Identification and Evaluation of Candidate Control Measures

Phase II Final Report

Prepared for:

The Lake Michigan Air Directors Consortium
(LADCO)
2250 East Devon Avenue, Suite 250
Des Plaines, IL 60018
847.296.2181

Prepared by:

MACTEC Federal Programs, Inc.
560 Herndon Parkway, Suite 200
Herndon, VA 20170
703.471.8383

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Edward Sabo
Principal

Douglas A. Toothman
Senior Principal

June, 2006

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SECTION 1

BACKGROUND

Introduction

The States of the Midwest Regional Planning Organization (MRPO) are considering 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, additional emission reductions beyond current requirements may 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 States' air quality planning activities.

Under Phase I of the Candidate Control Measures project, MACTEC evaluated the following categories:

1. Electric Generating Units (EGUs)
2. Industrial, Commercial, and Institutional (ICI) Boilers
3. Portland Cement Plants
4. Industrial Surface Coating
5. Industrial Solvent Cleaning (Degreasing)
6. Architectural and Industrial Maintenance (AIM) Coatings
7. Portable Fuel Containers
8. Auto Refinishing
9. Consumer Solvents
10. Gasoline Dispensing Facilities (Stage I, Stage II, and Underground Storage Tanks)
11. Asphalt Paving Applications

MACTEC prepared interim White Papers for each of these categories. The White Papers went through several rounds of review by LADCO member States. At the end of Phase I, LADCO posted these papers on their web site for review by stakeholders. LADCO also staged regional air quality planning workshops to present the information contained in the White Papers to stakeholders.

Under Phase II, MACTEC and the LADCO member States reviewed stakeholder comments (see Table 1), considered how to address comments, and made revisions to the White Papers to incorporate new or updated information. Also, MACTEC developed interim White Papers for five new categories:

12. Petroleum Refineries
13. Asphalt Production Plants
14. Glass and Fiberglass Furnaces
15. Chemical Plants
16. Airport Operations

This report is organized into this Background section and three additional sections. Section 2 summarizes information for each of the candidate control measures. Section 3 describes the control factor files that were prepared to support air quality modeling. Section 4 identifies issues that LADCO may want 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

EVALUATION OF CANDIDATE CONTROL MEASURES

General Format for the Interim White Papers

MACTEC developed a series of "Interim White Papers" to present the evaluation of candidate control measures. 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 supporting references. The type of information in each subsection is described below:

- **Summary Table** – Identifies the source category, control measures already accounted for in the Base K 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 LADCO's Base K inventory and the 2009 values are based on future year emission projections (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). They are also contained in Appendix D of this report.

Development of Phase II White Papers

Five new interim White Papers were prepared during Phase II:

- Petroleum Refineries. Recent enforcement settlements are likely to result in significant reductions over the next few years. MACTEC compiled information from the enforcement settlements and included that information in the White Paper. We identified opportunities for additional reductions beyond those called for in the enforcement settlements for flare gas recovery, leak detection and repair, and benzene/wastewater requirements. However, the emissions reductions expected from these measures are uncertain and were not quantified for this report.
- Chemical Plants. We identified and evaluated existing and potential controls for chemical processes. Most of the NOx and SO2 emissions from the chemical process industry are generated from fuel combustion sources. Candidate control measures for these pollutants are discussed in the Industrial, Commercial, and Institutional Boiler White Paper. The majority of the NOx non-fuel combustion process emissions are from nitrogen-based fertilizer manufacturers operating nitric acid plants. The largest sources of non-fuel combustion process SO2 emissions include facilities operating sulfuric plants in the production of inorganic chemicals. A wide array of chemical processing facilities are generating VOC and PM2.5 process emissions including plants producing inorganic and organic chemicals, inorganic fertilizers, plastics and ethanol. The PM2.5 process emissions from individual facilities are relatively small in comparison to the other criteria pollutants, with the largest process source a nitrogen-based fertilizer manufacturer. We recommend that detailed case-by-case assessments of these facilities are needed to accurately identify candidate control measures, possible emission reductions, and costs for obtaining any additional emission reductions.
- Asphalt Production Plants. Emission estimates for this category are highly uncertain because most of these facilities are minor sources and are not included in the MRPOs point source inventory. We did identify options for reducing emissions of NOx and SO2. For NOx, we are assuming that sources could achieve a 25 percent reduction from uncontrolled levels through combustion modifications such as low-NOx burners, similar to that required in SJVUAPCD proposed new rule 4309. Sources could reduce SO2 emissions by switching to natural gas or low-sulfur fuel oil; however, we cannot determine an SO2 percent reduction at this time because we cannot determine whether natural gas or low-sulfur fuel is available for these plants.
- Glass and Fiberglass Manufacturing Furnaces. Several alternative control technologies are available to glass manufacturing facilities to limit NOx emissions. These options include combustion modifications (low NOx burners, oxy-fuel firing, oxygen-enriched air staging), process modifications (fuel switching, batch preheat, electric boost), and post combustion modifications (fuel reburn, SNCR, SCR). Using EPA's "highly cost effective" threshold of $2000/ton; we assumed an average across the MRPO region of a *30 percent reduction* in NOx emissions (for example, low NOx burners or SNCR). Using a "cost effective" threshold of $4000/ton; we assumed an average across the MRPO region of a 75 *percent reduction* in NOx emissions (for example, oxy-firing or SCR).
- Airport Operations. We identified a number of options for reducing emissions at airports and examined the constraints, potential emission reductions, and the costs associated with these options. For each category of emissions at the airport, we identified technological measures (such

as engine improvements, electrification of support equipment, alternative fuels) and operational control options (such as congestion management, and changes in taxiing, takeoff, and landing procedures). Due to the variety of emissions sources at airports and strategies available for reducing emissions (and some of the legal barriers which preempt states from regulation aircraft engine emissions), it is difficult to prescribe a particular control measures that is appropriate for any individual airport or for the various types of equipment, operations, and functions. While cost-effective technical and operational options are available to reduce emissions from all airport sources, the feasibility of the different measures can vary from airport to airport. For example, installing electrified gates can be done more easily at newer airports than at older airports. Some of the most cost effective options outlined in the NESCAUM report are reducing NOx emissions through GSE and GAV electrification or use of alternative fuels. For this White Paper, we are suggesting that NOx emissions from GSE can be reduced by up to 90 percent over a ten-year period after adoption of the measure.

Each of these new White Papers underwent a round of review by LADCO member States. MACTEC made discussed these White Papers during a presentation at the November 16, 2005, Regional Air Quality Workshop.

Revisions to Phase I White Papers

MACTEC revised many of the Phase I White Papers to provide updated information. For example, the Phase I EGU White Paper was based on the proposed Clean Air Interstate Rule (CAIR) rule and data developed to support the proposed rule. The EGU White Paper was updated to reflect the requirements of the final CAIR which was promulgated in the spring of 2005. This included the use of new results from the Integrated Planning Model (IPM) that forecasted future year emissions in the EGU sector using the final CAIR requirements.

The White Papers for several area source VOC categories (coatings, consumer products, portable fuel containers) were also updated to reflect new information. The candidate control measures for these categories were based on measures either on-the-books or under development in California. We updated the White Papers for these categories to provide the current status of the regulatory development efforts in California and changes in any emission reduction or cost effectivness data.

Stakeholders provided comments on several of the Phase I White Papers. The commenters are identified in Tables 1 and 2. A brief summary and response to these comments is contained in Appendix A. The comments in Appendix A are organized by source category.

Emission Reductions from Candidate Control Measures

Table 3 identifies the Interim White Papers that were developed and summarizes information about the candidate control measures that were evaluated. The table 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 Appendix B.

TABLE 1 – COMMENTS RECEIVED FROM STAKEHOLDERS REGARDING ELECTRIC GENERATING UNITS

White Paper	Date	Organization and Reference
Electric Generating Units (EGUs)	March 8 ,2005	Environmental Committee of the Ohio Electric Utilities, *Comments on Interim White Paper – Source Category: Electric Generating Units*
	March 9, 2005	Midwest Ozone Group and Utility Air Regulatory Group, *Comments on Emissions Standards, Schedule Proposed in Interim White Paper*
	March 9, 2005	Center for Energy & Economic Development, *Age and Size of Coal Power Plants*
	May 2005	United Mine Workers of America, *Comments of United Mine Workers of America on Proposed LADCO EGU White Paper*
	June 28, 2005	Midwest Ozone Group and Utility Air Regulatory Group, *Comparison of EGU1 and EGU2 to Consent Decrees and BACT Limits*
	June 28, 2005	Midwest Ozone Group, *Evaluation of the Midwest RPO Interim Measures and EGU1 and EGU2*
	July 5, 2005	United Mine Workers of America, *Comments of United Mine Workers of America on Proposed Amended Rules for Fossil-Fired Powerplants 28 IR 2817*
	July 11, 2005	BBC on behalf of CEED, MOG, and NiSource, *Impacts of LADCO CAIR-Plus Proposals on the Midwest Economy*
	July 27, 2005	American Electric Power, *Electric Generating Unit White Paper*
	July 29, 2005	Cinergy Corp., *Comments on Interim White Paper- Source Category: Electric Generating Units*
	August 1, 2005	Midwest Generation EME, *Midwest Generation's Comments on the EGU Interim White Paper dated 1/14/05*
	August 1, 2005	Midwest Ozone Group, *Evaluation of the Midwest RPO Interim Measures and EGU1 and EGU2*
	August 1, 2005	Midwest Ozone Group and Utility Air Regulatory Group, *Comparison of EGU1 and EGU2 to Consent Decrees and BACT Limits*
	August 2, 2005	Office of Public Utilities, City of Springfield IL, *Comments on Interim White Paper, Midwest RPO Candidate Control Measures, Source Category: Electric Generating Units*
	February 3, 2006	Stratus Consulting. *Review of the Midwest Ozone Group's Cost Impact Analyses of the Midwest Regional Planning Organization's Candidate Control Measures for SO2 and NOx Emissions from Electric Generating Units*

TABLE 2 – COMMENTS RECEIVED FROM STAKEHOLDERS REGARDING OTHER SOURCE CATEGORIES

White Paper	Date	Organization and Reference
Consumer and Commercial Products	July 29, 2005	Consumer Specialty Products Association, *Comments on Interim White Paper – Source Category: Consumer and Commercial Products*
	August 1, 2005	Automotive Specialty Products Alliance, *Comments on Interim White Paper on Consumer and Commercial Products*
	August 1, 2005	Cosmetic, Toiletry, and Fragrance Association, *Interim White Paper – Possible Regulation of Consumer Products*
AIM and Industrial Surface Coatings	August 1, 2005	National Paint and Coatings Association, *Comments on Architectural and Industrial Maintenance (AIM) and Industrial Surface Coatings*
	November, 2005	National Paint and Coatings Association, *Additional Comments on Architectural and Industrial Maintenance (AIM) and Industrial Surface Coatings*
	December 29, 2005	Glitsa American. *Comments on AIM White Paper*
	September 27, 2005	Michigan Manufacturers Association, *Comments on Midwest Planning Organization (RPO) Identification and Evaluation of Candidate Control Measures and Associated "White Papers"*
Gasoline Distribution Facilities	September 27, 2005	Michigan Manufacturers Association, *Comments on Midwest Planning Organization (RPO) Identification and Evaluation of Candidate Control Measures and Associated "White Papers"*
Industrial, Commercial, and Institutional (ICI) Boilers	July 29, 2005	Citizens Thermal Energy, *Comments Regarding "Interim White Paper – Midwest RPO Candidate Control Measures: Source Category ICI Boilers (03/29/05)"*
Cement Plants	October 7, 2005	Portland Cement Association. *Comments on the MRPOs Engineering Analysis on Cement Best Available Retrofit Technology (BART) and Interim White Paper – Source Category: Cement Kilns*
	May 19, 2006	Portland Cement Association. *Comments on Interim White Paper – Midwest Regional Planning Organization Candidate Control Measures (Source Category: Cement Kilns)*

TABLE 3 – SUMMARY OF CANDIDATE CONTROL MEASURES

Source Category	ID	Description	Percent Reduction from 2009 On-the-Books Emission Levels			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	3		41	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	22		61	700 - 2,100		800 - 3,000
ICI Boilers	ICI1	Apply 40% SO2 and 60% NOx reduction to all medium and large ICI boilers	19		29	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	*		*	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	31	*	66	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	Cost savings to 2,500		2,211 - 6,917
	KILN2	Apply likely controls (95% SO2 and 80% NOx reduction) to kilns subject to the proposed BART requirements	*	*	*	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	*	*	*			

Source Category	ID	Description	Percent Reduction from 2009 On-the-Books Emission Levels			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		78			100 - 21,000	
	SOLV5B	Area sources - adopt RACT regulations (90% from uncontrolled), lower applicability thresholds, and extend geographic coverage to all counties		72			100 – 21,000	
Industrial Solvent Cleaning	SOLV6A	Adopt Chicago/Metro East cold cleaning regulations (66% reduction from uncontrolled) in all counties		60			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		20			6,400	
	SOLV1B	Adopt SCAQMD Phase III VOC limits in addition to OTC Model Rule		31			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)		24			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			2,860	

Source Category	ID	Description	Percent Reduction from 2009 On-the-Books Emission Levels			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			4,800	
Gasoline Dispensing Facilities	SOLV7A	Adopt CARB EVR Stage I requirements (98% control) in 8-hour nonattainment areas and adjacent counties		0 in 2009 55 in 2011			100 - 4,742 (depending on size)	
	SOLV7B	Adopt CARB EVR Stage II requirements (95% control) in 8-hour nonattainment areas and adjacent counties in addition to on-board vapor recovery		67			13,300 to 36,260	
	SOLV7C	Require air pollution control device (90% control) for UST vent in 8-hour nonattainment areas and adjacent counties		53			Near 0 due to gas recovery	
Asphalt Paving	SOLV8A	Adopt SCAQMD 1108.1 VOC content limit (50% reduction) for emulsified asphalt		33			?	
Asphalt Production Plants		Apply available combustion modification controls to all asphalt manufacturing plants		25		17,630 – 21,084		
Glass and Fiberglass Manufacturing Plants	GLASS1	Apply “Highly Cost Effective” Controls	30			<2,000		
	GLASS2	Apply “Cost Effective” Reasonably Available Controls	75			2,000 – 4,000		
Airport Operations	GSE01	Convert or retrofit gasoline/diesel ground support equipment	90			0 -5,800 Depending on type		

* The additional reductions for ICI Boilers, Petroleum Refineries, Iron & Steel Plants, and Chemical Plants were due to emission controls discussed in the *MRPO Best Available Retrofit Engineering Analysis* reports for these categories prepared by MACTEC. Emission reductions from BART are not expected to occur until after 2009.

Figures 2a through 2c and Table 4 summarize the emissions from the 2002 LADCO Base K inventory and various control scenarios in 2009 for the five LADCO States (Illinois, Indiana, Michigan, Ohio, and Wisconsin). Table 4 shows the actual emissions in 2002 (yellow column); the emissions expected in 2009 after implementation of "on-the-books" control measures, (green column, does not include emission changes due to economic growth); the emissions expected in 2009 after implementation of the candidate control measures identified in Table 3 (beige column, and the incremental reduction in 2009 from the White Paper candidate control measures as compared to the 2009 "on-the-books" scenarios (second beige column).

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, including the final CAIR, which will result in additional reductions after 2002. The third bar shows the 2009 emissions with the application of the less stringent measures identified in the White Papers. The fourth 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, NOx, and VOC are as follows:

- With the implementation of the final CAIR and other Federal onroad/nonroad rules, total SO2 emissions in the 5-state region are expected to be reduced by one-third 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 25 percent from projected 2009 levels. Implementing the most stringent of the candidate control measures (EGU2 for EGUs and ICI3 for industrial boilers) will reduce SO2 emissions by 38 percent from projected 2009 levels.
- With the implementation of the final CAIR and other Federal onroad/nonroad rules, total NOx emissions in the 5-state region are expected to be reduced by 34 percent between 2002 and 2009. Implementing the least stringent of the candidate control measures (EGU1 for EGUs and ICI1 for industrial boilers) will reduce NOx emissions 2.5 percent from 2009 levels. Implementing the most stringent of the candidate control measures (EGU2 for EGUs and ICI3 for industrial boilers) will reduce NOx emissions by 6 percent from 2009 levels.

For VOC, emissions are expected to be reduced by 16 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 13 percent compared to projected 2009 levels. Implementing the most stringent of the candidate control measures will reduce VOC emissions by 15 percent compared to 2002 levels.

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

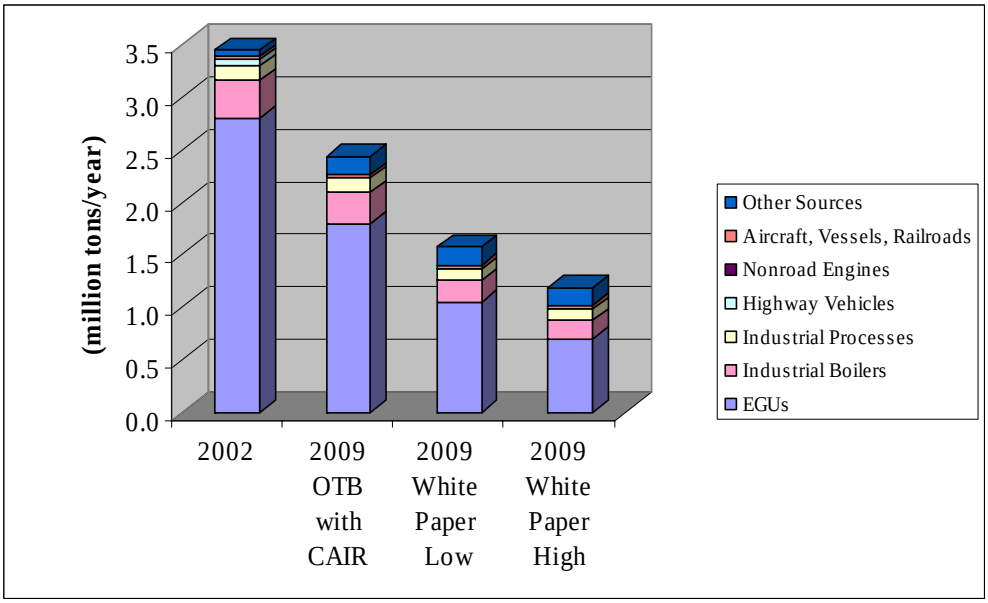
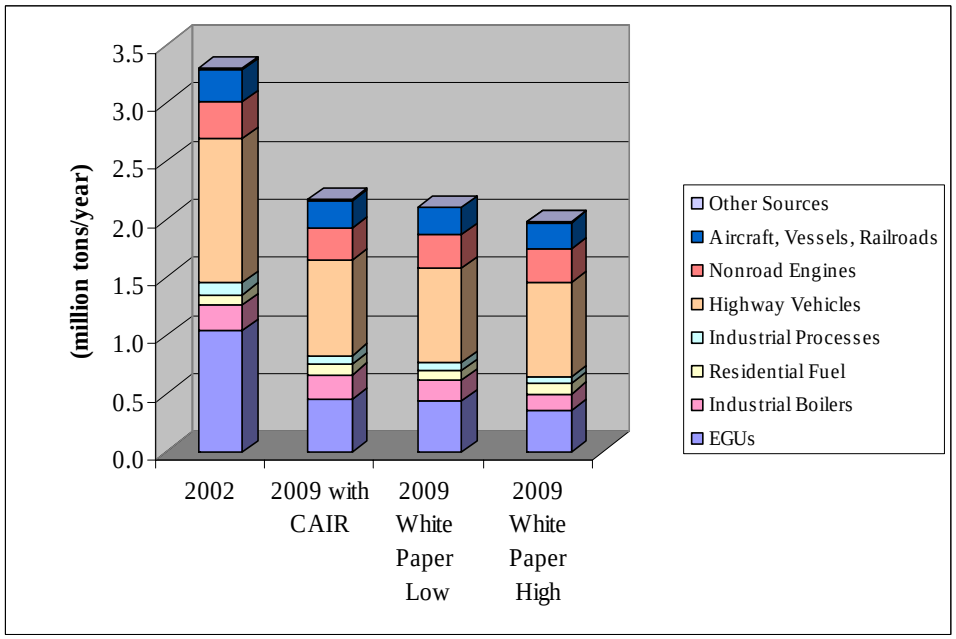
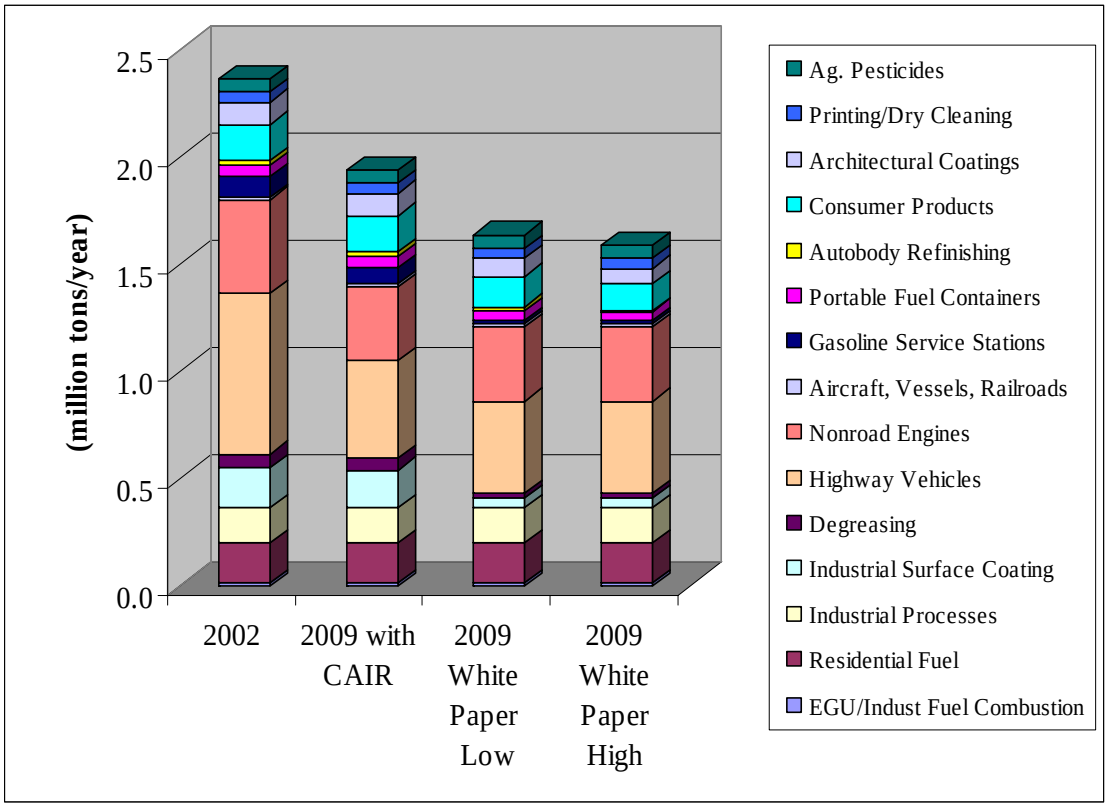


FIGURE 2b – COMPARISON OF 2002 AND 2009 NOx EMISSIONS FOR 5-STATE MRPO AREA



The 2002 emissions presented in these figures are from the LADCO's Base K inventory and the 2009 values based on future year emission projections (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's Base K inventory and the 2009 values based on future year emission projections (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.

TABLE 4 – COMPARISON ON 2002 BASE YEAR, 2009 ON-THE-BOOKS, AND 2009 CANDIDATE CONTROL MEASURE EMISSION SCENARIOS

CONTROLS INCLUDED IN 2002 INVENTORY	OTB (ON-THE-BOOKS) and OTW (ON-THE-WAY) REDUCTIONS OCCUR AFTER 2002	CANDIDATE CONTROL MEASURES	2002 LADCO EI vs 2009 OTB vs Candidate Reductions											
			VOC				NOx				SO2			
				OTB	Candidate Controls			OTB	Candidate Controls			OTB	Candidate Controls	
			2002 (tpy)	2009 (tpy)	2009 (tpy)	Reduction (tpy)	2002 (tpy)	2009 (tpy)	2009 (tpy)	Reduction (tpy)	2002 (tpy)	2009 (tpy)	2009 (tpy)	Reduction (tpy)
SOURCE CATEGORY: EGUs														
PSD/NSR/NSPS; RACT in NAA; Title IV SO2 Allowances; Title IV Phase I/II NOx Limits	NOx SIP Call (except WI); Utility Enforcement Settlements; Combustion Turbine MACT; CAIR (SO2@0.56, NOx @0.31 lbs/mmBtu average for all EGUs)	WP EGU1 - Emission Cap Based on "Retrofit BACT Level" Interim 2009 based on SO2@ 0.36, NOx@0.24 lbs/mmBtu	7,569	7,764	7,819	-55	1,047,484	449,630	437,797	11,833	2,798,884	1,794,962	1,050,713	744,249
		WP EGU2 - Emission Cap Based on "BACT for New Plants" Interim 2009 based on SO2@ 0.15, NOx@0.12 lbs/mmBtu							350,238	99,392			700,745	1,094,217
SOURCE CATEGORY: INDUSTRIAL/COMMERCIAL/INSTITUTIONAL BOILERS														
PSD/NSR/NSPS; RACT in NAA	NOx SIP Call (except WI); Boiler/Heater/RICE MACT	WP ICI1 - Apply 40% SO2 and 60% NOx reduction to all medium and large ICI boilers	4,498	4,498	4,498	0	218,547	213,283	173,569	39,714	362,347	295,521	209,096	86,425
		WP ICI2 Apply Likely Controls (90% SO2 and 80% NOx Reduction) to ICI Boilers subject to BART							196,276	17,007			177,800	117,721
		WP ICI3 - Apply 90% SO2 and 80% NOx reduction to all medium and large ICI boilers							146,953	66,330			101,065	194,456
SOURCE CATEGORY: INDUSTRIAL PROCESSES - CHEMICAL PLANTS														
PSD/NSR/NSPS; RACT in NAA; 2-, 4-, 7-yr MACT	10-yr_MACT	WP CHEM1 Apply Likely Controls (90% SO2 and 80% NOx Reduction) to Boilers subject to BART	15,580	15,580	15,580	0	3,504	3,504	2,000	1,504	10,946	10,946	10,946	9,000
SOURCE CATEGORY: INDUSTRIAL PROCESSES - IRON&STEEL PLANTS														
PSD/NSR/NSPS; RACT in NAA; 2-, 4-, 7-yr MACT	10-yr_MACT	WP I&S1 Apply Likely Controls (90% SO2 and 80% NOx Reduction) to Boilers subject to BART	15,617	15,617	15,617	0	43,479	43,479	36,515	6,964	47,786	47,786	35,739	12,047
SOURCE CATEGORY: INDUSTRIAL PROCESSES - PETROLEUM REFINING														
PSD/NSR/NSPS; RACT in NAA; 2-, 4-, 7-yr MACT	10-yr_MACT	WP REF1 Apply Likely Controls (90% SO2 and 80% NOx Reduction) to Boilers subject to BART	9,229	8,100	8,100	0	31,831	22,532	22,532	0	75,223	25,281	25,281	0
SOURCE CATEGORY: INDUSTRIAL PROCESSES - GLASS AND FIBERGLASS FURNACES														
PSD/NSR	None	WP - GLASS1 Apply "Highly Cost-Effective Controls"					15,354	15,016	10,748	4,268				
SOURCE CATEGORY: INDUSTRIAL PROCESSES - PORTLAND CEMENT KILNS														
PSD/NSR/NSPS; RACT in NAA; 2-, 4-, 7-yr MACT	NOx SIP Call	WP KILN1 - Apply Reasonable Available Controls to All Kilns in Region	1,960	1,960	1,960	0	34,032	23,822	17,106	6,716	38,703	38,703	3,870	34,833
		WP KILN2 - Likely BART Controls for Cement Kilns							14,415	9,407			17,066	21,637
SOURCE CATEGORY: INDUSTRIAL PROCESSES - ASPHALT MANUFACTURING PLANTS														
State Fuel Combustion Rules	None	WP ASPH1 - Apply Combustion Modification Controls and Low-Sulfur Fuels	2,996	2,996	2,996	0	4,014	4,014	3,011	1,003	3,614	3,614	3,164	0

CONTROLS INCLUDED IN 2002 INVENTORY	OTB (ON-THE-BOOKS) and OTW (ON-THE-WAY) REDUCTIONS OCCUR AFTER 2002	CANDIDATE CONTROL MEASURES	2002 LADCO EI vs 2009 OTB vs Candidate Reductions											
			VOC				NOx				SO2			
				OTB	Candidate Controls			OTB	Candidate Controls			OTB	Candidate Controls	
			2002 (tpy)	2009 (tpy)	2009 (tpy)	Reduction (tpy)	2002 (tpy)	2009 (tpy)	2009 (tpy)	Reduction (tpy)	2002 (tpy)	2009 (tpy)	2009 (tpy)	Reduction (tpy)
SOURCE CATEGORY: AIRPORT OPERATIONS														
None	None	WP GSE01 - Replace gas/diesel ground support equipment with electric or alternative fuels	149	149	149	0	1,266	1,266	950	316	165	165	165	0
SOURCE CATEGORY: GASOLINE DISPENSING FACILITIES - STAGE I														
Stage I RACT		WP SOLV7A - CARB Enhanced Vapor Recovery (Stage I)	42,263	42,263	9,796	32,467								
SOURCE CATEGORY: GASOLINE DISPENSING FACILITIES - STAGE II														
Stage II nozzle VRS in selected counties 11 IL, 4 IN, 14 OH, 9 WI	On-board refueling vapor recovery canisters (OBVR) everywhere	WP SOLV7C - CARB Enhanced Vapor Recovery (Stage II)	44,815	21,503	4,265	17,238								
SOURCE CATEGORY: GASOLINE DISPENSING FACILITIES - UNDERGROUND STORAGE TANKS														
P/V valve in Chicago and Metro East	None	WP SOLV7C - Require Air Pollution Control Device for UST Vent	10,194	10,194	2,854	7,340								
SOURCE CATEGORY: PORTABLE FUEL CONTAINERS														
None	None	WP SOLV3A - OTC Model Rule	50,970	50,970	41,795	9,175								
		WP SOLV3B - OTC Model Rule with Incentives			38,690	12,280								
SOURCE CATEGORY: SOLVENTS - INDUSTRIAL SURFACE COATING POINT SOURCES														
PSD/NSR; RACT in NAA; 2-, 4-, 7-year MACT	10-yr_MACT	WP SOLV5A - More Stingent RACT, lower applicability threshold, statewide coverage	70,380	56,590	12,164	44,426								
SOURCE CATEGORY: SOLVENTS - INDUSTRIAL SURFACE COATING AREA SOURCES														
None	None	WP SOLV5B - More Stingent RACT, lower applicability threshold, statewide coverage	118,036	118,036	33,050	84,986								
SOURCE CATEGORY: SOLVENTS - ASPHALT PAVING 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	32,242	16,106								
SOURCE CATEGORY: SOLVENTS - DEGREASING														
State Rules; MACT Standard		SOLV6A Adopt Chicago/Metro East rule for cold cleaning (66% control)	61,226	56,295	22,790	33,505								
SOURCE CATEGORY: SOLVENTS - AUTO REFINISHING														
Part 59 Rules; State Rules		WP SOLV4B - Adopt More Stringent RACT regulations based on SCAQMD 1151 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	104,240	104,240	83,457	20,783								
		WP SOLV1B - OTC Model Rule/NR433.17 + SCAQMD Phase III			72,296	31,944								
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								
		WP SOLV2B - OTC Model Rule + CARB SIP			124,496	41,333								

CONTROLS INCLUDED IN 2002 INVENTORY	OTB (ON-THE-BOOKS) and OTW (ON-THE-WAY) REDUCTIONS OCCUR AFTER 2002	CANDIDATE CONTROL MEASURES	2002 LADCO EI vs 2009 OTB vs Candidate Reductions											
			VOC				NOx				SO2			
			2002 (tpy)	OTB 2009 (tpy)	Candidate Controls 2009 (tpy)	Reduction (tpy)	2002 (tpy)	OTB 2009 (tpy)	Candidate Controls 2009 (tpy)	Reduction (tpy)	2002 (tpy)	OTB 2009 (tpy)	Candidate Controls 2009 (tpy)	Reduction (tpy)
	Reductions from White Paper Control Measures (reductions shown for 2009 are from the 2009 OTB levels)	**Lower End of Reductions - All Categories Listed Above**	**799,218**	**756,251**	**446,089**	**310,162**	**1,399,511**	**776,546**	**693,480**	**83,066**	**3,337,668**	**2,216,978**	**1,338,974**	**878,004**
		Upper End of Reductions - All Categories Listed Above			**414,038**	**342,213**			**576,614**	**199,932**			**894,171**	**1,322,807**
	Categories for which White Papers Have not yet been developed	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	34,856	34,856	34,856	0	3,765	3,765	3,765	0	13,201	13,201	13,201	0
		Highway Vehicles in 8-hr moderate areas	246,415	142,572	142,572	0	222,494	158,106	158,106	0	10,518	1,316	1,316	0
		Highway Vehicles in 8-hr basic/marginal areas	199,790	115,596	115,596	0	169,359	120,347	120,347	0	11,210	1,402	1,402	0
		Highway Vehicles in 8-hr attainment areas	236,185	136,653	136,653	0	212,043	150,679	150,679	0	13,478	1,686	1,686	0
		Heavy Duty Highway Vehicles	33,534	23,819	23,819	0	568,945	318,215	318,215	0	17,508	479	479	0
		Nonroad Gasoline	344,151	344,151	344,151	0	57,367	45,297	45,297	0	255	267	267	0
		Nonroad Diesel	25,445	25,445	25,445	0	272,881	224,959	224,959	0	6,552	2,630	2,630	0
		Industrial Petroleum Storage/Transport	64,687	27,345	27,345	0			0	0			0	0
		Graphic Arts	36,790	36,790	36,790	0			0	0			0	0
		Dry Cleaning	10,071	10,071	10,071	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
		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 - 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	**1,553,563**	**1,220,535**	**1,220,535**	**0**	**1,947,030**	**1,421,780**	**1,421,780**	**0**	**119,454**	**67,914**	**67,914**	**0**
		Total Emissions with Lower End of Reductions	**2,352,781**	**1,976,786**	**1,666,624**	**310,162**	**3,346,541**	**2,198,326**	**2,115,260**	**83,066**	**3,457,122**	**2,284,892**	**1,406,888**	**878,004**
		Total Emissions with Upper End of Reductions	**2,352,781**	**1,976,786**	**1,634,573**	**342,213**	**3,346,541**	**2,198,326**	**1,998,394**	**199,932**	**3,457,122**	**2,284,892**	**962,085**	**1,322,807**

SECTION 3

DEVELOPMENT OF CONTROL FACTORS

This chapter describes how MACTEC prepared the control factor files in RPO Data Exchange Protocol Format. First, we describe changes made to the "on-the-books" point source control factor files that were made to include revised MACT control factors, recent enforcement settlements, and other changes identified by the States. Next, 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 nonEGU BART point source files.

NonEGU Point Source Control Factors for On-the-Books Controls

The starting place was the point source control factor file prepared by E.H. Pechan that contained control factors for MACT standards, refinery enforcement settlements, and the NOx SIP Call nonEGUs (file name: MidwestRPOPointControls.asc transmitted to MACTEC on January 3, 2006 by Mike Koerber). MACTEC made the following changes to this file:

1. For refineries, compared data compiled independently by Pechan, Brenda Shine from OAQPS, and MACTEC. In most cases, we all arrived at approximately the same control rates. The following is a summary of issues and how they were resolved:
    a. Some boilers/heaters were affected by both the NOx SIP CALL and Refinery Enforcement Settlement. In those cases, we included only the NOx SIP CALL control level to avoid double counting of reductions and to reflect that the reductions from the NOx SIP CALL will occur sooner that the reductions from the enforcement settlements..
    b. Our understanding is that the PREMCOR refinery in Illinois (17-119-119050AAA) was shut down in 2002. We included control factor records for this source to effectively reduce all emissions to zero in future years.
    c. Pechan's file did not have enforcement settlement CFs for ExxonMobil in Joliet, IL or Sunoco in Toledo, OH. These settlements were finalized in October 2005 and June 2005. We included enforcement settlement CFs for these two refineries.
    d. For a few refineries, the settlement calls for the "elimination of fuel oil burning" in process heaters – we created SO2 control factors for these units.
2. For the ADM plants in Decatur (17-115-115015AAE), Peoria (17-143-143065AJE), Quincy (17-001-001815AAF), Frankfort (18-023-00011), and Fostoria (39-063-0332020187) affected by the Archer Daniel Midland enforcement settlement, we created control factors for SO2, NOx, and VOC to reflect reduction identified in the settlement.
3. For the Cargill plants in Bloomington (17-113-113804AAR), Lafayette (18-157-00038), Hammond (8-089-00203), and Dayton (39-113-0857041124) affected by the Cargill enforcement settlement, we created control factors for SO2, NOx, and VOC to reflect reduction identified in the settlement.
4. We added SO2 control factor records for Units 1, 2, and 3 at the Alcoa Warrick IN facility (18-173-00002). We used a 98% control efficiency for scrubbers on these units. Unit 4 is considered an EGU and in the IPM inventory – so we did not create a control record for Unit 4. We assumed reductions would occur by January 1, 2009, but the exact date is not known since this is not a federally enforceable condition.
5. Based on information from stakeholders, we created control factor records for the following boilers in Indiana:

a. Styline (18-037-00102) retired the remaining coal-fired boiler in 2002 (EU B2-A)
b. Eli Lilly's Tippecanoe plant coal-fired boilers will be converted replaced with natural gas for compliance with the Industrial Boiler MACT standards

6. Teresa Walker of Michigan DEQ reported that two coal-fired boilers at General Chemical (26-101-B1821) and one coal-fired boiler at Cargill Salt (26-147-A6240) have been retired.
7. Wisconsin identified several OTB control factors:
    a. The casting line at Grede Foundries (55-079-241012310, EU P07) has been shut down
    b. ESP installed at Weyerhauser (55-073-73701045, EU P11)
    c. New post-2002 NOx controls at UW-Milwaukee (55079-241019900, EU B20, B21, B22) and Miller Brewing (55079-241007030, EU B20)
    d. New post-2002 NOx emission reductions at Saint-Gobain Glass (55101-252005930, EU P30 and P31)
    e. Changes to control factors for emission units potentially affected by post-2002 VOC MACT standards where WI estimates of VOC emission reductions differ from the default factors. We changed the MACT control factors provided by Pechan to the values recommended by WI for sources in Wisconsin.
8. Illinois identified two changes to OTB control factors:
    a. 34 emission units potentially affected by post-2002 VOC MACT standards where no VOC emission reductions are expected. We changed the MACT control factors to 0.
    b. Changes to cement kiln control factors for NOx SIP Call sources .

Table 5 identifies the RPO Data Exchange Protocol fields populated in the nonEGU OTB files.

NonEGU Point Source Control Factors for Candidate Control Measures

MACTEC prepared a single control factor file for nonEGU point sources for three source categories – ICI boilers. cement kilns, and glass furnaces. Control factors for NOx and SO2 were developed by process. 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 nonEGU 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 6 identifies the RPO Data Exchange Protocol fields populated in the nonEGU file.

NonEGU Point Source Control Factors for BART Control Measures

MACTEC prepared an updated control factor file for nonEGU BART sources for five source categories – ICI boilers, cement kilns, chemical plant boilers, iron and steel mills, and petroleum refineries. Control factors for NOx and SO2 were developed on a process-by-process basis. We also added control factors for 10 EGUs in North Dakota not covered by CAIR and six taconite facilities and two ICI boilers in Minnesota. The list of facilities assumed to be subject to BART was based on initial modeling analyes conducted by the LADCO States and information supplied by North Dakota and Minnesota. (Note: the LADCO States are working with EPA to finalize the list of "subject to BART" sources). 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 nonEGU 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 7 identifies the fields populated in the nonEGU BART file.

TABLE 5 – NONEGU "OTB" CONTROL FACTOR FILE INFORMATION

The ASCII file listed below provides "On-the-Books" control factors for nonEGU 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**
MidwestRPOPointControls10jan06.TXT	Specific point sources affected by MACT standards, recent enforcement settlements, and information provided by states and stakeholders
Control Measure ID	**Control Measure Description**
ETHANOL	ADM and Cargill ethanol plant enforcement settlements
MACT	EPA post-2002 MACT Standards
NOXSIPCALL	NonEGUs affected by NOx SIP Call
REFINERIES	Global Refinery Enforcement Initiative
SHUTDOWN	Post-2002 Plant Permanent Shutdowns
STATERULE	Post-2002 State Rules
BART	EGUs in North Dakota not covered by CAIR; six taconite facilites in Minnesota and two in Michigan; an industrial boiler in Minnesota
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	Xxxxxxxxxxxxxxx from NIF files
EMISSION UNIT ID	xxxxxx from NIF files
EMISSION RELEASE POINT ID	xxxxxx from NIF files
POLLUTANT CODE	SO2 or NOx
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 identified above
FUTURE DATE CHEMICAL SPECIATION	Blank
ALLOWABLE EMISSIONS CAP	Non-Blank for NOx SIP Call sources
MARKET PENETRATION OF SPECIATION	Blank
FIELD 3	Blank
FIELD 2	Blank
FIELD 1	Blank
CONTROL DESCRIPTION	Description of source category or control measure
PRIMARY CONTACT	ejsabo@mactec.com jwilson@pechan.com

TABLE 6 – NONEGU "CANDIDATE MEASURES" CONTROL FACTOR FILE

The ASCII file listed below provides control factors for nonEGU 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 (dated 2/15/2006)	Applies to all medium and large ICI boilers (defined as SO2 or NOx > 100 tpy), cement kilns, and glass/fiberglass furnaces
Control Measure ID	**Control Measure Description**
ICI1	Apply 40% SO2 and 60% NOx reduction to all medium and large ICI boilers
ICI3	Apply 90% SO2 and 80% NOx reduction (similar to BART) to all medium and large ICI boilers
KILN1	Apply reasonably available controls (90% SO2 and 50% NOx reduction) to all cement kilns in the region
GLASS1	Apply "highly" cost-effective controls (30% NOx reduction) to all glass/fiberglass furnaces in the region
GLASS2	Apply cost-effective controls (75% NOx reduction) to all glass/fiberglass furnaces 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	Xxxxxxxxxxxxxxx from NIF files
EMISSION UNIT ID	xxxxxx from NIF files
EMISSION RELEASE POINT ID	xxxxxx from NIF files
POLLUTANT CODE	SO2 or NOx
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, ICI3, KILN1, GLASS1, GLASS2)
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	Control Measure ID used in LADCO White Papers and control measure description
PRIMARY CONTACT	ejsabo@mactec.com

TABLE 7 – NONEGU "BART" CONTROL FACTOR FILE INFORMATION

The ASCII file listed below provides control factors for nonEGU 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**
CF_BART_mrpo_mn_nd_2013.txt (dated 2/28/2006)	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% SO2 and 80% NOx Reduction) to ICI Boilers subject to the proposed BART requirements
REF1	Apply likely controls (90% SO2 and 80% NOx Reduction) to sources subject to the proposed BART requirements
I&S1	Apply likely controls (90% SO2 and 80% NOx Reduction) to sources subject to the proposed BART requirements
KILN2	Apply likely controls (95% SO2 and 80% NOx reduction) to kilns subject to the proposed BART requirements
CHEM1	Apply likely controls (90% SO2 and 80% NOx 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	Xxxxxxxxxxxxxxx from NIF files
EMISSION UNIT ID	xxxxxx from NIF files
EMISSION RELEASE POINT ID	xxxxxx from NIF files
POLLUTANT CODE	SO2 or NOx
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

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 are 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 PM2.5, 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 8 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 9 identifies the RPO Data Exchange Protocol fields populated in this file.

TABLE 8 - 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 (dated 2/15/2006)	Control Factors only for 8-hr ozone nonattainment counties in the MRPO Region
VOCControlsAffectedByRP_8hr_and_Adjacent_Counties.txt (dated 2/15/2006)	Control Factors for 8-hr ozone nonattainment counties and adjacent counties in the MRPO Region
VOCControlsAffectedByRP_All_Counties.txt (dated 2/15/2006)	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 9 – 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 (dated 2/15/2006)	Control Factors only for 8-hr ozone nonattainment counties in the MRPO Region
VOCControlsByStartYear_8hr_and_Adjacent_Counties.txt (dated 2/15/2006)	Control Factors for 8-hr ozone nonattainment counties and adjacent counties in the MRPO Region
VOCControlsByStartYear_All_Counties.txt (dated 2/15/2006)	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	xxxxxxxxxx from White Papers for area; from EM file for point
SITEID	Blank for area, xxxxxxxxxxxxxxx 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	ejsabo@mactec.com

EGU Control Factors

MACTEC prepared ten control factor files for EGUs to account for the two control measures (EGU1 and EGU2), three years (2009, 2012, and 2018), and two geographic areas (the 5 MRPO States and 7 other States adjacent to the LADCO States). The five MRPO States are Illinois, Indiana, Michigan, Ohio, and Wisconsin. The other seven States are Minnesota, Iowa, Missouri, Kentucky, Tennessee, West Virginia, and Pennsylvania. These control factor files are intended to be applied to the EGU NIF files (2009, 2012, and 2018 CAIR control scenarios) that were created by E.H. Pechan from the IPM parsed files that were generated for VISTAS/MRPO in 2005. Table 10 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 NOx emission caps based on the IPM-projected heat inputs (mmBtu) and the average emission rate (lbs/mmBtu) for the control measure/year;
- Identify all units with emission rates below the average emission rate for the control measure/year; set the future year percent control efficiency to 0 for these units since they are already below the average emission rate on which the caps are based;
- Subtract the emissions from units with emission rates below the average emission rate and calculate an "adjusted" emission rate (lbs/mmBtu) that units above the average emission rate must meet;
- Calculate the control factor (for units above the "adjusted" emission rate) as one minus the ratio of the "adjusted" average emission rate to the actual emission rate for that unit.

A similar procedure was used for the 12-State 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, 2012, or 2018 emission estimate.

For SO2, a single annual average control factor was calculated on a unit-by-unit basis. For NOx, 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 NOx SIP Call have lower average NOx 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 NOx control factor records for each unit: the first for the first part of the winter season (future date = 010109, 010112, 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, 010112, 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 NOx record, and two winter NOx records).

TABLE 10 – EGU CONTROL FACTOR FILE INFORMATION

The ASCII files listed below provide control factors for EGUs. There are ten control factor files to account for the two control measures (EGU1 and EGU2), three years (2009, 2012, and 2018), and two geographic areas (the 5 MRPO States and 7 adjacent states). 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 2005.The table below identifies the RPO Data Exchange Protocol fields populated in this file.	
File Name	**Geographic Coverage**
EGU1_5state_2009.txt (dated 2/1/2006)	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_5state_2009.txt (dated 2/1/2006)	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_5state_2012.txt (dated 2/1/2006)	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_5state_2012.txt (dated 2/1/2006)	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
EGU2_5state_2018.txt (dated 2/28/2006)	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_12state_2009.txt (dated 2/1/2006)	Measure EGU1 (interim emission caps based on 0.15 lbs/mmBtu for NOx and 0.36 lbs/mmBtu for SO2) for 5 MRPO and 7 adjacent state region
EGU2_12state_2009.txt (dated 2/1/2006)	Measure EGU2 (interim emission caps based on 0.12 lbs/mmBtu for NOx and 0.24 lbs/mmBtu for SO2) for 5 MRPO and 7 adjacent state region
EGU1_12state_2012.txt (dated 2/1/2006)	Measure EGU1 (interim emission caps based on 0.15 lbs/mmBtu for NOx and 0.36 lbs/mmBtu for SO2) for 5 MRPO and 7 adjacent state region
EGU2_12state_2012.txt (dated 2/1/2006)	Measure EGU2 (interim emission caps based on 0.12 lbs/mmBtu for NOx and 0.24 lbs/mmBtu for SO2) for 5 MRPO and 7 adjacent state region
EGU2_12state_2018.txt (dated 2/28/2006)	Measure EGU2 (final emission caps based on 0.07 lbs/mmBtu for NOx and 0.10 lbs/mmBtu for SO2) for 5 MRPO and 7 adjacent state 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	Xxxxxxxxxxxxxxx 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

Field Name	**How Populated?**
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
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	ejsabo@mactec.com

SECTION 4

FUTURE CONSIDERATIONS

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

- Various alternatives to the EGU1 and EGU2 candidate control measures are being considered. There are different alternatives for year of implementation, stringency in terms of system-wide emission rate, and geographic coverage. The LADCO States should consider updating the control measures and control factor files for EGU1 and EGU2 based on the alternatives of interest and any future IPM modeling of alternatives.
- This report does not address possible emission reductions resulting from various alternative fuel scenarios being developed by the Southeast Michigan Council of Governments (SEMCOG) or mobile source control measures analyzed by Environ. Any reductions expected from these alternative fuel or mobile source measures would be in addition to the reductions shown in this report.
- The California Air Resources Board continues to evaluate revisions to their control measure analyses for several area source VOC categories, including architectural and industrial maintenance coatings, automobile refinishing coatings, consumer/commercial products, and portable fuel containers. LADCO should closely follow CARB's activities, which may result in measures that are more stringent (or possibly less stringent) than those identified in the LADCO White Papers.
- The Ozone Transport Commission is considering updates to several of its Model Rules that served as the basis for candidate control measures in several of the White Papers (AIM coatings, consumer productions, portable fuel containers, auto refinish coatings, solvent cleaning). The LADCO States should track the OTC's rule development process and compare any changes to the OTC Model Rules to the measures contained in these White Papers.
- The EPA proposed its mobile source air toxic rule in February, 2006. One of the categories in this rule is portable fuel containers. The LADCO States should track the EPA's proposed rule and compare it to the measures contained in the PFC White Paper.
- 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 OF CHANGES TO LADCO WHITE PAPERS

I. Changes to Electric Generating Units White Paper(December 8, 2005)

Comments Addressed in Revised EGU White Paper

Comment: Update regulatory section (e.g., reflect final CAIR and BART rules)
Response: MACTEC updated Tables 1 and 2 to use the results from the latest round of RPO IPM modeling reflecting the requirements of the final CAIR rule as well as updates to the input EGU inventory. No changes to the EGU1 and EGU2 levels of control were made. MACTEC expanded Tables 1 and 2 to show ozone season emissions for NOx, since the final CAIR specifies ozone season NOx emission budgets. We revised the description of the "On-the-Way Regulations" to reflect the provisions of the final CAIR and CAMR rules.

Comment: The discussion of allocating CAIR SO2 allowances in incorrect (i.e., SO2 allocations are set by the 1990 CAA, not CAIR) middle of page 7 in 1/14/2005 version.
Response: This paragraph was rewritten to accurately describe the CAIR cap-and-trade program.

Comment: Projected emissions (based on IPM) may not be accurate (e.g., size of allowance banks flawed, and assumptions about which plants will install pollution equipment does not match reality)
Response: MACTEC updated Tables 1 and 2 to use the results from the latest round of RPO IPM modeling reflecting the requirements of the final CAIR rule as well as updates to the input EGU inventory. Any projections of which plants will install pollution equipment have some uncertainty – IPM is generally considered to be the best available analytical tool for making those projections.

Comment: Need to clarify whether the NOx emission caps are on an annual basis, and address the implications of maintaining the summer ozone season CAIR NOx emission cap.
Response: Tables 1 and 2 were updated to show the ozone season NOx emissions in 2002, projected emissions under the CAIR, and projected emissions under EGU1 and EGU2. For now, the NOx emission caps for the ozone season were calculated using the same EGU1 and EGU2 lbs/mmBtu values as for the annual case (.i.e, "retrofit BACT levels" of 0.15 lbs/mmBtu for SO2 and 0.10 lbs/mmBtu for NOx, to be fully implemented by 2013; "BACT levels for new plants" of 0.10 lbs/mmBtu for SO2 and 0.07 lbs/mmBtu for NOx, to be fully implemented by 2013.)

Comments to be Addressed at a Later Date

Comment: The BBC study, commissioned by CEED, MOG, and NiSource shows:
- Electric rates would increase regionally by 11% (EGU1), 16% (EGU2)
- Demand for IL,IN,OH coal would decrease by 48% (EGU1), 54% EGU2)
- Economic output would decrease regionally by $7-10 billion (EGU1), $9-14 billion (EGU2)
- Employment in the region would decline by 50-70K jobs (EGU1), 70-95K (EGU2)

Comment: The Marchetti study, commissioned by MOG, shows:
- Retirement of 10.6 and 34.9 GW, respectively, of coal-fired capacity
- Increased annualized compliance costs (10x greater than those for CAIR)
- Displacement of 42.6-47.8 M tons of IL, IN, OH coal with natural gas, PRB coal
- Emission caps cannot be achieved even with aggressive application of FGDs, SCRs

Response: The emission caps assumed in the Marchetti and BBC studies are more stringent than those identified for EGU1 and EGU2 in the White Paper. A more complete benefit-cost study based on the correct EGU1 and EGU2 is currently being performed for LADCO.

Comment: Remarks on appropriate combination (and amount) of local and regional controls needed to provide for attainment of NAAQS and meet regional haze goals:
- Supports CAIR as a basis for regional controls.
- A wider range of EGU reductions should be considered.
- If the States continue to pursue beyond-CAIR reductions from EGUs, then consideration should be given exempting those utilities that will already have coalfired units equipped with FGDs and SCRs.
- The States should consider a balance between local and regional controls; in particular local reductions for nonEGU and mobile sources (e.g., EPA's ozone source apportionment modeling shows that nonroad, on-road, and nonEGU sources are the main contributors to ozone in Chicago)
- Source apportionment modeling shows that local controls of area and mobile sources are more important to achieve attainment. MRPO should support states in more localized control strategies.
- Nonattainment is a local problem and reductions should come from all sources within the nonattainment area.
- EGU1, EGU2 will not significantly aid individual states in developing their SIPs for ozone or PM2.5.
- Even if the control options are technically achievable, they should be disregarded if they do not make a meaningful difference in achieving attainment.

Comment: BACT is not an appropriate level of control to be considered for the universe of EGUs across the 5-state region. Furthermore, the amount of SO2 reduction needed to achieve the EGU1 and EGU2 limits of 0.15 and 0.10 lb/MMBTU for the high sulfur coals in IL, IN, and OH is on the order of 96-98%, which is unachievable across the universe of power plants of diverse capacity, age, retrofit difficult, and thermal efficiency. An emission limit of 0.35 lb/MMBTU would allow nearly all IL, IN, and OH coals to be used at an assumed 95% FGD control efficiency. EGU1 and EGU2 limits would necessitate fuel switching and discriminate against the use of local coal resources. Assumption that every retrofit can meet a high level of reduction (95- 98 percent removal) is incorrect.

Comment: EGU1, EGU2 will result in replacing the use of local (IL) coal with a lower sulfur coals supply, which is not a prudent policy.

Comment: The following additional information should be included in the White Paper:
- MW hours of electricity produced by coal-fired units in comparison to other generation sources in the Midwest.
- Number of existing control equipment that might need to be upgraded, the upgrade costs, and the time needed to implement the upgrades.

Comment: The control meaasures in the STAPPA/ALAPCO have not been analyzed for feasibility or cost.

Comment: Need to conduct more comprehensive study of key risk factors and rigorous analysis of what can be realistically accomplished by specific deadlines and what the costs will be.

Comment: Extrapolation of cost effectiveness information from USEPA's CAIR analysis is inappropriate. Marginal costs in a smaller region (i.e., 5-state LADCO region) will be higher than those in a larger 28-state region. An analysis of cost should be conducted for the 5-state region using the most accurate economic assumptions. Other cost metrics, beside $ per ton, should be considered.

Comment: In comparison to recent consent decrees and BACT determinations, EGU1 and EGU2:
- Are extremely aggressive targets.
- Are more stringent than NSPS.

• Will require universal deployment of SCRs for NOx (EGU2), which may not be possible on all existing units and may force retirement for certain smaller, older units (thereby, posing reliability problems). Furthermore, maintaining high levels of control for 12 months with SCR equipment is unproven.
• Will require retrofit of FGD for SO2 on most units, which may force retirement for certain smaller, older units (thereby, posing reliability problems)

Comment: The derivation of EGU1, EGU2 emission caps is overly simplistic and unrealistic:
• Ignores unit design, operation, fuel handling, and other site-specific factors
• Arbitrarily uses only 2001 heat input, rather than a range of years or future year growth.
• Interim caps not supported by appropriate technical analyses.
• Need to consult with appropriate state agencies, such as utility transmission and planning regulators.

Comment: The White Paper should address implementation of EGU1 and EGU2, including the interaction with the CAIR trading program, and use of the existing bank of SO2 allowances.

Comment: Need to address how state-specific mercury reduction requirements, which are more stringent than CAMR, impact SO2 and NOx reductions.

Comment: Miscellaneous Comments:
• Use of ICAC's position, without consideration of utility industry's opposing comments filed under CAIR undermines the credibility of the W.P.
• The estimated NOx reduction costs ($700-2,100 per ton) are well below the current allowance market price of $3,000-4,500 per ton.
• In "Candidate Control Measures", only the Emission Control Technologies item is relevant.
• Unreasonable to assume that any modeled control strategy that goes beyond the NOx SIP call and CAIR will be adopted by all the states in a timely manner.
• If EGU1, EGU2 are to be modeled in IPM, then the IPM assumptions should be documented and made available for review and comment.

II. Changes to the Industrial, Commercial, Institutional (ICI) Boilers (December 6, 2005)

Commenter: Citizens Thermal Energy, *Comments Regarding "Interim White Paper – Midwest RPO Candidate Control Measures: Source Category ICI Boilers (03/29/05)"*, July 29, 2005.

Comment #1: Comments Regarding Source Category Description: (a) ICI Boilers utilize a variety of fuels, (b) Most ICI Boiler designs cannot accommodate wholesale fuel switching with ease, (c) Consideration should be made to the CFB boiler technology by acknowledging its significant environmental benefits, (d) Table 2 must be improved – it is an "interesting first pass at characterizing the population of Midwest ICI boilers", but is "wholly inadequate as a base for regulatory assessment." .

Response to (1a): MACTEC has added a new table showing emissions by fuel type and an expanded discussion in the "Source Category Description" section to illustrate the variety of fuels used and emissions generated by fuel type. MACTEC also referred readers to new References 8 and, the Energy and Environmental Analysis report *Characterization of the U.S. Industrial/Commercial Boiler Population* and the Oak Ridge National Laboratory report *Guide to Low-Emission Boiler and Combustion Equipment Selection*, which provide a more detailed description the diversity of the ICI boiler population.

Response to (1b): MACTEC added a sentence in the "Source Category Description" to indicate that most boilers are design to combust specific fuels and that switching fuels may decrease capacity or efficiency.

Response to (1c): MACTEC added a sentence in the "Source Category Description" to describe CFB boilers.

Response to (1d): MACTEC added Table 2b to show emissions by fuel type. We are continuing to work with States and industry in improving the ICI boiler database to account for differences in boiler size, design, and fuel type.

Comment #2: Comments Regarding Regulatory History: (1) Reflect final CAIR and BART rules and (2) take into account current unit level reductions from NOx SIP Call and consent orders.

Response to (2a): MACTEC revised the discussion to reflect final CAIR and BART rules.

Response to (2b): As shown in Table 3a of the 3/29/05 versions of the White Paper, emission from the NOx SIP call were accounted for. We reviewed enforcement settlements for the refining and ethanol industries and accounted for these reductions in the "on-the-books" scenarios. We also identified plans for scrubbers at the Alcoa Warrick facility that will result in large reductions from this unique facility. Information on existing controls was collected from the states to better characterize the controls already in place for MRPO ICI boilers. The emissions shown in all of the tables were recalculated using this new information. We are continuing to work on improving the ICI boiler database to account for existing controls.

Comment #3: Comments Regarding Candidate Control Measures: control assumptions based on BART-eligible units are not applicable for all other units, emerging technologies have only been tested for a limited number of boiler types/sizes and may not scale down to the ICI boiler category, SCR for NOx has limited applicability to the ICI boiler category.

Response to #3: MACTEC is continuing to investigate whether data exists to develop more specific candidate control measures based on fuel type, size, and boiler design. For the Ozone Transport Commission, we are currently conducting a benchmarking study to better characterize emission controls for different boiler designs and fuel types. EPA is also working to improve its inventory of emissions anc

control cost information for nonEGU boilers. Results of these efforts may be incorporated in future versions of the White Paper to provide more specific emission reduction and cost-effectiveness estimates based on boiler type, size, and fuel type.

Comment #4: Comments Regarding Cost Effectiveness and Basis: cost-effectiveness does not account for the complexity of the ICI boiler population, candidate control measures are real options for only a few ICI boilers, must fully consider impact on non-traditional fuels.

Response to #4: See Response to #3.

Comment #5: Comments Regarding Timing of Implementation: Any future control program should be coordinated with the ICI boiler MACT standard, and should only require reductions that are cost-effective.

Response to #5: This issue will be addressed separately by the States at a later date.

III: Changes to the Cement Kilns White Paper (December 15, 2005)

Commenter: Portland Cement Association, *Comments on the Midwest Regional PlanningOrganization's Engineering Analysis on Cement Best Available Retrofit Technology (BART) and Interim White Paper - Midwest RPO Candidate Control Measures, Source Category: Cement Kilns"*, October 7, 2005.

Comment #1: The assessment of low-NOx burner technology assumes an extremely aggressive control efficiency and fails to include certain costs.

Response to #1: The performance and cost information for low-NOx burners in the White Paper came directly from EPA's *NOx Control Technologies for the Cement Industry,* September 19, 2000. Attachment 1 of the White Paper lists a range of $300 to $1200/ton for low-NOx burners, which came from Table 6-19 of the EPA document, which was based on an average 25% NOx reduction, which is in the middle of the range of the 4-47% NOx reduction quoted in the White Paper. These estimates represent average costs that might be expected for a typical kiln.

Comment #2: The assessment of SCR technology assumes an unsupported control efficiency and fails to include certain costs. Furthermore, the application of SCRs to cement kilns is extremely limited. The commentor disagreed that SCR technology is a reasonably available technology for controlling NOx emissions.

Response to #2: After reviewing available literature, we agree that SCR technology has limited applicability and is not likely to be considered reasonably available or BART. However, as the commenter points out, "other more established NOx-control technologies are capable of achieving the emission rates that are currently attained by the sole plant currently utilizing SCR…these other technologies are significantly less expensive to install and operate". For example, European Commission, Integrated Pollution Prevention and Control (IPPC) Bureau's *Reference Document on Best Available Techniques in the Cement and Lime Manufacturing*
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Industries indicates that two plants in Europe are achieving reduction rates of 80-85% using SNCR technologies. MACTEC made changes to the White Paper to indicate that SCR is not applicable, but retained the 80% reduction percentage as BART based on the experience of the two European plants that utilize SNCR.

Comment #3: Several problems were noted with respect to the cost estimates, including use of an inappropriate interest rate; lack of cost calculations for mid-kiln firing, SNCR, and change in feed material; lack of data to support purchased equipment costs; failure to include certain costs associate with FGC systems; and inclusion of a "tipping fee" in the cost effectiveness calculations.

Response to #3: Cost estimates for NOx controls in the White Paper came directly from EPA's *NOx Control Technologies for the Cement Industry,* September 19, 2000. Chapter 6 of that document provides detailed cost calculations for low-NOx burners, mid-kiln firing, SNCR, and SCR.

Comment #4: The White Paper fails to address site-specific considerations, such as space availability and other regulatory factors.

Response to #4: These factors are very site-specific and cannot be addressed in this preliminary discussion of candidate control measures. These factors will be addressed at a later time by the States.

Comment #5: The White Paper incorrectly states that there are no existing controls for SO2 or NOx. Many cement kilns are subject to the NOx SIP Call and some are subject to NOx RACT.

Response to #5: The emission inventory database that MACTEC is using lacked data on existing controls at cement kilns. This is a gap in the inventory database. To fill this gap, we asked each state to identify the existing controls at each cement kiln. The White Paper acknowledges in several places (Table 1, the discussion of the NOx SIP call on page 3, Table 2, and Table 3) that emission reductions from 2002 levels based on controls installed to comply with the NOx SIP call requirements. No state identified any existing SO2 controls.

Comment #6: Several problems were noted with respect to the assumed control technologies, including lack of data to support the assertion that advanced FGD is technically feasible, and lack of support for the assumed wet FGD control efficiencies.

Response to #6: We agree that the advanced FGD system referenced (the Passamaquoddy scrubber system) was a DOE demonstration project and it is questionable whether it is technically feasible. MACTEC changed the White Paper to use a wet FGD system for both candidate control measures *KILN1* and *KILN2*, using a 90% SO2 reduction for the wet FGD system The European Commission, Integrated Pollution Prevention and Control (IPPC) Bureau's *Reference Document on Best Available Techniques in the Cement and Lime Manufacturing Industries* indicates that wet scrubbers have achieved SO2 reductions of more than 90 percent at plants in Europe.

IV: Changes to the Consumer and Commercial Products White Paper (December 1, 2005)

Commenter: Consumer Specialty Products Association, *Comments on Interim White Paper – Source Category: Consumer and Commercial Products,* July 29, 2005.

Commenter: Automotive Specialty Products Alliance, *Comments on Interim White Paper on Consumer and Commercial Products,* August 1, 2005.

Commenter: Cosmetic, Toiletry, and Fragrance Association, *Interim White Paper – Possible Regulation of Consumer Products,* August 1, 2005.

Comment: Stakeholders support uniform and consistent regulations throughout the 5-State MRPO Region.
Response: MRPO States recognize the need to uniformity and consistency.

Comment: Adoption of Future CARB Regulations in the Midwest is Cost Prohibitive.
Response: This comment will be addressed separately by the MRPO States at a later date.

Comment: Costs to implement CARB regulation CONS-1 are underestimated (i.e., costeffectiveness is in the $12-20/pound ($24,000-41,560/ton) range, not the $2.40/pound ($4,800/ton) estimate listed in the White Paper.
Response: The $4,800/ton value quoted in the White Paper came from page VIII-175 of the CARB's *Initial Statement of Reasons for the Proposed Amendments to the California Aerosol Coating Products, Antiperspirants and Deodorants, and Consumer Product Regulations (May 7,2004)*. During the CARB rulemaking process, stakeholders commented that CARB's analysis underestimates by more than a factor of ten the actual costs attributable to the proposed rule. In the *Final Statement of Reasons for Rulemaking, Including Summary of Comments and Agency Responses (June 13, 2005),* CARB responded to this comment by saying "Staff does not agree that the costs of the proposed amendments were underestimated…The methodologies employed were also the same or very similar to those in other consumer products rulemakings. Staff has many years of experience in conducting these analyses, and this experience indicates that accurate cost estimates have resulted from these methodologies in the past."

Comment: Sell-Through Limitation Provisions are not necessary
Response: We included a discussion of the sell-through provision since it provided "a window during which manufacturers and distributors may continue to sell products that were produced before a set deadline even if they do not meet the more stringent VOC limits. The sell-through period is simply a safeguard to prevent compliance action for occasional older products remaining on retail shelves." Commenters believe it is more of a record-keeping burden than a safeguard. Since the OTC model rule does not include a sell-through provision, we revised the White Paper to reflect the comment that a sell-through period is not necessary.

Comment: Miscalculation (underestimation) of Emission Reduction Credits. Commenters take issue with White Paper assertion that "According to EPA, VOC emissions from those 24 product categories are reduced by 20 percent. But since over half of the inventory is unaffected by the rule, the Federal rule is estimated to yield VOC reductions of 9.7 percent from uncontrolled levels for the entire consumer and commercial production category." Commenters suggest that a 20 percent credit should be used as stated in Seitz 1995 memo *Regulatory Schedule for Consumer and Commercial Products under Section 183(e) of the Clean Air Act.*
Response: First, the 9.7 percent value on page one is a typo – it should read 8.0 percent, which is the value shown and used in Table 2 to represent the overall reduction from Federal Part 59 Rule. The reference for the 8.0 percent reduction is page 36 of LADCO's *Development of Growth and Control*

Factors for Lake Michigan Air Directors Consortium. The uncontrolled per capita factor listed in the LADCO report is 7.79 lbs/person, while the controlled factor after Part 59 is 7.17 lbs/person, which is a reduction of 7.96 percent. The LADCO report states that "these values are consistent with those used by EPA to compute 2002 national emission estimates for this source category". It also similar to the reductions estimated in the OTC's *Control Measure Development Support Analysis of Ozone Transport Commission Model Rules*. The uncontrolled per capita factor listed in the OTC report is 7.84 lbs/person, while the controlled factor after Part 59 is 7.06 lbs/person, which is a reduction of 0.8 lbs/person or 9.9 percent. These values are also consistent with the Seitz memo which states that "a 20 percent reduction would be approximately 0.8 pounds per capita annually". As shown in the table on page 7 of the White Paper, we are using the 20 percent reduction for the control efficiency, but multiplying it by the rule penetration (the percentage of products affected by the rule). We believe that the 20 percent reduction quoted in the Seitz memo only applies to those categories affected by the Federal Part 59, not to all products, and that the emissions reductions from the Part 59 rule quoted in the White Paper are correct.

Comment: MRPO States should provide a reasonable future effective date for any new VOC standards. Commenter suggests that a compliance date of Jan. 1 2009 is appropriate if States promulgated final regulations in 2006-2007.
Response: This comment will be addressed separately by the MRPO States at a later date.

Comment: CSPA Strongly Supports the Inclusion of Necessary Regulatory Flexibility Provisions like the Innovative Product and Alternative Control Plan.
Response: We modified the White Paper to note that these provisions exist in the OTC model rules and should be considered by MRPO States during regulatory development.

Comment: States should consider a voluntary program based on the OTC standards and consult with EPA about obtaining SIP credit for emission reductions that are not mandatory.
Response: This comment will be addressed separately by the MRPO States at a later date.

V: Changes to the AIM Coatings White Paper (December 1, 2005)

Commenter: National Paint and Coatings Association, *Comments on Architectural and Industrial Maintenance (AIM) and Industrial Surface Coatings,* August 1, 2005.

Commenter: National Paint and Coatings Association, *Comments on Midwest Region Planning Organization (MRPO) Identification and Evaluation of Candidate Control Measures (April 14, 2005 Version) Architectural and Industrial Maintenance Coatings ,* November 22, 2005.

Comment: Accuracy of the Emission Estimates – emissions should track closely to state population since emissions are based on per capita factors.

Response: The emission estimates in the White Paper (and in the slides from the AIM presentation on June 29, 2005) came from the EPA'2 2002 Draft NEI. For architectural coatings, one would expect the emissions to be directly proportional to population since the emissions are per capita-based and there are no differences in the regulatory requirements among the five states. There seems to be different emission factors used by the states for this category – the 2002 Draft NEI has an 12 emission factor of 3.94 lbs/person for IL, 3.22 lbs/person for IN, and 3.12 lbs/person for WI (emission factors were not reported for MI or OH).

To address the inconsistency in emission factors, MACTEC recalculated the emissions for solvent-based architectural coatings, water-based architectural coatings, industrial maintenance coatings, and special purpose coatings using the latest emission factors from EPA's *Documentation for the Draft 2002 Nonpoint Source National Emission Inventory for Criteria and Hazardous Air Pollutants (March 2005 Version)*. The factors are 1.609 lbs/person for solventbased architectural coatings, 1.513 lbs/person for water-based coatings, 0.64 lbs/person for industrial maintenance coatings, and 0.64 lbs/person for special purpose coatings. These emission factors reflect the impact of the Part 59 AIM rules. It should be noted that EPA, states, and stakeholders are currently reviewing the emission calculation procedures for AIM coatings, both in terms of the baseline emission levels (with and without Part 59) as well as the emission reductions from the OTC Model Rule (See Federal Register notice dated August 31 entitled *Advance Notice to Solicit Comments, Data, and Information for Determining the Emission Reductions Achieved in Ozone Nonattainment Areas from the Implementation of Rules Limiting the VOC Content of AIM Coatings)*. In this notice, the EPA is encouraging all interested parties to submit information on how to best calculate the VOC emission reductions from the adoption of AIM coating rules. We recommend that the MRPO track the results of EPA's analysis to better quantify the baseline emission levels and reductions attributable to the OTC Model Rule.

Comment: Support the use of up-to-date references.

Response: As mentioned above, the procedures for calculating baseline emissions and reductions from the OTC Model Rule are currently being reevaluated. In addition to the Region III analysis, EPA's OAQPS has an on-going study to evaluate emissions from architectural coatings and other solvent categories, resulting in a draft report *"Solvent Mass Balance" Approach for Estimating VOC Emissions from Eleven Nonpoint Solvent Source Categories (March 28, 2005)*. As this is a draft report that cannot be cited, we recommend that the MRPO track the results of OAQPS's analysis to better quantify the baseline emission levels and reductions attributable to candidate control measures. The issues of reactivity is also the subject of ongoing studies. For example, EPA's September 1, 2005, *Interim Guidance on Control of VOC in Ozone State Implementation Plans*, which encourages states to consider recent scientific information on the photochemical reactivity of VOC in the development of SIPs. The interim guidance summarizes recent scientific findings, provides examples of innovative VOC control measures, and clarifies EPA innovative reactivity based policies. CARB is also conducting on-going studies of

reactivity-based control measures. We recommend that the MRPO track these on-going studies of reactivity-based control measures.

Comment: AIM Coatings Control vs. Other Control Measures. Commenter suggests that other categories offer much greater cost effective reductions – these include nonroad vehicles, highway vehicles, and industrial processes.

Response: This comment will be addressed separately by the MRPO States.

Comment: Numerous concerns with South Coast Rule 1113 were identified, including: 1. Phase III limits have not been implemented 2. Coatings formulated for southern CA will not work in the upper Midwest 3. CARB is still conducting several projects 4. CARB is working on revisions to its suggested control measure 5. EPA's ANPR on AIM coatings will raise issues that need to be resolved

Response: This comment will be addressed separately by the MRPO States.

VI: Changes to the Industrial Surface Coating White Paper (November 29, 2005)

Commenter: Michigan Manufacturers Association, *Comments on Midwest Planning Organization (RPO) Identification and Evaluation of Candidate Control Measures and Associated "White Papers"*, September 27, 2005.

Comment: With regard to auto assembly plants, the document is out of date by 10-15 years with regard to common coating practices and doesn't reflect the many have converted to low VOC coatings and have some level of add-on controls already.

Response: MACTEC added a paragraph to the "Source Category Description" section to indicate that some industries have implemented "low emission paint systems" over the past 10-15 years to meet regulatory requirements or pollution prevention goals. The White Paper does reflect that surface coating emissions are already significantly controlled. The second bullet on page 3 indicated that "many point sources are already controlled or soon will be controlled as a result of recently promulgated MACT standards". Table 3 shows that VOC emissions have already been reduced by an average of 78% across all surface coating categories, and will be reduced by an average of 84% from uncontrolled after implementation of MACT standards. For the Autos and Light Truck Category, Table 3 shows that uncontrolled emissions will be reduced by an average of 65% after implementation of the MACT standard.

Comment: Table 1a costs are inaccurate (i.e., not representative of the difficulty and cost of controlling auto coating lines with low concentration, high volume streams).

Response: MACTEC changed Table 1a and the "Cost Effectiveness and Basis" section to reflect the fact that controlling a low concentration waste stream will be much more expensive that cleaning a high pollutant load flow. We added Reference 8 to the White Paper which states that the cost effectiveness for regenerative thermal oxidizers may range up to $21,000 per ton when a control device is used for ver low-VOC concentration streams (less than around 100 ppmv) at very low flow rates.

Comment: Inclusion of emissions from attainment counties in Table 1a is inappropriate (i.e., only emissions from nonattainment counties should be included).

Response: At the requests of the states, MACTEC prepared Table 4 in the White Paper to show estimated emission reductions obtainable from nonattainment counties only, attainment counties adjacent to nonattainment areas, and all other attainment counties. This was done to allow states to evaluate policy options for geographic coverage of control measures.

Comment: Should not assume overall control of 90% for industrial surface coating as it may not be technically feasible or cost effective. Instead, there should be an examination of each source in a representative modern facility, with a rigorous analysis of retrofit costs, operating costs, and effectiveness before presenting prospective reduction figures.

Response: The purpose of the White Paper is to identify an initial set of possible control measures that may be considered in more detail in the future, with a "ballpark" estimate of the types of reductions that may be expected. The 90% reduction from uncontrolled was assumed based on the fact that many (but certainly not all) surface coating sources can achieve 98+% using 100% capture systems and add-on control equipment; for other sources this high level of control may not be technically feasible or cost effective. Conducting a rigorous analysis of cost and effectiveness for each of the many types of surface coating operations was beyond the scope of work for this initial identification of possible control

measures. States will need to conduct this type of rigorous analysis to determine the level of stringency for control measures selected for further consideration.

Comment: The White Paper does not address the serious issue of catalyst poisoning and blinding.

Response: We recognize that pretreatment to remove PM may be needed for certain types of coating operations and control systems to prevent catalyst poisoning or blinding. These issues will need to be considered if and when States conduct rigorous analyses to determine the level of stringency for control measures for specific types of coating operations.

Additional Changes

E.H. Pechan and Associates re-evaluated the potential VOC emission reductions that may be achieved through the implementation of the post-2002 MACT surface coating standards. For four categories (large appliances, metal furniture, plastic parts, and miscellaneous metal parts), Pechan determined that there will not be any additional VOC reductions as a result of post-2002 MACT implementation. Tables 1a, 3, and 4 have been modified to reflect this change.

VII: Changes to the Gasoline Distribution Facilities White Paper (November 29, 2005)

Commenter: Michigan Manufacturers Association, *Comments on Midwest Planning Organization (RPO) Identification and Evaluation of Candidate Control Measures and Associated "White Papers"*, September 27, 2005.

Comment: April 8, 2005 version of White Paper references CARB's 2000 Initial Statement of Reasons report that was subsequently been updated in 2002. CARB's revised analysis indicated that costs identified in the 2000 report were off (low) by a factor of three.

Response: MACTEC obtained and reviewed the more recent CARB reference document (*Staff Report: Enhanced Vapor Recovery Technology Review*. October 2002). On page 43 of the 2002 Staff Report, CARB states: . "The EVR technical review modifications to the cost analysis are reflected in the costeffectiveness values in the bottom row of the table. The cost-effectiveness values have increased by about a factor of three. The main reason is correction of the calculation error discussed in the previous section regarding distribution of the equipment costs over the 4 year phase-in period."

VIII. Additional Changes Since December 30, 2005 (March 10, 2006)

ICI BOILERS
Revised emissions presented in Tables 1a, 1b, 3a, and 3b for Control Measure ICI2 (OTB plus likely control for sources subject to BART) using the latest version of LADCO's 12/29/05 "List of Sources Possibly Subject to BART".

PETROLEUM REFINERIES
Corrected the emissions for all refineries in Illinois to reflect the latest LADCO inventory (Base K); made editorial comments and corrections suggested by Bob Elvert of ExxonMobil.

CEMENT KILNS
Changed Table 2 to reflect current BART status base on latest version of LADCO's 12/29/05 "List of Sources Possibly Subject to BART". Revised emissions presented in Tables 1 and 3 for Control Measure KILN2 (Apply likely control to kilns subject to BART) using the latest version of LADCO's 12/29/05 "List of Sources Possibly Subject to BART".

ARCHITECTURAL AND INDUSTRIAL MAINTENANCE COATINGS
Changed emissions in Tables 1 and 3 per Grant Hetherington comment that there should be no reductions for traffic markings in WI since the control measure is based on WI NR 422.17 which is already in place in WI.

Added a paragraph to the end of the regulatory history to give an update on CARB's future revisions AIM suggested control measure. "*CARB is in the process of updating the 2000 Suggested Control Measure (SCM) for Architectural Coatings. They are currently completing a 2004 survey of AIM coating usage and VOC contents. They will not begin the formal SCM update process until the survey is completed, and are expected to propose revisions to the SCM in mid to late 2007. It cannot be determined at this time whether CARB's updated SCM will be as stringent as the SCAQMD Phase III limits. "*

CONSUMER PRODUCTS
Slightly changed Regulatory History paragraph on CARB 2003 SIP requirements to indicate that CARB expects to adopt the second phase of the amendments (CONS-2) by the end of 2006.

AUTO REFINISH COATINGS
Changed emissions in Tables 1, 2, and 3 per Grant Hetherington, who pointed out an error in which counties in Wisconsin were considered adjacent and not adjacent to nonattainment areas. The 3/28/2005 version used an older version of the county lookup table and was not updated (as the other White Papers were) to reflected the updated adjacent/not adjacent classifications. Added a paragraph to the end of the regulatory history to indicated that CARB has a new automotive coating suggested control measure and that SCAQMD 1151 was recently updated to be consistent with the SCM. "*SCAQMD updated their rules in December 2005 based on CARB's October 2005 Proposed Suggested Control Measure (SCM) for automotive coatings.*" Revised cost-effectiveness information based on CARB's 2005 Suggested Control Measure analysis.

Added a reference for the CARB 2005 Suggest Control Measure staff report.

PORTABLE FUEL CONTAINERS
Changed the Regulatory History section to provide an update on the CARB rules, which were amended on September 15, 2005, to add requirements for kerosene and utility jugs and other changes to improve effectiveness of the container design.

Change the Regulatory History and Rule Development sections to provide on update on EPA's proposed national rules. "*On February 28, 2006, EPA proposed a national regulation to reduce hazardous air pollutant emissions from mobile sources. Included in the proposed rules are standards that would reduce hydrocarbon emissions PFCs from evaporation, permeation, and spillage. The proposed EPA program is very similar to the revised California program. Although a few aspects of the program are different, EPA believes manufacturers would be able to meet both EPA and California requirements with the same gas can designs. Since the proposed EPA requirements would not go into effect in 2009 and there will be 5-10 year period for the new containers to penetrate the market, only a very small reduction in VOC emissions is expected in 2009.*"

ASPHALT PAVING
Changed emission reductions to correct calculation error as pointed out by Grant Hetherington. The documentation says 40% reduction from emulsified asphalt, but error in spreadsheet only took 37.5% reduction. Tables 1 and 2 changed accordingly.

GASOLINE DISTRIBUTION FACILITIES
Changed Stage II emissions in 9 WI counties based on Grant Hetherington comment: "For Kewaunee, Kenosha, Manitowoc, Sheboygan, Washington, Ozaukee, Waukesha, Milwaukee and Racine counties, the current CE, RE and RP values achieved by existing Stage II systems are comparable to those achieved by the new EVR Stage II systems. Consequently, there is no benefit to moving to EVR Stage II in the 9-counties."

Changed Stage I emissions in 20 WI counties based on Grant Hetherington comment: "For stage I emissions in the 20 NAA and adjacent counties, I'm using CE=97.39, RE=98 and RP=98. The revised emissions are in the attached spreadsheet." Revised Tables 1 and 2 accordingly.

INDUSTRIAL SURFACE COATING
Added area source emissions for SCC=24-01-090-000 Misc. Manufacturing to emission tables as these emissions were inadvertently left out (per comment from Grant Hetherington).

Bill Juris of Ohio EPA suggested that the area source emissions in the White Paper should be changed to reflect the final 2002 NEI which he says "will most likely include VOC emission estimates based upon the methodology developed in the draft EPA report "'Solvent Mass Balance' Approach for Estimating VOC Emissions From Eleven Nonpoint Solvent Source Categories" (March 28, 2005). " I downloaded the final NEI 2002 and the area source VOC emissions for surface coating are virtually identical to what is in the White Paper.

Bill Juris of Ohio EPA recommended doing a separate White Paper on printing/graphic arts, which is a separate category and not included in the surface coating category.

Bill Juris of Ohio EPA made several technical clarifications and corrections which were incorporated into the White Paper.
3
SOLVENT CLEANING (DEGREASING)
Grant Hetherington pointed out that we were taking reductions from the electronics sector which are specifically excluded from the OTC model rule and Chicago area Cold Cleaning RACT regulations. Changed calculations to exclude electronics and revised 1 and 3 with revised emission reduction estimates.

Bill Juris's comments indicate that Maryland and the OTC overestimated by 50% the reductions achievable from their model rule. His argument seems to make sense, but I don't think we should change

the White Paper until a more detailed analysis can be done and we get a better handle on what the actual emissions are (see following comment).

He also comments the area source emissions in the White Paper are too high and should be changed to reflect the final 2002 NEI which he says “the methodology for estimating 2002 emissions may be outdated as shown in the draft EPA report "'Solvent Mass Balance' Approach for Estimating VOC Emissions From Eleven Nonpoint Solvent Source Categories" (March 28, 2005). In that "solvent mass balance" report, the 2002 VOC emissions from surface cleaning for Ohio are shown as 7,402 tons…the 2002 VOC emissions for Ohio in the White Paperare shown as 17,877 tons” I downloaded the final NEI 2002 and the area source VOC emissions for degreasing are identical to what is in the White Paper, so it doesn’t look like EPA decided to use “solvent mass balance” approach.

APPENDIX B

SUMMARY TABLES FOR CANDIDATE CONTROL MEASURES

TABLE B.1 – SO2 CONTROL MEASURE SUMMARY FOR EGUs

Control Measure Summary	**SO2 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 SO2 Program	2002 Base:	2,798,884
2009 On-the-Way measures: CAIR (IPM estimates 36% reduction in 2009 emissions from 2002 levels due to early reductions)	Reduction: 2009 Remaining:	-1,003,922 1,794,962
Candidate measure ID EGU1: Adopt Emission Caps Based on "Retrofit SO2 BACT Level" of 0.15 lbs/mmBtu by 2013 (with Interim Cap Based on 0.36 lbs/mmBtu in 2009) *Emission Reductions*: 62% reduction from 2002 levels in 2009, 83% reduction from 2002 levels in 2013 *Control Cost*: $800/ton to $1,500/ton *Timing of Implementation*: Assumes full reductions achieved in 2013 *Implementation Area*: 5-State MRPO region	2009 Reduction: 2009 Remaining: 2013 Reduction: 2013 Remaining:	-1,748,171 1,050,713 -2,333,059 465,825
Candidate measure ID EGU2: Adopt Emission Caps Based on "SO2 BACT Level for New Plants" of 0.10 lbs/mmBtu by 2013 (with Interim Cap Based on 0.24 lbs/mmBtu in 2009) *Emission Reductions*: 75% reduction from 2002 levels in 2009, 89% reduction from 2002 levels in 2013 *Control Cost*: $800/ton to $3,000/ton *Timing of Implementation*: Assumes full reductions achieved in 2013 *Implementation Area*: 5-State MRPO region	2009 Reduction: 2009 Remaining: 2013 Reduction: 2013 Remaining:	-2,098,139 700,745 -2,488,334 310,550

TABLE B.2 – NOx CONTROL MEASURE SUMMARY FOR EGUs

Control Measure Summary	**Annual NOx Emissions (tons/year) in MRPO Region**	
2002 Existing measures (MRPO average NOx is 0.43 lbs/mmBtu): NSPS; PSD/NSR; State RACT Rules; Title IV NOx Requirements	2002 Base:	1,047,484
2009 On-the-Way: CAIR (IPM estimates 57% reduction from 2002 levels)	Reduction: 2009 Remaining:	-597,854 449,630
Candidate measure ID EGU1: Adopt Emission Caps Based on "Retrofit NOx BACT Level" of 0.10 lbs/mmBtu by 2013 (with Interim Cap Based on 0.15 lbs/mmBtu in 2009) *Emission Reductions*: 58% reduction from 2002 levels in 2009 70% reduction from 2002 levels in 2013 *Control Cost*: $700/ton to $1,600/ton *Timing of Implementation*: Assumes full reductions achieved in 2013 *Implementation Area*: 5-State MRPO region	2009 Reduction: 2009 Remaining: 2013 Reduction: 2013 Remaining:	-609,687 437,797 -736,934 310,550
Candidate measure ID EGU2: Adopt Emission Caps Based on "NOx BACT Level for New Plants" of 0.07 lbs/mmBtu by 2013 (with Interim Cap Based on 0.12 lbs/mmBtu in 2009) *Emission Reductions*: 67% reduction from 2002 levels in 2009 79% reduction from 2002 levels in 2013 *Control Cost*: $700/ton to $2,100/ton *Timing of Implementation*: Assumes full reductions achieved in 2013 *Implementation Area*: 5-State MRPO region	2009 Reduction: 2009 Remaining: 2013 Reduction: 2013 Remaining:	-697,246 350,238 -830,099 217,385

Control Measure Summary	**Ozone Season NOx Emissions (tons/season) in MRPO Region**	
2002 Existing measures (MRPO average NOx is 0.43 lbs/mmBtu): NSPS; PSD/NSR; State RACT Rules; Title IV NOx Requirements	2002 Base:	439,374
2009 On-the-Way: CAIR (IPM estimates 57% reduction from 2002 levels)	Reduction: 2009 Remaining:	-249,049 190,325
Candidate measure ID EGU1: Adopt Emission Caps Based on "Retrofit NOx BACT Level" of 0.10 lbs/mmBtu by 2013 (with Interim Cap Based on 0.15 lbs/mmBtu in 2009) *Emission Reductions*: 57% reduction from 2002 levels in 2009 69% reduction from 2002 levels in 2013 *Control Cost*: $700/ton to $1,600/ton *Timing of Implementation*: Assumes full reductions achieved in 2013 *Implementation Area*: 5-State MRPO region	2009 Reduction: 2009 Remaining: 2013 Reduction: 2013 Remaining:	-249,765 189,609 -304,124 135,250
Candidate measure ID EGU2: Adopt Emission Caps Based on "NOx BACT Level for New Plants" of 0.07 lbs/mmBtu by 2013 (with Interim Cap Based on 0.12 lbs/mmBtu in 2009) *Emission Reductions*: 65% reduction from 2002 levels in 2009 78% reduction from 2002 levels in 2013 *Control Cost*: $700/ton to $2,100/ton *Timing of Implementation*: Assumes full reductions achieved in 2013 *Implementation Area*: 5-State MRPO region	2009 Reduction: 2009 Remaining: 2013 Reduction: 2013 Remaining:	-287,687 151,687 -344,699 94,675

TABLE B.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:	362,347
2009 On-the-Books measures: Enforcement settlements and Alcoa announced scrubbers	Reduction: 2009 OTB:	-66,826 295,521
Candidate measure ID ICI1: OTB measures plus 40% SO2 Reduction to All Medium and Large ICI Boilers *Emission Reductions*: overall reduction of 29% from the 2009 on-the-books estimate, based on 40% reduction in SO2 emissions from ICI boilers > 100 mmBtu/hr *Control Cost*: $633 to $1,075 per ton *Timing of Implementation*: Assumes full reductions achieved in 2009 *Implementation Area*: 5-State MRPO region	2009 OTB: 2009 Reduction: 2009 Remaining:	295,521 -86,425 209,096
Candidate measure ID ICI2: OTB Measures plus Likely Controls to ICI Boilers subject to the proposed BART requirements *Emission Reductions*: overall reduction of 40% from the 2009 on-the-books estimate, based on 90% reduction in SO2 emissions from ICI boilers subject to BART requirements *Control Cost*: $1,622 to 5,219 per ton *Timing of Implementation*: Assumes full reductions achieved in 2013 *Implementation Area*: 5-State MRPO region	2009 OTB 2013 Reduction: 2013 Remaining:	295,521 -117,721 177,800
Candidate measure ID ICI3: OTB Measures plus 90% SO2 Reduction (similar to BART) to All Medium and Large ICI Boilers *Emission Reductions*: overall reduction of 66% from the 2009 on-the books estimate, based on 90% reduction in SO2 emissions from ICI boilers > 100 mmBtu/hr *Control Cost*: $1,622 to 5,219 per ton *Timing of Implementation*: Assumes full reductions achieved in 2009 *Implementation Area*: 5-State MRPO region	2009 OTB 2009 Reduction: 2009 Remaining:	295,521 -194,456 101,065

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 B.4 – NOx CONTROL MEASURE SUMMARY FOR ICI BOILERS

Control Measure Summary	**NOx Emissions (tons/year) in 5-state MRPO Region**	
2002 Existing measures : NSPS; PSD/NSR; State RACT Rules	2002 Base:	218,547
2009 On-the-Books measures: NOx SIP Call for large boilers, enforcement settlements	Reduction: 2009 OTB:	-5,264 213,283
Candidate measure ID ICI1: OTB Measures plus 60% Reduction (similar to NOx SIP Call) to all Medium and Large ICI Boilers *Emission Reductions*: overall reduction of 19% from 2009 on-the-books estimates, based on 60% reduction for all ICI boilers > 100 mmBtu/hr *Control Cost*: $280 to 1,399 per ton *Timing of Implementation*: Assumes full reductions achieved in 2009 *Implementation Area*: 5-State MRPO region	2009 OTB:2009 Reduction: 2009 Remaining:	213,283 -39,714 173,569
Candidate measure ID ICI2: OTB Measures plus Likely Controls to ICI Boilers subject to the proposed BART requirements *Emission Reductions*: overall reduction of 8% from 2009 on-the-books estimates, based on 80% reduction for ICI boilers subject to BART requirements *Control Cost*: $536 to 4,493 per ton *Timing of Implementation*: Assumes full reductions achieved in 2013 *Implementation Area*: 5-State MRPO region	2009 OTB:2013 Reduction: 2013 Remaining:	213,283 -17,007 196,276
Candidate measure ID ICI3: OTB Measures plus 80% Reduction (similar to BART) to all Medium and Large ICI Boilers *Emission Reductions*: overall reduction of 31% from 2009 on-the-books estimates, based on 80% reduction for ICI boilers > 100 mmBtu/hr *Control Cost*: $536 to 4,493 per ton *Timing of Implementation*: Assumes full reductions achieved in 2009 *Implementation Area*: 5-State MRPO region	2009 OTB:2009 Reduction: 2009 Remaining:	213,283 -66,330 146,953

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 B.5 – SO2 CONTROL MEASURE SUMMARY FOR PETROLEUM REFINERIES

Control Measure Summary	**SO2 Emissions (tons/year) in 5-state MRPO Region**	
2002 Existing measures : NSPS; PSD/NSR; State RACT Rules, MACT standards	2002 Base:	75,223
On-the-Books measures: Refinery Enforcement Settlements (contols on FCCUs, boilers/heaters, sulfur recovery units, flaring, equipment leaks, and wastewater treatment)	2009 Reduction: 2009 Remaining: 2012 Reduction: 2012 Remaining:	-49,942 25,281 -55,641 19,582

TABLE B.6 – NOx CONTROL MEASURE SUMMARY FOR PETROLEUM REFINERIES

Control Measure Summary	**NOx Emissions (tons/year) in 5-state MRPO Region**	
2002 Existing measures : NSPS; PSD/NSR; State RACT Rules, MACT standards	2002 Base:	31,831
On-the-Books measures: Refinery Enforcement Settlements (contols on FCCUs, boilers/heaters, sulfur recovery units, flaring, equipment leaks, and wastewater treatment); NOx SIP Call	2009 Reduction: 2009 Remaining: 2012 Reduction: 2012 Remaining:	-9,299 22,532 -13,941 17,890

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

Control Measure Summary	**SO2 Emissions (tons/year) in 5-state MRPO Region**	
2002 Existing measures : NSPS; PSD/NSR; State Rules	2002 Base:	47,786
Candidate measure ID REF1: Apply Likely Controls to Refinery Sources subject to the proposed BART requirements *Emission Reductions*: overall reduction of 25% from the iron and steel category, based on 90% reduction in SO2 emissions from boilers, furnaces, and process units identified as being subject to BART *Control Cost*: $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 *Timing of Implementation*: Assumes full reductions achieved in 2013 *Implementation Area*: Affected BART sources in MRPO region	2013 Reduction: 2013 Remaining:	-12,047 35,739

TABLE B.8 - NOx CONTROL MEASURE SUMMARY FOR IRON & STEEL PLANTS

Control Measure Summary	**NOx Emissions (tons/year) in 5-state MRPO Region**	
2002 Existing measures : NSPS; PSD/NSR; State Rules	2002 Base:	43,479
Candidate measure ID REF1: Apply Likely Controls to Refinery Sources subject to the proposed BART requirements *Emission Reductions*: overall reduction of 16% from the iron and steel category, based on 80% reduction in NOx emissions from boilers, furnaces, and process units identified as being subject to BART *Control Cost*: $850 per ton for boilers; $2,018 per ton for furnaces *Timing of Implementation*: Assumes full reductions achieved in 2013 *Implementation Area*: Affected BART sources in MRPO region	2013 Reduction: 2013 Remaining:	-6,964 36,515

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

Control Measure Summary	**SO2 Emissions (tons/year) in 5-state MRPO Region**	
2002 Existing measures : NSPS; PSD/NSR; State Rules	2002 Base:	38,703
2009 On-the-Books measures: None identified	Reduction: 2009 Remaining:	-0 38,703
Candidate measure ID KILN1: Apply Reasonably Available Controls to All Kilns in Region *Emission Reductions*: 90% from 2002 baseline for all cement kilns in MRPO region *Control Cost*: $2,211/ton to $6,917/ton *Timing of Implementation*: Assumes full reductions achieved in 2009 *Implementation Area*: 5-State MRPO region	2009 Reduction: 2009 Remaining:	-34,833 3,870
Candidate measure ID KILN2: Apply Likely Controls to Kilns subject to the proposed BART requirements *Emission Reductions*: overall reduction of 56% from the cement kiln category, based on 90% reduction in SO2 emissions from kilns identified as being BART-eligible *Control Cost*: $2,211/ton to $6,917/ton *Timing of Implementation*: Assumes full reductions achieved in 2013 *Implementation Area*: 5-State MRPO region	2013 Reduction: 2013 Remaining:	-21,637 17,066

TABLE B.10– NOx CONTROL MEASURE SUMMARY FOR CEMENT KILNS

Control Measure Summary	**NOx Emissions (tons/year) in 5-state MRPO Region**	
2002 Existing measures : NSPS; PSD/NSR; State RACT Rules	2002 Base:	34,032
2009 On-the-Books measures: NOx SIP Call for cement kilns (30% reduction from uncontrolled levels)	Reduction: 2009 Remaining:	-10,210 23,822
Candidate measure ID KILN1: Apply Reasonably Available Controls to All Kilns in Region *Emission Reductions*: overall reduction of 50% from 2002 Base emissions and 29% reduction from NOx SIP call levels *Control Cost*: $-310/ton to $2,500/ton *Timing of Implementation*: Assumes full reductions achieved in 2009 *Implementation Area*: 5-State MRPO region	2009 Reduction: 2009 Remaining:	-17,016 17,016
Candidate measure ID KILN2: Apply Likely Controls to Kilns subject to the proposed BART requirements *Emission Reductions*: overall reduction of 28% from 2002 emissions category and 40% from NOx SIP Call levels, based on 80% reduction for cement kilns identified as being BART-eligible *Control Cost*: $1,500/ton to $2,500/ton *Timing of Implementation*: Assumes full reductions achieved in 2013 *Implementation Area*: 5-State MRPO region	2013 Reduction: 2013 Remaining:	-9,408 14,415

TABLE B.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:	313,179 -242,799 70,380
2009 On-the Books measures: 10-year MACT surface coating standards, incremental reduction of 20% from 2002 actual levels	2002 Base: 2009 Reduction: 2009 Remaining:	70,380 -13,790 56,590
Candidate measure: Adopt More Stringent RACT regulations, lower applicability thresholds, and extend geographic coverage *Measure ID:* SOLV5A *Emission Reductions*: reduction of 42-83% from 2002 levels depending on the geographic coverage *Control Cost*: varies considerably by process, ranging from $100 for uncontrolled high concentration streams to $21,000 per ton for very low-VOC concentration streams. *Timing of Implementation*: Assuming 2007 effective date of rule, emission reductions are achieved in 2009 *Implementation Area*: (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 B.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:	118,036
2009 On-the Books measures: None identified	2002 Base: 2009 Reduction: 2009 Remaining:	118,036 -0 118,036
Candidate measure: Adopt More Stringent RACT regulations, lower applicability thresholds, and extend geographic coverage *Measure ID:* SOLV5B *Emission Reductions*: reduction of 42-72% from 2002 levels depending on the geographic coverage *Control Cost*: varies considerably by process, ranging from $100 for uncontrolled high concentration streams to $21,000 per ton for very low-VOC concentration streams. *Timing of Implementation*: Assuming 2007 effective date of rule, emission reductions are achieved in 2009 *Implementation Area*: (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:	118,036 -84,986 33,050

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 B.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 -4,931 56,295
Candidate measure: Adopt Chicago/Metro East Cold Cleaning Regulations in additional counties *Measure ID:* SOLV6A *Emission Reductions*: reduction of 36-63% from 2002 levels depending on the geographic coverage *Control Cost*: $1,400 per ton *Timing of Implementation*: Assuming 2007 effective date of rule, emission reductions are achieved in 2009 *Implementation Area*: (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 -38,436 22,790

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 B.14 – CONTROL MEASURE SUMMARY FOR ARCHITECTURAL AND INDUSTRIAL MAINTENANCE COATINGS

Control Measure Summary	**VOC Emissions (tons/year) in 5-State MRPO Region**	
2002 existing measure: Federal AIM rules 40CFR Part 59 *Emission Reductions*: 20% reduction from uncontrolled levels *Control Cost*: $250 per ton *Timing of Implementation*: Compliance required by September 1999 *Implementation Area*: Nationwide	Uncontrolled: 2002 Reduction: 2002 Base:	130,300 -26,060 104,240
Candidate measure: Adopt more stringent VOC limits for AIM coatings based on OTC Model Rule and Wisconsin NR433.17 *Measure ID:* SOLV1A *Emission Reductions*: 31% beyond Federal AIM rule (for a total reduction of 36% from uncontrolled emissions) *Control Cost*: $6,400 per ton *Timing of Implementation*: Assuming 2007 effective date of rule and 2-year sell-through period, emission reductions are achieved in 2009 *Implementation Area*: 5-state MRPO region	2002 Base: 2009 Reduction: 2009 Remaining:	104,240 -20,783 83,457
Candidate measure: Adopt SCAQMD Phase III VOC limits in addition to OTC Model Rule *Measure ID:* SOLV1B *Emission Reductions*: 13.4% beyond OTC Model Rule (for a total reduction of 44% from uncontrolled emissions) *Control Cost*: $20,000 per ton *Timing of Implementation*: Assuming 2007 effective date of rule and 2-year sell-through period, emission reductions are achieved in 2009 *Implementation Area*: 5-state MRPO region	2002 Base: 2009 Reduction: 2009 Remaining:	104,240 -31,944 72,296
Candidate measure: Develop Reactivity-Based Limits *Measure ID:* SOLV1C *Emission Reductions*: cannot be determined at this time *Control Cost*: cannot be determined at this time *Timing of Implementation*: cannot be determined at this time	Not available (n/a)	n/a

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 B.15 – CONTROL MEASURE SUMMARY FOR PORTABLE FUEL CONTAINERS

Control Measure Summary	**VOC Emissions (tons/year) in 5-State MRPO Region**	
2002 existing measure: None *Emission Reductions*: none *Control Cost*: $0 per ton *Timing of Implementation*: n/a *Implementation Area*: n/a	2002 Base:	50,970
Candidate measure: Adopt OTC Model Rule for PFCs *Measure ID:* SOLV3A *Emission Reductions*: 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 *Control Cost*: $250 per ton to $480 per ton *Timing of Implementation*: Assuming 2007 effective date of rule and 10% per year turnover, full reductions are achieved in 2015 *Implementation Area*: 5-state MRPO region	2002 Base: 2009 Reduction: 2009 Remaining: 2015 Reduction: 2015 Remaining:	50,970 -9,175 41,795 -27,524 23,446
Candidate measure: Adopt Incentive Programs in Nonattainment Areas to Accelerate Phase-In of Compliant PFCs *Measure ID:* SOLV3B *Emission Reductions*: 27% 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 *Control Cost*: $4,600 per ton *Timing of Implementation*: 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 *Implementation Area*: Nonattainment counties only	2002 Base: 2009 Reduction: 2009 Remaining: 2015 Reduction: 2015 Remaining:	50,970 -12,281 38,690 -27,524 23,446

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

TABLE B.16 – CONTROL MEASURE SUMMARY FOR AUTOBODY REFINISHING

Control Measure Summary	**VOC Emissions (tons/year) in 5-State MRPO Region**	
2002 existing measures: Federal Auto Body Refinishing rules 40CFR Part 59 and RACT in 1-hour ozone nonattainment counties *Emission Reductions*: 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 *Control Cost*: $118 per ton for Part 59 rules *Timing of Implementation*: Part 59 compliance required by January 1999 *Implementation Area*: Part 59 – Nationwide; RACT only in 1-hour nonattainment counties in IL, IN, and WI	Uncontrolled: 2002 Reduction: 2002 Base:	42,545 -17,226 25,319
Candidate measure: Extend the existing IL/IN/WI RACT regulations beyond 1-hr nonattainment counties *Measure ID:* SOLV4A *Emission Reductions*: reduction of 55% from uncontrolled emissions, with an incremental reduction of 15-24 percent from 2002 levels depending on the geographic coverage *Control Cost*: $1,354 per ton *Timing of Implementation*: Assuming 2007 effective date of rule, emission reductions are achieved in 2009 *Implementation Area*: (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:	25,301 -6,168 19,133
Candidate measure: Adopt More Stringent RACT regulations based on SCAQMD 1151 *Measure ID:* SOLV4B *Emission Reductions*: reduction of 89% from uncontrolled emissions, with an incremental reduction of 55-82 percent from 2002 levels depending on the geographic coverage *Control Cost*: $2,860 per ton incremental cost from going from IL/IN/WI RACT rules to new SCAQMD 1151 *Timing of Implementation*: Assuming 2007 effective date of rule, emission reductions are achieved in 2009 *Implementation Area*: (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:	25,301 -20,624 4,677

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 B.17 – CONTROL MEASURE SUMMARY FOR CONSUMER AND COMMERCIAL PRODUCTS

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

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 B.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:	42,463
2009 On-the Books measures: None	2002 Base: 2009 Reduction: 2009 Remaining:	42,463 -0 42,463
Candidate measure: Adopt CARB EVR Stage I requirements in 8-hour nonattainment areas and adjacent counties *Measure ID:* SOLV7A *Emission Reductions*: reduction of 29-77% from 2002 levels depending on the geographic coverage* *Control Cost*: $7,640 per ton to upgrade existing systems to meet CARB EVR Phase I requirements; $100 to 4,742 for new Stage I systems; dependent on the size of the station *Timing of Implementation*: Assuming 2007 effective date of rule, emission reductions are achieved in 2011 with CARB's four-year window for existing facilities to upgrade equipment *Implementation Area*: (1) 8-hr ozone nonattainment areas, (2) 8-hr ozone nonattainment areas plus adjacent counties, or (3) all counties in MRPO region	2002 Base: 2011 Reduction: 2011 Remaining:	42,463 -32,666 9,796

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.

If implemented statewide, the reduction would be 77% from 2002 levels. If implemented only in 8-hour ozone nonattainment areas, the reduction would be 29%. If implemented in both 8-hour nonattainment areas and counties adjacent to 8-hour areas, the reduction would be 55%.

TABLE B.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 -23,312 21,503
Candidate measure: Adopt CARB EVR Stage II requirements in 8-hour nonattainment areas and adjacent counties *Measure ID:* SOLV7B *Emission Reductions*: reduction of 45-83% from 2002 levels depending on the geographic coverage *Control Cost*: $36,260 per ton to upgrade existing systems to meet CARB EVR Phase II requirements; about $13,300 for new Stage II systems in 2009, increasing to $28,500 by 2015 *Timing of Implementation*: Assuming 2007 effective date of rule, emission reductions are achieved in 2011 with CARB's four-year window for existing facilities to upgrade equipment *Implementation Area*: (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 -40,550 4,265

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.

If implemented statewide, the reduction would be 83% from 2002 levels. If implemented only in 8-hour ozone nonattainment areas, the reduction would be 45%. If implemented in both 8-hour nonattainment areas and counties adjacent to 8-hour areas, the reduction would be 67%.

TABLE B.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 *Measure ID:* SOLV7C *Emission Reductions*: reduction of 28 to 72% from 2002 levels depending on the geographic coverage *Control Cost*: minimal if system recovers gasoline vapors and returns to storage tank *Timing of Implementation*: Assuming 2007 effective date of rule, emission reductions are achieved in 2009 *Implementation Area*: (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.

If implemented statewide, the reduction would be 72% from 2002 levels. If implemented only in 8-hour ozone nonattainment areas, the reduction would be 28%. If implemented in both 8-hour nonattainment areas and counties adjacent to 8-hour areas, the reduction would be 53%.

TABLE B.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 aphalt *Measure ID:* SOLV8A *Emission Reductions*: annual reduction of 40% from 2002 levels emulsified asphalt, no additional reductions for cutback asphalt since it is banned during ozone season; the net annual reduction from both emulsified and cutback is 33% *Control Cost*: Not Available *Timing of Implementation*: Assuming 2007 effective date of rule, emission reductions are achieved in 2009 *Implementation Area*: (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 -16,106 32,242

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

TABLE B.22 – CONTROL MEASURE SUMMARY FOR GLASS AND FIBERGLASS FURNACES

Control Measure Summary	**NOx Emissions (tons/year) in 5-state MRPO Region**	
2002 Existing measures : NSPS; PSD/NSR; State RACT Rules	2002 Base:	15,354
2009 On-the-Books measures: Wisconsin Rule 428.05	Reduction: 2009 Remaining:	-338 15,016
Candidate measure: Apply "Highly Cost-Effective" Reasonably Available Controls to all Glass Manufacturing Plants in Region *Measure ID:* GLASS1 *Emission Reductions:* average of 30% control from 2002 in MRPO region *Control Cost:* less than $2,000/ton *Timing of Implementation*: Assumes full reductions achieved in 2009 *Implementation Area*: 5-State MRPO region	2009 Reduction: 2009 Remaining:	-4,269 10,748
Candidate measure: Apply "Cost-Effective" Reasonably Available Controls to all Glass Manufacturing Plants *Measure ID:* GLASS2 *Emission Reductions:* average of 75% control from 2002 in MRPO region *Control Cost:* $2,000/ton to $4,000/ton *Timing of Implementation*: Assumes full reductions achieved in 2009 *Implementation Area*: 5-State MRPO region	2009 Reduction: 2009 Remaining:	-11,262 3,754

Note: the 2009 emission estimates presented here are not growth-adjusted.

TABLE B-23 – CONTROL MEASURE SUMMARY FOR ASPHALT MANUFACTURING

Control Measure Summary	**NOx Emissions (tons/year) in 5-state MRPO Region**	
2002 Existing measures : State fuel combustion rules	2002 Base:	4,014
2009 On-the-Books measures: None identified	Reduction: 2009 Remaining:	-0 4,014
Candidate measure: Apply Available Combustion Modification Controls to All Asphalt Manufacturing Plants *Emission Reductions:* 25% control from 2002 in MRPO region *Control Cost:* $17,630/ton to $21,084/ton *Timing of Implementation*: Assumes full reductions achieved in 2009 *Implementation Area*: 5-State MRPO region	2009 Reduction: 2009 Remaining:	-1,004 3,011

Control Measure Summary	**SO_2 Emissions (tons/year) in 5-state MRPO Region**	
2002 Existing measures : State fuel combustion rules	2002 Base:	3,614
2009 On-the-Books measures: None identified	Reduction: 2009 Remaining:	-0 3,614
Candidate measure: Apply Available Fuel Switching Controls (Natural Gas or Low-Sulfur Fuel Oil) Where Feasible to All Asphalt Manufacturing Plants *Emission Reductions:* cannot be estimated at this time – requires site-by-site analysis of availability of natural gas *Control Cost:* cannot be estimated at this time – requires site-by-site analysis of availability of natural gas *Timing of Implementation*: Assumes full reductions achieved in 2009 *Implementation Area*: 5-State MRPO region	2009 Reduction: 2009 Remaining:	Cannot be estimated at this time

TABLE B-24 – CONTROL MEASURE SUMMARY FOR GROUND SERVICE EQUIPMENT

Control Measure Summary	**NO_x Emissions (tons/year) in 5-State MRPO Region**	
2002 existing measure: None Identified	2002 Base:	1,266
2009 On-the-Books measures: None identified	Reduction: 2009 Remaining:	-0 1,266
Candidate measure: Convert or replace gasoline and diesel GSE engines to alternative fuels *Measure ID:* GSE01 *Emission Reductions*: 90% reduction of NOx emissions over a ten year period *Control Cost*: Varies from cost savings to $5,800 per ton, depending upon the type of equipment being replaced *Timing of Implementation*: 25% reduction by 2009, 50% reduction by 2012, and 90% reduction by 2018 *Implementation Area*: primarily large metropolitan areas in the 5-state MRPO region	2002 Base: 2009 Reduction: 2009 Remaining: 2012 Reduction: 2012 Remaining: 2018 Reduction: 2018 Remaining:	1,266 -316 949 -633 633 -1,139 127

APPENDIX C

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

APPENDIX D

INTERIM WHITE PAPERS

1. Airport Related Activities
2. Architectural and Industrial Maintenance Coatings
3. Asphalt Manufacturing
4. Asphalt Paving
5. Auto Body Refinishing
6. Cement Kilns
7. Chemical Manufacturing
8. Consumer and Commercial Products
9. Electric Generating Units
10. Gasoline Distribution Facilities
11. Glass Manufacturing
12. Industrial, Commercial, and Institutional Boilers
13. Industrial Solvent Cleaning
14. Industrial Surface Coating
15. Petroleum Refineries
16. Portable Fuel Containers