

Illinois Emissions Inventory Review

St. Louis

November 19, 2004

- 2002 Periodic Inventory and Milestone Demonstration
- LADCO's Efforts to Identify Candidate Control Measures
- Candidate Control Measures



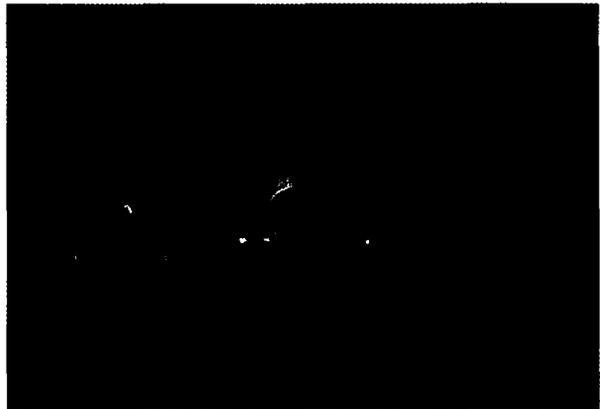
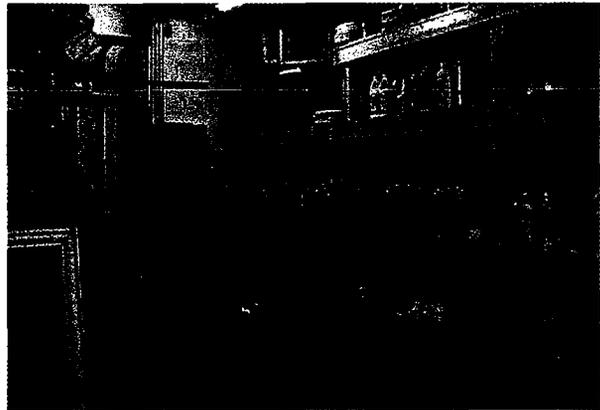
Illinois
Environmental
Protection Agency

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November 2004

IEPA/BOA/04-023

Illinois Periodic Emission Inventory and Milestone Demonstration for 2002



Governor Rod R. Blagojevich
Director Renee Cipriano

Figure 2-6: Metro-East NAA Ozone Precursor Emissions (tons/day)

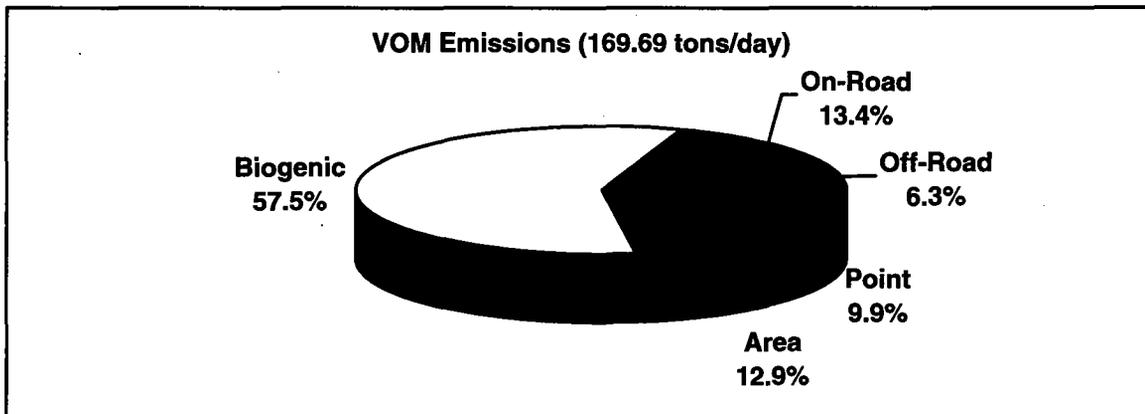
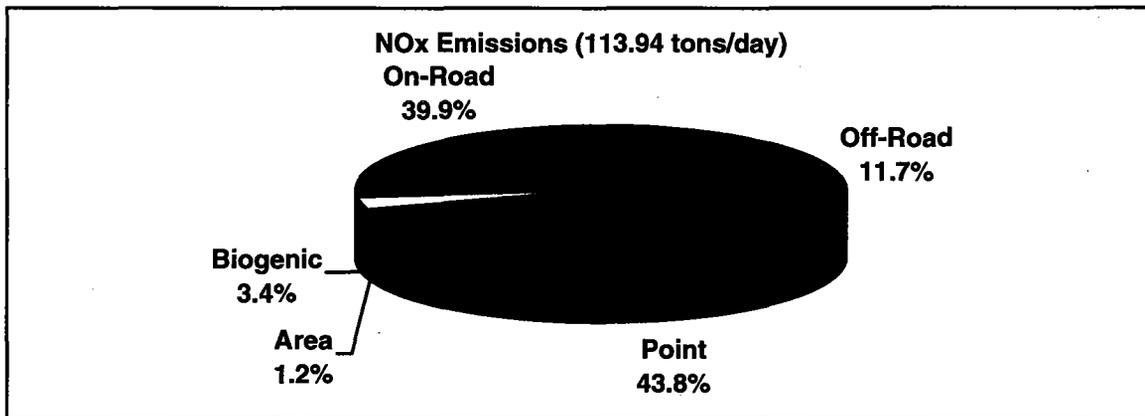
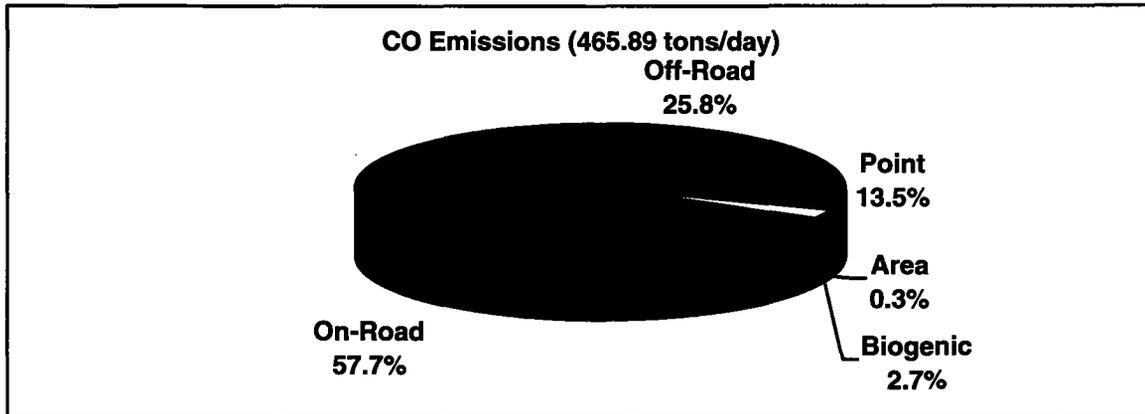


Figure 2-8: Statewide Ozone Precursor Emissions (tons/day)

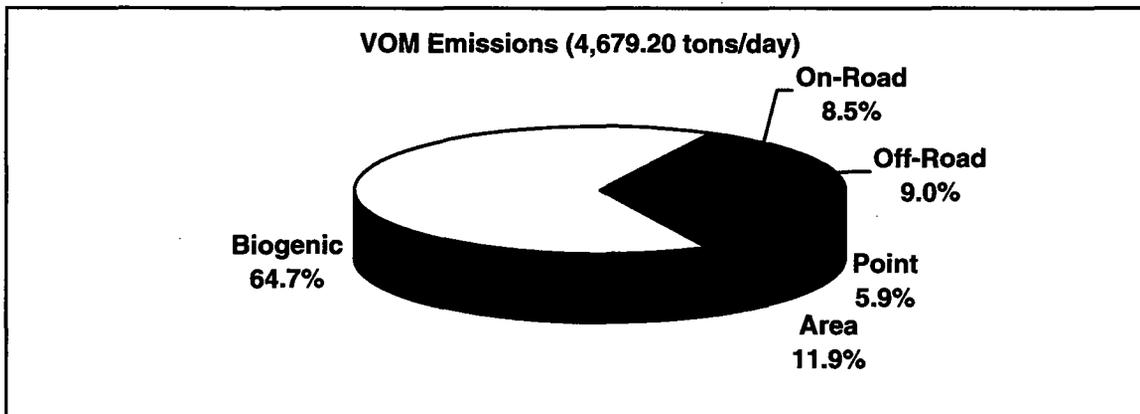
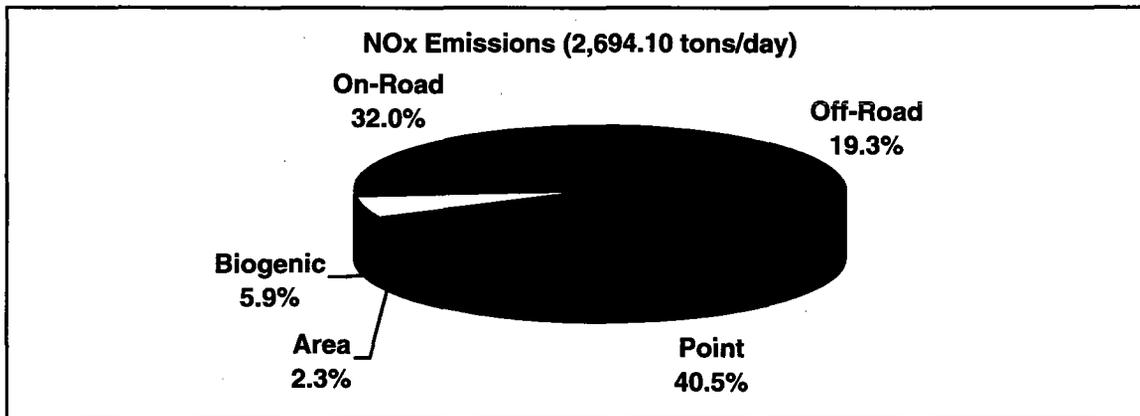
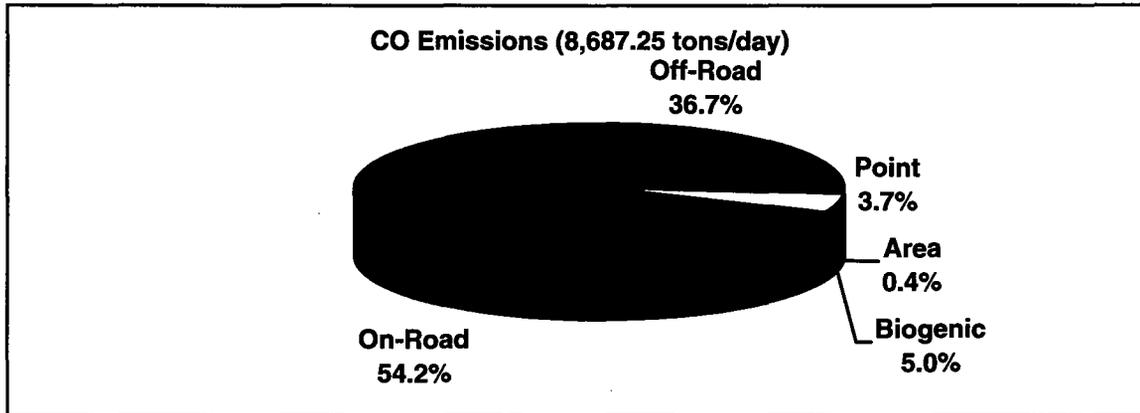


Figure 2-5: Chicago NAA Ozone Precursor Emissions (tons/day)

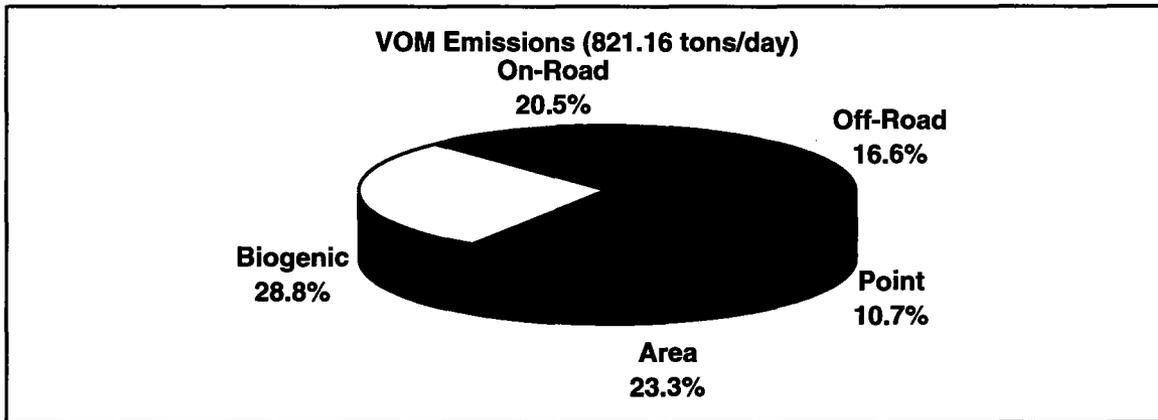
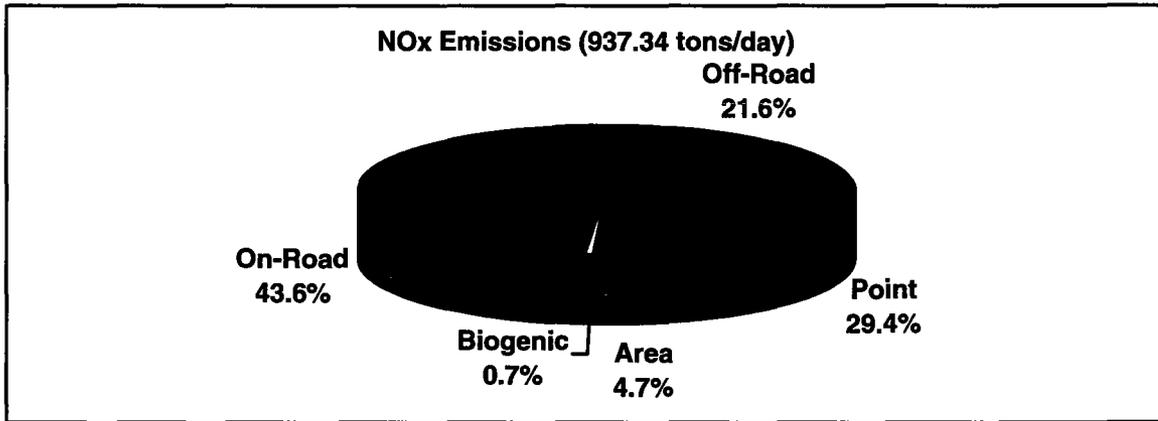
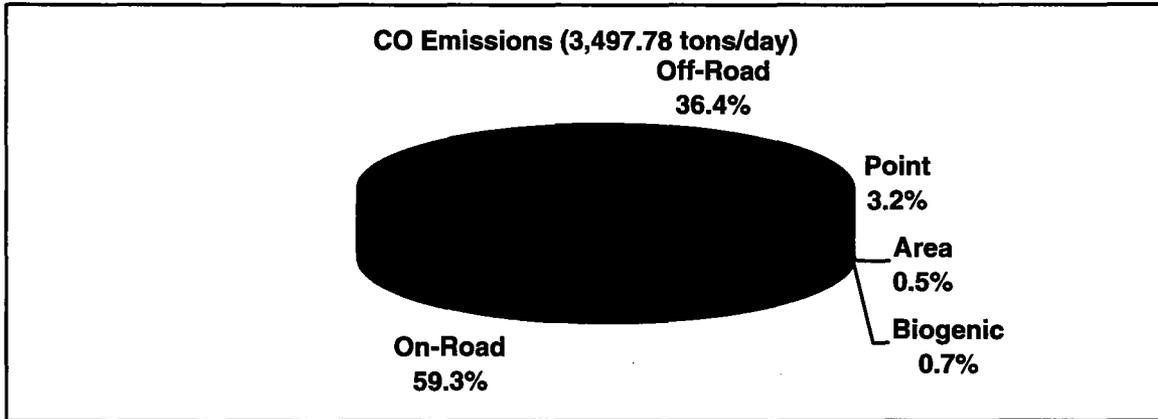


Figure 2-7: Attainment Area Ozone Precursor Emissions (tons/day)

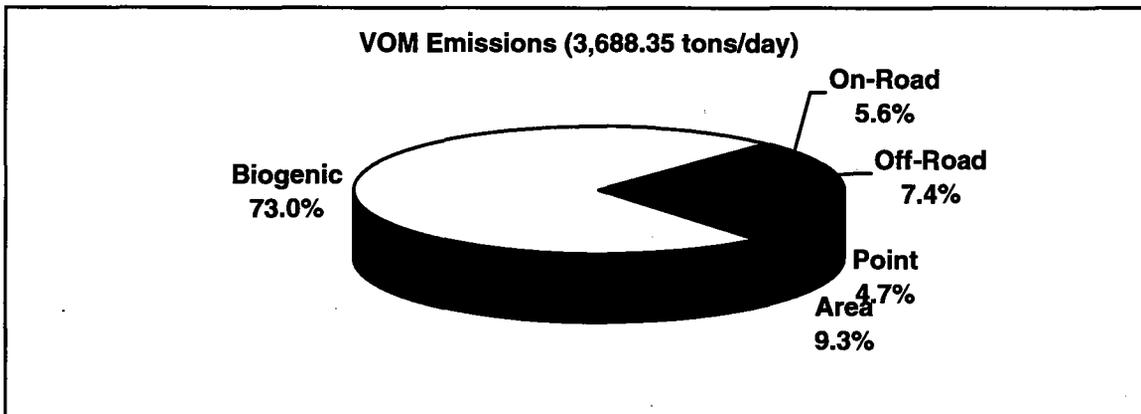
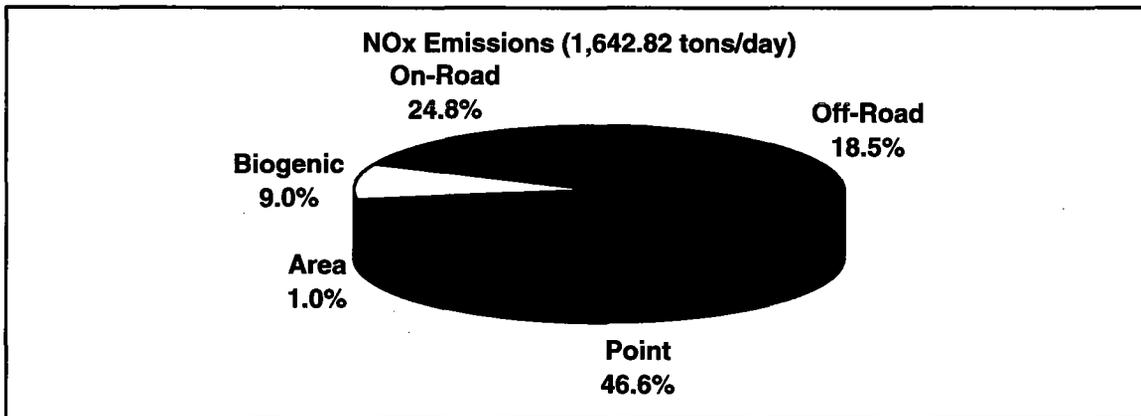
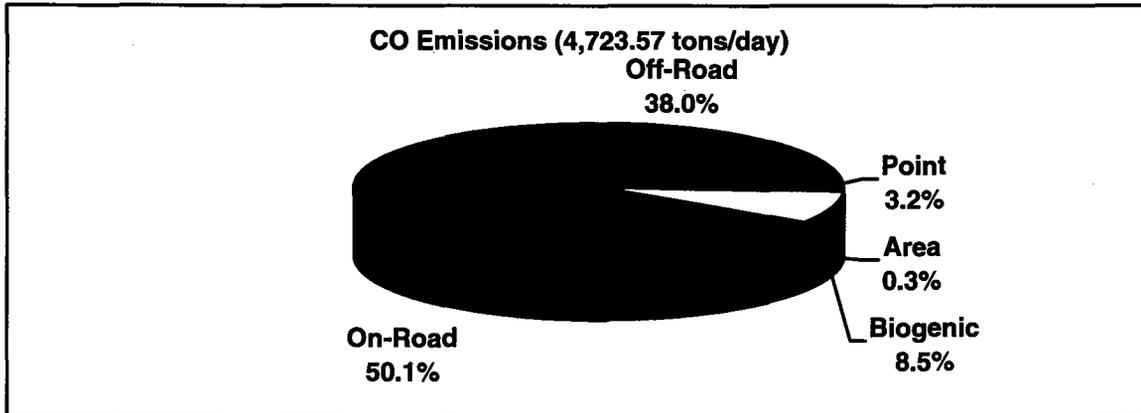


Figure 2-1: Illinois 2002 CO Emission Summary (tons/day)

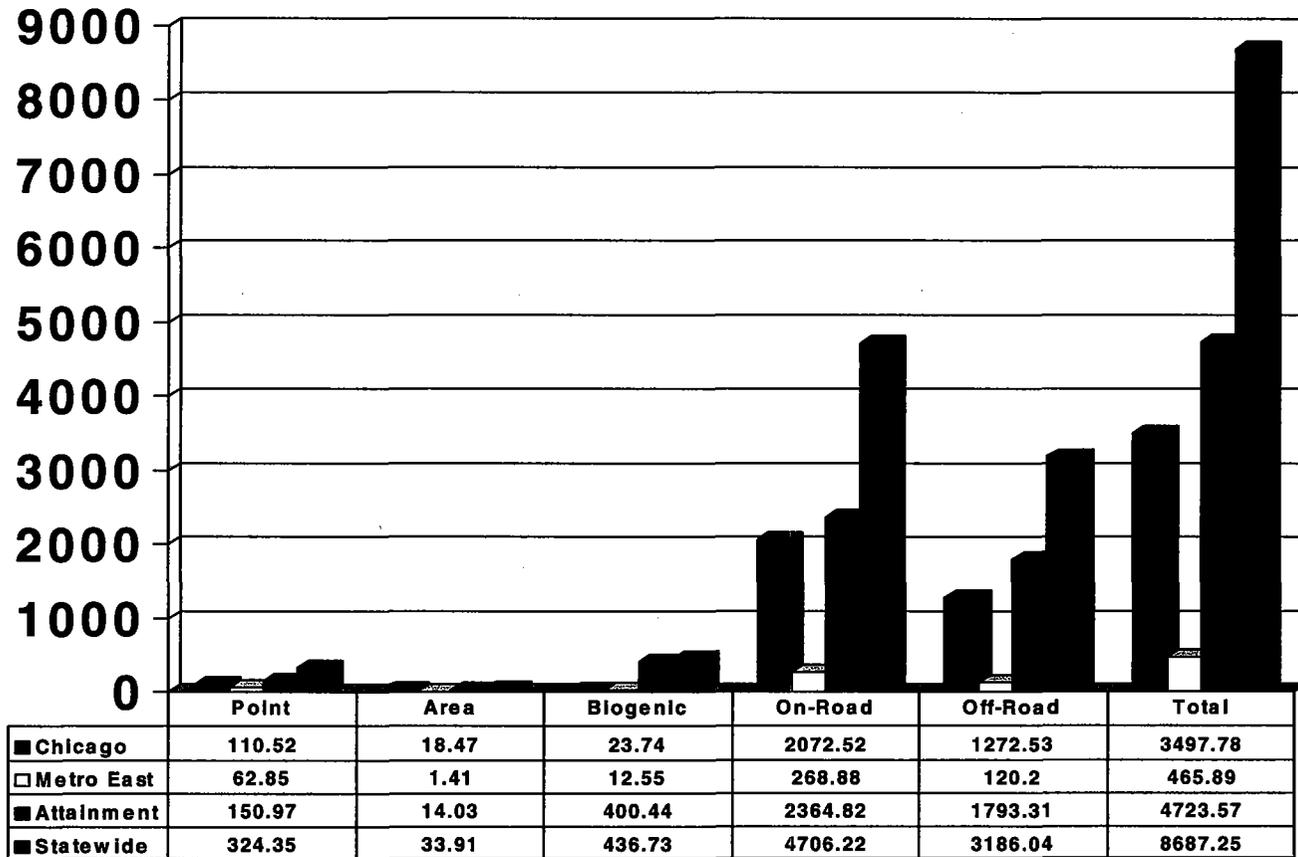


Figure 2-2: Illinois 2002 NOx Emission Summary (tons/day)

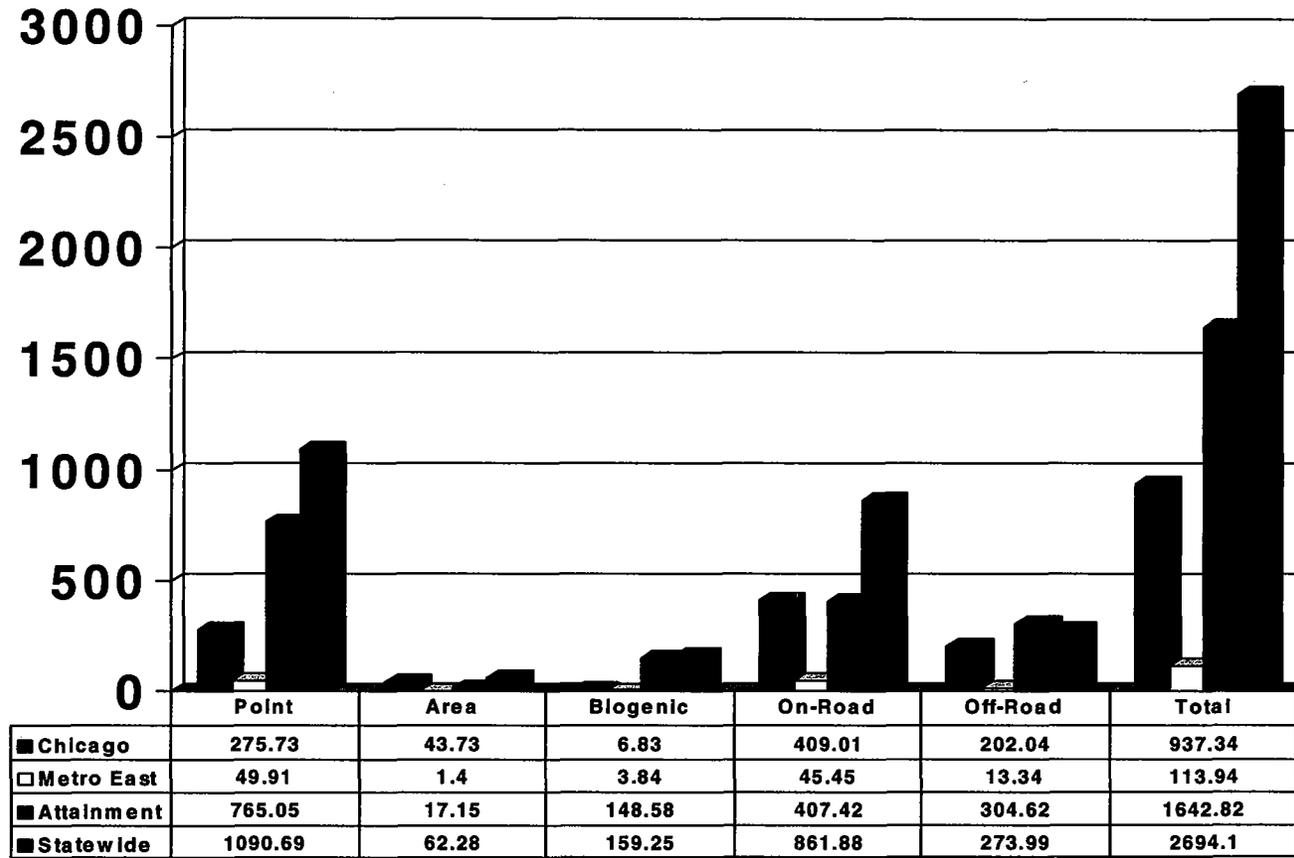


Figure 2-3: Illinois 2002 VOM Emission Summary (tons/day)

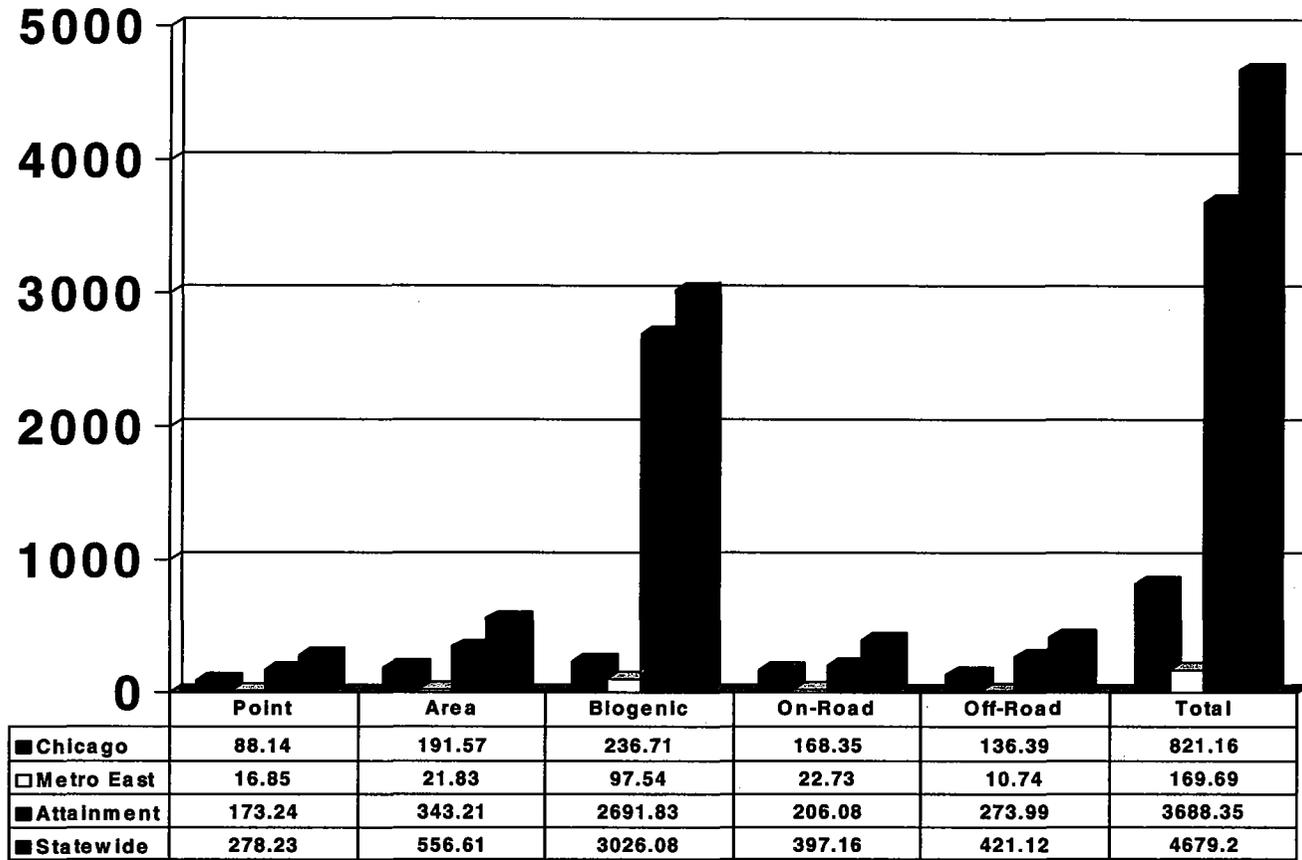


Table 6-3: 2002 Anthropogenic Ozone Inventory Typical Summer Day Emissions (tons/day)

	Point	Area	On-Road	Off-Road	Total
Chicago NAA					
CO	110.52	18.47	2,072.52	1,272.53	3,474.04
NOx	275.73	43.73	409.01	202.04	930.51
VOM	88.14	191.57	168.35	136.39	584.45
Metro-East NAA					
CO	62.85	1.41	268.88	120.20	453.34
NOx	49.91	1.40	45.45	13.34	110.10
VOM	16.85	21.83	22.73	10.74	72.15
Attainment Area					
CO	150.97	14.03	2,364.82	1,793.31	4,323.13
NOx	765.05	17.15	407.42	304.62	1,494.24
VOM	173.24	343.21	206.08	273.99	996.52
Statewide					
CO	324.35	33.91	4,706.22	3,186.04	8,250.52
NOx	1,090.69	62.28	861.88	520.00	2,534.85
VOM	278.23	556.61	397.16	421.12	1,653.12

Table 6-4: ROP Target, Projected and Actual VOM and NOx Levels Typical Summer Day Emissions (tons/day)

Year	Chicago NAA VOM			Attainment Area NOx		
	Target	Projected	Actual	Target	Projected	Actual
1990			1,216.56			2,085.80
1996	857.02	835.81	770.93	1996.56	1723.97	1,747.94
1999	807.82	772.72	667.58	1820.51	1632.81	1,746.10
2002	770.11	647.64	584.45	1657.23	1538.83	1,494.24
2005	740.92	613.47		1514.41	1019.35	
2007	729.13	591.58		1412.76	977.17	

These values are presented graphically below in Figures 6-1 and 6-2.

LADCO's Efforts to Identify Candidate Control Measures

Project Overview

- Candidate Control Measures
 - **Identify potential emission reduction measures**
 - Conduct technical and cost analysis
 - Fresh assessment of RACT for VOC and NO_x
- BART Regional Engineering Analysis
 - Prioritize non-EGU source categories
 - Identify potential emission reduction measures
 - Recommend approach for BART analysis
 - Implement BART approach for specific sources

Control Strategy Scenarios

- On-the-Books (OTB)
- On-the-Way (Proposed,
not Final)
- Candidate Control
Measures

“On the way” Controls

- Proposed CAIR
- Measures in EPA’s proposed implementation guidance for ozone and PM

Format for White Papers

- **Source Category Description**
- **Regulatory History**
- **Description of Candidate Control Measures**
- **Expected Emission Reductions**
- **Cost Effectiveness and Basis**
- **Geographic/seasonal Applicability**
- **Time Frame for Implementation**
- **Regulatory Implementation Issues**
- **Other Impacts**
- **References**

Update on Fresh Assessment of RACT

- Review basis for current RACT rules
 - Based on guidance from mid-1990s or earlier
- Compare relative stringency of LADCO state RACT rules to other agencies
 - South Coast, Bay Area, NJ, MD, MA
- Provide recommendations for tightening RACT

Other Contractual Efforts Underway...

- E.H. Pechan – Develop growth and control files for emissions modeling.
- ICF Consulting – Develop growth factors for electric utilities using IPM model.

Candidate Control Measures

2002 TYPICAL SUMMER DAY EMISSIONS OF VOM, NO_x and SO₂
Emissions Stated in Tons Per Day (TPD)

Metro East NAA VOM	
SOURCE CATEGORY	VOM (tpd)
Highway Vehicles - Gasoline	21.79
Nonroad - Marine Vessels	9.85
Petroleum Storage/Transport - Industrial	6.10
Nonroad - Gasoline	5.13
Solvents - Pesticide Application	3.91
Solvents - Consumer Solvents	3.56
Nonroad - Diesel	3.10
Solvents - Architectural/Maintenance Coatings	3.09
Solvents - Asphalt Application	3.08
Petroleum Storage/Transport - Service St (Stage I & II)	2.98
Industrial Process - Petroleum Refinery	2.93
Solvents - Degreasing	1.79
Solvents - Industrial Surface Coating	1.67
Waste Disposal & Recycling - Industrial (C/I and landfills added)	1.61
Industrial Process - Metals (Iron)	1.48
Solvents - Graphic Arts	1.37
Nonroad - Railroads	1.34
Highway Vehicles - Diesel	0.94
Fuel Comb. - Industrial	0.72
Industrial Process - Other NEC (includes cement and pulp/paper)	0.60
Solvents - Auto Refinishing	0.47
Fuel Comb. - Utility	0.46
Solvents - Dry Cleaning	0.38
Fuel Comb. - Comm/Inst	0.37
Solvents - Non-industrial Surface Coating (endup with traffic m p)	0.34
Nonroad - Aircraft	0.29
Fires - Structural/Prescribed/Wild	0.14
Waste Disposal & Recycling - Open Burnin	0.07
Industrial Process - Chemical Mfg.	0.06
Fuel Comb. - Residential	0.05
Nonroad - LPG & NG	
Agricultural Crops	
Construction	
Paved Roads	
Unpaved Roads	
Livestock Waste	
Fertilizer Applications	

Metro East NAA NOx	
SOURCE CATEGORY	NOx (tpd)
Highway Vehicles - Diesel	23.66
Fuel Comb. - Industrial	22.55
Highway Vehicles - Gasoline	21.81
Nonroad - Diesel	17.61
Fuel Comb. - Utility	16.31
Nonroad - Railroads	5.36
Industrial Process - Metals (Iron)	4.77
Industrial Process - Petroleum Refinery	3.15
Nonroad - Marine Vessels	1.34
Fuel Comb. - Residential	0.86
Fuel Comb. - Comm/Inst	0.79
Waste Disposal & Recycling - Industrial (C/I and landfills added)	0.57
Nonroad - Gasoline	0.42
Industrial Process - Chemical Mfg.	0.30
Nonroad - Aircraft	0.21
Industrial Process - Other NEC (includes cement and pulp/pape	0.14
Fires - Structural/Prescribed/Wild	0.02
Waste Disposal & Recycling - Open Burnin	0.01
Nonroad - LPG & NG	
Solvents - Degreasing	
Solvents - Dry Cleaning	
Solvents - Graphic Arts	
Solvents - Asphalt Application	
Solvents - Pesticide Application	
Solvents - Consumer Solvents	
Solvents - Industrial Surface Coating	
Solvents - Architectural/Maintenance Coatings	
Solvents - Non-industrial Surface Coating (endup with traffic m p)	
Solvents - Auto Refinishing	
Petroleum Storage/Transport - Industrial	
Petroleum Storage/Transport - Service St (Stage I & II)	
Agricultural Crops	
Construction	
Paved Roads	
Unpaved Roads	
Livestock Waste	
Fertilizer Applications	

Metro East NAA SO₂	
<u>SOURCE CATEGORY</u>	SO₂ (tpd)
Fuel Comb. - Utility	32.76
Industrial Process - Petroleum Refinery	31.56
Fuel Comb. - Industrial	10.06
Industrial Process - Metals (Iron)	9.41
Industrial Process - Chemical Mfg.	5.19
Highway Vehicles - Gasoline	1.35
Nonroad - Marine Vessels	1.33
Industrial Process - Other NEC (includes cement and pulp/paper)	1.04
Nonroad - Railroads	0.59
Highway Vehicles - Diesel	0.50
Waste Disposal & Recycling - Industrial (C/I and landfills added)	0.33
Nonroad - Diesel	0.22
Fuel Comb. - Comm/Inst	0.05
Nonroad - Gasoline	0.03
Fuel Comb. - Residential	0.02
Fires - Structural/Prescribed/Wild	0.00
Nonroad - Aircraft	0.00
Waste Disposal & Recycling - Open Burnin	0.00
Nonroad - LPG & NG	
Solvents - Degreasing	
Solvents - Dry Cleaning	
Solvents - Graphic Arts	
Solvents - Asphalt Application	
Solvents - Pesticide Application	
Solvents - Consumer Solvents	
Solvents - Industrial Surface Coating	
Solvents - Architectural/Maintenance Coatings	
Solvents - Non-industrial Surface Coating (endup with traffic m p)	
Solvents - Auto Refinishing	
Petroleum Storage/Transport - Industrial	
Petroleum Storage/Transport - Service St (Stage I & II)	
Agricultural Crops	
Construction	
Paved Roads	
Unpaved Roads	
Livestock Waste	
Fertilizer Applications	

SOURCE CATEGORY	CONTROLS ACCOUNTED FOR IN 2002 INVENTORY	OR PROPOSED REGS (REDUCTIONS AFTER 2002)	CANDIDATE CONTROL MEASURES
Fuel Comb. - Utility	PSD/NSR/NSPS; RACT in NAA Title IV SO2 Emission Allowances Title IV Phase I/II NOx limits	NOx SIP Call (except WI) Clean Air Interstate Rule Combustion Turbine MACT	Mercury MACT Controls Beyond CAIR Emission Reductions Conservation/energy efficiency Fuel Switching - Coal to Natural Gas Fuel Switching - high-sulfur to low-sulfur coal Renewables (biomass, solar, hydro and wind)
Fuel Comb. - Industrial	PSD/NSR/NSPS; RACT in NAA	NOx SIP Call (except WI) Boiler/Heater/RICE MACT	Beyond NOx SIP Call Emission Limits Lower Size Threshold for NOx SIP Call Limits Fuel switching during ozone season Incentives for Co-generation Conservation/energy efficiency Incentives for Co-generation
Fuel Comb. - Comm/Inst			
Highway Vehicles - Gasoline	Tier I Tailpipe Emission Standards I/M Milwaukee, Chicago, Louisville, St. Louis, Cleveland/Akron, Dayton/Springfield, and Cincinnati Reformulated Gasoline Phase II in Chicago, Milwaukee Reid Vapor Pressure limits in non-RFG counties	Tier II Tailpipe/Sulfur Standards	Transportation control measures (Transit, HOV lanes, road pricing, commuter alternatives, etc.) I/M more stringent/greater geographic coverage; remote sensing, high emitting vehicle scrappage Clean Fuel Fleets California Low Emission Vehicles Reformulated Gasoline Opt-in/Lower RVP Alternative fuels - SEMCOG Improving fuel efficiency
Highway Vehicles - Diesel	Heavy duty Diesel standards	Heavy duty diesel (2007) engine standards/low sulfur fuel Clean School Bus USA Voluntary Diesel Retrofit Program	Heavy-Duty Vehicle Testing Heavy-Duty Idling Restrictions Expand Fleet Retrofit Programs
Nonroad - Gasoline	Phase I Small SI Engine Standards	Phase 2 Small SI Engine Standards Recreational Vehicle Standards	Container spillage control measures Subsidize electric lawnmowerers
Nonroad - Diesel	CI Engine Standards	2004 Nonroad Diesel Engines and Sulfur Rule Voluntary Diesel Retrofit Program	Electric/alternative fuels Expand engine retrofit programs
Nonroad - Aircraft	ICAO Emission Standards		
Nonroad - Marine Vessels	1999 Commercial Marine Diesel Rule	New Commercial Marine Engine Standards	
Nonroad - Railroads	1997 Federal Locomotive Rule	New Railroad Locomotive Standards	
Nonroad - LPG & NG		Large SI Engine standards	
Fuel Comb. - Residential			Wood stove/fireplace reductions; Wook stove replacement (trade-in) program Education and Advisory Program Reduced Residential Energy Demand SCAQMD Rule 1121 residential water heater NOx controls
Waste Disposal & Recycling - Industrial	PSD/NSR/NSPS; RACT in NAA 2-, 4-, 7-year MACT		Gas collection systems at landfills
Waste Disposal & Recycling - Open Burmin	Open Burning Regs		Mandatory/voluntary burning bans
Solvents - Degreasing	2-, 4-, 7-year MACT State Rules		Conversion to non-VOC solvents SCAQMD 1122 (VOC content limit)
Solvents - Dry Cleaning	2-, 4-, 7-year MACT		Non-VOC solvents or emission controls
Solvents - Graphic Arts	2-, 4-, 7-year MACT		Low VOC materials or emission controls (Permanent Total Enclosures and Incineration)
Solvents - Asphalt Application			Low VOC formulations

Solvents - Pesticide Application			Low VOC formulations
			Better Pest Management practices
			Limit pesticide application in ozone season
Solvents - Consumer Solvents	Part 59 Consumer Product Rule		CARB Mid-term and Long-term Limits
Solvents - Industrial Surface Coating	PSD/NSR/NSPS; RACT in NAA 2-, 4-, 7-year MACT	10-year MACT	Beyond CTG RACT or statewide RACT
Solvents - Architectural/Maintenance Coatings	Part 59 AIM Federal Rule		OTC Model Rule; SCAQMD Phase III limits
Solvents - Non-industrial Surface Coating			CARB/SCAQMD rules
Solvents - Auto Refinishing	Part 59 Auto Refinish Federal Rule		CARB BARCT Limits
Industrial Process - Chemical Mfg.	PSD/NSR/NSPS; RACT in NAA 2-, 4-, 7-year MACT	10-year MACT	RACT or statewide RACT
Industrial Process - Metals	PSD/NSR/NSPS; RACT in NAA 2-, 4-, 7-year MACT	RACT in 8-hr NAA 10-year MACT	RACT or statewide RACT
Industrial Process - Petroleum Refinery	PSD/NSR/NSPS; RACT in NAA 2-, 4-, 7-year MACT	CCU/CRU/SRU MACT	Revisit PM limits for steel mills RACT or statewide RACT
Industrial Process - Other NEC (includes cement and pulp/paper)	PSD/NSR/NSPS; RACT in NAA 2-, 4-, 7-year MACT	10-year MACT	Alternatives to flaring; Smart LDAR RACT on SO2/NOx from Process Heaters RACT or statewide RACT
Petroleum Storage/Transport - Industrial	PSD/NSR/NSPS; RACT in NAA 2-, 4-, 7-year MACT	Organic liquids 10-yr MACT	Beyond CTG RACT or statewide RACT
Petroleum Storage/Transport - Service St	Stage I/II RACT		Lower tank applicability threshold Statewide Stage II
			Stage I and II for marinas
			California certification of vapor recovery
			Portable container spillage measures
Agricultural Crops			Dust control programs
Construction			Dust control programs
Fires - Structural/Prescribed/Wild			
Paved Roads			Vacuum Sweeping
Unpaved Roads			Chemical stabilization or paving
Livestock Waste			Chemical additives
Fertilizer Applications			

Prioritized List of Midwest RPO

Candidate Controls

- 1. Fuel Combustion-Utility**
 - * Controls beyond CAIR emission reductions**

- 2. Fuel Combustion-Industrial**
 - * Beyond NO_x SIP Call emission limitations**
 - * Lower size threshold for NO_x SIP Call emission limitations**

- 3. Highway Vehicles-Gasoline**
 - * I/M more stringent (e.g., greater geographic coverage, remote sensing, high emitting vehicle scrappage)**
 - * Alternative fuels (To be addressed by SEMCOG fuels study)**

- 4. Highway Vehicles-Diesel**
 - * Expand fleet retrofit programs**
 - * Heavy-duty idling restrictions**

- 5. Nonroad-Gasoline**
 - * Container spillage control measures**

- 6. Nonroad-Diesel**
 - * Expand engine retrofit programs**

- 7. Degreasing Solvents**
 - * Low VOC Formulations**

Prioritized List of Midwest RPO **Candidate Controls**

(Continued)

- 8. Solvents-Asphalt Applications**
 - * Low VOC Formulations**

- 9. Solvents-Consumer Solvents**
 - * CARB mid-term and long-term limits**

- 10. Solvents-AIM**
 - * OTC Model Rule, SCAQMD Phase III limits (White Paper already provided)**

- 11. Industrial Processes-Metals**
 - * Revisit PM Limits for Steel Mills**

- 12. Industrial Processes-Petroleum Refineries**
 - * RACT or statewide RACT**
 - * RACT on SO_x/NO_x from process heaters**

- 13. Petroleum Storage and Transport**
 - * Statewide Stage II**
 - * Stage I and II for marinas**