



Project Summary

Reranking of Area Sources in Light of Seasonal/Regional Emission Factors and State/Local Needs

Sharon L. Kersteter

The Clean Air Act deadline for attaining the national ambient air quality standard (NAAQS) for ozone was the end of 1987. The failure of 68 U.S. metropolitan areas to attain the ozone standard by December 31, 1987 was one of the major environmental issues of 1988. Ozone is photochemically produced in the atmosphere when volatile organic compounds (VOCs) are mixed with nitrogen oxides (NO_x) and carbon monoxide (CO) in the presence of sunlight. To develop and implement an effective ozone control strategy, information must be compiled and reviewed on the sources of these precursor pollutants.

Although substantial emission controls have been placed on many stationary point and mobile sources and significant improvements have been made, the ozone standard has not been attained in many metropolitan areas. Many area sources have not yet had any controls applied even though they are known to be a substantial source of VOC emissions. To determine the area source categories on which to place emission controls, area sources must be evaluated to identify those categories where controls can be both effective and feasible. Regional and seasonal patterns of emissions should also be investigated, as these characteristics can influence the effectiveness of the emission controls.

This project has been designed to provide a better understanding of

area sources and their emissions, to prioritize their importance as VOC emitters, and to identify sources for which better emission estimation methodologies are needed. The specific goals of this task are as follows:

1. prioritize area sources, identifying both seasonal and regional emission dependencies;
2. prioritize solvent categories for future work, seasonally and regionally, using tonnages;
3. identify factors affecting the variability of each area source category; and
4. document inventory assumptions and seasonal/regional factors and discuss reliability, pointing out the weakest and most important assumptions.

This Project Summary was developed by EPA's Air and Energy Engineering Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

The goals listed above are designed to build upon one another so that an improved procedure and/or test case for estimating emissions from a given area source category can be developed. The work outlined below (and discussed in greater detail in the full report) leads up to that point.

Area Source Prioritization

Area sources are ranked from highest emissions contributors to lowest for EPA Regions 1, 2, 6, and 9 on both an annual and seasonal basis (summer, or ozone season, emissions). Two sets of seasonal factors, one from the National Acid Precipitation Assessment Program (NAPAP) methodology and one from the Regional Oxidant Modeling for Northeast Transport (ROMNET) process, are used. Rankings are compared within states and between states and regions. Annual and summer emissions for Region 9 are shown in Figures 1 and 2, respectively.

The National Emissions Data System (NEDS) Evaporative Loss—Solvents Purchased category (SCC 053) is disaggregated into the NAPAP solvent categories 078 through 101 and reported by State and Regional totals for EPA Regions 1, 2, 6, and 9. The solvent categories are identified in Table 1. These categories are ranked from high to low with respect to annual emissions and are reranked in light of seasonal variations using ROMNET and NAPAP seasonal adjustment factors. Data for Region 9 are shown in Table 2 and in Figures 3 and 4.

Table 1. NAPAP Area Source Solvent Categories

SCC	Category Description
078	Degreasing
079	Dry Cleaning
080	Graphic Arts/Printing
081	Rubber and Plastics Manufacturing
082	Architectural Coatings
083	Auto Body Repair
084	Motor Vehicle Manufacture
085	Paper Coating
086	Fabricated Metals
087	Machinery Manufacturing
088	Furniture Manufacturing
089	Flat Wood Products
090	Other Transportation Equipment Manufacturing
091	Electrical Equipment Manufacturing
092	Shipbuilding and Repair
093	Miscellaneous Surface Coating
095	Miscellaneous Solvent Use

Validity of Results

NEDS/NAPAP-generated emission estimates for four counties in Texas are compared to estimates generated in an

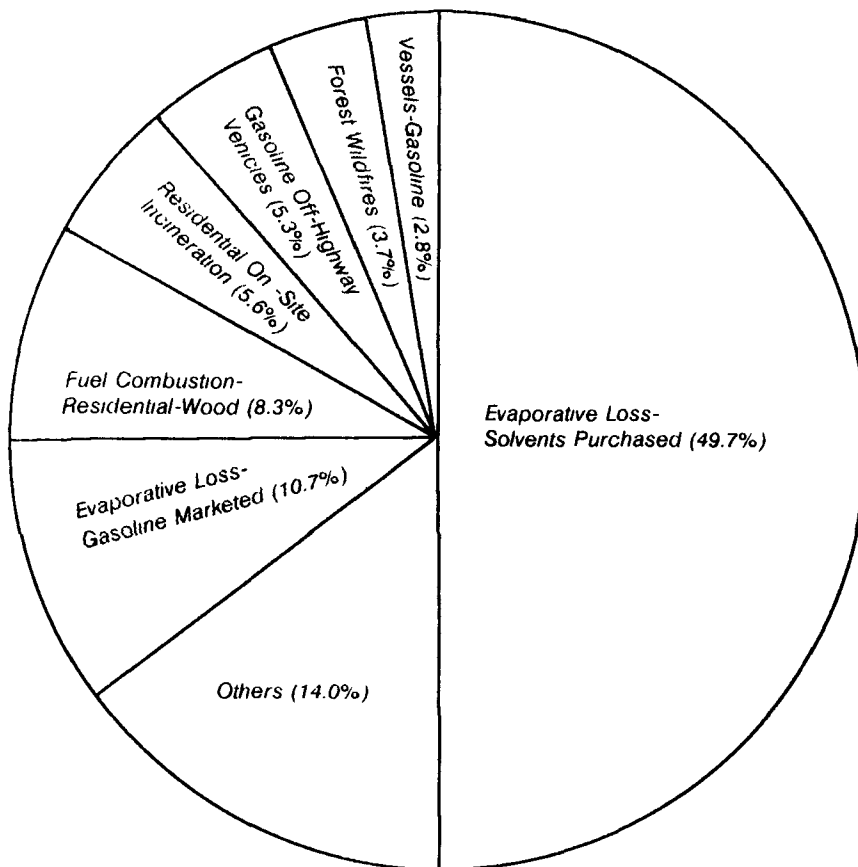


Figure 1. Percent of nonmobile area source categories—Region 9.

emissions trends analysis for the same four counties using EPA ozone precursor methodologies. The "top-down" procedures used by NEDS/NAPAP are compared with the "bottom-up" EPA ozone precursor procedures for the categories where the emissions estimates differed significantly.

Rankings using NAPAP seasonal (summer) adjustment factors are compared to rankings using ROMNET seasonal adjustment factors. ROMNET seasonal adjustment factors have been developed for the following categories: pleasure boating/ gasoline vessels (SCC 054); gasoline service stations (SCC 054); trade paints/ architectural surface coatings (SCC 082); pesticides (SCC 094); bulk gas terminals (SCC 103); and hazardous waste treatment, storage, and disposal facilities (SCC 109). These factors are substituted for NAPAP seasonal adjustment factors (where appropriate) and emissions are recalculated for the area source categories affected. The solvent categories are reranked using the ROMNET factors to identify their effects.

The bases for the development of the NAPAP and ROMNET seasonal adjustment factors are reviewed and compared. Several "bottom-up" methodologies, are discussed.

Evaluation of Three Area Source Solvent Categories

The identification and discussion of the basis for the NAPAP solvent allocation methodology and emission estimates for three NAPAP solvent categories, (SCC 082—Architectural Coatings, SCC 093—Miscellaneous Surface Coatings, and SCC 095—Miscellaneous Solvent Use) are outlined. The original algorithm used in the NAPAP methodology and recent updates to the methodology are discussed.

Conclusions and Recommendations

- Among States and Regions, the ranking of area source categories based on annual emissions consistently shows the evaporative loss categories (Solvents Purchased and

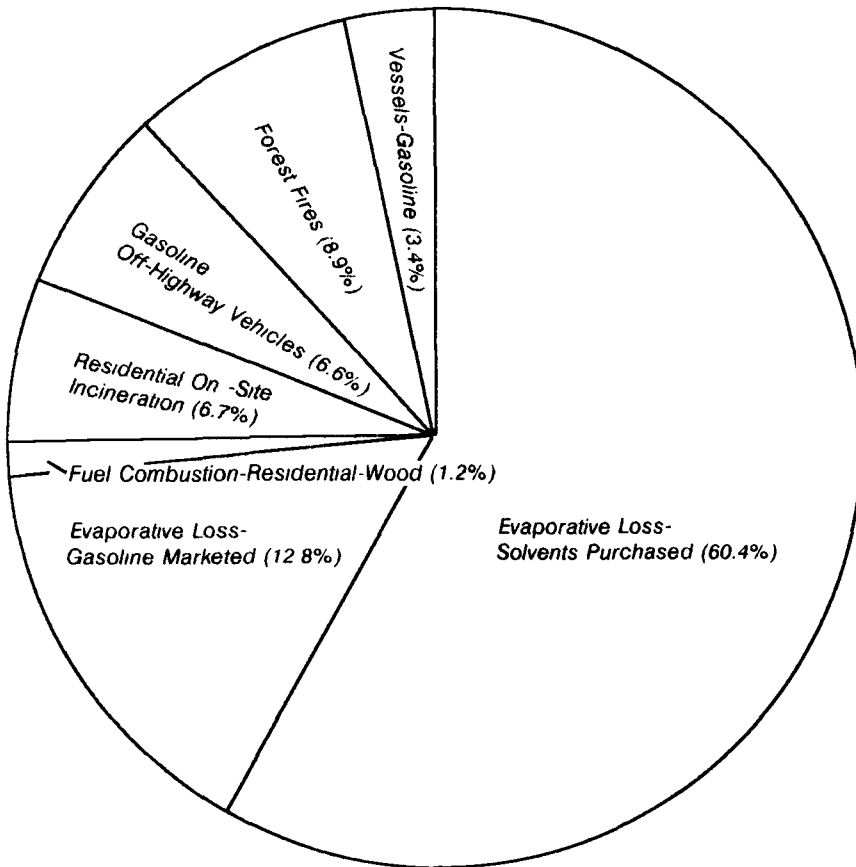


Figure 2. Percent of summer emissions for top nonmobile area source categories—Region 9.

Gasoline Marketed) and Residential Wood Combustion) to be the top three categories. Adjustment for the ozone season results in a drop in the ranking of Residential Wood Combustion, however, the evaporative loss categories still show the highest rankings overall.

- Further breakdown of the Solvents Purchased category shows that Miscellaneous Solvent Use and Miscellaneous Surface Coatings rank first and second, respectively, for most states and regions covered in this study. These rankings remain the same for both annual and ozone season emissions. In fact, seasonal adjustments to the annual emissions result in almost no change in the rankings of solvent categories for all states and regions.
- Comparisons of different methodologies used to estimate emissions from certain area sources show that results of the different methodologies can vary drastically. In general, the use of local data to estimate emissions through "bottom-up" meth-

odologies provides more accurate and reliable data than the use of State or national data allocated to the county or local area ("top-down" methodologies). "Bottom-up" methodologies, however, often require greater resources, both in terms of time and money, than "top-down" methodologies.

- Use of seasonal adjustment factors shows changes in ranking from the annual rankings of some categories. While actual tonnages may differ, use of two different groups of seasonal adjustment factors, NAPAP and ROMNET, result in the same seasonal rankings in almost all cases. The availability of additional ROMNET seasonal adjustment factors may cause minor differences in seasonal rankings, compared to the NAPAP rankings.
- A review of NEDS/NAPAP source methodologies and comparison with bottom-up methodologies could be used by state and local inventorying agencies. These would include identi-

fication and resolution of variations in the emission estimates between these two inventory sources. Feasible and effective control measures to reduce emissions can not be applied effectively to the area source categories if the estimated emissions from the categories are misrepresented by either overestimation or underestimation.

- The Miscellaneous Solvent Use category (SCC 095), especially the Commercial/Consumer Solvent Use portion of this category, requires further disaggregation, with emphasis on how the solvents are apportioned to the various subcategories and on what can be done to improve this process. For maximum value, NAPAP methodology for the 1990 NAPAP inventory should be updated periodically.

Table 2. Top Area Source Categories—Region 9

State----->	Arizona			California			
	Ranking	Source Category (Tons*)	% Nonhwy VOC	% Total Area Source VOC	Source Category (Tons)	% Nonhwy VOC	% Total Area Source VOC
	1	Evap. Loss Solv. Purch. 50,901	41.1	23.9	Evap. Loss Solv. Purch. 526,525	51.3	31.1
	2	Evap. Loss Gas Mktd 14,618	11.8	6.9	Evap. Loss Gas Mktd 107,951	10.5	6.4
	3	Fuel Comb. Res. Wood 14,486	11.7	6.8	Fuel Comb. Res. Wood 77,013	7.5	4.5
	4	Managed Burning 8,645	7.0	4.1	Res. On-Site Incn. 59,899	5.8	3.5
	5	Gas Off Hwy. Veh. 6,058	4.9	2.8	Gas Off Hwy. Veh. 54,905	5.3	3.2
	6	Res. On-Site Incn. 5,329	4.3	2.5	Forest Wildfires 42,541	4.1	2.5
	7	Cutback Asphalt 5,280	4.3	2.5	Vessels—Gasoline 26,934	2.6	1.6
			(85.0)	(49.5)			
Total Area Source VOC (Excluding Hwy. Mobile Sources)		123,934	100.0	58.3	1,026,855	100.0	60.6
Hwy. Mobile Sources		88,700	—	41.7	666,314	—	39.4
Total State Area Source VOC		212,634	—	100.0	1,693,169	—	100.0

State----->	Nevada			Region IX			
	Ranking	Source Category (Tons*)	% Nonhwy VOC	% Total Area Source VOC	Source Category (Tons)	% Nonhwy VOC	% Total Area Source VOC
	1	Evap. Loss Solv. Purch. 13,741	36.2	19.4	Evap. Loss Solv. Purch. 591,167	49.7	29.9
	2	Fuel Comb. Res. Wood 6,652	17.5	9.4	Evap. Loss Gas Mktd 127,251	10.7	6.4
	3	Evap. Loss Gas Mktd 4,682	12.3	6.6	Fuel Comb. Res. Wood 98,151	8.3	5.0
	4	Railroad Locomotives 1,815	4.8	2.6	Res. On-Site Incn. 66,694	5.6	3.4
	5	Gas Off Hwy. Veh. 1,748	4.6	2.5	Gas Off Hwy. Veh. 62,710	5.3	3.2
	6	Cutback Asphalt 1,606	4.2	2.3	Forest Wildfires 44,014	3.7	2.2
	7	Vessels—Gasoline 1,481	3.9	2.1	Vessels—Gasoline 32,750	2.8	1.7
			(83.6)	(44.8)			
Total Area Source VOC (Excluding Hwy. Mobile Sources)		37,932	100.0	53.6	1,188,722	100.0	60.1
Hwy. Mobile Sources		32,808	—	46.4	787,823	—	39.9
Total State Area Source VOC		70,740	—	100.0	1,976,545	—	100.0

*1 ton = 0.907 tonne

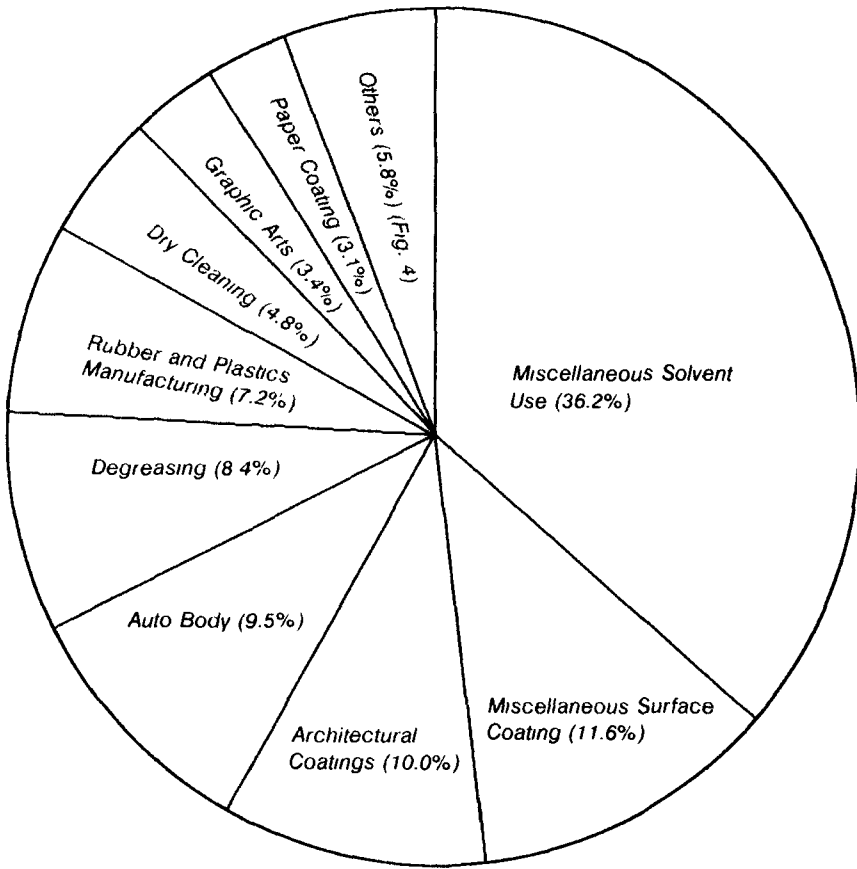


Figure 3. Solvent category emissions – Region 9.

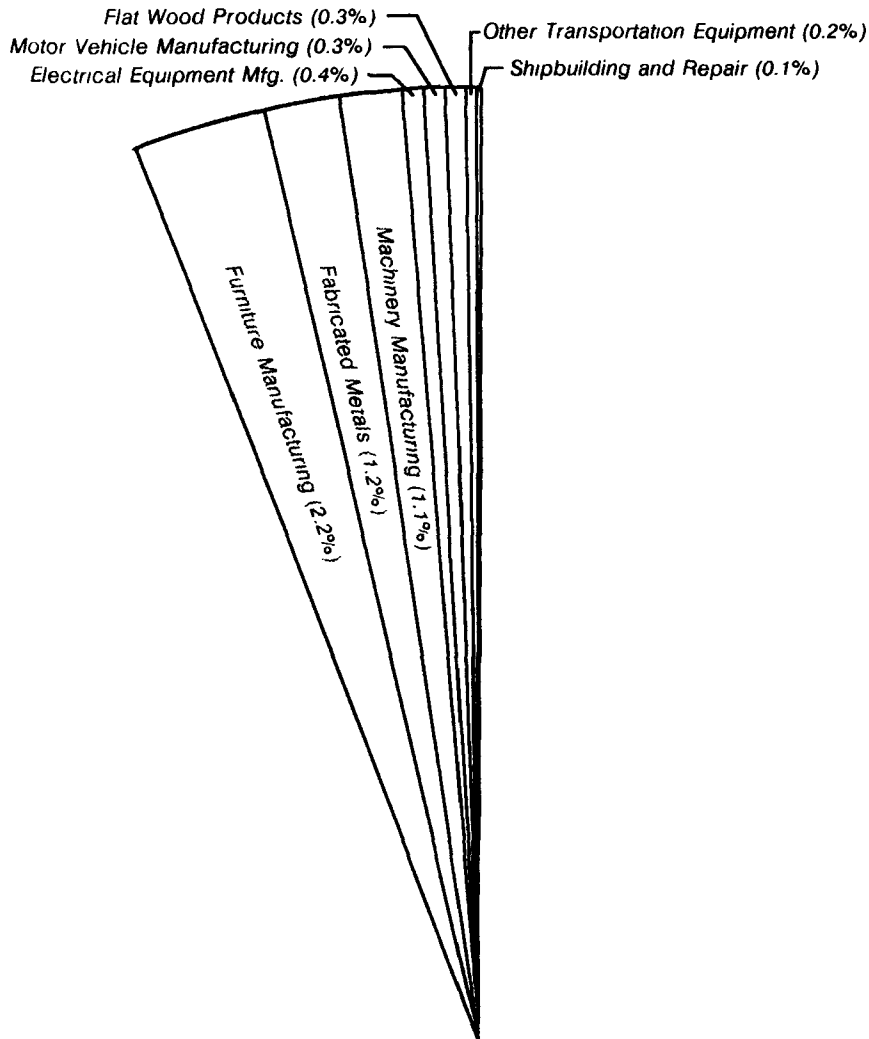


Figure 4. Solvent "others" category emissions—Region 9.

Sharon L. Kersteter is with Alliance Technologies Corp., Chapel Hill, NC 27514.

Michael Kosusko is the EPA Project Officer (see below).

The complete report, entitled "Reranking of Area Sources in Light of Seasonal/Regional Emission Factors and State/Local Needs," (Order No. PB 90-110 115/AS; Cost: \$23.00, subject to change) will be available only from:

National Technical Information Service

5285 Port Royal Road

Springfield, VA 22161

Telephone: 703-487-4650

The EPA Project Officer can be contacted at:

Air and Energy Engineering Research Laboratory

U.S. Environmental Protection Agency

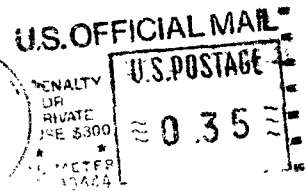
Research Triangle Park, NC 27711

United States
Environmental Protection
Agency

Center for Environmental Research
Information
Cincinnati OH 45268

Official Business
Penalty for Private Use \$300

EPA/600/S7-89/008



000085833 PS
U S ENVIR PROTECTION AGENCY
REGION 5 LIBRARY
230 S DEARBORN STREET
CHICAGO IL 60604