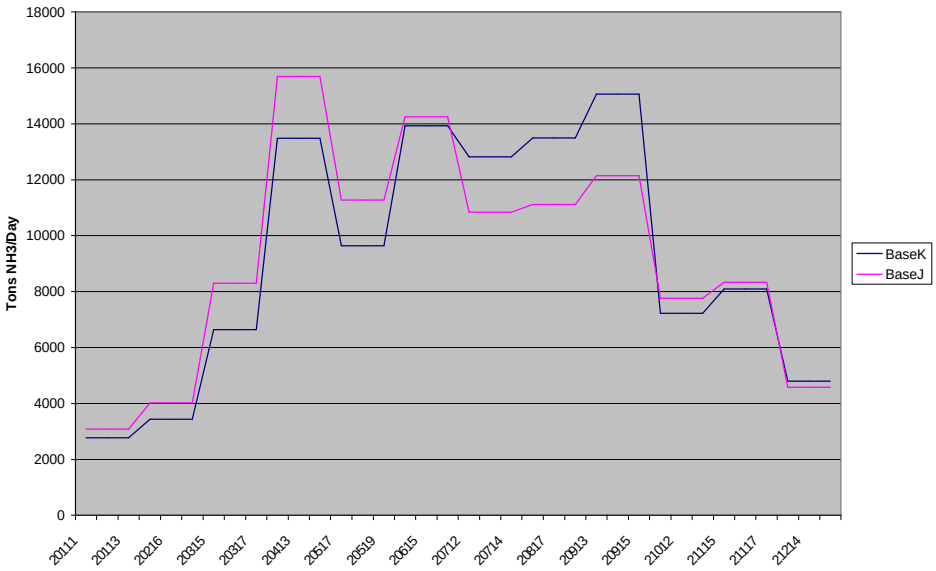

Figure 3. Base J v. Base K Regional Ammonia Emissions by Month

- Revised EGU temporal profile: Continuous emissions monitoring (CEM) data were processed to produce temporal profiles for EGUs which account for month of year, and day of week variations. Unit-specific profiles were developed. (Note, a contractor previously developed a limited number CEM-based temporal profiles, which were assigned to groups of EGUs, but these profiles became obsolete when the source ID numbers changed with the latest IPM modeling. For Base J, national default profiles were assumed.)

- New Canadian emissions: An updated inventory of Canadian stationary and mobile sources for 2000 was provided by Environment Canada. The new inventory reflects significantly lower emissions.

- Improved nonroad emissions: Two changes were made to the nonroad inventory: (1) commercial marine, airports, and railroads were included (note: these categories, which are not part of the NONROAD2004 model, were not included in Base J), and (2) NMIM (with NONROAD2004) was rerun with fuel parameter inputs consistent with the on-road emissions modeling (note – these emission estimates still do not include permeation effects).

- Point sources: All co-generation sources are now included in the EGU file. (Previously, some co-generation sources were in the EGU file and some in the non-EGU.) In addition, stack exit parameters were corrected for Ohio point sources.

Future Year Emissions

Four future year inventories were developed: 2008, 2009, 2012, and 2018. The emissions for 2009, 2012, and 2018 were derived by running the emissions model for each source sector for each year. For 2008, emissions were derived from interpolating between 2002 and 2009 for all sectors, except EGUs. For 2008 summer ozone modeling, the 2008 EGU emissions were processed based on the IPM modeling.

Scenario 1: This scenario represents the future year "base" inventory (i.e., growth to the future year of interest and application of existing ["on the books"] controls). The following controls were included in this scenario:

On-Highway Mobile Sources

- Tier II/Low sulfur fuel
- Inspection/Maintenance programs (nonattainment areas)
- Reformulated gasoline (nonattainment areas)

Off-Highway Mobile Sources

- Federal control programs incorporated into NONROAD model (e.g., nonroad diesel rule), plus the evaporative Large Spark Ignition and Recreational Vehicle standards
- Heavy-duty diesel (2007) engine standard/Low sulfur fuel
- Federal railroad/locomotive standards
- Federal commercial marine vessel engine standards

Power Plants

- Title IV (Phases I and II)
- NOx SIP Call
- Clean Air Interstate Rule
- Clean Air Mercury Rule

Other Point Sources

- VOC 2-, 4-, 7-, and 10-year MACT standards
- Combustion turbine MACT
- Industrial boiler/process heater/RICE MACT

Updates to the future year "base" emissions compared to Base J include:

- Updated growth factors for several area and point source categories (see "Development of Updated Growth and Control Factors for Lake Michigan Air Directors Consortium", Draft Report, December 29, 2005, E.H. Pechan)

- Updated control factors for several area and point source categories (see "Development of Updated Growth and Control Factors for Lake Michigan Air Directors Consortium?, Draft Report, December 29, 2005, E.H. Pechan; and "Documentation for MACTEC NonEGU "On-the-Books" Control Factor File", January 10, 2006, MACTEC). The changes include settlement agreement for petroleum refineries, and other non-EGU sources in the LADCO region.

- CAIR scenarios
    - 1a: "VISATASII_PC_1f" reflects the IPM scenario which assumed full trading and banking. The results of this IPM run were delivered in July 2005, and were used in Round 3.
    - 1b: "VISTASII_PC_3b" reflects the IPM scenario which assumed the CAIR state-specific emission budgets as an environmental constraint, but allowed banking. The results of this restricted trading IPM run were delivered in December 2005.
    - 1c: This scenario is the same as 1a, with the addition of BART reductions for non-EGU sources. The determination of sources subject to BART is based on the latest Midwest RPO analyses.
    - 1d: This scenario is based on 1a, but scales-back the emissions in each state to match the CAIR state-specific emission budgets (i.e., removes any excess introduced by banking).

- Inclusion of a pollution control retrofits at a few facilities (note: this information was not available at the time the IPM full trading was conducted in summer 2005)
    - MI – Monroe: SO2 emissions from Units 3-4 reduced by 97% (based on November 9 letter from Skiles Boyd, DTE-Energy)
    - MI – Campbell: NOx emissions from Units 2-3 reduced by 90% (based on information supplied by Louis Pocalujka, Consumers Energy)
    - IN – Gibson: SO2 emissions from Units 1-3 reduced by 95% (based on information supplied by Dan Weiss, Cinergy)
    - IN – Cayuga: SO2 emissions from Units 1-2 reduced by 95% (based on information supplied by Dan Weiss, Cinergy)

- Revised motor vehicle emissions: Unlike 2002, EMS was run for only a few days for 2009, 2012, and 2018. To provide emissions for all 36 days at 36 km, the 2002 emission files were scaled by the emission ratios for one day (i.e., September 13 for 2009, and August 16 for 2012). To provide emissions for all 12 days at 12 km, a similar approach was used, along with consideration of the spatially disaggregated 36 km derived emissions.

Scenario 2: This scenario reflects Scenario 1a plus the additional SO2 and NOx candidate control measures in the "Interim White Paper, Source Category: Electric Generating Units" (January 14, 2005):

2a reflects EGU2[2] for the top 30 EGUs in the 5-state region (based on Q/d)
2b reflects EGU2 for all EGUs within 100 km of a residual nonattainment area
2c reflects EGU2 throughout the 5-state LADCO region
2d reflects EGU2 throughout the 5-state LADCO region plus seven neighboring states: MN, IA, MO, KY, TN, WV, and PA
2e reflects EGU1 throughout the 5-state LADCO region
2f reflects EGU1 throughout the 5-state LADCO region based on recent IPM modeling
2g reflects EGU2 throughout the 5-state LADCO region based on recent IPM modeling

Further discussion of the modeling for these scenarios is provided in the Appendix.

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[2] EGU2 and EGU1 in Scenarios 2a – 2e were derived by applying control factors developed by MACTEC. The derivation of these control factors is explained in "Identification and Evaluation of Candidate Control Measures", prepared by MACTEC, Aprl 14, 2005.

Scenario 3: This scenario reflects Scenario 2 plus additional white paper controls for stationary and mobile sources

Scenario 3a reflects the minimum control level for the EGU, non-EGU point, and area source White Paper controls, plus chip reflashing for HDDVs and a "highly cost effective" voluntary/incentive control program for HDDVs and construction equipment (i.e., < $5,000/T)

EGU	EGU1 (Scenario 2e)
Non-EGU	ICI1 and GLASS1
Area	SOLV1A-7
On-Road	Reflashing – Base diesel NOx emissions derived by multiplying MOBILE6 emissions in 2002, 2009, 2012 by 1.04 to account for "true" compliance rates of chip reflashing (i.e., 10% in 2002, and 30% in 2009-2012 timeframe), based on MOBILE6 modeling by Chris Bovee, WDNR. (Note, MOBILE6 assumes a compliance rate of 90%.)
	Controlled diesel NOx emissions derived by multiplying MOBILE6 emissions by 1.01 in 2009 and 2012 to account for expected compliance rates of chip reflashing (i.e., 60-80%).
	HDDV Voluntary Programs (Diesel Retrofits) – Assume a reduction of 50 TPD (out of 850 TPD for Class 8 HDDV) – i.e., apply ratio of 0.94 to 2009 Class 8 HDDV inventory (or 0.95 to the entire on-road diesel inventory)
	Low RVP Fuel - Controlled emissions derived using adjustment factors developed by Environ (see Fuel Sensitivity Runs, March 7, 2005) for the following areas: Indianapolis: Boone, Hamilton, Hancock, Hendricks, Johnson, Madison, Marion, Morgan, and Shelby Detroit: Livingston, Macomb, Monroe, Oakland, St.Clair, Washtenaw, and Wayne Cleveland: Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, and Summit Cincinnati: Butler, Clermont, Hamilton, Warren, and Clinton Dayton: Clark, Greene, Miami, and Montgomery
Nonroad	Construction Equipment Voluntary Programs (Diesel Retrofits) – Assume a reduction of 45 TPD (out of 275 TPD) – i.e., apply ratio of 0.84 to diesel construction equipment

Scenario 3b reflects the maximum control level for the EGU, non-EGU point, and area source White Paper controls, plus chip reflashing for HDDVs and a "cost effective" voluntary/incentive control program for HDDVs, and construction and agricultural equipment (i.e., < $10,000/T)

EGU — EGU2 (Scenario 2c)

Non-EGU — ICI3, KILN1, GLASS2, and 25% NOx reduction for asphalt plants

Area — SOLV1B-4B 5A-7A

On-Road — Reflashing – Base diesel NOx emissions derived by multiplying MOBILE6 emissions in 2002, 2009, 2012 by 1.04 to account for "true" compliance rates of chip reflashing (i.e., 10% in 2002, and 30% in 2009-2012 timeframe), based on MOBILE6 modeling by Chris Bovee, WDNR. (Note, MOBILE6 assumes a compliance rate of 90%.)

Controlled diesel NOx emissions derived by multiplying MOBILE6 emissions by 1.01 in 2009 and 2012 to account for expected compliance rates of chip reflashing (i.e., 60-80%).

HDDV Voluntary Programs (Diesel Retrofits) – Assume a reduction of 100 TPD (out of 850 TPD for Class 8 HDDV) – i.e., apply ratio of 0.88 to 2009 Class 8 HDDV inventory (or 0.91 to the entire on-road diesel inventory)

Low RVP Fuel - Controlled emissions derived using adjustment factors developed by Environ (see Fuel Sensitivity Runs, March 7, 2005) for the following areas:

Indianapolis: Boone, Hamilton, Hancock, Hendricks, Johnson, Madison, Marion, Morgan, and Shelby
Detroit: Livingston, Macomb, Monroe, Oakland, St.Clair, Washtenaw, and Wayne
Cleveland: Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, and Summit
Cincinnati: Butler, Clermont, Hamilton, Warren, and Clinton
Dayton: Clark, Greene, Miami, and Montgomery

Nonroad — Construction Equipment Voluntary Programs (Diesel Retrofits) – Assume a reduction of 45 TPD (out of 275 TPD) – i.e., apply ratio of 0.84 to diesel construction equipment

Agricultural Equipment Voluntary Programs – Assume a reduction of 55 TPD (out of 255 TPD) – i.e., apply ratio of 0.78 to diesel agricultural equipment

Scenario 4: This scenario reflects Scenario 1a plus the additional control measures under discussion by the MW and NE State Commissioners:

Non-EGU	ICI1
Area	AIM, consumer products, and portable fuel containers
On-Road	Reflashing (see discussion under Scenario 3)

In addition, the Commissioners have discussed a voluntary retrofit program (although it is unclear whether the objective is to reduce NOx, VOC, and/or PM) and a regional gasoline. For the purposes of this model run, the Scenario 3a on-road and nonroad controls were assumed to reflect these possible other controls.

Scenario 5: This scenario reflects Scenario 1a plus the additional control measures identified by the LADCO Project Team as a possible control option:

EGU	EGU1 for SO2, EGU2 for NOx
Non-EGU	ICI1
Area	AIM, consumer products, and portable fuel containers
On-Road	Reflashing (see discussion under Scenario 3) HDDV voluntary programs (diesel retrofits) Low RVP fuel
Nonroad	Construction equipment voluntary programs (diesel retrofits)

In addition, the Project Team identified organic carbon control measures, case-by-case point source controls, and state programs (e.g., RACT rules). For the purposes of this model run, no emission reductions were assumed for these other controls due to the lack of specific control information.

Table 1. Round 4 Modeling Runs

Run		Description		2002	2008	2009	2012	2018
Base K		2002 baseyear emissions inventory		*36,12*				
Scenario 1		Existing (OTB) controls, plus CAIR						
		a. CAIR w/ full trading			*12*	*36,12*	*36,12*	*36*
		b. CAIR w/ restricted trading					*36,12*	
		c. CAIR w/ full trading and BART for non-EGUs						*36*
		d. EGU0 - CAIR w/ full trading scaled-back to state budgets				*36,12*	*36,12*	
Scenario 2		Scenario 1a plus EGU controls:						
		a. EGU2 for top 30 EGUs in 5-state region (based on Q/d)					*36,12*	
		b. EGU2 in 100 km radius of each residual NA area					*36,12*	
		c. EGU2 in 5-state region				*36,12*	*36,12*	*36*
		d. EGU2 in 12-state Midwest region					*36,12*	*36*
		e. EGU1 in 5-state region				*36,12*	*36,12*	
		f. EGU1-IPM in 5-state region						
		g. EGU2-IPM in 5-state region						
Scenario 3		a. Scenario 2 e plus "low" control level for non-EGU point, area, and mobile sources throughout 5-state region				*36,12*	*36,12*	
		Non-EGU Point Sources						
		* ICI Boilers - 40% SO2, 60% NOx reduction (ICI1)						
		* Glass manufacturing - 30% NOx reduction (GLASS1)						
		Area Sources						
		* Consumer products - OTC model rule (SOLV2A)						
		* AIM coatings - OTC model rule (SOLV1A)						
		* Portable fuel containers - OTC model rule (SOLV3A)						
		* Auto refinishing - extend IL.IN,WI RACT rules (SOLV4A)						
		* Ind. surface coating - more stringent RACT (SOLV5A)						
		* Degreasing – more stringent RACT (SOLV6A)						
		* Gas. Dispensing - enhanced vapor recovery (SOLV7A)						
		Mobile Sources						
		* HDDV – reflashing and voluntary measures <$5,000/T						
		* Construction Equipment - voluntary measures < $5,000/T						
		* Low RVP fuel (IN, MI, OH counties)						
		b. Scenario 2 c plus "high" control level for non-EGU point, area, and mobile sources throughout 5-state region				*36,12*	*36,12*	
		Non-EGU Point Sources						
		* ICI Boilers - 90% SO2, 80% NOx reduction (ICI3)						
		* Cement kilns – 90% SO2, 50% NOx reduction (KILN1)						
		* Asphalt plants – 25% NOx reduction						
		* Glass manufacturing - 75% NOx reduction (GLASS2)						
		Area Sources						
		* Consumer products - SCAQMD rule (SOLV2B)						
		* AIM coatings - CARB 2003 rule (SOLV1BA)						

		* Portable fuel cont, - Accelerated phase in (SOLV3B)						
		* Auto refinishing - SCAQMD rule (SOLV4B)						
		* Ind. surface coating - more stringent RACT (SOLV5A)						
		* Degreasing - more stringent RACT (SOLV6A)						
		* Gas. dispensing - enhanced vapor recovery (SOLV7A)						
		* Asphalt paving applications - low VOC formulations						
		Mobile Sources						
		* HDDV - reflashing and voluntary measures <$10,000/T						
		* Const. Equipment - voluntary measures < $10,000/T						
		* Agricultural Equipment - voluntary measures < $10,000/T						
		* Low RVP fuel (IN, MI, OH counties)						

Note: 12 = 12 km summer run, 36 = 36 km annual run

Round 4	VOC	2009							2012														2015	2018			
July	2002	1a	1b	1d	2c	2e	3a	3b	1a	1b	1d	2a	2b	2c	2d	2e	2f	2g	3a	3b	4	5	1a	1a	1c	2c	2d
Nonroad																											
IL	224	164	164		164	164	164	164	149	149		149	149	149	149	149	149	149	149	149	149	149		130	130	130	130
IN	125	94	94		94	94	94	94	95	95		95	95	95	95	95	95	95	95	95	95	95		95	95	95	95
MI	348	307	307		307	307	307	307	276	276		276	276	276	276	276	276	276	276	276	276	276		222	222	222	222
OH	222	161	161		161	161	161	161	145	145		145	145	145	145	145	145	145	145	145	145	145		126	126	126	126
WI	214	194	194		194	194	194	194	175	175		175	175	175	175	175	175	175	175	175	175	175		140	140	140	140
5-State Total	1133	920	920		920	920	920	920	840	840		840	840	840	840	840	840	840	840	840	840	840	776.5	713	713	713	713
TOTAL	10294	7270	7270		7270	7270	7270	7270	8895	8895		8895	8895	8895	8895	8895	8895	8895	8895	8895	8895	8895		7072	7072	7072	7072
MAR																											
IL	10	10	10		10	10	10	10	10	10		10	10	10	10	10	10	10	10	10	10	10		10	10	10	10
IN	5	5	5		5	5	5	5	5	5		5	5	5	5	5	5	5	5	5	5	5		5	5	5	5
MI	7	7	7		7	7	7	7	7	7		7	7	7	7	7	7	7	7	7	7	7		8	8	8	8
OH	8	8	8		8	8	8	8	8	8		8	8	8	8	8	8	8	8	8	8	8		8	8	8	8
WI	4	4	4		4	4	4	4	4	4		4	4	4	4	4	4	4	4	4	4	4		4	4	4	4
5-State Total	34	34	34		34	34	34	34	34	34		34	34	34	34	34	34	34	34	34	34	34	33.5	35	35	35	35
TOTAL	307	321	321		321	321	321	321	329	329		329	329	329	329	329	329	329	329	329	329	329		346	346	346	346
OtherArea																											
IL	679	688	688		688	688	599	565	700	700		700	700	700	700	700	700	700	613	576	647	647		738	738	738	738
IN	354	365	365		365	365	268	251	373	373		373	373	373	373	373	373	373	278	259	353	353		398	398	398	398
MI	518	516	516		516	516	364	337	520	520		520	520	520	520	520	520	520	371	342	476	476		541	541	541	541
OH	546	550	550		550	550	361	331	558	558		558	558	558	558	558	558	558	362	332	493	493		593	593	593	593
WI	458	467	467		467	467	364	353	474	474		474	474	474	474	474	474	474	368	355	455	455		506	506	506	506
5-State Total	2555	2586	2586		2586	2586	1956	1837	2625	2625		2625	2625	2625	2625	2625	2625	2625	1992	1864	2424	2424	2700.5	2776	2776	2776	2776
TOTAL	19299	19885	19885		19885	19885	19252	19135	20359	20359		20359	20359	20359	20359	20359	20359	20359	19727	19598	20158	20158		21759	21759	21759	21759
On-Road																											
IL	446	314	314		314	314	*314*	*314*	260	260		260	260	260	260	260	260	260	*260*	*260*	*260*	*260*		197	197	197	197
IN	405	237	237		237	237	*225*	*225*	193	193		193	193	193	193	193	193	193	*183*	*183*	*183*	*183*		150	150	150	150
MI	522	335	335		335	335	*328*	*328*	303	303		303	303	303	303	303	303	303	*296*	*296*	*296*	*296*		217	217	217	217
OH	574	365	365		365	365	*336*	*336*	340	340		340	340	340	340	340	340	340	*311*	*311*	*311*	*311*		238	238	238	238
WI	238	144	144		144	144	*144*	*144*	117	117		117	117	117	117	117	117	117	*117*	*117*	*117*	*117*		88	88	88	88
5-State Total	2185	1395	1395		1395	1395	*1348*	*1348*	1213	1213		1213	1213	1213	1213	1213	1213	1213	*1168*	*1168*	*1168*	*1168*	1051.5	890	890	890	890
TOTAL	14263								7825	7825		7825	7825	7825	7825	7825	7825	7825									
EGU																											
IL	9	8							8															9	9	9	9
IN	6	6							7															6	6	6	6
MI	12	11							11															12	12	12	12
OH	5	6							7															7	7	7	7
WI	3	3							4															4	4	4	4
5-State Total	35	34							37														37.5	38	38	38	38
TOTAL	214	195							197															215	215	215	215
Non-EGU																											
IL	313	286	286		286	286	286	286	305	305		305	305	305	305	305	305	305	305	305	305	305		350	350	350	350
IN	150	160	160		160	160	160	160	170	170		170	170	170	170	170	170	170	170	170	170	170		199	199	199	199
MI	123	115	115		115	115	115	115	122	122		122	122	122	122	122	122	122	122	122	122	122		139	139	139	139
OH	77	75	75		75	75	75	75	79	79		79	79	79	79	79	79	79	79	79	79	79		90	90	90	90
WI	88	97	97		97	97	97	97	104	104		104	104	104	104	104	104	104	104	104	104	104		120	120	120	120
5-State Total	751	733	733		733	733	733	733	780	780		780	780	780	780	780	780	780	780	780	780	780	839	898	898	898	898
TOTAL	4087	4409	4409		4409	4409	4409	4409	4700	4700		4700	4700	4700	4700	4700	4700	4700	4700	4700	4700	4700		5378	5378	5378	5378
IL	1681	1470	1462		1462	1462	1373	1339	1432	1164		1424	1424	1424	1424	1424	1424	1424	1337	1300	1371	1371		1434	1434	1434	1434
IN	1045	867	861		861	861	752	735	843	643		836	836	836	836	836	836	836	731	712	806	806		853	853	853	853
MI	1530	1291	1280		1280	1280	1121	1094	1239	925		1228	1228	1228	1228	1228	1228	1228	1072	1043	1177	1177		1139	1139	1139	1139
OH	1432	1165	1159		1159	1159	941	911	1137	790		1130	1130	1130	1130	1130	1130	1130	905	875	1036	1036		1062	1062	1062	1062
WI	1005	909	906		906	906	803	792	878	757		874	874	874	874	874	874	874	768	755	855	855		862	862	862	862
5-State Total	6693	5702	5668		5668	5668	4991	4872	5529	4279		5492	5492	5492	5492	5492	5492	5492	4814	4686	5246	5246	5438.5	5350	5350	5350	5350

Round 4	**NOx**	**2009**								**2012**														**2015**		**2018**			
July	2002	1a	1b	1d	2c	2e	3a	3b		1a	1b	1d	2a	2b	2c	2d	2e	2f	2g	3a	3b	4	5		1a		1a	1c	2c	2d
Nonroad																													
IL	324	263	263		263	263	245	222		224	224		224	224	224	224	224	224	224	208	189	208	208			154	154	154	154
IN	178	142	142		142	142	133	121		141	141		141	141	141	141	141	141	141	132	120	132	132			141	141	141	141
MI	205	159	159		159	159	153	140		133	133		133	133	133	133	133	133	133	128	116	128	128			93	93	93	93
OH	253	195	195		195	195	186	169		162	162		162	162	162	162	162	162	162	155	140	155	155			109	109	109	109
WI	145	114	114		114	114	197	98		97	97		97	97	97	97	97	97	97	91	83	91	91			69	69	69	69
5-State Total	1105	873	873		873	873	914	750		757	757		757	757	757	757	757	757	757	714	648	714	714		661.5		566	566	566	566
TOTAL	8897	8930	8930		8930	8930	8685	8610		8895	8895		8895	8895	8895	8895	8895	8895	8895	8661	8596	8661	8661			8704	8704	8704	8704
MAR																													
IL	277	201	201		201	201	201	201		195	195		195	195	195	195	195	195	195	195	195	195	195			186	186	186	186
IN	123	89	89		89	89	89	89		87	87		87	87	87	87	87	87	87	87	87	87	87			84	84	84	84
MI	114	112	112		112	112	112	112		111	111		111	111	111	111	111	111	111	111	111	111	111			110	110	110	110
OH	177	128	128		128	128	128	128		126	126		126	126	126	126	126	126	126	126	126	126	126			122	122	122	122
WI	79	59	59		59	59	59	59		59	59		59	59	59	59	59	59	59	59	59	59	59			57	57	57	57
5-State Total	770	589	589		589	589	589	589		578	578		578	578	578	578	578	578	578	578	578	578	578		568.5		559	559	559	559
TOTAL	4968	4002	4002		4002	4002	4002	4002		3964	3964		3964	3964	3964	3964	3964	3964	3964	3964	3964	3964	3964			3919	3919	3919	3919
OtherArea																													
IL	62	68	68		68	68	68	68		70	70		70	70	70	70	70	70	70	70	70	70	70			73	73	73	73
IN	62	65	65		65	65	65	65		67	67		67	67	67	67	67	67	67	67	67	67	67			69	69	69	69
MI	49	52	52		52	52	52	52		53	53		53	53	53	53	53	53	53	53	53	53	53			54	54	54	54
OH	50	59	59		59	59	59	59		60	60		60	60	60	60	60	60	60	60	60	60	60			62	62	62	62
WI	32	34	34		34	34	34	34		34	34		34	34	34	34	34	34	34	34	34	34	34			35	35	35	35
5-State Total	255	278	278		278	278	278	278		284	284		284	284	284	284	284	284	284	284	284	284	284		288.5		293	293	293	293
TOTAL	4240	4248	4248		4248	4248	4248	4248		4372	4372		4372	4372	4372	4372	4372	4372	4372	4372	4372	4372	4372			4566	4566	4566	4566
On-Road																													
IL	890	578	578		578	578	*567*	*558*		474	474		474	474	474	474	474	474	474	*456*	*448*	*456*	*456*			300	300	300	300
IN	703	425	425		425	425	*416*	*408*		313	313		313	313	313	313	313	313	313	*299*	*292*	*299*	*299*			187	187	187	187
MI	926	680	680		680	680	*666*	*654*		619	619		619	619	619	619	619	619	619	*597*	*586*	*597*	*597*			385	385	385	385
OH	1035	609	609		609	609	*595*	*584*		512	512		512	512	512	512	512	512	512	*490*	*481*	*490*	*490*			270	270	270	270
WI	481	303	303		303	303	*297*	*292*		226	226		226	226	226	226	226	226	226	*218*	*214*	*218*	*218*			118	118	118	118
5-State Total	4035	2595	2595		2595	2595	*2542*	*2496*		2144	2144		2144	2144	2144	2144	2144	2144	2144	*2059*	*2022*	*2059*	*2059*		1702		1260	1260	1260	1260
TOTAL	23499									13170	13170		13170	13170	13170	13170	13170	13170	13170										
EGU																													
IL	712	227	230	223	205	224	224	205		244	235	241	184	180	155	157	206	201	192	206	155	244	155			231	231	165	165
IN	830	406	325	375	294	388	388	294		424	325	414	263	350	158	161	242	325	172	242	158	424	158			283	283	154	154
MI	448	218	189	207	198	251	251	198		219	184	203	148	142	107	109	167	220	146	167	107	219	107			247	247	127	127
OH	1139	330	347	302	252	317	317	252		322	337	322	199	194	165	167	216	216	205	216	165	322	165			271	271	179	179
WI	293	146	148	128	122	144	144	122		139	137	131	111	101	65	66	98	125	117	98	65	139	65			147	147	76	76
5-State Total	3422	1327	1239	1235	1071	1324	1324	1071		1348	1218	1311	905	967	650	660	929	1087	832	929	650	1348	650		1263.5		1179	1179	701	701
TOTAL	14371	7746	7537	7654	7488	7742	7742	7488		7721	7484	7683	7278	7339	7023	6248	7302			7302	7023	7721	7023			7007	7007	6530	5961
Non-EGU																													
IL	356	334	334		334	334	314	298		338	338		338	338	338	338	338	338	338	318	302	320	320			343	340	343	343
IN	238	212	212		212	212	174	148		216	216		216	216	216	216	216	216	216	177	151	179	179			225	189	225	225
MI	216	208	208		208	208	194	175		214	214		214	214	214	214	214	214	214	200	180	200	200			229	191	229	229
OH	177	157	157		157	157	142	127		160	160		160	160	160	160	160	160	160	144	130	148	148			167	153	167	167
WI	98	91	91		91	91	63	52		92	92		92	92	92	92	92	92	92	63	52	65	65			94	76	94	94
5-State Total	1085	1002	1002		1002	1002	887	800		1020	1020		1020	1020	1020	1020	1020	1020	1020	902	815	912	912		1039		1058	949	1058	1058
TOTAL	6446	6129	6129		6129	6129	6013	5926		6435	6435		6435	6435	6435	6435	6435	6435	6435	6318	6230	6326	6326			6952	6775	6952	6952
IL	2621	1671	1674		1649	1668	1619	1552		1545	1536		1485	1481	1456	1458	1507	1502	1493	1453	1359	1493	1404			1287	1284	1221	1221
IN	2134	1339	1258		1227	1321	1265	1125		1248	1149		1087	1174	982	985	1066	1149	996	1004	875	1188	922			989	953	860	860
MI	1958	1429	1400		1409	1462	1428	1331		1349	1314		1278	1272	1237	1239	1297	1350	1276	1256	1153	1308	1196			1118	1080	998	998
OH	2831	1478	1495		1400	1465	1427	1319		1342	1357		1219	1214	1185	1187	1236	1236	1225	1191	1102	1301	1144			1001	987	909	909
WI	1128	747	749		723	745	794	657		647	645		619	609	573	574	606	633	625	563	507	606	532			520	502	449	449
5-State Total	10672	6664	6576		6408	6661	6534	5984		6131	6001		5688	5750	5433	5443	5712	5870	5615	5466	4997	5895	5197		5523		4915	4806	4437	4437

Round 4	SOX	2009							2012													2015	2018			
July	2002	1a	1b	1d	2c	2e	3a	3b	1a	1b	1d	2a	2b	2c	2d	2e	2f	2g	3a	3b	4	5	1a	1a	1c	2c	2d
Nonroad																											
IL	31	5	5		5	5	5	5	0.6	0.6		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		0.4	0.4	0.4	0.4
IN	17	3	3		3	3	3	3	3	3		3	3	3	3	3	3	3	3	3	3	3		0.3	0.3	0.3	0.3
MI	19	3	3		3	3	3	3	0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.3	0.3	0.3	0.3
OH	23	4	4		4	4	4	4	0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.3	0.3	0.3	0.3
WI	13	2	2		2	2	2	2	0.3	0.3		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		0.2	0.2	0.2	0.2
5-State Total	103	17	17		17	17	17	17	4.9	4.9		4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	3.2	1.5	1.5	1.5	1.5
TOTAL	1190	263	263		263	263	263	263	251	251		251	251	251	251	251	251	251	251	251	251	251		250	250	250	250
MAR																											
IL	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
IN	0.2	0.2	0.2		0.2	0.2	0.2	0.2	0.2	0.2		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2		0.2	0.2	0.2	0.2
MI	0.6	0.7	0.7		0.7	0.7	0.7	0.7	0.7	0.7		0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		0.8	0.8	0.8	0.8
OH	0.4	0.3	0.3		0.3	0.3	0.3	0.3	0.3	0.3		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		0.3	0.3	0.3	0.3
WI	12.7	9.5	9.5		9.5	9.5	9.5	9.5	9.5	9.5		9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		8.7	8.7	8.7	8.7
5-State Total	13.9	10.7	10.7		10.7	10.7	10.7	10.7	10.7	10.7		10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	11.05	10	10	10	10
TOTAL	620	509	509		509	509	509	509	509	509		509	509	509	509	509	509	509	509	509	509	509		503	503	503	503
OtherArea																											
IL	11	12	12		12	12	12	12	12	12		12	12	12	12	12	12	12	12	12	12	12		13	13	13	13
IN	158	150	150		150	150	150	150	151	151		151	151	151	151	151	151	151	151	151	151	151		153	153	153	153
MI	71	68	68		68	68	68	68	68	68		68	68	68	68	68	68	68	68	68	68	68		68	68	68	68
OH	22	34	34		34	34	34	34	35	35		35	35	35	35	35	35	35	35	35	35	35		35	35	35	35
WI	9	9	9		9	9	9	9	10	10		10	10	10	10	10	10	10	10	10	10	10		10	10	10	10
5-State Total	271	273	273		273	273	273	273	276	276		276	276	276	276	276	276	276	276	276	276	276	277.5	279	279	279	279
TOTAL	2289	2279	2279		2279	2279	2279	2279	2340	2340		2340	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340		2406	2406	2406	2406
On-Road																											
IL																											
IN																											
MI																											
OH																											
WI																											
5-State Total																							0				
TOTAL																											
EGU																											
IL	1310	944	885	692	529	748	748	529	789	743	646	548	530	320	334	395	553	387	395	320	789	395		810	810	332	343
IN	2499	1267	1075	824	548	846	846	548	1263	1086	847	628	818	190	209	325	587	427	325	190	1263	325		1048	1048	172	184
MI	1103	1022	1020	479	356	600	600	356	1031	1048	476	469	449	140	152	220	293	145	220	140	1031	220		1058	1058	154	161
OH	3131	1463	1207	1280	535	719	719	535	994	1087	977	444	426	209	231	335	437	362	335	209	994	335		701	701	240	258
WI	602	512	516	274	193	318	318	193	492	483	279	372	318	75	82	120	295	174	120	75	492	120		500	500	88	93
5-State Total	8645	5208	4703	3549	2161	3231	3231	2161	4569	4447	3225	2461	2541	934	1008	1395	2165	1495	1395	934	4569	1395	4343	4117	4117	986	1039
TOTAL	31839	20163	17066	18505	17115	18186	18186	17115	17629	17629	16285	15520	15606	13995	10566	14455			14455	13995	17629	14455		14727	14727	11596	9040
Non-EGU																											
IL	373	251	251		251	251	215	152	257	257		257	257	257	257	257	257	257	220	157	221	221		249	248	249	249
IN	292	270	270		270	270	221	133	274	274		274	274	274	274	274	274	274	224	136	225	225		290	228	290	290
MI	162	166	166		166	166	149	52	171	171		171	171	171	171	171	171	171	154	53	154	154		185	116	185	185
OH	240	231	231		231	231	196	152	210	210		210	210	210	210	210	210	210	175	130	175	175		216	198	216	216
WI	163	154	154		154	154	100	31	155	155		155	155	155	155	155	155	155	100	31	100	100		156	100	156	156
5-State Total	1230	1072	1072		1072	1072	881	520	1067	1067		1067	1067	1067	1067	1067	1067	1067	873	507	875	875	1081.5	1096	890	1096	1096
TOTAL	5759	6093	6093		6093	6093	5900	5540	6340	6340		6340	6340	6340	6340	6340	6340	6340	6148	5780	6148	6148		6970	6746	6970	6970
IL	1725	1212	1153		797	1016	980	698	1059	1013		818	800	590	604	665	823	657	628	490	1023	629		1072	1071	594	605
IN	2966.2	1690	1498		971	1269	1220	834	1691	1514		1056	1246	618	637	753	1015	855	703	480	1642	704		1492	1430	616	628
MI	1355.6	1260	1258		594	838	821	480	1271	1288		709	689	380	392	460	533	385	443	262	1254	443		1312	1243	408	415
OH	3416.4	1732	1476		804	988	953	725	1240	1333		690	672	455	477	581	683	608	546	375	1205	546		953	935	492	510
WI	799.7	687	691		368	493	439	245	667	658		547	493	250	257	295	470	349	240	126	612	240		675	619	263	268
5-State Total	10262.9	6581	6076		3534	4604	4413	2982	5928	5806		3820	3900	2293	2367	2754	3524	2854	2560	1733	5736	2562	5716	5504	5298	2373	2426

APPENDIX
Scenario 2 EGU Strategies

The Round 4 control strategy modeling includes five scenarios reflecting the EGU1 and EGU2 controls in the White Paper ("Interim White Paper – Midwest RPO Candidate Control Measures, Electric Generating Units", January 14, 2005). A summary of the scenarios is provided below.

Overview of EGU1, EGU2

EGU1 and EGU2 represent regional emission caps (tons per year for SO2 and NOx, and tons per season for NOx) based on the following emission limits:

SO2 (lb/MMBTU):	EGU1 0.36 (2009), 0.15 (2012)
	EGU2 0.24 (2009), 0.10 (2012)
NOx (lb/MMBTU):	EGU1 0.15 (2009), 0.10 (2012)
	EGU2 0.12 (2009), 0.07 (2012)

For this round of modeling, the compliance date is assumed to be 2012, not 2013 as identified in the original White Paper. EGU1 and EGU2 are defined based on the 2012 regional emissions cap. The 2009 " interim limits" represent where we expect to be on the path to meeting the 2012 emissions cap. The proposed emission cap applies to the entire region (and not individual states) and incorporates demand growth (calculated by IPM) for the target year.

MACTEC derived unit-specific control factors for EGU1 and EGU2 in the following manner:

- For each control measure and year, calculate the 5-state region annual SO2 emission caps and winter/summer NOx emission caps based on the IPM-projected heat inputs (mmBtu) and the average emission rate (lbs/mmBtu) for the control measure/year;
- Identify all units with emission rates below the average emission rate for the control measure/year; set the future year percent control efficiency to 0 for these units since they are already below the average emission rate on which the caps are based;
- Subtract the emissions from units with emission rates below the average emission rate and calculate an "adjusted" emission rate (lbs/mmBtu) that units above the average emission rate must meet;
- Calculate the control factor (for units above the "adjusted" emission rate) as one minus the ratio of the "adjusted" average emission rate to the actual emission rate for that unit.

Description of Scenarios

a. EGU2 for top 30 EGUs in 5-state region (based on Q/d)

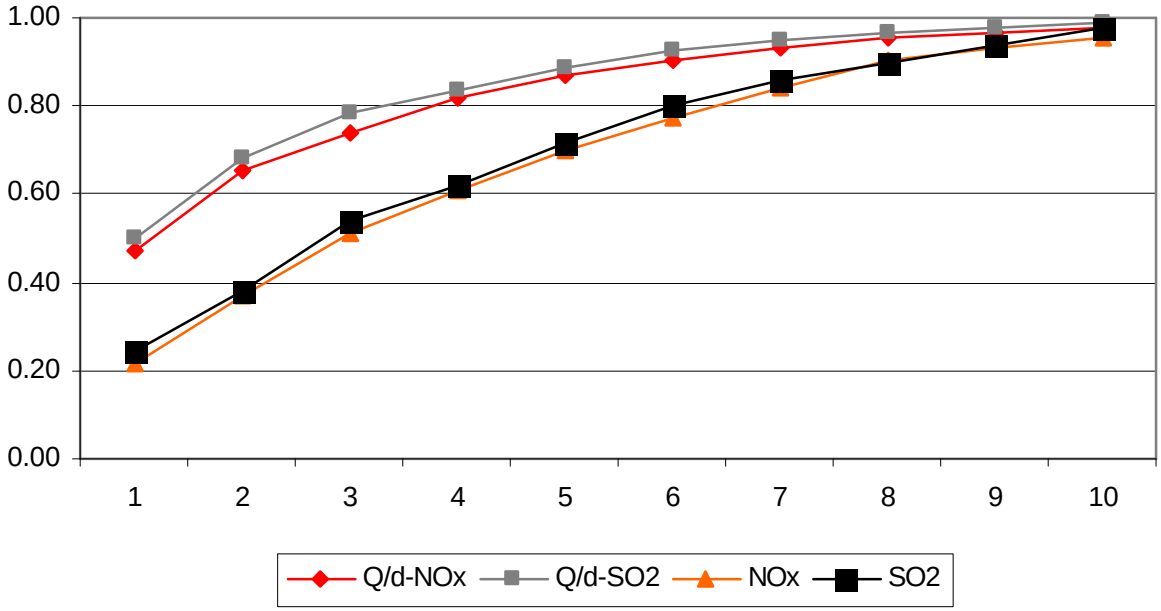
EGUs in the 5-state region were ranked based on their Q/d value. These values were calculated using:

- 2012 SO2 and NOx emission estimates; and
- distances to residual nonattainment monitors (based on Round 3 modeling – i.e., ozone: Chicago, Milwaukee, and Cleveland; PM2.5: Chicago, St.Louis/Granite City, Detroit, Cleveland, and Cincinnati) and nearby Class I areas.

The table below shows the Q/d values, emissions, and rankings for the top 40 facilities. The list is sorted based on the combined rankings of Q/d-NOx and Q/d-SO2.

Obs	ctryid	stid	stname	cyid	cyname	fcid	name	gridx	gridy	mindist	minmon	qdnox	nox	qdso2	so2	no	nq	so	sq	ord
1	US	26	Mich	163	Wayne	B2810	DETROIT EDISON RIV	1134.99	338.815	6	26163	3.39044	19.5	10.2767	59.2	108	1	92	1	1
2	US	39	Ohio	25	Clermont	1413100008	CINERGY CG&E WC BE	1089.89	-35.356	29	39061	1.30407	37.2	4.9612	141.6	44	3	19	2	2
3	US	39	Ohio	85	Lake	0243160009	CLEVELAND ELECTRIC	1279.13	291.746	23	39055	1.36151	30.8	3.3584	75.9	59	2	60	8	3
4	US	55	Wisc	117	Sheboygan	460033090	WP & L Alliant Ene	726.01	448.454	18	55117	1.07065	19.5	3.6255	66.0	109	4	80	6	4
5	US	26	Mich	163	Wayne	B2811	DETROIT EDISON TRE	1131.97	321.469	20	26163	0.74758	15.1	3.9601	80.1	149	7	52	4	5
6	US	26	Mich	147	St_Clair	B2796	ST. CLAIR / BELLE	1175.59	406.808	80	26163	0.73779	58.7	3.0537	243.1	18	8	2	9	6
7	US	18	Indi	29	Dearborn	00002	AMERICAN ELECTRIC	1040.07	-31.946	34	39061	0.71100	24.1	1.7065	57.8	81	9	97	16	7
8	US	26	Mich	115	Monroe	B2816	DETROIT EDISON/MON	1122.40	293.916	48	26163	0.43704	21.1	3.8031	183.6	99	22	7	5	8
9	US	39	Ohio	113	Montgomery	0857780013	DP&L, O.H. HUTCHIN	1080.83	32.197	49	39061	0.53632	26.2	1.9923	97.3	76	14	35	13	9
10	US	17	Illi	197	Will	197809AAO	MIDWEST GENERATION	754.82	201.224	55	17031	0.51395	28.3	2.0365	112.2	66	16	25	12	10
11	US	17	Illi	197	Will	197810AAK	MIDWEST GENERATION	739.33	216.943	44	17031	0.76842	34.0	1.5210	67.4	54	6	77	22	11
12	US	39	Ohio	61	Hamilton	1431350093	CINERGY CORP MIAMI	1044.54	-28.042	28	39061	0.57482	16.1	1.6199	45.5	130	11	136	19	12
13	US	17	Illi	31	Cook	031600AIN	MIDWEST GENERATION	740.23	258.241	20	17031	0.50121	10.1	1.9447	39.0	225	19	164	14	13
14	US	18	Indi	147	Spencer	00020	INDIANA MICHIGAN P	868.79	-182.363	116	MACA1	0.50965	59.1	1.6709	193.9	16	17	6	17	14
15	US	17	Illi	119	Madison	119020AAE	DYNEGY MIDWEST GEN	591.69	-103.839	17	17119	0.50712	8.7	1.5276	26.1	247	18	223	21	15
16	US	39	Ohio	35	Cuyahoga	1318000245	CLEVELAND ELECTRIC	1251.32	271.203	13	39035	0.37684	4.8	1.2550	16.1	352	24	290	26	16
17	US	17	Illi	31	Cook	031600AMI	MIDWEST GENERATION	770.73	243.506	16	17031	0.36113	5.9	1.1973	19.6	317	26	262	27	17
18	US	18	Indi	73	Jasper	00008	NIPSCO - R.M. SCHA	829.67	180.703	103	17031	0.39803	40.8	0.9307	95.4	37	23	38	32	18
19	US	18	Indi	89	Lake	00117	NIPSCO - DEAN H. M	792.89	223.831	46	17031	0.30339	13.9	1.1665	53.6	161	30	106	28	19
20	US	17	Illi	97	Lake	097190AAC	MIDWEST GENERATION	737.64	294.196	44	17031	0.24810	11.0	1.0000	44.3	205	34	141	29	20
21	US	39	Ohio	85	Lake	0243110008	PAINESVILLE MUNICI	1291.00	293.274	15	39055	0.14955	2.2	1.6578	24.8	474	53	228	18	21
22	US	26	Mich	115	Monroe	B2846	J.R. WHITING CO	1115.57	281.924	61	26163	0.18892	11.6	0.6854	42.1	196	41	148	39	22
23	US	39	Ohio	81	Jefferson	0641160017	W. H. SAMMIS PLANT	1370.12	182.626	121	39055	0.20359	24.7	0.5863	71.0	80	38	70	46	23
24	US	39	Ohio	1	Adams	0701000007	DP&L, J.M. STUART	1146.62	-66.909	93	39061	0.17124	15.9	0.6739	62.5	138	48	89	41	24
25	US	39	Ohio	93	Lorain	0247030013	AVON LAKE POWER PL	1233.49	243.827	40	39035	0.16397	6.6	0.6830	27.6	303	50	212	40	25
26	US	18	Indi	77	Jefferson	00001	IKEC - CLIFTY CREE	996.96	-75.840	95	39061	0.12745	12.0	1.4725	139.2	185	68	20	23	26
27	US	39	Ohio	95	Lucas	0448020006	TOLEDO EDISON CO.,	1113.16	257.144	86	26163	0.19430	16.7	0.5539	47.7	127	39	127	52	27
28	US	18	Indi	125	Pike	00002	IPL PETERSBURG GEN	842.68	-117.982	181	MACA1	0.31925	57.8	0.3770	68.3	20	28	73	71	28
29	US	18	Indi	43	Floyd	00004	PSI ENERGY - GALLA	968.21	-132.214	129	MACA1	0.17509	22.5	0.5434	69.9	91	47	71	53	29
30	US	55	Wisc	79	Milwaukee	241007800	WIS ELECTRIC POWER	735.39	372.568	72	55117	0.16369	11.8	0.5543	39.9	190	51	158	51	30
31	US	18	Indi	97	Marion	00033	IPL HARDING STREET	918.09	22.833	156	39061	0.14779	23.1	0.4341	67.8	88	56	75	62	31
32	US	55	Wisc	21	Columbia	111003090	Alliant Energy-Col	604.68	417.449	141	55117	0.11278	16.0	0.6267	88.7	137	77	45	43	32
33	US	39	Ohio	25	Clermont	1413090154	CINCINNATI GAS & E	1097.26	-48.043	43	39061	0.19308	8.3	0.3218	13.8	260	40	312	81	33
34	US	17	Illi	137	Morgan	137805AAA	AMEREN ENERGY GENE	573.75	-11.925	110	17119	0.13136	14.5	0.4641	51.2	156	67	113	58	34
35	US	26	Mich	139	Ottawa	B2835	J. H. CAMPBELL PLA	875.41	374.703	149	55117	0.09172	13.7	0.9888	147.2	165	95	18	31	35
36	US	26	Mich	163	Wayne	B2132	WYANDOTTE DEPT MUN	1133.22	331.351	11	26163	0.14801	1.6	0.3474	3.7	528	55	442	75	36
37	US	39	Ohio	7	Ashtabula	0204010000	CLEVELAND ELECTRIC	1339.05	329.017	63	39055	0.14809	9.4	0.3396	21.5	233	54	248	78	37
38	US	39	Ohio	31	Coshocton	0616000000	CONESVILLE POWER P	1273.11	126.550	144	39035	0.10727	15.4	0.5565	80.1	144	83	53	50	38
39	US	17	Illi	127	Massac	127855AAC	ELECTRIC ENERGY IN	730.42	-276.692	130	MING1	0.11597	15.1	0.4524	58.7	151	76	93	59	39
40	US	26	Mich	103	Marquette	B4261	WISCONSIN ELECTRIC	736.05	769.936	113	ISLE1	0.14091	16.0	0.3417	38.8	136	60	165	76	40

The figure below shows the fraction of the total regional Q/d value for each group of 10 facilities (i.e., the top 10 facilities are represented by the first set of symbols, which are designated by the number "1"). This shows that the top 30 facilities represent 75-80% of the regional Q/d value and about 50% of the regional NOx and SO2 emissions. To model this scenario, the MACTEC EGU2 control factors for only these top 30 facilities will be applied.



b. EGU2 in 100 km radius of each residual ozone and PM2.5 nonattainment area

There are 162 EGUs within 105 km of at least one of the residual nonattainment monitors/areas noted above. (Note: 105 km was used to flag facilities instead of 100 km because there were five large facilities slightly beyond 100 km.) These 162 EGUs represent 80% of the regional Q/d value and about 47% of the regional NOx and SO2 emissions. To model this scenario, the MACTEC EGU2 control factors for only these 162 facilities will be applied.

c. EGU2 in 5-state region

To model this scenario, the MACTEC EGU2 control factors for all 392 EGUs in the 5-state region will be applied.

d. EGU2 in 12-state region (5-state region plus MN, IA, MO, KY, TN, WV, PA)

To model this scenario, the MACTEC EGU2 control factors for all EGUs in the 5-state region plus EGUs in several neighboring factors (MN, IA, MO, KY, TN, WV, and PA)[3] will be applied.

e. EGU1 in 5-state region

To model this scenario, the MACTEC EGU1 control factors for all EGUs in the 5-state region will be applied.

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[3] The control factors for these other states were derived by MACTEC following the same procedures as those outlined above for the five LADCO states.

f. EGU1 in 5-state region based on IPM modeling

IPM modeling for EGU1 was conducted by ICF to provide the modeling emissions inventory.

g. EGU2 in 5-state region based on IPM modeling

IPM modeling for EGU2 was also conducted by ICF to provide the modeling emissions inventory.

Two assumptions in the IPM modeling should be noted:

- ICF assumed banking and withdrawal of allowances, which results in higher SO2 and NOx emissions in later years, such as 2012, compared to the EGU1 and EGU2 emission caps. If desired, then ICF can disable banking so that the emissions in the LADCO states are at the level of the SO2 and NOx caps.

- ICF assumed EGU1 and EGU2 policies independent of the CAIR policies. If one wants to see a net reduction in both the LADCO and the CAIR regions, then it is necessary to retire the Title IV SO2 and the CAIR NOx allowance budgets to the extent that the EGU1 and EGU2 caps are lower than the CAIR state level budgets. This, too, can be implemented in IPM.

To undo these assumptions (i.e., disable banking and force the EGU1/EGU2 emission caps) will require another IPM run. (No decision has been made whether to pursue further IPM modeling.)