DEVELOPMENT OF GROWTH AND CONTROL FACTORS FOR LAKE MICHIGAN AIR DIRECTORS CONSORTIUM (LADCO)

DRAFT REPORT

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TABLES

ACRONYMS AND ABBREVIATIONS

AEO	*Annual Energy Outlook*
AIM	Architectural and Industrial Maintenance (coatings)
BART	best available retrofit technology
bhp-hr	brake horsepower-hour
CE	control efficiency
CMV	commercial marine vessel
DOE	Department of Energy
EGAS	Economic Growth Analysis System
EGU	electric generating unit
EIA	Energy Information Administration
EPA	United States Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
HAPs	hazardous air pollutants
IC	internal combustion
ICAO	International Civil Aviation Organization
ICI	industrial, commercial, and institutional
kW	kilowatt
LADCO	Lake Michigan Air Directors Consortium
LAER	lowest achievable emission rate
MACT	maximum achievable control technology
MERR	Mobile Equipment Repair and Refinishing
MPO	Metropolitan Planning Organization
NAAQS	national ambient air quality standards
NEI	National Emissions Inventory
NIPC	Northeastern Illinois Planning Commission
NMIM	National Mobile Inventory Model
NO_x	oxides of nitrogen
NSPS	new source performance standard
OTAQ	Office of Transportation and Air Quality
OTC	Ozone Transport Commission
Pechan	E.H. Pechan & Associates, Inc.
PM	particulate matter
RACT	reasonably available control technology
RE	rule effectiveness
REMI	Regional Economic Models, Inc.
RIA	regulatory impact analysis
RICE	reciprocating internal combustion engines
RP	rule penetration
RPO	Regional Planning Organization
RSD	Regulatory Support Document
SCC	source classification code
S-I	spark-ignition

SIC	standard industrial classification
SIP	State Implementation Plan
VMT	vehicle miles traveled
VOC	volatile organic compound

CHAPTER I. BACKGROUND

E.H. Pechan & Associates, Inc. (Pechan) is supporting the Lake Michigan Air Directors Consortium's (LADCO) efforts to forecast anthropogenic emissions for the purpose of assessing progress for air quality goals, including goals related to regional haze and attainment of the ozone national ambient air quality standards (NAAQS). Although the primary geographic area of interest is the 5-State Midwest Regional Planning Organization (RPO) region (i.e., Indiana, Illinois, Michigan, Ohio, and Wisconsin), LADCO has requested assistance in projecting emissions throughout the continental United States. The scope of this study includes non-electric generating unit (EGU) point, area, and nonroad source category emissions.[1] Emission activity growth and emission control data were prepared for these categories relative to a base year (2002) inventory supplied by LADCO (Janssen, 2004; Judson, 2004).[2]

To assess progress for attaining air quality goals, LADCO requires emission activity growth and control data to forecast emissions from a 2002 base year inventory to several future years of interest. These future years were identified by LADCO as 2007, 2008, 2009, 2012, and 2018 (e.g., 2018 is the first milestone for regional haze reasonable progress demonstrations). Pechan prepared emission control factors to support forecasting for each of these years. Because the incremental level of effort required to develop emission activity growth factors for each year over the 2003-2018 period was nominal, Pechan prepared non-EGU point and area and nonroad source growth factors for each year over this entire period.

Under Task 1, Pechan summarized alternative stationary point and area source and on-road and nonroad mobile source growth methodologies for LADCO's consideration (Pechan, 2004a). The Task 1 report provides a summary of the emission projection methodology information obtained from each Midwest RPO region State agency and provides the following information on each approach:

- Background/overview of the method/data;
- Geographic and source category coverage; and
- Cost and availability of documentation.

Under Task 2, Pechan evaluated the growth methodologies summarized under Task 1 using a set of evaluation criteria selected in consultation with LADCO. The Task 2 report presents the evaluation of alternative emission activity projection methodologies (Pechan, 2004b). Under Task 3, Pechan prepared a summary of recommendations as to the methods and data to be used in developing growth factors to support LADCO's emission forecasting efforts (Bollman, 2004).

LADCO is conducting a multi-phase forecasting study involving three control scenarios. These control scenarios involve (1) currently mandated controls ("on-the-books" controls); (2) the

[1] LADCO is compiling vehicle miles traveled (VMT) data to support onroad mobile source emission forecasting and a separate Pechan study will provide LADCO with EGU forecast data.

[2] Although the base year inventory data supplied by LADCO included EGU SCCs (both point and area), Pechan did not include growth or control factors for these SCCs in these draft submittals (forecast year information for EGUs is being prepared under a separate LADCO contract).

United States Environmental Protection Agency (EPA) controls that have been proposed, but not yet promulgated ("on-the-way" controls); and (3) one or more additional control programs yet to be determined. Because no non-EGU point/area or nonroad source category "on-the-way" controls were identified as part of this effort, this report solely concerns "on-the-books" controls.

This report describes Pechan efforts to develop emission growth and control data to support future year air quality modeling by LADCO. This report is organized into this Background chapter and:

- Chapter II, which describes the development of the emission activity growth data;
- Chapter III, which discusses how the emission control data were compiled;
- Chapter IV, which describes the preparation of the growth and control factor files;
- Chapter V, which identifies study uncertainties and requests for assistance by LADCO/Midwest RPO region State agencies in addressing these uncertainties; and
- Chapter VI, which presents the references consulted in preparing this report.

CHAPTER II. EMISSION ACTIVITY GROWTH DATA

A. OVERVIEW

Given the number of non-EGU point and area and nonroad source classification codes (SCCs) in the base year inventory supplied by LADCO, for most SCCs, it was necessary for Pechan to rely on a default forecast approach. This approach is based on the information that is currently being incorporated into the forthcoming Version 5.0 of the Economic Growth Analysis System (EGAS). However, for priority source categories, which were identified in consultation with LADCO, Pechan conducted a detailed evaluation of alternative growth methodologies before selecting the forecasting approach used in this study. By focusing these evaluations on the highest-emitting SCCs, Pechan ensured that these evaluations provide LADCO with the best growth methodology for the most important source categories. Details on these evaluations are available from the Task 2 report (Pechan, 2004b).

Appendix Table A-1 presents the growth surrogate indicator assignments used in this study. For the non-priority source categories, these assignments were taken from the SCC-crosswalk developed for the forthcoming Economic Growth Analysis System (EGAS) 5.0 and rely on two main growth indicator resources: (1) version 5.5 of Regional Economic Models Incorporated (REMI)'s State-level economic models (Houyoux, 2004); and (2) the Department of Energy (DOE)'s *Annual Energy Outlook 2004* (DOE, 2004). Because there are a few non-priority SCCs in the LADCO base year inventory that are not included in the forthcoming EGAS 5.0 crosswalk, Pechan assigned these SCCs to an appropriate growth indicator. These non-EGAS 5.0 crosswalk assignments are:

SCC	SCC Description	Growth Indicator	Data Source
2501011010	Portable Fuel Containers, Residential	Stage II Gasoline Regression Equation	REMI
2501012010	Portable Fuel Containers, Industrial	Stage II Gasoline Regression Equation	REMI
30502034	n/a	Nonmetallic minerals, except fuels - SIC 14	REMI
30502035	n/a	Nonmetallic minerals, except fuels - SIC 14	REMI
30502037	n/a	Nonmetallic minerals, except fuels - SIC 14	REMI
30502042	n/a	Nonmetallic minerals, except fuels - SIC 14	REMI
30502043	n/a	Nonmetallic minerals, except fuels - SIC 14	REMI
30502051	n/a	Nonmetallic minerals, except fuels - SIC 14	REMI
99999999	n/a	Population	REMI
null		Population	REMI

n/a - No descriptions were identified for these SCCs (SCCs 305020xx are associated with Stone Quarrying - Processing activities).
null - represents records in base year inventory without values reported in SCC field.

The balance of this chapter describes the emission activity growth data developed in this study. Chapter IV discusses how these data were compiled into the file format required by LADCO.

B. NON-EGU POINT AND AREA SOURCES

1. Non-Priority Source Sectors

For non-priority source categories, Pechan relied on the two main sets of forecasting data that will be used in the forthcoming Version 5.0 of EGAS: (1) version 5.5 of REMI's State-level economic models (Houyoux, 2004); and (2) DOE's *Annual Energy Outlook 2004* (DOE, 2004). While the REMI socioeconomic growth indicators provide State-level growth rates, the DOE

energy forecasts typically provide regional growth rates (i.e., the same growth rate is applied to each Midwest RPO State because each of these States is included in the DOE's East North Central division). The DOE only provides national forecast data for the following energy sectors/fuel types that were used as growth indicators for non-EGU point/area SCCs:

Code	Indicator	Code	Indicator
1401	Cement/Distillate	1903	Other Manufacturing/Natural Gas
1402	Cement/Natural Gas	1904	Other Manufacturing/Petroleum Subtotal
1403	Cement/Residual	1905	Other Manufacturing/Renewable Energy
1404	Cement/Steam Coal	1906	Other Manufacturing/Residual
1601	Iron and Steel/Distillate	1907	Other Manufacturing/Steam Coal
1602	Iron and Steel/Metallurgical Coal	1908	Other Manufacturing/Total
1603	Iron and Steel/Natural Gas	2001	Paper/Distillate
1605	Iron and Steel/Residual	2002	Paper/Natural Gas
1606	Iron and Steel/Total	2003	Paper/Residual
1701	Metals-Based Durables/Distillate	2004	Paper/Total
1702	Metals-Based Durables/Natural Gas	2101	Refining/Distillate
1703	Metals-Based Durables/Residual	2102	Refining/Liquified Petroleum Gas
1801	Mining/Distillate	2103	Refining/Natural Gas
1802	Mining/Lease and Plant Fuel	2104	Refining/Other Petroleum
1803	Mining/Natural Gas	2105	Refining/Petroleum Subtotal
1804	Mining/Other Petroleum	2106	Refining/Residual
1805	Mining/Residual	2107	Refining/Still Gas
1806	Mining/Total	2108	Refining/Total
1901	Other Manufacturing/Distillate	3001	Total Refined Petroleum Products Supplied
1902	Other Manufacturing/Liquified Petroleum		

Pechan also compiled population projections from each State in the Midwest RPO region. Except for Illinois, county-level projections were available for every State for each fifth year over the period 2000 through 2020 (IU, 2004; MSU, 2001; ODOD, 2004; and WIDOA, 2004). To develop growth factors for each year over the 2003-2018 period, Pechan interpolated between the available years. Illinois is currently in the process of updating their county population projections based on data from the 2000 Census (Taft, 2004). Because these data will not be available until later this year, Pechan was only able to use current county-level population projections for six Illinois counties (Cook, DuPage, Kane, Lake, McHenry, and Will) prepared by the Northeastern Illinois Planning Commission (NIPC, 2004). Because population data from the NIPC were available for 2000 and 2030, Pechan interpolated between the projections for these years to develop growth factors for each year of interest. For all other counties in Illinois, Pechan utilized State-level population projections from the REMI models. Table II-1 presents the population projections for 2002, 2007, 2008, 2009, 2012, and 2018 used for the Midwest RPO region.

2. Priority Source Sectors

For a set of priority non-EGU point and area source categories, Pechan conducted more detailed analysis of the alternative emission activity growth methodologies. Pechan assisted LADCO in compiling a list of the emission activities associated with these categories. For these emission activities (see Table II-2), Pechan conducted past performance evaluations to identify the growth methodology with the most empirical validity based on how well each methodology had been able to predict past emission activity trends. The Task 2 study report describes more details on the empirical validity and other criteria that were used to evaluate each alternative growth methodology (Pechan, 2004b).

Table II-1. Midwest RPO Region Population Projections for Years of Interest

ILLINOIS							
STCTYFIPS	**County**	**2002**	**2007**	**2008**	**2009**	**2012**	**2018**
17000	Illinois	12,552	12,935	13,042	13,154	13,516	14,403
17031	Cook	5,412,465	5,502,815	5,521,066	5,539,376	5,594,674	5,706,931
17043	Dupage	910,395	926,169	929,357	932,555	942,217	961,841
17089	Kane	418,887	458,211	466,509	474,956	501,227	558,210
17097	Lake	656,071	686,300	692,511	698,778	717,922	757,797
17111	McHenry	269,752	295,543	300,990	306,538	323,801	361,298
17197	Will	529,462	604,071	620,210	636,780	689,194	807,319
INDIANA							
18001	Adams	33,447	33,292	33,347	33,403	33,760	34,806
18003	Allen	334,263	341,391	343,145	344,899	350,761	363,669
18005	Bartholomew	71,212	71,030	71,105	71,181	71,599	72,746
18007	Benton	9,294	9,053	9,029	9,004	8,967	8,944
18009	Blackford	13,921	13,667	13,634	13,602	13,536	13,458
18011	Boone	48,541	53,843	54,668	55,494	57,489	60,636
18013	Brown	15,329	16,100	16,206	16,313	16,513	16,681
18015	Carroll	20,261	20,488	20,530	20,572	20,690	20,929
18017	Cass	40,503	39,795	39,760	39,726	39,798	40,317
18019	Clark	97,706	100,522	101,005	101,487	102,730	104,851
18021	Clay	26,513	26,504	26,531	26,559	26,696	27,059
18023	Clinton	33,569	33,145	33,155	33,166	33,377	34,112
18025	Crawford	11,095	11,887	12,019	12,152	12,484	13,019
18027	Daviess	29,782	29,866	29,936	30,006	30,315	31,151
18029	Dearborn	47,214	49,665	50,062	50,458	51,416	52,886
18031	Decatur	24,541	24,627	24,681	24,735	24,954	25,502
18033	De Kalb	40,593	41,430	41,617	41,805	42,407	43,707
18035	Delaware	119,640	121,708	122,089	122,470	123,665	126,124
18037	Dubois	39,709	39,851	39,897	39,942	40,102	40,459
18039	Elkhart	183,531	186,693	187,720	188,746	192,489	201,243
18041	Fayette	25,250	24,589	24,511	24,434	24,302	24,229
18043	Floyd	71,041	71,618	71,743	71,867	72,266	73,050
18045	Fountain	17,877	17,742	17,732	17,723	17,715	17,742
18047	Franklin	22,590	23,563	23,720	23,878	24,269	24,926
18049	Fulton	20,583	20,788	20,836	20,885	21,048	21,390
18051	Gibson	32,589	32,795	32,831	32,868	32,979	33,217
18053	Grant	72,823	71,676	71,537	71,399	71,440	72,212
18055	Greene	33,186	33,272	33,292	33,313	33,356	33,424
18057	Hamilton	208,294	267,432	277,836	288,239	314,499	356,870
18059	Hancock	58,309	64,583	65,530	66,478	68,662	71,727
18061	Harrison	35,222	37,221	37,549	37,876	38,685	39,958
18063	Hendricks	113,961	136,044	139,685	143,325	152,298	166,519
18065	Henry	48,148	47,414	47,317	47,220	47,015	46,751
18067	Howard	84,650	84,254	84,292	84,329	84,627	85,596
18069	Huntington	38,125	38,344	38,415	38,487	38,769	39,445
18071	Jackson	41,364	41,575	41,659	41,743	42,053	42,763
18073	Jasper	30,672	31,983	32,166	32,350	32,757	33,389
18075	Jay	21,656	21,407	21,395	21,384	21,435	21,694
18077	Jefferson	32,117	32,958	33,070	33,181	33,487	34,100
18079	Jennings	28,210	29,736	30,006	30,277	31,023	32,369
18081	Johnson	121,229	134,449	136,545	138,640	143,773	151,965
18083	Knox	39,257	39,314	39,343	39,371	39,473	39,809
18085	Kosciusko	74,323	75,288	75,572	75,855	76,843	79,063
18087	Lagrange	35,470	37,114	37,516	37,917	39,235	42,128
18089	Lake	483,466	482,365	482,638	482,910	484,741	490,352
18091	La Porte	110,018	110,082	110,180	110,278	110,711	111,852

Table II-1 (continued)

STCTYFIPS	County	2002	2007	2008	2009	2012	2018
INDIANA (continued)							
18093	Lawrence	45,968	46,093	46,120	46,148	46,221	46,336
18095	Madison	132,299	130,034	129,695	129,357	128,517	127,136
18097	Marion	858,354	859,686	861,927	864,168	873,577	896,310
18099	Marshall	45,498	46,519	46,751	46,984	47,736	49,335
18101	Martin	10,363	10,365	10,370	10,376	10,397	10,429
18103	Miami	36,301	36,811	36,901	36,992	37,227	37,637
18105	Monroe	123,323	129,653	130,749	131,844	134,835	140,168
18107	Montgomery	37,743	38,021	38,076	38,130	38,412	39,164
18109	Morgan	67,874	70,536	70,978	71,420	72,538	74,328
18111	Newton	14,518	14,445	14,444	14,444	14,468	14,540
18113	Noble	46,409	47,016	47,220	47,423	48,176	49,947
18115	Ohio	5,734	5,977	6,016	6,054	6,139	6,253
18117	Orange	19,461	19,835	19,905	19,976	20,176	20,563
18119	Owen	22,366	23,647	23,852	24,058	24,546	25,259
18121	Parke	17,297	17,417	17,436	17,454	17,474	17,424
18123	Perry	18,837	18,729	18,723	18,716	18,712	18,734
18125	Pike	12,952	13,202	13,240	13,279	13,372	13,510
18127	Porter	149,208	154,395	155,182	155,968	157,617	160,224
18129	Posey	26,945	26,705	26,671	26,638	26,546	26,391
18131	Pulaski	13,809	13,940	13,966	13,991	14,065	14,179
18133	Putnam	36,572	37,834	38,051	38,267	38,878	40,083
18135	Randolph	27,229	26,916	26,888	26,861	26,835	26,905
18137	Ripley	26,920	27,839	28,000	28,162	28,612	29,427
18139	Rush	18,049	17,646	17,605	17,563	17,506	17,504
18141	St. Joseph	265,884	267,929	268,708	269,487	272,831	281,003
18143	Scott	23,414	24,436	24,607	24,777	25,206	25,928
18145	Shelby	43,471	43,680	43,765	43,849	44,165	44,876
18147	Spencer	20,323	20,228	20,233	20,237	20,281	20,391
18149	Starke	23,420	23,213	23,211	23,209	23,265	23,454
18151	Steuben	33,353	33,786	33,898	34,010	34,438	35,460
18153	Sullivan	21,954	22,410	22,485	22,561	22,755	23,062
18155	Switzerland	9,343	9,963	10,063	10,164	10,415	10,812
18157	Tippecanoe	152,344	160,062	161,378	162,695	166,607	173,745
18159	Tipton	16,555	16,501	16,491	16,481	16,448	16,375
18161	Union	7,353	7,368	7,372	7,376	7,388	7,416
18163	Vanderburgh	172,037	173,068	173,497	173,926	175,726	179,750
18165	Vermillion	16,641	16,342	16,303	16,264	16,177	16,052
18167	Vigo	105,982	106,584	106,784	106,985	107,976	110,562
18169	Wabash	34,791	34,531	34,529	34,526	34,614	34,966
18171	Warren	8,589	8,934	8,980	9,025	9,113	9,196
18173	Warrick	53,411	55,624	55,959	56,295	57,087	58,247
18175	Washington	27,764	28,990	29,198	29,405	29,945	30,858
18177	Wayne	70,717	69,945	69,843	69,742	69,555	69,402
18179	Wells	27,614	27,676	27,697	27,717	27,805	28,046
18181	White	25,140	24,995	25,017	25,040	25,181	25,556
18183	Whitley	31,238	32,441	32,645	32,848	33,382	34,290
MICHIGAN							
26001	Alcona	10,655	10,797	10,819	10,841	10,899	10,975
26003	Alger	9,956	10,051	10,072	10,093	10,145	10,200
26005	Allegan	104,406	109,023	109,967	110,912	113,870	119,825
26007	Alpena	30,544	30,281	30,217	30,152	29,904	29,274
26009	Antrim	22,318	23,769	24,059	24,350	25,245	27,060
26011	Arenac	17,049	17,742	17,888	18,033	18,443	19,170
26013	Baraga	8,313	8,168	8,139	8,111	8,036	7,908

Table II-1 (continued)

STCTYFIPS	County	2002	2007	2008	2009	2012	2018
MICHIGAN (continued)							
26015	Barry	55,271	56,917	57,232	57,547	58,438	59,969
26017	Bay	111,158	110,175	109,914	109,654	108,731	106,593
26019	Benzie	14,858	15,672	15,834	15,995	16,473	17,382
26021	Berrien	162,065	161,372	161,177	160,983	160,361	159,237
26023	Branch	44,275	45,378	45,604	45,829	46,511	47,817
26025	Calhoun	143,488	144,797	145,017	145,237	145,832	146,895
26027	Cass	49,987	50,297	50,338	50,380	50,428	50,313
26029	Charlevoix	25,294	26,883	27,209	27,534	28,550	30,625
26031	Cheboygan	24,000	24,684	24,822	24,959	25,342	25,955
26033	Chippewa	40,347	42,988	43,541	44,093	45,876	49,675
26035	Clare	30,387	32,077	32,427	32,776	33,882	36,170
26037	Clinton	63,923	65,031	65,207	65,382	65,779	66,208
26039	Crawford	15,437	16,842	17,135	17,427	18,337	20,225
26041	Delta	38,837	38,969	39,001	39,032	39,136	39,338
26043	Dickinson	27,468	27,627	27,666	27,706	27,824	28,034
26045	Eaton	103,643	107,402	108,147	108,892	111,165	115,830
26047	Emmet	29,332	30,644	30,907	31,171	31,997	33,712
26049	Genesee	436,833	433,755	432,858	431,961	428,753	421,489
26051	Gladwin	26,290	27,657	27,929	28,202	29,025	30,601
26053	Gogebic	16,467	15,488	15,303	15,117	14,597	13,636
26055	Grand Traverse	78,604	84,035	85,155	86,274	89,817	97,159
26057	Gratiot	40,098	40,111	40,101	40,092	39,996	39,633
26059	Hillsdale	47,132	48,434	48,689	48,943	49,690	51,120
26061	Houghton	36,670	37,163	37,275	37,386	37,733	38,403
26063	Huron	34,956	34,657	34,599	34,540	34,367	34,042
26065	Ingham	280,229	280,353	280,302	280,251	280,173	280,026
26067	Ionia	61,766	63,031	63,280	63,530	64,202	65,219
26069	Iosco	24,969	25,147	25,185	25,223	25,365	25,715
26071	Iron	12,528	12,111	12,039	11,966	11,757	11,357
26073	Isabella	58,223	59,620	59,918	60,217	61,134	62,877
26075	Jackson	157,506	159,364	159,709	160,053	161,038	162,835
26077	Kalamazoo	235,415	239,250	239,922	240,595	242,549	246,258
26079	Kalkaska	16,368	17,676	17,954	18,232	19,078	20,717
26081	Kent	564,007	590,809	596,303	601,797	619,133	655,174
26083	Keweenaw	1,862	1,803	1,794	1,784	1,759	1,701
26085	Lake	10,400	10,971	11,094	11,217	11,613	12,414
26087	Lapeer	91,926	97,671	98,810	99,950	103,255	109,518
26089	Leelanau	19,609	20,239	20,362	20,486	20,929	21,907
26091	Lenawee	100,699	103,241	103,708	104,174	105,445	107,732
26093	Livingston	154,734	169,703	172,729	175,754	185,287	205,544
26095	Luce	5,586	5,570	5,565	5,561	5,536	5,462
26097	Mackinac	11,545	12,197	12,361	12,526	13,143	14,688
26099	Macomb	760,691	770,751	771,901	773,052	775,068	777,014
26101	Manistee	22,956	23,015	23,029	23,043	23,062	22,996
26103	Marquette	69,047	68,707	68,602	68,498	68,082	67,043
26105	Mason	27,361	27,632	27,690	27,749	27,914	28,167
26107	Mecosta	38,683	39,461	39,628	39,795	40,271	41,138
26109	Menominee	23,153	22,110	21,905	21,701	21,124	19,975
26111	Midland	84,079	86,587	87,035	87,483	88,663	90,698
26113	Missaukee	14,792	15,790	16,006	16,221	16,887	18,185
26115	Monroe	144,078	146,497	146,893	147,290	148,249	149,655
26117	Montcalm	61,421	63,960	64,473	64,987	66,514	69,431
26119	Montmorency	11,275	12,458	12,714	12,969	13,816	15,610
26121	Muskegon	166,911	168,096	168,322	168,547	169,219	170,431

Table II-1 (continued)

STCTYFIPS	County	2002	2007	2008	2009	2012	2018
MICHIGAN (continued)							
26123	Newaygo	47,843	51,121	51,820	52,518	54,776	59,456
26125	Oakland	1,241,734	1,297,420	1,308,126	1,318,831	1,351,747	1,420,507
26127	Oceana	24,435	24,852	24,937	25,023	25,250	25,601
26129	Ogemaw	23,201	25,178	25,589	26,001	27,274	29,879
26131	Ontonagon	8,224	7,916	7,853	7,789	7,588	7,161
26133	Osceola	22,649	23,263	23,388	23,513	23,864	24,474
26135	Oscoda	9,831	10,650	10,822	10,994	11,548	12,706
26137	Otsego	24,246	26,869	27,422	27,976	29,751	33,537
26139	Ottawa	237,473	257,124	261,180	265,236	278,212	305,968
26141	Presque Isle	14,500	14,704	14,743	14,781	14,893	15,117
26143	Roscommon	25,339	27,317	27,731	28,144	29,459	32,220
26145	Saginaw	213,777	213,284	213,070	212,855	212,013	210,014
26147	St. Clair	164,288	170,963	172,262	173,560	177,426	184,938
26149	St. Joseph	62,019	62,834	62,988	63,141	63,551	64,134
26151	Sanilac	43,104	43,862	44,019	44,177	44,617	45,332
26153	Schoolcraft	8,812	8,887	8,900	8,913	8,944	8,945
26155	Shiawassee	72,985	73,267	73,271	73,275	73,123	72,445
26157	Tuscola	58,798	59,559	59,684	59,810	60,076	60,308
26159	Van Buren	80,336	84,541	85,397	86,254	88,847	94,035
26161	Washtenaw	311,132	322,886	325,118	327,351	333,900	346,852
26163	Wayne	2,001,675	1,947,989	1,936,821	1,925,652	1,894,487	1,838,871
26165	Wexford	29,245	29,599	29,673	29,746	29,969	30,369
OHIO							
39001	Adams	27,702	28,720	28,950	29,180	29,758	31,006
39003	Allen	108,314	107,644	107,426	107,208	106,874	106,202
39005	Ashland	53,232	55,044	55,416	55,788	56,712	58,422
39007	Ashtabula	103,206	104,340	104,550	104,760	105,130	105,802
39009	Athens	62,920	64,194	64,306	64,418	65,602	66,484
39011	Auglaize	46,766	47,272	47,408	47,544	48,120	49,356
39013	Belmont	69,818	68,732	68,498	68,264	67,858	67,126
39015	Brown	43,282	46,082	46,738	47,394	49,002	52,140
39017	Butler	340,038	357,592	360,948	364,304	374,964	396,684
39019	Carroll	29,384	30,848	31,172	31,496	32,248	33,658
39021	Champaign	39,294	40,448	40,722	40,996	41,738	43,406
39023	Clark	144,496	143,398	143,032	142,666	142,160	141,776
39025	Clermont	182,880	195,270	197,790	200,310	207,222	220,728
39027	Clinton	41,472	43,910	44,430	44,950	46,282	48,886
39029	Columbiana	111,920	111,788	111,842	111,896	111,918	112,260
39031	Coshocton	36,752	36,962	36,998	37,034	37,210	37,588
39033	Crawford	46,682	45,930	45,770	45,610	45,190	44,470
39035	Cuyahoga	1,379,132	1,347,132	1,342,268	1,337,404	1,323,380	1,304,978
39037	Darke	53,290	53,048	52,942	52,836	52,774	52,666
39039	Defiance	39,580	39,636	39,604	39,572	39,624	39,720
39041	Delaware	120,398	146,298	151,442	156,586	172,338	204,588
39043	Erie	80,138	81,180	81,260	81,340	81,756	82,344
39045	Fairfield	126,588	136,942	139,248	141,554	148,448	163,856
39047	Fayette	28,390	28,466	28,534	28,602	28,778	29,318
39049	Franklin	1,086,540	1,130,092	1,138,698	1,147,304	1,171,670	1,221,074
39051	Fulton	42,556	43,806	44,074	44,342	45,098	46,658
39053	Gallia	31,274	31,840	31,970	32,100	32,450	33,128
39055	Geauga	92,316	96,192	97,068	97,944	99,808	103,402
39057	Greene	148,154	149,834	150,476	151,118	152,464	155,362
39059	Guernsey	40,762	40,992	41,128	41,264	41,504	42,152
39061	Hamilton	837,464	818,450	814,820	811,190	799,712	778,100

Table II-1 (continued)

STCTYFIPS	County	2002	2007	2008	2009	2012	2018
OHIO (continued)							
39063	Hancock	71,992	73,490	73,720	73,950	74,804	76,442
39065	Hardin	32,118	32,402	32,418	32,434	32,562	32,724
39067	Harrison	15,808	15,722	15,718	15,714	15,670	15,652
39069	Henry	29,302	29,480	29,500	29,520	29,664	29,934
39071	Highland	41,536	43,368	43,792	44,216	45,292	47,440
39073	Hocking	28,492	29,258	29,452	29,646	30,024	30,720
39075	Holmes	39,680	41,850	42,380	42,910	44,004	46,146
39077	Huron	60,026	61,314	61,556	61,798	62,268	63,102
39079	Jackson	32,868	33,534	33,696	33,858	34,120	34,744
39081	Jefferson	72,462	68,804	68,046	67,288	65,358	61,896
39083	Knox	55,620	58,620	59,280	59,940	61,600	64,804
39085	Lake	228,710	231,862	232,538	233,214	233,838	234,216
39087	Lawrence	62,424	62,712	62,778	62,844	63,086	63,638
39089	Licking	148,430	156,216	157,904	159,592	164,508	175,170
39091	Logan	46,686	48,236	48,504	48,772	49,592	50,972
39093	Lorain	286,156	289,376	289,864	290,352	292,768	298,042
39095	Lucas	452,746	447,522	446,638	445,754	442,670	436,538
39097	Madison	40,886	42,392	42,638	42,884	43,594	44,830
39099	Mahoning	255,600	249,900	248,520	247,140	243,924	237,678
39101	Marion	66,244	66,252	66,238	66,224	66,426	67,014
39103	Medina	155,328	166,506	168,924	171,342	177,012	187,866
39105	Meigs	23,242	23,576	23,614	23,652	23,798	23,978
39107	Mercer	41,088	41,536	41,634	41,732	42,150	43,194
39109	Miami	99,666	101,900	102,420	102,940	103,988	105,974
39111	Monroe	15,012	14,776	14,784	14,792	14,632	14,320
39113	Montgomery	555,896	546,858	544,712	542,566	537,936	530,964
39115	Morgan	15,020	15,200	15,200	15,200	15,228	15,180
39117	Morrow	32,070	33,402	33,738	34,074	34,798	36,286
39119	Muskingum	85,162	86,532	86,788	87,044	88,132	90,436
39121	Noble	14,328	14,986	15,114	15,242	15,558	16,074
39123	Ottawa	40,934	40,826	40,814	40,802	40,654	40,342
39125	Paulding	20,218	20,070	20,050	20,030	19,854	19,506
39127	Perry	34,736	36,200	36,440	36,680	37,524	39,072
39129	Pickaway	53,434	54,966	55,204	55,442	56,296	57,776
39131	Pike	28,096	29,122	29,338	29,554	29,998	30,784
39133	Portage	153,392	156,498	157,052	157,606	158,992	161,092
39135	Preble	42,804	43,780	43,920	44,060	44,444	44,966
39137	Putnam	34,818	35,002	35,028	35,054	35,216	35,594
39139	Richland	128,586	128,474	128,616	128,758	128,848	129,538
39141	Ross	74,282	76,760	77,300	77,840	79,220	81,950
39143	Sandusky	61,498	60,612	60,388	60,164	59,528	58,304
39145	Scioto	79,192	79,036	78,964	78,892	78,808	78,514
39147	Seneca	58,232	57,236	57,074	56,912	56,218	54,724
39149	Shelby	48,470	49,674	49,856	50,038	50,616	51,534
39151	Stark	377,572	376,656	376,594	376,532	375,474	373,086
39153	Summit	546,464	554,150	555,320	556,490	559,320	563,610
39155	Trumbull	224,364	221,430	220,530	219,630	217,634	213,056
39157	Tuscarawas	91,102	92,098	92,452	92,806	93,492	95,244
39159	Union	42,638	47,434	48,536	49,638	53,080	61,378
39161	Van Wert	29,588	29,420	29,390	29,360	29,254	29,038
39163	Vinton	13,078	13,612	13,678	13,744	14,066	14,606
39165	Warren	168,712	196,534	202,696	208,858	226,096	262,834
39167	Washington	63,506	63,738	63,662	63,586	63,566	63,308
39169	Wayne	113,020	117,066	117,994	118,922	121,318	126,610

Table II-1 (continued)

STCTYFIPS	County	2002	2007	2008	2009	2012	2018
OHIO (continued)							
39171	Williams	39,210	39,248	39,252	39,256	39,160	38,998
39173	Wood	122,226	125,184	125,796	126,408	128,012	131,798
39175	Wyandot	22,894	22,958	23,002	23,046	23,126	23,312
WISCONSIN							
55001	Adams	20,270	21,089	21,235	21,382	21,704	22,070
55003	Ashland	16,968	17,256	17,325	17,393	17,598	17,986
55005	Barron	45,405	46,601	46,867	47,134	47,838	49,029
55007	Bayfield	15,181	15,591	15,671	15,750	15,950	16,241
55009	Brown	231,001	241,921	244,123	246,326	252,794	265,564
55011	Buffalo	13,905	14,180	14,241	14,303	14,474	14,779
55013	Burnett	15,954	16,622	16,746	16,869	17,127	17,381
55015	Calumet	42,051	45,468	46,112	46,755	48,591	52,236
55017	Chippewa	56,213	58,731	59,226	59,722	61,080	63,525
55019	Clark	33,857	34,687	34,878	35,068	35,753	37,285
55021	Columbia	53,254	55,207	55,593	55,980	57,074	59,106
55023	Crawford	17,338	17,624	17,695	17,767	17,939	18,207
55025	Dane	438,286	465,785	470,715	475,644	489,551	517,727
55027	Dodge	86,815	89,141	89,616	90,090	91,476	94,066
55029	Door	28,386	29,459	29,676	29,894	30,325	30,738
55031	Douglas	43,561	44,277	44,430	44,582	45,053	45,981
55033	Dunn	40,733	42,736	43,081	43,426	44,329	46,303
55035	Eau Claire	94,957	99,239	100,020	100,800	102,813	107,070
55037	Florence	5,141	5,271	5,297	5,322	5,373	5,430
55039	Fond du Lac	98,443	101,310	101,884	102,457	104,129	107,407
55041	Forest	10,087	10,249	10,283	10,316	10,389	10,458
55043	Grant	50,069	51,074	51,221	51,369	51,641	52,304
55045	Green	34,151	35,381	35,618	35,856	36,559	37,988
55047	Green Lake	19,191	19,459	19,528	19,597	19,765	20,004
55049	Iowa	23,079	23,849	24,011	24,172	24,651	25,595
55051	Iron	6,853	6,837	6,834	6,832	6,812	6,745
55053	Jackson	19,344	19,943	20,060	20,176	20,516	21,144
55055	Jefferson	77,072	80,282	80,909	81,535	83,368	87,052
55057	Juneau	24,846	26,455	26,862	27,270	28,060	29,123
55059	Kenosha	152,920	161,032	162,581	164,129	168,856	178,465
55061	Kewaunee	20,418	20,996	21,112	21,227	21,569	22,238
55063	La Crosse	108,393	111,466	112,047	112,629	114,142	117,163
55065	Lafayette	16,167	16,288	16,326	16,363	16,493	16,759
55067	Langlade	20,910	21,345	21,436	21,526	21,764	22,141
55069	Lincoln	29,792	30,215	30,314	30,412	30,661	31,093
55071	Manitowoc	83,565	85,267	85,614	85,960	87,006	89,138
55073	Marathon	127,597	131,947	132,799	133,652	136,237	141,519
55075	Marinette	43,580	44,148	44,284	44,421	44,744	45,160
55077	Marquette	14,754	15,263	15,368	15,474	15,761	16,190
55078	Menominee	4,640	4,845	4,889	4,934	5,075	5,318
55079	Milwaukee	946,690	963,232	966,609	969,986	981,605	1,006,163
55081	Monroe	41,650	43,542	43,922	44,303	45,352	47,338
55083	Oconto	36,479	38,500	38,890	39,280	40,356	42,365
55085	Oneida	37,072	37,823	37,976	38,130	38,509	39,091
55087	Outagamie	165,030	174,667	176,532	178,396	183,978	195,191
55089	Ozaukee	83,409	85,923	86,362	86,800	88,220	91,374
55091	Pepin	7,380	7,827	7,925	8,023	8,240	8,609
55093	Pierce	37,360	38,844	39,168	39,493	40,367	42,069
55095	Polk	42,240	44,533	44,989	45,445	46,677	48,892
55097	Portage	68,379	71,009	71,425	71,842	72,920	75,266

Table II-1 (continued)

STCTYFIPS	County	2002	2007	2008	2009	2012	2018
WISCONSIN (continued)							
55099	Price	15,812	15,811	15,817	15,824	15,815	15,753
55101	Racine	190,574	194,978	195,873	196,767	199,559	205,155
55103	Richland	18,004	18,232	18,287	18,341	18,518	18,875
55105	Rock	154,061	158,379	159,223	160,067	162,688	167,930
55107	Rusk	15,434	15,680	15,738	15,796	15,911	16,073
55109	St. Croix	66,844	75,738	77,418	79,099	83,654	92,308
55111	Sauk	56,383	59,245	59,806	60,368	61,966	64,901
55113	Sawyer	16,487	17,207	17,349	17,491	17,833	18,288
55115	Shawano	41,124	42,284	42,518	42,753	43,423	44,666
55117	Sheboygan	114,022	117,406	118,075	118,743	120,815	125,092
55119	Taylor	19,725	19,875	19,916	19,957	20,100	20,377
55121	Trempealeau	27,264	27,917	28,053	28,190	28,583	29,355
55123	Vernon	28,480	29,562	29,785	30,009	30,683	31,999
55125	Vilas	21,233	21,723	21,818	21,914	22,101	22,259
55127	Walworth	93,681	97,963	98,853	99,744	103,016	109,377
55129	Washburn	16,290	16,903	17,018	17,134	17,404	17,775
55131	Washington	119,926	125,776	126,879	127,982	131,153	137,230
55133	Waukesha	366,417	379,519	381,832	384,146	391,045	404,911
55135	Waupaca	52,293	53,502	53,756	54,009	54,677	55,827
55137	Waushara	24,110	26,024	26,199	26,373	26,820	27,527
55139	Winnebago	158,888	163,932	164,861	165,789	168,578	174,516
55141	Wood	75,901	76,834	77,041	77,248	77,830	78,800

Table II-2. Priority Stationary Point and Area Source Emission Activities

Emission Activity	Emission Activity Units	Source Classification Code(s)
Non-Energy Categories		
Surface Coating		
Architectural Coatings Paint Shipments	Thousand Gallons	2401001000
Automobile Refinishing	Thousand Metric Tons	2401005000
Wood Furniture	Thousand Gallons	2401020000
Miscellaneous Manufacturing	Thousand Gallons	2401090000
Other Special Purpose Coatings	Thousand Gallons	2401200000
Metal Cans	Thousand Gallons	2401040000
Industrial Maintenance Coatings	Thousand Gallons	2401100000
Electronic and Other Electrical	Thousand Gallons	2401065000
Pesticide Application		
Pesticide Application	Thousand Lbs of Active Ingredient	2461800000
Consumer/Commercial Solvents		
All Adhesives and Sealants	Value of Shipments in Constant Dollars was used as proxy of change in volume of adhesives and sealants used)	2465600000
All FIFRA Products	Millions of Lbs of Active Ingredient	2460800000
All Coatings and Related Products	Thousand Gallons	2401990000
Stage 2: Gasoline Marketing		
Stage II Gasoline	Thousand Barrels	2501011010, 2501012010, 2501050120, 2501060000, 2501060050 thru 2501060053, 2501060100 thru 2501060103, 2501060200, 2501060201, 2501995120, 2505000120, 2505030120, 40400201 thru 40400232, 40400241, 40400248, 40400261, 40400262, 40400263, 40400271, 40400272, 40400273, 40400278, 40400401 thru 40400406, 40600101, 40600126, 40600131, 40600136, 40600141, 40600144, 40600147, 40600162, 40600163, 40600301, 40600302, 40600305, 40600306, 40600307, 40600399, 40600401, 40600402, 40600403, 40600499, 40600601, 40600602, 40600603, 40600701, 40600702, 40600706, 40600707
Open Burning		
Residential Household Waste	Pounds/Person/Day	2610030000
Livestock		
Swine Production Composite	Number of Livestock	2805025000
Cattle and Calves Waste Emissions, Milk Cows	Number of Livestock	2508018000; 2805019100 thru 2805023300
Poultry Waste Emissions, Layers	Number of Livestock	2805007100 thru 2805008300
Cattle and Calves Waste Emissions, Heifers and Heifer Calves	Number of Livestock	

Table II-2 (continued)

Emission Activity	Emission Activity Units	Source Classification Code(s)
Fertilizer Application		
Urea	Thousand Metric Tons	2801700004
Nitrogen Solutions	Thousand Metric Tons	2801700003
Pulp and Paper		
Plywood Operations, Waferboard Dryer	Million Square Feet	30700704, 30701001, 30701008, 30701010, 30701053, 30701057
Sulfate (Kraft) Pulping	Thousand Short Tons	30700101 thru 30700114, 30700117, 30700118, 30700199
Sulfite Pulping	Thousand Short Tons	30700203, 30700212, 30700213, 30700215, 30700221, 30700222, 30700223, 30700231, 30700233, 30700234, 30700299, 30700301 thru 30700304, 30700399
Iron and Steel Production		
Titanium, Other Not Classified	Metric Tons	3031299
Energy Categories		
Industrial Fuel Combustion		
Natural Gas	Million Cubic Feet	2102006000 thru 2102006002
Bituminous/Subbituminous Coal	Thousand Short Tons	2102002000
Distillate Oil	Thousand Barrels	2102004000
Residential Wood Combustion		
Fireplaces: General	Thousand Cords of Wood	2104008002
Woodstoves: General	Thousand Cords of Wood	2104008000
Industrial Boilers		
Bituminous/Subbituminous Coal	Thousand Short Tons	10200201 thru 10200206, 10200210, 10200212, 10200217, 10200218, 10200219, 10200222, 10200224, 10200225, 10200226
Natural Gas	Million Cubic Feet	10200601 thru 10200604
Distillate Oil	Thousand Barrels	10200501, 10200502, 10200503, 10200504, 10200505
Petroleum Refineries		
Catalytic Cracking Units, Fluid Catalytic Unit	Million Barrels	30600201
Process Heaters, Gas-Fired	Thousand Barrels	30600104
Process Heaters, Oil-Fired	Thousand Barrels	30600103
Natural Gas Production		
Other Not Classified	Million Cubic Feet	31000299

Table II-3 presents the growth methodology utilized in developing growth factors for each of the priority emission activities. The "Forecast Data" column identifies whether the growth data were from the DOE's *Annual Energy Outlook* (AEO), REMI, or the output of an equation that relates emission activity trends to trends in a REMI socioeconomic variable. These equations, which are listed in Table II-4, were identified through multiple regression analyses that tested potential relationships between historical emission activities and historical values for variables available from version 5.5 of the REMI model. Pechan performed analyses that regressed national/regional emission activity data against national/regional data for variables identified as potentially correlated with the activity. Pechan then used State-level REMI projections for the variables identified as most strongly correlated with changes in emission activity in these equations to estimate State-level emission activity changes.

For four source categories (Surface Coating: Wood Furniture; Surface Coating: Miscellaneous Manufacturing; Consumer/Commercial Solvents: All Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) Related Products; Consumer/Commercial Solvents: All Coatings and Related Products), the use of State-level REMI forecasts in the nationally-derived emission activity estimation equations resulted in anomalous growth factor values. For these source categories, Pechan first utilized national REMI projections in the equations. After reviewing the output of the equations, Pechan decided to use the regression equation to directly develop growth factors only through 2009. For post-2009 years, Pechan then either held the national growth factor at 2009 levels (for Consumer/Commercial Solvents: All Coatings and Related Products) or else developed growth factors by adjusting the output of the regression equation by one-half of the projected change in each year. Finally, Pechan developed State-level growth factors by adjusting the national growth factors by multiplying these factors by State/National growth factor ratios. These ratios were determined using State/National projections for the REMI indicator included in the regression equation.

C. NONROAD SOURCES

For priority nonroad source categories, emphasis was placed on adjusting national level growth rates to reflect state differences. These adjustments were performed from established sources using additional surrogate indicators known to correlate with the activity. This procedure was used for the Midwest RPO states only. For all other States, LADCO will rely on NONROAD model default growth rates (except for the commercial marine vessel and locomotive categories, which will rely on EGAS 5.0 growth rates).

Table II-3. Growth Methodology Utilized in Developing Growth Factors for Priority Emission Activities

CATEGORY	FORECAST DATA	SECTOR	GEOGRAPHIC LEVEL	COMMENTS
AREA SOURCES				
Industrial Fuel Combustion				
Natural Gas	AEO	Industrial/Total Industrial/Natural Gas	Regional	
Bituminous/Subbituminous Coal	AEO	Industrial/Total Industrial/Steam Coal	Regional	
Distillate Oil	AEO	Industrial/Total Industrial/Distillate	Regional	
Residential Wood Combustion				
Fireplaces: General	AEO	Residential Renewables	Regional	Applied DOE data to Census of Housing data for the 5 Midwest RPO states, the rest of the nation just had the DOE data applied
Woodstoves: General	AEO	Residential Renewables	Regional	Applied DOE data to Census of Housing data for the 5 Midwest RPO states, the rest of the nation just had the DOE data applied
Surface Coating				
Architectural Coatings	Regression	Population	County for Midwest RPO States; State for other regions	Regression equation growth factors adjusted by projected solvent content of Architectural Coatings (from Freedonia Group)
Auto Refinishing	REMI	Automobile parking, repair, and services - SIC 752-754	State	
Wood Furniture	Regression	Furniture Fixtures - SIC 25- Employment	State	Regression equation output was developed at the national level. After 2009 half of the change in the output between the current year and the previous year was subtracted from the previous year's output. Regression equation growth factors were developed at the State level by multiplying the growth rate of the regression output by the ratio of State REMI growth factors to the national REMI growth factor. Growth factors then adjusted by projected wood furniture solvent content (from Freedonia Group).
Miscellaneous Manufacturing	Regression	Miscellaneous Manufacturing Industries - SIC 39- Value Added	State	Regression equation output was developed at the national level. After 2009 half of the change in the output between the current year and the previous year was subtracted from the previous year's output. Regression equation growth factors were developed at the State level by multiplying the growth rate of the regression output by the ratio of State REMI growth factors to the national REMI growth factor.
Other Special Purpose Coatings	REMI	Paints and allied products - SIC 285	State	
Metal Cans	REMI	Metal cans and shipping containers - SIC 341	State	
Industrial Maintenance Coatings	REMI	Total Manufacturing	State	

Table II-3 (continued)

CATEGORY	FORECAST DATA	SECTOR	GEOGRAPHIC LEVEL	COMMENTS
Electronic and Other Electrical	Regression	Electronic components & access. - SIC 367- Employ.	State	Post-2007 Iowa and Mississippi growth factors were developed by extrapolating from 2002-2007 trend because equation-based 2018 factors were less than 0.1
Degreasing				
Automotive Repair Cold Cleaning	REMI	Auto Repair, Services and Parking - SIC 75	State	
Miscellaneous Manufacturing Cold Cleaning	REMI	Misc. Manufacturing Industries - SIC 39	State	
Electronic and Other Electrical Vapor and In-Line Cleaning	REMI	Electronic Equipment, exc. computer equip. - SIC 36	State	
Miscellaneous Manufacturing Vapor and In-Line	REMI	Misc. Manufacturing Industries - SIC 39	State	
Dry Cleaning				
All Processes, Total: All Solvent Types	REMI	Laundry, cleaning, and shoe repair - SIC 721,725	State	
Pesticide Application				
Pesticide Application: Agricultural, All Processes	REMI	Population	County for Midwest RPO States; State for other regions	
Consumer/Commercial Solvents				
All Auto. Aftermarket Prods.	REMI	Population	County for Midwest RPO States; State for other regions	
All Adhesives and Sealants	REMI	Population	County for Midwest RPO States; State for other regions	
All FIFRA Related Products	Regression	Population	County for Midwest RPO States; State for other regions	Regression equation output was developed at the national level. After 2009 the national output was held constant. Regression equation growth factors were developed at the State and county level by multiplying the growth rate of the regression output by the ratio of State (county) population growth factors to the national population growth factor.
All Coatings and Related Products	Regression	Chemicals and Allied Products - SIC 28- Value Added	State	Regression equation output was developed at the national level. After 2009 half of the change in the output between the current year and the previous year was subtracted from the previous year's output. Regression equation growth factors were developed at the State level by multiplying the growth rate of the regression output by the ratio of State REMI growth factors to the national REMI growth factor.
Stage 2 Gasoline Marketing				
Stage 2: Total	Regression	Gasoline & Oil Expends.	State	
Open Burning				
Residential, Household Waste	REMI	Population	County for Midwest RPO States; State for other regions	
Land Clearing Debris	REMI	Population	County for Midwest RPO States; State for other regions	
Livestock				
Swine production composite	Regression	Food and Kindred Products- SIC 20- Value Added	State	
Cattle and Calves Waste Emissions, Milk Cows	Regression	Farm - SIC 01, 02- Employment	State	

Table II-3 (continued)

CATEGORY	FORECAST DATA	SECTOR	GEOGRAPHIC LEVEL	COMMENTS
Poultry Waste Emissions, Layers	Regression	Food and Kindred Products - SIC 20- Value Added	State	
Cattle and Calves Waste Emissions, Heifers and Heifer Calves	Regression	Meat products - SIC 201- Employment	State	
Fertilizer Application				
Urea	REMI	Farm - SIC 01, 02	State	
Nitrogen Solutions	REMI	Farm - SIC 01, 02	State	
POINT SOURCES				
Industrial Boilers				
Bituminous/Subbituminous Coal	AEO	Industrial/Total Industrial/Steam Coal	Regional	
Natural Gas	AEO	Industrial/Total Industrial/Natural Gas	Regional	
Distillate Oil	AEO	Industrial/Total Industrial/Distillate	Regional	
Petroleum Refineries				
Catalytic Cracking Units, Fluid Catalytic Unit	AEO	Refined Petroleum Products Supplied/Total	National	
Process Heaters, Gas-Fired	AEO	Industrial/Refining/ Natural Gas	National	
Process Heaters, Oil-Fired	AEO	Industrial/Refining/ Petroleum Subtotal	National	
Pulp and Paper				
Plywood Operations, Waferboard Dryer	Regression	Construction - SIC 15-17- Employment	State	
Sulfate (Kraft) Pulping	REMI	Pulp, paper, & paperboard mills - SIC 261 -263	State	
Sulfite Pulping	Regression	Paper and Allied Products- Value Added	State	Post-2009 growth factors for Alaska, Arizona, Nevada, and Wyoming were developed by extrapolating from 2002-2009 growth factors because equation-based 2018 growth factors were less than 0.1
Natural Gas Production				
Other Not Classified	REMI	Crude petroleum, natural gas & gas liquids; Oil & gas field services - SIC 13	State	
Iron and Steel Production				
Titanium, Other Not Classified	REMI	Primary nonferrous smelting & refining - SIC 333	State	

Table II-4. Regression Equations Used in Forecasting Emission Activity Levels

Sector	Comments	Years	Equation	coeff (y-int.)	coeff (b1)	coeff (b2)	REMI Variable	R2	R2 adjusted	R2 prediction	t-stat (y-int.)	t-stat (m1)	t-stat (m2)	F-stat	D-W
Surface Coating															
Architectural Coatings		1990-2002	y = b0 +b1*x	-0.6	1.56		Population	0.9	0.837	0.785	-3	7.9		63	1.6
Wood Furniture		1993-2002	DIF(y) = b0 + b1* DIF(x)^3	0.1	3024.3		Furniture Fixtures - SIC 25 Employ	0.925	0.914	0.891	2.43	9.29		86.37	1.9
Miscellaneous Manufacturing		1993-2002	y = b0 + b1*x^3	1	-0.1		Misc. Manuf. Industries - SIC 39 Value Added	0.8	0.799	0.723	24	-6		33	2.2
Electronic and Other Electrical		1993-2002	LOG(y) = b0 + b1*LOG(x)^3	0	-204		Elect. Components & Accessories - SIC 367 Employ	0.8	0.722	0.649	0	-5		22	1.9
Consumer/Commercial Solvents															
All FIFRA Related Products		1990-1999	LOG(y) = b0 + b1*LOG(x)^3 + b2*LOG(x)^2	0	2291	-129	Population	0.9	0.926	0.755	-1.15	7.17	-8.20	50.94	2.3
All Coatings and Related Products		1993-2000	y= b0 + b1*x	2.32	-1.1		Chemicals & Allied Products - SIC 28 Value Added	0.9	0.902	0.841	14	-7		56	2
Gasoline Marketing															
Stage 2: Total	EGAS 5.0 equation	1990-2002	LOG(y) = b0 + b1*LOG(x)^2	0	7.42		Gasoline and Oil Expenditures	0.9	0.89	0.839	2.2	9.1		82	1.7
Livestock															
Swine production composite		1990-2002	LOG(y) = b0 + b1*LAG(LOG(x)	0	-1.6		Food & Kindred Prods. - SIC 20 Value Added	0.9	0.864	0.83	0.3	-8.02		64.33	2.3
Cattle and Calves Waste Emissions, Milk Cows		1990-2002	y = b0 + b1*x	-1.2	2.19		Farm-SIC 01, 02 Employ	0.907	0.899	0.874	-1	2.7		108	1.5
Poultry Waste Emissions, Layers		1990-2002	y = b0 + b1*LAG(y) + b2*x	-0.4	0.58	0.79	Food & Kindred Prods - SIC 20 Value Added	1	0.992	0.990	-6.35	10.04	7.9	726.57	2.3
Cattle and Calves Waste Emissions, Heifers/Heifer Calves		1990-2002	y = b0 + b1*LAG(y)^3 + b2*x^2	0.944	0.254	-0.196	Meat prods - SIC 201 Employ	1	0.968	0.953	10	6.14	-4	165.52	2.5
Pulp and Paper															
Plywood Operations, Waferboard Dryer		1990-2002	y = b0 + b1*x	-1.9	3.22		Construction - SIC 15, 16, 17 Employ	0.9	0.934	0.909	-6	13		157	1.3
Sulfite Pulping		1990-2000	y = b0 + b1*x	1.99	-1		Paper & Allied Prods. - SIC 26 Value Added	0.9	0.873	0.818	15	-8		70	2

Table II-4 (continued)

Sector	Comments	Years	Equation	coeff (y-int.)	coeff (b1)	coeff (b2)	REMI Variable	R2	R2 adjusted	R2 prediction	t-stat (y-int.)	t-stat (m1)	t-stat (m2)	F-stat	D-W
Cement Production															
Cement		1972-2002	y = b0 + b1*x	0.34	0.64		Total Output	0.9	0.92	0.909	5.6	18		321	1.4
Structure Fires															
Structure Fires		1985-2002	y = b0 + b1*x + b2*x^3	0	1.14	-0.1	Housing Expenditures	1	0.985	0.971	0	7.5	-4	568	1.3
Railroad Diesel															
Railroad Diesel		1972-2002	LOG(y) = b0 + b1*LOG(x) + b2*LOG(x)^3	0	0.56	-1	Railroad Transportation- SIC 40 Employment	0.9	0.893	0.88	-4	9.7	-4	117	1.4

1. NONROAD Model

Growth factors in NONROAD2004 are based on national, historical changes in fuel-specific equipment populations. Pechan has concerns about using growth rates that vary significantly from the model growth rates without fully evaluating the impact the revised growth rates may have on other related activity variables such as median life and scrappage rates. Pechan did, however, reflect State differences in growth rates by adjusting the NONROAD model growth rates. These adjustments were performed using State-level growth rates based on surrogate socioeconomic indicators believed to correlate with activity for each category. The NONROAD priority categories, along with the State-level socioeconomic indicator used to adjust the national growth rate for each category, are listed in Table II-5.

The general equation used is shown below, along with an example of how this calculation was performed for diesel construction equipment for year 2012 relative to base year 2002.

$$NRDGR_{ST} = NRDGR_{NAT} \times (REMIGR_{ST}/REMIGR_{NAT})$$

where:
- $NRDGR_{ST}$ = Revised NONROAD State-level Growth Rate
- $NRDGR_{NAT}$ = Base NONROAD National Growth Rate
- $REMIGR_{ST}$ = State REMI Growth Rate
- $REMIGR_{NAT}$ = National REMI Growth Rate

The revised growth rate for diesel construction equipment in Ohio is calculated as follows

$$NRDGR_{ST} = 1.243 \times (1.062 \div 1.032)$$
$$= 1.279$$

2. Non-NONROAD Model

For the commercial marine and locomotive source categories, Pechan determined that fuel consumption forecasts, as published in DOE's *Annual Energy Outlook*, were the best overall projection methodology (Pechan 2004b). However, one limitation of the applicable DOE transportation sector fuel projections is that they are available only on a national basis. Pechan adjusted these national growth rates based on growth in select REMI indicators in the Midwest RPO States relative to national growth in each sector as determined from REMI's forecast data. These variables are associated with the best-fit emission activity estimation equation for each source category when tested against several potential explanatory REMI variables. Table II-6 indicates the national DOE growth indicator, and, for Midwest RPO region States, the select REMI indicator used to reflect State-level differences. Table II-7 provides the definition of the REMI indicator codes used to make regional adjustments for priority categories.

Aircraft was not identified by LADCO as a priority category. For the Midwest RPO States, the aircraft category was projected to future years using EGAS version 5.0.

Table II-5. NONROAD Model Priority Growth Categories and REMI Data for Adjusting National NONROAD Growth Rates

SCC	SCC Description	NONROAD Model Growth Indicator Code	REMI Code	REMI Code Description
2270005000	Diesel Farm	21	604	Construction Employment - SIC 15, 16, 17
2270002000	Diesel Construction	31	667	Farm Employment - SIC 01, 02
2260004000 2265004000	2-Stroke Gasoline Lawn and Garden 4-Stroke Gasoline Lawn and Garden	52	901	Population (Thousands)
2282005000 2282010000	2-Stroke Gasoline Recreational Marine 4-Stroke Gasoline Recreational Marine	92	903	Real Disposable Personal Income
2260001020	2-Stroke Gasoline Snowmobiles	98	903	Real Disposable Personal Income
2282005015	2-Stroke Gasoline Recreational Marine - Personal Watercraft	99	903	Real Disposable Personal Income

Table II-6. Growth Indicators for Aircraft, Commercial Marine, and Locomotive SCCs

SCC	SCC Description	Growth Indicator
2275001000	Aircraft Military Aircraft Total	EGAS: Federal Government Military
2275020000	Aircraft Commercial Aircraft Total: All Types	EGAS: Air transportation -SIC 45
2275050000	Aircraft General Aviation Total	EGAS: Air transportation -SIC 45
2275060000	Aircraft Air Taxi Total	EGAS: Air transportation -SIC 45
2275070000*	Aircraft Auxiliary Power Units Total	EGAS: Air transportation -SIC 45
2275900000	Aircraft Refueling: All Fuels All Processes ** (Use 25-01-080-xxx)	EGAS: Air transportation -SIC 45
2280002021	Marine Vessels, Commercial Diesel Tugs	DOE Distillate Shipping Adjusted with REMI Code 109
2280002022	Marine Vessels, Commercial Diesel Ferries	DOE Distillate Shipping Adjusted with REMI Code 109
2280002023	Marine Vessels, Commercial Diesel Push Boats	DOE Distillate Shipping Adjusted with REMI Code 109
2280002024	Marine Vessels, Commercial Diesel Excursion	DOE Distillate Shipping Adjusted with REMI Code 109
2280002025	Marine Vessels, Commercial Diesel Dredge	DOE Distillate Shipping Adjusted with REMI Code 109
2280002029	Marine Vessels, Commercial Diesel Support Vessels	DOE Distillate Shipping Adjusted with REMI Code 109
2280002030	Marine Vessels, Commercial Diesel Fishing Vessels	DOE Distillate Shipping Adjusted with REMI Code 109
2280002040	Marine Vessels, Commercial Diesel Military Vessels	DOE Distillate Shipping Adjusted with REMI Code 352
2280002100	Marine Vessels, Commercial Diesel Port emissions	DOE Distillate Shipping Adjusted with REMI Code 109
2280002200	Marine Vessels, Commercial Diesel Underway emissions	DOE Distillate Shipping Adjusted with REMI Code 109
2280003100	Marine Vessels, Commercial Residual Port emissions	DOE Residual Shipping Adjusted with REMI Code 109
2280003200	Marine Vessels, Commercial Residual Underway emissions	DOE Residual Shipping Adjusted with REMI Code 109
2280004030	Marine Vessels, Commercial Gasoline Fishing Vessels	EGAS: Water transportation - SIC 44
2280004040	Marine Vessels, Commercial Gasoline Military Vessels	EGAS: Federal Government Military
2285000000*	Mobile Sources Railroad Equipment All Fuels Total	EGAS: Railroad transportation - SIC 40 Total
2285002000*	Mobile Sources Railroad Equipment Diesel Total	EGAS: Regression Equation
2285002006	Railroad Equipment Diesel Line Haul Locomotives: Class I Operations	DOE Freight Rail Distillate (diesel) Adjusted with REMI Code 299
2285002007	Railroad Equipment Diesel Line Haul Locomotives: Class II / III Operations	DOE Freight Rail Distillate (diesel) Adjusted with REMI Code 358
2285002008	Railroad Equipment Diesel Line Haul Locomotives: Passenger Trains (Amtrak)	DOE Intercity Rail (diesel) Adjusted with REMI Code 105
2285002009	Railroad Equipment Diesel Line Haul Locomotives: Commuter Lines	DOE Commuter Rail (diesel) Adjusted with REMI Code 901
2285002010	Railroad Equipment Diesel Yard Locomotives	DOE Freight Rail Distillate (diesel) Adjusted with REMI Code 299

*SCCs not in Midwest RPO Inventory, but included in National Inventory

Table II-7. REMI Indicator Used to Adjust National Nonroad Growth Rates

Code	Code Name	Data Type
105	Railroad transportation - SIC 40	Constant Dollar Output
109	Water transportation - SIC 44	Constant Dollar Output
299	Total Output	Constant Dollar Output
352	Federal Government Military	Constant Dollar Value Added
358	Total Manufacturing - SIC 20-39	Constant Dollar Value Added
901	Population (Thousands)	Population

CHAPTER III. EMISSION CONTROL DATA

A. OVERVIEW

Because the focus of this study was on the Midwest RPO States, a more robust approach was used to develop future year control data for these States versus the rest of the nation. In particular, Pechan contacted each Midwest RPO State to inquire about any on-the-books controls that affect non-EGU point and area source categories in the forecast period. The results of these investigations are presented in the following sections. For non-Midwest RPO States, Pechan compiled control information from EPA and Ozone Transport Commission (OTC) regulatory analyses and did not contact individual States for information on any State or local control programs that would affect non-EGU point and area source categories in the forecast period.

B. NON-EGU POINT SOURCES

1. Midwest RPO States

The approach used for developing non-EGU point source control factors by pollutant, control program, and geographic area is summarized in Table III-1.

2. Non-Midwest RPO States

In the State and sub-State areas that are affected by the oxides of nitrogen (NO_x) State Implementation Plan (SIP) Call, the regulatory approaches and timing are relatively consistent across the Midwest RPO region. For example, Illinois, Indiana, Ohio, and the fine grid portion of Michigan all have industrial, commercial, and institutional (ICI) boilers, and gas turbines included in the trading program. Because five month ozone season NO_x allowances have been established for the large non-EGU sources in the trading program by Illinois, Indiana, Ohio, and Michigan, those allowances were used to develop plant and unit-specific NO_x control factors to simulate the effect of this portion of the NO_x SIP Call on ICI boilers and gas turbines.

Table III-2 summarizes these NO_x allowances and the assignment of these allowances to specific point identification codes in the 2002 point source emissions file. Places where the NO_x allowance is not listed in the point ID column in Table III-2 indicate that the facility (or point) was not found in the 2002 point source emissions file. The general procedure used to assign NO_x allowances for the non-EGU trading program sources can be summarized as follows:

1. Search the 2002 point source emissions file by plant ID, boiler ID, and point ID (where provided) to determine the matching 2002 point source file ID.
2. If only a plant-level match was possible, the plant-level NO_x allocation was distributed among the ICI boiler and gas turbine SCCs in proportion to the 2002 annual NO_x emissions.
3. Search by company name/facility name where plant ID matches did not occur.

Table III-1. Midwest RPO Point Source Control Factors File Organization - Non-EGU Sources

Pollutant/Control	Midwest RPO States	Non-Midwest RPO SIP Call States	Non-Midwest RPO Non-SIP Call States
*NO_x Controls/SIP Call**			
Trading Program Sources	NO_x allowances assigned at the point ID level	Apply control factors by SCC code	No additional controls post-2002
RICE Engines	State-specific control factors		
Cement Kilns	25% control efficiency for the 2 SCCs representing cement kilns		
VOC Controls			
VOC RACT Regulation	Apply some State/county SCC or plant-specific control factors in the Cincinnati, OH nonattainment area	No additional control	No additional control
MACT Standards (this includes some control factors for other pollutants)	Apply control factor file for post-2002 implementation MACT standards	Apply control factor file for post-2002 implementation MACT standards	Apply control factor file for post-2002 implementation MACT standards

* Geographic area of applicability of NO_x SIP Call is according to recent *Federal Register* notices (fine grid area).

Table III-2. Midwest RPO State Non-EGU NO_x Allowances and 2002 Point Source File Linkages

Company	County	FIPS County	Plant ID	Boiler ID	Boiler Cap (mmBTU/hr)	2002 Point Source File ID	Future Year NO_x 5 Month Allocation (tons)
Illinois							
United States Steel LLC		31	600ALZ				88
United States Steel LLC		031	600ALZ				87
Corn Products International, Inc.		031	012ABI				53
Corn Products International, Inc.		031	012ABI			0041	204
Corn Products International, Inc.		031	012ABI			0042	203
Corn Products International, Inc.		031	012ABI			0045	79
Corn Products International, Inc.		031	012ABI				205
Corn Products International, Inc.		031	012ABI				79
A. E. Staley		115	015ABX			299	171
A. E. Staley		115	015ABX			358	170
A. E. Staley		115	015ABX				121
ADM		115	015AAE			0223	231
ADM		115	015AAE			0224	253
ADM		115	015AAE			0225	259
ADM		115	015AAE			0226	268
ADM		115	015AAE			0227	267
ADM		115	015AAE			0228	302
ADM		115	015AAE			0231	18
ADM		115	015AAE			0232	18
Marathon-Ashland Refining		033	808AAB			0055	51
Marathon-Ashland Refining		033	808AAB			0058	52
Exxon-Mobil		197	800AAA			0021	98
Exxon-Mobil		197	800AAA			0043	82
Aventine Renewable Energy, Inc.		179	060ACR			0070	366
ConocoPhillips		119	090AAA			0080	38
ConocoPhillips		119	090AAA			0081	39
ConocoPhillips		119	090AAA			0082	78
CITGO Petroleum Corp.		197	090AAI			0037	22
Indiana							
Alcoa		173					3172
American Electric Power							3
BP AMOCO-Boiler House							106
BP AMOCO-Boiler House		89	00003			Multiple	1260
Citizens Thermal Energy							541
Ispat Inland		89	00316			Multiple	1368
New Energy		141	00033			014	238
Portside Energy							89
Purdue University		157	00012			005	72
Michigan							
Menasha Corp	Allegan	5	A0023	0024	293.9	EU0062	59
Menasha Corp	Allegan	5	A0023	0025	293.9	EU0063	62
CE - Karn & Weadock	Bay	17	B2840	A	300		9
CE - Karn & Weadock	Bay	017	B2840	B	300		7
Georgia Pacific Corp.	Kalamazoo	077	B4209	0005	290		99
General Motors Corp	Genesee	049	A1178	0501	480	0509	39
General Motors Corp	Genesee	049	A1178	0502	480	0510	39
General Motors Corp	Genesee	049	A1178	0507	480		39
Lansing BW&L	Ingham	065	B2647	0014	290		39
Michigan State University	Ingham	065	K3249	0053	300	0529	86
Michigan State University	Ingham	065	K3249	0054	300	0530	75

Table III-2 (continued)

Company	County	FIPS County	Plant ID	Boiler ID	Boiler Cap (mmBTU/hr)	2002 Point Source File ID	Future Year NO_x 5 Month Allocation (tons)
Michigan State University	Ingham	065	K3249	0055	452	0531	91
Michigan State University	Ingham	065	K3249	0056	433	0532	90
Graphics Pkg.	Kalamazoo	077	B1678	0003	253	0032	80
Dow Chemical USA	Midland	111	A4033	0401	300	0228	2
Dow Chemical USA	Midland	111	A4033	0402	300	0228	2
General Motors Corp	Oakland	125	B4032	0510	443	0046	38
The Regents of The U of M	Washtenaw	161	M0675	003	264		57
The Regents of The U of M	Washtenaw	161	M0675	004	264		45
The Regents of The U of M	Washtenaw	161	M0675	006	264		33
Marathon Oil Company	Wayne	163	A9831	0001	415	0070	90
Ohio							
AK Steel	Butler	140	9010006			P009	66
AK Steel	Butler	140	9010006			P010	66
AK Steel	Butler	140	9010006			P011	66
AK Steel	Butler	140	9010006			P012	66
Biomass Energy	Lawrence	074	4000009			B003	106
Biomass Energy	Lawrence	074	4000009			B004	106
Biomass Energy	Lawrence	074	4000009			B007	106
BP Oil, Toledo Refinery	Lucas	448	020007			B004	39
BP Oil, Toledo Refinery	Lucas	448	020007			B020	101
Cargill	Montgomery	857	041124			B004	131
Cargill	Montgomery	857	041124			B006	1
Cognis	Hamilton	143	1070035			B027	206
Goodyear Tire & Rubber	Summit	167	7010193			B101	100
Goodyear Tire & Rubber	Summit	167	7010193			B102	106
LTV Steel Company	Cuyahoga	131	8001613			B005	137
LTV Steel Company	Cuyahoga	131	8001613			B006	148
LTV Steel Company	Cuyahoga	131	8001613			B003	157
LTV Steel Company	Cuyahoga	131	8001613			B004	156
LTV Steel Company	Cuyahoga	131	8001613			B007	153
LTV Steel Company	Cuyahoga	131	8001613			B905	14
Mead	Ross	671	010028			B001	182
Mead	Ross	671	010028			B002	205
Mead	Ross	671	010028			B003	248
New Boston Coke Corp.	Scioto	077	3010004			B008	20
New Boston Coke Corp.	Scioto	077	3010004			B008	15
Premcor Refinery	Allen	030	2020012			B009	16
Procter & Gamble	Hamilton	143	1390903			B043	71
Procter & Gamble	Hamilton	143	1390903			B022	292
Republic Engineered Steels	Lorain	024	7080229			B013	157
Smart Papers	Butler	140	9040212			B010	264
Sun Oil, Toledo Refinery	Lucas	044	8010246			B044	47
W CI Steel	Trumbull	027	8000463			B001	111
W CI Steel	Trumbull	027	8000463			B002	29
W CI Steel	Trumbull	27	8000463			B004	140

Then, for each point ID with a future year NO_x 5 month allocation, the future year control factor was computed by multiplying the 5-month allocation by 365/153, and then dividing by the actual 2002 NO_x emissions for the point. In cases where the NO_x allowance exceeds the 2002 NO_x emissions, the control factor is set equal to 1.00.

For stationary reciprocating internal combustion engines (RICE), not all States have regulated this category. Internal combustion (IC) engine rule adoption status by State can be summarized as follows:

1. Illinois - no rule adopted.
2. Indiana - rule in workgroup stage (include in Scenario 1).
3. Michigan - gas-fired subject to 14 grams/unit. Diesel-fired subject to 10 grams/unit.
4. Ohio - Phase 2 budget limit set according to EPA list of units.

Based on the above, it was decided to develop SCC-specific control factors and to apply these control factors to the IC engine SCCs in Indiana, Michigan (fine grid portion), and Ohio.

Michigan's NO_x limits were used to develop the IC engine control factors, which are a 17 percent control efficiency for both gas- and oil (diesel)-fired engines. The 17 percent NO_x control efficiency for gas-fired engines is the estimated reduction from 16.8 grams per brake horsepower-hour (bhp-hr) uncontrolled NO_x emission factor to 14 grams/unit. Similarly, for oil-fired engines, the uncontrolled NO_x emission factor is 12 grams per bhp-hr and the emission limit is 10 grams/unit.

An alternative method for RICE engines that might produce a more accurate simulation of the effect of NO_x SIP Call requirements on this source category is to use the EPA list of large engines by State, match these with the appropriate point IDs in the 2002 point source emissions file, and apply a 90 percent emission reduction to these specific engines. This approach was considered, but not applied, in developing the draft control factor file because of the difficulty in matching the EPA file to the 2002 point source emissions file. However, with assistance from the respective State agencies, it may be possible to prepare a more complete set of matches.

The effect of the NO_x SIP Call requirements on affected cement kilns was simulated via a 25 percent control efficiency applied to the two point source SCCs for cement kilns (30500606 and 30500706). The 2002 point source file was reviewed to see if the required NO_x controls may have been installed in the base year, but it was found that all NO_x base year control efficiencies for these sources were zero.

a. Federal Maximum Achievable Control Technology (MACT) Standards

Numerous MACT standards have been promulgated pursuant to Section 112 of Title I of the Clean Air Act, and control emissions of hazardous air pollutants (HAPs) from stationary sources of air pollution. Many HAPs are also volatile organic compounds (VOCs [VOC HAPs]). Many of the MACT standards are expected to produce associated VOC reductions, so the emission projections capture the expected effects of post-2002 MACT standards.

Pechan performed the following steps to determine the MACT standards expected to have the greatest impact on VOC, NO_x, and particulate matter (PM) emissions for the projection years 2007 and beyond:

1. Identified the source categories and associated SCCs for each MACT standard having a post-2002 compliance date for existing sources.
2. Eliminated MACT categories that do not achieve significant VOC emission reductions.
3. Applied "EPA-estimated" VOC emission reduction percentages to emissions from sources falling under each MACT category for emission projection purposes. Apply the emission reduction factor on and after the compliance date for existing sources specified for each MACT standard.

Pechan matched the "EPA-estimated" VOC, NO_x, and PM emission reduction percentages to the applicable SCC(s) affected by each respective MACT standard to arrive at emission projection estimates. The MACT categories, applicable SCCs, existing source compliance dates, and expected VOC emission reductions are summarized in Table III-3. The emission reduction percentages were obtained either from an EPA-provided Microsoft Excel file (MACT_GENERAL_may_03_relevant_columns.xls) or from EPA-published technical fact sheets for each standard. For the RICE MACT standards, a VOC reduction estimate of 40 percent was assumed for total VOC reduction, which is the lower end of the range for EPA's estimated 40-90 percent reduction for formaldehyde, acrolein, acetaldehyde, and methanol emissions.

For purposes of emission projections, it is estimated that all applicable sources will be in compliance with all respective MACT standards listed in Table III-3 by projection year 2007.

b. VOC Reasonably Achievable Control Technology (RACT) Regulations

Pechan reviewed the 2002 point source file for the Cincinnati, Ohio ozone nonattainment area in an attempt to determine the specific facilities/sources expected to have to reduce their VOC emissions to meet newly adopted RACT requirements. Because the most significant emission reductions are expected from bakeries, 2002 point source file records for bakery point source SCCs were reviewed. Unfortunately, no bakery sources were found in this file. Therefore, no VOC RACT control factors were developed for this area. Further consultation with Ohio EPA is needed to determine how best to develop plant-specific control factors for the Cincinnati, Ohio area.

For non-Midwest RPO States that are subject to NO_x SIP Call requirements, SCC-specific NO_x control factors were developed in a way that is consistent with how EPA has modeled the SIP Call requirements in its regulatory analyses (Pechan, 2000).

Table III-3. Post-2002 MACT Standards and Expected VOC, NO_x, and PM Reductions

MACT Standard - Source Category	Code of Federal Regulations Subpart	Compliance Date (existing sources)	VOC (% Reduction)	NO_x (% Reduction)	Total PM (% Reduction)	Affected SCCs
Asphalt Processing and Asphalt Roofing Manufacturing	LLLLL	5/1/2006	29			30500101 to 30500199
Auto and Light Duty Trucks	IIII	4/26/2007	66.73			40201601 to 40201632; 40201699
Boat Manufacturing	VVVV	8/22/2004	35.79			31401501 to 31401571
Brick and Structural Clay Products Manufacturing	JJJJJ	5/16/2006			45.1	30500310; 30500313; 305003XX
Cellulose Products	UUUU	6/11/2005	62.9			62540001 to 62540050; 625800001; 62582001; 62582002; 62582501; 62582502 to 62582599; 64420001 to 64420042; 64430001 to 64430030; 64431001 to 64431030; 64450001 to 64450022; 64920001 to 64920034; 64930001 to 64930050; 64931001 to 64931050; 64980001; 64982001; 64982002; 64982599
Clay Ceramics Manufacturing	KKKKK	5/16/2005				305008XX
Coke Ovens: Pushing, Quenching and Battery Stacks	CCCCC	4/14/2006	50			30300304; 30300303
Combustion Sources at Kraft, Soda and Sulfite Pulp and Paper Mills	MM	4/14/2006	7.02			30700103; 30700104; 30700106; 30700110
Engine Test Cells/Stands	PPPPP	5/17/2006	0			all SCCs beginning with 204
Fabric Printing, Coating & Dyeing	OOOO	5/29/2006	60.17			40201101 to 40201199; 40201201; 40201210
Flexible Polyurethane Foam Fabrication Operation	MMMMM	4/14/2006	67.4			30101880 to 30101899
Friction Products Manufacturing	QQQQQ	10/18/2005	43.9			30111103; 30111199; 31401001; 31401002
Generic MACT	YY	7/12/2005	44.5 (cyanide); 26.1 (carbon black)			Carbon black: 301005XX; Cyanide: 651400XX; 30103901; 30103902; 30103903
Hydrochloric Acid Production	NNNNN	4/17/2006				65130001; 30101101; 30101199
Industrial, Commercial and Institutional Boilers and Process Heaters	DDDDD	9/13/2007	0		40	102XXXXX, 103XXXXX, 105XXXXX
Integrated Iron and Steel	FFFFF	5/20/2006				30301501 to 30301596
Iron and Steel Foundries	EEEEE	4/22/2007	40 (iron foundries only)			304003XX; 304007XX
Large Appliances	NNNN	7/23/2005				40201401 to 40201499
Leather Finishing Operations	TTTT	2/27/2005	38.9			32099997; 32099998; 32099999
Lime Manufacturing	AAAAA	1/5/2007			28	305016XX
Manufacturing Nutritional Yeast	CCCC	5/21/2004	12.5			30203404 to 30203424; 30203504 to 30203540
Mercury Cell Chlor-Alkali Plants	IIII	12/19/2006				30100801 to 30100805; 30100899
Metal Can	KKKK	6/10/2005	70.83			40201702; 40201703 to 40201799
Metal Coil	SSSS	6/10/2005	53.06			402018XX
Metal Furniture	RRRR	5/23/2006	73.07			402020XX

Table III-3 (continued)

MACT Standard - Source Category	Code of Federal Regulations Subpart	Compliance Date (existing sources)	VOC (% Reduction)	NO_x (% Reduction)	Total PM (% Reduction)	Affected SCCs
Misc. Coating Manufacturing	HHHHH	12/11/2006	66.2			402026XX
Misc. Metal Parts and Products	MMMM	1/2/2007	47.93			402025XX
Misc. Organic Chemical Production and Processes (MON)	FFFF	11/10/2006	66.2			645200XX; 30113001 to 30113007; 684300XX; 30101005 to 30101099; 68445001; 68445010; 68445013; 68445020; 68445022; 68445101; 68445201; 30110002 to 30110099; 64820001; 64820010; 64821001; 64821010; 64822001; 64822010; 64823001; 64823010; 64823001; 64823010; 64880001; 64882001; 64882002; 64882599; 30105001; 30105101 to 30105130; 30801001; 31604001; 31604002; 31600403; 68510001; 68510010; 68510011; 68580001; 68582001; 68582002; 68582599; 30101837; 64610301 to 64610350; 64610001 to 64610050; 64610101 to 64610150; 64610201 to 64610250; 64615001 to 64615030; 64620001 to 64620038; 64630001 to 64630083; 64631001 to 64631083; 64632001 to 64632083; 64680001; 64682001; 64682002; 64682501; 64682502; 64682599; 64130001 to 64130025; 64130101 to 64130125; 64130201 to 64130225; 64131010 to 64131030; 64132001 to 64132030; 64133001 to 64133030; 64180001; 64182001; 64182002; 64182599; 64615001; 64620001; 65135001
Municipal Solid Waste Landfills	AAAA	1/16/2006	75.2			50100401 to 50100433
Paper and Other Web	JJJJ	12/4/2005	82.05			30701199; 402013XX
Pesticide Active Ingredient Production	MMM	12//23/2003	64.82			3013301
Petroleum Refineries	UUU	4/11/2005	87.4 (all SCC except other); 65.63 (other)			30600201; 30600202; 30600301 (FCC); 30103201 to 30103205; 30103299; 306888XX (fugitives); 30600402 (blowdown w/o); 306009XX, 306099XX, 30601001, 30601101, 30601201, 30601301, 30601401, 30610001, 403888XX, 40399999 (other)
Plastic Parts	PPPP	4/19/2007	77			402022XX
Plywood and Composite Wood Products	DDDD		41.2			307007XX; 30700921 to 30700971; 30701001 to 30701057; 30700602 to 30700661
Polymers and Resins III	OOO	1/20/2003	55.7			Phenolic resins: 3101805; “polyamide” resins: 30101827
Polyvinyl Chloride and Copolymers Production	J	7/10/2005	0			64630001; 64631001; 64632001
Primary Copper	QQQ	6/12/2005				30300502 to 30300599
Primary Magnesium Refining	TTTTT	10/10/2004				304006XX

Table III-3 (continued)

MACT Standard - Source Category	Code of Federal Regulations Subpart	Compliance Date (existing sources)	VOC (% Reduction)	NO_x (% Reduction)	Total PM (% Reduction)	Affected SCCs
Reciprocating Internal Combustion Engines (RICE)	ZZZZ	6/15/2007	40	17		20100102; 20100202; 20100702; 20100802; 20100902; 20200102; 20200104; 20200202; 20200204; 20200301; 20201001; 20201002; 20201012, 20201014; 20201602; 20201702, 20200501; 20200702; 20200706; 20200902; 20300101; 20300201; 20300301
Refractory Products Manufacturing	SSSSS	4/16/2006	0 (non-VOC)			30500501 to 30500509; 30500598; 30500599
Rubber Tire Manufacturing	XXXX	7/11/2005	47.6			308001XX
Secondary Aluminum Production	RRR	3/24/2003			90	30400101 to 30400199
Semiconductor Manufacturing	BBBBB	5/22/2006	0			31306500 to 31306531; 31306599
Site Remediation	GGGGG	10/8/2006	50.08			504001XX; 50400201, 50400202; 504002XX; 504100XX; 504101XX; 504102XX; 504103XX; 504102XX; 504103XX; 504104XX; 504105XX; 504106XX; 504107XX; 50480001; 50482001; 50482002; 50482599; 50480004
Solvent Extraction for Vegetable Oil Production	GGGG	4/12/2004	38.69			302019XX
Stationary Combustion Turbines	YYYY	3/5/2007	0.25			20100101, 20100201, 20200101, 20200103, 20200201, 20200203, 20200901, 20300102, 20300202, 20300203
Taconite Iron Ore Processing	RRRRR	10/30/2006			62	32302371 to 32302399
Wet Formed Fiberglass Mat Production	HHHH	4/11/2005	74			30501201 to 30501299
Wood Building Products	QQQQ	5/28/2006	62.82			40202101 to 40202199

**Based on organic HAP emission reductions

C. NON-EGU AREA SOURCES

1. Midwest RPO States

For the Midwest RPO States, Pechan contacted each State to obtain information for any on-the-books controls affecting non-EGU point and area sources over the study period. Pechan also compiled information for national controls affecting these sources from EPA regulatory support documents. The following sections describe the information gathered from these efforts.

a. State/Local Area Controls

Auto Body Refinishing/Mobile Equipment Repair and Refinishing (MERR)

Base year 2002 emission estimates are expected to include the effects (37 percent VOC emission reduction) of the national VOC emission standards for automobile refinish coatings.

For SCC 2401005000, a 29 percent additional VOC control efficiency was applied to all future year emissions in certain Wisconsin counties, where a more stringent than Federal standard MERR regulation applies. With the 37 percent VOC reduction included in the base year emission estimates, this Wisconsin rule achieves a 55 percent reduction from uncontrolled VOC in future years. The WI counties where the auto body refinishing rule applies are: Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington, and Waukesha. Pechan entered a base year 37 percent and a forecast year 55 percent overall VOC emission reduction value in the implementation year control factor file for these counties. Pechan also entered a 55 percent control efficiency (CE) value, and 100 percent rule penetration (RP) and rule effectiveness (RE) values in this control factor file. For the purpose of modeling, Pechan assumed 2003 as the initial year of implementation for the MERR rule.

Solvent Cleaning Operations

The Comparability Study's suggested cold cleaning-auto repair emission factor is 270 pounds of VOC per employee. In Illinois, the Chicago and Metro East areas of the State have a cold cleaning VOC regulation that is equivalent to what is required in the OTC model rule. The emission reduction credit for this regulation is a 66 percent reduction from uncontrolled levels. An equivalent regulation in the Chicago nonattainment area portion of Indiana is expected to achieve the same 66 percent VOC reduction. For the following counties, Pechan applied a 0 percent base year and a 66 percent overall VOC emission reduction value in the implementation year control factor file:

STATE	COUNTY NAME	STATE	COUNTY NAME
ILLINOIS	Cook	INDIANA	Clark
	Du Page		Floyd
	Kane		
	Lake		
	McHenry		
	Madison		
	Monroe		
	St. Clair		
	Will		

These control percentages were applied to SCCs 2415345000 (Miscellaneous Manufacturing [standard industrial classification [SIC] code 39]: Cold Cleaning) and 2415360000 (Auto Repair Services [SIC 75]: Cold Cleaning). Pechan also entered the following future year values in this control factor file: 66 percent CE and 100 percent RP and RE. For the purpose of modeling, Pechan assumed 2003 as the initial year of implementation for the MERR rule.

In Wisconsin, the 2002 solvent cleaning emission estimates reflect VOC control efficiencies for four source classification codes in the nine county southeastern Wisconsin area. These SCCs are 2415245000, 241523000, 2415345000, and 241536000. Beginning in year 2002, there is a 30 percent VOC emission reduction applied in the 6 county area, while an 8 percent VOC emission reduction is applied in Kewaunee, Manitowoc, and Sheboygan counties. Because no additional control applies to these categories in the forecast years, Pechan did not incorporate this base year control information into the implementation year control factor file.

Portable Fuel Containers

There is a portable fuel container rule in Illinois that will reduce VOC emissions from SCCs 2501011010 (Residential Portable Fuel Containers) and 2501012010 (Industrial Portable Fuel Containers) in future years. This rule is expected to reduce fuel container VOC emissions by 75 percent from pre-control levels. The turnover from old to new containers is expected to take 10 years. If the rule is implemented in 2005 as planned, then RP for existing fuel containers will be 5 percent in the summer of 2005, 15 percent in the summer of 2006, 25 percent in the summer of 2007, etc. until 100 percent RP is achieved by 2015.

To account for the fact that growth in the portable fuel container population and turnover from old to new containers will be affected by the portable fuel container rule,[3] Pechan calculated projection year emissions using the following equation:

$$Q_N = Q_o \left\{ \left[\left(G_N \right) - 1 \right] F_n + \left[\left(1 - R_i \right)^t \right] F_e + \left[1 - \left(1 - R_i \right)^t \right] F_n \right\} \qquad \textit{(Eq. 1)}$$

where:

Q_N = emissions in projection year
Q_o = emissions in base year
R_i = annual retirement rate
F_e = emission factor ratio for existing sources (1.0)
G_N = projection year growth factor (projection year activity/base year activity)
F_n = emission factor ratio for new sources relative to existing sources
t = number of years between base year (2002) and projection year

The first term in the equation represents new source growth and controls, the second term accounts for retirement and controls for existing sources, and the third term accounts for

[3] Note that to simplify the analysis Pechan assumed that all post-2002 new container growth would be affected by the portable fuel container regulation (due to the low growth rates calculated for IL, this assumption did not have a significant impact on the overall emission reduction estimates of this rule).

replacement source controls. Because retirement was not estimated using a constant annual rate, Pechan replaced the $(1-R_i)^t$ terms in this equation with the appropriate proportion of containers retired between the base year and the appropriate forecast year. Pechan then computed an overall emission reduction for each future year of interest by comparing the forecast year controlled emissions calculated from this equation to the forecast year uncontrolled emissions. For example, a 56.3 percent VOC emission reduction was calculated for the year 2012 emission reduction. Pechan then back-calculated the appropriate RP value for each forecast year based on the overall emissions reduction, the 75 percent CE value, and an RE of 100 percent (e.g., the calculated RP for the Illinois rule for 2012 is 75.1 percent).

b. Federal Controls

Residential Wood Combustion

For this analysis, a 20-year estimated lifetime for woodstoves and fireplace inserts was used along with the source classification code specific growth factors developed by Pechan for this project, and emission factor ratios by SCC, to account for the replacement of retired woodstoves that emit at pre-new source performance standard (NSPS) levels, with new wood burning equipment, that would be catalyst-equipped. This was done using an equation to estimate equipment turnover for a situation with a 4 percent per year retirement rate, and the SCC-specific growth factors. Emission factor ratios are pollutant-specific. The growth and retirement equation was applied to estimate the relationship between base year (2002) emissions and future year emissions by SCC and pollutant. Then, this relationship was used to estimate the control efficiency that would have to be applied along with the growth factor to yield the appropriate future year emission value. SCCs for "controlled" woodstoves and fireplace inserts have no control efficiency applied. Their future year emissions change in proportion to the growth rate. Table III-4 displays the various residential woodstove and fireplace area source SCCs that are used in the 2002 LADCO State emission inventories.

The effects of growth and retirement rates on future year woodstove and fireplace emissions were incorporated in the analysis using Equation 1. The terms in this equation are applied differently to the SCCs in Table III-4 to account for differences in how the LADCO States have prepared their 2002 emission estimates for this source type. Thus, for States that break down their fireplace insert and woodstove activity and emissions among pre-controlled, certified non-catalytic, and certified catalytic, all of the growth is applied to the certified insert or woodstove SCCs, and the pre-control inserts and woodstoves are retired.

Consumer Products

The federal consumer products rule was in effect in 1999, so VOC emission estimates for 2002 for the LADCO States should take into account a 20 percent CE and a 48.6 percent RP value. The LADCO states reported their 2002 consumer products VOC emissions using seven different product categories (SCCs), so the base year CE for each are those from the LADCO comparability study performed by Mark Janssen. The comparability study was missing a CE for FIFRA-regulated products, so an appropriate VOC CE was computed by Pechan so that the net CE over all seven categories would match the expected effect of the federal rule, which is equal to a per capita emission factor of 7.06 lbs VOC. This information is displayed in Table III-5.

Table III-4. Residential Wood Combustion Emission Reductions for Midwest RPO States

Description	SCC	Growth Factors					Pollutant	CF*	Percentage Emission Reduction					
		2007	2008	2009	2012	2018			2002	2007	2008	2009	2012	2018
Total Woodstoves + Fireplaces	2104008000	1.047	1.051	1.049	1.056	1.059	VOC	0.28	0.0	16.0	18.4	20.5	26.7	36.6
		1.047	1.051	1.049	1.056	1.059	CO	0.45	0.0	12.2	14.8	15.7	20.4	28.0
		1.047	1.051	1.049	1.056	1.059	NO_x	0.71	0.0	6.4	9.5	8.3	10.7	14.8
		1.047	1.051	1.049	1.056	1.059	PM	0.67	0.0	7.3	10.3	9.4	12.2	16.8
Fireplaces	2104008001	1.107	1.123	1.133	1.176	1.249			0	0	0	0	0	0
		1.107	1.123	1.133	1.176	1.249			0	0	0	0	0	0
		1.107	1.123	1.133	1.176	1.249			0	0	0	0	0	0
		1.107	1.123	1.133	1.176	1.249			0	0	0	0	0	0
Fireplace inserts	2104008002	1.115	1.132	1.143	1.191	1.273	VOC	0.28	0.0	19.4	22.2	24.8	31.8	42.6
		1.115	1.132	1.143	1.191	1.273	CO	0.45	0.0	14.8	18.9	18.9	24.3	32.5
		1.115	1.132	1.143	1.191	1.273	NO_x	0.71	0.0	7.8	14	10	12.8	17.2
		1.115	1.132	1.143	1.191	1.273	PM	0.67	0.0	8.9	14.7	11.3	14.6	19.5
Fireplace inserts-certified-non-catalytic	2104008003	1.115	1.132	1.143	1.191	1.273			0	0	0	0	0	0
		1.115	1.132	1.143	1.191	1.273			0	0	0	0	0	0
		1.115	1.132	1.143	1.191	1.273			0	0	0	0	0	0
		1.115	1.132	1.143	1.191	1.273			0	0	0	0	0	0
Fireplace inserts-certified-catalytic	2104008004	1.115	1.132	1.143	1.191	1.273			0	0	0	0	0	0
		1.115	1.132	1.143	1.191	1.273			0	0	0	0	0	0
		1.115	1.132	1.143	1.191	1.273			0	0	0	0	0	0
		1.115	1.132	1.143	1.191	1.273			0	0	0	0	0	0
Woodstoves-general	2104008010	1.008	1.003	0.994	0.977	0.932	VOC	0.28	0.0	13.3	15.6	18.0	24.1	34.6
		1.008	1.003	0.994	0.977	0.932	CO	0.45	0.0	10.2	11.9	13.8	18.4	26.4
		1.008	1.003	0.994	0.977	0.932	NO_x	0.71	0.0	5.4	6.3	7.3	9.7	13.9
		1.008	1.003	0.994	0.977	0.932	PM	0.67	0.0	6.1	7.2	8.3	11.1	15.8
Woodstoves-certified-catalytic	2104008030	1.008	1.003	0.994	0.977	0.932			0	0	0	0	0	0
		1.008	1.003	0.994	0.977	0.932			0	0	0	0	0	0
		1.008	1.003	0.994	0.977	0.932			0	0	0	0	0	0
		1.008	1.003	0.994	0.977	0.932			0	0	0	0	0	0
Woodstoves-certified-noncatalytic	2104008050	1.008	1.003	0.994	0.977	0.932			0	0	0	0	0	0
		1.008	1.003	0.994	0.977	0.932			0	0	0	0	0	0
		1.008	1.003	0.994	0.977	0.932			0	0	0	0	0	0
		1.008	1.003	0.994	0.977	0.932			0	0	0	0	0	0

NOTES: *This is the ratio between the emission factor for a certified-catalyst equipped woodstove/fireplace insert and the emission factor for an uncontrolled unit

Table III-5. Consumer Product Rule VOC Emission Factors (Pre-Control vs. Federal Rule)

Product Category	Pre-Control Per Capita VOC	2002 LADCO CEs	Post-Control Per Capita VOC	SCC Code
Personal care products	2.32	12.11	2.04	2460100000
Household products	0.79	10.94	0.70	2460200000
Auto aftermarket products	1.36	8.97	1.24	2460400000
Adhesives and Sealants	0.57	8.30	0.52	2460600000
FIFRA-regulated products	1.78	13.70	1.54	2460800000
Coatings and related products	0.95	0.00	0.95	2460500000
Misc products	0.07	0.00	0.07	2460900000
Total	**7.84**		**7.06**	

No state rules affecting VOC emissions from this source category have been adopted in the Midwest RPO region States. Therefore, no consumer product rule records were incorporated into the control factor files for these States.

Architectural and Industrial Maintenance (AIM) Coatings

For 2002, the national AIM coatings rule is in full effect. This is typically simulated using a 20 percent CE, and 100 percent RP and RE values. However, the Midwest RPO States estimated 2002 VOC emissions for coatings using average water-based and solvent-based coatings contents, which may differ from the federal rule requirements. Because there are no incremental post-2002 AIM coating emission reductions for the Midwest RPO States, no AIM coating rule records were incorporated for these States into the control factor files.

2. Non-Midwest RPO States

Table III-6 displays the area source VOC solvent category post-2002 RE, RP, and CE values that were applied in the OTC States to simulate the effects of adoption of the OTC model rules. Future year control efficiencies are contrasted with those expected to have been used in computing 2002 emissions in the OTC States. The Table III-6 values are an approximation of what is occurring in these States during this time period because each State has added regulations to achieve such emission reductions according to their own individual schedules. In general, though, the timing of the model rule adoption for consumer products and architectural and industrial maintenance coatings is expected to occur after 2002, but before 2007 in most OTC States. For the purpose of modeling, Pechan assumed a 2003 implementation year for both controls.

The effects of adopting OTC model rules to reduce autobody refinishing and solvent cleaning (degreasing) emissions are expected to be included in OTC State 2002 emission inventories, so no post-2002 control factors are applied to the OTC States for these solvent categories.

Table III-6. OTC State Model Rule Solvent VOC Solvent Category Control Information

Category	Year	CE	RP	RE	Emission Reduction %
Consumer Products	Base (2002)	20	48.6	100	9.7
	Future (all post-2002)	34.2	48.6	100	16.6
AIM Coatings	Base (2002)	20	100	100	20
	Future (all post-2002)	44.8	100	100	44.8

Portable fuel container rules are also being adopted in the OTC States, with 2003 assumed as the average rule adoption date in these States. The VOC reduction benefits of portable fuel container rules within the OTC States are simulated in the same way as the Illinois rule, with a two year earlier implementation date. However, due to the level of effort required to develop State-specific growth-adjusted control information, the emission reduction information for the OTC States does not account for the increased RP that occurs when there is growth between the base year and the forecast year. The base year inventory supplied by LADCO did not contain portable fuel container category emissions for any OTC State. However, Pechan prepared portable fuel container control information for Pennsylvania and Delaware SCCs for which emissions were submitted to the 2002 National Emissions Inventory.

Except for Residential Wood Combustion, for all non-Midwest RPO States outside the OTC, the area source control factors are computed the same way as those for the Midwest RPO States, without any of the sub-State programs applied. To reduce the level of effort required to develop control information for the residential wood combustion category, non-Midwest RPO State emission reduction information is not adjusted to account for State-specific growth rates. This assumption will only significantly understate RP and overall emission reductions for States with large growth factors. Because the largest residential wood combustion growth factor for non-Midwest RPO States is 1.124 (California, Oregon, and Washington State growth factor for 2018), the use of non-growth adjusted emission reduction information does not have a significant impact on the reductions estimated for this category.

D. NONROAD SOURCES

The primary emphasis for the nonroad sector was placed on developing representative control factors for locomotives and commercial marine vessels. In addition to the control efficiency, Pechan accounted for the appropriate level of rule penetration due to fleet engine turnover and the phase-in of new engines subject to the emission standards. A description of the development of control information for NONROAD model engines is first described below.

1. NONROAD Model

EPA OTAQ's NONROAD2004 model incorporates the effects of most final Federal standards, including the Tier 4 diesel engine standards and the exhaust emission standards for large spark-

ignition (S-I) engines, diesel marine, and land-based recreational engines. The only remaining federal standards not modeled by NONROAD2004 include permeation and evaporative emission standards for gasoline recreational and large S-I engines, respectively. The evaporative standards for recreational equipment only affect permeation emissions, which are not currently included in NONROAD2004. These standards do not affect any other evaporative emission components in the model (i.e., diurnal or refueling). Therefore, Pechan did not model the recreational equipment permeation emission standards. Pechan developed an estimate of the emission reductions due to the large S-I standard to apply to the affected SCCs as a post-processing adjustment.

For the large S-I evaporative standards, Pechan obtained overall emission reduction information from the Large S-I Regulatory Support Document (EPA, 2002). Using large S-I evaporative base and control case future year inventories, emission reductions were estimated for the modeling years of interest. These emission reductions vary by evaporative component, but for this analysis Pechan summed the emissions across all components to estimate emission reductions for all evaporative emissions combined, as well as crankcase emissions. Large S-I emission reductions by year are presented in Table III-7.

Table III-7. Large S-I Emission Reductions by Year

Year	Emission Reduction, %
2007	38.7
2008	45.9
2009	53.0
2012	64.8
2018	78.1

Pechan calculated two rule penetration adjustments to account for the fraction of the SCC-level emissions that are affected by the rule. Since the rule only affects large S-I engines greater than 25 horsepower, the first adjustment was developed to reflect that fraction of the activity associated with these larger engines. This was estimated using 2002 national gasoline consumption results by horsepower and equipment category from NONROAD2004. As a simplifying assumption, we used the same rule penetration value for each projection year and for all applications within a category, though this is likely to vary by year and application. Table III-8 provides a summary of the horsepower-related rule penetration values by equipment category. A second rule penetration adjustment by SCC was also developed to account for that fraction of the SCC-level emissions associated with evaporative VOC relative to the total VOC emissions (i.e., exhaust plus evaporative). These rule penetration values varied by year and SCC and are not presented in this report, but Pechan could make these data available upon request. These adjustments enable the emission reductions to be applied directly to the SCC-level output from the NONROAD model as a post-processing step.

Table III-8. Horsepower-Related Rule Penetration Values by Category for Large S-I Evaporative Standards

Fuel Type	Classification	Rule Penetration
Gasoline	Agricultural Equipment	0.40
Gasoline	Airport Equipment	0.74
Gasoline	Commercial Equipment	0.05
Gasoline	Construction and Mining Equipment	0.14
Gasoline	Industrial Equipment	0.59
Gasoline	Commercial Lawn and Garden Equipment	0.07
Gasoline	Railroad Equipment	0.04
Gasoline	Recreational Equipment[1]	0.43
CNG	All Classifications	1.0
LPG	All Classifications	1.0

[1]Applies to specialty vehicle carts only; other recreational equipment covered by recreational standards.

The following equation shows an example of how overall adjusted emission reductions were estimated for 4-stroke industrial forklifts in 2018:

$$ER_{ADJ} = RP_{hp} \times RP_{evap} \times ER$$

where:

ER_{ADJ} = adjusted emission reduction accounting for rule penetration
R_{php} = rule penetration for affected horsepower fraction
R_{pevap} = rule penetration for evaporative fraction of total VOC emissions
ER = evaporative emission reduction for affected engines

$$ER_{ADJ} = 0.590 \times 0.529 \times 0.781$$
$$= 0.244$$
$$= 24.4 \text{ percent}$$

Finally, Pechan accounted for local fuel-related programs that would affect NONROAD model engine emissions. Pechan identified local Stage 2 refueling programs to account for Stage 2 controls by county. Based on a listing provided by EPA, several counties in Illinois, Indiana, Ohio, and Wisconsin use Stage 2 refueling controls in 2002. Pechan assumed a value of 86 percent to represent the overall emission reduction for this program. To the extent information was provided by the Midwest RPO States, Pechan also accounted for county-level fuel program parameters such as Reid vapor pressure (RVP), gasoline oxygen content, and market shares of oxygenated gasolines. Data for 2002 were assumed to apply to the future modeling years of interest, with the exception of fuel sulfur content. These fuel parameters were then incorporated into a database described in more detail in Section IV.A of this report.

2. Non-NONROAD Model

Pechan focused on compiling control information for commercial marine vessels and locomotives. Standards affecting these categories are Federal standards that affect all areas of the nation. No additional local controls were identified in the Midwest RPO States for these categories.

In 2003, EPA proposed aircraft engine NOx emission standards that will bring U.S. aircraft standards into alignment with standards developed by the International Civil Aviation Organization (ICAO). The EPA did not prepare emission reduction estimates for these standards because any such reductions would be modest (e.g., 94 percent of aircraft engines are currently meeting or exceeding these standards). Therefore, Pechan did not account for emission reductions from these standards for this analysis.

a. Locomotives

Emission reduction impacts of the Federal locomotive engine standards are available in an EPA Regulatory Support Document (RSD) (EPA, 1998). This document contains emission reduction information specific to Class I Operations, Class II/III Operations, Passenger Trains (Amtrak and Commuter Lines), and Switch (Yard) Locomotives. Year-specific percentage reduction estimates for select pollutants are available for each locomotive sector for each year over the 1999-2040 period. Pechan developed overall emission reduction values that reflect the control technology efficiencies, as well as the expected rule penetration for the modeling years of interest based on growth rates calculated for Midwest RPO States under this project. Rule penetration was assumed to be 100 percent.

The basis for the emission reductions in the RSD assume that there is no growth in fuel consumption over time (i.e., increases in fuel efficiency outweigh increases in locomotive activity). However, Midwest RPO State-specific growth rates developed for this project were showing growth increases of 20 to 30 percent by 2018. As such, Pechan adjusted the overall expected emission reductions by the growth rate calculated for each locomotive SCC and each State. Tables III-9a and III-9b show an example of how this was performed for Commuter Line Haul NO_x emissions in the State of Michigan for the year 2007. New locomotive engines are subject to more stringent Tier standards over time. For new engines, we estimated a weighted control efficiency that represented the number of years associated with each Tier between 2002 and 2007. This final control efficiency of 0.56 is shown in Table III-9a. After this step, the fraction of engines associated with new growth versus existing engines is then calculated in Table III-9b, and these values are used to weight their respective control efficiencies of 0.56 and 0.17. This results in an adjusted emission reduction of 20.6 percent (compare to EPA's reported 17 percent) to reflect the faster turnover and phase-in of cleaner engines for this locomotive category in the State.

Table III-9a. Commuter Line Haul NOx Emission Reductions for New Growth in Michigan in 2007

Technology	Tier-specific Emission Reduction	Effective Years of Tiers	Fraction by Tier	Weighted Emission Reduction
Tier 0	0.34	0	0.00	0.00
Tier 1	0.49	3	0.50	0.25
Tier 2	0.62	3	0.50	0.31
				0.56

Table III-9b. Commuter Line Haul Adjusted Overall NOx Emission Reductions for Michigan in 2007

	2007 Growth Rate	2007 Growth Fraction	Overall Emission Reduction	Adjusted Emission Reduction
New Growth	0.1002	0.0911	0.56	0.051
Existing	1.0000	0.9089	0.17	0.155
	1.1002			**0.206**

In addition, overall SO_2, PM-10, and PM-2.5 emission reductions associated with decreases in the diesel fuel sulfur content were also included. These were estimated from future base case and control case locomotive emission inventories prepared for EPA's regulatory impact analysis (RIA) for the Clean Air Diesel Rule (EPA, 2004). In the case of PM, since exhaust PM standards already apply to locomotives, a combined emission reduction was calculated for each future year that accounted for both the exhaust standards and reductions in PM sulfate due to the fuel sulfur limits.

b. Commercial Marine Vessels

EPA has promulgated two sets of commercial marine vessel (CMV) regulations: a regulation setting Category 1 and 2 marine diesel engine standards and a regulation setting Category 3 marine diesel engine standards. Category 1 marine diesel engines are defined as engines of greater than 37 kilowatts (kW) but with a per-cylinder displacement of 5 liters/cylinder or less. Category 2 marine diesel engines cover engines of 5 to 30 liters/cylinder, and Category 3 marine diesel engines include the remaining, very large, engines. For this analysis, overall emission reductions were estimated for each projection year of interest using information from the regulatory support documents prepared for these rulemakings (EPA, 1999; EPA, 2003). In addition to the EPA standards, beginning in 2000, marine diesel engines greater than or equal to 130 kW are subject to an international NO_x emissions treaty (MARPOL) developed by the International Maritime Organization. The emission reductions reflect both the MARPOL and EPA standards.

Because the reductions vary by category of vessel, assumptions were made concerning the characterization of engines associated with each diesel commercial marine vessel SCC included

in the base year inventory. Table III-10 displays the commercial marine SCCs that are used in the 2002 LADCO State emission inventories, along with the category assignment for this analysis.

Table III-10. Vessel Category Assignment for Commercial Marine Vessel SCCs in Midwest RPO Inventory

SCC	SCC Description	Category
2280002021	Mobile Sources Marine Vessels, Commercial Diesel Tugs	2
2280002022	Mobile Sources Marine Vessels, Commercial Diesel Ferries	1
2280002023	Mobile Sources Marine Vessels, Commercial Diesel Push Boats	2
2280002024	Mobile Sources Marine Vessels, Commercial Diesel Excursion	1
2280002025	Mobile Sources Marine Vessels, Commercial Diesel Dredge	2
2280002029	Mobile Sources Marine Vessels, Commercial Diesel Support Vessels	1
2280002030	Mobile Sources Marine Vessels, Commercial Diesel Fishing Vessels	1
2280002040	Mobile Sources Marine Vessels, Commercial Diesel Military Vessels	1
2280002100	Mobile Sources Marine Vessels, Commercial Diesel Port emissions	2
2280002200	Mobile Sources Marine Vessels, Commercial Diesel Underway emissions	3

Similar to locomotives, overall SO_2, PM-10 and PM-2.5 emission reductions associated with decreases in the diesel fuel sulfur content were also included based on information in EPA's RIA for the Clean Air Diesel Rule (EPA, 2004). Because exhaust PM standards already apply to certain categories of vessels (i.e., Category 1), in these cases a combined emission reduction was calculated for each future year that accounted for both the exhaust standards and reductions in PM sulfate due to the fuel sulfur limits.

Pechan compared the growth rates assumed for the overall emission reductions reported in the regulatory support documents to the CMV growth rates calculated for Midwest RPO States. Unlike the locomotive category, Pechan did not make adjustments to the overall emission reductions, because the EPA growth rates forming the basis of the future emission reductions were comparable to the State-specific growth rates calculated for this analysis.

CHAPTER IV. PREPARATION OF GROWTH AND CONTROL FILES

The purpose of this chapter is to describe how Pechan prepared the growth and control factor files from the projection information described in Chapter II and the control information described in Chapter III. This chapter first describes the development of projection year NONROAD model input files. This is followed by a discussion of the preparation of the non-EGU point and area and miscellaneous nonroad source growth and control factors in the RPO Data Exchange Protocol Format.

A. NONROAD MODEL INPUT FILES

1. Growth

Pechan prepared a revised NATION.GRW file for use in the NONROAD model. Once year 2002-based year growth rates were calculated, Pechan normalized these rates to reflect the 2002 year value in the NATION.GRW file. Since this year was not reported for most category codes, these 2002 data were calculated using linear interpolation of values reported for the most recent prior year and closest future year. Pechan then incorporated data for each of the appropriate indicator codes for all five Midwest RPO States, for each year between 2002 and 2018. State-specific records for historic years prior to 2002 were also added, using the same values as the national-level indicators. Pechan tested the updated ***RV_NATION.GRW*** file for the State of Wisconsin for year 2012 to ensure that the model produced the expected results using the revised growth rates.

2. Control

Because LADCO will use EPA's National Mobile Inventory Model (NMIM) to generate NONROAD model projection year inventories, tables in the NMIM county-level database were updated with fuel properties to match those used for the onroad sector. The starting point for the projection year fuel updates were the projection year NMIM defaults from the May 8, 2004 version of the NMIM county-level database. The records for the five Midwest RPO states were extracted from the GASOLINE and the COUNTYYEARMONTH tables in this database for the projection years of 2007, 2008, 2009, 2012, and 2018. Updates to these extracted data were made based on highway gasoline properties included in the 2002 Midwest RPO base year MOBILE6 modeling files, as provided to Pechan by LADCO on September 21, 2004. Note that gasoline and diesel sulfur content information were not extracted from these 2002 MOBILE6 files because sulfur levels will decrease nationally from the levels observed in 2002 during the projection years due to the lower sulfur content requirements of gasoline from the Tier 2 rulemaking and of diesel from the Heavy Duty Vehicle rulemaking. From the MOBILE6 files, Pechan extracted data on Reid vapor pressure (RVP), gasoline oxygen contents and market shares of oxygenated gasolines, aromatic contents, olefin contents, benzene contents, and the vapor percentage of gasoline at 200°F and 300°F, reformulated gasoline program participation, and whether an RVP waiver has been granted to allow splash blending of alcohol-based oxygenates. These fuel properties were updated in the GASOLINE table for the corresponding gasolines used by the Midwest RPO States, as identified in the COUNTYYEARMONTH table.

Not all States included updates to all of these properties, and the updates sometimes varied by month. Each of the gasolines used in the Midwest RPO States was given a new ID number so that these data will not be confused with the default data. The gasoline IDs in the COUNTYYEARMONTH table were updated to match the appropriate gasoline ID from the revised GASOLINE table. Both the onroad and nonroad gasoline IDs were updated so that onroad and nonroad sector gasolines would be the same in any given county.

The table below illustrates which gasoline properties were updated from the defaults in each of the five States. No changes were made to the Ohio fuel properties as the gasoline information contained in the Ohio MOBILE6 files matched the information in NMIM tables. For the other States, some of the changes below applied only in specific areas of the States and not in all counties in the State.

State	RVP Updates	RVP Oxygenated Fuel Waiver Updates	Oxygenated Fuel Updates	Other Gasoline Property Updates	Reformulated Gas Program Updates
IL	X	X	X		
IN	X				
MI	X				
OH					
WI		X	X	X	X

For nonroad refueling controls, Pechan updated the COUNTYYEAR table in the NMIM county-level database to reflect nonroad Stage 2 controls in the appropriate counties in Illinois, Indiana, Ohio, and Wisconsin, all at EPA's assumed efficiency of 86 percent. Pechan prepared an updated COUNTYYEAR table that included only the five selected projection years for all counties in the Midwest RPO States, with the only change from the default table being the Stage 2 updates to the affected counties.

Evaporative hydrocarbon controls for large spark-ignition engines included in the NONROAD model will be applied as a post-processing adjustment to the affected gasoline SCCs. These control records were included in the RPO Data Exchange Protocol Files for area/miscellaneous nonroad source controls as described below.

B. RPO DATA EXCHANGE PROTOCOL FORMAT FILES

Table IV-1 presents the RPO Data Exchange Protocol Format for reporting emission growth and control data. Pechan utilized this format to create growth and control factor files for LADCO. Because the growth factors (unlike the control factors) do not differ by pollutant, Pechan developed a separate file containing only the growth factors. Four sets of control factor files were prepared: two for non-EGU area/nonroad source categories and two for non-EGU point sources. Each of the growth and control files were developed in fixed field ascii format. The following sections describe the contents of the growth and control factor files.

Table IV-1 RPO Data Exchange Protocol Format for Growth/Control Data

Field Name	Field Description	Field Length
RECORD TYPE	A code that identifies the type of record (G for growth, C for control)	2
COUNTRY CODE	A code that identifies the country (US = United States)	2
STATE PROVINCE TRIBAL CODE	The code for the state/province/tribe	4
COUNTY FIPS	The FIPS code for the county	3
SIC	4-digit SIC, or 2 digit SIC with remaining digits blank (not zero)	4
SCC	EPA source classification code or a fraction of the code	10
SITE ID	Unique state/local/tribal ID reported consistently over time	15
EMISSION UNIT ID	Unique state/local/tribal ID reported consistently over time	6
EMISSION RELEASE POINT ID	State/ local/tribal ID for point /location where emissions are released to ambient air	6
POLLUTANT CODE	Pollutant code	9
PROCESS ID	Unique state/local/tribal ID reported consistently over time	6
BASE DATE	Date that the control strategy comes into effect	6
FUTURE DATE	Future date that the control strategy affects	6
PRIMARY CONTROL EQUIPMENT CODE	Primary control equipment code	10
BASE DATE CONTROL EFFICIENCY	Base year % control efficiency(60% reduction = 60)	6
FUTURE DATE CONTROL EFFICIENCY	Future year % control efficiency(60% reduction = 60)	6
FUTURE DATE GROWTH FACTOR	Growth factor based on changes in throughput, economic growth (unrelated to controls). This is an absolute growth rate not an annual growth rate.	11
CONTROL TYPE	MACT, RACT, LAER, SIPCALL, BART, etc	10
FUTURE DATE CHEMICAL SPECIATION PROFILE	Code matching speciate chemical speciation profile unless in base year	6
ALLOWABLE EMISSIONS CAP	Allowable emissions cap units must be in TONS/day	10
MARKET PENETRATION OF NEW SPECIATION PROFILE	Fraction of future year emissions using new speciation profile	6
RESERVED FOR FUTURE USE FIELD 3	(Field used to enter future year control efficiency value where available)	10
RESERVED FOR FUTURE USE FIELD 2	(Field used to enter future year rule effectiveness value where available)	10
RESERVED FOR FUTURE USE FIELD 1	(Field used to enter future year RP value where available)	10
CONTROL DESCRIPTION	A text description of the control	80
PRIMARY CONTACT	Email address of the primary contact/developer of this record	30

1. Non-EGU Point and Area, and Miscellaneous Nonroad Source Growth Factors

Pechan compiled the Midwest RPO and non-Midwest RPO region State growth factor information into the file ***LADCOGrowthFactors.asc***. Table IV-2 displays the RPO Data Exchange Protocol Format fields and identifies the fields that were populated in this file. The file contains separate records for each SCC/State for each year between 2003 and 2018 (population-based Midwest RPO State growth indicator records are reported by SCC/State/County because population projections were available by county).

Table IV-2 Fields Populated in Growth Factor File

Field Name	Populated in Growth Factor File?
RECORD TYPE	Yes
COUNTRY CODE	Yes
STATE PROVINCE TRIBAL CODE	Yes
COUNTY FIPS	Yes (with "000" except for population data)
SIC	No
SCC	Yes
SITE ID	No
EMISSION UNIT ID	No
EMISSION RELEASE POINT ID	No
POLLUTANT CODE	No
PROCESS ID	No
BASE DATE	Yes
FUTURE DATE	Yes
PRIMARY CONTROL EQUIPMENT CODE	No
BASE DATE CONTROL EFFICIENCY	No
FUTURE DATE CONTROL EFFICIENCY	No
FUTURE DATE GROWTH FACTOR	Yes
CONTROL TYPE	No
FUTURE DATE CHEMICAL SPECIATION PROFILE	No
ALLOWABLE EMISSIONS CAP	No
MARKET PENETRATION OF NEW SPECIATION PROFILE	No
RESERVED FOR FUTURE USE FIELD 3 *(future year CE)*	No
RESERVED FOR FUTURE USE FIELD 2 *(future year RE)*	No
RESERVED FOR FUTURE USE FIELD 1 *(future year RP)*	No
CONTROL DESCRIPTION	No
PRIMARY CONTACT	Yes

2. Non-EGU Point Source Control Factors

Pechan compiled the non-EGU point source control factors into two sets of ascii files: one set providing control information for the Midwest RPO States **(*MidwestRPOPointControls.asc*)** and one set for all other States **(*NonMidwestRPOPointControls.asc*)**. Both of these files report control information for the specific date that each control is due to be implemented.

a. Midwest RPO State Controls

The ***MidwestRPOPointControls.asc*** file reports control information down to the Process ID-level. Note that the Base Date Control Efficiency field is populated with a zero for every record because Pechan did not have any base year control information other than that reported in the base year inventory supplied by LADCO. LADCO should rely on the control information in the

base year inventory to identify the base year level of control. Table IV-3 identifies the RPO Data Exchange Protocol fields that are populated in this file.

b. Non-Midwest RPO State Controls

The ***NonMidwestRPOPointControls.asc*** file expresses control information by State/County and SCC. Note that the Base Date Control Efficiency field is populated with a zero for every record because Pechan did not have any base year control information other than that reported in the base year inventory supplied by LADCO. LADCO should rely on the control information in the base year inventory to identify the base year level of control. Table IV-3 identifies the RPO Data Exchange Protocol fields that are populated in this file.

3. Non-EGU Area and Miscellaneous Nonroad Source Control Factors

Pechan compiled the non-EGU area and miscellaneous (locomotive, commercial marine vessel, large S-I and land-based recreational vehicle evaporative) nonroad source control factor information into two separate ascii files: one file that includes controls for which there is no change in emission reduction after the initial implementation year, and the other file that includes controls for which the emission reduction changes over time due to the effect of increased RP. The non-EGU area and miscellaneous nonroad source control factor files are expressed at the State-level for controls that are State/National (e.g., Portable Fuel Container control), and at the county-level for control factors that are county-specific (e.g., MERR regulation).

In cases where it was feasible to do so, Pechan populated the 5th, 4th, and 3rd fields from the end of each control factor file ("RESERVED FOR FUTURE USE" in the RPO Data Exchange Protocol Format) with future year CE, RE, and RP values, respectively (the field "FUTURE DATE CONTROL EFFICIENCY" was populated with the overall percentage emission reduction.

a. Controls Affected by Rule Penetration

The ascii file ***LADCOControlsAffectedByRulePenetration.asc*** contains area and miscellaneous nonroad source control factors for which the level of emission reduction increases over time due to increased RP. Due to the level of effort associated with estimating RP for each year, this file incorporates control factors only for the years of interest(2007, 2008, 2009, 2012, and 2018). Table IV-4 identifies the RPO Data Exchange Protocol fields that are populated in this file.

b. Controls Unaffected by Rule Penetration

The ascii file ***LADCOControlsByImplementationYear.asc*** provides control factors for area source emission controls for which RP does not change over time. Because there is no projected change in the emission reduction after the initial implementation year, this file reports control factors only for the first year that each control is due to be implemented. However, these control factors also apply to each post-implementation year. Table IV-4 identifies the RPO Data Exchange Protocol fields populated in this file.

Table IV-3 Fields Populated in Non-EGU Point Source Control Factor Files

RPO Data Exchange Protocol Format Field Name	Populated in Midwest RPO State Control Factor File	Populated in Non-Midwest RPO State Control Factor File
RECORD TYPE	Yes	Yes
COUNTRY CODE	Yes	Yes
STATE PROVINCE TRIBAL CODE	Yes	Yes
COUNTY FIPS	Yes	Yes
SIC	Yes	No
SCC	Yes	Yes
SITE ID	Yes	No
EMISSION UNIT ID	Yes	No
EMISSION RELEASE POINT ID	Yes	No
POLLUTANT CODE	Yes	Yes
PROCESS ID	Yes	No
BASE DATE	Yes	Yes
FUTURE DATE	Yes	Yes
PRIMARY CONTROL EQUIPMENT CODE	No	No
BASE DATE CONTROL EFFICIENCY[1]	Yes	Yes
FUTURE DATE CONTROL EFFICIENCY[2]	Yes	Yes
FUTURE DATE GROWTH FACTOR	No	No
CONTROL TYPE	Yes	Yes
FUTURE DATE CHEMICAL SPECIATION PROFILE	No	No
ALLOWABLE EMISSIONS CAP	No	No
MARKET PENETRATION OF NEW SPECIATION PROFILE	No	No
RESERVED FOR FUTURE USE FIELD 3 *(future year CE)*	No	No
RESERVED FOR FUTURE USE FIELD 2 *(future year RE)*	No	No
RESERVED FOR FUTURE USE FIELD 1 *(future year RP)*	No	No
CONTROL DESCRIPTION	Yes	Yes
PRIMARY CONTACT	Yes	Yes

[1] All records populated with “0" - LADCO should rely on control information reported in base year inventory.
[2] Populated with overall percentage emission reduction.

Table IV-4 Fields Populated in Area/Miscellaneous Nonroad Source Control Factor Files

RPO Data Exchange Protocol Format Field Name	Populated in Implementation Year Control Factor File	Populated in Rule Penetration Based Control Factor File
RECORD TYPE	Yes	Yes
COUNTRY CODE	Yes	Yes
STATE PROVINCE TRIBAL CODE	Yes	Yes
COUNTY FIPS	Yes	Yes
SIC	No	No
SCC	Yes	Yes
SITE ID	No	No
EMISSION UNIT ID	No	No
EMISSION RELEASE POINT ID	No	No
POLLUTANT CODE	Yes	Yes
PROCESS ID	No	No
BASE DATE	Yes	Yes
FUTURE DATE	Yes	Yes
PRIMARY CONTROL EQUIPMENT CODE	Yes	Yes
BASE DATE CONTROL EFFICIENCY	Yes	Yes
FUTURE DATE CONTROL EFFICIENCY[1]	Yes	Yes
FUTURE DATE GROWTH FACTOR	No	No
CONTROL TYPE	No	No
FUTURE DATE CHEMICAL SPECIATION PROFILE	No	No
ALLOWABLE EMISSIONS CAP	No	No
MARKET PENETRATION OF NEW SPECIATION PROFILE	No	No
RESERVED FOR FUTURE USE FIELD 3 *(future year CE)*	Yes	Yes[2]
RESERVED FOR FUTURE USE FIELD 2 *(future year RE)*	Yes	Yes[2]
RESERVED FOR FUTURE USE FIELD 1 *(future year RP)*	Yes	Yes[2]
CONTROL DESCRIPTION	Yes	Yes
PRIMARY CONTACT	Yes	Yes

[1] Populated with overall percentage emission reduction (product of CE, RE, and RP).
[2] Populated only for Residential Wood Combustion and Portable Fuel Container controls (not populated for Commercial Marine Vessel or Locomotive controls).

CHAPTER V. STUDY UNCERTAINTIES/REQUESTS FOR ADDITIONAL LADCO/STATE AGENCY INPUT

In compiling the growth and control factors for this project, Pechan identified a number of issues that could not be resolved in time for this draft submittal. The following two sub-sections identify these issues for potential resolution by LADCO or the Midwest RPO States. Input that Pechan receives on these issues will be incorporated into the final growth and/or control factor information that will be submitted later this year. The following sub-sections identify these growth and control factor issues, organized by geographic area to which the issue pertains.

A. MIDWEST RPO REGION ISSUES

Because of difficulties in matching EPA's large engines file to LADCO's base year point source inventory file, it was necessary to model NOx SIP Call-related RICE engine controls using SCC-specific control factors. However, with assistance from the respective Midwest RPO State agencies (IN, MI, OH), it may be possible to apply controls to the specific affected sources. *Pechan requests assistance from the Midwest RPO State agencies in identifying the specific sources in the base year inventory file for which these controls should be applied.*

The base year inventory for Illinois did not include emissions for the SCCs for which Pechan compiled solvent cleaning and auto repair control factor information (i.e., SCCs 2415345000 and 2415360000). In addition, Pechan is not sure if the base year control factor should be non-zero for this VOC control. *Pechan requests State input as to the proper way to model these controls given the base year emissions reported in Illinois's inventory (e.g., develop a weighted RP value based on the proportion of general degreasing category VOC emissions that are cold cleaning).*

Pechan was unable to identify the availability of suitable population projections for all Illinois counties. Although appropriate population projections were available for six Northeastern Illinois Planning Commission counties, these projections were not available for the remaining counties.[4] *Pechan requests assistance from the State of Illinois in identifying a more complete set of suitable county population projections.*

Pechan reviewed the 2002 point source inventory file for the Cincinnati, Ohio ozone nonattainment area in an attempt to determine specific VOC emission sources for which newly adopted RACT requirements should be applied. Because the most significant emission reductions are expected from bakeries, base year inventory file records for bakery point source SCCs were reviewed. Pechan was unable to develop VOC RACT control factors for this area because no bakery sources were found in this file. *Pechan requests assistance from the State of Ohio to determine how best to develop plant-specific control factors for the Cincinnati, Ohio area*.

[4] Projections are available based on the 1990 Census, however, projections based on the 2000 Census will not be available until later this year.

B. NON-MIDWEST RPO REGION ISSUES

For the OTC States, the area source inventory provided by LADCO did not report emissions for any of the portable fuel container emission SCCs. Because Pechan is aware that there is an OTC model rule for portable fuel containers and that two States (Delaware and Pennsylvania) submitted portable fuel container emissions to the 2002 National Emissions Inventory (NEI), Pechan created control records for the SCCs submitted by these States. *Pechan requests that LADCO consider whether to incorporate the Delaware and Pennsylvania portable fuel container emission records into LADCO's base year area source inventory.*

CHAPTER VI. REFERENCES

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APPENDIX A. SCC CROSSWALK USED IN PREPARING EMISSION ACTIVITY GROWTH FACTORS