



PROTOCOL

Modeling Demonstration to Support an Attainment Date Extension for the Western Michigan and Northeastern Wisconsin Moderate Ozone Nonattainment Areas

Pursuant to Section 181 of the Clean Air Act Amendments of 1990 ("the Act"), USEPA has classified portions of western Michigan and northeastern Wisconsin as moderate nonattainment areas for ozone. These areas are as follows:

Michigan: Grand Rapids Area (Kent and Ottawa Counties)

Muskegon Area (Muskegon County)

Wisconsin: Kewaunee County

Manitowoc County

Sheboygan County

A map showing the location of these counties is provided in Figure 1.

Section 182(b)(1)(A) of the Act requires each state in which all or part of an ozone moderate nonattainment area exists to submit by November 15, 1994 a revision to its implementation plan which provides for sufficient reductions in emissions of volatile organic compounds (VOC) and oxides of nitrogen (NO_x) as necessary to attain the national ambient air quality standard (NAAQS) for ozone by the statutory attainment date.

According to section 181 of the Act, moderate nonattainment areas for ozone are required to attain as expeditiously as practicable, but not later than November 15, 1996. Because there is overwhelming transport of ozone into these LMOS moderate nonattainment areas from nearby upwind (severe) nonattainment areas, and because severe nonattainment areas have a later statutory attainment date (i.e., November 15, 2007, in this case), the western Michigan and northeastern Wisconsin moderate nonattainment areas may not be able to: (a) submit a demonstration by November 1994 that the areas will attain by 1996, or (b) actually demonstrate attainment through monitoring data by 1996.

To resolve these conflicting provisions of the Act, USEPA has issued guidance on attainment dates for ozone nonattainment areas affected by overwhelming transport (see "Ozone Attainment Dates for Areas Affected by Overwhelming Transport", September 1, 1994). This guidance allows such areas to suspend temporarily the original attainment date without "bumping" them up to a higher classification. For the purposes of developing their attainment demonstration, Michigan and Wisconsin can use the upwind areas' attainment date (i.e., 2007) in the absence of any analyses from the upwind areas. When later information becomes available from the upwind areas, USEPA may require additional analysis by the downwind moderate nonattainment areas to determine if an adjustment of the 2007 date is necessary.

According to USEPA's guidance, to qualify for an extension, it must demonstrate that emissions reduction measures contained in the SIP would be, at a minimum, sufficient to achieve attainment by the date generally applicable for the area's classification but for the overwhelming amount of transported pollutants into the area from the upwind area. This demonstration for the Lake Michigan area will be performed using the UAM-V model (Fast Version 1.21). The model will be run with both Grid A (outer grid with 16 km resolution) and Grid B (inner grid with 8 km resolution), and 8 vertical layers. Model inputs are as follows:

Boundary Conditions: based on observations, with surface data used to set layer 1-2 values and aircraft data used to set layer 3-8

Wind Fields: based on the CALRAMS prognostic meteorological model

Emissions: based on the LMOS Round 3a modeling inventory (see "Modeling Inventory for the Lake Michigan Region", August 1994)

Vertical Diffusivity: based on KRAMS preprocessor, w/ LADCO modifications

Chemical Mechanism: USEPA's recommended CB-IV mechanism (with UAM-IV photolysis rates)

Plume-in-Grid: applied to top 50 NOx point sources

For more information concerning these model inputs, see "Evaluation of the UAM-V Photochemical Grid Model in the Lake Michigan Region", Version 2.0, September 1994.

The modeling analysis will consist of the following steps:

(1) Demonstrate Effectiveness of Mandatory Control Measures: Model LMOP Strategy 1 (1996 scenario reflecting growth and mandatory controls) for LMOS Episodes 1 - 4. Table 1 presents a listing of the control measures included in Strategy 1.

These modeling runs will likely show improved (lower) air quality compared to the base case, but may not show attainment of the NAAQS, especially in the moderate nonattainment areas (e.g., western Michigan during Episode 2, and northeastern Wisconsin during Episodes 1 and 3). Pursuant to USEPA's guidance, it is, therefore, necessary to show that overwhelming transport is responsible for preventing attainment in these areas. Consequently, the following analysis will be performed to identify the contributions of the moderate nonattainment areas and the upwind nonattainment areas.

(2) Demonstrate Overwhelming Transport:

(a) Western Michigan: Zero-out NOx and anthropogenic VOC emissions in three western Michigan moderate nonattainment counties for Episode 2

(b) Northeastern Wisconsin: Zero-out NOx and anthropogenic VOC emissions in three northeastern Wisconsin moderate nonattainment counties for Episodes 1 and 3

(c) Enhancement/deficit plots comparing these "zero-out" results with the corresponding Strategy 1 results will be prepared to quantify the impact of the moderate nonattainment areas.

These three additional modeling runs are expected to show that during these episodes: (a) the air entering these counties is above the NAAQS, and (b) the local contribution is very small. This demonstration, coupled with the modeling showing air quality improvements from the mandatory control measures, should be sufficient to prove that the moderate nonattainment areas would be able to attain the ozone NAAQS by 1996, but for the overwhelming transport from nearby upwind severe nonattainment areas. Consequently, according to USEPA's guidance, these moderate nonattainment areas qualify for a temporary suspension of the original attainment date.

FIGURE 1

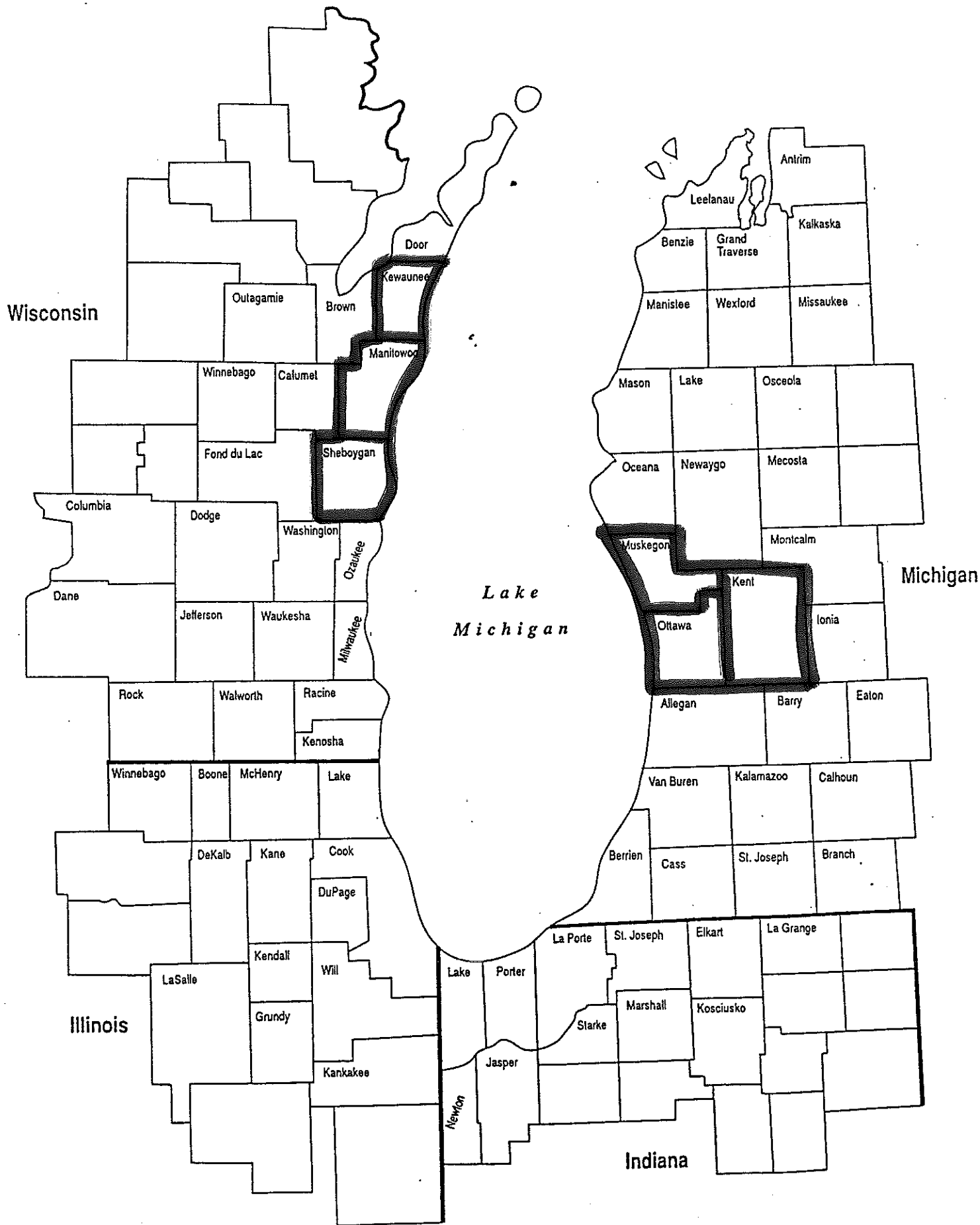


TABLE 1

- Strategy 1:** Mandatory Measures to be implemented before 1996
Other 15% Plan Measures for implementation before 1996
- Strategy 2:** Same Mandatory Measures as in Strategy 1, but grown out to 2007
Other Mandatory Measures being implemented after 1996
Same "Other 15% Plan Measures" as in Strategy 1, but grown out to 2007

Federally Mandated Measures NOTE: These are measures to be implemented, as part of Strategy 1 or 2.

<u>IL</u>		<u>IN</u>		<u>MI</u>		<u>WI</u>		<u>Code</u>	
<u>S1</u>	<u>S2</u>	<u>S1</u>	<u>S2</u>	<u>S1</u>	<u>S2</u>	<u>S1</u>	<u>S2</u>		
									CTG categories for which you will ever be required to develop rules (does not include autobody refinishing)
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>			2725	SOCMI Reactors & Distillation
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>		<u>x</u>	2425	Offset Lithography
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>			2501	VOL Storage (working and breathing)
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>			2740	Batch Processes
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>					4375	Industrial Wastewater TF
<u>x</u>	<u>x</u>			<u>x</u>	<u>x</u>		<u>x</u>	2340	Plastic Parts: Bus. Machines and Automobiles
<u>x</u>	<u>x</u>			<u>x</u>	<u>x</u>		<u>x</u>	2325	Wood Furniture Coating (MACT)
									Aerospace Coatings (MACT)
									Shipbuilding (MACT)
		<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>		<u>x</u>	2480	Industrial Cleanup Solvents
									Off-road engine standards (with agreement on how applied to inventory)
	<u>x</u>		<u>x</u>		<u>x</u>		<u>x</u>	30XX	Phase 1
	<u>x</u>		<u>x</u>		<u>x</u>		<u>x</u>		Phase 2
				<u>x</u>	<u>x</u>				Stage 1 - vapor recovery for storage tanks
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>		<u>x</u>	4220	Stage 2 - vapor recovery for vehicle refueling (includes gas reform)
									Effects of gas reform. on:
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>				<u>x</u>	3000	Off-road mobile
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>				<u>x</u>	2510	Stationary point sources (Bulk and Terminal Gasoline Plants)
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>						Stage 1 (gas stations; negligible?)
<u>x</u>	<u>x</u>						<u>x</u>	4265	Tank Truck Lossess
<u>x</u>	<u>x</u>						<u>x</u>	4225	Underground Storage Tank Breathing
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>		<u>x</u>	3805	Autobody Refinishing
	<u>x</u>		<u>x</u>		<u>x</u>			4100	Consumer/Commercial Solvents
<u>x</u>	<u>x</u>		<u>x</u>	<u>x</u>	<u>x</u>		<u>x</u>	3800	Architectural and Industrial Maintenance Coatings
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>						Marine Vessel VOL Loading Rule
									Acid Rain NOx provisions
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>		<u>x</u>	1015	Phase 1
	<u>x</u>		<u>x</u>		<u>x</u>			1015?	Phase 2
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>					5010	RACT Fix-Ups
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>					5020	RACT Catch-Ups (expansion of the non-attainment area)
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>		<u>x</u>	5030	25-Ton non-CTG RACT

MACT standards currently published or proposed, as of 7/20/94

<u>X X</u>	<u>X X</u>	---	---		Coke Ovens
<u>X X</u>	<u>X X</u>	---	---		The HON (final 2/28/94)
---	---	---	---		Perchloroethylene Dry Cleaners - photochemically non-reactive, no control inputs necessary (final 9/22/93)
---	---	---	---		Industrial Process Cooling Towers (proposed, final 7/31/94)
---	---	---	---		Hard Chromium Electroplating (area & pt.) (proposed, final 11/23/94)
---	---	---	---		Decorative Chromium Electroplating (area & pt.) (proposed, final 11/23/94)
---	---	---	---		Commercial Sterilization Facilities (area & pt.) (proposed final 11/23/94)
---	---	---	---		Chromic Acid Anodizing (area & pt.) (proposed, final 11/23/94)
---	---	---	---		Halogenated Solvent Cleaners (area & pt.) (proposed, final 11/23/94)
---	---	---	---		Magnetic Tapes (surface coating) (proposed, final 11/23/94)
---	---	---	---		Gasoline Distribution - Stage 1 (proposed, final 11/23/94)
---	---	---	---		Non-Nylon Polyamides Production (proposed 4/30/94, final 2/28/95)
---	---	---	---		Epoxy Resin Production (proposed 4/30/94, final 2/28/95)
---	---	---	---		Secondary Lead Smelting (proposed 5/31/94, final 5/31/95)
---	---	---	---		Petroleum Refineries - Other Sources Not Distinctly Listed (proposed 6/30/94, final 6/30/95)
<u>X X</u>	---	---	---	2690	Aerospace Industries (proposed 7/31/94, final 7/31/95)
---	---	---	---		Solid Waste Treatment, Storage and Disposal Facilities (TSDFs) (proposed 10/21/94, final 11/15/1995)
---	<u>X X</u>	---	---	2665	Municipal Landfills (final 11/15/00)
---	<u>X X</u>	---	<u>X X</u>	2901	Benzene NESHAPS
---	<u>X X</u>	---	<u>X X</u>	4001	Ethylene Oxide

State Discretionary Measures

<u>X X</u>	---	---	<u>X X</u>	4225	Underground Storage Tank Valves
<u>X X</u>	---	---	---	4480	Bakeries (area)
<u>X X</u>	---	---	---	2780	Bakeries (point)
---	---	---	---	2745	SOCMI Air Oxidation
---	---	---	---	2398	Coatings (miscellaneous)
---	---	---	<u>X X</u>	3810	Traffic Marking
---	---	---	<u>X X</u>	2445	Screen Printing
---	---	---	<u>X X</u>	2835	Iron & Steel Foundries
---	---	---	<u>X X</u>	2905	Asphalt Production Plants (appl. of BACT to Ch. 445)
---	---	---	<u>X X</u>	3799	Degreasing (area)
---	---	---	<u>X X</u>	2797	Yeast Manufacturing
---	---	---	<u>X X</u>		Adhesives
---	---	---	<u>X X</u>	2510	Large Gasoline Storage Facilities (appl. of LAER to Ch. 445)

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SUBJECT: Protocol for LMOS "Bump-Up" Modeling

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Attached please find a copy of the protocol for the modeling to be performed in support of the attainment date extension petition for the Wisconsin and Michigan moderate nonattainment areas. The protocol has been reviewed and verbally approved by USEPA (Region V and OAQPS).

The LMOP Modeling Team will perform this modeling as soon as the Strategy 1 emissions files are available. We expect to have all of the necessary technical support completed by late October.