

Midwest Regional Planning Organization (RPO)

Identification and Evaluation of Candidate Control Measures

Prepared for:

**The Lake Michigan Air Directors Consortium
(LADCO)**

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SECTION 1

BACKGROUND

Introduction

The States of the Midwest Regional Planning Organization (MRPO) are considering adopting additional control measures as part of their planning to achieve regional haze goals and to attain the ozone and PM2.5 National Ambient Air Quality Standards (NAAQS). Although currently mandated controls will achieve significant emission reductions over the next 5-10 years, it is likely that additional emission reductions beyond current requirements will be necessary to meet State Implementation Plan (SIP) requirements and to demonstrate attainment. The Lake Michigan Air Directors Consortium (LADCO) issued a contract to MACTEC to identify and evaluate candidate control measures to support the State's air quality planning activities.

Under this contract, MACTEC was tasked with the following activities:

1. Identify and summarize candidate control measures for regional haze, PM2.5, and ozone;
2. Identify and summarize candidate control measures to support the Best Available Retrofit Technology (BART) engineering analysis required by the Regional Haze rules;
3. Conduct a technical and economic assessment of available control measures;
4. Conduct a fresh assessment of Reasonably Available Control Technology (RACT) for VOC and NOx; and,
5. Prepare documentation and electronic control factor data files in RPO Data Exchange format.

This report describes MACTEC's efforts to identify and evaluate candidate control measures and to prepare control factor files to support future year air quality modeling.

This report is organized into this Background section and five additional sections. Section 2 describes how we identified and prioritized candidate control measures to be considered for further analysis. Section 3 discusses the development of interim White Papers that provide a more detailed evaluation of the candidate control measures selected for further analysis. Section 4 discusses our assessment of RACT for VOC source categories. Section 5 describes the preparation of control factor files. Section 6 identifies issues that LADCO may wish to address in future efforts.

The candidate control measures identified in this document represent an initial set of possible measures. The MRPO States have not yet determined which measures will be necessary to meet the requirements of the Clean Air Act. As such, the inclusion of a particular measure here should not be interpreted as a commitment or decision by any State to adopt that measure. Other measures may be examined in the near future.

SECTION 2

IDENTIFICATION AND PRIORITIZATION OF CANDIDATE CONTROL MEASURES

Introduction

Identifying candidate control measures and selecting measures for further analysis involved the following activities:

1. Obtain and summarize emission inventory data for 2002 and 2010 to identify important source categories;
2. Identify and summarize control measures that are “on-the-books” or “on-the-way” and will result in additional emission reductions after 2002;
3. Conduct a literature search to identify candidate control measures; and,
4. Develop a prioritized list of control measure for further detailed analysis.

Each of these activities is documented in the following paragraphs.

Summary of Emission Inventory

We obtained and reviewed two U.S. EPA emission inventory databases to determine the relative importance (on a mass emission basis) of the various point, area, and mobile source sectors. The first database was the Preliminary 2002 National Emission Inventory (NEI). The preliminary version of the 2002 NEI carried forward emission estimates for many source categories from the 1999 NEI, version 3 final, and but also included updated emission calculations several mobile source category. This preliminary version of the 2002 NEI did not contain the State 2002 submittals required by the Consolidated Emissions Reporting Rule. However, it was considered best data available at the time and had undergone substantial quality review by EPA.

The second database was the 2010 inventory developed by the U.S. EPA to support development of the Clean Air Interstate Rule (CAIR). This inventory started with a base year 2001 inventory. Emissions were projected to 2010 to account for growth as well as control programs that would result in additional reductions by 2010.

Figures 1a through 1d summarize the emissions from the 2002 preliminary NEI and the 2010 CAIR inventory for the five LADCO states (Illinois, Indiana, Michigan, Ohio, and Wisconsin). The first bar in each figure shows the 2002 emissions; the second bar shows the projected 2010 emissions that include growth and “on-the-books” controls that will result in additional reductions after 2002; the third bar shows the projected 2010 emissions that include growth, “on-the-books” controls, and reductions from the CAIR (as proposed in 2004). These charts illustrate the relative importance of each source category by pollutant:

- For SO₂, the electric generating unit (EGU) sector is the dominant source category, accounting for 75% of the total emissions in 2002. With the implementation of the CAIR rule, SO₂ emissions are expected to be reduced by half by 2010. In 2010, EGUs are expected to account for 64% of the total SO₂, non-EGU fuel combustion accounts for 22%, and other industrial processes (refineries, iron & steel mills, chemical manufacturing, cement manufacturing, etc.) account for 11% of the total SO₂ in the 5-state LADCO region.
- For NO_x, the EGU and highway vehicle sectors are the two largest source categories. Emissions are expected to be reduced by about 33% as the result of the NO_x SIP Call, various Federal motor vehicle and off-road equipment control programs, and CAIR.

FIGURE 1a – COMPARISON OF 2002 AND 2010 SO₂ EMISSIONS FOR 5-STATE MRPO AREA

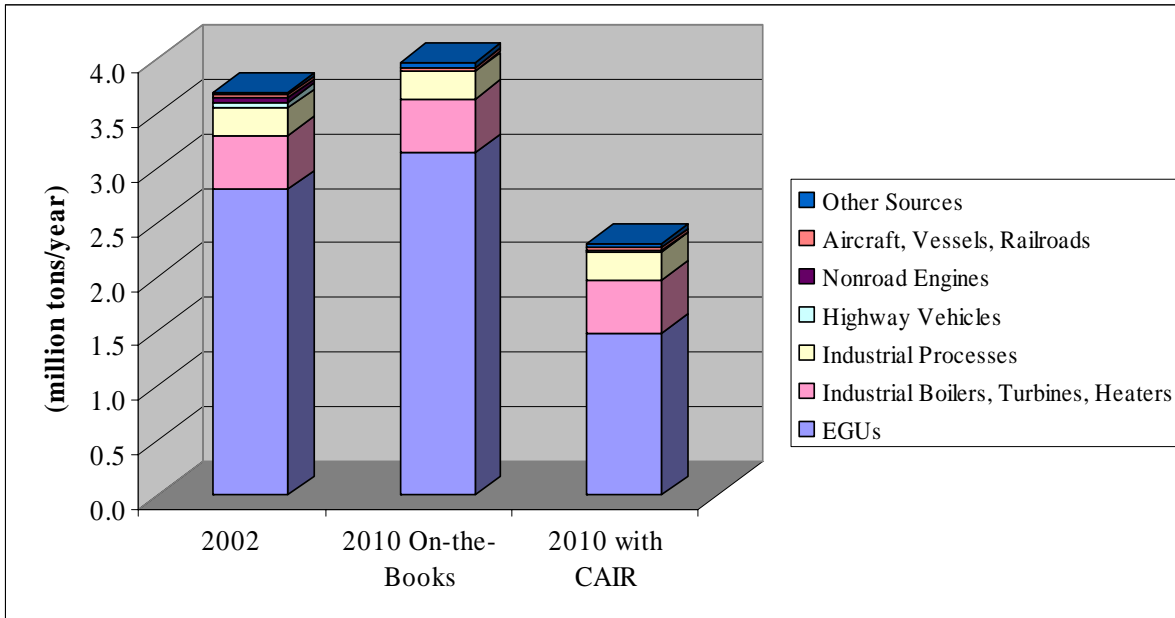
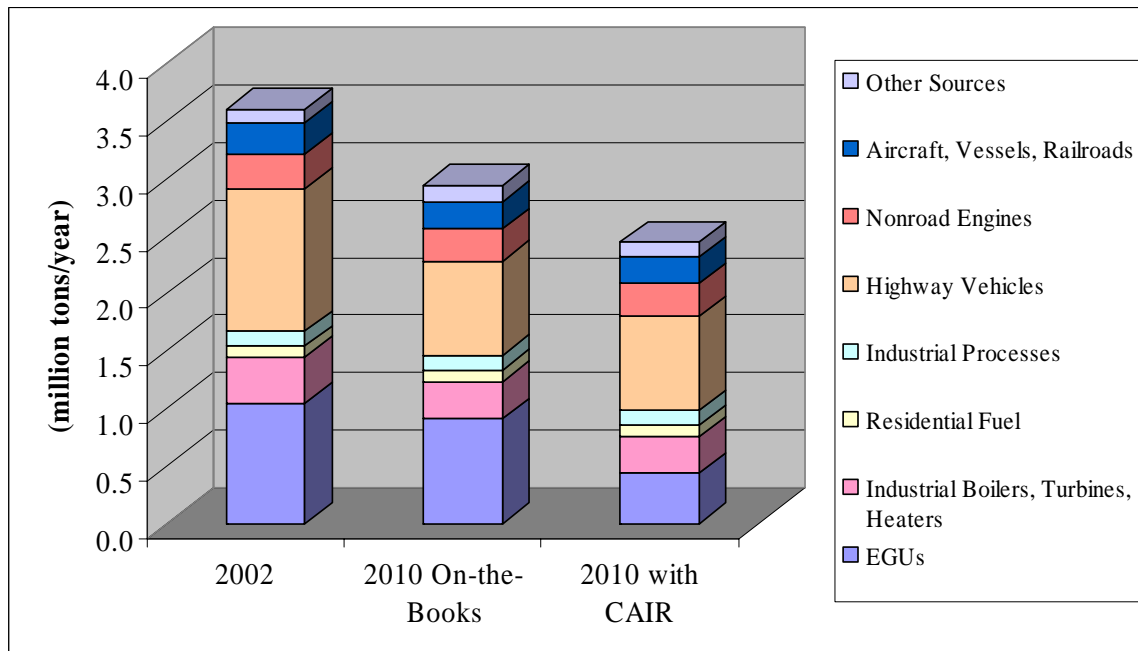


FIGURE 1b – COMPARISON OF 2002 AND 2010 NO_x EMISSIONS FOR 5-STATE MRPO AREA



The 2002 emissions presented in this figure are from EPA's Preliminary 2002 National Emission Inventory; the 2010 projections were developed by the U.S. EPA to support development of the proposed Clean Air Interstate Rule (CAIR).

FIGURE 1c – COMPARISON OF 2002 AND 2010 VOC EMISSIONS FOR 5-STATE MRPO AREA

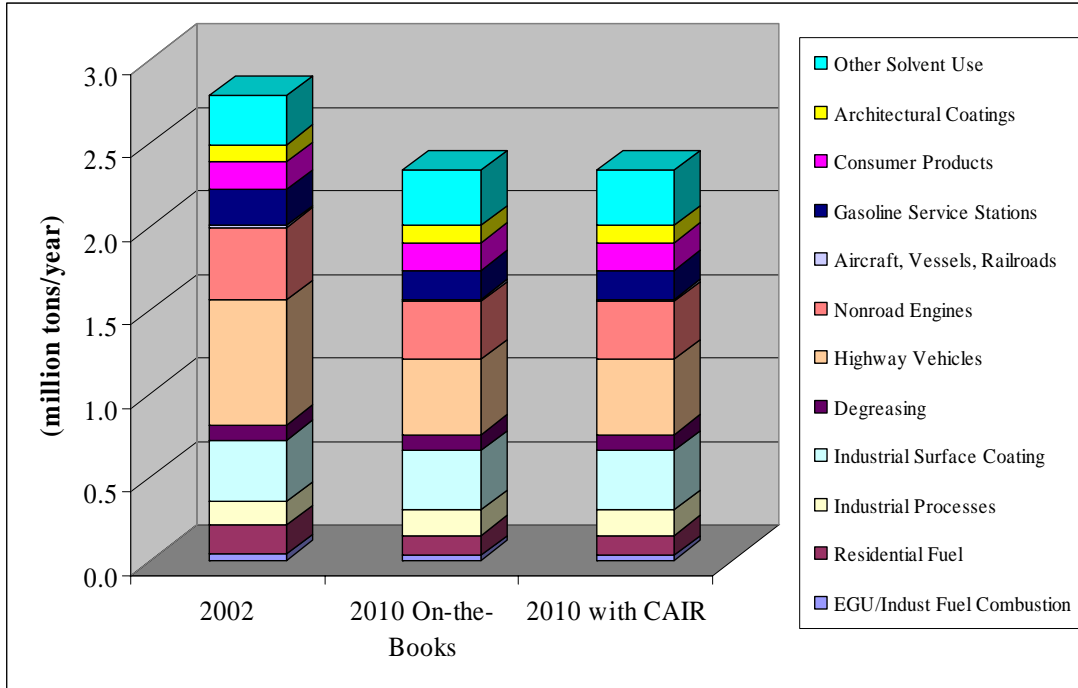
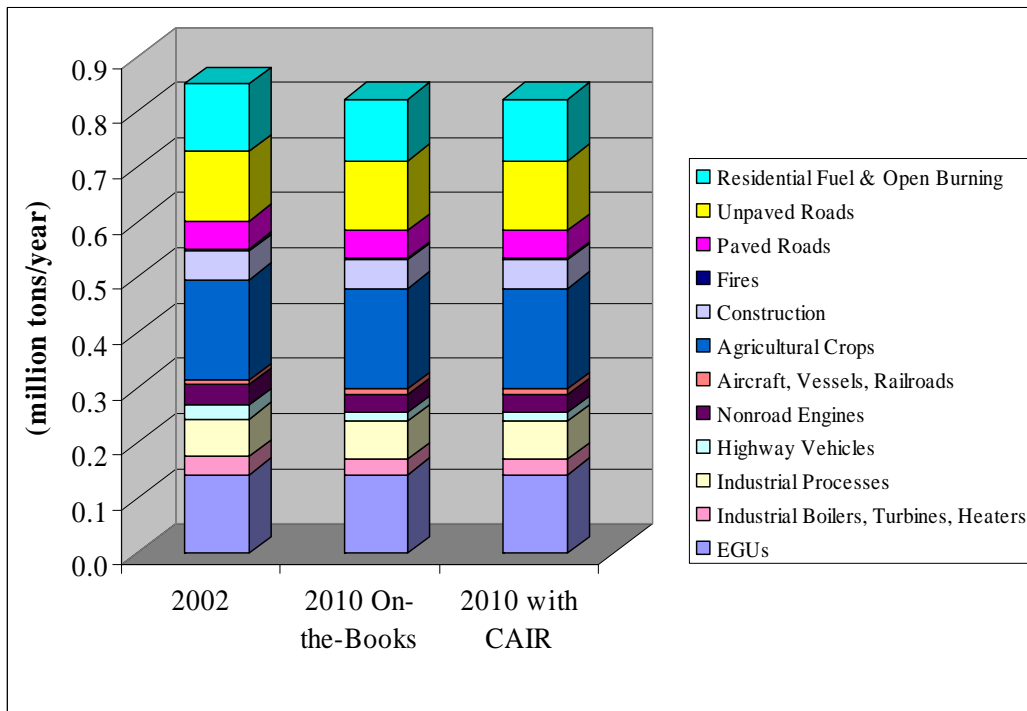


FIGURE 1d – COMPARISON OF 2002 AND 2010 PM2.5 EMISSIONS FOR 5-STATE MRPO AREA



The 2002 emissions presented in these figures are from EPA's Preliminary 2002 National Emission Inventory; the 2010 projections were developed by the U.S. EPA to support development of the proposed Clean Air Interstate Rule (CAIR).

- For VOC, there are a number a significant point, area, and mobile source categories. Emissions are projected to be reduced by about 33% as the result of Maximum Achievable Control Technology (MACT) standards for industrial surface coating operations and various Federal motor vehicle and off-road equipment control programs.
- For PM_{2.5}, fugitive dust categories (paved and unpaved roads, agricultural tilling operations, construction activities) appear to be significant, although the transportable fraction of these emissions is expected to be small. The EGU sector, industrial processes, residential wood combustion, and open burning are also significant components of the inventory. Little emission reductions are projected from 2002 to 2010.

We did not consider ammonia emissions in this study. Ammonia emissions may be considered in future studies.

Identification of Currently Mandated and Proposed Post-2002 Control Measures

As shown in the previous charts, substantial post-2002 mission reductions are projected to occur as the result of currently mandated controls (“on-the-books” controls) as well as Federal controls that have been proposed but not yet promulgated (“on-the-way” controls). E.H. Pechan and Associates, under a separate contract with LADCO, identified the following “on-the-books” controls that will result in post-2002 emission reductions:

- Current State/local regulations to meet 1-hour ozone requirements (e.g., regulations implementing Phase I/II NO_x SIP Call);
- Federal control programs incorporated into NONROAD model (e.g., Nonroad diesel rule) and the evaporative Large Spark Ignition and Recreational Vehicle standards that are not included in current model;
- Federal Railroad Locomotive standards;
- Federal Commercial Marine Vessel engine standards;
- Federal woodstove standards;
- Title IV for Phase I and II EGUs;
- Federal Consumer Products standards;
- Federal Architectural and Industrial Maintenance (AIM) Coatings standards; and
- Maximum Achievable Control Technology (MACT) standards, including several surface coating MACT standards, the Combustion Turbine MACT and the Industrial Boiler/Process Heater/reciprocating internal combustion engines (RICE) MACT.

The primary “on-the-way” control programs were the proposed CAIR (since promulgated as a final rule on March 11, 2005) and any new requirements proposed by EPA to implement the new 8-hour ozone and PM_{2.5} NAAQS.

Results of Literature Search of Candidate Control Measures

In addition to the control measures already promulgated, there are literally hundreds of additional emission reduction measures. We identified a large number of potential control measures through searches of published literature, websites and databases. We also interviewed technical experts and solicited input from State agencies. Table 1 identifies the primary resources used in identifying candidate control measures.

TABLE 1
PRIMARY REFERENCES REVIEWED TO IDENTIFY CANDIDATE CONTROL MEASURES

Organization	Reference Document
Austin Early Action Compact Task Force	Draft Clean Air Action Plant (CAAP) Recommended Emission Reduction Measures; October 2003 http://www.nustats.com/cleanair/EACTFproposedmeasures%20final.htm
Bay Area Air Quality Management District	Bay Area 2004 Ozone Strategy – Appendix C – Stationary and Mobile Source Measure Descriptions; August 2004 http://www.baaqmd.gov/pln/plans/ozone/2004OzoneStrategyDraftControlMeasures.asp
California Air Resources Board	Proposed List of Measures to Reduce Particulate Matter – PM10 and PM2.5; October 2004 http://www.arb.ca.gov/pm/pmmeasures/staff_report.pdf
California Air Resources Board	Proposed 2003 State and Federal Strategy for the California State Implementation Plan; August 2003; http://www.arb.ca.gov/planning/sip/stfed03/revsect1.pdf
Clean Air Act Advisory Committee Air Quality Management Work Group	Recommendations to the Clean Air Act Advisory Committee; Dec. 2004 http://www.epa.gov/air/caaac/pdfs/report1-17-05.pdf
E.H. Pechan	AirControlNET Version 3.2 Documentation Report; September 2003 http://www.epa.gov/ttn/ecas/AirControlNET.htm
E.H. Pechan	Control Measure Development Support Analysis of Ozone Transport Commission Model Rules; March 2001
Indiana DEM	Summary of Potential Control Measures for Central Indiana (Potential Emission Reduction Benefits and Means of Implementation) http://www.in.gov/idem/air/ciaqag/sept03/summarycontrol.html
Metropolitan Washington Council of Governments	Complete List of Control Measures Considered by MWAQC for Use in Severe Area SIP; May 2003 http://www.mwcog.org/environment/air/downloads/Control%20Measures%20-%20Complete%20List.pdf
Pennsylvania DEP	Southeast Pennsylvania Ozone Stakeholder Working Group Final Report; Jan. 1997 http://www.dep.state.pa.us/dep/deputate/airwaste/aq/plans/archive/stakeholder/se_final.pdf
Sacramento Air Quality Management District	Clean Air Plan Update – Potential Control Measure Overview http://www.airquality.org/cleanairplan/ws0306/ws0306Oview.shtml
South Coast Air Quality Management District	2003 Air Quality Management Plan; August 2003 http://www.aqmd.gov/aqmp/AQMD03AQMP.htm
STAPPA/ALAPCO	Controlling Nitrogen Oxides Under the Clean Air Act: A Menu of Options; July 1994
STAPPA/ALAPCO	Controlling Particulate Matter Under the Clean Air Act: A Menu of Options; July 1996
STAPPA/ALAPCO	Meeting the 15-Percent Rate-of-Progress Requirement Under the Clean Air Act: A Menu of Options; September 1993
STAPPA/ALAPCO	Reducing Greenhouse Gases & Air Pollution: A Menu of Harmonized Options; Oct. 1999
U.S. EPA OAQPS	Serious and Severe Ozone Nonattainment Areas: Information on Emissions, Control Measures Adopted or Planned, and Other Available Control Measures; Nov. 1999 http://www.epa.gov/ttn/naaqs/ozone/eac/measures.pdf
Wisconsin DNR	List of Potential Voluntary Measures for Cleaner Air Faster; August 2003

Selection of Measures for Detailed Analysis

Based on our review of the hundreds of potential control measures identified in the literature, we developed a preliminary list of approximately 70 candidate control measures to be considered for more detailed analysis. These measures were identified to focus on the pollutants and source categories that are thought to be the most effective in reducing air quality levels in the upper Midwest.

We asked States and LADCO to review the preliminary list of 70 candidate control measures and rank the relative importance of each based on a qualitative assessment of the following four factors:

- Analysis of relative emission contribution to total emissions in the region to focus on source categories with substantial emissions remaining in 2010;
- Analysis of previous air quality modeling and source apportionment studies to focus on pollutants and source categories that have been shown to be the most effective in reducing air quality levels in the upper Midwest;
- Assessment of timing for implementing the measures to focus on measure with the potential to actually achieve emission reductions in the near term (i.e., the 2007/2008/2009 timeframe when many of the attainment demonstrations must be made); and,
- Assessment of authority of States to implement the measure (i.e., certain vehicle and off-road equipment categories can only be regulated by the U.S. EPA and States are precluded from adopting local measures for these source categories).

In addition, States were asked to focus the ranking efforts on SO₂, NO_x, and VOC. Future candidate control measures may be identified when emissions of primary PM, elemental/organic carbon compounds, and ammonia are considered.

Based on this ranking exercise by the States and LADCO (as well as an assessment of the resources available under the MACTEC contract), the following 17 categories were selected for further control measure analysis:

1. Electric Generating Units (EGUs)
2. Industrial, Commercial, and Institutional (ICI) boilers
3. Petroleum Refineries
4. Iron and Steel Plants
5. Portland Cement Plants
6. Chemical Plants
7. Industrial Surface Coating
8. Industrial Solvent Cleaning (Degreasing)
9. Architectural and Industrial Maintenance (AIM) Coatings
10. Portable Fuel Containers
11. Auto Refinishing
12. Consumer Solvents
13. Gasoline Dispensing Facilities (Stage I, Stage II, and Underground Storage Tanks)
14. Asphalt Paving Applications
15. Gasoline Highway Vehicles
16. Diesel Trucks
17. Non-Road Engines

A full discussion of these categories and candidate control measures is presented in the next section.

SECTION 3

EVALUATION OF CANDIDATE CONTROL MEASURES

Development of White Papers

The evaluation of candidate control measures was presented in a series of “Interim White Papers.” Each paper includes summary table, description of the source category, brief regulatory history, discussion of candidate control measures, expected emission reductions, cost effectiveness and basis, timing for implementation, rule development issues, other issues, and a list of supporting references. The type of information in each of these subsections is described below:

- **Summary Table** – Identifies the source category, control measures already accounted for in the 2002 inventory, 2002 base year emissions, control measures “on-the-books” or “on-the-way” that will result in post-2002 emission reductions, 2009 projected emissions after implementation of “on-the-books” or “on-the-way” controls, candidate control methods used to achieve additional emission reductions, estimate of the region-wide emission reductions from the candidate control measure, estimate of emission reduction cost, timing for achieving emission reductions, and geographic area affected by the control measure.
- **Source Category Description** – Briefly describes the emission generating processes, factors such as fuel type or process design that affect the type and quantity of emissions generated, and relative importance of emissions from the category as compared to regional totals.
- **Regulatory History** – Discusses relevant federal and LADCO state emission control regulations already implemented, newly mandated or proposed federal or LADCO state regulations that will result in additional post-2002 emission reductions, and existing or proposed regulations in other states that are more stringent than federal or LADCO state requirements.
- **Candidate Control Measures** – Discusses possible alternatives for further emission reductions and expected performance, and recommends specific measures for consideration.
- **Emission Reductions** – Describes 2002 base year emissions for the category, emission reductions expected from post-2002 on-the-books and on-the-way control measures, and emission reductions expected from the candidate control measure. The emission reductions are presented for each LADCO state, as well as the regional total reductions. The emission values for 2002 are based on State CERR data and the 2009 values on based on LADCO’s future year emission estimates (2009 emissions account for reductions from candidate control measures as well as future “on-the-books” or “on-the-way” reductions, but do not account for economic growth).
- **Cost Effectiveness and Basis** – Documents the findings in supporting documentation and other sources to provide preliminary ranges or estimates of the costs associated with implementing the control measure. This section is not intended to provide definitive control costs, which will need to be analyzed in more detail as specific regulations are developed.
- **Timing of Implementation** – Discusses the timeframe for when emission reductions can be achieved and any phase-in issues that will result in the variable emission reductions over time.
- **Rule Development Issues** – Discusses implementation issues such as authority of state agency to implement the regulation and whether regional/national collaboration is needed.
- **Geographic Applicability** – Discusses whether the control measure will be applied on a regional, state, or nonattainment area basis.
- **Affected SCCs** – Identifies Source Classification Codes affected by the regulation.
- **Other Impacts** – Identifies any adverse economic, energy, or social impacts associated with the control measure.

Each Interim White Paper also includes a list of references referred to or used in preparing the evaluation. The Interim White Papers are posted on the LADCO Regional Air Quality Planning web site (see: [http://www.ladco.org/Regional Air Quality.html](http://www.ladco.org/Regional_Air_Quality.html)).

Emission Reductions from Candidate Control Measures

Table 2 identifies the Interim White Papers that were developed and summarizes information about the candidate control measures that were evaluated. Table 2 shows the source category, an identification code for each candidate control measure, a description of the control measure, the percent reduction from 2002 emissions for the entire source category, and a preliminary cost effectiveness estimate in units of dollars per ton of pollutant removed. More detailed summaries of each of the candidate control measures are presented in Tables A.1 through A.21 in Appendix A.

Figures 2a through 2c and Table 3 summarize the emissions from the 2002 LADCO inventory and various control scenarios in 2009 for the five LADCO states (Illinois, Indiana, Michigan, Ohio, and Wisconsin). Table 3 shows the actual emissions in 2002, the emissions expected in 2009 after implementation of “on-the-books” control measures (include the Clean Air Interstate Rule *as proposed* in 2004), the emissions expected in 2009 after implementation of the candidate control measures identified in Table 2, and the incremental reduction in 2009 from the White Paper candidate control measures as compared to the 2009 “on-the-books” scenarios.

Figures 2a through 2c summarize the emissions from the 2002 LADCO inventory and various control scenarios in 2009 for the five LADCO states (Illinois, Indiana, Michigan, Ohio, and Wisconsin). The first bar in each figure shows the 2002 emissions. The second bar shows the projected 2009 emissions that include “on-the-books” controls that will result in additional reductions after 2002. The third bar shows the projected 2009 emissions that include “on-the-books” controls and reductions from the CAIR (*as proposed* in 2004). The fourth bar shows the projected 2009 emissions with the application of the less stringent measures identified in the White Papers. The fifth bar shows the projected 2009 emissions with the application of the more stringent measures identified in the White Papers. The percentage emission reductions for SO₂, NO_x, and VOC are as follows:

- With the implementation of the proposed CAIR rule, SO₂ emissions are expected to be reduced by half between 2002 and 2009. Implementing the least stringent of the candidate control measures (EGU1 for EGUs and ICI1 for industrial boilers) will reduce SO₂ emissions by 58 percent compared to 2002 levels. Implementing the most stringent of the candidate control measures (EGU2 for EGUs and ICI3 for industrial boilers) will reduce SO₂ emissions by 71 percent compared to 2002 levels.
- For NO_x, emissions are expected to be reduced by 21 percent by 2009 as a result of the NO_x SIP call and Federal onroad/offroad control programs. Implementing the least stringent of the candidate control measures will reduce NO_x emissions by 38 percent compared to 2002 levels. Implementing the most stringent of the candidate control measures will reduce NO_x emissions by 41 percent compared to 2002 levels.
- For VOC, emissions are expected to be reduced by 20 percent by 2009 as a result of the MACT standards, vehicle on-board vapor recovery, and Federal onroad/offroad control programs. Implementing the least stringent of the candidate control measures will reduce VOC emissions by 33 percent compared to 2002 levels. Implementing the most stringent of the candidate control measures will reduce NO_x emissions by 34 percent compared to 2002 levels.

TABLE 2 – SUMMARY OF CANDIDATE CONTROL MEASURES

Source Category	ID	Description	Percent Reduction from 2002 Emissions for Entire Category			Preliminary Cost Per Ton (\$/ton)		
			NOx	VOC	SO2	NOx	VOC	SO2
Electric Generating Units	EGU1	Adopt emission caps based on “Retrofit BACT Level” of 0.15 lbs/mmBtu for SO2 and 0.10 lbs/mmBtu for NOx	62		66	700 - 1,600		800 - 1,500
	EGU2	Adopt emission caps based on “BACT Level for New Plants” of 0.10 lbs/mmBtu for SO2 and 0.07 lbs/mmBtu for NOx	69		77	700 - 2,100		800 - 3,000
ICI Boilers	ICI1	Apply 40% SO2 and 60% NOx reduction to all medium and large ICI boilers	24		33	280 – 1,399		633 - 1,075
	ICI2	Apply Likely Controls (90% SO2 and 80% NOx Reduction) to ICI Boilers subject to the proposed BART requirements	6		20	536 – 4,493		1,622 - 5,219
	ICI3	Apply 90% SO2 and 80% NOx reduction (similar to BART) to all medium and large ICI boilers	37		74	536 – 4,493		1,622 - 5,219
Petroleum Refineries*	REF1	Apply likely controls (90% SO2 and 80% NOx Reduction) to sources subject to the proposed BART requirements						
Iron and Steel Plants*	I&S1	Apply likely controls (90% SO2 and 80% NOx Reduction) to sources subject to the proposed BART requirements						
Portland Cement Plants	KILN1	Apply reasonably available controls (90% SO2 and 50% NOx reduction) to all cement kilns in the region	50		90	-310 - 2,500		2,211 - 6,917
	KILN2	Apply likely controls (95% SO2 and 80% NOx reduction) to kilns subject to the proposed BART requirements	23		46	1,500 - 2,000		2,211 - 6,917
Chemical Plants*	CHEM1	Apply likely controls (90% SO2 and 80% NOx Reduction) to chemical plant boilers subject to the proposed BART requirements						1,622 - 5,219

Source Category	ID	Description	Percent Reduction from 2002 Emissions for Entire Category			Preliminary Cost Per Ton (\$/ton)		
			NOx	VOC	SO2	NOx	VOC	SO2
Industrial Surface Coating	SOLV5A	Point sources - adopt more stringent RACT regulations (90% from uncontrolled), lower applicability thresholds, and extend geographic coverage to all counties		83			100 - 5,000	
	SOLV5B	Area sources - adopt RACT regulations (90% from uncontrolled), lower applicability thresholds, and extend geographic coverage to all counties		72			100 - 5,000	
Industrial Solvent Cleaning	SOLV6A	Adopt Chicago/Metro East cold cleaning regulations (66% reduction from uncontrolled) in all counties		65			1,400	
AIM Coatings	SOLV1A	Adopt more stringent VOC limits (21% reduction beyond Federal Part 59 limits) for AIM coatings based on OTC Model Rule and Wisconsin NR433.17		37			6,400	
	SOLV1B	Adopt SCAQMD Phase III VOC limits in addition to OTC Model Rule		45			20,000	
Portable Fuel Containers	SOLV3A	Adopt OTC Model Rule for portable fuel containers (18% reduction by 2009, 54% reduction at full implementation in 2015)		18			250 - 480	
	SOLV3B	Adopt incentive programs in nonattainment areas to accelerate phase-in of compliant PFCs (27% reduction in 2009, 54% at full implementation in 2012)		27			4,600	
Auto Refinishing	SOLV4A	Extend the existing IL/IN/WI RACT regulations (55% reduction from uncontrolled, 24% reduction beyond Part 59 limits) to all counties		24			1,354	
	SOLV4B	Adopt more stringent RACT regulations (89% reduction from uncontrolled) based on SCAQMD 1145		82			7,200	

Source Category	ID	Description	Percent Reduction from 2002 Emissions for Entire Category			Preliminary Cost Per Ton (\$/ton)		
			NOx	VOC	SO2	NOx	VOC	SO2
Consumer and Commercial Solvents	SOLV2A	Adopt OTC Model Rule with additional product coverage and more stringent VOC limits(14.2% reduction beyond Federal Part 59 rule, for a total reduction of 21.0% from uncontrolled emissions)		14			800	
	SOLV2B	Adopt CARB 2003 SIP requirements with additional products and more stringent VOC limits in addition to OTC Model Rule (25% reduction beyond Federal Part 59 rule)					4,800	
Gasoline Dispensing Facilities	SOLV7A	Adopt CARB EVR Stage I requirements (98% control) in 8-hour nonattainment areas and adjacent counties		66				
	SOLV7B	Adopt CARB EVR Stage II requirements (95% control) in 8-hour nonattainment areas and adjacent counties in addition to on-board vapor recovery						
	SOLV7C	Require air pollution control device (90% control) for UST vent		90			Near 0	
Asphalt Paving	SOLV8A	Adopt SCAQMD 1108.1 VOC content limit (50% reduction) for emulsified asphalt		40			?	
Gasoline Highway Vehicles**								
Diesel Trucks**								
Non-Road Engines**								

* White Papers for Petroleum Refineries, Iron & Steel Plants, and Chemical Plants were not completed; however emission controls for these sources are discussed in the *MRPO Best Available Retrofit Engineering Analysis* reports for these categories prepared by MACTEC.

** Because of resource and time constraints, White Papers for these on-road and off-road categories could not be completed.

FIGURE 2a – COMPARISON OF 2002 AND 2009 SO₂ EMISSIONS FOR 5-STATE MRPO AREA

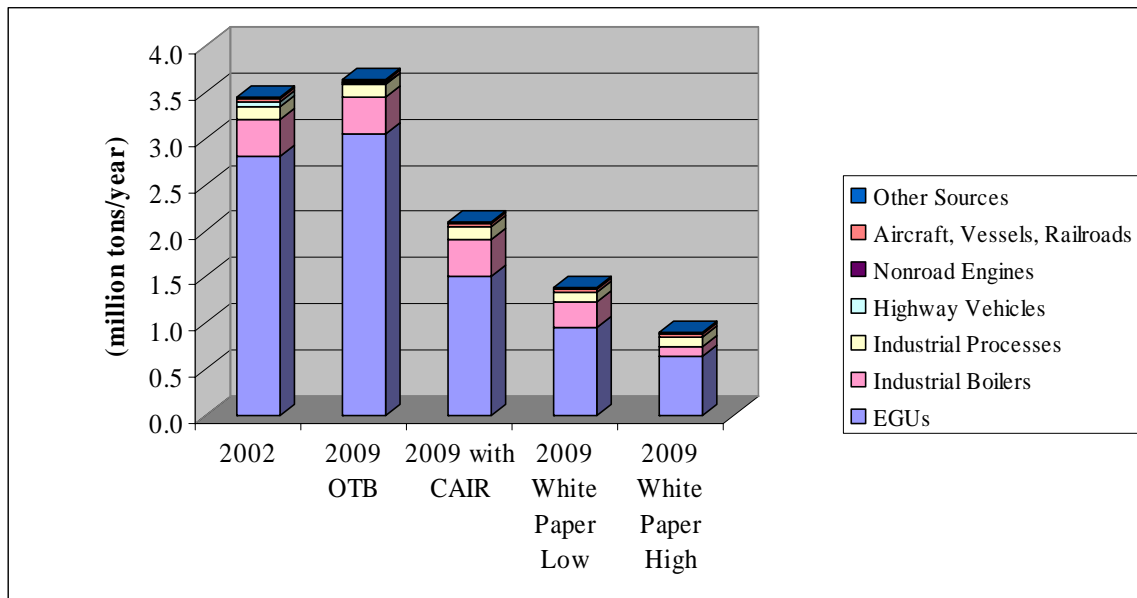
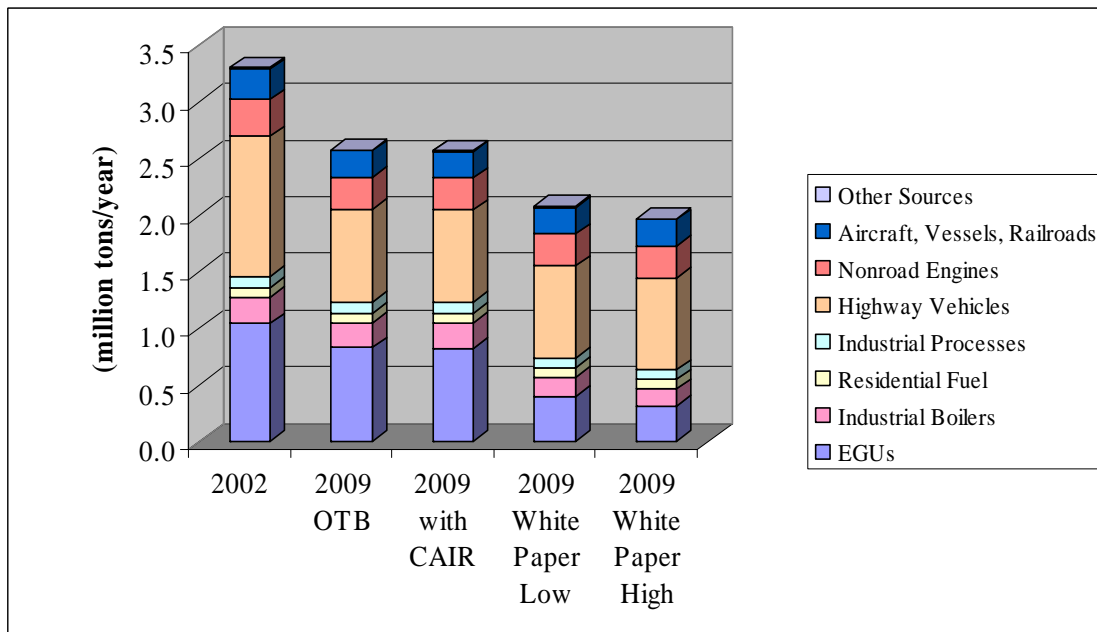
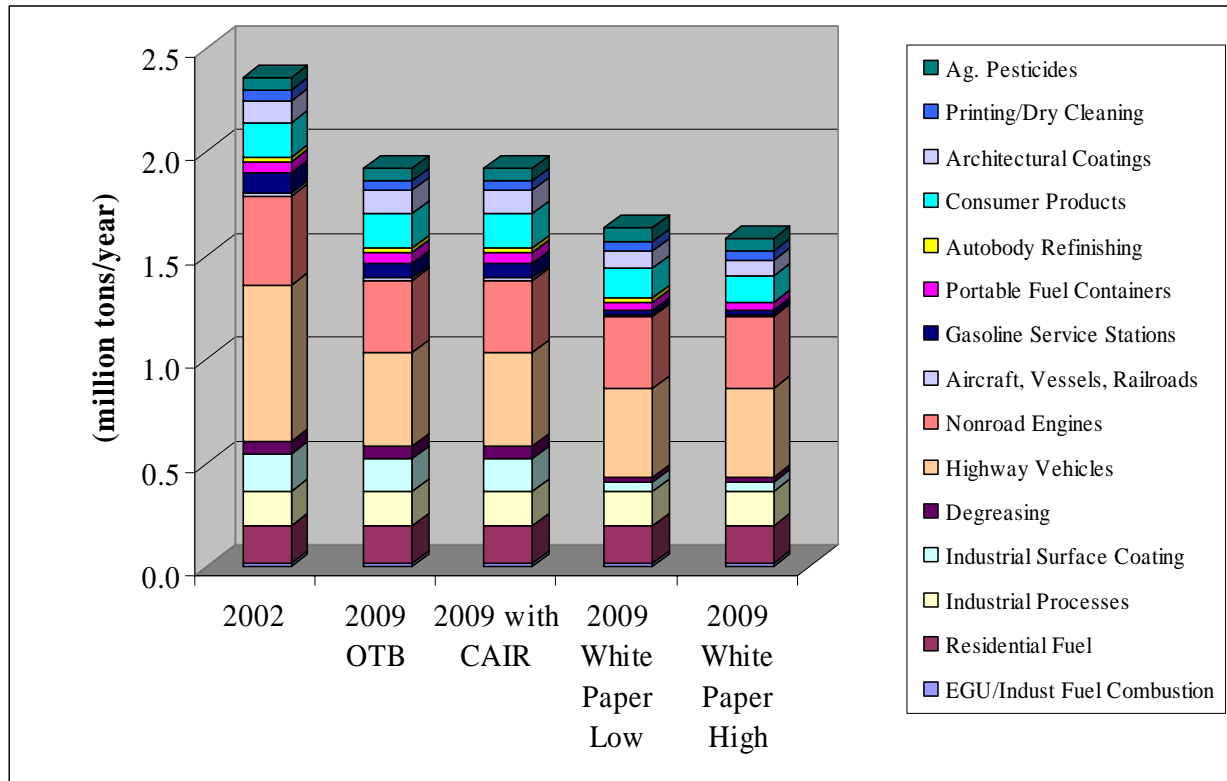


FIGURE 2b – COMPARISON OF 2002 AND 2009 NO_x EMISSIONS FOR 5-STATE MRPO AREA



The 2002 emissions presented in these figures are from the LADCO States' 2002 CERR data; the 2009 values are based on LADCO's future year emission estimates (2009 emissions account for reductions from candidate control measures as well as future "on-the-books" or "on-the-way" reductions, but do not account for economic growth). "White Paper Low" uses the least stringent of the control measures identified in the White Papers; "White Paper High" uses the most stringent control measures.

FIGURE 2c – COMPARISON OF 2002 AND 2009 VOC EMISSIONS FOR 5-STATE MRPO AREA



The 2002 emissions presented in these figures are from the LADCO States' 2002 CERR data; the 2009 values are based on LADCO's future year emission estimates (2009 emissions account for reductions from candidate control measures as well as future "on-the-books" or "on-the-way" reductions, but do not account for economic growth). "White Paper Low" uses the least stringent of the control measures identified in the White Papers; "White Paper High" uses the most stringent control measures.

CONTROLS INCLUDED IN 2002 INVENTORY	OTB (ON-THE-BOOKS) REDUCTIONS OCCUR AFTER 2002	OTW (ON-THE-WAY, i.e. CAIR) AND CANDIDATE CONTROL MEASURES	5-State VOC (tpy)				5-State NOx (tpy)				5-State SO2 (tpy)			
			Actual 2002	OTB 2009	Candidate Controls 2009	Reduction from 2009 OTB	Actual 2002	OTB 2009	Candidate Controls 2009	Reduction from 2009 OTB	Actual 2002	OTB 2009	Candidate Controls 2009	Reduction from 2009 OTB
SOURCE CATEGORY: SOLVENTS - INDUSTRIAL SURFACE COATING POINT SOURCES														
PSD/NSR; RACT in NAA; 2-, 4-, 7-year MACT	10-yr_MACT	WP SOLV5A - More Stringent RACT, lower applicability threshold, statewide coverage	70,380	49,012	12,164	36,848								
SOURCE CATEGORY: SOLVENTS - INDUSTRIAL SURFACE COATING AREA SOURCES														
None	None	WP SOLV5B - More Stringent RACT, lower applicability threshold, statewide coverage	108,101	108,101	30,268	77,833								
SOURCE CATEGORY: SOLVENTS - ASPHALT APPLICATIONS														
Prohibition on cutback asphalt usage during ozone season		WP SOLV8A Adopt SCAQMD 1108.1 VOC content limit for emulsified asphalt	48,348	48,348	33,245	15,103								
SOURCE CATEGORY: SOLVENTS - DEGREASING														
State Rules; MACT Standard		SOLV6A Adopt Chicago/Metro East rule for cold cleaning (66% control)	61,226	56,295	21,323	34,972								
SOURCE CATEGORY: SOLVENTS - AUTO REFINISHING														
Part 59 Rules; State Rules		WP SOLV4B - Adopt More Stringent RACT regulations based on SCAQMD 1145 statewide	25,319	25,319	4,676	20,643								
SOURCE CATEGORY: SOLVENTS - ARCHITECTURAL, TRAFFIC MARKINGS, INDUSTRIAL MAINTENANCE COATINGS														
Part 59 AIM Federal Rule	Part 59 AIM Federal Rule	WP SOLV1A - OTC Model Rule/NR433.17	109,051	109,051	86,160	22,891	0	0	0	0	0	0	0	0
		WP SOLV1B - OTC Model Rule/NR433.17 + SCAQMD Phase III			74,575	34,476								
SOURCE CATEGORY: SOLVENTS - CONSUMER PRODUCTS														
Part 59 Consumer Products Federal Rule	Part 59 Consumer Products Federal Rule	WP SOLV2A - OTC Model Rule	165,829	165,829	142,281	23,548	0	0	0	0	0	0	0	0
		WP SOLV2B - OTC Model Rule + CARB SIP			124,496	41,333								
	<i>Reductions from White Paper Control Measures (reductions shown for 2009 are from the 2009 OTB levels)</i>	Lower End of Reductions - All Categories Above	803,878	754,462	455,682	298,780	1,347,158	1,113,312	1,044,060	69,252	3,317,955	3,563,234	1,861,270	1,701,964
		Upper End of Reductions - All Categories Above			423,207	331,255			506,312	607,000			813,531	2,749,703
	<i>Categories for which White Papers Have not yet been developed</i>	Residential Fuel Combustion	185,441	185,441	185,441	0	84,565	84,656	84,656	0	6,450	6,450	6,450	0
		Pulp and Paper Industry	7,777	7,777	7,777	0	3,884	3,884	3,884	0	1,963	1,963	1,963	0
		Other Industrial Processes	37,852	37,852	37,852	0	23,133	23,133	23,133	0	16,815	16,815	16,815	0
		Gasoline Highway Vehicles	502,570	394,821	394,821	0	603,896	429,132	429,132	0	35,206	4,404	4,404	0
		Heavy Duty Highway Diesel Vehicles	33,534	23,819	23,819	0	568,945	318,215	318,215	0	17,508	479	479	0
		Highway - Heavy Duty Gas	33,381	33,381	33,381	0	68,558	68,558	68,558	0	2,628	2,628	2,628	0
		Nonroad Gasoline	344,195	325,446	325,446	0	45,297	57,399	57,399	0	255	267	267	0
		Nonroad Diesel	25,550	22,143	22,143	0	274,115	224,959	224,959	0	6,716	2,630	2,630	0
		Industrial Petroleum Storage/Transport	64,687	27,345	27,345	0			0	0			0	0
		Graphic Arts/Dry Cleaning	46,861	46,861	46,861	0			0	0			0	0
		Non-consumer Pesticide Application	62,702	62,702	62,702	0			0	0			0	0
		Waste Disposal & Open Burning	20,706	20,706	20,706	0	9,544	9,544	9,544	0	4,124	4,124	4,124	0
		Nonroad - Aircraft	2,508	2,853	2,853	0	9,353	7,991	7,991	0	874	880	880	0
		Nonroad - Marine Vessels	4,319	4,912	4,912	0	140,921	120,395	120,395	0	23,953	24,105	24,105	0
		Nonroad - Railroads	4,805	5,465	5,465	0	123,351	105,384	105,384	0	6,740	6,783	6,783	0
		Low-Priority Categories	1,556,708	1,201,524	1,201,524	0	1,955,562	1,453,250	1,453,250	0	123,232	71,528	71,528	0
		Total Emissions	2,360,586	1,955,986	1,624,731	331,255	3,302,720	2,566,562	1,959,562	607,000	3,441,187	3,634,762	885,059	2,749,703

SECTION 4

ANALYSIS OF REASONABLY AVAILABLE CONTROL TECHNOLOGY

Reasonably Available Control Technology (RACT) is defined as the lowest emission limit that a particular source is capable of meeting through the application of control technology that is reasonably available considering technological and economic feasibility. In general, State VOC and NO_x regulations have to meet a level of stringency equivalent to or better than RACT. The U.S. EPA provides guidance on RACT in documents called Control Technique Guidelines (CTGs) and Alternative Control Technologies (ACT) documents. For sources not covered by a CTG or ACT document, state regulations require that case-specific RACT determinations be made. Most of the CTGs and ACT documents for VOC were developed prior to 1990. NO_x RACT guidance was generally developed in the mid-1990s.

An assessment of NO_x RACT is not included here; rather, analyses of NO_x control technology for important source categories is included in the MACTEC White Papers for electric generating units, industrial/commercial/institutional boilers, and cement kilns. Further discussion of NO_x control technology is included in the MACTEC BART Engineering Analyses for industrial boilers, cement plants, iron and steel mills, and petroleum refineries.

Our general approach for assessing the potential for tightening VOC RACT requirements is similar to what we used in preparing the *Beyond VOC RACT CTG Requirements* document that we prepared in 1995 for EPA's Control Technology Center. Our approach is to identify and compare examples of State and local agency rules that exceed or may exceed the RACT requirements that are specified in the Federal CTGs or ACT documents or existing LADCO state regulations.

We obtained, reviewed, and evaluated existing Federal CTGs or ACT documents for each source category that define RACT were thoroughly reviewed and evaluated. Also, we referred to EPA's "Blue Book" ("Issues Relating to VOC Regulation Cutpoints, Deficiencies, and Deviations - Clarification to Appendix D of November 24, 1987 1-2 Federal Register," May 25, 1988, revised 1/11/90) to clarify CTG related issues. We also obtained and reviewed, where applicable, any Maximum Achievable Control Technology (MACT) standard that might identify more stringent requirements for VOC control.

We obtained, examined, and summarized regulations from the five LADCO states (Illinois, Indiana, Michigan, Ohio, and Wisconsin), three northeastern states (Maryland, Massachusetts, and New Jersey), and two California control districts (the Bay Area Air Quality Management District (AQMD) and the South Coast AQMD).

We reviewed the State regulations for each source category and compared for stringency with the guidelines in the applicable Federal CTG. We evaluated the stringency of the rules based on, but not limited to, VOC content limits of coatings, emission limitations, percent emission reduction (capture and control), and transfer efficiency requirements. We categorized other differences between the regulations and the Federal CTGs (such as equipment specifications, recordkeeping, and work practice requirements) which have the potential to "enhance" the pollution prevention aspects of a rule, but not necessarily as being more stringent.

Table 4 summarizes the State existing requirements and provides suggestions for tightening RACT requirements by improving the performance of emission control devices, upgrading to a more effective control device, or reducing the VOC content of coatings/inks/solvents. In general, the Bay Area and South Coast regulations are generally more stringent than Federal RACT and the State regulations. The MACT requirements are also generally more stringent than Federal RACT and the State regulations.

TABLE 4 – RECOMMENDATIONS FOR TIGHTENING RACT

Source Category	Recommendation for Tightening RACT
Degreasing – Cold Cleaning	<p>Summary: The CTG for solvent metal cleaning, including cold cleaning, was published in November 1977. The 5 LADCO states have adopted requirements based on the CTG recommendations but with varying geographic and size applicability criteria. Illinois and Indiana include an additional restriction on solvent volatility that applies in identified 1-hour ozone nonattainment areas.</p> <p>Recommendation: A candidate for strengthening RACT cold cleaning requirements is the inclusion of limits on the volatility of cleaning solvents. Two options are currently in use: (1) vapor pressure maximum of 1 mm Hg at 68°F (current requirement in Chicago, Metro East, selected Indiana counties, Maryland, New Jersey) or (2) VOC content limit of 25 gm/liter (0.21 lbs/gal) (SCAQMD).</p>
Degreasing – Open Top Vapor	<p>Summary: The CTG for solvent metal cleaning, including open top vapor cleaning, was published in November 1977. The LADCO states have adopted equipment and operating requirements that are similar to the CTG recommendations. Each has a different applicability criteria based on one or more factors including the unit's open area, new or existing status at regulatory date, and unit location in a non-attainment area. Wisconsin has incorporated into their requirements more specific criteria for defining an acceptable cover for a vapor degreaser. Indiana, Michigan, and Wisconsin have exempted freeboard and control system CTG requirements for either smaller units or units located outside the listed nonattainment counties. A MACT standard for Halogenated Solvent Cleaners was promulgated in December 1994. Both the South Coast and New Jersey vapor degreaser requirements are more prescriptive than the CTG recommendations.</p> <p>Recommendation: The New Jersey requirements parallel the MACT standard, including the multiple compliance options. Facilities operating vapor degreasers using one of the six listed HAPs are currently subject to the MACT compliance requirements. A candidate for strengthening RACT is to expand the applicability of the control requirements in the MACT from the six listed HAPs to all VOCs, thus adding vapor degreasers that are using VOC solvents other than the listed HAPs.</p>
Graphic Arts – Offset Lithography Printing	<p>Summary: An alternative control technique (ACT) guideline for lithography was published in June 1994 based on a September 1993 draft CTG. Illinois and Wisconsin have adopted limits based on the ACT with applicability limited to the 1-hour ozone non-attainment counties. In Indiana, Michigan, and Ohio any lithographic facilities that qualify as a major source in a nonattainment area would be subject to control under case-by-case RACT requirements. No MACT standard is planned to cover HAP emissions from lithography.</p> <p>Recommendation: Options for strengthening RACT include: (1) adopting the 90% control efficiency requirement for heatset offset presses in the ACT in all 8-hour ozone nonattainment areas; (2) adopting more stringent VOC limits for cleaning agents than the ACT recommendations, such as those in the SCAQMD which limit the VOC content at less than half of the ACT recommendation; and, (3) adopting BAAQMD or SCAQMD limits on the VOC content in inks and coatings which are not addressed by the ACT recommendations.</p>

Source Category	Recommendation for Tightening RACT
Graphic Arts – Rotogravure and Flexography Printing	<p>Summary: The CTG covering rotogravure and flexography printing was published in December 1978. Illinois, Indiana, Michigan, Ohio, and Wisconsin have adopted requirements that are based on the CTG recommendations. Each has added requirements for control system effectiveness (typically 90%). The MACT standard was published in May 1996, with compliance required by May 1999. To meet higher overall control efficiency requirements of the MACT standards (92% publication, 95% flexo and other gravure), many facilities have successfully installed permanent total enclosures (PTEs) to provide for 100% capture.</p> <p>Recommendation: One option for increasing RACT stringency should include requiring 100% capture and 90% control for adsorption or 95% control for oxidation with an opt-out provision based on technical infeasibility for facilities unable to meet capture requirements.</p>
Petroleum Liquids in External Floating Roof Tanks	<p>Summary: The CTG was published in December 1977 and covers the storage of petroleum liquids in floating roof tanks with a 40,000 gallon and greater storage capacity storing volatile petroleum liquids with greater than 1.5 psia true vapor pressure. Petroleum storage tanks are subject to three separate new source performance standards, the most recent covers new floating roof or fixed roof tanks of 10,000 gallons or greater constructed after July 1984. No MACT standard is planned for this source category. The LADCO states have adopted requirements essentially the same as the CTG recommendations. The applicability of the Illinois requirements in the Chicago and Metro East areas is based on the 1.5 psia true vapor pressure cutoff as recommended in the CTG, and 2.5 psia statewide. Indiana and Ohio's requirements apply only in identified nonattainment counties. Michigan's requirements apply statewide, but with a 1.0 psia (rather than the CTG 1.5 psia) true vapor pressure applicability criterion. Wisconsin's requirements apply statewide.</p> <p>Recommendation: A candidate for strengthening RACT requirements is lowering the tank size applicability threshold, for example to a 10,000 gallon tank capacity cutoff, and expanding the geographic coverage. Lowering the vapor pressure threshold will not add coverage of any appreciable quantity of petroleum products. Gasoline, crude oil, and JP-4 are above 1.5 psia, and kerosene, No.2, and residual oil are well below 0.5 psia.</p>
Petroleum Liquids in Fixed Roof Tanks	<p>Summary: The CTG was published in December 1977 and covers the storage of petroleum liquids in fixed roof tanks with a 40,000 gallon and greater storage capacity storing volatile petroleum liquids with greater than 1.52 psia true vapor pressure. Petroleum storage tanks are subject to three separate new source performance standards, the most recent covers new floating roof or fixed roof tanks of 10,000 gallons or greater constructed after July 1984. No MACT standard is planned for this source category. Michigan, Ohio, and Wisconsin have adopted the CTG recommendations statewide. Illinois has adopted the CTG requirements in the Chicago and Metro east areas, and state wide with a 2.5 psia (rather than the CTG 1.5 psia) applicability criterion. Indiana adopted the CTG requirements in 8 nonattainment counties.</p> <p>Recommendation: A candidate for strengthening RACT requirements is lowering the tank size applicability threshold, for example to a 10,000 gallon tank capacity cutoff, and expanding the geographic coverage.</p>

Source Category	Recommendation for Tightening RACT
Surface Coating – Auto Refinishing	<p>Summary: An Alternative Control Technique (ACT) Document for automobile refinishing was published in September 1988 with recommended VOC content limits for State consideration. In September 1998, under Section 183 of the 1990 Clean Air Act Amendments, EPA published standards limiting the VOC content in coatings sold for automobile refinishing (40 CFR Part 59, Subpart B). Manufacturers are prohibited from selling coatings after January 1999 that do not comply with the Subpart B limits. Illinois, Indiana, and Wisconsin have adopted rules for limiting emissions from the automobile finishing facilities with geographic applicability limited to the 1-hour ozone nonattainment counties. The requirements include VOC content limits that mirror the Subpart B requirements. In addition, the rules include requirements for use of high transfer-efficiency painting methods and controls on emissions from equipment cleaning, housekeeping activities, and operator training. No requirements for refinishing were identified for Michigan and Ohio. SCAQMD Rule 1145 contains VOC content limits more stringent than the federal rule</p> <p>Recommendation: Candidates for strengthening RACT include (1) extending the existing IL/IN/WI RACT regulations from the 1-hr nonattainment counties to the 8-hr nonattainment counties. The second candidate control measure adopts more stringent requirements similar to those in SCAQMD Rule 1151.</p>
Surface Coating – Original Equipment Automobiles and Light Duty Trucks	<p>Summary: The CTG for surface coating of automobiles and light-duty trucks was published in May of 1977. The CTG is based on lbs of VOC per gallon of coating minus water, but allows the alternative use of add-on control devices with 90% control efficiency via incineration and 85% control efficiency by carbon adsorption. Wisconsin has adopted requirements that are based on the CTG recommendations. In Illinois, Michigan, and Ohio, some limits are based on lbs/gallon of solids rather than the CTG format of lbs/gallon (minus water), but provide a similar degree of control. With the exception of Indiana, each State has added a more stringent limit for prime coatings applied via electrodeposition. The MACT standard was published in April 2004 with compliance required by April of 2007. The majority of the automobile and light duty truck manufacturing facilities that are subject to VOC control requirements are also expected to be subject to MACT requirements to control HAPs. The MACT standard is expected to control HAP emissions by 60% or more, with an April 2007 compliance date. Additional control of VOC emissions will result from MACT compliance. The extent VOCs are further reduced will depend on whether MACT compliance strategies are based on reduced solvent usage and/or the addition of control systems rather than substitution of the use of HAPs with other non-HAP VOCs. To meet higher overall control efficiency requirements of the MACT standards, many facilities have successfully installed permanent total enclosures (PTEs) to provide for 100% capture.</p> <p>Recommendation: One option for increasing RACT stringency should include requiring 100% capture and 95% control for oxidation with an opt-out provision based on technical infeasibility for facilities unable to meet capture requirements.</p>
Surface Coating – Metal Cans	<p>Summary: The CTG for can coating operations was published in May 1977. The CTG recommendations were based lbs VOC/gallon (minus water). EPA later clarified “minus water” included exempt solvents. The MACT standard for metal can surface coating was published in November 2003 with compliance</p>

Source Category	Recommendation for Tightening RACT
	<p>required by November 2006. The HAP limits in the MACT are based on lbs of HAP/gallon of solids applied. The LADCO states adopted requirements based on the CTG recommendations. Illinois also adopted more stringent requirements in the Chicago and East St. Louis metropolitan areas effective March 1996 for three of the coatings covered by the CTG guidance (sheet basecoat, exterior basecoat and over-varnish, and interior body spray for two-piece cans). Ohio's can coating regulation also includes alternative limits for control systems based on lbs VOC per <i>gallon of solids</i> applied. The local program requirements in the Bay Area and South Coast districts are more stringent than the CTG requirements and any LADCO State requirement. The Bay Area VOC content limits, effective July 1998 and January 2002, are the most stringent with one exception. The South Coast District requires 0.0 lbs VOC/gallon (-water) for the application of end sealants during the production of non-food cans (the Bay Area limit is 0.1 and the CTG recommendation is 3.7, both for all end sealant use).</p> <p>Recommendation: Options for strengthening RACT requirements include adopting the BAAQMD limits would reduce allowable levels by 30 to 50 percent across the different coating applications. The Bay Area also includes an option for achieving 90% overall control efficiency with an add-on control system. This essentially requires 100% capture and a 90% or better control device. A second option is a requirement to meet the higher overall control efficiency requirements of the MACT standard, which requires that VOC HAP emissions must be reduced by an overall control efficiency of at least 97 percent for new or reconstructed sources and 95 percent for existing sources.</p>
Surface Coating – Paper and Other Web	<p>Summary: The CTG covering paper coating was published in May 1977. The LADCO states have adopted requirements that apply statewide based on the CTG recommendations but with different applicability criteria. Illinois includes a more stringent limit in the Chicago and metro East areas. Indiana, Ohio, and Wisconsin have a lower applicability threshold in listed nonattainment counties. The local program requirements in the Bay Area and South Coast districts are more stringent than the State requirements reviewed and similar to the requirements in the Chicago and Metro East areas. The MACT standard covering these operations was published in December 2002 with compliance required by December 2005. Existing sources will have to limit emissions to (1) 5 percent of the mass of air toxics applied (95 percent control efficiency), (2) 4 percent of the mass of coating materials applied, or (3) 20 percent of the mass of coating solids applied. New sources will have to limit emissions to (1) 2 percent of the mass of air toxics applied (98 percent control efficiency), (2) 1.6 percent of the mass of coating materials applied, or (3) 8 percent of the mass of coating solids applied.</p> <p>Recommendation: A candidate for strengthening RACT requirements includes lowering the VOC limit for compliant coatings to the local programs or Chicago/Metro East level, e.g., from 2.9 to 2.2 lbs/gallon (-water) and lowering the applicability threshold, e.g., to 25 tons/per year statewide. Alternatively, a control system option could be included requiring 100% capture and 90% control for adsorption or 95% control for oxidation.</p>
Surface Coating – Wood Furniture	<p>Summary: The CTG for wood furniture manufacturing operations was published in April 1996 and was developed in parallel with the MACT standard</p>

Source Category	Recommendation for Tightening RACT
	<p>for wood furniture manufacturing through a regulatory negotiation process with the wood furniture industry. States were expected to adopt the CTG requirements by May 1997 with sources compliance by May 1998. Compliance deadline for the MACT was November 1997. Illinois, Indiana, and Wisconsin have adopted requirements that are based on the CTG recommendations. In November 2004, Ohio proposed rulemaking to adopt the CTG recommendations for the wood furniture industry. No VOC requirements specific to the wood furniture were identified for Michigan. The local program requirements in the Bay Area and South Coast districts are more stringent than the CTG requirements and any State requirements reviewed. The South Coast's new limits, effective July 1, 2005, are the most stringent. They include alternatives for different coating types using the same format as the CTG recommendations (lb VOC/lb solids). The CTG recommended limits are generally between 1.8 and 2.3 lbs VOC/lb solids. The South Coast limits are considerably more stringent and for most coatings range from 0.21 to 0.42 lbs VOC/lb solids.</p> <p>Recommendation: A candidate for strengthening RACT requirements is adopting the South Coast limits, which would reduce allowable levels by 70% or more from the CTG adopted levels.</p>

SECTION 5

DEVELOPMENT OF CONTROL FACTORS

This chapter describes how MACTEC prepared the control factor files in RPO Data Exchange Protocol Format. First, we describe the development of the VOC control factors for area point source files. This is followed by a discussion of the preparation of the EGU point source files, the non-EGU point source files, and the non-EGU BART point source files.

VOC Area and Point Source Control Factors

MACTEC prepared VOC control factor files for eight source categories – AIM Coatings, Consumer and Commercial Solvents, Portable Fuel Containers, Auto Refinishing, Industrial Surface Coating, Industrial Solvent Cleaning, Gasoline Dispensing Facilities (Stage I, Stage II, and USTs), and Asphalt Paving. Three sets of control factor files were developed for three geographic areas: (1) all 8-hour ozone nonattainment counties in the 5-state MRPO region; (2) all 8-hour ozone nonattainment counties plus adjacent counties; and, (3) all counties in the MRPO region. Appendix B lists each county in the region, its attainment status for ozone and PM_{2.5}, and whether it borders an 8-hour ozone nonattainment area.

For area sources, we followed the conventions established by E.H. Pechan and Associates in developing the “on-the-books” control factors for area sources. Information into two separate sets of files: one file that includes controls for which there is no change in emission reduction after the initial implementation year, and the other file that includes controls for which the emission reduction changes over time due to the effect of increased Rule Penetration (RP). In cases where it was feasible to do so, we 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. The field “BASE DATE CONTROL EFFICIENCY” was populated with the base year overall percentage emission reduction from uncontrolled levels. The field “FUTURE DATE CONTROL EFFICIENCY” was populated with the overall percentage emission reduction from uncontrolled levels for the control measure.

For point sources, VOC control factors were developed for the industrial surface coating category on a process by process basis. The field “BASE DATE CONTROL EFFICIENCY” was populated with the base year overall control efficiency from the NIF CE file. The field “FUTURE DATE CONTROL EFFICIENCY” was populated with the overall percentage emission reduction from uncontrolled levels for the control measure (i.e., 90 percent reduction). If the actual base year control efficiency was greater than 90 percent, then the future date control efficiency was set equal to the base year control efficiency.

Controls Affected by Rule Penetration

Three control factor files were developed for area source categories which the level of emission reduction increases over time due to increased RP. The only category included in this set of files is the Portable Fuel Container category. Table 5 provides information about the RPO Data Exchange Protocol files and fields. This file incorporates control factors for all years from 2007 through 2018.

Controls Unaffected by Rule Penetration

Three additional control factor files were developed for area and point source categories which the level of emission reduction does not change over time. Because there is no projected change in the emission reduction after the initial implementation year, this file reports control factors only for the first year that each control is due to be implemented. However, these control factors also apply to each post-implementation year. Table 6 identifies the RPO Data Exchange Protocol fields populated in this file.

**TABLE 5 - AREA SOURCE CONTROL FACTOR FILE INFORMATION
FOR CATEGORIES AFFECTED BY RULE PENETRATION**

The ASCII files listed below contain VOC area source control factors for which the level of emission reduction increases over time due to increased RP. This file incorporates control factors for 2007-2018. The table below identifies the strategies and the RPO Data Exchange Protocol fields that are populated in these files.	
File Name	Geographic Coverage
VOCControlsAffectedByRP_8hr_Counties.txt	Control Factors only for 8-hr ozone nonattainment counties in the MRPO Region
VOCControlsAffectedByRP_8hr_and_Adjacent_Counties.txt	Control Factors for 8-hr ozone nonattainment counties and adjacent counties in the MRPO Region
VOCControlsAffectedByRP_All_Counties.txt	Control Factors for all counties in the MRPO Region
Control Measure ID	Control Measure Description
SOLV3A	Portable Fuel Containers - OTC Model Rule
SOLV3B	Portable Fuel Containers - OTC Model Rule Plus Accelerated Phase-In in Nonattainment Areas
Field Name	How Populated?
RECORD TYPE	C
COUNTRY CODE	US
STATE CODE	xx__ from EM files
COUNTY FIPS	xxx from EM files
SIC	Blank
SCC	xxxxxxxxxx from White Papers
SITEID	Blank
EMISSION UNIT ID	Blank
EMISSION RELEASE POINT ID	Blank
POLLUTANT CODE	VOC
PROCESS ID	Blank
BASE DATE	010102
FUTURE DATE	010107-010118 (separate records for each year)
PRIMARY CONTROL CODE	Blank
BASE DATE CONTROL EFFICIENCY	0
FUTURE DATE CONTROL EFFICIENCY	Populated with overall percentage emission reduction from uncontrolled (product of CE, RE, and RP); changes by year
FUTURE DATE GROWTH FACTOR	Blank
CONTROL TYPE	Refers to Control Measure ID used in LADCO White Papers
FUTURE DATE CHEMICAL SPECIATION	Blank
ALLOWABLE EMISSIONS CAP	Blank
MARKET PENETRATION OF SPECIATION	Blank
FIELD 3	Future Year CE
FIELD 2	Future Year RE
FIELD 1	Future Year RP
CONTROL DESCRIPTION	Uses Control Measure ID used in LADCO White Papers, category affected, and control measure description
PRIMARY CONTACT	ejsabo@mactec.com

**TABLE 6 – AREA SOURCE CONTROL FACTOR FILE INFORMATION
FOR CATEGORIES NOT AFFECTED BY RULE PENETRATION**

The ASCII files listed below provide control factors for VOC point and area source emission controls for which RP does not change over time. Because there is no projected change in the emission reduction after the initial implementation year, this file reports control factors only for the first year that each control is due to be implemented. However, these control factors also apply to each post-implementation year. The table below identifies the RPO Data Exchange Protocol fields populated in this file	
File Name	Geographic Coverage
VOCControlsByStartYear_8hr_Counties.txt	Control Factors only for 8-hr ozone nonattainment counties in the MRPO Region
VOCControlsByStartYear_8hr_and_Adjacent_Counties.txt	Control Factors for 8-hr ozone nonattainment counties and adjacent counties in the MRPO Region
VOCControlsByStartYear_All_Counties.txt	Control Factors for all counties in the MRPO Region
Control Measure ID	Control Measure Description
SOLV1A	Adopt more stringent VOC limits (21% reduction beyond Federal Part 59 limits) for AIM coatings based on OTC Model Rule and Wisconsin NR433.17
SOLV1B	Adopt SCAQMD Phase III VOC limits in addition to OTC Model Rule
SOLV2A	Consumer Products - Limits Based on OTC Model Rule
SOLV2B	Consumer Products - Limits Based on CARB 2003 SIP Requirements in addition to OTC Model Rule
SOLV4A	Auto Refinishing - Extend Existing IL/IN/WI RACT Rules beyond 1-hr nonattainment counties
SOLV4B	Auto Refinishing - Adopt More Stringent RACT based on SCAQMD 1145
SOLV5A	Point Source Industrial Surface Coatings - More Stringent RACT, Lower Applicability Thresholds, Extended Geographic Coverage
SOLV5B	Area Source Industrial Surface Coatings - More Stringent RACT, Lower Applicability Thresholds, Extended Geographic Coverage
SOLV6A	Degreasing - Adopt Chicago/Metro East cold cleaning regulations in all counties
SOLV7A	GDFs Stage I - Adopt CARB Stage I EVR requirements
SOLV7B	GDFs Stage II - Adopt CARB Stage I EVR requirements
SOLV7C	GDFs UST - Require APCD on UST Vent
SOLV8A	Asphalt Paving - Adopt SCAQMD 1108.1 VOC content Limits for emulsified asphalt
Field Name	How Populated?
RECORD TYPE	C
COUNTRY CODE	US
STATE CODE	xx__ from EM files
COUNTY FIPS	xxx from EM files
SIC	Blank
SCC	xxxxxxxxx from White Papers for area; from EM file for point
SITEID	Blank for area, xxxxxxxxxxxxxx from EM file for point

Field Name	How Populated?
EMISSION UNIT ID	Blank for area, xxxxxx from EM file for point
EMISSION RELEASE POINT ID	Blank for area, xxxxxx from EM file for point
POLLUTANT CODE	VOC
PROCESS ID	Blank for area, xxxxxx from EM file for point
BASE DATE	010102
FUTURE DATE	010109
PRIMARY CONTROL CODE	Blank
BASE DATE CONTROL EFFICIENCY	Populated with base year overall percentage emission reduction from uncontrolled
FUTURE DATE CONTROL EFFICIENCY	Populated with future year overall percentage emission reduction from uncontrolled (product of CE, RE, and RP)
FUTURE DATE GROWTH FACTOR	Blank
CONTROL TYPE	Refers to Control Measure ID used in LADCO White Papers
FUTURE DATE CHEMICAL SPECIATION	Blank
ALLOWABLE EMISSIONS CAP	Blank
MARKET PENETRATION OF SPECIATION	Blank
FIELD 3	Future Year CE
FIELD 2	Future Year RE
FIELD 1	Future Year RP
CONTROL DESCRIPTION	Uses Control Measure ID used in LADCO White Papers, category affected, and control measure description
PRIMARY CONTACT	ejisabo@mactec.com

EGU Control Factors

MACTEC prepared eight control factor files for EGUs to account for the two control measures (EGU1 and EGU2), two years (2009 and 2018), and two geographic areas (the 5 MRPO states and the 8 other States in the Midwest Governors Association {MWGA} region). The five MRPO states are Illinois, Indiana, Michigan, Ohio, and Wisconsin. The remaining eight states that are part of the MWGA are Iowa, Kansas, Kentucky, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota. These control factor files are intended to be applied to the EGU NIF files (2009 and 2018 CAIR control scenarios) that were created by E.H. Pechan from the IPM parsed files that were generated for VISTAS/MRPO in December 2004. Table 7 identifies the RPO Data Exchange Protocol fields populated in the EGU files.

The unit-specific future date control efficiency for the 5 MRPO states was calculated in the following manner:

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

A similar procedure was used to the other 8 states in the MWGA region. The base date control efficiency is populated with zero for every record since the future date control efficiency is the incremental reduction from the IPM-projected 2009 or 2018 emission estimate.

For SO₂, a single annual average control factor was calculated on a unit-by-unit basis. For NO_x, two control factors were calculated – one for the 7-month winter season (January to April, October to December) and the second for the 5-month summer season (May to September). This was done because units affected by the NO_x SIP Call have lower average NO_x emission rates in the summer than in the winter, and the degree of reduction needed to meet the average emission rate is less in the summer months. Thus, there are three NO_x control factor records for each unit: the first for the first part of the winter season (future date = 010109 or 010118), the second for the summer season (future date = 050109 or 050118), and the third for the second part of the winter season (future date = 100109 or 100118).

The EGU source identifiers (State FIPS, County FIPS, Site ID, Emission Unit ID, Emission Release Point ID, and Process Rate) were taken from the EGU NIF files (control scenario) that were created by E.H. Pechan from the IPM parsed files. Each process level record in the NIF files has four corresponding records in the control factor file (i.e., one annual SO₂ record, one summer NO_x record, and two winter NO_x records).

TABLE 7 – EGU CONTROL FACTOR FILE INFORMATION

The ASCII files listed below provide control factors for EGUs. There are eight control factor files to account for the two control measures (EGU1 and EGU2), two years (2009 and 2018), and two geographic areas (the 5 MRPO states and the 8 other States in the MWGA region). These control factors are intended to be applied to the EGU NIF files for the CAIR control scenario that were created by E.H. Pechan from the IPM parsed files generated for VISTAS/MRPO in December 2004. The table below identifies the RPO Data Exchange Protocol fields populated in this file.	
File Name	Geographic Coverage
EGU1_MRPO_2009.txt	Measure EGU1 (interim emission caps based on 0.15 lbs/mmBtu for NOx and 0.36 lbs/mmBtu for SO2) for 5-state MRPO region
EGU2_MRPO_2009.txt	Measure EGU2 (interim emission caps based on 0.12 lbs/mmBtu for NOx and 0.24 lbs/mmBtu for SO2) for 5-state MRPO region
EGU1_MRPO_2018.txt	Measure EGU1 (final emission caps based on 0.10 lbs/mmBtu for NOx and 0.15 lbs/mmBtu for SO2) for 5-state MRPO region
EGU2_MRPO_2018.txt	Measure EGU2 (final emission caps based on 0.07 lbs/mmBtu for NOx and 0.10 lbs/mmBtu for SO2) for 5-state MRPO region
EGU1_Other_MWGA_2009.txt	Measure EGU1 (interim emission caps based on 0.15 lbs/mmBtu for NOx and 0.36 lbs/mmBtu for SO2) for 8 other states in the MWGA region
EGU2_Other_MWGA_2009.txt	Measure EGU2 (interim emission caps based on 0.12 lbs/mmBtu for NOx and 0.24 lbs/mmBtu for SO2) for 8 other states in the MWGA region
EGU1_Other_MWGA_2018.txt	Measure EGU1 (final emission caps based on 0.10 lbs/mmBtu for NOx and 0.15 lbs/mmBtu for SO2) for 8 other states in the MWGA region
EGU2_Other_MWGA_2018.txt	Measure EGU2 (final emission caps based on 0.07 lbs/mmBtu for NOx and 0.10 lbs/mmBtu for SO2) for 8 other states in the MWGA region
Control Measure ID	Control Measure Description
EGU1	Adopt emission caps based on “Retrofit BACT Level” of 0.15 lbs/mmBtu for SO2 and 0.10 lbs/mmBtu for NOx to be achieved by 2013; interim caps for 2009-2012 of 0.36 lbs/mmBtu for SO2 and 0.15 lbs/mmBtu for NOx
EGU2	Adopt emission caps based on “BACT Level for New Plants” of 0.10 lbs/mmBtu for SO2 and 0.07 lbs/mmBtu for NOx to be achieved by 2013; interim caps for 2009-2012 of 0.24 lbs/mmBtu for SO2 and 0.12 lbs/mmBtu for NOx
Field Name	How Populated?
RECORD TYPE	C
COUNTRY CODE	US
STATE CODE	xx__ from Pechan NIF files
COUNTY FIPS	xxx from Pechan NIF files
SIC	Blank
SCC	xxxxxxxxxx from Pechan NIF files
SITEID	XXXXXXXXXXXXXXXX from Pechan NIF files
EMISSION UNIT ID	xxxxxx from Pechan NIF files
EMISSION RELEASE POINT ID	xxxxxx from Pechan NIF files
POLLUTANT CODE	SO2 or NOx
PROCESS ID	xxxxxx from Pechan NIF files
BASE DATE	010102
FUTURE DATE	010109 or 010118 for winter NOx and annual SO2 050109 or 050118 for summer NOx 100109 or 100118 for winter NOx
PRIMARY CONTROL CODE	Blank

Field Name	How Populated?
BASE DATE CONTROL EFFICIENCY	0
FUTURE DATE CONTROL EFFICIENCY	Populated with unit-specific emission reduction needed to achieve region-wide emission cap
FUTURE DATE GROWTH FACTOR	Blank
CONTROL TYPE	Refers to Control Measure ID used in LADCO White Papers (EGU1 or EGU2)
FUTURE DATE CHEMICAL SPECIATION	Blank
ALLOWABLE EMISSIONS CAP	Blank
MARKET PENETRATION OF SPECIATION	Blank
FIELD 3	Blank
FIELD 2	Blank
FIELD 1	Blank
CONTROL DESCRIPTION	Uses Control Measure ID used in LADCO White Papers and control measure description
PRIMARY CONTACT	ejisabo@mactec.com

Non-EGU Point Source Control Factors

MACTEC prepared a single control factor file for non-EGU point sources for two source categories – ICI boilers and cement kilns. Control factors for NO_x and SO₂ were developed on a process-by-process basis. Note that the Base Date Control Efficiency field is populated with a zero for every record because the base year control information reported in the base year CE inventory supplied by LADCO was zero for these categories. The non-EGU source identifiers (State FIPS, County FIPS, Site ID, Emission Unit ID, Emission Release Point ID, and Process Rate) were taken from the NIF files supplied by LADCO. Table 8 identifies the RPO Data Exchange Protocol fields populated in the non-EGU files.

Non-EGU BART Source Control Factors

MACTEC prepared a single control factor file for non-EGU BART sources for five source categories – ICI boilers, cement kilns, chemical plant boilers, iron and steel mills, and petroleum refineries. Control factors for NO_x and SO₂ were developed on a process-by-process basis. Note that the Base Date Control Efficiency field is populated with a zero for every record because the base year control information reported in the base year CE inventory supplied by LADCO was zero for these categories. The non-EGU source identifiers (State FIPS, County FIPS, Site ID, Emission Unit ID, Emission Release Point ID, and Process Rate) were taken from the NIF files supplied by LADCO. Table 9 identifies the RPO Data Exchange Protocol fields populated in the non-EGU BART file.

TABLE 8 – NON-EGU POINT SOURCE CONTROL FACTOR FILE INFORMATION

The ASCII file listed below provides control factors for non-EGU point sources. There is a single control factor file. These control factors are intended to be applied to the NIF files supplied by LADCO in January 2005. The table below identifies the RPO Data Exchange Protocol fields populated in this file.	
File Name	Geographic Coverage
NonEGU_MRPO_2009.txt	Applies to all medium and large ICI boilers (defined as SO ₂ or NO _x > 100 tpy) and all cement kilns in the MRPO area
Control Measure ID	Control Measure Description
ICI1	Apply 40% SO ₂ and 60% NO _x reduction to all medium and large ICI boilers
ICI3	Apply 90% SO ₂ and 80% NO _x reduction (similar to BART) to all medium and large ICI boilers
KILN1	Apply reasonably available controls (90% SO ₂ and 50% NO _x reduction) to all cement kilns in the region
Field Name	How Populated?
RECORD TYPE	C
COUNTRY CODE	US
STATE CODE	xx__ from NIF files
COUNTY FIPS	xxx from NIF files
SIC	Blank
SCC	xxxxxxxxxx from NIF files
SITEID	XXXXXXXXXXXXXXXX from NIF files
EMISSION UNIT ID	xxxxxx from NIF files
EMISSION RELEASE POINT ID	xxxxxx from NIF files
POLLUTANT CODE	SO ₂ or NO _x
PROCESS ID	xxxxxx from NIF files
BASE DATE	010102
FUTURE DATE	010109
PRIMARY CONTROL CODE	Blank
BASE DATE CONTROL EFFICIENCY	0
FUTURE DATE CONTROL EFFICIENCY	Populated with future year overall percentage emission reduction from 2002 base year levels
FUTURE DATE GROWTH FACTOR	Blank
CONTROL TYPE	Refers to Control Measure ID used in LADCO White Papers (ICI1, ICI2, or KILN1)
FUTURE DATE CHEMICAL SPECIATION	Blank
ALLOWABLE EMISSIONS CAP	Blank
MARKET PENETRATION OF SPECIATION	Blank
FIELD 3	Blank
FIELD 2	Blank
FIELD 1	Blank
CONTROL DESCRIPTION	Uses Control Measure ID used in LADCO White Papers and control measure description
PRIMARY CONTACT	ejsabo@mactec.com

TABLE 9 – NON-EGU BART SOURCE CONTROL FACTOR FILE INFORMATION

The ASCII file listed below provides control factors for non-EGU BART point sources. There is a single control factor file. These control factors are intended to be applied to the NIF files supplied by LADCO in January 2005. The table below identifies the RPO Data Exchange Protocol fields populated in this file.	
File Name	Geographic Coverage
BART_MRPO_2013.txt	Applies to all BART units in the MRPO region in the industrial boilers, cement, chemical manufacturing, iron and steel, and petroleum refinery BART categories
Control Measure ID	Control Measure Description
ICI2	Apply Likely Controls (90% SO ₂ and 80% NO _x Reduction) to ICI Boilers subject to the proposed BART requirements
REF1	Apply likely controls (90% SO ₂ and 80% NO _x Reduction) to sources subject to the proposed BART requirements
I&S1	Apply likely controls (90% SO ₂ and 80% NO _x Reduction) to sources subject to the proposed BART requirements
KILN2	Apply likely controls (95% SO ₂ and 80% NO _x reduction) to kilns subject to the proposed BART requirements
CHEM1	Apply likely controls (90% SO ₂ and 80% NO _x Reduction) to chemical plant boilers subject to the proposed BART requirements
Field Name	How Populated?
RECORD TYPE	C
COUNTRY CODE	US
STATE CODE	xx__ from NIF files
COUNTY FIPS	xxx from NIF files
SIC	Blank
SCC	xxxxxxxxxx from NIF files
SITEID	XXXXXXXXXXXXXXXX from NIF files
EMISSION UNIT ID	xxxxxx from NIF files
EMISSION RELEASE POINT ID	xxxxxx from NIF files
POLLUTANT CODE	SO ₂ or NO _x
PROCESS ID	xxxxxx from NIF files
BASE DATE	010102
FUTURE DATE	010113
PRIMARY CONTROL CODE	Blank
BASE DATE CONTROL EFFICIENCY	0
FUTURE DATE CONTROL EFFICIENCY	Populated with future year overall percentage emission reduction from 2002 base year levels
FUTURE DATE GROWTH FACTOR	Blank
CONTROL TYPE	Refers to Control Measure ID used in LADCO White Papers (ICI2, KILN2) or BART Measure ID (REF1, CHEM1, I&S1)
FUTURE DATE CHEMICAL SPECIATION	Blank
ALLOWABLE EMISSIONS CAP	Blank
MARKET PENETRATION OF SPECIATION	Blank
FIELD 3	Blank
FIELD 2	Blank
FIELD 1	Blank
CONTROL DESCRIPTION	Uses Control Measure ID used in LADCO White Papers and control measure description
PRIMARY CONTACT	ejsabo@mactec.com

SECTION 6

FUTURE CONSIDERATIONS

The following are issues that LADCO may wish to address in future control measure evaluations:

- The U.S. EPA promulgated the Clean Air Interstate Rule (CAIR) in March 2005. The candidate control measures and control factor files described in this report were developed based on the version of the rule that was proposed in 2004. The proposed CAIR did not call for substantial NO_x reductions until 2010, whereas the final CAIR calls for reductions to occur by 2009. The MRPO should consider updating the control measures and control factor files for EGU1 and EGU2 based on the final CAIR and results of future IPM modeling of the final CAIR requirements.
- This report does not address possible emission reductions resulting from various alternative fuel scenarios being developed by the Southeast Michigan Council of Governments (SEMCOG). Any reductions expected from these alternative fuel measures should be incorporated in Table 3.
- In addition to the control measures identified during this project, Table 3 also identified additional categories for which White Papers have not yet been developed. Among the categories with large emission rates that were not analyzed are:
 - ❖ Residential fuel combustion
 - ❖ Gasoline highway vehicles
 - ❖ Heavy duty diesel vehicles
 - ❖ Nonroad gasoline equipment
 - ❖ Nonroad diesel equipment
 - ❖ Nonroad marine vessels
 - ❖ Nonroad railroad equipment
 - ❖ Non-consumer (agricultural) pesticide application
- During the course of this project, some states also suggested additional source categories be assessed in more detail. These categories included:
 - ❖ Glass manufacturing plants
 - ❖ Asphalt batch plants
 - ❖ Small (<100 tpy) point and area source ICI boilers
- Finally, candidates for further study may include important categories with respect to primary particulate matter, organic and elemental carbon, and ammonia.

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APPENDIX A

SUMMARY TABLES FOR CANDIDATE CONTROL MEASURES

TABLE A.1 – SO₂ CONTROL MEASURE SUMMARY FOR EGUs

Control Measure Summary	SO ₂ Emissions (tons/year) in 5-state MRPO Region	
2002 Existing measures (MRPO average SO₂ is 1.16 lbs/mmBtu): NSPS; PSD/NSR; State RACT Rules; Title IV SO ₂ Program	2002 Base:	2,798,884
2009 On-the-Way proposed measures: CAIR (IPM estimates 46% reduction in 2009 emissions from 2002 levels due to early reductions, additional reductions through 2015)	Reduction: 2009 Remaining:	<u>-1,296,587</u> 1,502,297
Candidate measure ID EGU1: Adopt Emission Caps Based on “Retrofit SO₂ BACT Level” of 0.15 lbs/mmBtu <i>Emission Reductions:</i> 66% reduction from 2002 levels in 2009, 84% reduction from 2002 levels in 2013 <i>Control Cost:</i> \$800/ton to \$1,500/ton <i>Timing of Implementation:</i> Assumes full reductions achieved in 2013 <i>Implementation Area:</i> 5-State MRPO region	2009 Reduction: 2009 Remaining: 2013 Reduction: 2013 Remaining:	<u>-1,841,645</u> 957,239 <u>-2,347,834</u> 451,050
Candidate measure ID EGU2: Adopt Emission Caps Based on “SO₂ BACT Level for New Plants” of 0.10 lbs/mmBtu <i>Emission Reductions:</i> 77% reduction from 2002 levels in 2009, 89% reduction from 2002 levels in 2013 <i>Control Cost:</i> \$800/ton to \$3,000/ton <i>Timing of Implementation:</i> Assumes full reductions achieved in 2013 <i>Implementation Area:</i> 5-State MRPO region	2009 Reduction: 2009 Remaining: 2013 Reduction: 2013 Remaining:	<u>-2,160,725</u> 638,159 <u>-2,498,184</u> 300,700

TABLE A.2 – NO_x CONTROL MEASURE SUMMARY FOR EGUs

Control Measure Summary	NO _x Emissions (tons/year) in 5-state MRPO Region	
2002 Existing measures (MRPO average NO_x is 0.43 lbs/mmBtu): NSPS; PSD/NSR; State RACT Rules; Title IV NO _x Requirements	2002 Base:	1,045,736
2009 On-the-Way proposed measures: NO _x SIP Call (21% reduction from 2002 levels); additional reductions from CAIR not anticipated until 2010	Reduction: 2009 Remaining:	<u>-218,338</u> 827,398
Candidate measure ID EGU1: Adopt Emission Caps Based on “Retrofit NO_x BACT Level” of 0.10 lbs/mmBtu <i>Emission Reductions:</i> 62% reduction from 2002 levels in 2009 71% reduction from 2002 levels in 2013 <i>Control Cost:</i> \$700/ton to \$1,600/ton <i>Timing of Implementation:</i> Assumes full reductions achieved in 2013 <i>Implementation Area:</i> 5-State MRPO region	2009 Reduction: 2009 Remaining: 2013 Reduction: 2013 Remaining:	<u>-646,886</u> 398,850 <u>-745,036</u> 300,700
Candidate measure ID EGU2: Adopt Emission Caps Based on “NO_x BACT Level for New Plants” of 0.07 lbs/mmBtu <i>Emission Reductions:</i> 69% reduction from 2002 levels in 2009 80% reduction from 2002 levels in 2013 <i>Control Cost:</i> \$700/ton to \$2,100/ton <i>Timing of Implementation:</i> Assumes full reductions achieved in 2013 <i>Implementation Area:</i> 5-State MRPO region	2009 Reduction: 2009 Remaining: 2013 Reduction: 2013 Remaining:	<u>-726,656</u> 319,080 <u>-835,246</u> 210,490

TABLE A.3 – SO2 CONTROL MEASURE SUMMARY FOR ICI BOILERS

Control Measure Summary	SO2 Emissions (tons/year) in 5-state MRPO Region	
	2002 Existing measures : NSPS; PSD/NSR; State RACT Rules	2002 Base:
2009 On-the-Books measures: None identified	Reduction: 2009 Remaining:	<u>-0</u> 405,271
Candidate measure ID ICI1: Apply 40% SO2 Reduction to All Medium and Large ICI Boilers <i>Emission Reductions:</i> overall reduction of 33 for the ICI boiler category, based on 40% reduction in SO2 emissions from ICI boilers > 100 mmBtu/hr <i>Control Cost:</i> \$633 to \$1,075 per ton <i>Timing of Implementation:</i> Assumes full reductions achieved in 2009 <i>Implementation Area:</i> 5-State MRPO region	2009 Reduction: 2009 Remaining:	<u>-132,580</u> 272,691
Candidate measure ID ICI2: Apply Likely Controls to ICI Boilers subject to the proposed BART requirements <i>Emission Reductions:</i> overall reduction of 20% for the ICI boiler category, based on 90% reduction in SO2 emissions from ICI boilers subject to BART requirements <i>Control Cost:</i> \$1,622 to 5,219 per ton <i>Timing of Implementation:</i> Assumes full reductions achieved in 2013 <i>Implementation Area:</i> 5-State MRPO region	2013 Reduction: 2013 Remaining:	<u>-83,266</u> 322,005
Candidate measure ID ICI3: Apply 90% SO2 Reduction (similar to BART) to All Medium and Large ICI Boilers <i>Emission Reductions:</i> overall reduction of 74% for the ICI boiler category, based on 90% reduction in SO2 emissions from ICI boilers > 100 mmBtu/hr <i>Control Cost:</i> \$1,622 to 5,219 per ton <i>Timing of Implementation:</i> Assumes full reductions achieved in 2009 <i>Implementation Area:</i> 5-State MRPO region	2009 Reduction: 2009 Remaining:	<u>-298,217</u> 107,054

Note: ICI1 and ICI3 apply to all medium and larger boilers in the region; ICI3 is a more stringent version of ICI1; ICI2 applies only to ICI boilers subject to BART and emission reductions are not anticipated until 2013.

TABLE A.4 – NO_x CONTROL MEASURE SUMMARY FOR ICI BOILERS

Control Measure Summary	NO_x Emissions (tons/year) in 5-state MRPO Region	
2002 Existing measures : NSPS; PSD/NSR; State RACT Rules	2002 Base:	228,815
2009 On-the-Books measures: NO _x SIP Call for large boilers	Reduction: 2009 Remaining:	<u>-9,530</u> 219,285
Candidate measure ID ICI1: Apply 60% Reduction (similar to NO_x SIP Call) to all Medium and Large ICI Boilers <i>Emission Reductions:</i> overall reduction of 24% from 2002 emissions, based on 60% reduction for all ICI boilers > 100 mmBtu/hr <i>Control Cost:</i> \$280 to 1,399 per ton <i>Timing of Implementation:</i> Assumes full reductions achieved in 2009 <i>Implementation Area:</i> 5-State MRPO region	2009 Reduction: 2009 Remaining:	<u>-55,794</u> 173,021
Candidate measure ID ICI2: Apply Likely Controls to ICI Boilers subject to the proposed BART requirements <i>Emission Reductions:</i> overall reduction of 6% from 2002 emissions category, based on 80% reduction for ICI boilers subject to BART requirements <i>Control Cost:</i> \$536 to 4,493 per ton <i>Timing of Implementation:</i> Assumes full reductions achieved in 2013 <i>Implementation Area:</i> 5-State MRPO region	2013 Reduction: 2013 Remaining:	<u>-12,647</u> 216,168
Candidate measure ID ICI3: Apply 80% Reduction (similar to BART) to all Medium and Large ICI Boilers <i>Emission Reductions:</i> overall reduction of 37% from 2002 emissions, based on 60% reduction for ICI boilers > 100 mmBtu/hr <i>Control Cost:</i> \$536 to 4,493 per ton <i>Timing of Implementation:</i> Assumes full reductions achieved in 2009 <i>Implementation Area:</i> 5-State MRPO region	2009 Reduction: 2009 Remaining:	<u>-84,203</u> 144,612

Note: ICI1 and ICI3 apply to all medium and larger boilers in the region; ICI3 is a more stringent version of ICI1; ICI2 applies only to ICI boilers subject to BART and emission reductions are not anticipated until 2013.

TABLE A.5 – SO₂ CONTROL MEASURE SUMMARY FOR PETROLEUM REFINERIES

Control Measure Summary	SO ₂ Emissions (tons/year) in 5-state MRPO Region	
	2002 Existing measures : NSPS; PSD/NSR; State Rules	2002 Base:
Candidate measure ID REF1: Apply Likely Controls to Refinery Sources subject to the proposed BART requirements <i>Emission Reductions:</i> overall reduction of 42% from the petroleum refinery category, based on 90% reduction in SO ₂ emissions from boilers, heaters, and process units identified as being subject to BART <i>Control Cost:</i> \$3,943 to 8,113 per ton for oil-fired process heaters; \$1,130 to 1,148 per ton for CCU regenerators; \$1,128 to 1,146 per ton for Sulfur Recovery Units <i>Timing of Implementation:</i> Assumes full reductions achieved in 2013 <i>Implementation Area:</i> Affected BART sources in MRPO region	2013 Reduction: 2013 Remaining:	<u>-15,721</u> 21,474

TABLE A.6 – NO_x CONTROL MEASURE SUMMARY FOR PETROLEUM REFINERIES

Control Measure Summary	NO _x Emissions (tons/year) in 5-state MRPO Region	
	2002 Existing measures : NSPS; PSD/NSR; State Rules	2002 Base:
Candidate measure ID REF1: Apply Likely Controls to Refinery Sources subject to the proposed BART requirements <i>Emission Reductions:</i> overall reduction of 9% from the petroleum refinery category, based on 80% reduction in NO _x emissions from boilers, heaters, and process units identified as being subject to BART <i>Control Cost:</i> \$850 to \$1,110 per ton for gas-fired boilers and heaters; \$907 per ton for oil-fired process heaters <i>Timing of Implementation:</i> Assumes full reductions achieved in 2013 <i>Implementation Area:</i> Affected BART sources in MRPO region	2013 Reduction: 2013 Remaining:	<u>-2,293</u> 23,000

TABLE A.7 - SO₂ CONTROL MEASURE SUMMARY FOR IRON & STEEL PLANTS

Control Measure Summary	SO ₂ Emissions (tons/year) in 5-state MRPO Region	
	2002 Existing measures : NSPS; PSD/NSR; State Rules	2002 Base:
Candidate measure ID REF1: Apply Likely Controls to Refinery Sources subject to the proposed BART requirements <i>Emission Reductions:</i> overall reduction of 25% from the iron and steel category, based on 90% reduction in SO ₂ emissions from boilers, furnaces, and process units identified as being subject to BART <i>Control Cost:</i> \$4,734 to 10,008 for sinter wind boxes; \$4,165 to 10,098 for coke oven under firing; \$20,073 to 37,024 for furnaces <i>Timing of Implementation:</i> Assumes full reductions achieved in 2013 <i>Implementation Area:</i> Affected BART sources in MRPO region	2013 Reduction: 2013 Remaining:	<u>-12,047</u> 35,739

TABLE A.8 - NO_x CONTROL MEASURE SUMMARY FOR IRON & STEEL PLANTS

Control Measure Summary	NO _x Emissions (tons/year) in 5-state MRPO Region	
	2002 Existing measures : NSPS; PSD/NSR; State Rules	2002 Base:
Candidate measure ID REF1: Apply Likely Controls to Refinery Sources subject to the proposed BART requirements <i>Emission Reductions:</i> overall reduction of 16% from the iron and steel category, based on 80% reduction in NO _x emissions from boilers, furnaces, and process units identified as being subject to BART <i>Control Cost:</i> \$850 per ton for boilers; \$2,018 per ton for furnaces <i>Timing of Implementation:</i> Assumes full reductions achieved in 2013 <i>Implementation Area:</i> Affected BART sources in MRPO region	2013 Reduction: 2013 Remaining:	<u>-6,964</u> 36,515

TABLE A.9 – SO₂ CONTROL MEASURE SUMMARY FOR CEMENT KILNS

Control Measure Summary	SO ₂ Emissions (tons/year) in 5-state MRPO Region	
	2002 Existing measures : NSPS; PSD/NSR; State Rules	2002 Base:
2009 On-the-Books measures: None identified	Reduction: 2009 Remaining:	<u>-0</u> 38,703
Candidate measure ID KILN1: Apply Reasonably Available Controls to All Kilns in Region <i>Emission Reductions:</i> 90% from 2002 baseline for all cement kilns in MRPO region <i>Control Cost:</i> \$2,211/ton to \$6,917/ton <i>Timing of Implementation:</i> Assumes full reductions achieved in 2009 <i>Implementation Area:</i> 5-State MRPO region	2009 Reduction: 2009 Remaining:	<u>-34,833</u> 3,870
Candidate measure ID KILN2: Apply Likely Controls to Kilns subject to the proposed BART requirements <i>Emission Reductions:</i> overall reduction of 46% from the cement kiln category, based on 95% reduction in SO ₂ emissions from nine kilns identified as being subject to BART requirements <i>Control Cost:</i> \$2,211/ton to \$6,917/ton <i>Timing of Implementation:</i> Assumes full reductions achieved in 2013 <i>Implementation Area:</i> 5-State MRPO region	2013 Reduction: 2013 Remaining:	<u>-20,739</u> 17,964

TABLE A.10– NO_x CONTROL MEASURE SUMMARY FOR CEMENT KILNS

Control Measure Summary	NO _x Emissions (tons/year) in 5-state MRPO Region	
	2002 Existing measures : NSPS; PSD/NSR; State RACT Rules	2002 Base:
2009 On-the-Books measures: NO _x SIP Call for cement kilns (30% reduction from 2002 Base)	Reduction: 2009 Remaining:	<u>-10,210</u> 23,822
Candidate measure ID KILN1: Apply Reasonably Available Controls to All Kilns in Region <i>Emission Reductions:</i> overall reduction of 50% from 2002 Base emissions and 29% reduction from NO _x SIP call levels <i>Control Cost:</i> \$-310/ton to \$2,500/ton <i>Timing of Implementation:</i> Assumes full reductions achieved in 2009 <i>Implementation Area:</i> 5-State MRPO region	2009 Reduction: 2009 Remaining:	<u>-17,016</u> 17,016
Candidate measure ID KILN2: Apply Likely Controls to Kilns subject to the proposed BART requirements <i>Emission Reductions:</i> overall reduction of 23% from 2002 emissions category, based on 80% reduction for cement kilns subject to BART requirements <i>Control Cost:</i> \$1,500/ton to \$2,000/ton <i>Timing of Implementation:</i> Assumes full reductions achieved in 2013 <i>Implementation Area:</i> 5-State MRPO region	2013 Reduction: 2013 Remaining:	<u>-7,737</u> 16,085

**TABLE A.11 – CONTROL MEASURE SUMMARY FOR
INDUSTRIAL SURFACE COATING – POINT SOURCES**

Control Measure Summary	VOC Emissions (tons/year) in 5-State MRPO Region	
	2002 existing measures: NSPS; RSD/NSR: State RACT rules in 1-hour ozone nonattainment counties; 2-, 4-, and 7-year MACT standards; results in 78% reduction from uncontrolled levels	Uncontrolled: 2002 Reduction: 2002 Base:
2009 On-the Books measures: 10-year MACT surface coating standards, incremental reduction of 30% from 2002 actual levels	2002 Base: 2009 Reduction: 2009 Remaining:	70,380 -21,368 49,012
Candidate measure: Adopt More Stringent RACT regulations, lower applicability thresholds, and extend geographic coverage <i>Measure ID: SOLV5A</i> <i>Emission Reductions:</i> reduction of 42-83% from 2002 levels depending on the geographic coverage <i>Control Cost:</i> \$100 to \$5,000 per ton <i>Timing of Implementation:</i> Assuming 2007 effective date of rule, emission reductions are achieved in 2009 <i>Implementation Area:</i> (1) 8-hr ozone nonattainment areas, (2) 8-hr ozone nonattainment areas plus adjacent counties, or (3) all counties	2002 Base: 2009 Reduction: 2009 Remaining:	70,380 -58,216 12,164

Notes: 2002 emission reductions shown are reductions from uncontrolled levels; 2009 emission reductions shown are reductions from 2002 base emissions, assuming that control measures are implemented statewide; 2009 emissions are not growth-adjusted.

**TABLE A.12 – CONTROL MEASURE SUMMARY FOR
INDUSTRIAL SURFACE COATING – AREA SOURCES**

Control Measure Summary	VOC Emissions (tons/year) in 5-State MRPO Region	
	2002 existing measures: None identified	2002 Base:
2009 On-the Books measures: None identified	2002 Base: 2009 Reduction: 2009 Remaining:	108,101 -0 108,101
Candidate measure: Adopt More Stringent RACT regulations, lower applicability thresholds, and extend geographic coverage <i>Measure ID: SOLV5B</i> <i>Emission Reductions:</i> reduction of 42-83% from 2002 levels depending on the geographic coverage <i>Control Cost:</i> \$100 to \$5,000 per ton <i>Timing of Implementation:</i> Assuming 2007 effective date of rule, emission reductions are achieved in 2009 <i>Implementation Area:</i> (1) 8-hr ozone nonattainment areas, (2) 8-hr ozone nonattainment areas plus adjacent counties, or (3) all counties	2002 Base: 2009 Reduction: 2009 Remaining:	108,101 -77,833 30,268

Notes: 2002 emission reductions shown are reductions from uncontrolled levels; 2009 emission reductions shown are reductions from 2002 base emissions, assuming that control measures are implemented statewide; 2009 emissions are not growth-adjusted.

TABLE A.13 – CONTROL MEASURE SUMMARY FOR INDUSTRIAL SOLVENT CLEANING – AREA SOURCES

Control Measure Summary	VOC Emissions (tons/year) in 5-State MRPO Region	
2002 existing measures: CTG Requirements in 1-hour nonattainment areas; halogenated solvent cleaning MACT standard	2002 Base:	61,226
2009 On-the Books measures: Illinois cold cleaning VOC regulation for the Chicago and Metro East areas and an equivalent regulation affecting the southern Indiana counties of Clark and Floyd is expected to achieve the 66 percent VOC reduction in 2003 in those counties.	2002 Base: 2009 Reduction: 2009 Remaining:	61,226 <u>-4,931</u> 56,295
Candidate measure: Adopt Chicago/Metro East Cold Cleaning Regulations in additional counties <i>Measure ID:</i> SOLV6A <i>Emission Reductions:</i> reduction of 38-65% from 2002 levels depending on the geographic coverage <i>Control Cost:</i> \$1,400 per ton <i>Timing of Implementation:</i> Assuming 2007 effective date of rule, emission reductions are achieved in 2009 <i>Implementation Area:</i> (1) 8-hr ozone nonattainment areas, (2) 8-hr ozone nonattainment areas plus adjacent counties, or (3) all counties	2002 Base: 2009 Reduction: 2009 Remaining:	61,226 <u>-39,903</u> 21,323

Notes: 2002 emission reductions shown are reductions from uncontrolled levels; 2009 emission reductions shown are reductions for 2002 base emissions, assuming that control measures are implemented statewide; 2009 emissions are not growth-adjusted.

**TABLE A.14 – CONTROL MEASURE SUMMARY FOR
ARCHITECTURAL AND INDUSTRIAL MAINTENANCE COATINGS**

Control Measure Summary	VOC Emissions (tons/year) in 5-State MRPO Region	
<p>2002 existing measure: Federal AIM rules 40CFR Part 59 <i>Emission Reductions:</i> 20% reduction from uncontrolled levels <i>Control Cost:</i> \$250 per ton <i>Timing of Implementation:</i> Compliance required by September 1999 <i>Implementation Area:</i> Nationwide</p>	<p>Uncontrolled: 136,314 2002 Reduction: <u>-27,263</u> 2002 Base: 109,051</p>	
<p>Candidate measure: Adopt more stringent VOC limits for AIM coatings based on OTC Model Rule and Wisconsin NR433.17 <i>Measure ID:</i> SOLV1A <i>Emission Reductions:</i> 21% beyond Federal AIM rule (for a total reduction of 36.8% from uncontrolled emissions) <i>Control Cost:</i> \$6,400 per ton <i>Timing of Implementation:</i> Assuming 2007 effective date of rule and 2-year sell-through period, emission reductions are achieved in 2009 <i>Implementation Area:</i> 5-state MRPO region</p>	<p>2002 Base: 109,051 2009 Reduction: <u>-22,891</u> 2009 Remaining: 86,160</p>	
<p>Candidate measure: Adopt SCAQMD Phase III VOC limits in addition to OTC Model Rule <i>Measure ID:</i> SOLV1B <i>Emission Reductions:</i> 13.4% beyond OTC Model Rule (for a total reduction of 45.3% from uncontrolled emissions) <i>Control Cost:</i> \$20,000 per ton <i>Timing of Implementation:</i> Assuming 2007 effective date of rule and 2-year sell-through period, emission reductions are achieved in 2009 <i>Implementation Area:</i> 5-state MRPO region</p>	<p>2002 Base: 109,051 2009 Reduction: <u>-34,476</u> 2009 Remaining: 74,575</p>	

Notes: 2002 emission reductions shown are reductions from uncontrolled levels; 2009 emission reductions shown are reductions for 2002 base emissions, assuming that control measures are implemented statewide; 2009 emissions are not growth-adjusted.

**TABLE A.15 – CONTROL MEASURE SUMMARY FOR
PORTABLE FUEL CONTAINERS**

Control Measure Summary	VOC Emissions (tons/year) in 5-State MRPO Region	
2002 existing measure: None <i>Emission Reductions:</i> none <i>Control Cost:</i> \$0 per ton <i>Timing of Implementation:</i> n/a <i>Implementation Area:</i> n/a	2002 Base:	50,970
Candidate measure: Adopt OTC Model Rule for PFCs <i>Measure ID:</i> SOLV3A <i>Emission Reductions:</i> 18% in 2009 (75% control efficiency phased in at 10% turnover per year, with rule effectiveness of 80%), and 54% when fully implemented in 2015 <i>Control Cost:</i> \$250 per ton to \$480 per ton <i>Timing of Implementation:</i> Assuming 2007 effective date of rule and 10% per year turnover, full reductions are achieved in 2015 <i>Implementation Area:</i> 5-state MRPO region	2002 Base: 2009 Reduction: 2009 Remaining: 2015 Reduction: 2015 Remaining:	50,970 <u>-9,175</u> 41,795 <u>-27,524</u> 23,446
Candidate measure: Adopt Incentive Programs in Nonattainment Areas to Accelerate Phase-In of Compliant PFCs <i>Measure ID:</i> SOLV3B <i>Emission Reductions:</i> 24 in 2009 (75% from control efficiency phased in at 15% turnover per year, with rule effectiveness of 80%), and 54% when fully implemented in 2015 <i>Control Cost:</i> \$4,600 per ton <i>Timing of Implementation:</i> Assuming 2007 effective date of rule and 15% per year turnover in nonattainment areas and 10% per year in attainment areas, full reductions are achieved in 2015 <i>Implementation Area:</i> Nonattainment counties only	2002 Base: 2009 Reduction: 2009 Remaining: 2015 Reduction: 2015 Remaining:	50,970 <u>-12,281</u> 38,690 <u>-27,524</u> 23,446

Notes: 2009 and 2015 emission reductions shown are reductions for 2002 base emissions.

**TABLE A.16 – CONTROL MEASURE SUMMARY FOR
AUTOBODY REFINISHING**

Control Measure Summary	VOC Emissions (tons/year) in 5-State MRPO Region	
<p>2002 existing measures: Federal Auto Body Refinishing rules 40CFR Part 59 and RACT in 1-hour ozone nonattainment counties <i>Emission Reductions:</i> 55% reduction from uncontrolled levels in 1-hour nonattainment counties due to RACT and 37% from uncontrolled levels due to Part 59 VOC content limits <i>Control Cost:</i> \$118 per ton for Part 59 rules <i>Timing of Implementation:</i> Part 59 compliance required by January 1999 <i>Implementation Area:</i> Part 59 – Nationwide; RACT only in 1-hour nonattainment counties in IL, IN, and WI</p>	<p>Uncontrolled: 42,545 2002 Reduction: <u>-17,226</u> 2002 Base: 25,319</p>	
<p>Candidate measure: Extend the existing IL/IN/WI RACT regulations beyond 1-hr nonattainment counties <i>Measure ID:</i> SOLV4A <i>Emission Reductions:</i> reduction of 55% from uncontrolled emissions, with an incremental reduction of 15-24 percent from 2002 levels depending on the geographic coverage <i>Control Cost:</i> \$1,354 per ton <i>Timing of Implementation:</i> Assuming 2007 effective date of rule, emission reductions are achieved in 2009 <i>Implementation Area:</i> (1) 8-hr ozone nonattainment areas, (2) 8-hr ozone nonattainment areas plus adjacent counties, or (3) all counties in MRPO region</p>	<p>2002 Base: 25,319 2009 Reduction: <u>-6,192</u> 2009 Remaining: 19,126</p>	
<p>Candidate measure: Adopt More Stringent RACT regulations based on SCAQMD 1145 <i>Measure ID:</i> SOLV4B <i>Emission Reductions:</i> reduction of 89% from uncontrolled emissions, with an incremental reduction of 55-82 percent from 2002 levels depending on the geographic coverage <i>Control Cost:</i> \$7,200 per ton <i>Timing of Implementation:</i> Assuming 2007 effective date of rule, emission reductions are achieved in 2009 <i>Implementation Area:</i> (1) 8-hr ozone nonattainment areas, (2) 8-hr ozone nonattainment areas plus adjacent counties, or (3) all counties in MRPO region</p>	<p>2002 Base: 25,319 2009 Reduction: <u>-20,643</u> 2009 Remaining: 4,676</p>	

Notes: 2002 emission reductions shown are reductions from uncontrolled levels; 2009 emission reductions shown are reductions for 2002 base emissions, assuming that control measures are implemented statewide; 2009 emissions are not growth-adjusted.

**TABLE A.17 – CONTROL MEASURE SUMMARY FOR
CONSUMER AND COMMERCIAL PRODUCTS**

Control Measure Summary	VOC Emissions (tons/year) in 5-State MRPO Region	
<p>2002 existing measure: Federal Consumer and Commercial Products rules 40CFR Part 59 <i>Emission Reductions:</i> Overall 8.0% from uncontrolled levels (20% reduction for products covered by rule, only 40% of all products are covered by the rule) <i>Control Cost:</i> \$237 per ton <i>Timing of Implementation:</i> Compliance required by December 1998 <i>Implementation Area:</i> Nationwide</p>	<p>Uncontrolled: 2002 Reduction: 2002 Base:</p>	<p>180,168 <u>-14,339</u> 165,829</p>
<p>Candidate measure: Adopt OTC Model Rule with additional product coverage and more stringent VOC limits <i>Measure ID:</i> SOLV2A <i>Emission Reductions:</i> 14.2% beyond Federal Part 59 rule (for a total reduction of 21.0% from uncontrolled emissions) <i>Control Cost:</i> \$800 per ton <i>Timing of Implementation:</i> Assuming 2007 effective date of rule and 2-year sell-through period, emission reductions are achieved in 2009 <i>Implementation Area:</i> 5-state MRPO region</p>	<p>2002 Base: 2009 Reduction: 2009 Remaining:</p>	<p>165,829 <u>-23,548</u> 142,281</p>
<p>Candidate measure: Adopt CARB 2003 SIP requirements with additional products and more stringent VOC limits (in addition to OTC Model Rule) <i>Measure ID:</i> SOLV2B <i>Emission Reductions:</i> 12.5% beyond OTC Model Rule (for a total reduction of 30.9% from uncontrolled emissions) <i>Control Cost:</i> \$4,800 per ton <i>Timing of Implementation:</i> Assuming 2007 effective date of rule and 2-year sell-through period, emission reductions are achieved in 2009 <i>Implementation Area:</i> 5-state MRPO region</p>	<p>2002 Base: 2009 Reduction: 2009 Remaining:</p>	<p>165,829 <u>-41,333</u> 124,496</p>

Notes: 2002 emission reductions shown are reductions from uncontrolled levels; 2009 emission reductions shown are reductions for 2002 base emissions, assuming that control measures are implemented statewide; 2009 emissions are not growth-adjusted.

**TABLE A.18 – CONTROL MEASURE SUMMARY FOR
GASOLINE DISTRIBUTION FACILITIES – STAGE I**

Control Measure Summary	VOC Emissions (tons/year) in 5-State MRPO Region	
2002 existing measures: Submerged fill and vapor balance/recovery in selected counties	2002 Base:	42,291
2009 On-the Books measures: None	2002 Base: 2009 Reduction: 2009 Remaining:	42,291 -0 42,291
Candidate measure: Adopt CARB EVR Stage I requirements in 8-hour nonattainment areas and adjacent counties <i>Measure ID: SOLV7A</i> <i>Emission Reductions:</i> reduction of 30-78% from 2002 levels depending on the geographic coverage <i>Control Cost:</i> \$0 to 2,120 per ton to upgrade existing systems to meet CARB EVR Phase I requirements; \$100 to 4,742 for new systems; dependent on the size of the station <i>Timing of Implementation:</i> Assuming 2007 effective date of rule, emission reductions are achieved in 2009 <i>Implementation Area:</i> (1) 8-hr ozone nonattainment areas, (2) 8-hr ozone nonattainment areas plus adjacent counties, or (3) all counties in MRPO region	2002 Base: 2009 Reduction: 2009 Remaining:	42,291 <u>-32,987</u> 9,304

Notes: 2009 emission reductions shown are reductions for 2002 base emissions, assuming that control measures are implemented in all counties; 2009 emissions are not growth-adjusted.

**TABLE A.19 – CONTROL MEASURE SUMMARY FOR
GASOLINE DISTRIBUTION FACILITIES – STAGE II**

Control Measure Summary	VOC Emissions (tons/year) in 5-State MRPO Region	
2002 existing measures: Stage II vapor recovery systems in moderate, serious, and severe for 1-hour ozone nonattainment areas	2002 Base:	44,815
2009 On-the Books measures: Use of on-board refueling vapor recovery (ORVR) canisters to capture and adsorb vapors from the vehicle fuel tank. ORVR is required to be installed on some new vehicles in 1998, and all new vehicles will be required to have ORVR installed by 2006.	2002 Base: 2009 Reduction: 2009 Remaining:	44,815 <u>-23,312</u> 21,503
Candidate measure: Adopt CARB EVR Stage II requirements in 8-hour nonattainment areas and adjacent counties <i>Measure ID:</i> SOLV7B <i>Emission Reductions:</i> reduction of 46-91% from 2002 levels depending on the geographic coverage <i>Control Cost:</i> \$840 to \$13,420 per ton to upgrade existing systems to meet CARB EVR Phase II requirements; about \$13,300 for new systems in 2009, increasing to \$28,500 by 2015 <i>Timing of Implementation:</i> Assuming 2007 effective date of rule, emission reductions are achieved in 2009 <i>Implementation Area:</i> (1) 8-hr ozone nonattainment areas, (2) 8-hr ozone nonattainment areas plus adjacent counties, or (3) all counties in MRPO region	2002 Base: 2009 Reduction: 2009 Remaining:	44,815 <u>-40,807</u> 4,008

Notes: 2009 emission reductions shown are reductions for 2002 base emissions, assuming that control measures are implemented in all counties; 2009 emissions are not growth-adjusted.

**TABLE A.20 – CONTROL MEASURE SUMMARY FOR
GASOLINE DISTRIBUTION FACILITIES – UNDERGROUND STORAGE TANKS**

Control Measure Summary	VOC Emissions (tons/year) in 5-State MRPO Region	
2002 existing measures: P/V valve in Chicago and Metro East areas	2002 Base:	10,194
2009 On-the Books measures: None	2002 Base: 2009 Reduction: 2009 Remaining:	10,194 -0 10,194
Candidate measure: Require Air Pollution Control Device for UST Vent <i>Measure ID:</i> SOLV7C <i>Emission Reductions:</i> reduction of 28 to 72% from 2002 levels depending on the geographic coverage <i>Control Cost:</i> minimal if system recovers gasoline vapors and returns to storage tank <i>Timing of Implementation:</i> Assuming 2007 effective date of rule, emission reductions are achieved in 2009 <i>Implementation Area:</i> (1) 8-hr ozone nonattainment areas, (2) 8-hr ozone nonattainment areas plus adjacent counties, or (3) all counties in MRPO region	2002 Base: 2009 Reduction: 2009 Remaining:	10,194 -7,340 2,854

Notes: 2009 emission reductions shown are reductions for 2002 base emissions, assuming that control measures are implemented in all counties; 2009 emissions are not growth-adjusted.

**TABLE A.21 – CONTROL MEASURE SUMMARY FOR
ASPHALT PAVING**

Control Measure Summary	VOC Emissions (tons/year) in 5-State MRPO Region	
2002 existing measures: CTG Requirements	2002 Base:	48,348
Candidate measure: Adopt SCAQMD 1108.1 VOC content limit for emulsified asphalt <i>Measure ID:</i> SOLV8A <i>Emission Reductions:</i> annual reduction of 50% from 2002 levels emulsified asphalt (or 42% for all types of asphalt) <i>Control Cost:</i> Not Available <i>Timing of Implementation:</i> Assuming 2007 effective date of rule, emission reductions are achieved in 2009 <i>Implementation Area:</i> (1) 8-hr ozone nonattainment areas, (2) 8-hr ozone nonattainment areas plus adjacent counties, or (3) all counties	2002 Base: 2009 Reduction: 2009 Remaining:	48,348 -15,099 <u>33,249</u>

Notes: 2009 emission reductions shown are reductions for 2002 base emissions, assuming that control measures are implemented statewide; 2009 emissions are not growth-adjusted.

APPENDIX B

LIST OF COUNTIES AND ATTAINMENT STATUS

STATE	FIPS Code	County Name	8-Hour Ozone Attainment Status	PM2.5 Attainment Status
IL	17001	Adams	Attainment	Attainment
IL	17003	Alexander	Attainment	Attainment
IL	17005	Bond	Attainment Border	Attainment
IL	17007	Boone	Attainment Border	Attainment
IL	17009	Brown	Attainment	Attainment
IL	17011	Bureau	Attainment	Attainment
IL	17013	Calhoun	Attainment Border	Attainment
IL	17015	Carroll	Attainment	Attainment
IL	17017	Cass	Attainment	Attainment
IL	17019	Champaign	Attainment	Attainment
IL	17021	Christian	Attainment	Attainment
IL	17023	Clark	Attainment Border	Attainment
IL	17025	Clay	Attainment	Attainment
IL	17027	Clinton	Attainment Border	Attainment
IL	17029	Coles	Attainment	Attainment
IL	17031	Cook	Moderate	Entire
IL	17033	Crawford	Attainment	Attainment
IL	17035	Cumberland	Attainment	Attainment
IL	17037	De Kalb	Attainment Border	Attainment
IL	17039	De Witt	Attainment	Attainment
IL	17041	Douglas	Attainment	Attainment
IL	17043	Du Page	Moderate	Entire
IL	17045	Edgar	Attainment Border	Attainment
IL	17047	Edwards	Attainment	Attainment
IL	17049	Effingham	Attainment	Attainment
IL	17051	Fayette	Attainment	Attainment
IL	17053	Ford	Attainment	Attainment
IL	17055	Franklin	Attainment	Attainment
IL	17057	Fulton	Attainment	Attainment
IL	17059	Gallatin	Attainment	Attainment
IL	17061	Greene	Attainment Border	Attainment
IL	17063	Grundy	Moderate	Partial
IL	17065	Hamilton	Attainment	Attainment
IL	17067	Hancock	Attainment	Attainment
IL	17069	Hardin	Attainment	Attainment
IL	17071	Henderson	Attainment	Attainment
IL	17073	Henry	Attainment	Attainment
IL	17075	Iroquois	Attainment	Attainment
IL	17077	Jackson	Attainment	Attainment
IL	17079	Jasper	Attainment	Attainment
IL	17081	Jefferson	Attainment	Attainment
IL	17083	Jersey	Moderate	Attainment
IL	17085	Jo Daviess	Attainment	Attainment
IL	17087	Johnson	Attainment	Attainment
IL	17089	Kane	Moderate	Entire

STATE	FIPS Code	County Name	8-Hour Ozone Attainment Status	PM2.5 Attainment Status
IL	17091	Kankakee	Attainment Border	Attainment
IL	17093	Kendall	Moderate	Partial
IL	17095	Knox	Attainment	Attainment
IL	17097	Lake	Moderate	Entire
IL	17099	La Salle	Attainment Border	Attainment
IL	17101	Lawrence	Attainment	Attainment
IL	17103	Lee	Attainment	Attainment
IL	17105	Livingston	Attainment Border	Attainment
IL	17107	Logan	Attainment	Attainment
IL	17109	McDonough	Attainment	Attainment
IL	17111	McHenry	Moderate	Entire
IL	17113	McLean	Attainment	Attainment
IL	17115	Macon	Attainment	Attainment
IL	17117	Macoupin	Attainment Border	Attainment
IL	17119	Madison	Moderate	Entire
IL	17121	Marion	Attainment	Attainment
IL	17123	Marshall	Attainment	Attainment
IL	17125	Mason	Attainment	Attainment
IL	17127	Massac	Attainment	Attainment
IL	17129	Menard	Attainment	Attainment
IL	17131	Mercer	Attainment	Attainment
IL	17133	Monroe	Moderate	Entire
IL	17135	Montgomery	Attainment Border	Attainment
IL	17137	Morgan	Attainment	Attainment
IL	17139	Moultrie	Attainment	Attainment
IL	17141	Ogle	Attainment	Attainment
IL	17143	Peoria	Attainment	Attainment
IL	17145	Perry	Attainment	Attainment
IL	17147	Piatt	Attainment	Attainment
IL	17149	Pike	Attainment	Attainment
IL	17151	Pope	Attainment	Attainment
IL	17153	Pulaski	Attainment	Attainment
IL	17155	Putnam	Attainment	Attainment
IL	17157	Randolph	Attainment Border	Partial
IL	17159	Richland	Attainment	Attainment
IL	17161	Rock Island	Attainment	Attainment
IL	17163	St. Clair	Moderate	Entire
IL	17165	Saline	Attainment	Attainment
IL	17167	Sangamon	Attainment	Attainment
IL	17169	Schuyler	Attainment	Attainment
IL	17171	Scott	Attainment	Attainment
IL	17173	Shelby	Attainment	Attainment
IL	17175	Stark	Attainment	Attainment
IL	17177	Stephenson	Attainment	Attainment
IL	17179	Tazewell	Attainment	Attainment

STATE	FIPS Code	County Name	8-Hour Ozone Attainment Status	PM2.5 Attainment Status
IL	17181	Union	Attainment	Attainment
IL	17183	Vermilion	Attainment	Attainment
IL	17185	Wabash	Attainment	Attainment
IL	17187	Warren	Attainment	Attainment
IL	17189	Washington	Attainment Border	Attainment
IL	17191	Wayne	Attainment	Attainment
IL	17193	White	Attainment	Attainment
IL	17195	Whiteside	Attainment	Attainment
IL	17197	Will	Moderate	Entire
IL	17199	Williamson	Attainment	Attainment
IL	17201	Winnebago	Attainment Border	Attainment
IL	17203	Woodford	Attainment	Attainment
IN	18001	Adams	Attainment Border	Attainment
IN	18003	Allen	Basic	Attainment
IN	18005	Bartholomew	Attainment Border	Attainment
IN	18007	Benton	Attainment	Attainment
IN	18009	Blackford	Attainment Border	Attainment
IN	18011	Boone	Basic	Attainment
IN	18013	Brown	Attainment Border	Attainment
IN	18015	Carroll	Attainment	Attainment
IN	18017	Cass	Attainment	Attainment
IN	18019	Clark	Basic	Entire
IN	18021	Clay	Attainment Border	Attainment
IN	18023	Clinton	Attainment Border	Attainment
IN	18025	Crawford	Attainment	Attainment
IN	18027	Daviess	Attainment Border	Attainment
IN	18029	Dearborn	Basic	Partial
IN	18031	Decatur	Attainment Border	Attainment
IN	18033	De Kalb	Attainment Border	Attainment
IN	18035	Delaware	Basic	Attainment
IN	18037	Dubois	Attainment Border	Entire
IN	18039	Elkhart	Basic	Attainment
IN	18041	Fayette	Attainment	Attainment
IN	18043	Floyd	Basic	Entire
IN	18045	Fountain	Attainment	Attainment
IN	18047	Franklin	Attainment Border	Attainment
IN	18049	Fulton	Attainment	Attainment
IN	18051	Gibson	Attainment Border	Partial
IN	18053	Grant	Attainment Border	Attainment
IN	18055	Greene	Basic	Attainment
IN	18057	Hamilton	Basic	Entire
IN	18059	Hancock	Basic	Attainment
IN	18061	Harrison	Attainment Border	Attainment
IN	18063	Hendricks	Basic	Entire

STATE	FIPS Code	County Name	8-Hour Ozone Attainment Status	PM2.5 Attainment Status
IN	18065	Henry	Attainment Border	Attainment
IN	18067	Howard	Attainment	Attainment
IN	18069	Huntington	Attainment Border	Attainment
IN	18071	Jackson	Basic	Attainment
IN	18073	Jasper	Attainment Border	Attainment
IN	18075	Jay	Attainment Border	Attainment
IN	18077	Jefferson	Attainment Border	Partial
IN	18079	Jennings	Attainment Border	Attainment
IN	18081	Johnson	Basic	Entire
IN	18083	Knox	Attainment Border	Attainment
IN	18085	Kosciusko	Attainment Border	Attainment
IN	18087	Lagrange	Attainment Border	Attainment
IN	18089	Lake	Moderate	Entire
IN	18091	La Porte	Marginal	Attainment
IN	18093	Lawrence	Attainment Border	Attainment
IN	18095	Madison	Basic	Attainment
IN	18097	Marion	Basic	Entire
IN	18099	Marshall	Attainment Border	Attainment
IN	18101	Martin	Attainment Border	Attainment
IN	18103	Miami	Attainment	Attainment
IN	18105	Monroe	Attainment Border	Attainment
IN	18107	Montgomery	Attainment Border	Attainment
IN	18109	Morgan	Basic	Entire
IN	18111	Newton	Attainment Border	Attainment
IN	18113	Noble	Attainment Border	Attainment
IN	18115	Ohio	Attainment Border	Attainment
IN	18117	Orange	Attainment	Attainment
IN	18119	Owen	Attainment Border	Attainment
IN	18121	Parke	Attainment Border	Attainment
IN	18123	Perry	Attainment	Attainment
IN	18125	Pike	Attainment Border	Partial
IN	18127	Porter	Moderate	Entire
IN	18129	Posey	Attainment Border	Attainment
IN	18131	Pulaski	Attainment	Attainment
IN	18133	Putnam	Attainment Border	Attainment
IN	18135	Randolph	Attainment Border	Attainment
IN	18137	Ripley	Attainment Border	Attainment
IN	18139	Rush	Attainment Border	Attainment
IN	18141	St. Joseph	Basic	Entire
IN	18143	Scott	Attainment Border	Attainment
IN	18145	Shelby	Basic	Attainment
IN	18147	Spencer	Attainment Border	Partial
IN	18149	Starke	Attainment Border	Attainment
IN	18151	Steuben	Attainment	Attainment
IN	18153	Sullivan	Attainment Border	Attainment

STATE	FIPS Code	County Name	8-Hour Ozone Attainment Status	PM2.5 Attainment Status
IN	18155	Switzerland	Attainment Border	Attainment
IN	18157	Tippecanoe	Attainment Border	Attainment
IN	18159	Tipton	Attainment Border	Attainment
IN	18161	Union	Attainment	Attainment
IN	18163	Vanderburgh	Basic	Entire
IN	18165	Vermillion	Attainment Border	Attainment
IN	18167	Vigo	Basic	Attainment
IN	18169	Wabash	Attainment	Attainment
IN	18171	Warren	Attainment	Attainment
IN	18173	Warrick	Basic	Entire
IN	18175	Washington	Attainment Border	Attainment
IN	18177	Wayne	Attainment	Attainment
IN	18179	Wells	Attainment Border	Attainment
IN	18181	White	Attainment	Attainment
IN	18183	Whitley	Attainment Border	Attainment
MI	26001	Alcona	Attainment	Attainment
MI	26003	Alger	Attainment	Attainment
MI	26005	Allegan	Basic	Attainment
MI	26007	Alpena	Attainment	Attainment
MI	26009	Antrim	Attainment	Attainment
MI	26011	Arenac	Attainment	Attainment
MI	26013	Baraga	Attainment	Attainment
MI	26015	Barry	Attainment Border	Attainment
MI	26017	Bay	Attainment	Attainment
MI	26019	Benzie	Basic	Attainment
MI	26021	Berrien	Basic	Attainment
MI	26023	Branch	Attainment Border	Attainment
MI	26025	Calhoun	Basic	Attainment
MI	26027	Cass	Marginal	Attainment
MI	26029	Charlevoix	Attainment	Attainment
MI	26031	Cheboygan	Attainment	Attainment
MI	26033	Chippewa	Attainment	Attainment
MI	26035	Clare	Attainment	Attainment
MI	26037	Clinton	Basic	Attainment
MI	26039	Crawford	Attainment	Attainment
MI	26041	Delta	Attainment	Attainment
MI	26043	Dickinson	Attainment	Attainment
MI	26045	Eaton	Basic	Attainment
MI	26047	Emmet	Attainment	Attainment
MI	26049	Genesee	Basic	Attainment
MI	26051	Gladwin	Attainment	Attainment
MI	26053	Gogebic	Attainment	Attainment
MI	26055	Grand Traverse	Attainment Border	Attainment
MI	26057	Gratiot	Attainment Border	Attainment

STATE	FIPS Code	County Name	8-Hour Ozone Attainment Status	PM2.5 Attainment Status
MI	26059	Hillsdale	Attainment Border	Attainment
MI	26061	Houghton	Attainment	Attainment
MI	26063	Huron	Basic	Attainment
MI	26065	Ingham	Basic	Attainment
MI	26067	Ionia	Attainment Border	Attainment
MI	26069	Iosco	Attainment	Attainment
MI	26071	Iron	Attainment	Attainment
MI	26073	Isabella	Attainment	Attainment
MI	26075	Jackson	Attainment Border	Attainment
MI	26077	Kalamazoo	Basic	Attainment
MI	26079	Kalkaska	Attainment	Attainment
MI	26081	Kent	Basic	Attainment
MI	26083	Keweenaw	Attainment	Attainment
MI	26085	Lake	Attainment Border	Attainment
MI	26087	Lapeer	Basic	Attainment
MI	26089	Leelanau	Attainment Border	Attainment
MI	26091	Lenawee	Marginal	Attainment
MI	26093	Livingston	Marginal	Entire
MI	26095	Luce	Attainment	Attainment
MI	26097	Mackinac	Attainment	Attainment
MI	26099	Macomb	Marginal	Entire
MI	26101	Manistee	Attainment Border	Attainment
MI	26103	Marquette	Attainment	Attainment
MI	26105	Mason	Basic	Attainment
MI	26107	Mecosta	Attainment	Attainment
MI	26109	Menominee	Attainment	Attainment
MI	26111	Midland	Attainment	Attainment
MI	26113	Missaukee	Attainment	Attainment
MI	26115	Monroe	Marginal	Entire
MI	26117	Montcalm	Attainment Border	Attainment
MI	26119	Montmorency	Attainment	Attainment
MI	26121	Muskegon	Marginal	Attainment
MI	26123	Newaygo	Attainment Border	Attainment
MI	26125	Oakland	Marginal	Entire
MI	26127	Oceana	Attainment Border	Attainment
MI	26129	Ogemaw	Attainment	Attainment
MI	26131	Ontonagon	Attainment	Attainment
MI	26133	Osceola	Attainment	Attainment
MI	26135	Oscoda	Attainment	Attainment
MI	26137	Otsego	Attainment	Attainment
MI	26139	Ottawa	Basic	Attainment
MI	26141	Presque Isle	Attainment	Attainment
MI	26143	Roscommon	Attainment	Attainment
MI	26145	Saginaw	Attainment Border	Attainment
MI	26147	St. Clair	Marginal	Entire

STATE	FIPS Code	County Name	8-Hour Ozone Attainment Status	PM2.5 Attainment Status
MI	26149	St. Joseph	Attainment Border	Attainment
MI	26151	Sanilac	Attainment Border	Attainment
MI	26153	Schoolcraft	Attainment	Attainment
MI	26155	Shiawassee	Attainment Border	Attainment
MI	26157	Tuscola	Attainment Border	Attainment
MI	26159	Van Buren	Basic	Attainment
MI	26161	Washtenaw	Marginal	Entire
MI	26163	Wayne	Marginal	Entire
MI	26165	Wexford	Attainment Border	Attainment
OH	39001	Adams	Attainment	Partial
OH	39003	Allen	Basic	Attainment
OH	39005	Ashland	Attainment Border	Attainment
OH	39007	Ashtabula	Moderate	Partial
OH	39009	Athens	Attainment Border	Attainment
OH	39011	Auglaize	Attainment Border	Attainment
OH	39013	Belmont	Basic	Entire
OH	39015	Brown	Attainment Border	Attainment
OH	39017	Butler	Basic	Entire
OH	39019	Carroll	Attainment Border	Attainment
OH	39021	Champaign	Attainment Border	Attainment
OH	39023	Clark	Basic	Entire
OH	39025	Clermont	Basic	Entire
OH	39027	Clinton	Basic	Attainment
OH	39029	Columbiana	Basic	Entire
OH	39031	Coshocton	Attainment Border	Partial
OH	39033	Crawford	Attainment	Attainment
OH	39035	Cuyahoga	Moderate	Entire
OH	39037	Darke	Attainment Border	Attainment
OH	39039	Defiance	Attainment Border	Attainment
OH	39041	Delaware	Basic	Entire
OH	39043	Erie	Attainment Border	Attainment
OH	39045	Fairfield	Basic	Entire
OH	39047	Fayette	Attainment Border	Attainment
OH	39049	Franklin	Basic	Entire
OH	39051	Fulton	Attainment Border	Attainment
OH	39053	Gallia	Attainment	Partial
OH	39055	Geauga	Moderate	Attainment
OH	39057	Greene	Basic	Entire
OH	39059	Guernsey	Attainment Border	Attainment
OH	39061	Hamilton	Basic	Entire
OH	39063	Hancock	Attainment Border	Attainment
OH	39065	Hardin	Attainment Border	Attainment
OH	39067	Harrison	Attainment Border	Attainment
OH	39069	Henry	Attainment Border	Attainment

STATE	FIPS Code	County Name	8-Hour Ozone Attainment Status	PM2.5 Attainment Status
OH	39071	Highland	Attainment Border	Attainment
OH	39073	Hocking	Attainment Border	Attainment
OH	39075	Holmes	Attainment Border	Attainment
OH	39077	Huron	Attainment Border	Attainment
OH	39079	Jackson	Attainment	Attainment
OH	39081	Jefferson	Basic	Entire
OH	39083	Knox	Basic	Attainment
OH	39085	Lake	Moderate	Entire
OH	39087	Lawrence	Attainment	Entire
OH	39089	Licking	Basic	Entire
OH	39091	Logan	Attainment	Attainment
OH	39093	Lorain	Moderate	Entire
OH	39095	Lucas	Basic	Entire
OH	39097	Madison	Basic	Attainment
OH	39099	Mahoning	Basic	Entire
OH	39101	Marion	Attainment Border	Attainment
OH	39103	Medina	Moderate	Entire
OH	39105	Meigs	Attainment Border	Attainment
OH	39107	Mercer	Attainment	Attainment
OH	39109	Miami	Basic	Attainment
OH	39111	Monroe	Attainment Border	Attainment
OH	39113	Montgomery	Basic	Entire
OH	39115	Morgan	Attainment Border	Attainment
OH	39117	Morrow	Attainment Border	Attainment
OH	39119	Muskingum	Attainment Border	Attainment
OH	39121	Noble	Attainment Border	Attainment
OH	39123	Ottawa	Attainment Border	Attainment
OH	39125	Paulding	Attainment Border	Attainment
OH	39127	Perry	Attainment Border	Attainment
OH	39129	Pickaway	Attainment Border	Attainment
OH	39131	Pike	Attainment	Attainment
OH	39133	Portage	Moderate	Entire
OH	39135	Preble	Attainment Border	Attainment
OH	39137	Putnam	Attainment Border	Attainment
OH	39139	Richland	Attainment Border	Attainment
OH	39141	Ross	Attainment	Attainment
OH	39143	Sandusky	Attainment Border	Attainment
OH	39145	Scioto	Attainment	Entire
OH	39147	Seneca	Attainment Border	Attainment
OH	39149	Shelby	Attainment Border	Attainment
OH	39151	Stark	Basic	Entire
OH	39153	Summit	Moderate	Entire
OH	39155	Trumbull	Basic	Entire
OH	39157	Tuscarawas	Attainment Border	Attainment
OH	39159	Union	Attainment Border	Attainment

STATE	FIPS Code	County Name	8-Hour Ozone Attainment Status	PM2.5 Attainment Status
OH	39161	Van Wert	Attainment Border	Attainment
OH	39163	Vinton	Attainment	Attainment
OH	39165	Warren	Basic	Entire
OH	39167	Washington	Basic	Entire
OH	39169	Wayne	Attainment Border	Attainment
OH	39171	Williams	Attainment Border	Attainment
OH	39173	Wood	Basic	Entire
OH	39175	Wyandot	Attainment	Attainment
WI	55001	Adams	Attainment	Attainment
WI	55003	Ashland	Attainment	Attainment
WI	55005	Barron	Attainment	Attainment
WI	55007	Bayfield	Attainment	Attainment
WI	55009	Brown	Attainment Border	Attainment
WI	55011	Buffalo	Attainment	Attainment
WI	55013	Burnett	Attainment	Attainment
WI	55015	Calumet	Attainment Border	Attainment
WI	55017	Chippewa	Attainment	Attainment
WI	55019	Clark	Attainment	Attainment
WI	55021	Columbia	Attainment	Attainment
WI	55023	Crawford	Attainment	Attainment
WI	55025	Dane	Attainment Border	Attainment
WI	55027	Dodge	Attainment Border	Attainment
WI	55029	Door	Basic	Attainment
WI	55031	Douglas	Attainment	Attainment
WI	55033	Dunn	Attainment	Attainment
WI	55035	Eau Claire	Attainment	Attainment
WI	55037	Florence	Attainment	Attainment
WI	55039	Fond Du Lac	Attainment Border	Attainment
WI	55041	Forest	Attainment	Attainment
WI	55043	Grant	Attainment	Attainment
WI	55045	Green	Attainment	Attainment
WI	55047	Green Lake	Attainment	Attainment
WI	55049	Iowa	Attainment	Attainment
WI	55051	Iron	Attainment	Attainment
WI	55053	Jackson	Attainment	Attainment
WI	55055	Jefferson	Attainment Border	Attainment
WI	55057	Juneau	Attainment	Attainment
WI	55059	Kenosha	Moderate	Attainment
WI	55061	Kewaunee	Basic	Attainment
WI	55063	La Crosse	Attainment	Attainment
WI	55065	Lafayette	Attainment	Attainment
WI	55067	Langlade	Attainment	Attainment
WI	55069	Lincoln	Attainment	Attainment
WI	55071	Manitowoc	Basic	Attainment

STATE	FIPS Code	County Name	8-Hour Ozone Attainment Status	PM2.5 Attainment Status
WI	55073	Marathon	Attainment	Attainment
WI	55075	Marinette	Attainment	Attainment
WI	55077	Marquette	Attainment	Attainment
WI	55078	Menominee	Attainment	Attainment
WI	55079	Milwaukee	Moderate	Attainment
WI	55081	Monroe	Attainment	Attainment
WI	55083	Oconto	Attainment	Attainment
WI	55085	Oneida	Attainment	Attainment
WI	55087	Outagamie	Attainment Border	Attainment
WI	55089	Ozaukee	Moderate	Attainment
WI	55091	Pepin	Attainment	Attainment
WI	55093	Pierce	Attainment	Attainment
WI	55095	Polk	Attainment	Attainment
WI	55097	Portage	Attainment	Attainment
WI	55099	Price	Attainment	Attainment
WI	55101	Racine	Moderate	Attainment
WI	55103	Richland	Attainment	Attainment
WI	55105	Rock	Attainment Border	Attainment
WI	55107	Rusk	Attainment	Attainment
WI	55109	St. Croix	Attainment	Attainment
WI	55111	Sauk	Attainment	Attainment
WI	55113	Sawyer	Attainment	Attainment
WI	55115	Shawano	Attainment	Attainment
WI	55117	Sheboygan	Moderate	Attainment
WI	55119	Taylor	Attainment	Attainment
WI	55121	Trempealeau	Attainment	Attainment
WI	55123	Vernon	Attainment	Attainment
WI	55125	Vilas	Attainment	Attainment
WI	55127	Walworth	Attainment Border	Attainment
WI	55129	Washburn	Attainment	Attainment
WI	55131	Washington	Moderate	Attainment
WI	55133	Waukesha	Moderate	Attainment
WI	55135	Waupaca	Attainment	Attainment
WI	55137	Waushara	Attainment	Attainment
WI	55139	Winnebago	Attainment Border	Attainment
WI	55141	Wood	Attainment	Attainment