DEVELOPMENT OF 2005 BASE YEAR GROWTH AND CONTROL FACTORS FOR LAKE MICHIGAN AIR DIRECTORS CONSORTIUM (LADCO)

FINAL REPORT

PECHAN

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TABLES

ACRONYMS AND ABBREVIATIONS

AEO	*Annual Energy Outlook*
AIM	architectural and industrial maintenance
BART	best available retrofit technology
CE	control efficiency
CMV	commercial marine vessel
DEQ	Department of Environmental Quality
DOE	Department of Energy
EGAS	Economic Growth Analysis System
EGU	electric generating unit
EPA	United States Environmental Protection Agency
FAA	Federal Aviation Administration
FCCUs	fluid catalytic cracking units
FCU	fluid coking units
FGR	flue gas recirculation
HAP	hazardous air pollutant
IC	internal combustion
LADCO	Lake Michigan Air Directors Consortium
LAER	lowest achievable emission rate
LNB	low NO_x burner
MACT	maximum achievable control technology
MAR	marine, aircraft, and railroad
MSAT	mobile source air toxics
NAAQS	national ambient air quality standards
NH3	ammonia
NMIM	National Mobile Inventory Model
NO_x	oxides of nitrogen
NSPS	new source performance standard
OTB	on-the-books
OWB	outdoor wood boiler
Pechan	E.H. Pechan & Associates, Inc.
PFC	portable fuel container
PM	particulate matter
PM-2.5	particulate matter less than or equal to 2.5 micrometers
RACT	reasonably available control technology
RE	rule effectiveness
REMI	Regional Economic Models, Inc.
RIA	Regulatory Impact Analysis
RICE	reciprocating internal combustion engines
ROG	reactive organic gases
RP	rule penetration
RPO	Regional Planning Organization
SCC	source classification code

SIC	standard industrial classification
SIP	State Implementation Plan
tpy	tons per year
SO_2	sulfur dioxide
VOC	volatile organic compound

SECTION 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). Under a previous contract with LADCO, Pechan prepared emission activity growth and emission control data for all non-electric generating unit (EGU) point, area, and nonroad source categories relative to a base year (2002) inventory supplied by LADCO. In December 2004, Pechan submitted emissions activity growth and control factor files for use by LADCO in emissions modeling. A December 14, 2004 Pechan report documents the contents and derivation of these files (Pechan, 2004). Revised files were later provided to LADCO in March 2005.

In September 2005, LADCO contracted with Pechan to conduct the following two tasks to develop updated growth and control factors needed to support future year control strategy analyses for regional haze, particulate matter less than or equal to 2.5 micrometers (PM-2.5), and ozone:

Task 1: Update control factors to reflect current information pertaining to:
- (a) Petroleum refinery cases and settlements;
- (b) Maximum achievable control technology (MACT) standard control efficiency assumptions;
- (c) Residential wood combustion unit lifetime; and
- (d) Regional Planning Organization (RPO) inventories.

Task 2: Develop non-EGAS default-based emission activity growth factors for:
- (a) Priority point source categories; and
- (b) Priority area source categories.

A December 2005 report describes Pechan efforts to perform these tasks, which resulted in updated emissions activity growth and control factor files (Pechan, 2005). The updates reflect the use of more recent and/or more detailed information than that used in the earlier study. As with the earlier study, this effort involved the preparation of emission activity growth and control information relative to a 2002 base year inventory for future years of interest. Control information was developed for 2007, 2008, 2009, 2012, and 2018 (e.g., 2018 is the first milestone for regional haze reasonable progress demonstrations). 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.

For the current study, LADCO requested that Pechan develop growth and control factor files to support emission projections from a recently compiled 2005 base year inventory for the following LADCO states: Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. LADCO requested that Pechan provide files representing changes in emission activity and emission control between the base year and 2009, 2012, and 2018. As with the previous studies, Pechan provided updated point/area source and marine, aircraft, and railroad (MAR) category

growth factors for each year over the 2006-2018 period. Control factor development focused on the modeling years of interest, or in the case of point source controls, the specific anticipated implementation date within the forecast period.

This report is organized into this Background section and:

- Section II, which describes the development of the emission activity growth data;
- Section III, which discusses how the updated emission control data were compiled;
- Section IV, which describes the preparation of the updated growth and control factor files; and
- Section V, which presents the references consulted in preparing this report.

SECTION II. EMISSION ACTIVITY GROWTH DATA

A. OVERVIEW

As with the two previous studies, Pechan relied on the data incorporated into Version 5.0 of the Economic Growth Analysis System (EGAS) as the default growth factor data source.[1] The EGAS 5.0 projections data are typically derived from two main resources: (1) version 5.5 of Regional Economic Models Incorporated (REMI)'s state-level economic models; and (2) the Department of Energy (DOE)'s *Annual Energy Outlook (AEO) 2004*. While socioeconomic growth indicators from the REMI models provide state-level growth rates, the DOE energy forecasts provide regional or national growth rates (e.g., the same growth rate is applied to each LADCO state because each of these states is included in the DOE's East North Central division). Instead of relying on REMI's population forecasts, Pechan developed growth factors from county-level population projections available from each LADCO region state.

LADCO requested that Pechan review the growth indicators applied to particular source classification codes (SCCs) in the 2005 base year inventory. For these "priority" source categories, Pechan evaluated alternative growth methodologies and data sources before selecting a forecasting approach. The balance of this section describes the emission activity growth data developed in this study. Section IV discusses how these data were compiled into the file format required by LADCO.

B. AREA SOURCE/MAR CATEGORIES

LADCO provided Pechan with a list of priority point/area source and MAR categories for which emission activity projection improvements were to be evaluated. For these source categories, Pechan reviewed U.S. Environmental Protection Agency (EPA) SCC documentation and emission estimation guidance to identify the emissions activity (throughput) data associated with each SCC. Pechan then investigated the availability of LADCO state-specific projections for these data.

Table II-1 presents the descriptions and emissions activity for each priority area source/MAR category. The last column in this table identifies each category's growth indicator assignment under the previous Pechan forecast effort (Pechan, 2005). Table II-2 displays the assigned growth indicator for each priority area/MAR source category and any alternative indicators that were considered. This table also presents the percentage growth rates for the assigned indicators over two forecast periods: 2005-2009 and 2005-2018.

In addition to population data from the LADCO states and REMI employment data, the following information sources supplied data used in estimating emission activity growth for the priority area source/MAR categories:

[1] Information on these EGAS 5.0 data sources is provided in the report documenting the earliest study Pechan performed for LADCO (Pechan, 2004).

Table II-1. Priority Emission Activity Area Source/MAR Categories

POLLUTANT	SCC	DESC2	DESC3	DESC4	EMISSIONS ACTIVITY	CURRENT GROWTH BASIS
NH3	2805047100	Agriculture Production - Livestock	Swine production - deep-pit house operations (unspecified animal	Confinement	Annual average number of swine	REMI Farm sector value added
NH3	2805039200	Agriculture Production - Livestock	Swine production - operations with lagoons (unspecified animal	Manure handling and storage	Annual average number of swine	REMI Farm sector value added
NH3	2805047300	Agriculture Production - Livestock	Swine production - deep-pit house operations (unspecified animal	Land application of manure	Annual average number of swine	REMI Farm sector value added
NH3	2805001100	Agriculture Production - Livestock	Beef cattle - finishing operations on feedlots (drylots)	Confinement	Annual average number of beef cattle	REMI Farm sector value added
NH3	2805039100	Agriculture Production - Livestock	Swine production - operations with lagoons (unspecified animal	Confinement	Annual average number of swine	REMI Farm sector value added
NH3	2805003100	Agriculture Production - Livestock	Beef cattle - finishing operations on pasture/range	Confinement	Annual average number of beef cattle	REMI Farm sector value added
NH3	2805001300	Agriculture Production - Livestock	Beef cattle - finishing operations on feedlots (drylots)	Land application of manure	Annual average number of beef cattle	REMI Farm sector value added
NH3	2630020000	Wastewater Treatment	Public Owned	Total Processed	Volume of wastewater processed	REMI Water and Sanitation sector output
NH3	2805007100	Agriculture Production - Livestock	Poultry production - layers with dry manure management system	Confinement	Annual average number of poultry	Regression with Food/Kindred Products sector value added as explanatory variable
NH3	2805021300	Agriculture Production - Livestock	Dairy cattle - scrape dairy	Land application of manure	Annual average number of dairy cattle	Regression with Farm sector employment as explanatory variable
NH3	2805030000	Agriculture Production - Livestock	Poultry Waste Emissions	Not Elsewhere Classified (see also 28-05-007 -008-009)	Annual average number of poultry	REMI Farm sector value added
NH3	2805021200	Agriculture Production - Livestock	Dairy cattle - scrape dairy	Manure handling and storage	Annual average number of dairy cattle	Regression with Farm sector employment as explanatory variable
NH3	2104008070	Residential	Wood	Outdoor Boiler	Amount of wood burned	
NOX	2285002006	Railroad Equipment	Diesel	Line Haul Locomotives: Class I Operations	Amount of diesel consumed by Class I line-haul locomotives	AEO Freight rail distillate (nat'l) adjusted for relative state growth in REMI Total output
NOX	2280002023	Marine Vessels Commercial	Diesel	Push Boats	Amount of diesel consumed by commercial push boats	AEO Shipping distillate (nat'l) adjusted for relative state growth in REMI Water Transportation sector output
NOX	2102006001	Industrial	Natural Gas	All Boiler Types	Volume of natural gas burned by industrial area source boilers	AEO Industrial natural gas

Table II-1 (continued)

POLLUTANT	SCC	DESC2	DESC3	DESC4	EMISSIONS ACTIVITY	CURRENT GROWTH BASIS
NOX	2275020000	Aircraft	Commercial Aircraft	Total: All Types	Number of commercial aircraft landing-takeoff cycles	Federal Aviation Administration (FAA) itinerant air carrier Landing and Take-Off (LTO) forecasts by state
NOX	2285002010	Railroad Equipment	Diesel	Yard Locomotives	Amount of diesel consumed by yard locomotives	AEO Freight rail distillate (nat'l) adjusted for relative state growth in REMI Total output
NOX	2104006000	Residential	Natural Gas	Total: All Combustor Types	Volume of residential natural gas consumed	AEO Residential natural gas
NOX	2285002009	Railroad Equipment	Diesel	Line Haul Locomotives: Commuter Lines	Amount of diesel consumed by commuter locomotives	AEO Commuter rail diesel (nat'l) adjusted for relative growth in population
NOX	2280003200	Marine Vessels Commercial	Residual	Underway emissions	Amount of residual oil consumed by CMV during underway operations	AEO Shipping residual oil (nat'l) adjusted for relative state growth in REMI Water Transportation sector output
NOX	2102006000	Industrial	Natural Gas	Total: Boilers and IC Engines	Volume of natural gas burned by industrial area source boilers and IC engines	AEO Industrial natural gas
NOX	2104008070	Residential	Wood	Outdoor Boiler	Amount of wood burned	
ROG	2461850000	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	All Processes	(Not listed for this SCC)	Region V employment projections for "Pesticide Handlers, Sprayers"
ROG	2461020000	Miscellaneous Non-industrial: Commercial	Asphalt Application: All Processes	Total: All Solvent Types	Amount of solvent used	Region V employment projections for "Paving, Surfacing, & Tamping Operators"
ROG	2401200000	Surface Coating	Other Special Purpose Coatings	Total: All Solvent Types	Amount of solvent used	Population
ROG	2401001000	Surface Coating	Architectural Coatings	Total: All Solvent Types	Amount of solvent used	Regression with Population (inc. county level) as explanatory variable + projected solvent content change
ROG	2460100000	Miscellaneous Non-industrial: Consumer and Commercial	All Personal Care Products	Total: All Solvent Types	Amount of solvent used	Population (county-level for LADCO states)
ROG	2501011010	Petroleum and Petroleum Product Storage	Portable Gas Cans	Residential	Volume of gasoline stored	REMI, Gas and Oil Expenditures
ROG	2501060100	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 2: Total	Volume of gasoline pumped by stations	Regression with Gas and Oil Expenditures as explanatory variable
ROG	2460800000	Miscellaneous Non-industrial: Consumer and Commercial	All FIFRA Related Products	Total: All Solvent Types	Amount of solvent used	Regression with Population (county-level for LADCO states) as explanatory variable
ROG	2501060050	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 1: Total	Volume of gasoline pumped into stations	REMI, Gas and Oil Expenditures
ROG	2460400000	Miscellaneous Non-industrial: Consumer and Commercial	All Automotive Aftermarket Products	Total: All Solvent Types	Amount of solvent used	Population (county-level for LADCO states)
ROG	2425000000	Graphic Arts	All Processes	Total: All Solvent Types	Amount of solvent used	REMI, Printing and Publishing sector output
ROG	2401005000	Surface Coating	Auto Refinishing: SIC 7532	Total: All Solvent Types	Amount of solvent used	REMI, Automobile Parking, Repair, Services sector output
ROG	2460500000	Miscellaneous Non-industrial: Consumer and Commercial	All Coatings and Related Products	Total: All Solvent Types	Amount of solvent used	Population (county-level for LADCO states)

Table II-1 (continued)

POLLUTANT	SCC	DESC2	DESC3	DESC4	EMISSIONS ACTIVITY	CURRENT GROWTH BASIS
ROG	2460200000	Miscellaneous Non-industrial: Consumer and Commercial	All Household Products	Total: All Solvent Types	Amount of solvent used	Population (county-level for LADCO states)
ROG	2415020000	Degreasing	Fabricated Metal Products (SIC 34): All Processes	Total: All Solvent Types	Amount of solvent used	REMI, Fabricated Metals sector employment
ROG	2415025000	Degreasing	Industrial Machinery and Equipment (SIC 35): All Processes	Total: All Solvent Types	Amount of solvent used	REMI, Machinery and Computer Equipment sector employment
ROG	2460600000	Miscellaneous Non-industrial: Consumer and Commercial	All Adhesives and Sealants	Total: All Solvent Types	Amount of solvent used	Population (county-level for LADCO states)
ROG	2420000370	Dry Cleaning	All Processes	Special Naphthas	Amount of special naphthas used	SCC is not in current growth file; similar SCC (2420010370) is in file w/ REMI Laundry sector output
ROG	2630010000	Wastewater Treatment	Industrial	Total Processed	Volume of wastewater processed	Projected LADCO NEEDS industrial flow design forecast
ROG	2501060101	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 2: Displacement Loss/Uncontrolled	Volume of gasoline pumped via uncontrolled	Regression with Gas and Oil Expenditures as explanatory variable
ROG	2415360000	Degreasing	Auto Repair Services (SIC 75): Cold Cleaning	Total: All Solvent Types	Amount of solvent used	REMI, Automobile Parking, Repair, Services sector output
ROG	2401002000	Surface Coating	Architectural Coatings - Solvent-based	Total: All Solvent Types	Amount of solvent used	REMI, Housing expenditures
ROG	2401003000	Surface Coating	Architectural Coatings - Water-based	Total: All Solvent Types	Amount of solvent used	REMI, Housing expenditures
ROG	2104008070	Residential	Wood	Outdoor Boiler	Amount of wood burned	
SO2	2601020000	On-site Incineration	Commercial/Institutional	Total	Amount of material burned	REMI, Commercial sector employment
SO2	2102004000	Industrial	Distillate Oil	Total: Boilers and IC Engines	Amount of distillate oil burned by area source industrial boilers/IC engines	AEO Industrial distillate
SO2	2103004000	Commercial/Institutional	Distillate Oil	Total: Boilers and IC Engines	Amount of distillate oil burned by area source commercial boilers/IC engines	No growth based on historical energy data
SO2	2275020000	Aircraft	Commercial Aircraft	Total: All Types	See NOX entry	FAA itinerant air carrier LTO forecasts by state
SO2	2102005000	Industrial	Residual Oil	Total: All Boiler Types	Amount of residual oil burned by area source industrial boilers	AEO Industrial residual
SO2	2102002000	Industrial	Bituminous/Subbituminous Coal	Total: All Boiler Types	Amount of bit/sub coal burned by area source industrial boilers	AEO Industrial steam coal
SO2	2285002006	Railroad Equipment	Diesel	Line Haul Locomotives: Class I Operations	See NOX entry	AEO Freight rail distillate (nat'l) adjusted for relative state growth in Total output
SO2	2104008070	Residential	Wood	Outdoor Boiler	Amount of wood burned	

Table II-2. Growth Indicators for Priority Area Source/MAR Categories

Pollutant	SCC	Total % Change 2005-2009	Total % Change 2005-2018	Growth Indicator Basis	Alternatives Considered	Comment
NH3	2805047100	-1.7	6.2	Interpolated SCC/state-level animal count projections from EPA NH3 inventory of Animal Husbandry Operations		Forecast data are state-level
NH3	2805039200	-2.3	4.4	Interpolated SCC/state-level animal count projections from EPA NH3 inventory of Animal Husbandry Operations		Forecast data are state-level
NH3	2805047300	-1.6	6.4	Interpolated SCC/state-level animal count projections from EPA NH3 inventory of Animal Husbandry Operations		Forecast data are state-level
NH3	2805001100	5.2	16.7	Interpolated SCC/state-level animal count projections from EPA NH3 inventory of Animal Husbandry Operations		Forecast data are state-level
NH3	2805039100	-1.6	6.4	Interpolated SCC/state-level animal count projections from EPA NH3 inventory of Animal Husbandry Operations		Forecast data are state-level
NH3	2805003100	3.2	3.5	Interpolated SCC/state-level animal count projections from EPA NH3 inventory of Animal Husbandry Operations		Forecast data are state-level
NH3	2805001300	5.2	16.7	Interpolated SCC/state-level animal count projections from EPA NH3 inventory of Animal Husbandry Operations		Forecast data are state-level
NH3	2630020000	2.8	9.5	Municipal design flow forecasts from Drinking Water Infrastructure Needs Survey		
NH3	2805007100	-4.5	8.3	Interpolated SCC/state-level animal count projections from EPA NH3 inventory of Animal Husbandry Operations		Forecast data are state-level
NH3	2805021300	-10.2	-39.0	Interpolated SCC/state-level animal count projections from EPA NH3 inventory of Animal Husbandry Operations		Forecast data are state-level
NH3	2805030000	-5.3	6.8	Interpolated SCC/state-level animal count projections from EPA NH3 inventory of Animal Husbandry Operations		Forecast data are state-level
NH3	2805021200	-10.2	-39.0	Interpolated SCC/state-level animal count projections from EPA NH3 inventory of Animal Husbandry Operations		Forecast data are state-level
NH3	2104008070	78.0	84.3	Extrapolation of national 1999-2004 trend in OWB sales (exponential growth) thru 2006; linear growth thru 2008; 2009+ based on rural population growth rate		
NOX	2285002006	0.0	0.0	No growth due to contradictory historic and forecast trends	DOE 1990-2004 = -1.4% per year; AEO forecast = 1.4% per year	Note that post-2001 trend has been upward and that historical data shows several ups and downs
NOX	2280002023	4.3	9.9	AEO national Domestic Shipping sector distillate projections adjusted for LADCO region growth in REMI Water Transportation sector output relative to nation	1998-2004 fuel consumption data for barge traffic on regional rivers indicates similar annual growth rate (1.0%)	Forecast data are state-level
NOX	2102006001	0.0	0.0	No growth due to contradictory historic and forecast trends	DOE 1990-2004 = -0.01% per year; AEO forecast = 1.4% per year	
NOX	2275020000	0.0	0.0	No growth due to contradictory historic and forecast trends (Federal Aviation Administration commercial aircraft landing and take-offs data)	FAA 1990-2005 = -0.01% per year; FAA forecast = 1.7% per year	
NOX	2285002010	0.0	0.0	No growth due to contradictory historic and forecast trend (historic trend based on 1996-2002 regional Switch and Terminal Services employment)	1996-2004 = -1.6% per year employment decrease; AEO forecast = 1.4% per year	
NOX	2104006000	1.7	2.8	AEO residential natural gas consumption forecast	DOE 1990-2004 = 0.5% annual; AEO forecast = 0.2%	

Table II-2 (continued)

Pollutant	SCC	Total % Change 2005-2009	Total % Change 2005-2018	Growth Indicator Basis	Alternatives Considered	Comment
NOX	2285002009	7.4	26.1	Annual growth rate (1.8%) from 2005-2009 diesel fuel consumption projections reported in Marta 2007 budget		
NOX	2280003200	0.4	1.3	1995-2005 Great Lakes region ton-miles trend (0.1% annual growth)	AEO forecasts national Domestic Shipping residual oil consumption +1.1% per year	Used historical growth rate since region-specific
NOX	2102006000	0.0	0.0	No growth due to contradictory historic and forecast trends	DOE 1990-2004 = -0.01% per year; AEO forecast = 1.4% per year	
NOX	2104008070	78.0	84.3	Extrapolation of national 1999-2004 trend in OWB sales (exponential growth) thru 2006; linear growth thru 2008; 2009+ based on rural population growth rate		
ROG	2461850000	4.8	16.1	Regional employment projections for "Pesticide Handlers, Sprayers" combined with projected solvent content change from Freedonia's "Solvents to 2010-Agricultural Chemical Market for Solvents" (-0.4% per year)		Forecast data are state-level
ROG	2461020000	-1.9	-6.0	No employment growth assumption due to contradictory historic and forecast trends in "Paving, Surfacing, & Tamping Operators" employment, combined with projected solvent content change from Freedonia's "Solvents to 2010-Asphalt Production Market for Solvents" (-0.5% per year)		Forecast data are state-level
ROG	2401200000	-6.5	-16.1	Population forecast combined with projected change in paint solvent content from Freedonia's "Solvents to 2010-Paints/Coatings Market for Solvents" (-1.9% per year)		Forecast data are county-level
ROG	2401001000	-9.9	-9.3	Regression with Population forecast as explanatory variable combined with Freedonia projected change in proportion of total Architectural coatings that are solvent-based (-2.0% per year)		Forecast data are county-level
ROG	2460100000	-3.9	-11.6	Population forecast combined with projected solvent content change from Freedonia's "Solvents to 2010-Cosmetics & Toiletries Market for Solvents" (-1.5% per year)		Forecast data are county-level
ROG	2501011010	0.2	0.3	Regression equation with Gas and Oil Expenditures as explanatory variable		Forecast data are state-level
ROG	2501060100	0.2	0.3	Regression equation with Gas and Oil Expenditures as explanatory variable		Forecast data are state-level
ROG	2460800000	-10.5	-15.6	Regression equation with Population as explanatory variable		Forecast data are county-level
ROG	2501060050	0.2	0.3	Regression equation with Gas and Oil Expenditures as explanatory variable		Forecast data are state-level
ROG	2460400000	0.1	3.3	Population forecast combined with projected change in solvent use/vehicle from Freedonia's "Solvents to 2010-Transportation Markets for Solvents" (-0.4% per year)		Forecast data are county-level
ROG	2425000000	0.0	0.0	No employment growth assumption due to contradictory historic and forecast trends for "Printing Machine Operators" employment, and no projected change in solvent content of ink from Freedonia's "Solvents to 2010-Printing Ink Market for Solvents"		
ROG	2401005000	-12.9	-38.9	Employment projections for "Automotive Body and Related Repairers" combined w/ change in proportion of automotive coatings that are solvent-based from Freedonia's "Automotive Coatings, Adhesives & Sealants-Automotive Coatings Demand by Formulation and Substrate" (-4.3% per year)		Forecast data are state-level
ROG	2460500000	-6.5	-16.1	Population forecast combined with projected change in paint solvent content from Freedonia's "Solvents to 2010-Paints/Coatings Market for Solvents" (-1.9% per year)		Forecast data are county-level

Table II-2 (continued)

Pollutant	SCC	Total % Change 2005-2009	Total % Change 2005-2018	Growth Indicator Basis	Alternatives Considered	Comment
ROG	2460200000	0.6	6.8	Population forecast combined with projected change in cleaning product solvent content from Freedonia's "Solvents to 2010-Cleaning Product Market for Solvents" (-0.1% per year)		Forecast data are county-level
ROG	2415020000	-15.0	-35.9	Fabricated Metals sector employment forecast combined with projected change in solvent use from Freedonia's "Solvents to 2010-Metal Processing Market for Solvents" (-3.7% per year)		Forecast data are state-level
ROG	2415025000	0.2	-11.4	Machinery and Computer Equipment sector employment forecast combined with projected change in solvent use from Freedonia's "Solvents to 2010-Metal Processing Market for Solvents" (-3.7% per year)		Forecast data are state-level
ROG	2460600000	-10.0	-24.4	Population forecast combined with projected change in solvent content from Freedonia's "Solvents to 2010-Adhesives and Sealants Market for Solvents" (-2.7% per year)		Forecast data are county-level
ROG	2420000370	-1.6	-0.4	Regional employment projections for "Laundry and Dry Cleaning Workers" (+0.7% per year) combined with projected solvent content from Freedonia's "Solvents to 2010-Dry Cleaning and Other Markets for Solvents" (-0.7%)		
ROG	2630010000	4.1	13.8	Growth rate from regional industrial wastewater flow design forecast from Drinking Water Infrastructure Needs Survey		
ROG	2501060101	0.2	0.3	Regression equation with Gas and Oil Expenditures as explanatory variable		Forecast data are state-level
ROG	2415360000	2.4	10.3	Regional employment projections for "Automotive Service Technicians and Mechanics" combined with forecast change in solvent use from "Solvents to 2010-Transportation Markets for Solvents" (-0.4% per year)		
ROG	2401002000	-9.9	-9.3	Regression with Population forecast as explanatory variable combined with Freedonia projected change in proportion of total Architectural coatings that are solvent-based (-2.0% per year)		Forecast data are state-level
ROG	2401003000	3.6	12.3	Regression equation with Population as explanatory variable		Forecast data are state-level
ROG	2104008070	78.0	84.3	Extrapolation of national 1999-2004 trend in OWB sales (exponential growth) thru 2006; linear growth thru 2008; 2009+ based on rural population growth rate		
SO2	2601020000	7.2	15.0	Commercial sector employment forecast		Forecast data are state-level
SO2	2102004000	0.0	0.0	No growth due to contradictory historic and forecast trends	DOE 1990-2004 = +0.5% per year; AEO forecast = -0.3% per year	
SO2	2103004000	0.0	0.0	No growth due to contradictory historic and forecast trends	DOE 1990-2004 = -2.0% per year; AEO forecast = 0.8% per year	
SO2	2275020000	0.0	0.0	No growth due to contradictory historic and forecast trends	DOE 1990-2004 = -0.01% per year; AEO forecast = +1.7% per year	
SO2	2102005000	-49.4	-49.6	AEO forecast for industrial sector residual oil consumption	DOE 1990-2004 = -6.6% per year; AEO forecast = -5.1% per year	
SO2	2102002000	2.9	-0.6	AEO forecast for other industrial coal combustion	DOE 1990-2004 = -1.5% per year; AEO forecast = <-0.1% per year	

Table II-2 (continued)

Pollutant	SCC	Total % Change 2005-2009	Total % Change 2005-2018	Growth Indicator Basis	Alternatives Considered	Comment
SO2	2285002006	0.0	0.0	No growth due to contradictory historic and forecast trends	DOE 1990-2004 = -1.4% per year; AEO forecast = +1.4% per year	Note that post-2001 trend is upward & historical data has several ups/downs
SO2	2104008070	78.0	84.3	Extrapolation of national 1999-2004 trend in OWB sales (exponential growth) thru 2006; linear growth thru 2008; 2009+ based on rural population growth rate		

- Animal Husbandry: projected number of animals from EPA's ammonia emission forecasts for animal husbandry operations (EPA, 2004);

- Marine Vessels Commercial, Diesel–Push Boats: historical (1998-2004) fuel consumption for barge traffic on rivers in LADCO region (ENVIRON, 2007a);

- Multiple Fuel Combustion categories: DOE East North Central region energy forecasts from *AEO 2007* and 1990-2004 LADCO region energy consumption data (DOE, 2007a and 2007b);

- Commercial Aircraft: state-level itinerant aircraft operations (FAA, 2007);

- Diesel Line Haul Locomotives–Commuter Lines: Metra diesel fuel expenditure/price projections (Metra, 2007);

- Pesticide Application–Agricultural: LADCO region projected number of "pesticide handlers, sprayers, and applicators, vegetation" (BLS, 2007);

- Commercial Asphalt Application–All Processes: LADCO region projected number of "paving, surfacing, and tamping operators" (BLS, 2007);

- Graphic Arts –All Processes: LADCO region projected number of "printing machine operators" (BLS, 2007);

- Surface Coating–Auto Refinishing: SIC 7532: LADCO region projected number of "Automotive Body and Related Repairers" (BLS, 2007);

- Dry Cleaning, All Processes–Special Naphthas: LADCO region projected number of "Laundry and Dry Cleaning Workers" (BLS, 2007);

- Wastewater Treatment-Industrial: LADCO region projected wastewater treatment industrial design flow (EPA, 2007a); and

- Degreasing–Auto Repair Services (SIC 75): Cold Cleaning: LADCO region projected number of "Automotive Service Technicians and Mechanics" (BLS, 2007).

Many of the above are solvent use categories for which Pechan also incorporated projected solvent content changes as forecast by The Freedonia Group, Inc. (Freedonia, 2006).

In cases where energy consumption is the emissions activity, a common growth factor development approach was to compare available regional historical (1990-2004) energy consumption data to *AEO 2007* forecast data to determine if the forecast growth rates appear suspect relative to historical trends. Pechan conducted similar historical/forecast activity trend comparisons for the non-fuel combustion priority categories whenever historical trend data were readily available (e.g., occupational employment data). In selecting from alternative data

sources/trend data, the general decision-making hierarchy was as follows, listed in order of preference:

1. If the forecast and historical trends were in the same direction, Pechan relied on forecast data (an exception was made, however, in cases where forecast data were only available on a national-level, but historical data were available for the LADCO region).

2. If the forecast and historical trends were in different directions (e.g., forecast trend is for an increase in activity, but historical trend was a decrease), Pechan applied a no growth assumption.

Outdoor Wood Boilers

Residential Wood Combustion from Outdoor Wood Boilers (SCC 2104008070) was not originally identified as a source category for growth indicator review because this category was only recently added to LADCO's emissions inventory. Outdoor Wood Boilers (OWBs) have become much more prevalent in the last several years as homeowners seek ways to avoid recent large increases in natural gas and home heating oil prices. This source category does not exist in EPA's official SCC list, and there is no current EPA emission inventory preparation guidance for this sector. Pechan assumed that this category's emissions are based on the estimated number of wood boilers, the average amount of wood burned in each boiler, and emission factors that are related to the amount of wood burned.

Investigations indicate little historical and forecast OWB data exist to assist in identifying future trends in LADCO region OWB use: state-specific sales from nine manufacturers obtained by EPA from nine manufacturers, and national sales data obtained by the New York Attorney General's Office via subpoena of 21 manufacturers. These sales data are for 1999-2004. Because of the much greater manufacturer coverage for the national data, and because the state estimates indicate that the majority of recent OWBs sales have occurred in the LADCO states, Pechan focused the historical trend analysis on the national data. These data indicate an extremely high average growth rate of 41 percent per year over the 1999-2004 period. Manufacturers indicate that although OWBs have been available for sale since the 1980s, the very large OWB sales growth rates are new phenomenon. The growth rates appear to mainly result from homeowner reactions to recent large increases in residential heating prices (e.g., between 1999 and 2004, residential natural gas and distillate oil prices rose 61 and 87 percent, respectively). Because DOE data indicate that natural gas accounts for the majority of residential energy consumption in the LADCO States, and increases in residential natural gas prices continued through 2006 (the average annual price for residential natural gas increased 28 percent between 2004 and 2006), Pechan forecast the national number of OWBs through 2006 via extrapolation of the 1999-2004 national OWB trend. In particular, Pechan fit an exponential equation to the 1994-2004 data, and used the equation to estimate 2005 and 2006 OWB counts.

Next, Pechan reviewed *AEO 2007* projections of residential natural gas prices for the East North Central region (which includes 5 of the 6 LADCO region States) to identify whether recent increases are expected to continue. The *AEO 2007* projects the average 2007 price for residential

natural gas in the East North Central region to be 4 percent lower than in 2006, and forecasts continued price decreases through the 2008-2018 period (see table below).

Year	Residential Natural Gas Price ($/million Btu)	% Change from 2006
2006	12.08	
2007	10.92	-4.1
2008	10.80	-5.1
2009	10.28	-9.7
2010	10.02	-11.9
2011	9.61	-15.5
2012	9.48	-16.9
2013	9.28	-18.4
2014	9.32	-18.1
2015	9.27	-18.6
2016	9.37	-17.7
2017	9.60	-15.7
2018	9.56	-20.8

Given the projected modest price decreases thru 2008, and the fact that distillate oil prices are forecast to increase 6.1 percent between 2006 and 2008, and because one expects a time lag in responding to energy price changes, Pechan assumes that OWB sales will continue to increase at a significant rate through 2008. Pechan specifically fit a linear trend line to the 1999-2004 OWB, and projected OWBs in 2007 and 2008 by extending the trend through 2008, and applying each year's growth rate to the estimated count of OWBs in 2006.

By 2009, Pechan projects that the larger projected declines in natural gas prices, and forecasted decreases in other heating fuel prices, will significantly restrain OWB growth. In addition, because of neighborhood smoke nuisance concerns, and the need for ready access to inexpensive wood, it is expected that the market for OWBs will be generally constrained to heavily-wooded rural areas. Therefore, Pechan forecasts post-2008 year OWB growth to more closely trend with population growth in these areas. To approximate this growth, Pechan compiled 1990 and 2000 total and rural area population data for the LADCO region. These data indicate that rural area population grew at approximately 60 percent of the rate of total population over this period. Pechan estimated rural area population growth for the LADCO region by multiplying this adjustment factor by the forecasted growth rate for total population in the LADCO region. The following table displays the projected count of OWBs in the LADCO region for 2005, 2009, 2002, and 2018.

Year	Estimated # of OWBs
2005	81,082
2009	144,356
2012	145,911
2018	149,421

It is important to note that it is particularly challenging to forecast OWB activity given the extremely high OWB sales growth rates that have occurred in recent years. LADCO will want to closely monitor activity and emission trends for this category given its relative importance in the emissions inventory, recent historical growth rates, and additional unique characteristics.

Finally, Pechan reviewed the complete list of area/MAR source categories in the LADCO base year inventory to identify the priority category growth indicators that could be applied to non-priority area/MAR categories. This step yielded priority category growth indicator assignments for an additional 26 area/MAR categories.

C. NON-EGU POINT SOURCES

Table II-3 displays the priority point source categories, including the description and emissions activity associated with each category. The last column in this table identifies each category's growth indicator assignment under the previous growth and control factor contract. Table II-4 presents the assigned growth indicator for each priority point source category and identifies any alternative growth indicators that were considered. Pechan first considered the use of historical throughput data from LADCO state point source inventories to identify recent trends that provided sufficient support for extrapolation. As mentioned above, for energy consumption sectors, Pechan compared regional historical (1990-2004) energy consumption data to *AEO 2007* forecast data to determine if the forecast growth rates appear suspect relative to historical trends.

In selecting from alternative growth indicator data sources, the general decision-making hierarchy was as follows, listed in order of preference:

(1) If throughput data were available for states representing a majority of emissions for a given category, and these data indicated a consistent trend, the historical throughput trend was extended thru 2009, and held constant thereafter (two reasons for not extending the trend throughput the entire forecast period are that throughput data are only available for a three or a six-year period, and in some cases the historical throughput decrease was so large that it would eventually result in no activity);

(2) If the forecast and historical trends were in the same direction, Pechan relied on the forecast data (an exception was made, however, if the forecast data were only available on a national-level, but the historical data were available for the LADCO region); and

If the forecast and historical trends were in different directions (e.g., forecast trend is for an increase in activity, but historical trend was a decrease), Pechan applied a no growth assumption.

Table II-3. Priority Emission Activity Point Source Categories

POLLUTANT	SCC	DESC2	DESC3	DESC4	EMISSIONS ACTIVITY	CURRENT GROWTH BASIS
NH3	10200601	Industrial	Natural Gas	> 100 Million Btu/hr	Volume of natural gas burned in industrial pt source boilers of >100 MMBtu	No growth based on historical (1990-2001) energy data
NH3	30102599	Chemical Manufacturing	Cellulosic Fiber Production	Other Not Classified	Amount of cellulosic fiber produced	Avg of REMI employment & output GFs for Plastics, Materials, & Synthetics sector
NH3	10200602	Industrial	Natural Gas	10-100 Million Btu/hr	Volume of natural gas burned in industrial pt source boilers of 10-100 MMBtu	No growth based on historical energy data
NH3	30199999	Chemical Manufacturing	Other Not Classified	Specify in Comments Field	Amount of (unknown) chemical products produced	Avg of REMI employment & output GFs for Chemicals sector
NH3	10200204	Industrial	Bituminous/Subbituminous Coal	Spreader Stoker	Amount of bituminous coal burned in spreader stoker industrial pt source boilers	AEO Industrial steam coal
NOX	20200202	Industrial	Natural Gas	Reciprocating	Volume of natural gas burned in industrial pt source reciprocating engines	No growth based on historical energy data
NOX	30500606	Mineral Products	Cement Manufacturing (Dry Process)	Kilns	Amount of cement produced via dry process	LADCO region historical cement production growth rate
NOX	30600201	Petroleum Industry	Catalytic Cracking Units	Fluid Catalytic Cracking Unit	Amount of fresh feed processed via fluid catalytic cracking units (FCCU)	AEO Refined Petroleum Products Supplied (national)
NOX	30600104	Petroleum Industry	Process Heaters	Gas-fired	Volume of gas burned in petroleum industry pt source process heaters	AEO Refining sector natural gas (national)
NOX	10200202	Industrial	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom	Amount of bituminous coal burned in dry bottom industrial pt source boilers	AEO Industrial steam coal
NOX	10200601	Industrial	Natural Gas	> 100 Million Btu/hr	Volume of natural gas burned in industrial pt source boilers of >100 MMBtu	No growth based on historical energy data
NOX	30300304	Primary Metal Production	By-product Coke Manufacturing	Quenching	Amount of coal charged to manufacture coke	REMI output for Blast Furnaces and Basic Steel products sector
NOX	10200217	Industrial	Bituminous/Subbituminous Coal	Atmospheric Fluidized Bed Combustion: Bubbling Bed (Bituminous	Amount of bituminous coal burned in bubbling bed industrial pt source boilers	AEO Industrial steam coal
NOX	10200707	Industrial	Process Gas	Coke Oven Gas	Volume of process gas burned in coke ovens	AEO Metallurgical coal consumption projections (national)
NOX	10200602	Industrial	Natural Gas	10-100 Million Btu/hr	Volume of natural gas burned in industrial pt source boilers of 10-100 MMBtu	No growth based on historical energy data

Table II-3 (continued)

POLLUTANT	SCC	DESC2	DESC3	DESC4	EMISSIONS ACTIVITY	CURRENT GROWTH BASIS
NOX	20200254	Industrial	Natural Gas	4-cycle Lean Burn	Volume of natural gas burned in industrial sector 4-cycle lean burn IC engines	No growth based on historical energy data
NOX	20100102	Electric Generation	Distillate Oil (Diesel)	Reciprocating	Amount of distillate oil burned in reciprocating engines for electricity	AEO Electric Generation distillate oil
NOX	20200201	Industrial	Natural Gas	Turbine	Volume of natural gas burned in industrial sector turbines	No growth based on historical energy data
NOX	39000689	In-process Fuel Use	Natural Gas	General	Volume of industrial process pt source natural gas burned	No growth based on historical energy data
NOX	10200201	Industrial	Bituminous/Subbituminous Coal	Pulverized Coal: Wet Bottom	Amount of bituminous coal burned in wet bottom industrial pt source boilers	AEO Industrial steam coal
NOX	10200701	Industrial	Process Gas	Petroleum Refinery Gas	Volume of petroleum refinery (still) gas burned	No growth based on historical energy data
ROG	30100399	Chemical Manufacturing	Ammonia Production	Other Not Classified	Amount of ammonia produced	REMI output for Agricultural Chemicals sector
ROG	30201916	Food and Agriculture	Vegetable Oil Processing	Oil Extraction	Amount of extractor feed cake produced	REMI output for Grain Mill Products and Fats and Oils sector
ROG	40500511	Printing/Publishing	General	Gravure: 2754	Amount of solvent in ink used by pt sources	REMI output for Commercial Printing and Business Forms sector
ROG	30199999	Chemical Manufacturing	Other Not Classified	Specify in Comments Field	Amount of (unknown) chemical products produced	Avg of REMI employment & output GFs for Chemicals sector
ROG	30125099	Chemical Manufacturing	Methanol/Alcohol Production	Other Not Classified	Amount of methanol/alcohol produced	REMI output for Industrial Chemicals sector
ROG	40201301	Surface Coating Operations	Paper Coating	Coating Operation	Amount of solvent in coating used by pt sources	No growth based on historical LADCO emissions trend
ROG	40200101	Surface Coating Operations	Surface Coating Application - General	Paint: Solvent-base	Amount of coating mix applied by pt sources	No growth based on historical LADCO emissions trend
ROG	30102599	Chemical Manufacturing	Cellulosic Fiber Production	Other Not Classified	Amount of cellulosic fiber produced	Avg of REMI employment & output GFs for Plastics, Materials, & Synthetics sector
ROG	30500201	Mineral Products	Asphalt Concrete	Rotary Dryer: Conventional Plant (see 3-05-002-50 to -53 for	Amount of hot mix asphalt produced by pt sources	Avg of REMI employment & output GFs for Misc. Petroleum and Coal Products sector
ROG	30201906	Food and Agriculture	Vegetable Oil Processing	Corn Oil: General	Amount of extractor feed cake produced	REMI output for Grain Mill Products and Fats and Oils sector
ROG	30201919	Food and Agriculture	Vegetable Oil Processing	Fugitive Leaks	Amount of extractor feed cake produced	REMI output for Grain Mill Products and Fats and Oils sector
ROG	40200110	Surface Coating Operations	Surface Coating Application - General	Paint: Solvent-base	Amount of solvent-based coatings applied by pt sources	Historical LADCO throughput data trend
ROG	40201899	Surface Coating Operations	Metal Coil Coating	Other Not Classified	Amount of solvent in coating used by pt sources	REMI output for Nonferrous Rolling and Drawing sector
ROG	40388801	Petroleum Product Storage at Refineries	Fugitive Emissions	Specify in Comments Field	Petroleum product storage capacity at refineries	AEO Refined Petroleum Products Supplied (national)
ROG	40200701	Surface Coating Operations	Surface Coating Application - General	Adhesive Application	Amount of adhesive coatings applied by pt sources	REMI output for Total Manufacturing sector

Table II-3 (continued)

POLLUTANT	SCC	DESC2	DESC3	DESC4	EMISSIONS ACTIVITY	CURRENT GROWTH BASIS
SO2	30600201	Petroleum Industry	Catalytic Cracking Units	Fluid Catalytic Cracking Unit	Amount of fresh feed processed via FCCU	AEO Refined Petroleum Products Supplied (national)
SO2	10200202	Industrial	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom	Amount of bituminous coal burned in dry bottom industrial pt source boilers	AEO Industrial steam coal
SO2	30600805	Petroleum Industry	Fugitive Emissions	Miscellaneous: Sampling/Non-Asphalt Blowing/Purging/etc.	Barrels of refinery feed processed	AEO Refined Petroleum Products Supplied (national)
SO2	30199999	Chemical Manufacturing	Other Not Classified	Specify in Comments Field	Amount of (unknown) chemical products produced	Avg of REMI employment & output GFs for Chemicals sector
SO2	10200217	Industrial	Bituminous/Subbituminous Coal	Atmospheric Fluidized Bed Combustion: Bubbling Bed (Bituminous	Amount of bituminous coal burned in bubbling bed industrial pt source boilers	AEO Industrial steam coal
SO2	10200201	Industrial	Bituminous/Subbituminous Coal	Pulverized Coal: Wet Bottom	Amount of bituminous coal burned in wet bottom industrial pt source boilers	AEO Industrial steam coal
SO2	10200225	Industrial	Bituminous/Subbituminous Coal	Traveling Grate (Overfeed) Stoker (Subbituminous Coal)	Amount of subbituminous coal burned in overfeed stoker industrial pt source boilers	AEO Industrial steam coal
SO2	30500606	Mineral Products	Cement Manufacturing (Dry Process)	Kilns	Amount of cement produced via dry process	LADCO region historical cement production growth
SO2	30600401	Petroleum Industry	Blowdown Systems	Blowdown System with Vapor Recovery System with Flaring	Barrels of refinery feed processed	AEO Refined Petroleum Products Supplied (national)
SO2	10200204	Industrial	Bituminous/Subbituminous Coal	Spreader Stoker	Amount of bituminous coal burned in spreader stoker industrial pt source boilers	AEO Industrial steam coal
SO2	10300217	Commercial/Institutional	Bituminous/Subbituminous Coal	Atmospheric Fluidized Bed Combustion: Bubbling Bed (Bitumin.)	Amount of bituminous coal burned in bubbling bed commercial pt source boilers	AEO Commercial coal
SO2	39000701	In-process Fuel Use	Process Gas	Coke Oven or Blast Furnace	Volume of coke oven or blast furnace gas burned	AEO Metallurgical coal consumption projections (national)
SO2	30103201	Chemical Manufacturing	Elemental Sulfur Production	Mod. Claus: 2 Stage w/o Control (92-95% Removal)	Amount of 100% sulfur produced	REMI output for Industrial Chemicals sector
SO2	10300225	Commercial/Institutional	Bituminous/Subbituminous Coal	Traveling Grate (Overfeed) Stoker (Subbituminous Coal)	Amount of subbituminous coal burned in overfeed stoker commercial pt source boilers	AEO Commercial coal
SO2	10300209	Commercial/Institutional	Bituminous/Subbituminous Coal	Spreader Stoker (Bituminous Coal)	Amount of bituminous coal burned in spreader stoker commercial pt source boilers	AEO Commercial coal
SO2	10200401	Industrial	Residual Oil	Grade 6 Oil	Amount of residual oil (No. 6) burned in industrial pt source boilers	No growth based on historical energy data

Table II-3 (continued)

POLLUTANT	SCC	DESC2	DESC3	DESC4	EMISSIONS ACTIVITY	CURRENT GROWTH BASIS
EMISSION TREND ANALYSIS CATEGORIES NOT LISTED ABOVE WITH CONSISTENT THROUGHPUT TRENDS						
VOC	40202201	Petroleum and Solvent Evaporation	Surface Coating Operations	Plastic Parts: Coating Operation	Amount of solvent used in coating applied	Historical LADCO throughput data trend
NOX	39000699	In Process Fuel Use	Natural Gas	General	Amount of nat gas used in industrial processes	No growth based on historical energy data

Table II-4. Growth Indicators for Priority Point Source Categories

Pollutant	SCC	Emissions Priority Category	Total % Change 2005-2009	Total % Change 2005-2018	Growth Indicator Basis	Alternatives Considered	Comment
NH3	10200601	NOx	-11.5	-11.5	Historic throughput trend from 3 states (-3.0% per year) extended thru 2009; post-2009 held constant.	DOE 1990-2004 = -0.01% per year; AEO forecast = +1.4% per year	
NH3	30102599		4.9	18.2	Avg of REMI employment & output growth factors for Plastics, Materials, & Synthetics sector		Forecast data are state-level
NH3	10200602	NOx	-12.2	-12.2	Historic throughput trend from 4 states (-3.2% per year) extended thru 2009; post-2009 held constant.	DOE 1990-2004 = -0.01% per year; AEO forecast = +1.4% per year	
NH3	30199999		8.9	25.6	Avg of REMI employment & output growth factors for Chemicals sector		Forecast data are state-level
NH3	10200204	NOx	2.9	-0.6	AEO forecast for other industrial coal combustion	DOE 1990-2004 = -1.5% per year; AEO forecast = <-0.1% per year	Did not use throughput since available states represent <50% of regional emissions
NOX	20200202	NOx	0.0	0.0	No growth due to contradictory historic and forecast trends	DOE 1990-2004 = -0.01% per year; AEO forecast = +1.4% per year	Did not use throughput since available state represent <50% of regional emissions
NOX	30500606		8.2	29.4	LADCO region historical cement production growth rate (+2.0% per year)		
NOX	30600201	SO2	0.4	0.4	AEO refinery distillation projections for Petroleum Administration District (PAD) II, which includes all LADCO states plus additional surrounding states	Similar 1990-2005 data also includes states not in LADCO region and shows very small growth rate	Did not use throughput since available states represent <50% of regional emissions
NOX	30600104		5.9	20.6	1991-2002 Midwest Census region Refining sector natural gas consumption growth rate (+1.5% per year)	AEO National Refining sector natural gas consumption forecast is +2.7% per year	Used historical growth rate because it is regional and of similar direction to AEO national forecast
NOX	10200202	NOx	2.9	-0.6	AEO forecast for other industrial coal combustion	DOE 1990-2004 = -1.5% per year; AEO forecast = <-0.1% per year	Did not use throughput since available states represent <50% of regional emissions
NOX	10200601	NOx	-11.5	-11.5	Historic throughput trend from 3 states (-3.0% per year) extended thru 2009; post-2009 held constant.	DOE 1990-2004 = -0.01% per year; AEO forecast = +1.4% per year	
NOX	30300304		-6.2	-19.8	AEO forecast for metallurgical coal consumption	DOE 1990-2004 = -3.0% per year; AEO forecast = -1.7% per year	
NOX	10200217		2.9	-0.6	AEO forecast for other industrial coal combustion	DOE 1990-2004 = -1.5% per year; AEO forecast = <-0.1% per year	
NOX	10200707		-6.2	-19.8	AEO forecast for metallurgical coal consumption	DOE 1990-2004 = -3.0% per year; AEO forecast = -1.7% per year	
NOX	10200602	NOx	-12.2	-12.2	Historic throughput trend from 4 states (-3.2% per year) extended thru 2009; post-2009 held constant.	DOE 1990-2004 = -0.01% per year; AEO forecast = +1.4% per year	
NOX	20200254		0.0	0.0	No growth due to contradictory historic and forecast trends	DOE 1990-2004 = -0.01% per year; AEO forecast = +1.4% per year	

Table II-4 (continued)

Pollutant	SCC	Emissions Priority Category	Total % Change 2005-2009	Total % Change 2005-2018	Growth Indicator Basis	Alternatives Considered	Comment
NOX	20100102		1.7	5.5	DOE 1990-2004 historic trend (+0.4%)	AEO forecast = +5.0% per year thru 2009, but near equivalent decrease from 2009 to 2018	Used historic trend because of large difference between 2009 and 2018 forecast, & historic growth rate is in between the 2 forecast values
NOX	20200201		0.0	0.0	No growth due to contradictory historic and forecast trends	DOE 1990-2004 = -0.01% per year; AEO forecast = +1.4% per year	
NOX	39000689		0.0	0.0	No growth due to contradictory historic and forecast trends	DOE 1990-2004 = -0.01% per year; AEO forecast = +1.4% per year	
NOX	10200201	SO2	2.9	-0.6	AEO forecast for other industrial coal combustion	DOE 1990-2004 = -1.5% per year; AEO forecast = <-0.1% per year	No throughput data available
NOX	10200701		-1.3	-4.1	DOE 1990-2004 historic trend (-0.3% per year)	AEO forecast = 2009 (-1.0% per year) and 2018 (-0.1% per year)	Used historic trend because is region-specific (forecast is national), and historic change is in between the 2009 & 2018 AEO growth rates
ROG	30100399		-19.7	-28.6	Freedonia's "Chemical Catalysts to 2009-Ammonia Catalyst Demand" - national projections adjusted for relative state growth in REMI output for Agricultural Chemicals sector		Forecast data are state-level
ROG	30201916		2.2	11.9	Avg of REMI employment & output growth factors for Grain Mill Products and Fats and Oils sector		Forecast data are state-level
ROG	40500511		0.0	0.0	No growth due to contradictory historic trend versus forecast trend in regional employment for "Printing Machine Operators"		Freedonia's "Solvents to 2010-Printing Ink Market for Solvents" indicates no projected change in solvent content of ink
ROG	30199999		8.9	25.6	Avg of REMI employment & output growth factors for Chemicals sector		Forecast data are state-level
ROG	30125099		1.1	5.3	Freedonia's "Chemical Catalysts to 2009-Alcohols Catalyst Demand by Application" - national projections adjusted for relative state growth in REMI output for Industrial Chemicals sector		Forecast data are state-level
ROG	40201301		0	0	No growth based on consistent historic LADCO emissions trend		2005 emissions data confirm previous no growth approach
ROG	40200101	VOC	-6.4	-21.4	Regional employment projections for "Coating, Painting, and Spraying Machine Operators, and Tenders" adjusted for solvent content of paints and coatings from Freedonia's "Solvents to 2010-Paints and Coatings Market for Solvents" (-1.9% per year)		Forecast data are state-level; adopted approach believed better than available historic throughput data

Table II-4 (continued)

Pollutant	SCC	Emissions Priority Category	Total % Change 2005-2009	Total % Change 2005-2018	Growth Indicator Basis	Alternatives Considered	Comment
ROG	30102599		4.9	18.2	Avg of REMI employment & output growth factors for Plastics, Materials, & Synthetics sector		Forecast data are state-level
ROG	30500201		8.3	21.5	Avg of REMI employment & output growth factors for Misc. Petroleum and Coal Products sector		Forecast data are state-level
ROG	30201906		2.2	11.9	Avg of REMI employment & output growth factors for Grain Mill Products and Fats and Oils sector		Forecast data are state-level
ROG	30201919		2.2	11.9	Avg of REMI employment & output growth factors for Grain Mill Products and Fats and Oils sector		Forecast data are state-level
ROG	40200110	VOC	-6.4	-21.4	Regional employment projections for "Coating, Painting, and Spraying Machine Operators, and Tenders" adjusted for solvent content of paints and coatings from Freedonia's "Solvents to 2010-Paints and Coatings Market for Solvents" (-1.9% per year)		Forecast data are state-level; adopted approach believed better than available historic throughput data
ROG	40201899		6.9	26.0	Freedonia's "Protective Coatings to 2009-Demand for Coil Coatings" - national projections adjusted for relative state growth in REMI output for Nonferrous Rolling and Drawing sector, adjusted for projected solvent content information for paints and coatings from "Solvents to 2010-Paints/Coatings Market for Solvents" (-1.9% per year)		Forecast data are state-level; coil coating has seen significant growth historically, and such growth is projected to continue in the future
ROG	40388801		0.4	0.4	AEO refinery distillation projections for Petroleum Administration District (PAD) II, which includes all LADCO states plus additional surrounding states	1990-2005 data also includes states not in LADCO region and shows similar very small growth rate	
ROG	40200701		-1.6	-1.0	Freedonia's "Solvents to 2010-Adhesives & Sealants Market for Solvents" national projections, adjusted for relative state growth in REMI output in Total Manufacturing sector		
SO2	30600201	SO2	0.4	0.4	AEO refinery distillation projections for Petroleum Administration District (PAD) II, which includes all LADCO states plus additional surrounding states	1990-2005 data also includes states not in LADCO region and shows similar very small growth rate	Did not use throughput since available state represent <50% of regional emissions
SO2	10200202	NOx	2.9	-0.6	AEO forecast for other industrial coal combustion	DOE 1990-2004 = -1.5% per year; AEO forecast = <-0.1% per year	No throughput data available
SO2	30600805	SO2	0.4	0.4	AEO refinery distillation projections for Petroleum Administration District (PAD) II, which includes all LADCO states plus additional surrounding states	1990-2005 data also includes states not in LADCO region and shows similar very small growth rate	No throughput data available
SO2	30199999		8.9	25.6	Avg of REMI employment & output GFs for Chemicals sector		Forecast data are state-level
SO2	10200217		2.9	-0.6	AEO forecast for other industrial coal combustion	DOE 1990-2004 = -1.5% per year; AEO forecast = <-0.1% per year	
SO2	10200201	SO2	2.9	-0.6	AEO forecast for other industrial coal combustion	DOE 1990-2004 = -1.5% per year; AEO forecast = <-0.1% per year	No throughput data available
SO2	10200225		2.9	-0.6	AEO forecast for other industrial coal combustion	DOE 1990-2004 = -1.5% per year; AEO forecast = <-0.1% per year	
SO2	30500606		8.2	29.4	LADCO region historical cement production growth rate (+2.0% per year)		

Table II-4 (continued)

Pollutant	SCC	Emissions Priority Category	Total % Change 2005-2009	Total % Change 2005-2018	Growth Indicator Basis	Alternatives Considered	Comment
SO2	30600401		0.4	0.4	AEO refinery distillation projections for Petroleum Administration District (PAD) II, which includes all LADCO states plus additional surrounding states	1990-2005 data also includes states not in LADCO region and shows similar very small growth rate	
SO2	10200204	NOx	2.9	-0.6	AEO forecast for other industrial coal combustion	DOE 1990-2004 = -1.5% per year; AEO forecast = <-0.1% per year	Did not use throughput since available states represent <50% of regional emissions
SO2	10300217		0.0	0.0	No growth due to contradictory historic and forecast trends	DOE 1990-2004 = -1.2% per year; AEO forecast = +0.0% per year	
SO2	39000701		-6.2	-19.8	AEO forecast for metallurgical coal consumption	DOE 1990-2004 = -3.0% per year; AEO forecast = -1.7% per year	
SO2	30103201		2.5	8.2	1996-2005 recovered elemental sulfur production growth rate (+0.6% per year) for IL + MI + MN + OH		
SO2	10300225		0.0	0.0	No growth due to contradictory historic and forecast trends	DOE 1990-2004 = -1.2% per year; AEO forecast = +0.0% per year	
SO2	10300209		0.0	0.0	No growth due to contradictory historic and forecast trends	DOE 1990-2004 = -1.2% per year; AEO forecast = +0.0% per year	
SO2	10200401	SO2	-49.4	-49.6	AEO forecast for industrial residual oil consumption (-5.1% per year)	DOE 1990-2004 = -6.6% per year	Used AEO forecast due to similarity with AEO historical trend and throughput trend (-6.1%)
NON-PRIORITY CATEGORIES INCLUDED IN EMISSION TREND ANALYSIS WITH CONSISTENT THROUGHPUT TRENDS:							
VOC	40202201	VOC	-33.5	-33.5	Historic throughput trend from 3 states (-9.7%) extended thru 2009; post-2009 held constant.		
NOX	39000699	NOx	-15.8	-15.8	Historic throughput trend from 3 states (-4.2%) extended thru 2009; post-2009 held constant.		

Table II-4 also presents the 2005-2009 and 2005-2018 growth rates for the final assigned point source growth indicators. In addition, Pechan reviewed the complete list of point SCCs in the LADCO base year inventory to identify the priority category growth indicators that could be applied to non-priority point source categories. This step yielded priority category growth indicator assignments for an additional 539 point source categories.

D. NONROAD MODEL SOURCES

At LADCO's request, Pechan analyzed potential improvements to the default growth indicators for the 25 NONROAD model priority source categories displayed in Table II-5. With the exception of the all-terrain vehicle, offroad motorcycle, and snowmobile categories, 1989-1996 national equipment population trends form the basis for the NONROAD growth rates. For these other three categories, NONROAD relies on national equipment population forecasts prepared by a relevant trade association (see Table II-5 for details).

Table II-6 reports this study's growth indicator assignments for priority NONROAD model source categories. Given the acknowledged shortcomings of the NONROAD growth rates (use of 1989-1996 national equipment populations to project future equipment populations in each region of the country), the growth factor improvements generally reflect the use of regional/state-level forecast data that are expected to correlate with use of the equipment (i.e., regional occupational employment projections, state-level economic sector employment forecasts, or state-level landing/take-off projections). Table II-6 also displays any alternative growth indicators that were considered. For the three categories for which NONROAD relies on forecasts rather than historical 1989-1996 trends, Pechan compiled available recent historical equipment population estimates. This information was used to revise the current national forecast approach to reflect more recent information, and whenever possible, recent LADCO region-specific equipment population trends.

Although the NONROAD model growth rates are fuel-specific, Pechan was unable to develop fuel-specific forecast data. Therefore, Pechan updated a priority category's growth rates only when the 1989-1996 national equipment populations indicated that the category's fuel-specific growth rate had traditionally been similar to the overall sector's equipment population growth rate. Table II-6 identifies instances where the past fuel-specific growth rate substantially differed from the overall sector's growth rate. In these cases, Pechan retained the NONROAD model fuel-specific forecast approach. Section IV.A. describes how Pechan incorporated the updated equipment population growth rates into the NONROAD model

Table II-5. Priority Emission Activity NONROAD Model Source Categories

SCC	DESCRIPTION SUMMARY	EMISSIONS ACTIVITY	CURRENT GROWTH BASIS
2260001030	2-Stroke ATV	Population of 2-stroke gasoline ATVs	NONROAD (Motorcycle Industry Council national 2-stroke gasoline ATV projections)
2265001030	4-Stroke ATV	Population of 4-stroke gasoline ATVs	NONROAD (Motorcycle Industry Council national 4-stroke gasoline ATV projections)
2260001010	2-Stroke Offroad Motorcycles	Population of 2-stroke gasoline offroad motorcycles	NONROAD (Motorcycle Industry Council national off-highway motorcycle population projections)
2265001010	4-Stroke Offroad Motorcycles	Population of 4-stroke gasoline offroad motorcycles	NONROAD (Motorcycle Industry Council national off-highway motorcycle population projections)
2267006000	LPG Light Commercial	Population of light commercial LPG-fueled equipment	NONROAD (national 1989-1996 LPG light commercial equipment population growth rate)
2270004000	Diesel Lawn & Garden Equipment	Population of lawn & garden diesel-fueled equipment	NONROAD (national 1989-1996 diesel lawn & garden equipment population growth rate)
2270008000	Diesel Airport Service Equipment	Population of airport service diesel-fueled equipment	NONROAD (national 1989-1996 diesel airport service equipment population growth rate)
2267008000	LPG Airport Service Equipment	Population of airport service LPG-fueled equipment	NONROAD (national 1989-1996 total airport service equipment population growth rate)
2268008000	CNG Airport Service Equipment	Population of airport service CNG-fueled equipment	NONROAD (national 1989-1996 total airport service equipment population growth rate)
2260001020	2-Stroke Snowmobiles	Population of 2-stroke gasoline snowmobiles	NONROAD national growth (see below) with state adjustment based on real disposable income forecasts
2265001020	4-Stroke Snowmobiles	Population of 4-stroke gasoline snowmobiles	NONROAD (International Snowmobile Manufacturers Association national snowmobile population projections)
2260007000	2-Stroke Logging Equipment	Population of logging 2-stroke gasoline equipment	NONROAD (national 1989-1996 gasoline logging equipment population growth rate)
2265007000	4-Stroke Logging Equipment	Population of logging 4-stroke gasoline equipment	NONROAD (national 1989-1996 gasoline logging equipment population growth rate)
2270006000	Diesel Light Commercial	Population of light commercial diesel-fueled equipment	NONROAD (national 1989-1996 diesel light commercial equipment population growth rate)
2268006000	CNG Light Commercial	Population of light commercial CNG-fueled equipment	NONROAD (national 1989-1996 CNG light commercial equipment population growth rate)
2267007000	LPG Logging Equipment	Population of logging LPG-fueled equipment	NONROAD (national 1989-1996 logging equipment population growth rate)
2268007000	CNG Logging Equipment	Population of logging CNG-fueled equipment	NONROAD (national 1989-1996 logging equipment population growth rate)
2285002000	Diesel Railway Maintenance	Population of railway maintenance diesel-fueled equipment	NONROAD (national 1989-1996 diesel railway maintenance equipment population growth rate)
2260006000	2-Stroke Light Commercial	Population of light commercial 2-stroke gasoline equipment	NONROAD (national 1989-1996 gasoline light commercial equipment population growth rate)
2265006000	4-Stroke Light Commercial	Population of light commercial 4-stroke gasoline equipment	NONROAD (national 1989-1996 gasoline light commercial equipment population growth rate)
2270002000	Diesel Construction Equipment	Population of construction diesel-fueled equipment	NONROAD national growth with state adjustment based on Construction employment forecasts
2270003000	Diesel Industrial Equipment	Population of industrial diesel-fueled equipment	NONROAD (national 1989-1996 diesel industrial equipment population growth rate)
2267003000	LPG Industrial Equipment	Population of industrial LPG-fueled equipment	NONROAD (national 1989-1996 LPG industrial equipment population growth rate)
2270001000	Diesel Recreational Vehicles	Population of diesel recreational vehicles	NONROAD (national 1989-1996 diesel recreational equipment population growth rate)
2282020000	Diesel Recreational Marine	Population of diesel recreational marine vessels	NONROAD (national 1989-1996 diesel recreational equipment population growth rate)

Table II-6. Growth Indicators for Priority NONROAD Model Source Categories

SCC	Total % Change 2005-2009	Total % Change 2005-2018	Growth Indicator Basis	Alternatives Considered	Comment
2260001030	10.8	39.7	50% higher growth rate than overall LADCO region "Recreational Vehicle Service Technicians" employment projections, which is 1.7%/yr, based on premise that ATV market is less mature than market for other recreation vehicles	Available ATV/OHV registration data for MI+MN+WI indicate avg. annual growth of 14.6% between 2000 and 2005; however, 2006 data for each state is only +1 or +1.1%; NONROAD shows 2005-2006 = +10.5%. National ATV sales (not population) of +3.8% per year for 2000-2005; 2005-2006 sales = -4.2%	Did not use long-term historical trend as ATV market appears to be maturing based on most recent data (this is predicted by NONROAD model, but not until post-2010; NONROAD shows 2010-2018 = +2.7%/yr)
2265001030	10.8	39.7	50% higher growth rate than overall LADCO region "Recreational Vehicle Service Technicians" employment projections, which is 1.7%/yr, based on premise that ATV market is less mature than market for other recreation vehicles	Available ATV/OHV registration data for MI+MN+WI indicate avg. annual growth of 14.6% between 2000 and 2005; however, 2006 data for each state is only +1 or +1.1%; NONROAD shows 2005-2006 = +10.5%. National ATV sales (not population) of +3.8% per year for 2000-2005; 2005-2006 sales = -4.2%	Did not use long-term historical trend as ATV market appears to be maturing based on most recent data (this is predicted by NONROAD model, but not until post-2010; NONROAD shows 2010-2018 = +2.7%/yr)
2260001010	5.1	17.7	LADCO region employment projections for "Motorcycle Mechanics"	Unable to compile regional registration trends; national off-road motorcycle sales for 2000-2006 = +2.3%, but 2001-2006 = -1.6%	Employment projections are LADCO region-specific and fall in-between recent national sales trends
2265001010	5.1	17.7	LADCO region employment projections for "Motorcycle Mechanics"	Unable to compile regional registration trends; national off-road motorcycle sales for 2000-2006 = +2.3%, but 2001-2006 = -1.6%	Employment projections are LADCO region-specific and fall in-between recent national sales trends
2267006000	19.8	57.5	NONROAD (national 1989-1996 LPG light commercial equipment population growth rate)	REMI Commercial sector employment forecast for LADCO region (2005-2009=+1.8%yr; 2005-2018 = +1.1%/yr)	Did not use alternative because historical period indicates substantially different growth rate for LPG than overall sector
2270004000	5.8	20.1	LADCO region employment projections for "Landscaping and Groundskeeping Workers"		
2270008000	-0.7	18.0	State-level FAA itinerant air carrier + air taxi landing and take-off (LTO) forecast (updated as of December 2006)		
2267008000	-0.7	18.0	State-level FAA itinerant air carrier + air taxi landing and take-off (LTO) forecast (updated as of December 2006)		
2268008000	-0.7	18.0	State-level FAA itinerant air carrier + air taxi landing and take-off (LTO) forecast (updated as of December 2006)		
2260001020	3.5	11.9	50% lower growth rate than overall LADCO region "Recreational Vehicle Service Technicians" employment projections, which is 1.7%/yr, based on premise that snowmobile market is more mature than market for other recreation vehicles	Annual growth in snowmobile registrations for states representing 92% of 2006 LADCO region registrations: 2000-2006 = +0.0%	No growth assumption not adopted because lack of snowfall often cited as major contributing factor for recent stagnation in snowmobile registrations
2265001020	3.5	11.9	50% lower growth rate than overall LADCO region "Recreational Vehicle Service Technicians" employment projections, which is 1.7%/yr, based on premise that snowmobile market is more mature than market for other recreation vehicles	Annual growth in snowmobile registrations for states representing 92% of 2006 LADCO region registrations: 2000-2006 = +0.0%	No growth assumption not adopted because lack of snowfall often cited as major contributing factor for recent stagnation in snowmobile registrations

Table II-6 (continued)

SCC	Total % Change 2005-2009	Total % Change 2005-2018	Growth Indicator Basis	Alternatives Considered	Comment
2260007000	2.2	7.3			
2265007000	2.2	7.3	LADCO region employment projections for "Logging Equipment Operators"		
2270006000	7.2	15.0	REMI Commercial sector employment forecast for LADCO region		
2268006000	7.2	15.0	REMI Commercial sector employment forecast for LADCO region		
2267007000	2.2	7.3	LADCO region employment projections for "Logging Equipment Operators"		
2268007000	2.2	7.3	LADCO region employment projections for "Logging Equipment Operators"		
2285002000	12.2	36.7	NONROAD (national 1989-1996 diesel railway maintenance equipment population growth rate)	LADCO region employment projections for "Rail-Track Laying & Maintenance Equipment Operators" (-1.6%/yr)	Did not use alternative because historical period indicates substantially different growth rate for diesel than overall sector
2260006000	7.2	15.0	REMI Commercial sector employment forecast for LADCO region		
2265006000	7.2	15.0	REMI Commercial sector employment forecast for LADCO region		
2270002000	4.7	16.2	LADCO region employment projections for "Operating Engineers and Other Construction Equipment Operators"		
2270003000	0.1	0.2	LADCO region employment projections for "Industrial Machinery Mechanics"		
2267003000	0.1	0.2	LADCO region employment projections for "Industrial Machinery Mechanics"		
2270001000	10.4	31.5	NONROAD (national 1989-1996 diesel recreational equipment population growth rate)	LADCO region employment projections for "Recreational Vehicle Service Technicians" (+1.7%/yr)	Did not use alternative because historical period indicates substantially different growth rate for diesel than overall sector
2282020000	10.4	31.5	NONROAD (national 1989-1996 diesel recreational equipment population growth rate)	Two options: 1996-2005 LADCO region recreational boat registration growth rate (0.8%/yr) and LADCO region employment projections (+1.5%/yr) for "Motorboat Mechanics"	Did not use alternatives because historical period indicates substantially different growth rate for diesel than overall sector.

SECTION III. UPDATED EMISSION CONTROL DATA

A. NON-EGU POINT SOURCE CONTROLS

1. NO_x SIP Call

All states in the LADCO region affected by the NO_x (oxides of nitrogen) SIP (State Implementation Plan) Call requirements (OH, IN, IL, MI) indicated that their sources were complying in 2005. The only exception to this is for reciprocating internal combustion engines (RICE) in Illinois. The State of Illinois recommended that an 82 percent NO_x control efficiency be applied to large RICE engines that are affected by the SIP Call. The RICE engine requirement in Illinois has a January 1, 2008 compliance date. Table III-1 lists these engines and the associated NO_x control efficiencies applied in the emission projections. This requirement is expected to affect NO_x emissions in all projection years.

2. MACT Standards

Table III-2 summarizes the control factors used to estimate the post-2005 effects of MACT emission standards on volatile organic compounds (VOC), NO_x, and PM emissions in the projection years. The information in this table was developed from EPA guidance on estimating the criteria pollutant emission benefits of MACT standards (Page, 2007). Any post-2005 MACT standards that have no expected criteria pollutant emission reductions according to the draft EPA guidance were not included in Table III-2. Table III-2 was circulated to the states for review, and Wisconsin provided its own estimates of the expected VOC and PM emission reductions from these MACT standards in its state. The State of Michigan concurred with the emission reduction estimates made by Wisconsin. Those VOC and PM emission reduction percentages are shown in the two right-most columns of Table III-2. So, the control factor file reflects the EPA estimated values for IL, IN, MN, and OH, and the Wisconsin-provided estimates for MI and WI.

3. Consent Decrees

Previous Pechan-developed control efficiencies by source (Pechan, 2005) and pollutant were merged with the LADCO state 2005 point source file and control factors assigned accordingly. The 2005 point source control efficiencies (CEs) for sulfur dioxide (SO_2) and NO_x for fluid catalytic cracking units (FCCUs) and heaters and boilers were checked to see whether there is any compliance by 2005. Pechan also added all MACTEC revisions/additions from their earlier report to the control factor file (MACTEC incorporated cases and settlements control factors for refineries that were not evaluated for the 812 study) and made any changes/additions that were provided by the state air pollution control agencies. Table III-3 lists all of the LADCO state Non-EGU Point Sources affected by consent decrees. These sources all have post-2005 control factors applied in the analysis. There are two refineries in the study area who had either complied with their consent decrees or curtailed applicable operations by 2005, so no future year control factors were applied in this analysis. These two refineries are Premcor Refining in IL and the Flint Hills Refinery in MN.

Table III-1. RICE Engines in Illinois Affected by NO_x SIP Call

Id Number	Device	Process	Device Description	Pollutant	% Reduction	Comments
027807AAC	0003	01	ENGINES 09-ENG AND 10-ENG	NOX	59	50/50 for 2 engines = .5+.5(.18) = 59% reduction
041804AAC	0009	01	ENGINE 1213	NOX	82	
041804AAC	0010	01	ENGINE 1214	NOX	82	
041804AAC	0011	01	ENGINE 1215	NOX	82	
041804AAC	0012	01	ENGINE 1216	NOX	82	
041804AAC	0013	01	ENGINE 1217	NOX	82	
073816AAA	0001	01	WORTHINGTON MLV-10 COMPRESSOR & GAS FIRED ENGINE #12	NOX	82	
073816AAA	0004	01	CLARK TCV-10 COMPRESSOR & GAS FIRED ENGINE ENGINE #9	NOX	82	
073816AAA	0012	01	WORTHINGTON MLV-10 COMPRESSOR AND GAS FIRED ENGINE NO. 13	NOX	82	
073816AAA	0013	01	WORTHINGTON MLV-10 COMPRESSOR AND GAS FIRED ENGINE NO. 14	NOX	82	
073816AAA	0014	01	WORTHINGTON MLV-10 COMPRESSOR AND GAS FIRED ENGINE NO. 15	NOX	82	
073816AAA	0015	01	WORTHINGTON MLV-14 ENGINE #10	NOX	82	
085809AAA	0010	01	3 CLARK COMPRESSORS	NOX	82	
093802AAF	0003	01	ENGINE E-1008	NOX	82	
113817AAA	0002	01	ENGINE EC21	NOX	82	
113817AAA	0003	01	ENGINE IC11	NOX	82	
113821AAA	0002	01	ENTERPRISE RECIP COMP EC-21 4000 MP EF 3.3.2-1	NOX	82	
113821AAA	0005	01	COOPER COMPRESSOR CC22 EF 3.3.2-1 4000 HP	NOX	82	
149820AAB	0002	01	2 RECIPROCATING ENGINES (1013 - 1014)	NOX	59	50/50 for 2 engines = .5+.5(.18) = 59% reduction
149820AAB	0003	01	3 RECIPROCATING ENGINES (1015 - 1017)	NOX	82	
167801AAA	0001	01	ENGINES 1116 AND 1117	NOX	82	
167801AAA	0003	01	1-COOPER RECIPROCATING ENGINE, 4000HP, 1115	NOX	82	
167801AAA	0008	01	ENGINES 1118 AND 1119	NOX	59	50/50 for 2 engines = .5+.5(.18) = 59% reduction

Table III-2. Post-2005 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	MACT Code	Wisconsin and Michigan Values	
								VOC	PM
Asphalt Processing and Asphalt Roofing Manufacture	LLLLL	5/1/2006	85			30505001, 30500101, 30500102, 30505010, 30601101	0418	10	0
Auto and Light Duty Trucks	IIII	4/26/2007	40			40201601 to 40201632; 40201699	0702	0	0
Coke Ovens: Pushing, Quenching and Battery Stacks	CCCCC	4/14/2006	0			30300304; 30300303	0303	10	0
Fabric Printing, Coating & Dyeing	OOOO	5/29/2006	60			40201101 to 40201199; 40201201; 40201210	0713	10	0
Integrated Iron and Steel	FFFFF	5/20/2006	(5)		20	30301501 to 30301596	0305	0	10
Iron and Steel Foundries	EEEEE	4/22/2007	5			304003XX, 304007XX	0308	5	0
Lime Manufacturing	AAAAA	1/5/2007			23	305016XX	0408	0	10
Metal Can	KKKK	11/13/2006	70			40201702; 40201703 to 40201799	0707	0	0
Metal Furniture	RRRR	5/23/2006	0			402020XX		10	0
Misc. Coating Manufacturing	HHHHH	12/11/2006	64			402026XX	1642	10	0
Misc. Metal Parts and Products	MMMM	1/2/2007	0			402025XX		10	0
Misc. Organic Chemical Production and Processes (MON)	FFFF	11/10/2006	66			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;	1641	10	0

Table III-2 (continued)

MACT Standard – Source Category	Code of Federal Regulations Subpart	Compliance Date (existing sources)	VOC (% Reduction)	NO_x (% Reduction)	Total PM (% Reduction)	Affected SCCs	MACT Code	Wisconsin and Michigan Values	
								VOC	PM
						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			
Organic Liquids Distribution	EEEE	2/3/2007	70			40300102, 40300104, 40300106, 40300107, 40301010-40301021	0602	10	0
Plastic Parts	PPPP	4/19/2007	0			402022XX		10	0
Plywood and Composite Wood Products	DDDD	10/1/2007	54			307007XX; 30700921 to 30700971; 30701001 to 30701057; 30700602 to 30700661	1624		
Refractory Products Manufacturing	SSSSS	4/17/2006	81	0			0406	10	0
Reinforced Plastic Composites Production	WWWW	4/21/2006	39	0			1337	10	0
Site Remediation	GGGGG	10/8/2006	50	0		504001XX; 50400201, 50400202; 504002XX; 504100XX; 504101XX; 504102XX; 504103XX; 504102XX; 504103XX; 04104XX; 504105XX; 504106XX; 504107XX; 50480001; 50482001; 50482002; 50482599; 50480004	0805	10	0

Table III-2 (continued)

MACT Standard – Source Category	Code of Federal Regulations Subpart	Compliance Date (existing sources)	VOC (% Reduction)	NO_x (% Reduction)	Total PM (% Reduction)	Affected SCCs	MACT Code	Wisconsin and Michigan Values	
								VOC	PM
Stationary Combustion Turbines	YYYY	3/5/2007	13	17		20100101, 20100201, 20200101, 20200103, 20200201, 20200203, 20200901, 20300102, 20300202, 20300203	0105	0	0
Taconite Iron Ore Processing	RRRRR	10/30/2006	0	0	62	32302371 to 32302399	0411	0	10
Wood Building Products	QQQQ	5/28/2006	63	0		40202101 to 40202199	0703	10	0

**Based on organic hazardous air pollutant (HAP) emission reductions

Table III-3. LADCO State Non-EGU Point Sources Affected by Consent Decree Requirements and Other On-the-Books Controls

Identification Codes						FCCU Requirements		Heater/Boiler Requirements	
State	County	Facility*	Company	Location	State	SO_2	NO_x	SO_2	NO_x
18	089	00003	BP Amoco	Whiting	IN	FCU 500: Install wet gas scrubber; FCU 600: Use SO_2 adsorbing catalyst additive and/or hydrotreatment.	FCU 600: Install SCR; FCU 500: Low NO_x combustion promoter and NO_x adsorbing catalyst additive	Elimination of oil burning and restricting H_2S in refinery fuel gas	Use qualifying controls to reduce NO_x emissions by 9632 tons per year (tpy).
39	095	0448010246	BP Amoco	Toledo	OH	SO_2 catalyst additive	Install SNCR system	Elimination of oil burning and restricting H_2S in refinery fuel gas	Use qualifying controls to reduce NO_x emissions by 9632 tpy.
17	197	197090AAI	CITGO Global Refinery	Lemont	IL	New wet gas scrubber	Low NO_x combustion promoter (20 ppmvd limit)	Comply with NSPS Subparts A and J for fuel gas combustion devices. Eliminate fuel oil burning.	Use qualifying controls to reduce NO_x emissions from listed units by at least 50% of the revised baseline
17	119	119090AAA	Conoco Philips Global Refinery	Roxanna (Wood River)	IL	Install new wet gas scrubber (25 ppmvd or lower)	FCCU 1: Scrubber-based NO_x emission reduction technology to achieve 20 ppmvd	Subject to NSPS Subparts A and J for fuel gas combustion devices	Use qualifying controls to reduce NO_x emissions from combustion units by 4951 tpy
17	119	119090AAA	Conoco Philips Global Refinery	Hartford (Wood River)	IL	Install new wet gas scrubber (25 ppmvd or lower)	FCCU 2: Enhanced SNCR	Subject to NSPS Subparts A and J for fuel gas combustion devices	Use qualifying controls to reduce NO_x emissions from combustion units by 4951 tpy
17	197	197800AAA	Exxon-Mobil Refinery	Joliet	IL	Install new wet gas scrubber (25 ppmvd or lower)	Install and operate an SCR system	Accept NSPS Subpart J applicability for heaters and boilers and reduce or eliminate fuel oil firing	Use qualifying controls to reduce NO_x emissions from combustion units
17	033	033808AAB	Marathon Ashland Refinery	Robinson	IL	Existing wet gas scrubber	Catalyst additive	Accept NSPS Subpart J applicability for heaters and boilers and reduce or eliminate fuel oil firing	Reduce overall NO_x emissions from the controlled heaters and boilers at MAP refineries by 4,000 tpy. Control methods can include: SCR or SNCR; ULNB; technologies to reach 0.040 lbs per MMBtu or lower; alternate SO_2 single burner technology to achieve 0.055 lbs per MMBtu or lower; unit shutdowns.

Table III-3 (continued)

Identification Codes						FCCU Requirements		Heater/Boiler Requirements	
State	**County**	**Facility***	**Company**	**Location**	**State**	**SO_2**	**NO_x**	**SO_2**	**NO_x**
26	163	A9831	Marathon Ashland Refinery	Detroit	MI	SO_2 catalyst additive	Catalyst additive	Accept NSPS Subpart J applicability for heaters and boilers and reduce or eliminate fuel oil firing	Reduce overall NO_x emissions from the controlled heaters and boilers at MAP refineries by 4,000 tpy. Control methods can include: SCR or SNCR; ULNB; technologies to reach 0.040 lbs per MMBtu or lower; alternate SO_2 single burner technology to achieve 0.055 lbs per MMBtu or lower; unit shutdowns.
27	163	2716300003	Marathon Ashland Refinery	St Paul Park	MN	New wet gas scrubber on unit 1; catalyst additive on other unit	Catalyst additive	Accept NSPS Subpart J applicability for heaters and boilers and reduce or eliminate fuel oil firing	Reduce overall NO_x emissions from the controlled heaters and boilers at MAP refineries by 4,000 tpy. Control methods can include: SCR or SNCR; ULNB; technologies to reach 0.040 lbs per MMBtu or lower; alternate SO_2 single burner technology to achieve 0.055 lbs per MMBtu or lower; unit shutdowns.
39	151	1576000301	Marathon Ashland Refinery	Canton	OH	SO_2 catalyst additive	Catalyst additive	Accept NSPS Subpart J applicability for heaters and boilers and reduce or eliminate fuel oil firing	Reduce overall NO_x emissions from the controlled heaters and boilers at MAP refineries by 4,000 tpy. Control methods can include: SCR or SNCR; ULNB; technologies to reach 0.040 lbs per MMBtu or lower; alternate SO_2 single burner technology to achieve 0.055 lbs per MMBtu or lower; unit shutdowns.
39	095	0448010246	Sunoco Petroleum Refinery	Toledo	OH	Install new wet gas scrubber to meet 25 ppmvd SO_2	Install SCR systems or alternate technology to meet 20 ppmvd	Accept NSPS Subpart J applicability and reduce or eliminate fuel oil burning	

Table III-3 (continued)

Identification Codes						
State	**County**	**Facility***	**Company**	**Location**	**State**	**Notes**
17	115	115015AAE	ADM	Decatur	IL	Settlement agreement
17	143	143065AJE	ADM	Peoria	IL	Settlement agreement
17	001	001815AAF	ADM	Quincy	IL	Settlement agreement
18	173	00002	Alcoa	Warrick Units 1,2,3	IN	Settlement agreement

*Facility identification codes are those used in the 2002 point source files.

The Michigan Department of Environmental Quality (DEQ) provided information about the expected emissions reductions associated with settlements affecting Michigan sources. The information from Michigan DEQ was provided for Severstal (iron and steel), US Steel, and Marathon refinery. For Severstal, the key information provided indicated that NO_x emissions after the summer 2007 would be reduced at the blast furnace B and C stoves via a low NO_x burner (LNB) installation. A 50 percent NO_x control factor was applied with 2007 implementation year based on information in the Ozone Transport Rulemaking analysis about the expected emission reduction of LNB applied to a blast furnace. For US Steel, the Michigan DEQ-provided information indicated that PM controls would be installed during 2005 or 2006 on the basic oxygen furnace and blast furnace B, so it was assumed that these were base year controls and no future year control factor was applied. For the Marathon refinery in Michigan, the Michigan DEQ estimated that catalyst additives applied to the FCCU would reduce NO_x emissions by 25-50 percent and SO_2 emissions by 60-80 percent. The midpoint of each range was used to estimate post-2005 control factors for this refinery. All other expected controls at Marathon are to reduce PM emissions and were assumed to have occurred by 2005, so no future year PM control factors were applied.

4. On-the-Books (OTB) Control Additions

Table III-3 lists on-the-books controls that were applied to individual facilities/sources in the future year control factor file. This information was developed from the OTB updated control factor file provided by LADCO from the 2002 base year projections. The compliance date information in this file was used to eliminate controls that had compliance dates of 2005 or earlier. Ohio EPA provided information about the expected effects of NO_x Reasonably Available Control Technology (RACT) rules in achieving post-2005 emission reductions in the Cleveland-Akron, Ohio 8-hour ozone nonattainment area. Table III-4 summarizes the source categories, associated emission control equipment to meet the requirements, and the estimated NO_x control percentages.

Table III-4. Ohio RACT Rule Summary Cleveland/Akron 8-Hour Ozone Nonattainment Area

Source Category	Unit Size (MMBtu/hour)	NO_x Control	Estimated NO_x Control Efficiency
RICE Engines	All	Low Emission Combustion	80%
ICI Boilers	20-49	Burner Tune-up	10%
ICI Boilers	50-99	LNB+FGR	61%
ICI Boilers	100-249	LNB+FGR	61%
ICI Boilers	>250	LNB+FGR	61%
Combustion Turbine	All	Dry LNB	70%

SOURCE: Ohio EPA Division of Air Pollution Control.

5. Best Available Retrofit Technology (BART)

Table III-5 lists the BART-eligible sources for the states in the LADCO study region. In instances where criteria air pollutant control percentages (for SO_2 and NO_x) are listed in this table, those control percentages were applied in estimating 2018 emissions.

Table III-5. BART Eligible Non-EGU Sources

State	State ID	Source Name	County	County ID	Source ID	BART Emission Unit ID	Description	Stack ID	Est. Emission Reduction	
									SO_2	NO_x
ILLINOIS	17	Conoco Phillips	Madison	11D	119090AAA					
ILLINOIS	17	Exxon Mobil	Will	197	197800AAA					
ILLINOIS	17	CITGO	Will	197	197090AAI					
ILLINOIS	17	National Steel – Granite City	Madison	119	119813AAI					
INDIANA	18	AGC DIVISION-ALCOA POWER GENERATING	Warrick	173	2	Boiler #2	Dry Bottom, pulverized coal-fired boiler	241-242	95	90
						Boiler #3	Dry Bottom pulverized coal-fired boiler	242	95	90
						Boiler #4	Dry Bottom, pulverized coal-fired boiler	243	95	90
INDIANA	18	Alcoa Inc. – Warrick	Warrick	173	7	105m.1, 10	POTLINE #3. ROOMS 105 AND 106 gtc	105M	95	40
						107M, 108M	POTLINE #4. ROOMS 107 AND 108 GTC	107M	95	40
						109M,110M	POTLINE #5, ROOMS 109 AND 110, A-398	109M	95	40
						111M,112M,	POTLINE #6		95	40
						130m.1,104	potline #2, Rooms 103 and 104, A-398	103m.1	95	40
						134.63	HDC FURNACE COMLEXES	1EH	0	40
						134.71	OFFLINES #2	134.71	0	40
INDIANA	18	ESSROC CEMENT CORP. (Speed)	Clark	19	8	EU20	Kiln #1		95	70
						EU21	Kiln #2		95	70
INDIANA	18	GE PLASTICS MT. VERNON INC.	Posey	129	2	08-706	CO AND ORGANIC SULFIDE STREAM FROM PHOSGENE FED	08-706 707	95	0
						09-001	B&W NATURAL GAS AND OIL FIRED BOILER	09-001	0	70
						09-001	Riley Boiler	12-001	95	70
						12-001	Hot Oil Heater		0	0
						09-002	LASKER BOILER	09-002	95	75
						09-002	ERIE BOILER	09-002	95	75

Table III-5 (continued)

State	State ID	Source Name	County	County ID	Source ID	BART Emission Unit ID	Description	Stack ID	Est. Emission Reduction	
									SO_2	NO_x
INDIANA	18	ISG-BURNS HARBOR (Formerly Beth. Steel)	Porter	127	1	460-01	#7 Boiler	4	95	75
						46002	#8 Boiler	5	95	75
						460-03	#9 Boiler	6	95	75
						460-04	#10 Boiler	7	95	75
						460-05	Boiler #11	8	95	75
						460-06	#12 Boiler	9	95	75
						512-06	#1 COKE BATTERY PUSHING	11	0	0
						512-08	#1 Coke Battery Underfire	13	95	75
						512-14	#2 COKE BATTERY PUSHING	12	0	0
						512-16	#2 COKE BATTERY UNDERFIRE STACK	14	95	75
						520	BLAST FURNACE FUGITIVES		0	0
						520-04	SINTER WINDBOX STACK	25	95	75
						520-18	BLAST FURNACE D CASTHOUSE EMISSIONS	33	0	0
						520-18	C BLAST FURNACE STOVES	31	0	0
						520-19	BLAST FURNACE D STOVES	34	0	0
						520-19	BLAST FURNACE C CASTHOUSE	33	0	0
						534	STEELMAKING FUGITIVES		0	0
						534-01	STEELMAKING HMD STATION #1	57	0	0
						534-02	STEELMAKING HMD #2	59	0	0
						534-10	STEELMAKING VESSELS #1 & #2	62	0	0
						534-11	STEELMAKING VESSELS	64	0	0
						534-23	STEELMAKING FM BOILER	65	0	0

Table III-5 (continued)

State	State ID	Source Name	County	County ID	Source ID	BART Emission Unit ID	Description	Stack ID	Est. Emission Reduction	
									SO_2	NO_x
						595-24	CASTER #1	80	0	0
						670-05	HOT STRIP FURNACE #1	90	95	75
						670-07	HOT STRIP #3 FURNACE	92	95	75
						670-07	HOT STRIP	91	95	75
						673-14	160" OKATE MILL FURNACE #1	112	0	75
						673-15	160" PLATE MILL FURNACE #2	113	0	75
						673-16.17	160" PLATE MILL FURNACES 4&5	110	0	0
						673-18.19	160" PLATE MILL FURNACES 6&7	111	0	0
						673-20	160" PLATE MILL FURNACE #8	114	0	0
						674.26,27	110" PLATE MILL FURNACES #1	122	0	0
MICHIGAN	26	Lafarge Midwest Inc.	Alpena	7	B1477	Kilns #1-#5				
MICHIGAN	26	Stone Container Corp.	Ontonagon	131	A5754	Riley Boiler				
						Paper Machine #2				
MICHIGAN	26	Tilden Mining Co	Marquette	103	B4885	Pelletizing Line #1, includes kiln, furnace, cooler, dryer				
						Boiler #2				
						Primary crusher				
MICHIGAN	26	Empire Iron Mining	Marquette	103	B1827	Pelletizing Lines #1 - #3 furnace				
						Boilers #1 - #3				
						Primary crusher				
MICHIGAN	26	St. Mary's Cement (CEMEX)	Charlevoix	29	B1559	Kiln and pre-calciner				
MICHIGAN	26	New Page Paper (Escanaba)	Delta	41	A0884	Boiler #8				
						Boiler #9				
						Recovery furnace				
						Lime kiln				
MINNESOTA	27	Ipsat Inland	St. Louis	137	2713700062					
MINNESOTA	27	EVTAC-Fairlane	St. Louis	137	2713700113					
MINNESOTA	27	National Steel (Keewatin)	St. Louis	137	2713700063					
MINNESOTA	27	Hibbing Taconite	St. Louis	137	2713700061					
MINNESOTA	27	USS Minntac	St. Louis	137	2713700005					
MINNESOTA	27	Northshore Mining	Lake	75	2707500003					

Table III-5 (continued)

State	State ID	Source Name	County	County ID	Source ID	BART Emission Unit ID	Description	Stack ID	Est. Emission Reduction	
									SO_2	NO_x
N. DAKOTA	38	Great River Energy – Coal Creek	McLean	55	17					
N. DAKOTA	38	Basin Electric Power – Leland Olds	Mercer	57	1					
N. DAKOTA	38	Great River Energy – Stanton	Mercer	57	4					
N. DAKOTA	38	Minnkota Power – MR Young	Oliver	65	1					
OHIO	39	Mead Paper Division	Ross	67	671010028					
WISCONSIN	55	Georgia-Pacific Consumer Products (Formerly Fort James)	Brown	9	405032870	Boiler B26	stoker (coal, tire and other fuels), 350 mmBtu/hr	S10	85	50
						Boiler B27	cyclone, 615 mmBtu/hr	S10	85	88

B. AREA SOURCE/MAR CONTROLS

1. Area Sources

Pechan worked with the LADCO states to determine how to estimate the effect of federal/ state/local rules on area source category emissions. The sub-sections below describe the results of this effort.

a. VOC Solvent Categories

For VOC emissions from consumer products and architectural and maintenance coatings, it was decided to estimate post-2005 VOC emission reduction credits using EPA guidance to states for estimating the benefits of three Federal rules being promulgated during calendar year 2007 (Harnett, 2007). These rules will establish or amend VOC content limits for (1) aerosol coatings (new rule), (2) architectural and industrial maintenance (AIM) coatings (amendments), and (3) household and institutional consumer products (amendments).

EPA estimated that the aerosol coatings rule will achieve the equivalent of a 19 percent reduction in mass VOC emissions from the 1990 baseline. The year 1990 represents the baseline, since there has been no previous Federal rulemaking for aerosol coatings. The creditable reduction that may be claimed is 0.114 pounds per capita. In the LADCO state 2005 emission inventory, this VOC emission reduction is applied to SCC 2460500000, which are Coatings and related products. A 12 percent VOC emission reduction is applied to SCC 2460500000 in each forecast analysis year (i.e., 2009, 2012, and 2018) to estimate the benefit of the federal aerosol coatings rule. This percentage is lower than the equivalent value estimated by EPA because the aerosol coatings rule is a subset of the Coatings and related products category represented by SCC 2460500000.

For AIM coatings, EPA estimates that the amended Federal AIM rule will achieve a reduction of 31 percent from the post-1998 Federal rule baseline of 3.6 pounds per capita. This is a creditable reduction of 1.1 pounds per capita. AIM coating emission reductions are applied to the following SCCs in the base year LADCO inventory for each analysis year: 2401001000; 2401002000; 2401003000; 2401008000; 2401008999.[2]

For consumer products, EPA has calculated that the amended Federal rule will achieve a VOC reduction of approximately 29 percent beyond that achieved by the 1998 Federal rule. This is a creditable reduction of 0.9 pounds per capita. Emission reductions from the Federal rule are applied to all Consumer Product source categories (SCCs 2460*) in each analysis year.

b. Portable Fuel Containers

For portable fuel containers (PFCs), while there are state-by-state differences in likely rule adoption dates, all state's control factors are based on the EPA mobile source air toxics (MSAT) rule requirements. EPA adopted emission standards for portable fuel containers (such as gas

[2] Note that subsequent to delivery of the area source/MAR control file, Wisconsin stated that this last SCC should not be included for their state.

cans) under the consumer products authority of the Clean Air Act. Starting with containers manufactured in 2009, the standard limits evaporation and permeation emissions from these containers to 0.3 grams of hydrocarbons per gallon per day. EPA also adopted test procedures and a certification and compliance program in order to ensure that containers meet the emission standard over a range of in-use conditions.

The VOC emission reduction benefits were estimated assuming that the new rule affects PFC sales starting during 2009, and that each PFC that meets the MSAT standard has 75 percent lower emissions than the PFC being replaced.

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 MSAT 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 replacement source controls. Because retirement was not estimated using a constant annual rate (5 percent were assumed to be retired in the first year, with 10 percent retired in each additional forecast year), Pechan replaced the $(1\text{-}R_i)^t$ 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, an overall VOC emission reduction of 26.4 percent was computed for Illinois. Pechan then back-calculated the appropriate rule penetration (RP) value for each forecast year based on the overall emissions reduction, the 75 percent CE value, and an rule effectiveness (RE) of 100 percent (e.g., the calculated RP for Illinois for 2012 is 35.2 percent).

[3] Note that to simplify the analysis Pechan assumed that all post-2005 new container growth would be affected by the MSAT rule (due to low growth rates, this assumption does not have a significant impact on the overall emission reduction estimates of this rule).

c. Residential Wood Heating (Woodstoves and Fireplace Inserts)

Pechan developed control factors by pollutant and year to account for the effect of the replacement of retired wood stoves/inserts that emit at pre-residential wood heater new source performance standard (NSPS) levels,. These control factors were developed using an annual 2 percent retirement rate for wood stoves/fireplaces along with pre- and post-NSPS wood stove and fireplace emission factors. SCCs for "controlled" wood stoves and fireplace inserts have no control factors applied. Pechan developed updated residential wood combustion control factors for the LADCO states using the same algorithms applied previously (Pechan, 2004). Table III-6 displays the emission reduction, control efficiency, and rule penetration percentages modeled.

d. Stage II Vehicle Refueling

Pechan developed updated (2005 base year) Stage II vehicle refueling control factors via MOBILE runs for the LADCO states. Onroad refueling control factors were calculated based on the percentage difference between the projection year (2009, 2012, and 2018) MOBILE6 refueling emission factors and the 2005 MOBILE6 refueling emission factors.

MOBILE6 emission factors were calculated at January and July temperature and fuel conditions. July emission factors were used as the surrogate for the five-month ozone season (May through September) and the January emission factors were used as the surrogates for the remaining seven months. Temperatures modeled were the January and July average daily monthly maximum and minimum temperatures for each state (i.e., Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin) based on 30-year average temperature data, as used in EPA's second Section 812 Prospective analysis. MOBILE6 input files were created for each unique combination of: January and July Reid vapor pressure, reformulated gasoline, oxygenated fuel, gasoline sulfur, and Stage II control programs for each of the states mentioned above. Fuel data and Stage II control program information for each state and corresponding projection year were based on EPA's National Mobile Inventory Model (NMIM) County Database (version NDC20060201). Data extracted from NMIM's County Database for these input parameters were based on January and July values.

Stage II control programs for IL, IN, and WI began in 1998 with a phase-in year of one year and with a percent efficiency value of 86.0 percent for LDGVs and LDGTs in the program. Similarly, the HDGVs in the program have 86.0 percent efficiency. For Ohio, these control programs began in 1993 with a two-year phase-in and 77.0 percent efficiency for both the LDGVs + LDGTs and HDGVs in the program.

Modeling these temperature, fuel, and Stage II control inputs (where applicable), Pechan calculated MOBILE6 emission factors for calendar years 2005, 2009, 2012, and 2018.

The resulting MOBILE6 emission factors were first weighted according to the default MOBILE6 VMT mix to determine the weighted average refueling emission factor for all gasoline vehicle types. The resulting January and July emission factors were weighted together according to the number of days in the seven-month season (212 days) and the five-month ozone season (153).

Table III-6. Residential Wood Combustion NSPS Emission Reductions (percentage values)

SCC	SCC Description	Pollutant	2009			2012			2018		
			Reduction	Control Efficiency	Rule Penetration	Reduction	Control Efficiency	Rule Penetration	Reduction	Control Efficiency	Rule Penetration
2104008001	Total Fireplaces	CO	2.9	55.0	5.3	4.9	55.0	8.9	8.5	55.0	15.5
2104008010	Total Woodstoves	CO	3.1	55.0	5.6	5.2	55.0	9.5	9.0	55.0	16.4
2104008000	Total Fireplaces & Woodstoves	CO	3.0	55.0	5.5	5.1	55.0	9.3	8.9	55.0	16.2
2104008001	Total Fireplaces	NOX	1.9	28.6	6.6	3.3	28.6	11.5	5.6	28.6	19.6
2104008010	Total Woodstoves	NOX	2.0	28.6	7.0	3.4	28.6	11.9	5.8	28.6	20.3
2104008000	Total Fireplaces & Woodstoves	NOX	2.0	28.6	7.0	3.3	28.6	11.5	5.8	28.6	20.3
2104008001	Total Fireplaces	PM10-PRI	2.3	35.9	6.4	4.0	35.9	11.1	6.9	35.9	19.2
2104008010	Total Woodstoves	PM10-PRI	2.5	35.9	7.0	4.2	35.9	11.7	7.2	35.9	20.1
2104008000	Total Fireplaces & Woodstoves	PM10-PRI	2.4	35.9	6.7	4.1	35.9	11.4	7.1	35.9	19.8
2104008001	Total Fireplaces	PM25-PRI	2.3	35.9	6.4	4.0	35.9	11.1	6.9	35.9	19.2
2104008010	Total Woodstoves	PM25-PRI	2.5	35.9	7.0	4.2	35.9	11.7	7.2	35.9	20.1
2104008000	Total Fireplaces & Woodstoves	PM25-PRI	2.4	35.9	6.7	4.1	35.9	11.4	7.1	35.9	19.8
2104008001	Total Fireplaces	VOC	5.9	77.4	7.6	9.8	77.4	12.7	17.1	77.4	22.1
2104008010	Total Woodstoves	VOC	5.6	77.4	7.2	9.4	77.4	12.1	16.4	77.4	21.2
2104008000	Total Fireplaces & Woodstoves	VOC	5.4	77.4	7.0	9.2	77.4	11.9	16.0	77.4	20.7

Note: Rule effectiveness (RE) of 100 percent for each SCC/year.

After this was done for all of the modeled years and state or sub-state areas, the overall control efficiency for refueling, due to fleet turnover, was calculated based on the percentage difference between the 2005 and corresponding projection year emission factors. These control efficiencies were then assigned to individual counties, based on the mapping of fuel and Stage II control parameters to those modeled in the MOBILE6 files.

2. MAR Sources (Locomotives and Marine Vessels)

EPA issued a proposed rule this spring affecting future criteria pollutant emissions from railroad locomotives and commercial marine vessels (CMVs) (EPA, 2007b). These are the two off-road source categories that are addressed in this report. Base year emissions (2005) information for these two source categories was developed by ENVIRON under contract to LADCO (ENVIRON, 2007a and b).

Control factors for criteria air pollutants were developed using Chapter 3 (Emissions Inventory) of EPA's "Draft Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less than 30 Liters per Cylinder" (EPA, 2007b). This chapter presents EPA's analysis of the emissions impact of the proposed rule for three source categories affected: commercial marine diesel engines, recreational marine diesel engines, and locomotives. The proposed control requirements include NOx and PM emission standards for Category 1 and Category 2 commercial marine diesel engines (both above and below 37 kilowatts). New NOx and PM emission standards would also apply to all recreational diesel engines and locomotives. There are no new standards for HC or CO; however, the PM standards are also expected to decrease HC emissions.

For locomotives, the EPA Regulatory Impact Analysis (RIA) chapter was used to develop 2009, 2012 and 2018 estimates of baseline and post-control emissions by pollutant by locomotive usage. This information is summarized in Table III-7. The RIA examined the effect of the proposed rule on emissions for (1) large line haul, (2) large switch, (3) small railroads, and (4) passenger commuter trains. Each of these four usage types was assigned to the base year 2005 emission inventory SCCs. The SCC assignments are shown at the bottom of Table III-7.

Table III-7. Locomotive Emissions Reported in EPA Draft RIA

Year	Large Line Haul		Large Switch		Small Railroads		Passenger Commuter	
	Baseline	Controlled	Baseline	Controlled	Baseline	Controlled	Baseline	Controlled
Volatile Organic Compounds								
2006	43,874		5,501		2,891		1,609	
2009	43,486	42,008	5,696	5,552	3,032	3,032	1,546	1546
2012	42,891	35,890	5,898	5,364	3,179	3,179	1,476	1301
2018	41,684	23,607	6,325	5,066	3,497	3,497	1,332	771
PM-2.5								
2006	27,082		2,202		907		992	
2009	24,216	23,661	2,120	2,070	870	870	861	861
2012	23,800	20,672	2,188	2,006	912	912	819	738
2018	22,542	14,516	2,309	1,896	991	991	719	466
PM-10								
2006	27,919		2,270		935		1,023	
2009	24,965	24,393	2,185	2,134	897	897	888	888
2012	24,536	21,311	2,256	2,068	940	940	845	761
2018	23,240	14,965	2,380	1,954	1,022	1,022	741	480
Oxides of Nitrogen								
2006	779,842		86,861		37,690		38,466	
2009	755,490	751,364	88,573	87,999	39,528	39,528	32,338	32,338
2012	730,031	692,606	88,909	86,614	41,456	41,456	27,212	25,933
2018	708,525	608,010	90,875	84,612	44,299	44,299	22,559	19,496
SCC(s)	2285002006		2285002010		2285002007		2285002008; 2285002009	

Because the federal locomotive emission standards modeled under previous LADCO contracts will continue to achieve emission reductions, it was necessary for Pechan to adjust the information in the new RIA to estimate the total post-base year reductions from the effects of both the existing and proposed locomotive standards. Pechan computed a revised set of projected emissions for modeling years 2009, 2012, and 2018 that reflect application of EPA's assumed locomotive growth rate (1.6 percent per year) to the base year (2006) emissions from their analysis. This step was used to estimate the emissions for each modeling year excluding the effects of both sets of emission standards. Next, Pechan computed the percentage reduction in emissions between the revised emissions in each modeling year and the controlled emissions reported in EPA's draft RIA. Table III-8 shows how the revised baseline and percent reduction for each modeling year. For example, for large line haul railroads, the baseline 2009 uncontrolled VOC emissions are estimated to be 46,014 tons nationally. Controlled emissions of 42,008 tons represent an 8.7 percent VOC reduction from this uncontrolled emission estimate (46,014 – 42,008 = 4,010; 4,010/46,014 * 100 = 8.7).

Table III-8. Percentage Reductions Associated with Federal Locomotive Standards

Year	Large Line Haul		Large Switch		Small Railroads		Passenger Commuter	
	Revised Baseline	% Reduction	Revised Baseline	% Reduction	Revised Baseline	% Reduction	Revised Baseline	% Reduction
Volatile Organic Compounds								
2006								
2009	46,014	8.7%	5,769	3.8%	3,032	0.0%	1,687	8.4%
2012	48,258	25.6%	6,051	11.3%	3,180	0.0%	1,770	26.5%
2018	53,080	55.5%	6,655	23.9%	3,498	0.0%	1,947	60.4%
PM-2.5								
2006								
2009	28,403	16.7%	2,309	10.4%	951	8.5%	1,040	17.2%
2012	29,788	30.6%	2,422	17.2%	998	8.6%	1,091	32.4%
2018	32,765	55.7%	2,664	28.8%	1,097	9.7%	1,200	61.2%
PM-10								
2006								
2009	29,281	16.7%	2,381	10.4%	981	8.5%	1,073	17.2%
2012	30,709	30.6%	2,497	17.2%	1,028	8.6%	1,125	32.4%
2018	33,777	55.7%	2,746	28.9%	1,131	9.7%	1,238	61.2%
Oxides of Nitrogen								
2006								
2009	817,877	8.1%	91,097	3.4%	39,528	0.0%	40,342	19.8%
2012	857,766	19.3%	95,540	9.3%	41,456	0.0%	42,310	38.7%
2018	943,477	35.6%	105,087	19.5%	45,599	2.8%	46,537	58.1%
SCC(s)	2285002006		2285002010		2285002007		2285002008; 2285002009	

Note: emissions reported in short tons.

Analogous control factor calculations to those described above for locomotives were used to compute total CMV emission reduction values representing the effects of both existing and proposed emission standards. Table III-9 presents the EPA baseline emissions, Pechan's revised baseline emissions (computed using EPA's 0.9 percent annual growth assumption), EPA's controlled emissions, and the percentage reduction estimates applied in this analysis. For example, the CMV standards are expected to reduce VOC emissions by 33.9 percent in 2018.

Table III-9. Percentage Reductions Associated with Federal CMV Standards

Year	Emissions (short tons)			
	Baseline	Revised Baseline	Controlled	% Reduction
Volatile Organic Compounds				
2005	17,295			
2009	16,870	17,926	16,863	5.9%
2012	16,495	18,414	16,344	11.2%
2018	16,034	19,431	12,851	33.9%
PM-2.5				
2005	30,042			
2009	27,327	31,138	27,324	12.2%
2012	26,657	31,987	26,582	16.9%
2018	22,553	33,753	19,308	42.8%
PM-10				
2005	30,972			
2009	28,172	32,102	28,169	12.3%
2012	27,481	32,977	27,403	16.9%
2018	23,251	34,798	19,905	42.8%
Oxides of Nitrogen				
2005	825,229			
2009	781,105	855,341	781,105	8.7%
2012	743,915	878,643	742,453	15.5%
2018	686,966	927,171	591,991	36.2%
Sulfur Dioxide				
2005	82,543			
2009	46,838	85,555	46,839	45.3%
2012	42,515	87,886	42,515	51.6%
2018	6,054	92,740	5,630	93.9%
Carbon Monoxide				
2005	153,499			
2009	149,966	159,100	149,966	5.7%
2012	146,227	163,434	146,227	10.5%
2018	140,443	172,461	140,443	18.6%

For commercial marine diesel engines, the RIA examines expected rule emission benefits for four different engine types/sizes. The total CMV emission benefits in each year were used and applied equally to most of the affected SCCs in the 2005 inventory. However, Pechan applied rule penetration (RP) values to two CMV SCCs based on an ENVIRON table indicating RP values of less than 100 percent for these SCCs (see Table III-10).

Table III-10. Commercial Marine Vessel Rule Penetration Values

Source Category Code (SCC)	Source Definition	Purpose	Geographic Area	Percentage of Engines Affected by Proposed EPA Standards				
				NOx	PM-10	HC	CO	SOx
2280002023	Push Boats	Barge Freight	River Traffic	100%	100%	100%	100%	100%
			Lake Traffic	100%	100%	100%	100%	100%
2280002021	Tugs	Vessel assist and support functions	Near port	100%	100%	100%	100%	100%
2280003200	Deep draft	Laker and ocean-going large vessels	Mid-Great Lakes	85%	81%	86%	86%	77%
2280003100			Near port	81%	71%	87%	83%	63%
2280002022	Ferries	River or lake ferrying	Regular routes	100%	100%	100%	100%	100%
2280002024	Other Commercial Vessels	Excursion boats primarily	Near dock	100%	100%	100%	100%	100%
2280002025	Dredges	Dredging projects	Varies	100%	100%	100%	100%	100%
2280002029	Support Vessels	General work boats	Near port	100%	100%	100%	100%	100%
2280002030, 2280004030[1]	Commercial Fishing	Market fishing	Great Lakes	100%	100%	100%	100%	100%
2280002040, 2280004040[1]	Military	Coast Guard and Navy	Great Lakes	100%	100%	100%	100%	100%

SECTION IV. PREPARATION OF GROWTH AND CONTROL FILES

This section describes the contents of the growth and control factor files submitted to LADCO earlier this month. The first subsection discusses the preparation of the point and area source/ MAR factor file and the revised NONROAD model growth file. The final subsection describes the contents of the control factor 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 point and area source/MAR growth factors. Pechan revised the growth packet portion of the NONROAD model growth file (***NATION.GRW***) to replace the default model equipment population growth rates with growth rates based on more recent/more region-specific information. Two sets of control factor files were prepared: one for area source/MAR categories and one for point source categories. The point and area source/MAR growth and control files were developed in fixed field ascii format. The format of the default NONROAD model growth file was retained in the revised version prepared for LADCO. The following subsections describe the contents of the growth and control factor files.

A. GROWTH FACTORS

Pechan compiled the LADCO region growth factor information into the file ***$LADCO_2005_GF_Final_RPO.txt***. 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 2006 and 2018 (population-based growth indicator records are reported by SCC/state/county because population projections were available at the county-level).

Pechan revised the input file used by the NONROAD model (***NATION.GRW***) to reflect historical equipment population changes and to estimate future equipment population changes. In particular, Pechan incorporated LADCO state-specific records to the GROWTH packet portion of this file. The fixed field format of the data in this packet is as follows:

Characters	**Description**
1-5	FIPS code (00000 = applies to entire nation; ss000 = applies to all of state ss)
6-10	subregion code (left blank)
11-15	year of estimate (4-digit year)
17-20	indicator code (alphanumeric code identified within NONROAD)
26-45	value for indicator

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

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

B. CONTROL FACTORS

Pechan compiled control factors for the LADCO states in two sets of ascii files: one set for point source controls (***LADCO 2005 Base Year Point Control File.txt***), and the other set for area source/MAR controls (***LADCO 2005 Base Year Area Source and MAR Control File.txt***).

1. Point Source Control Factors

The ***LADCO 2005 Base Year Point Control File.txt*** file reports control information at the Process ID-level and for the specific date that each control is expected to be implemented. 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. For MACT standards, the point source control factors are incremental to base year control levels. Because all other point source control

factors represent absolute control levels, LADCO should subtract any existing 2005 inventory level of control from the control factor level of control to determine net reductions for non-MACT controls. Pechan found very few point source records with control information, so LADCO should expect very little control overlap between the 2005 inventory and the control file. Table IV-3 identifies the RPO Data Exchange Protocol fields that are populated in the point source control file.

2. Area Source and MAR Control Factors

Pechan compiled the area source and MAR control factor information into a single ascii file that reports the level of control for each year of interest (2009, 2012, and 2018). In cases where there is no change in emission reduction after the initial implementation year, the level of control is repeated for each year. For controls where emission reductions increase over time (due to increased levels of RP), the level of control increases for each successive modeling year. Except for the single control for which emission reductions are county-specific (Stage II Vehicle Refueling), the area source and MAR control factor file is expressed at the state-level. 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). Table IV-4 identifies the RPO Data Exchange Protocol fields that are populated in this file.

Table IV-3. Fields Populated in Point Source Control Factor File

RPO Data Exchange Protocol Format Field Name	Populated in Point Source Control Factor File
RECORD TYPE	Yes
COUNTRY CODE	Yes
STATE PROVINCE TRIBAL CODE	Yes
COUNTY FIPS	Yes
SIC	Yes
SCC	Yes
SITE ID	Yes
EMISSION UNIT ID	Yes
EMISSION RELEASE POINT ID	Yes
POLLUTANT CODE	Yes
PROCESS ID	Yes
BASE DATE	Yes
FUTURE DATE[1]	Yes
PRIMARY CONTROL EQUIPMENT CODE	No
BASE DATE CONTROL EFFICIENCY[2]	Yes
FUTURE DATE CONTROL EFFICIENCY[3]	Yes
FUTURE DATE GROWTH FACTOR	No
CONTROL TYPE	Yes
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	Yes
PRIMARY CONTACT	Yes

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

Table IV-4. Fields Populated in Area Source/MAR Control Factor File

RPO Data Exchange Protocol Format Field Name	Populated in Area Source/MAR Control Factor File
RECORD TYPE	Yes
COUNTRY CODE	Yes
STATE PROVINCE TRIBAL CODE	Yes
COUNTY FIPS	Yes
SIC	No
SCC	Yes
SITE ID	No
EMISSION UNIT ID	No
EMISSION RELEASE POINT ID	No
POLLUTANT CODE	Yes
PROCESS ID	No
BASE DATE	Yes
FUTURE DATE	Yes
PRIMARY CONTROL EQUIPMENT CODE	No
BASE DATE CONTROL EFFICIENCY	Yes
FUTURE DATE CONTROL EFFICIENCY[1]	Yes
FUTURE DATE GROWTH FACTOR	No
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)*	Yes[2]
RESERVED FOR FUTURE USE FIELD 2 *(future year RE)*	Yes[2]
RESERVED FOR FUTURE USE FIELD 1 *(future year RP)*	Yes[2]
CONTROL DESCRIPTION	Yes
PRIMARY CONTACT	Yes

[1] Populated with overall percentage emission reduction (product of CE, RE, and RP).
[2] Not populated for Federal locomotive standards or Stage II Vehicle Refueling control program.

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