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EXAMPLE EMISSION INVENTORY DOCUMENTATION FOR POST-1987 OZONE STATE IMPLEMENTATION PLANS (SIPs)

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By

Radian Corporation
Research Triangle Park, NC 27709

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EPA Project Officer: Michael W. Hamlin

Office Of Air Quality Planning And Standards
Office Of Air And Radiation
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PREFACE

This document supplements recent U. S. Environmental Protection Agency (EPA) guidance on compiling emission inventories for reactive volatile organic compounds (VOC), oxides of nitrogen (NO_x), and carbon monoxide (CO), for use in developing post-1987 State implementation plans (SIPs) for demonstrating attainment of the ambient ozone standards.[1,2] This document contains an example emissions inventory for reactive VOC, NO_x, and CO, which has been compiled and documented for a fictitious ozone (O_3) nonattainment area called Ozoneville. Although the scope of this example document is limited to inventories for O_3 nonattainment, the organization and the method of documentation are also applicable to inventories prepared in response to CO nonattainment. In addition, with minor modifications, many of the procedures described in this document may also be applicable to CO inventories.

Emission estimates are developed for point, area (including stationary and non-highway mobile sources), and highway vehicle sources for the base year of 1987. While required point, area and mobile source emissions data are summarized in Section 1.0 of the document and detailed throughout the subsequent sections and Appendix A, the bulk of this example emissions inventory is devoted to documentation of the data - background information describing how the data were obtained and how emissions were calculated. The example inventory and its documentation are presented in a manner consistent with the requirements of the proposed post-1987 policy for ozone nonattainment areas (52 FR 45044, November 24, 1987). The purpose of the example inventory is to provide guidance on how a State/local agency should document and present its post-1987 O_3 SIP inventory for EPA rather than how the agency should calculate emission totals.

This document updates and generally supersedes an earlier EPA inventory guidance document for ozone SIPs entitled <u>Example Emission Inventory Documentation for 1982 Ozone SIPs</u> (EPA-450/4-80-033). The most significant

1 <u>Procedures for the Preparation of Emissions Inventories for Precursors of Ozone: Volume I</u>. Third Edition. December 1988. EPA-450/4-88-021.

2 <u>Emission Inventory Requirements for Post-1987 Ozone State Implementation Plans</u>. December 1988. EPA-450/4-88-019.

revisions to the 1982 guidance document involve the required application of rule effectiveness in calculating emission estimates, the inclusion of CO emission estimates, the emissions estimation and data reporting requirements for VOC point sources with emissions in the 10 to 100 tons/yr range, the required application of MOBILE4--the newest version of EPA's highway vehicles emissions estimation model, and the application of the recently developed SIP Air Pollutant Inventory Management System (SAMS) computer software for compiling and reporting inventory data.

Several qualifications should be kept in mind when using this document. First, many of the emissions and activity level data presented are fictitious, and although they were selected to be reasonably realistic, they should not be considered as necessarily representative of a given source or source category. As such, this document should not be used as a reference for emission factors, activity levels or methodologies for estimating emissions; that information is provided in guidance issued previously.[1,2] Second, this document has not attempted to address every VOC, NO_x, or CO source type (particularly for point sources) or inventory situation that may occur for a given locale. The intent has been to focus on a set of example inventory conditions that are useful and applicable to illustrate how to prepare and document an O_3 SIP emissions inventory in the post-1987 era. The inventorying agency's actual point source inventory will necessarily have to encompass many more sources of VOC (including many to which reasonably available control technology (RACT) is applicable) than have been included in this example inventory. In contrast, the sections on area and highway vehicle sources in this document address all sources because of the smaller number of source categories that must be dealt with in each of these areas.

Section 1.0 contains a background and an overall emissions summary. The background describes the geographical area covered by the inventory and the corresponding demographic characteristics used throughout the remainder of the document as bases for estimating emissions. This first section also illustrates how to define the agencies responsible for preparing the inventory and identify key personnel and their telephone numbers so that follow up contacts can be made. Finally, Section 1.0 summarizes the base year inventory emissions in tabular and graphic form. Summary tables generated by the SIP Air Pollutant Inventory Management System (SAMS) show the distribution of VOC, CO and NO_x emissions by inventory component (point, area, or highway vehicle) and by specific emission category.

Section 2.0 describes the point source component of the inventory and the methodology used in gathering, evaluating, and compiling the data. The inventory includes point source listings in each of the seven major VOC source categories as well as sources emitting CO and NO_x.

Section 3.0 describes the area (including non-highway mobile) source component of the inventory and the methodology used to estimate emissions. The area source inventory includes comprehensive coverage of each of the six major area source categories.

Section 4.0 describes the highway vehicle component of the emission inventory, the models used to derive highway travel estimates, and the information used to estimate emissions via MOBILE4. The section also summarizes VOC, CO and NO_x emissions by vehicle type and road type for each of the MSA counties.

Section 5.0 highlights key elements of the overall quality assurance (QA) program, an integral part of the emissions inventory development effort. The section describes how internal quality assurance/quality control activities were used to ensure that the resulting inventory was complete, accurate and consistent with EPA requirements.

EXECUTIVE SUMMARY

This document has been prepared to help State and local agencies expedite the review and approval of base year inventories by organizing and documenting them well. The example emission inventory presented here is for the fictitious O_3 nonattainment area called Ozoneville, which is preparing to submit an ozone State implementation plan (SIP).

This example illustrates how information can be presented in ways that will make it easy for the reviewing agency to:

- determine if the post-1987 requirements were met,
- perform independent quality control checks and calculations,
- understand alternative procedures, as well as why and where they are used, and
- locate and evaluate the input bases and the results for any emission point or category.

This example inventory was developed by following the guidance and requirements documents issued by EPA for preparing post-1987 emission inventories. In a few cases, procedural deviations are included to illustrate how an agency should document alternative procedures should the preparing agency deem them necessary for site specific reasons. In preparing real world inventories the following caveats should be noted:

- since the places described are fictitious, this document should not be used as a reference document for performing data range checks or for defining "typical" emission distributions among the inventory categories;
- similarly, the document is not intended to be used as guidance for calculation procedures or emission factors, or as a list of post-1987 requirements.

The example inventory document is organized into five sections of text and four appendices.

The appendices contain detailed data to complement and support the information presented in the text. The appendices also include SAMS reports for each of the point sources. Detailed documentation is also included for most of the area source categories. Finally, the appendices contain a completed QA checklist documenting Ozoneville's self-evaluation of the draft inventory submittal.

1.0 BACKGROUND AND EMISSIONS SUMMARY

In 1977, Ozoneville was classified as being nonattainment for ozone (O_3) with respect to National Ambient Air Quality Standards (NAAQS). Ozoneville failed to demonstrate attainment by 1982 and was granted an extension until 1987. Again, the Ozoneville area was unable to demonstrate attainment by the 1987 deadline. In a letter dated May 30, 1988, EPA Regional Administrator Smith informed Governor Jones that the most recent three years of monitoring data showed that Ozoneville had failed to attain the NAAQS for O_3. In the absence of a final policy for addressing control requirements in the post-1987 era, Governor Jones was asked to provide an initial response to the SIP call consisting of (1) revising the State air regulations to become consistent with EPA's most recent guidance, and (2) preparing a base year emissions inventory for 1987 or 1988, also according to EPA's most recent guidance. This document fulfills the second requirement.

1.1 BACKGROUND

This document presents the 1987 base year emissions inventory for reactive volatile organic compounds (VOC), oxides of nitrogen (NO_x), and CO from point, nonhighway area, and highway vehicle sources for the Ozoneville Metropolitan Statistical Area (MSA). Emissions are reported on a daily basis, averaged over the peak O_3 season (April through October) for the Ozoneville area. Although not specifically required, emissions are also summarized on an annual basis. Annual emission summaries are provided to assist the review agency in two key ways. First, annual rates provide an easy format to assist the review agency in making quality assurance checks against other existing state and regional data bases. Second, the annual notation clearly delineates point sources (> 25 tpy) that are subject to the detailed reporting requirements. Due to variations in seasonal activity, O_3 seasonal hourly rates are not sufficient indicators for distinguishing between large and small sources.

Consistent with the post-1987 O_3 policy and related guidance, this draft base year inventory does not contain projected baseline emissions or SIP strategy projections. Once EPA approves this base year inventory and provides further direction on control strategies and SIP requirements, baseline and SIP strategy projections will be made for attainment demonstration planning purposes.

The geographic area covered in this inventory is shown in the map in Figure 1-1. This area is referred to as the inventory planning area and includes both the MSA and a 25-mile extension around the MSA for large point sources. In addition to the metropolitan area of Ozoneville, the MSA encompasses Counties A, B, C, and D. The 25-mile boundary surrounding the MSA encompasses portions of 12 counties. As can be imagined, a strict 25-mile boundary does not coincide with county or other jurisdiction lines. For the purpose of developing a clearer definition of the planning area boundary and to avoid unnecessary judgment calls pertaining to the precise location of particular facilities in relation to the MSA borders, the planning area boundary was conservatively defined to include all portions of the 12 surrounding counties. Figure 1-1 illustrates the Ozoneville MSA and surrounding planning area.

Demographic data characterizing the four counties in the Ozoneville MSA are presented in Table 1-1.[2,3] The data in Table 1-1 are crucial to many of the emission estimation calculation procedures used to develop the inventory, particularly for area source categories. As such, these data are frequently cited in the document.

A number of agencies were involved in preparing various portions of the Ozoneville MSA inventory. The lead agency was the Ozoneville Regional Planning Authority (ORPA). The ORPA was directly responsible for coordinating and supervising the completion of each segment of the inventory. Several other State and local agencies contributed information to the ORPA that was necessary for preparing emission estimates. The State Department of Environmental Regulation (DER), the Ozoneville Department of Public Health (ODPH), and various other State departments (e.g., labor, commerce, and energy) provided activity level data for use in the nonhighway area source

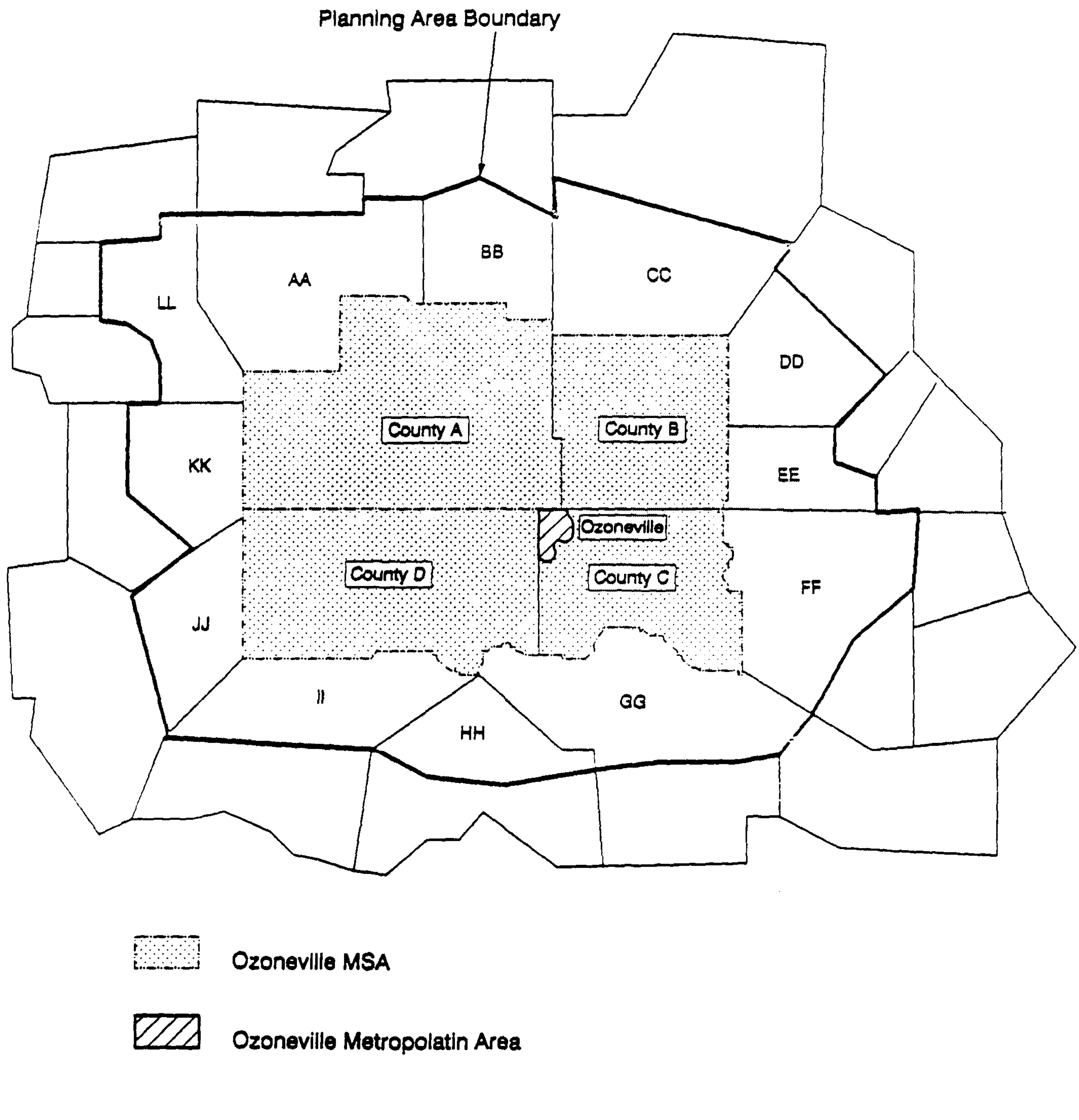

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Figure 1-1. Map of the Inventory Planning Area for the Ozoneville MSA Emissions Inventory

TABLE 1-1. SUMMARY OF 1987 DEMOGRAPHIC INFORMATION FOR THE OZONEVILLE MSA[2-4]

Demographic Parameter	County A Value	County B Value	County C Value	County D Value	State or National Value[a]
Population	407,497	205,259	368,314	301,077	6,412,000(S)
Land Area (sq.mi)	528	364	342	471	NA[b]
No. of Households[c]	154,355	79,868	133,932	120,915	90,031,000(N)
Manufacturing Emplolyment	68,617	27,341	36,185	34,619	NA
Construction Employment	15,157	3,856	7,905	6,502	691,223(N)
Wholesale Employment	10,602	2,575	4,178	2,902	NA
Retail Employment	32,706	11,096	22,663	18,509	NA
Commercial/ Institutional Employment	97,452	37,967	66,263	52,652	NA
Gasoline RVP	10.8	10.8	10.8	10.8	NA
Ozone Seasoln Temp. Range/Mean Temp. (°F)	71-95/89	71-95/89	71-95/89	71-95/89	NA

[a]This column provides State and National level values for the indicated parameters that were used in the analysis. Values followed by an (S) are State-level data and those followed by an (N) are National-level data.

[b]NA means the value of the indicated parameter was not used in the analysis and was therefore not applicable.

[c]Assumes an average of 2.64 persons per household in County A, 2.57 in County B, 2.75 in County C, and 2.49 in County D. Based on Bureau of Census, Professional Estimates of Households for Counties.[4]

inventory. The point source inventory was updated primarily through the results of a mail survey by the DER. In selected cases, the mail survey results were augmented with in-person source contacts. The majority of the highway vehicle emissions calculation information was provided by the Ozoneville Department of Transportation (ODOT). The ODOT ran all necessary transportation planning models to develop vehicle miles traveled (VMT) estimates and the MOBILE4 model to determine emission factors. The contact persons for the ORPA and the other major contributors to the inventory are listed in Table 1-2.

1.2 EMISSIONS SUMMARY

Consistent with the proposed post-1987 Policy, VOC, NO_x, and CO emissions were inventoried in the nonattainment MSA and in a 25-mile band extending from the MSA for certain point sources. Within the MSA boundaries, VOC, NO_x, and CO emission estimates were assembled for point, nonhighway area, and highway vehicle sources. The only sources inventoried in the 25-mile band extending from the MSA were major VOC, NO_x, or CO point sources with emissions of 100 tons/yr or greater (referred to hereafter as "100-ton sources"). The primary source of data for point sources not in the Ozoneville MSA was the State DER. Since the number of 100-ton sources in the 25-mile band was relatively few, follow-up telephone contacts were made with the majority to update and confirm DER information.

As stated previously, the base year for the inventory is 1987. Emissions totals are expressed as 1987 values using data for 1987, whenever available. Area source totals were based on current population, employment, and commodity data developed by the DER and ODPH. These data were generally combined with emission factors from EPA's AP-42 document[5] to yield emission totals. The starting point for point source estimates was the existing State DER inventory and permit files. These files were updated with questionnaire surveys distributed in the first quarter of the year. The surveys were structured using the guidelines in the EPA document <u>Procedures for the Preparation of Emission Inventories for Precursors of Ozone</u> (EPA-450/4-88-021).[6]

TABLE 1-2. LIST OF CONTACT PEOPLE FOR THE OZONEVILLE POST-1987 OZONE INVENTORY

Agency	Responsibility	Contact/Telephone No.
Ozoneville Regional Planning Authority 1313 Oak Street Ozoneville, USA 54321	Lead agency, overall inventory coordination and supervision	John Smith/111-123-4321
State Department of Environmental Regulation 535 Ridge Road Capital, USA 54321	Point and area source emissions data and area source activity levels	Jane Doe/555-111-2233
Ozoneville Department of Public Health 720 West Avenue Ozoneville, USA 54321	Area source activity level and emission factor data	Dr. Bill Plant/111-321-1234
Ozoneville Department of Transportation 678 North Highway Ozoneville, USA 54321	VMT generation, MOBILE4 emission factors, and all other highway vehicle data	Jim Summer/111-987-6543

Highway vehicle emissions were estimated by applying EPA emission factors from the recently released MOBILE4 model to VMT estimates for the MSA counties. The ODOT used Federal Highway Administration urban transportation planning models to generate the necessary VMT estimates. Ozoneville MSA-specific data were used whenever possible to run the VMT models and MOBILE4. For some parameters, however, sufficient resources were not available for the ODOT to develop site-specific values, so national average defaults contained in the models were used.

The VOC emission estimates provided in this document are for those VOCs determined by EPA to be photochemically reactive. All identified nonreactive VOC were excluded from the VOC totals reported here for all sources and source categories. Compounds considered to be nonreactive,[7,8,9] and therefore not included in the inventory, are listed below:

- Methane
- Ethane
- 1,1,1-Trichloroethane (methyl chloroform)
- Methylene chloride
- Trichlorofluoromethane (CFC 11)
- Dichlorodifluoromethane (CFC 12)
- Chlorodifluoromethane (CFC 22)
- Trifluoromethane (FC 23)
- Trichlorotrifluoroethane (CFC 113)
- Dichlorotetrafluoroethane (CFC 114)
- Chloropentafluoroethane (CFC 115)
- Dichlorotrifluoroethane (HCFC-123)
- Tetrafluoroethane (HFC-134a)
- Dichlorofluoroethane (HCFC-141b)
- Chlorodifluoroethane (HCFC-142b)

A summary of the VOC, NO_x, and CO emission totals for the Ozoneville MSA planning area is given in Tables 1-3, 1-4, and 1-5, respectively. The tables differentiate the contribution by emission source type and by whether it is from a point or area source. The magnitude of total VOC, NO_x, and CO emissions in the Ozoneville SIP planning area is clearly delineated in Figure 1-2.

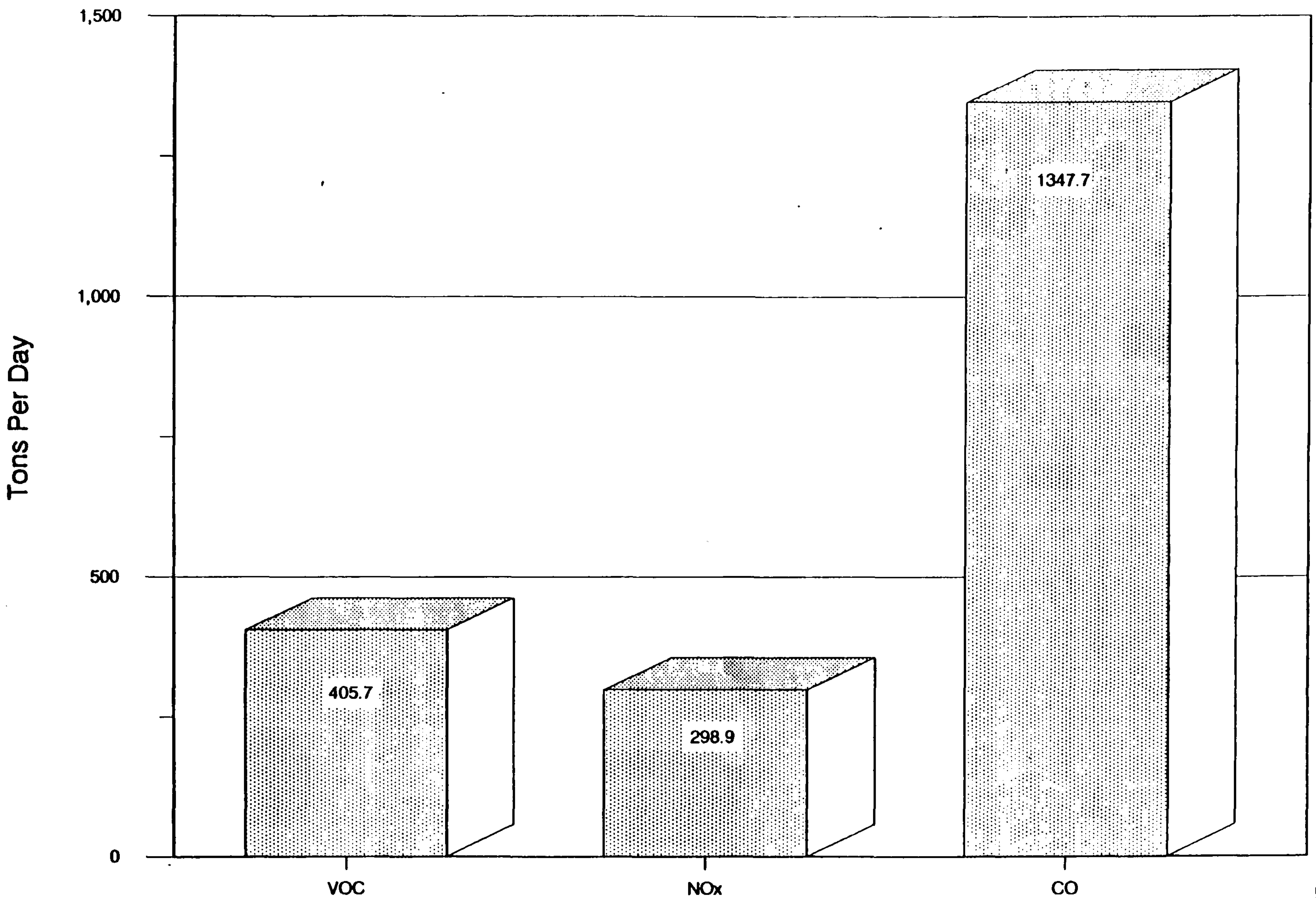

Figure 1-2. Summary of Ozoneville MSA Ozone Season Day Emissions, 1987 Base Year

TABLE 1-3. SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR OZONEVILLE MSA (ton per day

	Applicable Regulation[1]	Base Year (1987) Point	Base Year (1987) Area
STORAGE, TRANSPORTATION AND MARKETING OF VOC			
Gasoline and Crude Oil Storage[3]			
Fixed Roof			
External Floating Roof			
Volatile Organic Liquid Storage	I,II- 0925,0933,0518,0524	0.0[2]	
Barge and Tanker Cleaning			
Bulk Gasoline Terminals[4]	I- 0927,0518,0524,0525	13.9	
Gasoline Bulk Plants[5]	I- 0926,0518,0524,0525	0.0	
Service Stations			
Tank Truck Unloading	I- 0932,0928,0518		12.7
Vehicle Refueling			9.4
Tank Breathing Losses	I- 0518,0524		0.8
Tank Trucks in Transit			0.1
INDUSTRIAL PROCESSES			
Rubber Tire Manufacture	II- 0937,0518,0524	2.2	
INDUSTRIAL SURFACE COATING			
Paper Products	I- 0920,0518,0524	1.7	
Fabric and Vinyl	I- 0921,0518,0524	4.0	
NON-INDUSTRIAL SURFACE COATING			
Architectural Coatings			10.3
Auto Refinishing		0.3	6.4
OTHER SOLVENT USE			
Solvent Metal Cleaning			
Cold Cleaners	I- 0930,0518		6.0
Open Top Vapor Degreasers	I- 0930,0518	0.2	103.8
Conveyorized Degreasers	I- 0930,0518	0.1	
Dry Cleaning			
Perchloroethylene	II- 0938,0518	0.8	1.1
Petroleum	II- 0938,0518,0524		0.5
Graphic Arts			
Rotogravure	I,II- 0936,0920,0518,0524	4.1	1.4
Flexography	I,II- 0936,0920,0518,0524	0.6	
Adhesives			0.5
Cutback Asphalt	I- 0931,0518,0524		0.4
Consumer/Commercial Solvent Use			10.8

TABLE 1-3. SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR OZONEVILLE MSA (tons per day)

	Applicable Regulation[1]	Base Year (1987) Point	Area
WASTE DISPOSAL			
Municipal Waste Landfills			0.8
Municipal Wastewater Treatment			0.9
Industrial Wastewater Treatment			0.0
Open Burning			6.1
On-site Incineration			
Industrial			0.1
TSDFs			
Transfer, Storage & Handling			0.1
OTHER MISCELLANEOUS SOURCES			
Commercial Bakeries			1.2
Pesticide Applications			0.9
Asphalt Roofing Kettles/Tankers			0.0
Stationary External Combustion			
Coal		0.1	0.2
Fuel Oil			0.0
Natural Gas			0.2
Waste Disposal Combustion		0.1	0.7
Open Burning Combustion			0.4
Other VOC Sources (Leaking Underground Storage Tanks)			1.5
MOBILE SOURCES			
Highway Vehicles			
Light Duty Autos			106.1
Light Duty Trucks			30.8
Heavy Duty Gasoline Trucks			4.6
Heavy Duty Diesel Trucks			2.8
Other Highway Vehicles			1.8
Non-highway Vehicles			
Rail			0.8
Aircraft			4.2
Vessels			12.3
Farm Equipment			0.5
Construction Equipment			22.9
Industrial Equipment			2.7
Lawn and Garden Equipment			10.4
Others			0.3

TABLE 1-3. SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR OZONEVILLE MSA (tons per day)

	Applicable Regulation(1)	Base Year (1987) Point	Base Year (1987) Area
TOTALS			

Stationary Sources Total		28.2	177.2
Mobile Sources Total			200.2
Grand Total All Sources		28.2	377.4

Footnotes:

1. I, II, III refer to CTG Category Groups. Four digit codes refer to State Regulations.
   0518 = Miscellaneous Volatile Organic Compound Emissions
   0524 - New Source Performance Standards (NSPS)
   0525 National Emission Standards for Hazardous Air Pollutants (NESHAP)
   0920 Paper Coating
   0921 Fabric and Vinyl Coating
   0925 Petroleum Liquid Storage in Fixed Roof Tanks
   0926 - Bulk Gasoline Plants
   0927 = Bulk Gasoline Terminals
   0930 = Solvent Metal Cleaning
   0931 Cutback Asphalt
   0933 - Petroleum Liquid Storage in External Floating Roof Tanks
   0936 = Graphic Arts
   0938 = Perchloroethylene Dry Cleaning System
2. Emission values of 0.0 indicate that daily emission are >0 lbs/day but less than 100 lbs/day.
3. Includes all storage facilities except those at service stations and bulk plants.
4. Emissions from loading tank trucks and rail cars.
5. Emissions from storage and transfer operations.

TABLE 1-4. SUMMARY TABLE OF SEASONALLY ADJUSTED NO_x EMISSIONS FOR OZONEVILLE MSA (tons per day)

	Applicable Regulation[1]	Baseyear: 87 Point	Area
EXTERNAL FUEL COMBUSTION			
Utility Boilers	0524,40CFR 60.40a, Subpart Da		
Industrial Boilers	0524,40CFR 60.40b, Subpart Db	55.0	8.0
Commerical, Institutional & Residential	0524,40CFR 60.40b, Subpart Db		3.9
Other			
STATIONARY INTERNAL COMBUSTION			
Reciprocating Engines			
Gas Turbines	0524,40CFR 60.330, Subpart GG		
OTHER COMBUSTION			
Waste Disposal		3.6	0.1
Open Burning			1.5
Others			
INDUSTRIAL PROCESSES			
Chemical Manufacturing			
Adipic Acid			
Nitric Acid			
Others			
Iron and Steel			
Mineral Products			
Cement			
Glass			
Others			
Petroleum Refining			
Others			
Mobile Sources			
Highway Vehicles			
Light Duty Autos			31.7
Light Duty Trucks			11.9
Heavy Duty Gasoline Trucks			2.2
Heavy Duty Diesel Trucks			19.6
Other Highway Vehicles			0.2
Non-Highway Vehicles			
Rail			3.5
Aircraft			6.3
Vessels			0.2
Other			151.2
Stationary Sources Total		58.6	13.5
Mobile Sources Total			226.8
Grand Total - All Sources		58.6	240.3

Footnotes:

1. Four digit code "0524" refers to State citations of New Source Performance Standards.
   - o 40 CFR 60.40a Subpart Da - Standards of Performance for Fossil-Fuel-Fired Steam Generators
   - o 40 CFR 60.40b, Subpart Db - Standards of Performance for Industrial-Commerical-Institutional Steam Generating Units
   - o 40 CFR 60.330, Subpart GG - Standards of Performance for Stationary Gas Turbines

TABLE 1-5. SUMMARY TABLE OF SEASONALLY ADJUSTED CO EMISSIONS FOR OZONEVILLE MSA (tons per day)

	Applicable Regulation[1]	Baseyear: 87 Point	Area
EXTERNAL FUEL COMBUSTION			
Utility Boilers		8.6	
Industrial Boilers		0.0[2]	1.8
Commerical, Institutional & Residential		0.0	0.9
Other			
STATIONARY INTERNAL COMBUSTION			
Reciprocating Engines			
Gas Turbines			
OTHER COMBUSTION			
Waste Disposal		2.20	
Others			36.7
INDUSTRIAL PROCESSES			
Chemical Manufacturing			
Iron and Steel			
Mineral Products			
Petroleum Refining			
Others			
MOBILE SOURCES			
Highway Vehicles			
Light Duty Autos			582.1
Light Duty Trucks			212.1
Heavy Duty Gasoline Trucks			40.5
Heavy Duty Diesel Trucks			12.9
Other Highway Vehicles			7.3
Non-Highway Vehicles			
Rail			1.2
Aircraft			16.0
Vessels			41.9
Other			383.9
Stationary Sources Total		10.8	39.4
Mobile Sources Total			1,297.9
Grand Total - All Sources		10.8	1,337.3

Footnotes:

1. There are no regulations in the MSA limiting CO emissions.
2. Emission values of 0.0 indicate that daily emissions are greater than 0 lbs/day but less than 100 lbs/day.

The distribution of these emissions by point, nonhighway area, and highway vehicle categories is illustrated in Figure 1-3. As shown in Figure 1-3, area sources dominate VOC emissions in the MSA, constituting roughly 57 percent of the total. The primary source categories contributing to the area source VOC total are solvent metal cleaning (degreasing), nonhighway mobile sources, tank truck loading, vehicle refueling, architectural coating, and consumer/ commercial solvent use. NO_x emissions in the MSA are also dominated by area sources, constituting 58.4 percent of all NO_x emissions. The largest contributors to NO_x area source emissions are nonhighway mobile sources and stationary coal and natural gas combustion sources. Highway mobile sources generate the greatest quantity of CO emissions in the Ozoneville MSA, constituting 63.4 percent of the CO total. Point sources contribute less than one percent of the area's CO emissions.

The description and documentation for the point source component of the Ozoneville inventory is provided in Section 2.0, with supporting data in Appendix A. Section 3.0 describes the area source inventory with documentation provided in Appendix B. Highway vehicle emissions are documented in Section 4.0. Section 5.0 provides a description of the quality assurance (QA) program used to ensure that the inventory contained accurate and complete data. Appendix C contains PC-SAMS summary emission tables for VOC, NO_x, and CO for each individual county in the Ozoneville MSA. Appendix D contains a completed inventory QA checklist from EPA's guidance document <u>Quality Assurance Program for Post-1987 Ozone and Carbon Monoxide State Implementation Plan Emission Inventories</u> (EPA-450/4-89-004).[10]

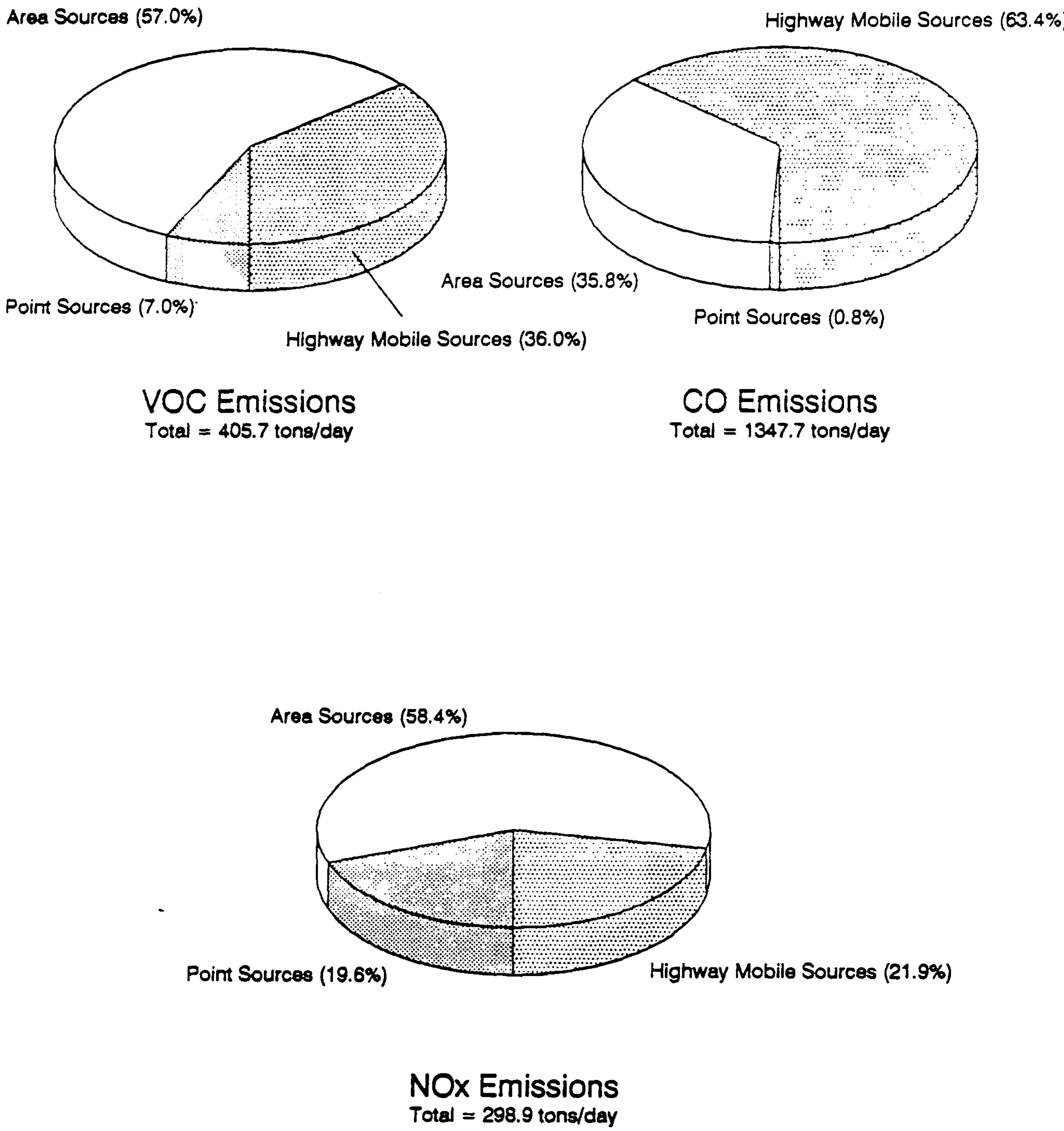

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Figure 1-3. Distribution of 1987 Base Year Emissions by Point, Area and Mobile Components

1.3 REFERENCES FOR SECTION 1

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9. U. S. Environmental Protection Agency. Revision to EPA Policy Concerning Ozone Control Strategies and Volatile Organic Compound Reactivity. 54 FR 1987. Washington, D.C. U. S. Government Printing Office. January 18, 1989.

10. U. S. Environmental Protection Agency. Quality Assurance Program for Post-1987 Ozone and Carbon Monoxide State Implementation Plan Emission Inventories. EPA-450/4-89-004. Research Triangle Park, North Carolina. March 1989.

2.0 POINT SOURCES

2.1 INTRODUCTION AND SCOPE

This section documents the development of the Ozoneville Metropolitan Statistical Area (MSA) point source inventory and serves to characterize this point component of the emission inventory by describing the major source category contributors, their control status and their relative size. For the purposes of this emission inventory, point sources are defined as stationary, commercial or industrial operations that emit more than 10 tons per year of volatile organic compounds (VOC) or 100 or more tons of nitrogen oxides (NO_x) or carbon monoxide (CO). Due to the lower size cut-off for VOC sources, the majority of point sources in the Ozoneville MSA are VOC emitters; therefore most of this section is dedicated to these sources. The point inventory consists of <u>actual</u> emissions for the base year 1987, and includes sources in the four Ozoneville MSA counties and 100-ton sources located in the 25-mile boundary zone.

Emissions from individual point sources are presented using two emission rate formats: annual (tons/yr) and daily (lbs/day) rates. Although not specifically required, annual emission rates are provided in order to assist the review agency in performing comparison checks against State and Regional data bases for quality assurance purposes. In addition, the annual emission rate notation clearly identifies point sources (>25 tons per year) subject to detail reporting requirements. Daily emission rate values (lbs/day) generated from SAMS reports are used as a convenient format for summarizing individual point source emissions. Due to their magnitudes, aggregate source category emission summaries are presented in tables and figures in a tons per day format.

The remainder of this section is divided into six parts. Section 2.2 describes the approach used in developing and compiling the Ozoneville point source listing. Section 2.3 presents an overall summary of the point source VOC, NO_x, and CO emissions. Section 2.4 characterizes the MSA's VOC emissions, and presents a detailed breakdown of contributions by source category and facility. Section 2.5 provides a similar characterization of the

NO_x and CO contributions. Section 2.6 lists the references used in preparing this section.

2.2 METHODOLOGY AND APPROACH

This section describes the methodology and approach used in developing information for the base year inventory. The purpose for including this section is to provide sufficient detail to the review agency to assist them in determinating on the adequacy of this inventory in light of the post-1987 guidelines. In addition, specific elements of the methodology and approach are being described in order to minimize the need for post-submittal clarifications.

Emission inventory development activities were initiated in September 1988, after receiving notification from EPA declaring the Ozoneville MSA a nonattainment area for ozone. The approach used in compiling the point source listing and associated data was based on guidance issued in EPA procedures documents,[1,2] and materials presented at EPA sponsored regional workshops.[3]

As mentioned previously, the Ozoneville Regional Planning Authority (ORPA) was the lead Agency responsible for development of the point source inventory. The ORPA was assisted in this effort by the Ozoneville Department of Public Health (ODPH) and the State Department of Environmental Regulation (DER). As a first step, an overall plan was developed to outline the planned technical approach, and to project the required resources and schedule. This plan was sent to the State and Regional Air Pollution Authority for approval in September 1988. In addition, this plan contained a detailed listing of internal quality assurance (QA) measures that would be an integral part of the emission inventory program. As described in the plan, internal QA measures for the point-source emission inventory were organized into four broad categories: 1) completeness/source category coverage checks, 2) data entry transcription checks, 3) reasonableness data range checks, and 4) consistency checks. Key personnel not otherwise involved in the inventory effort were assigned responsibilities in each of these areas. The following is a list identifying each of the key personnel assigned to the internal QA program, their area of responsibility and their specific area of expertise:

(1) Completeness/Source Category Coverage:
Ms. Nancy Brown, Environmental Specialist, DER, (555)111-2244

(2) Data Entry/transcription:
Mr. John Detail, Data Analyst, ODPH, (111)423-2121

(3) Reasonableness Data Range Checks:
Mr. Tony Jones, Environmental Engineer/VOL Transfer and Storage, DER, (555)111-3342

Ms. Julie Parker, Combustion Engineer, DER, (555)111-3242

Mr. Zachery Hampton Chemical Engineer (Organic Coating Specialist), DER, (555)111-3299

(4) Consistency Checks:
Ms. Amy King Planning, Public Policy Specialist, ORPA (111)629-1129.

Details pertaining to the specific activities in each of the four QA areas including lists of referee documents and reasonableness data ranges were included in the planning document and will not be repeated here.

Data collection activities were initiated immediately following the EPA sponsored regional workshop. An existing emission inventory which had been compiled for the Ozoneville 1982 SIP submittal formed the starting point of the overall inventory development effort. Because the current emission size cutoff for VOC sources is substantially lower than for previous inventories, much of the data collection activity focussed on a complete and accurate accounting of VOC sources. In addition, the geographical boundaries of the existing inventory were expanded to include all MSA counties, in contrast to the 1982 inventory which only covered sources in County C.

The overall point source inventory effort was organized into four tasks. These were: 1) develop a comprehensive list of potential VOC, NO_x, and CO emitting industry/business categories, 2) identify all plants/facilities in the MSA that fall into the potential VOC emitting categories, 3) survey facilities to refine the list and categorize according to the magnitude of emissions, and 4) evaluate data and compile detailed emission and process information into the SIP Air Pollutant Inventory Management System (SAMS). A brief description of the methodology and approach used to accomplish each of these tasks is presented in the following subsections.

2.2.1 List of Potential VOC-, NO_x-, and CO-emitting Source Categories

The primary purpose of this first task was to develop a detailed list of potential categories that could be used to ensure that all sources of VOC, NO_x and CO emissions were included in the inventory. EPA guidance documents[4] were used to identify industrial categories that were potential emitters of each of these pollutants. Standard Industrial Classification (SIC) codes corresponding to each of the source categories were identified. This SIC code list was used in the second task in combination with the existing inventory and business directories to develop a preliminary list of affected point sources.

2.2.2 Identification of Plant/Facility Listings

To supplement the existing point source inventory, an exhaustive list of potential point sources was developed by matching the SIC codes and industrial activities identified in the first task, with industries and businesses listed in county business directories, telephone books, electronic yellow pages, and State industrial directories.[5,6] In addition, this list was compared to State and local listings of permitted air pollution sources in order to adequately account for sources that had only recently begun operation. The resulting comprehensive, preliminary list was then refined by eliminating facilities that were known to have closed or that were subsequently found to have no local emission activities (sales offices, corporate headquarters, etc.).

2.2.3 Survey of Potential VOC, NO_x, and CO Sources

Using the list developed in the second task, each of the point sources were contacted by telephone and were administered a screening survey in order to determine if their emission activity exceeded the 10 ton per year threshold level for VOC, or 100 ton per year level for NO_x or CO. Plants or facilities with annual emissions less than these cut-off levels were eliminated from the point source list and were accounted for in the area source inventory (Section 3 of this document).

Based on the screening survey, plants whose emission activity exceeded the threshold level for any of the three pollutants were then sent survey questionnaires. The questionnaires were designed to obtain the site-specific data outlined in the EPA guidance.[1,4] Follow-up telephone calls were made in several cases to clarify responses. In addition, site visits were performed at several facilities as part of the survey follow-up activities.

In the majority of cases, emission estimates were derived using material balance approaches. AP-42 emission factors,[7] and source test data were also used as the basis for some base year estimates. In a few cases, information necessary to estimate VOC emissions was not available due to lack of response or lack of adequate recordkeeping. In all such cases, the facilities were known to emit less than 25 tons per year, and therefore estimates for those particular facilities were derived using a statistical approach as described in the EPA Procedures document.[2] This statistical approach was used in the development of emission estimates for six dry cleaning facilities and three auto body repair shops. In the case of dry cleaning, emission and employment data collected from five facilities (45 percent of the identified MSA sources) was used in the development of an employee-based emission factor, which was then used to estimate emissions from six other dry cleaning facilities. Emissions for the two auto body repair shops were derived using an identical employee-based emission factor methodology which was based on responses from three (60 percent of the identified MSA sources) facilities.

Appendix A of this document details the specific information obtained from each of the surveyed point sources, and shows how the information was used to calculate base year emission estimates.

Thirty point sources were identified in the four-county MSA and one source in the 25-mile boundary zone. Each of the 31 sources were emitters of VOC. Only three of these 31 point sources had emissions of CO and NO_x that exceeded the 100 ton per year threshold level. Eleven of the 31 point sources were found to emit 25 or more tons of VOC per year. Follow-up site visits were made to each of these 11 facilities in order to obtain operating schedules, process rates, and other detailed site specific data required for the post-1987 SIP submittal.

2.2.4 Data Evaluation and Compilation

The final task involved the evaluation and compilation of the collected data. All questionnaires were checked by ORPA engineers and specialists to ensure that the responses were reasonable and internally consistent. Although various aspects of data evaluation had already been performed as part of the previous task and associated follow-ups, this additional data evaluation served as a key component of the overall quality assurance program. A more complete discussion of this and other quality assurance activities performed as a part of this emission inventory effort is included in Section 5.0 of this document.

Another aspect of the data evaluation task was the application of a rule effectiveness factor for those sources currently subject to emission limitations, and a seasonal adjustment factor for those facilities which operated on a non-uniform schedule. A factor of 80 percent was applied to the control device efficiency to adjust the resulting emission estimate upward to account for rule effectiveness.[2,8] The application of these factors is explained in the emission estimate documentation summaries found in Appendix A.

The second part of this task involved the compilation of the data into the SAMS system developed by EPA and recommended for use in post-87 SIP inventory submittals. The SAMS summary reports generated for each of the Ozoneville MSA point sources are presented in Appendix A. SAMS data files are also being submitted to EPA in the form of computer diskettes to assist the Agency in their review and approval of this draft inventory submittal.

2.3 SUMMARY OF POINT SOURCE EMISSIONS

Thirty-one VOC point sources were identified within the Ozoneville MSA and associated 25-mile boundary zone. Only three point sources of NO_x, and CO were identified (100 tons/year or greater). A total of 28 tons of VOC emissions are released from point sources in the MSA each day during the ozone season. Daily ozone season point source emissions of NOx and CO are 59 and 11 tons respectively. Of the 31 VOC sources, eleven were characterized as emitting more than 25 tons per year. Table 2-1 lists each of the plants/facilities included as part of the point source VOC inventory, along with actual emissions for the 1987 base year. Table 2-2 lists the plants/facilities that were included as part of the point source inventories for CO and NO_x.

2.4 VOC POINT SOURCE EMISSIONS

Table 2-3 contains a summary of VOC emissions by major emission-producing activity. Emissions are presented in tons of pollutant per ozone season day, and have been adjusted to account for seasonal variability and rule effectiveness. The O_3 season for the Ozoneville MSA is April through October.[9] For sources whose operating schedule and production rate vary according to the season, average O_3 season production values were used to derive O_3 season emissions. A seasonal adjustment factor of 0.58 (7 months/12 months) was used to reflect uniform activity throughout the year. The data are organized into six major categories which are consistent with the groupings outlined in the EPA Requirements document.

Figure 2-1 shows how the daily O_3 season VOC emissions are apportioned among the six major categories. Note that approximately 90 percent of the MSA's point source emissions are attributed to three emission categories; Storage, Transportation and Marketing of VOC (49.3 percent), Industrial Surface Coating (20.1 percent), and Other Solvent Use (20.6 percent). Figure 2-2 shows the breakdown between controlled and uncontrolled emissions for each of the six categories. Note that overall, approximately 38 percent of the daily VOC emissions originate from processes or activities that have some level of emission control. Of particular significance is the small proportion of controlled emissions associated with the Storage, Transportation and Marketing of VOC category. Figure 2-3 shows how the daily emissions are distributed according to plant size. This shows that the majority of emissions are produced by a few large facilities thereby making control strategies for the point source component more straightforward. Six facilities emit more than 90 percent of the daily VOC emissions. These are

TABLE 2-1. SUMMARY LISTINGS OF VOC SOURCES INCLUDED IN THE OZONEVILLE MSA INVENTORY

Plant/Facility Name	County	Emission Size Category[a]	1987 Emissions[b] (tons/yr)	1987 Ozone Season Emissions[b] (lbs/day)
Jiffy Cleaners	A	L	75	482
Same Day Cleaners	A	S	12	77
Pinetree Metals	A	S	20	155
Bash-It Auto Body Repair	A	S	18	141
Imperial Coatings	A	L	1,465	8,030
4-Day Cleaners	A	S	12	78
	COUNTY SUBTOTALS - - ->		1,602	8,963
Bubba's Printing Co.	B	S	10	74
United Metal Works	B	S	24	210
Specialty Packaging	B	L	39	298
Paper Designs, Inc.	B	L	437	3,361
Twinkies Body Shop	B	S	13	96
Squeeky Cleaners	B	S	22	143
Town and City Cleaners	B	S	16	104
Friendly Power Company	B	L	55	302
	COUNTY SUBTOTALS - ->		616	4,588
Daily Gazette Publishing	C	L	154	844
Jacksonville Auto Body	C	S	15	116
Petro Excel Bulk Plant	C	S	20	108
Metal Products Inc.	C	L	43	327
Goodblimp Tire	C	L	820	4,491
People's Cleaners	C	S	12	74
Ozoneville Cleaners	C	S	22	234
Spotless Cleaners	C	S	18	117
	COUNTY SUBTOTALS - - ->		1,104	6,311

TABLE 2-1. SUMMARY LISTINGS OF VOC SOURCES INCLUDED IN THE OZONEVILLE MSA INVENTORY (Continued)

Plant/Facility Name	County	Emission Size Category[a]	1987 Emissions[b] (tons/yr)	1987 Ozone Season Emissions[b] (lbs/day)
University Publishing	D	L	1,269	8,134
Fender-Bender Repair	D	S	18	112
King's Auto Body Repair	D	S	24	156
Waste Busters, Inc.	D	L	32	200
Joes' Oil Company	D	L	5,073	27,797
JR's Laundry & Car Wash	D	S	22	138
Klutz Cleaning Service	D	S	10	64
Bob's Cleaners & Used Clothing	D	S	14	91
	COUNTY SUBTOTALS - -		> 6,462	36,692
Static Power & Light	EE	S	7	38
	COUNTY SUBTOTALS - - ->		7	38
		TOTALS - - ->	9,791	56,579

[a]L = plants with VOC emissions equal to or greater than 25 tons/yr.
S = plants with VOC emissions less than 25 tons/yr.
[b]Numbers may not sum to the totals due to rounding.

TABLE 2-2. SUMMARY OF NO_x AND CO POINT SOURCES INCLUDED IN THE OZONEVILLE MSA INVENTORY

Plant/ Facility Name	County	1987 NO_x Emissions (tons/yr)	1987 Ozone Season NO_x Emissions (lbs/day)	1987 CO Emissions (tons/yr)	1987 Ozone Season CO Emissions (lbs/day)
Friendly Power & Light Company	B	18,040	98,856	2,081	11,400
Waste Busters Inc	D	1,145	7,200	700	4,400
Static Power & Light	EE	2,029	11,119	1,051	5,760
	TOTALS - ->	21,214	117,175	3,832	21,560

TABLE 2-3. SUMMARY OF OZONEVILLE MSA POINT SOURCE VOC EMISSIONS BY MAJOR SOURCE CATEGORIES[a]

Category	1987 Emissions (tons/yr)	1987 O_3 Season Emissions (tons/day)
Storage, Transportation and Marketing of VOC	5,093	14.0
Industrial Processes	818	2.2
Industrial Surface Coating	1,901	5.7
Non-Industrial Surface Coating	89	0.3
Other Solvent Use	1,795	5.8
Waste Disposal	0	0.0
Other Miscellaneous Sources	94	0.3
TOTALS:	9,791	28.3

[a]Numbers may not sum to the totals due to rounding.

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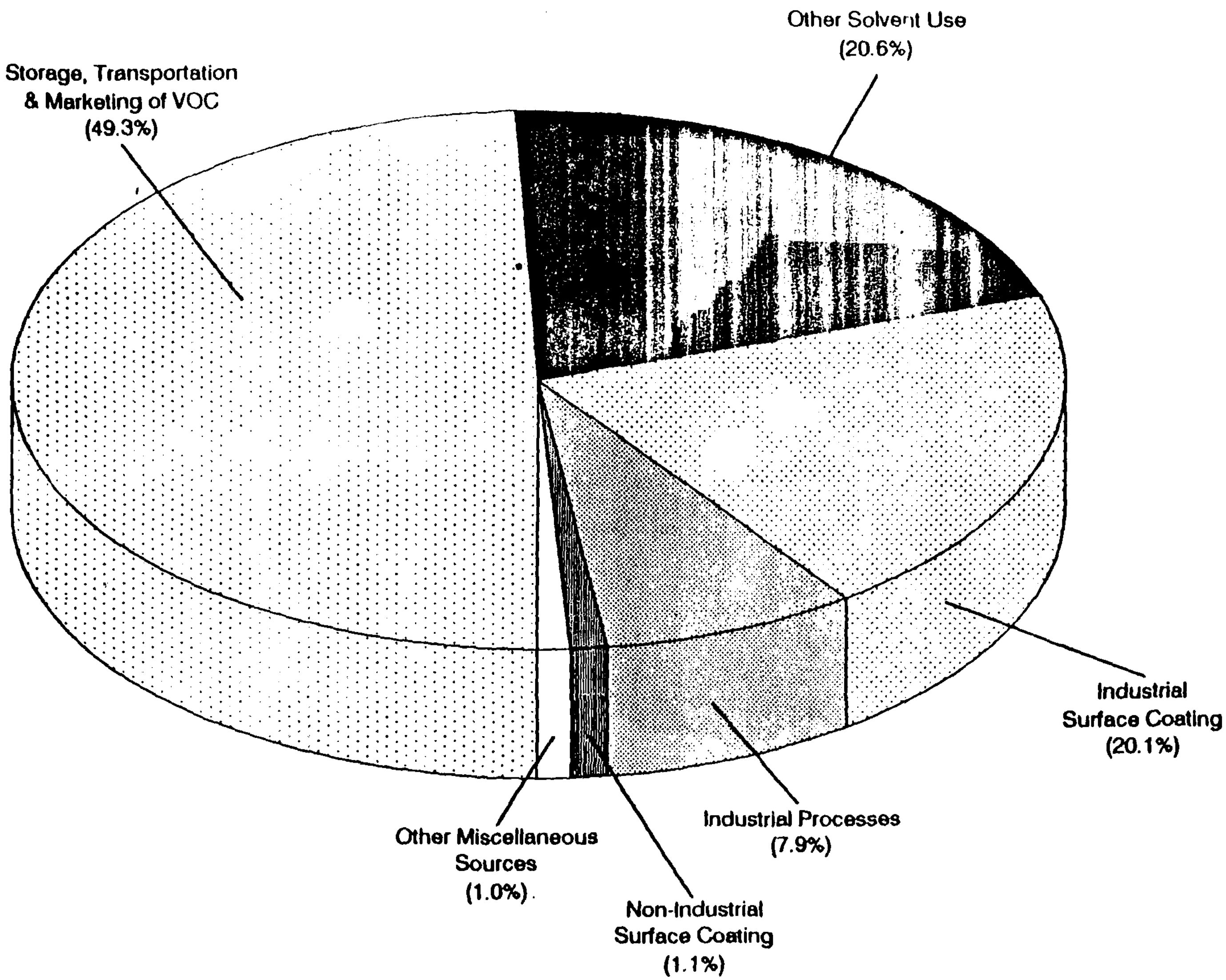

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Figure 2-1. Ozoneville MSA Point Source VOC Emissions
By Category; Total = 28.3 TPD

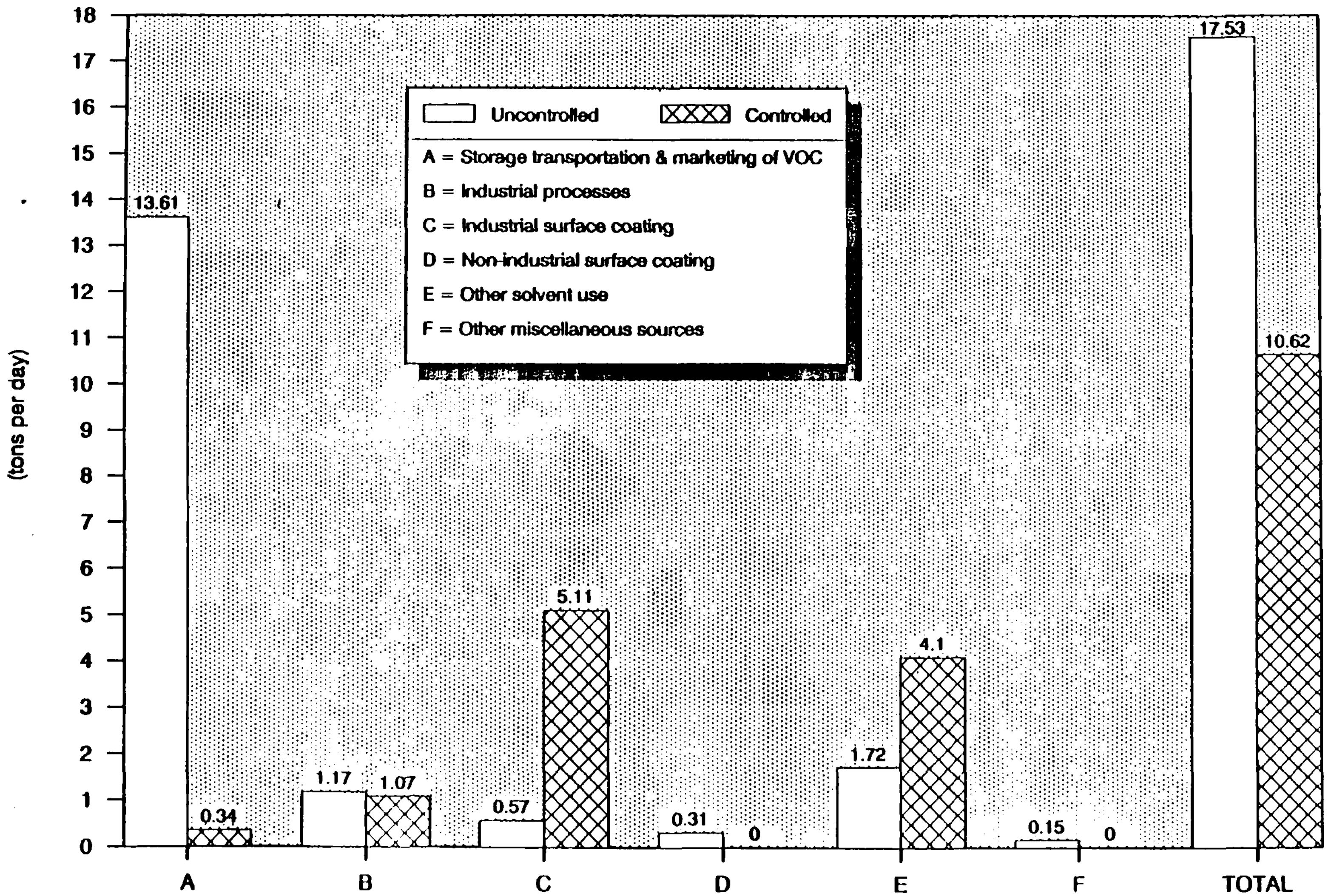

Figure 2-2. Distribution of Point Source VOC Emissions By Control Status and Category

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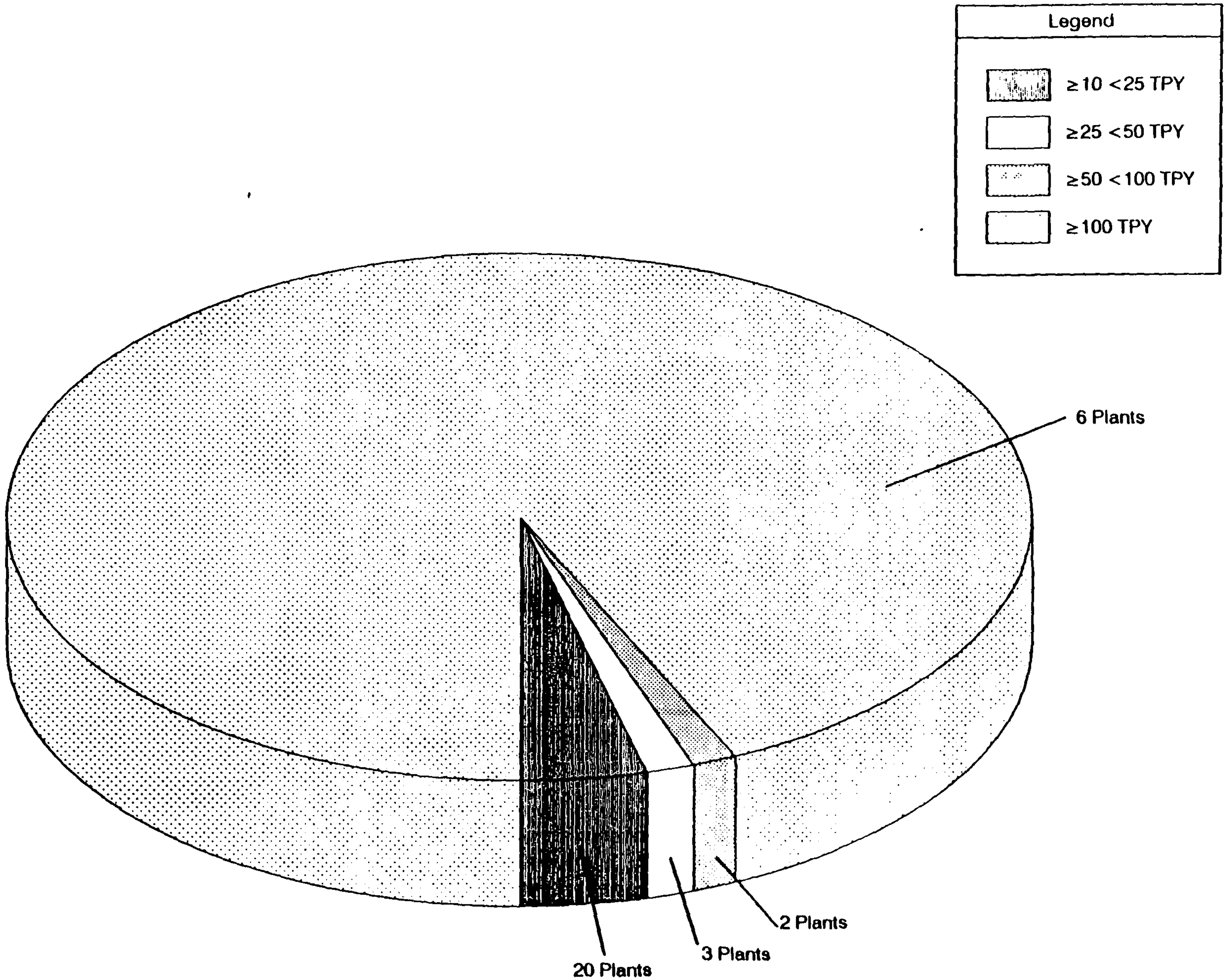

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Figure 2-3. Distribution of Point Source VOC Emissions
By Emission Size Category; Total = 28.3 TPD

Joe's Oil Company, University Publishing, Imperial Coatings, Goodblimp Tire Manufacturing, Paper Designs, Inc. and Daily Gazette Publishing.

The following subsections discuss each of the six major emission categories contributing to the Ozoneville MSA point source inventory.

Detailed information including emission factors, activity levels, operating schedules, control equipment and control efficiencies for individual plants contributing to each category is provided in Appendix A of this document.

2.4.1 Storage, Transportation and Marketing of VOC

Point source VOC emissions from activities in this source category total 14.0 tons per O_3 season day. These emissions originate from three main operations: bulk gasoline terminals, gasoline bulk plants, and storage of volatile organic liquids. Other operations which are considered as part of the Storage, Transportation, and Marketing of VOC emission category occur in the MSA but are inventoried as area sources. These include service station activities such as tank truck unloading, vehicle refueling, tank breathing losses, and tank trucks in transit. These are discussed in Section 3 of this document.

The five point source facilities contributing to the VOC Storage, Transportation, and Marketing category emissions are listed in Table 2-4, along with a brief description of the emission producing processes and a breakdown of their control status. As seen from the table, essentially all of this category's emissions are from Joes' Oil Company which operates a bulk gasoline terminal in County D. Breathing and working losses from the facility's 10 fixed-roof gasoline storage tanks are the primary sources.

2.4.2 Industrial Processes

Industrial processes contribute 2.2 tons of VOC per O_3 season day to the MSA airshed. All emissions originate from the manufacture of rubber tires. Goodblimp Tire Manufacturing Company is located in County C and is the only point source contributing to the Industrial Processes category. Several tire manufacturing activities and processes contribute to the VOC emissions from

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TABLE 2-4. VOC EMISSIONS FROM STORAGE TRANSPORTATION AND MARKETING OF VOLATILE ORGANICS: OZONEVILLE MSA POINT SOURCES

Plant Name	County	Emission Size Category[a]	Emission Activity	1987 Ozone Season Emissions (lbs/day)[b]	1987 Annual Emissions (tons/yr)[b]	Control Status[c]
Imperial Coatings	A	L	Tank Breathing-fixed Roof	0.8	0.1	U
Imperial Coatings	A	L	Tank Working Losses-Fixed Roof	5.9	1.1	U
Paper Designs, Inc.	B	L	Tank Breathing-Fixed Roof	0.6	0.1	U
Paper Designs, Inc.	B	L	Tank Working Losses-Fixed Roof	3.4	0.4	U
Goodblimp Tire Mfg.	C	L	Tank Breathing & Working-Fixed	11.0	2.0	U
Petro Excel Bulk Plant	C	S	Loading Losses	2.5	0.5	C
Petro Excel Bulk Plant	C	S	Tank Breathing & Working-Fixed	84.9	15.5	C
Joes' Oil Company	D	L	Loading Losses	595.2	108.6	C
Joes' Oil Company	D	L	Tank Breathing & Working-Fixed	27,202.0	4,964.4	U
			TOTALS - - - ->	27,906.3	5,092.6	

[a]L = plants with VOC emissions equal to or greater than 25 tons/yr.
S = plants with VOC emissions less than 25 tons/yr.
[b]Numbers may not sum to the totals due to rounding.
[c]U = uncontrolled
C = controlled

the plant. Table 2-5 presents a breakdown of the contribution of each process and the control status. Detailed process specific information for the Goodblimp Tire Manufacturing facility is included in Appendix A.3.

2.4.3 Industrial Surface Coating

The Industrial Surface Coating source category contributes 5.7 tons of VOC emissions per O_3 season day. Emissions originate from two facilities, Imperial Coatings Inc., a fabric coating facility located in County A, and Paper Designs, Inc., a manufacturer of decorative paper located in County B. Table 2-6 contains a summary of the emissions and control status of each of these facilities. Detailed process-specific information for Imperial Coatings, Inc., and Paper Designs, Inc., is included in Appendix A.1 and A.2, respectively.

2.4.4 Non-Industrial Surface Coating

The Non-Industrial Surface Coating source category contributes 0.3 tons of VOC emissions per O_3 season day. All emissions included in the point source originate from auto refinishing activities. Five facilities were identified as point sources and are listed in Table 2-7. Other Non-Industrial Surface Coating activities such as architectural coating are addressed in the area source component of the inventory.

2.4.5 Other Solvent Use

Facilities grouped into this category contribute a total of 5.8 tons of VOC emissions per O_3 season day. These emissions come from three main operation types: solvent metal cleaning, dry cleaning, and graphic arts printing. The point source facilities and emissions from each of these operation types are listed in Table 2-8.

TABLE 2.5. VOC EMISSIONS FROM INDUSTRIAL PROCESSES: OZONEVILLE MSA POINT SOURCES

Plant Name	County	Emission Size Category[a]	Emissions Activity	1987 Ozone Season Emissions (lbs/day)[b]	1987 Annual Emissions (tons/yr)[b]	Control Status[c]
Goodblimp Tire Mfg	C	L	Green Tire Spray	929.0	169.5	C
Goodblimp Tire Mfg	C	L	Undertread Cement	973.0	177.6	C
Goodblimp Tire Mfg	C	L	Tread End Cement	153.6	28.0	C
Goodblimp Tire Mfg	C	L	Bead Dipping	83.8	15.3	C
Goodblimp Tire Mfg	C	L	Molding & Curing	156.0	28.5	U
Goodblimp Tire Mfg	C	L	Sidewall Cementing	1,260.0	230.0	U
Goodblimp Tire Mfg	C	L	Tire Building	876.0	159.9	U
Goodblimp Tire Mfg	C	L	Tire Finishing	48.0	8.8	U
			TOTALS - - - - >	4,479.4	817.5	

[a]L = plants with VOC emissions equal to or greater than 25 tons/yr.
[b]Numbers may not sum to the totals due to rounding.
[c]U = uncontrolled
C = controlled

TABLE 2-6. VOC EMISSIONS FROM INDUSTRIAL SURFACE COATING: OZONEVILLE MSA POINT SOURCES

Plant Name	County	Emissions Size Category[a]	Emission Activity	1987 Ozone Season Emissions (lbs/day)[b]	1987 Annual Emissions (tons/yr)[b]	Control Status[c]
Imperial Coatings	A	L	Coating Lines	6,871.2	1,254.0	C
Imperial Coatings	A	L	Equipment Cleanup	792.0	145.0	C
Imperial Coatings	A	L	Mixing	360.0	66.0	C
Paper Designs, Inc.	B	L	Paper Coating-Coating Lines	2,213.4	287.7	C
Paper Designs, Inc.	B	L	Equipment Cleanup	584.0	75.9	U
Paper Designs, Inc.	B	L	Coating Mixing	560.0	72.8	U
			TOTALS - - - ->	11,380.6	1,901.4	

[a]L = plants with VOC emissions equal to or greater than 25 tons/yr.
[b]Numbers may not sum to the totals due to rounding.
[c]U = uncontrolled
C = controlled

TABLE 2-7. VOC EMISSIONS FROM NON-INDUSTRIAL SURFACE COATING: OZONEVILLE MSA POINT SOURCES

Plant Name	County	Emissions Size Category[a]	Emission Activity	1987 Ozone Season Emissions (lbs/day)[b]	1987 Annual Emissions (tons/yr)[b]	Control Status[c]
Bash-It Auto Body Shop	A	S	Painting	140.5	18.3	U
Twinkies Body Shop	B	S	Auto Painting	96.3	12.5	U
Jacksonville Auto Body	C	S	Auto Painting	115.7	15.0	U
King's Auto Body Repair	D	S	Auto Painting	163.3	25.5	U
Fender-Bender Repair	D	S	Auto Painting	112.4	17.5	U
			TOTALS - - - ->	628.2	88.8	

[a]S = plants with VOC emissions less than 25 tons/yr.
[b]Numbers may not sum to the totals due to rounding.
[c]U = uncontrolled

TABLE 2-8. VOC EMISSIONS FROM OTHER SOLVENT USE: OZONEVILLE MSA POINT SOURCES

Plant Name	County	Emission Size Category[a]	Emission Activity	1987 Ozone Season Emissions (lbs/day)[b]	1987 Annual Emissions (tons/yr)[b]	Control Status[c]
Pinetree Metals	A	S	Degreasing Open Top	155.0	20.2	U
Jiffy Cleaners	A	L	Dry cleaning	481.9	75.2	U
Same Day Cleaners	A	S	Dry cleaning	77.0	12.0	U
Four-Day Cleaners	A	S	Dry cleaning	78.0	12.2	U
Squeeky Cleaners	B	S	Dry cleaning	143.0	22.3	U
Town and City Cleaners	B	S	Dry cleaning	104.0	16.2	U
United Metal Workers	B	S	Degreasing-Conveyorized	237.7	63.4	U
Bubba's Printing	B	S	Printing-Solv. Consumption	74.0	9.6	C
Daily Gazette Publ Co.	C	L	Printing-Solv. Consumption	843.8	154.0	U
Metal Products Inc.	C	L	Degreasing Open Top	327.0	42.5	U
Ozoneville Cleaners	C	L	Dry cleaning	243.5	22.0	U
Spotless Cleaners	C	S	Dry cleaning	117.3	18.3	U
People's Cleaners	C	S	Dry cleaning	73.7	11.5	U
University Publishing	D	L	Printing	8,134.0	1,269.0	C
JR's Laundry & Car Wash	D	L	Dry cleaning	400.0	22.0	U
Bob's Clners & Used Clo	D	S	Dry cleaning	91.2	14.2	U
Klutz Cleaning Service	D	S	Dry cleaning	64.0	10.0	U
			TOTALS - - - ->	11,645.1	1,794.58	

[a]L = plants with VOC emissions equal to or greater than 25 tons/yr.
S = plants with VOC emissions less than 25 tons/yr.
[b]Numbers may not sum to the totals due to rounding.
[c]U = uncontrolled
C = controlled

2.4.6 Other Miscellaneous Sources

The three point sources that are included in this category contribute an estimated 0.3 tons of VOC per O_3 season day. These sources include two coal-fired electric utility plants and a municipal waste incinerator. A listing of these facilities, their base year emissions, and control status is contained in Table 2-9.

2.5 NO_x AND CO POINT SOURCE EMISSIONS

Numerous small sources of NO_x and CO were identified during the inventory development stage primarily being attributed to industrial/commercial and institutional boilers. Only three point sources emit NO_x and CO in quantities large enough to be counted in the point source inventory (>100 tons/year). These three combustion sources are listed in Table 2-10. O_3 season daily NO_x and CO emissions from these facilities are estimated at 59, and 11 tons per day respectively. As seen in the table, the Friendly Power Company located in County B is the source of over 80 percent of the MSA's daily NO_x emissions, and over 50 percent of the area's CO emissions.

TABLE 2-9. VOC EMISSIONS FROM OTHER MISCELLANEOUS SOURCES: OZONEVILLE MSA POINT SOURCES

Plant Name	County	Emission Size Category[a]	Emission Activity	1987 Ozone Season Emissions (lbs/day)[b]	1987 Annual Emissions (tons/yr)[b]	Control Status[c]
Friendly Power Co.	B	S	Coal Combustion/Elect Util.	302.0	55.0	U
Waste Busters, Inc.	D	L	Municipal Waste Incineration	200.0	31.8	U
Static Power & Light	E	L	Coal Combustion/Elect. Util.	37.8	7.0	U
			TOTALS - - - ->	539.8	93.8	

[a]L = plants with VOC emissions equal to or greater than 25 tons/yr.
S = plants with VOC emissions less than 25 tons/yr.
[b]Numbers may not sum to the totals due to rounding.
[c]U = uncontrolled

TABLE 2-10. SUMMARY OF OZONEVILLE MSA POINT SOURCE NO_x AND CO EMISSIONS

			NO_x EMISSIONS[a]		CO EMISSIONS[a]	
Plant Name	County	Emission Activity	1987 Ozone Season Emissions (lbs/day)	1987 Annual Emissions (tons/yr)	1987 Ozone Season Emissions (lbs/day)	1987 Annual Emissions (tons/yr)
Friendly Power Co.	B	Coal Combust/Elect Util	98,846	18,039	11,400	2,081
Waste Busters, Inc.	D	Municipal Waste Inciner.	7,200	2,029	4,400	1,051
Static Power & Light	EE	Coal Combust/Elect Util	11,119	1,314	5,760	803
		TOTALS - - - ->	117,165	21,382	21,560	3,935

[a]Numbers may not sum to the totals due to rounding.

2.6 REFERENCES FOR SECTION 2

1. U. S. Environmental Protection Agency. Emission Inventory Requirements for Post-1987 Ozone State Implementation Plans. EPA-450/4-88-019. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. December 1988.

2. U. S. Environmental Protection Agency. Procedures for the Preparation of Emission Inventories for Precursors of Ozone: Volume I. Third Edition. EPA-450/4-88-021. Office of Air Quality Planning and Standards, Monitoring and Reports Branch, Research Triangle Park, North Carolina. December 1988.

3. Regional Workshop for Ozone and Carbon Monoxide State Implementation Plan Emission Inventory Development. Sponsored by EPA Office of Air Quality Planning and Standards, Atlanta, Georgia. October 19-20, 1988.

4. U. S. Environmental Protection Agency. Development of Questionnaires for Various Emission Inventory Uses. EPA-450/3-78-122. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. March 1978.

5. State Department of Commerce. 1987-1988 Directory of Manufacturing Firms. 1987.

6. American Directory Publishing Company. 1988-1989 Business Directory Compiled from Yellow Page Listings. 1988.

7. U. S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources. Fourth Edition. AP-42. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. September 1985.

8. U. S. Environmental Protection Agency. Procedures for Estimating and Applying Rule Effectiveness in Post-1987 Base Year Emission Inventories for Ozone and Carbon Monoxide SIPs. Air Quality Management Division, Ozone and Carbon Monoxide Programs Branch, Policy Development Section, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. June 1989.

9. 40 CFR Part 58, Appendix D.

3.0 AREA SOURCES

3.1 INTRODUCTION AND SCOPE

This section documents the development of the Post-1987 area source emission inventory for reactive volatile organic compounds (VOC), oxides of nitrogen (NO_x) and carbon monoxide (CO) for the Ozoneville MSA. Area sources include nonhighway mobile and stationary sources that are too small or too numerous to be treated individually as point sources. Table 3-1 lists the categories of area source VOC, NO_x and CO emissions included in the Ozoneville analysis. Highway vehicle sources are discussed in Section 4.0. The emissions in the area source inventory documented here are typical of those occurring on a weekday during the summer ozone season. The base year of the inventory is 1987.

This section is organized into six subsections. Section 3.2 describes the general approach taken to estimate emissions from each source. Section 3.3 presents the quality assurance activities. Section 3.4 summarizes the contribution from each area source described in this document. The nature and derivation of emissions from each area source category are detailed in Section 3.5. Additional data, equations, assumptions, etc. to further document the derivation of Ozoneville area source emissions are provided in Appendix B. Finally, Section 3.6 lists references used in developing the inventory.

Several documents provided basic guidance for the development of the area source emission inventory. The first two are <u>Procedures for the Preparation of Emission Inventories for Precursors of Ozone: Volume I</u> (EPA-450/4-88-021),[1] referred to as the EPA Procedures Document, and <u>Emission Inventory Requirements for Post-1987 Ozone State Implementation Plans</u> (EPA-450/4-88-019).[2] Emission factors were generally taken from <u>Compilation of Air Pollutant Emission Factors (Including Supplements 1-10)</u> (AP-42),[3] referred to as AP-42. Nonreactive VOC were excluded from the inventory based primarily on data in <u>Volatile Organic Compound (VOC) Species Data Manual, Second Edition</u>, (EPA-450/4-80-015),[4] and the revised edition, <u>Air Emissions Species Manual Volume I, Volatile Organic Compound Species Profiles</u> (EPA-450/2-88-003a).[5] Additional references are listed in the sections in which they were used.

TABLE 3-1. AREA SOURCES INCLUDED IN THE OZONEVILLE MSA EMISSIONS INVENTORY

		NEDS: AREA SOURCE CODE
A. GASOLINE AND DIESEL DISTRIBUTION LOSSES		
Gasoline marketing	Service station--gasoline tank truck transit losses Service station--tank truck unloading Service station--vehicle refueling Service station--underground storage tanks	054
Diesel marketing	Service station--diesel tank truck transit losses Service station--tank truck unloading Service station--vehicle refueling Service station--underground storage tanks	
B. SOLVENT EVAPORATION		
Dry cleaning	Coin-operated laundries Dry cleaning plants, except rug cleaning Industrial laundries	079
Degreasing	Cold cleaners Conveyorized units Open top vapor units	078
Surface coating	Architectural type Automobile refinishing	082 083
Graphic Arts		080
Cutback Asphalt Paving		101
Roofing		
Pesticide application	Agricultural use Nonagricultural use	
Commercial/consumer solvent use	Aerosol products Household products Laundry treatment Moth control Non-industrial adhesives Polishes and waxes Rubbing compounds Space deodorant Toiletries Windshield washing	095
C. WASTE MANAGEMENT PRACTICES		
Publicly-owned treatment works		100
Industrial wastewater	On-site processing	
Hazardous waste treatment, storage and disposal	Solvent reclamation	109
Municipal landfills		
Solid waste burning	Incineration--industrial Open burning	024, 025, 026
D. SMALL STATIONARY SOURCE FOSSIL AND OTHER FUEL COMBUSTION		
Small fuel combustion	Commercial/Institutional--anthracite coal Commercial/Institutional--bituminous coal Commercial/Institutional--distillate fuel oil Commercial/Institutional--natural gas Commercial/Institutional--wood Industrial--bituminous coal Industrial--distillate fuel oil Industrial--natural gas Industrial--wood/bark	007 008 009 011 012 014 016 018 019

TABLE 3-1. (Continued)

		NEDS: AREA SOURCE CODE
	Residential--bituminous coal	002
	Residential--distillate fuel oil	003
	Residential--natural gas	005
	Residential--wood	006
E. OTHER		
Commercial bakeries		105
Miscellaneous combustion	Forest fires	060
	Slash burning and prescribed burning	061
	Agricultural burning	062
	Structure fires	064
	Orchard heaters	063
	Grass fires	
	Trash fires	
	Vehicle fires	
Leaking underground storage tanks		
F. NONHIGHWAY MOBILE SOURCES		
Nonhighway mobile	Aircraft--commercial	048
	Aircraft--general aviation	047
	Aircraft--military	046
	Aircraft--non-FAA traffic controlled towers	056
	Marine vessels--recreational with inboard motor	
	Marine vessels--recreational with outboard motor	
	Other--construction equipment	057
	Other--farm equipment: baler	
	Other--farm equipment: combine	
	Other--farm equipment: cotton pickers	
	Other--farm equipment: harvester	
	Other--farm equipment: tractors	
	Other--industrial equipment: heavy duty	
	Other--industrial equipment: light duty	
	Other--lawn and garden equipment	
	Other--motorcycles	
	Railroad locomotives	045

3.2 METHODOLOGY AND APPROACH

3.2.1 Source Category Identification

The majority of area source categories considered during the development of the inventory were identified from the EPA Procedures Document. Some of the recommended categories did not apply such as ocean going vessels because the Ozoneville MSA has no coastline nor inland port, and orchard heaters and snowmobiles were excluded because of the area's mild climate. However, several categories not included in EPA's list were also addressed as emission sources in the Ozoneville MSA: diesel marketing, adhesives used in roofing, commercial bakeries, and small airports that are not under Federal Aviation Administra- tion (FAA) control towers.

3.2.2 Emission Estimation Approach

In general, one of four emission factor-based emission estimations approaches was used to calculate Ozoneville area source emissions: (1) per-capita emission factors, (2) commodity consumption-related emission factors, (3) level-of-activity-based emission factors, and (4) employment-related emission factors. Where emission factors were not provided by AP-42 or did not appear in other available references such as the Criteria Pollutant Emission Factors for the 1985 NAPAP Emissions Inventory (NAPAP) document,[6] an emission factor was developed. These cases are described in further detail in the corresponding discussion in Section 3.5.

One adjustment was made to VOC emission factors that included all hydrocarbons. Using the VOC Species Data Manuals to provide estimates of the reactive VOC fraction, these VOC emission factors were multiplied by the reactive fraction before calculating emissions. The value of the reactive fraction used appears in the source discussion in Section 3.5. All emission factors shown in tables throughout this section represent reactive VOC.

Commodity or activity level data to use with the emission factors, or multipliers, were primarily available on a national level. Furthermore, few could be found for the base year. A number of adjustments were therefore necessary before emissions could be estimated. To derive county estimates from national data, ratios of population, households, and employment were typically used (see Table 1-1). Extrapolating to the base year was most often achieved by calculating annual growth rates from data for previous years. Applying these growth rates to the available data allowed estimation of the values for the base year. Other growth rate information for specific area source categories was obtained from published reference material. Wherever possible MSA-specific information was used.

One additional consideration in estimating annual emissions was the impact of existing regulations. For source categories subject to these regulations, a rule effectiveness factor of 80 percent was applied.

Once annual emissions had been estimated, the emissions were apportioned to the ozone season by making a number of assumptions about the activity of the source, first during the months of the ozone season, then during the weeks in the ozone season. Daily emissions are equal to:

$$\frac{\underset{\text{(tons)}}{\text{annual emissions}} \quad \times \quad \underset{\text{in the ozone season}}{\text{fraction of activity occurring}}}{\text{Number of days during the ozone season over which activity occurs}}$$

where the seasonal adjustment factor, is calculated as follows:

$$\text{SAF} = \frac{\text{(Peak Ozone Season Activity) (12 months)}}{\text{(annual activity) (Peak Ozone Season months = 7)}}$$

The EPA Procedures Document provided some of the seasonal adjustment factors but many of the assumptions about activity were based on some familiarity with typical practices in the MSA. Table 3-2 summarizes the emission estimation and apportionment approaches taken with each area source included in this inventory.

TABLE 3-2. SUMMARY OF THE ESTIMATION PROCEDURES FOR AREA SOURCES

Source Description		Estimation Approach[a]	Seasonal Adjustment Factor	Weekly Activity (days/week)
GASOLINE AND DIESEL MARKETING				
Gasoline:	Truck transit	3	Uniform	6
	Truck unloading	3	Uniform	6
	Refueling	3	Uniform	7
	Storage tanks	3	Uniform	7
Diesel:	Truck transit	3	Uniform	6
	Truck unloading	3	Uniform	6
	Refueling	3	Uniform	7
	Storage tanks	3	Uniform	7
SOLVENT EVAPORATION				
Dry cleaning		1,4	Uniform	5
Degreasing		1,2	Uniform	6
Surface coating:	architectural	1	1.3	7
	autobody refinishing	2	Uniform	5
Graphic arts		1	Uniform	6
Cutback asphalt paving		3	Uniform	5
Roofing		3	Uniform	5
Pesticides:	agricultural	3	1.3	6
	nonagricultural	3	Uniform	5
Commercial/Consumer use		1	Uniform	7
WASTE MANAGEMENT PRACTICES				
POTWs		3	Uniform	7
Industrial wastewater		3	Uniform	7
HWTSDFs		3	Uniform	7
Landfills		3	Uniform	7
Solid Waste Burning:				
Incineration--Industrial		3	Uniform	7
Open burning		3	Uniform	7
SMALL FOSSIL AND OTHER FUEL COMBUSTION				
Commercial/Institutional		3	0.35	6
Industrial		3	Uniform	7
Residential		3	0.18	7
OTHER				
Commercial bakeries		1	Uniform	6
Miscellaneous combustion		3	Uniform	7
Leaking underground storage tanks		4	Uniform	7

TABLE 3-2. (Continued)

Source Description	Estimation Approach[a]	Seasonal Adjustment Factor	Weekly Activity (days/week)
NONHIGHWAY MOBILE SOURCES			
Aircraft	4	Uniform	7
Marine vessels	3	1.1	7
Construction equipment	4	1.3	7
Farm equipment	4	1.1	7
Industrial equipment	4	Uniform	7
Lawn and garden	4	1.3	7
Motorcycles	4	1.3	7
Railroad locomotives	3	Uniform	7

[a]1 = per capita emission factor.
2 = employment-related emissions factor.
3 = commodity-consumption-related emission factor.
4 = level-of-activity-based emission factor.

3.3 QUALITY ASSURANCE MEASURES

The first issue in quality assurance (QA) was that of developing a complete list of area sources. The EPA Procedures Document was the primary reference used in preparing the list for the Ozoneville MSA. Next, measures to ensure valid emission estimates were adopted using guidance provided by the EPA QA document for Post-1987 SIP emission inventories.[7] Since many are based on AP-42 factors or factors given in the Procedures Document, sources of error would primarily be associated with the multiplier values and the accuracy of emission calculations. The former required a number of techniques. These included evaluating the multiplier values or the emission estimates to be reasonable or calculating emissions through different means for purposes of comparison. The accuracy was addressed by performing independent checks of the calculations.

One example of evaluating the reasonableness of emission estimates was to use industrial directories to determine the number of establishments in operation in a particular service category. Dividing this number into the estimated emissions gave an emissions-per-establishment value. Using EPA emission factors average activity levels or process throughput estimates were derived from the calculated emissions-per-establishment values. The resulting activity levels were screened for the purpose of identifying apparent data outliers (unreasonable values). For example, during our initial screening the average gasoline throughput per service station was determined to be 450 gallons per year. Since this quantity corresponded to just over one gallon per day per station we quickly flagged the gasoline marketing calculations for detailed re-evaluation. As a result, we identified that the emissions were off by a factor of 1000 and correct average daily throughput should be on the order of 450,000 gallons per year or 1230 gallons per day. Similar exercises were performed to evaluate estimates for the dry cleaning, graphic arts, autobody refinishing, aircraft, and construction equipment categories.

3.4 SUMMARY OF AREA SOURCE EMISSIONS

Table 3-3 provides a summary of the inventory results showing each of the six major categories of area sources. Both annual and daily emissions are

TABLE 3-3. SUMMARY OF EMISSIONS FROM AREA SOURCES

Source	VOC Emissions ton/yr	VOC Emissions lbs/day	NOx Emissions ton/yr	NOx Emissions lbs/day	CO Emissions ton/yr	CO Emissions lbs/day
Gasoline and Diesel Marketing						
Gasoline	7,937.39	46,082.5	NA[a]	NA	NA	NA
Diesel	1.03	6.1	NA	NA	NA	NA
SUBCATEGORY TOTAL	7,938.42	46,088.6				
Stationary Source Solvent Evaporation						
Dry cleaning	626.46	4,688.4	NA	NA	NA	NA
Degreasing	35,332.83	220,355.3	NA	NA	NA	NA
Architectural type	2,948.94	20,656.2	NA	NA	NA	NA
Automobile refinishing	1,785.68	13,363.7	NA	NA	NA	NA
Graphic arts	512.86	3,198.5	NA	NA	NA	NA
Cutback asphalt paving	107.09	802.5	NA	NA	NA	NA
Roofing	122.31	915.4	1.13	8.5	0.15	1.1
Pesticides	212.25	1,722.3	NA	NA	NA	NA
Commercial/consumer solvent use	4,038.77	21,589.7	NA	NA	NA	NA
SUBTOTAL	45,687.19	287,292.0	1.13	8.5	0.15	1.1
Less Point Source Contribution	460.4	3,295.5	0	0	0	0
SUBCATEGORY TOTAL	45,226.79	283,996.5	1.13	8.5	0.15	1.1
Waste Management Practices						
Publicly-owned treatment works	343.20	1,834.6	NA	NA	NA	NA
Industrial wastewater	0.03	0.1	NA	NA	NA	NA
Hazardous waste treatment, storage and disposal	47.32	253.0	NA	NA	NA	NA
Municipal landfills	311.64	1,665.9	NA	NA	NA	NA
Solid waste burning	2,318.55	12,394.0	496.24	2,652.6	6,589.53	35,225.1
SUBCATEGORY TOTAL	3,020.74	16,147.6	496.24	2,652.6	6,589.53	35,225.1

TABLE 3-3. (Continued)

Source	VOC Emissions ton/yr	VOC Emissions lbs/day	NOx Emissions ton/yr	NOx Emissions lbs/day	CO Emissions ton/yr	CO Emissions lbs/day
Small Fossil and Other Fuel Combustion						
Commercial/institutional	33.92	127.7	640.00	2,408.6	128.00	481.7
Industrial	87.13	465.8	3,602.68	19,258.5	853.77	4,563.9
Residential	64.24	106.6	1,212.00	2,010.7	242.40	402.1
SUBCATEGORY TOTAL	185.29	700.1	5,454.68	23,677.8	1,224.17	5,447.7
Other						
Commercial bakeries	367.34	2,291.0	NA	NA	NA	NA
Miscellaneous combustion	385.59	2,061.3	139.84	747.5	6,911.49	36,946.2
Leaking underground storage tanks	572.40	3,059.9	NA	NA	NA	NA
SUBCATEGORY TOTAL	1,325.33	7,412.2	139.84	747.5	6,911.49	36,946.2
Nonhighway Mobile Sources						
Aircraft	1,557.34	8,325.0	2,343.79	12,528.0	5,993.38	32,038.4
Marine vessels	3,086.21	24,625.4	42.58	345.6	10,329.22	83,776.2
Other--construction equipment	6,379.57	45,862.3	37,033.93	266,234.7	86,772.93	623,805.4
Other--farm equipment	131.04	1,062.8	271.15	2,199.2	1,705.41	13,831.9
Other--industrial equipment	1,003.85	5,366.2	6,254.86	33,435.6	13,616.46	72,787.9
Other--lawn and garden equipment	2,978.69	20,864.6	70.09	490.9	7,884.77	55,229.8
Other--motorcycles	82.30	523.4	8.44	53.7	358.72	2,281.3
Railroad locomotives	463.13	2,475.8	1,862.59	9,956.6	654.43	3,498.2
SUBCATEGORY TOTAL	15,682.13	109,105.5	47,887.43	325,244.3	127,315.32	887,249.1
TOTAL	73,378.70	463,450.4	53,979.32	352,330.7	141,659.74	964,869.2

[a]NA means not applicable.

given; daily emissions include adjustments for activity during the O_3 season. Inherent in the estimation procedure for area source emissions are the point source contribution; therefore, these are subtracted to prevent double-counting.

For the Ozoneville MSA, the highest contributions to VOC emissions are stationary source solvent evaporation, which account for 61 percent of the total, and construction equipment, which constitutes 24 percent of the total. These are depicted graphically in Figure 3-1. Also seen in Figure 3-1 is the contribution of the individual stationary sources with degreasing being the highest at 77 percent.

Similar figures are given for NO_x and CO (Figure 3-2 and 3-3) in which nonhighway mobile sources are the largest category. Within the nonhighway mobile source category, construction equipment is the major contributor to both types of pollutants at 82 and 70 percent, respectively. Fuel combustion sources, significant sources of NO_x and CO, are not as important during the ozone season because much of the fuel use is for heating, a wintertime activity.

A summary of the area source inventory by county is provided in Appendix C along with summaries of the point and mobile source inventories.

3.5 DISCUSSION OF THE AREA SOURCE CATEGORIES

As Table 3-1 shows, each of the six major area source categories is comprised of a number of area source types. Sections 3.5.1 through 3.5.6 describe each of the major categories and include a number of subsections that correspond to the individual source types. Details to supplement emission estimation procedures are provided in Appendix B.

3.5.1 Gasoline And Diesel Distribution

Four subcategories involving gasoline distribution losses were inventoried as area sources: (1) underground tank breathing and working losses, (2) tank truck unloading, (3) vehicle refueling, and (4) tank truck transit. The EPA Procedures Document recommends evaluating gasoline distribution losses by these subcategories to facilitate subsequent control strategy estimates. Other distribution activities such as tank farms and bulk

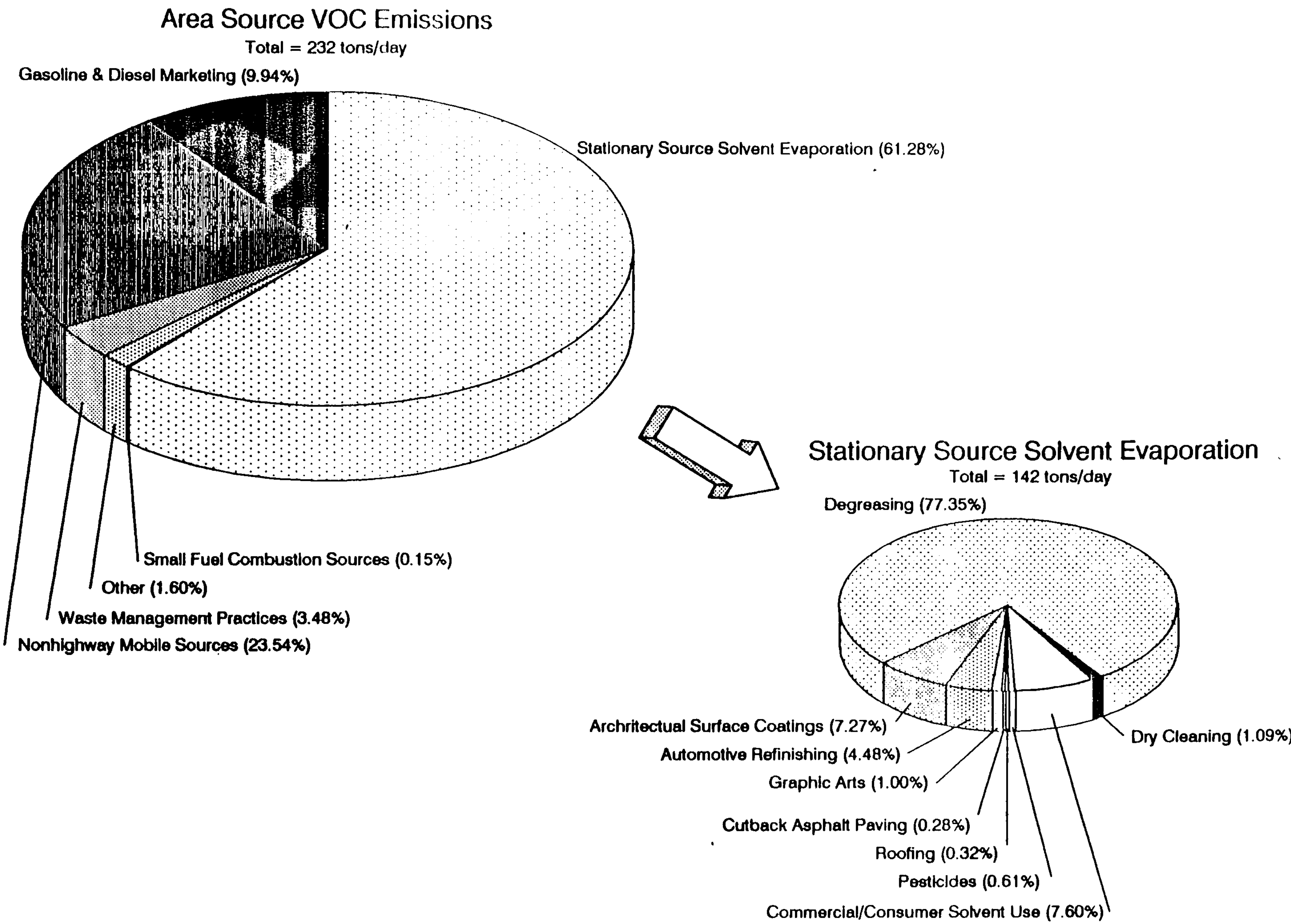

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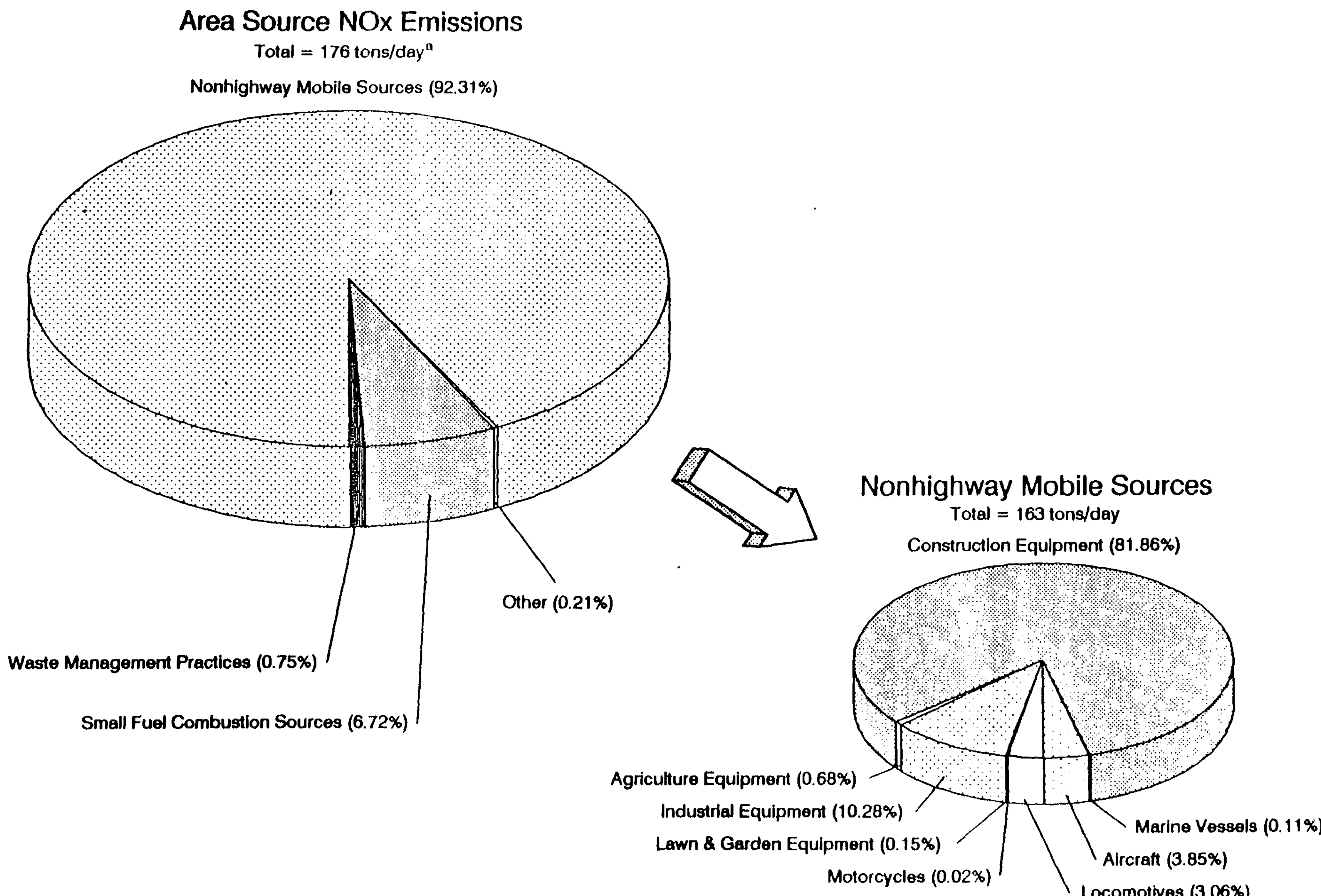
Figure 3-1. Ozoneville MSA Area Source VOC Emissions By Category



[a] Excludes gasoline and diesel marketing and stationary source solvent evaporation

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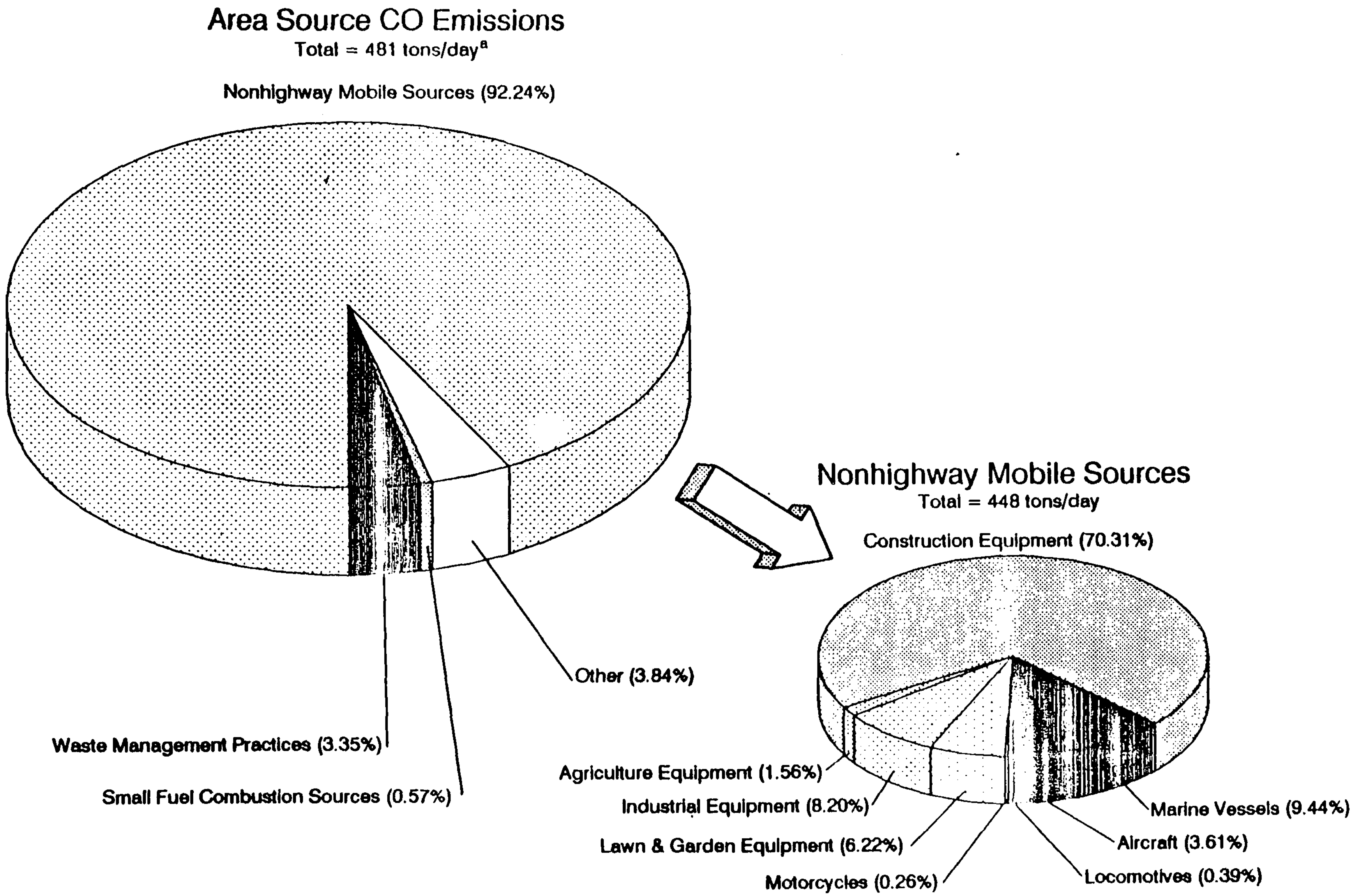
Figure 3-2. Ozoneville MSA Area Source NOx Emissions By Category



[a] Excludes gasoline and diesel marketing and stationary source solvent evaporation

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Figure 3-3. Ozoneville MSA Area Source CO Emissions By Category

plants that are also potential emission sources are included in the point source inventory. Storage tank breathing losses are evaporative emissions resulting from fluctuations in ambient temperature and pressure. Working losses are a result of displacement of vapor present in the distribution lines (i.e., lines between the underground storage tanks and fuel dispensing pumps). Similarly, emissions from storage tank filling and vehicle refueling activities are a result of vapor displacement. In addition, emission estimates for the vehicle refueling operation include factors to account for fuel spillage such as pre-fill and post-fill nozzle drip, spit back and overflow. Truck transit losses are estimates of the vaporization losses that occur during gasoline and diesel transport to the service stations.

Tables 3-4 and 3-5 present a summary of the estimated area source emissions associated with gasoline and diesel distribution activities. All emissions are considered to be reactive VOC. Estimates of storage tank breathing and working losses, vehicle refueling spillage and evaporation and tank truck transit losses for gasoline are based on emission factors from AP-42.[8] Overall, gasoline marketing accounted for 10 percent (23 tons/day) of VOC emissions during the ozone season, the third highest contributor in the inventory.

The emission factor for storage tank filling was calculated from an API equation in AP-42 using MSA-specific data: an RVP of 10.8 psia and a bulk fuel temperature of 70°F.[9] The calculations are shown in Appendix B (B.1.). Also, assumptions about fueling practices were made. A random telephone survey of 50 service stations revealed that 30 percent of the service stations in the study area are equipped for submerged filling while the remaining 70 percent employ splash filling. No service stations employed balance submerged filling (Stage I vapor recovery) in 1987.

AP-42 provides emission factors for losses from tank trucks in transit, both loaded and unloaded, under typical and extreme loss conditions. In the absence of specific information, the higher values were used for emissions estimation. Only those transferring fuel to service stations are included in the emissions estimate. Transfer at bulk plants and terminals are included in estimates for the point source inventory.

Emission factors to estimate emissions from diesel marketing were unavailable. Therefore, gasoline emission factors were adjusted by the ratio

TABLE 3-4. SUMMARY OF EMISSIONS FROM GASOLINE MARKETING

County	Multiplier (10^3 gal)	Weighted VOC Emission Factor (lbs/10^3 gal)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)
A	198,108	26.29	2,604.13	15,118.2
B	91,188	26.29	1,198.67	6,958.8
C	179,712	26.29	2,362.31	13,714.3
D	134,856	26.29	1,772.68	10,291.2
TOTAL			7,937.79	46,082.5

TABLE 3-5. SUMMARY OF EMISSIONS FROM DIESEL MARKETING

County	Multiplier (10^3 gal)	Weighted VOC Emission Factor (lbs/10^3 gal)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)
A	1,734	0.39	0.338	2.0
B	775	0.39	0.151	0.9
C	1,623	0.39	0.316	1.9
D	1,157	0.39	0.226	1.3
TOTAL			1.031	6.1

of the vapor pressures, diesel:gasoline, and used to estimate diesel emissions. The emission factor derivation procedure is shown in Appendix B, B.2.

The State Bureau of Liquid Fuels Taxation was contacted to obtain 1987 gasoline and diesel sales data.[10] Sales data was available by county and included both taxable and non-taxable gasoline sales. The Bureau of Liquid Fuels Taxation could not provide data on seasonal variations in fuel sales, however. Data from Highway Statistics 1986 was used to determine whether a seasonal scaling factor was needed.[11] Sales throughout the State during the ozone season did not differ significantly from other times of the year; therefore no adjustment was needed. Although these data are specific to 1986, fuel sales in 1987 were assumed to be the same as in 1986.

Additional assumptions about activity were needed to derive daily emissions from annual totals. In calculating daily emissions for a typical summer day, assumptions about service station activities were necessary. First, sales during the ozone season were assumed to be uniform year-round. Furthermore, service stations were assumed to operate seven days per week. Fuel delivery, however, was expected to occur six days per week. Finally, storage tank emissions occur seven days per week.

3.5.2 Stationary Source Solvent Evaporation

Eight subcategories are included in this area source type. All emit VOC because of their use of solvents. They are:

- dry cleaning,
- degreasing,
- surface coating,
- graphic arts,
- cutback asphalt paving,
- roofing,
- pesticide applications, and
- commercial/consumer solvent use.

Each of the subcategories is discussed individually in the following subsections. Some can be further divided to better characterize emissions. For example, surface coating includes auto body refinishing and architectural surface coating. The individual source types that comprise each subcategory are identified in their respective sections.

This area source category is the largest contributor to the Ozoneville VOC inventory resulting in 61 percent, or 142 tons per day, of emissions. A summary of the individual contributions to the solvent evaporation area source type is provided in Table 3-3. This table lists each source and its associated annual and typical summer day emissions. All solvent emissions were assumed to be 100 percent reactive; therefore, no adjustment of the emission factors was needed.

3.5.2.1 Dry Cleaning. The dry cleaning industry may be described by the three categories of services offered: coin-operated laundries offering dry cleaning; dry cleaning plants, except rug cleaning; and industrial laundries. These correspond to Standard Industrial Classification (SIC) Codes 7215, 7216, and 7218, respectively.

Dry cleaning is a process involving the use of organic solvents--petroleum-based solvents (blends of paraffinic, naphthanic, and aromatic compounds) and chlorinated hydrocarbons--but primarily tetrachloroethylene (perchloroethylene). The major source of emissions is the hot air tumble process of drying solvent-soaked garments. Unless controlled, total emissions are approximately equal to the volume of solvent used.

Typically, both point and area sources contribute to the source category emissions with point sources generally limited to industrial laundries because of their size and emissions potential. Emissions from point sources would therefore be subtracted from the estimated area source total to avoid double counting; however, no point sources of this type were identified in the Ozoneville MSA. The resulting total was 2.3 tons of VOC emissions per day during the ozone season.

The EPA Procedures Document gives two alternatives for commercial and coin-operated dry cleaners: the use of a survey and emission factors. For industrial launderers, contact with the facilities is recommended because their use of solvent has not been well-characterized. Alternatively, the large facilities will be included in the point source inventory and the smaller ones can be assumed to be included in estimates for the commercial plants. The latter was followed for this inventory.

To estimate emissions from commercial and coin-operated dry cleaners, a survey was conducted in County A for the calendar year 1986.[12] A brief survey form was developed to obtain the following information: the amount and type of cleaning solvent used; the number of employees; the quarterly throughput; and the type of control device, if used. The questionnaire achieved an 80 percent response and accounted for 75 percent of the employees in the 7215 and 7216 SIC Codes for the county as reported in County Business Patterns 1985.[13]

Emissions for County A were calculated using the survey data and the assumption from AP-42 that all solvent input to dry-cleaning operations is eventually evaporated to the atmosphere, so that the emission factor is 2,000 lbs VOC/ton solvent used. From the survey, the emissions from commercial and coin-operated plants totaled 120 tons of perchloroethylene and 52 tons of petroleum solvents. Data obtained during the survey were used as the basis for extrapolating emission estimates for sources that did not respond to the survey. The emissions from commercial and coin-operated plants were scaled up in the following manner:

$$\text{Nonreported Emissions} = \frac{\text{Reported Emissions}}{\text{Reported Employment}} \times \text{Total Employment} - \text{Reported Emissions}$$

$$= \frac{172 \text{ tons}}{311 \text{ employees}} \times 370 \text{ employees} - 172 \text{ tons}$$

$$= 33 \text{ tons}$$

For lack of better data, the nonreported emissions were also assumed to be 70 percent perchloroethylene, 30 percent petroleum solvents (i.e., the same ratio as for the reported emissions).

The results of the survey were used to develop an emission-per-employee emission factor that applied to the surrounding counties. For perchloroethylene use, the factor is 0.39 tons VOC per employee; for petroleum solvents use the emission factor is 0.14 tons VOC per employee. Multiplying these emission factors by employment for SIC Codes 7215 and 7216 for each county, emissions from dry cleaning were estimated. All the data are provided in

Table 3-6, including annual and daily emission estimates.

The daily emissions shown in Table 3-6 have been derived from the annual estimates assuming no increased activity during the ozone season and five days per week of operation.

3.5.2.2 Degreasing. Solvent degreasing is a physical method of removing grease, wax, or dirt from metal, glass, and fabric surfaces by exposing the material to an organic solvent. Frequently, degreasing activity is one of many production steps associated with industries in SIC Codes 25 and 33 through 39. These SICs include industrial categories such as metal furniture, primary metals, fabricated products, machinery, electric equipment, and instrumentation. In addition, there are many miscellaneous degreasing operations associated with auto repair shops, gasoline stations, and maintenance shops.

The types of degreasing performed in the United States falls into four categories: cold cleaning, open top vapor degreasing, conveyorized vapor degreasing, and fabric scouring. Fabric scouring is a degreasing technique that is unique to the textile industry and is specifically covered in the point source inventory.

Cold cleaning operations involve using organic solvents as room temperature liquids. Uses include wiping, spraying, or dipping of parts in a solvent for cleaning purposes. In open top vapor degreasing, cleaning takes place by exposing the part to solvent vapor. Conveyorized vapor degreasing entails the same activity as open top degreasing except that the parts to be cleaned continuously move in and out of the degreaser.

The estimated 110 tons of solvent evaporated per day makes degreasing the highest subcategory in the Ozoneville VOC inventory. This represents 77 percent of the solvent evaporation source category. Table 3-7 presents a summary of the emissions associated with degreasing operations. The subtotal includes the point source contribution which is subtracted out to avoid double-counting. Also shown in the table are the data used in deriving these estimates. A per capita emission factor from the EPA Procedures Document was used to estimate cold cleaning emissions.

Emission factors for open top vapor and conveyorized degreasers, however, were developed from information available from three permitted

TABLE 3-6. SUMMARY OF EMISSIONS FROM DRY CLEANING FACILITIES

County	Employment in 7215 and 7216 SIC Codes	Type of Cleaning Solvent	VOC Emission Factor (tons/employee)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)
A	370	Petroleum	0.14	51.80	387.7
		Perchloroethylene	0.39	144.30	1,079.9
B	263	Petroleum	0.14	36.82	275.6
		Perchloroethylene	0.39	102.57	767.6
C	352	Petroleum	0.14	49.28	368.8
		Perchloroethylene	0.39	137.28	1,027.4
D	197	Petroleum	0.14	27.58	206.4
		Perchloroethylene	0.39	76.83	575.0
SUBTOTAL				626.46	4,688.4
Less Point Source Contribution				236.1	1,603.2
TOTAL				390.36	3,085.2

TABLE 3-7. SUMMARY OF EMISSIONS FROM DEGREASING OPERATIONS

County	Facility Type	Multiplier Values	Multiplier Units	Value of the Emission Factor[a]	Emission Factor Units	Annual VOC Emissions (tons/year)	Daily VOC Emissions (lbs/day)
A	Cold Cleaners	407,497	Persons	3.0	lbs/capita	611.25	3,812.1
	Open Top Vapor / Conveyorized	14,265	No. of employees in SICs 25, 33-39	0.7	tons/employee	9,985.50	62,275.2
B	Cold Cleaners	205,259	Persons	3.0	lbs/capita	307.89	1,920.2
	Open Top Vapor / Conveyorized	8,210	No. of employees in SICs 25, 33-39	0.7	tons/employee	5,747.00	35,841.5
C	Cold Cleaners	368,314	Persons	3.0	lbs/capita	552.47	3445.5
	Open Top Vapor / Conveyorized	13,812	No. of employees in SICs 25, 33-39	0.7	tons/employee	9,668.40	60,297.5
D	Cold Cleaners	301,077	Persons	3.0	lbs/capita	451.62	2816.6
	Open Top Vapor / Conveyorized	11,441	No. of employees in SICs 25, 33-39	0.7	tons/employee	8,008.70	49,946.7
	SUBTOTAL					35,332.83	220,355.3
	Less Point Source Contribution					87.1	692.0
	TOTAL					35,245.73	219,663.3

[a]Emission factor for cold cleaners taken from the EPA Procedures Document. The one for open top vapor and conveyorized degreasers was derived from data on three point source.

sources. From point source data for the open top vapor degreaser, an employee-based emission factor was derived by dividing the number of employees at the facility (18 at Facility A, 75 at Facility B) into the emissions (20.2 tons per year at Facility A and 42.5 tons per year at Facility B) resulting from the degreasing operation: 1.12 tons per employee and 0.57 tons per employee per year, respectively. One conveyorized degreasing operation was permitted. For 24.4 tons of annual emissions and 65 employees, the emission factor is 0.38 tons per employee per year.

Because information on the percent of industry using open-top vapor degreasers and conveyorised degreasers was not available and because of the similarities in the two operations, an average of the emission factors was used. An estimate of the total number of employees in the pertinent SICs for each County was taken from Census Bureau data. An average annual growth of 2.06 percent determined from 1983-1985 Census Bureau data for the State was applied to the 1985 value to derive a 1987 value.[14]

In calculating the daily emissions shown in Table 3-7, degreasing activity was considered to be uniform throughout the year. Facilities involved in degreasing were assumed to operate six days per week.

3.5.2.3 Surface Coating. Industrial surface coating operations are primarily included in the point source inventory. However, there are two important emissions sources in surface coating that are treated as area sources: architectural surface coating and auto body refinishing. Both processes involve the use of solvent-based coatings which generate VOC emissions during application and drying as the solvent evaporates. A third source is the evaporation of solvent associated with its use in cleanup activities. Architectural surface coatings are paints, stains, varnishes, or other protective and decorative coatings sold through wholesale and retail outlets. Auto body refinishing is the repainting of automobiles, light-duty trucks, and other vehicles, excluding coating during original manufacture.

A summary of the data used to calculate emissions and the resulting estimates appear in Table 3-8. A number of auto body shops are included in the point source inventory, therefore, their emissions contribution was subtracted to avoid double-counting. Combined, architectural surface coating

TABLE 3-8. SUMMARY OF EMISSIONS FROM SURFACE COATING

County	Facility Type	Multiplier Value	Multiplier Units	Value of the VOC Emission Factor	Emission Factor Units	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)
A	Autobody Refinishing	264	No. of employees in SICS 7531, 7535	2.6	tons/employee	686.40	5,136.9
B	Autobody Refinishing	111	No. of employees in SICS 7531, 7535	2.6	tons/employee	288.60	2,159.8
C	Autobody Refinishing	132	No. of employees in SICS 7531, 7535	2.6	tons/employee	308.88[a]	2,311.6[a]
D	Autobody Refinishing	193	No. of employees in SICS 7531, 7535	2.6	tons/employee	501.80	3,755.4
	SUBTOTAL					1,785.68	13,363.7
A	Architectural Surface Coating	407,497	Persons	4.6	lbs/capita	937.24	6,565.0
B	Architectural Surface Coating	205,259	Persons	4.6	lbs/capita	472.10	3,306.9
C	Architectural Surface Coating	368,314	Persons	4.6	lbs/capita	847.12	5,933.8
D	Architectural Surface Coating	301,077	Persons	4.6	lbs/capita	692.48	4,850.5
	SUBTOTAL					2948.94	20,656.2
	Less Point Source Contribution[b]					628.2	88.8
	TOTAL					4,645.82	33,391.7

[a]Includes emissions reduction due to local regulation requirement.
[b]From Autobody Shops.

and automotive refinishing are the second highest VOC subcategory, contributing about 12 percent (17 tons/day during the ozone season) to the solvent evaporation source category.

The most accurate method of inventorying VOC emissions from the application of architectural surface coatings is to obtain sales and distribution data from local wholesale and retail suppliers of solventborne paints, varnishes, and other coatings. Due to manpower and budget constraints, this method was not feasible. Instead, the national average factor of 4.6 pounds of VOC emission per capita per year in the EPA Procedures Document was used.

Two alternative methods are given in the EPA Procedures Document for estimating emissions from automobile refinishing. One method is to apply a factor of 2.6 tons per/employee per year to the number of employees in SIC Codes 7531 and 7535. The second, preferred method is to collect local data. Again, for reasons of limited resources, the former was used to estimate emissions.

A local regulation in County C requires all auto body shops opened after 1981 to achieve a 50 percent reduction of their VOC emissions. Rule penetration is about 25 percent since eight facilities of the 33 in operation in the County are subject to the regulation. For these eight, a rule effectiveness factor of 80 percent was applied. Assuming that the new facilities also employ 25 percent of population working at auto body shops, 33 of the 132 employees in the County[13] work at newer facilities, 99 at the older ones. Emissions therefore are:

$$[33 \text{ employees} \times 2.6 \text{ tons/employee} \times (1-(0.5 \times 0.8))] + [99 \text{ employees} \times 2.6 \text{ tons/employee}] = 308.88 \text{ tons/year}$$

In developing daily emission estimates, auto body shops were assumed to operate uniformly throughout the year, five days per week. Architectural surface coating activity, however, increases during warmer weather with 75 percent of the activity occurring from May 1 to September 30. Assuming some painting takes place in October, the last month of the ozone season, the seasonable adjustment factor used was 0.76. Weekly activity is assumed to occur seven days per week.

3.5.2.4 Graphic Arts. The graphic arts industry, SIC Code 27, includes flexography, lithography, letterpress, rotogravure, and screen and spray painting. Solvent use is an integral part of the process and is the primary source of VOC emissions. Associated cleanup operations also require the use of solvent, thereby contributing to VOC emissions from the industry. Although emissions from graphic arts are accounted for in the point source inventory, numerous small facilities (i.e. < 10 tpy) are not adequately represented. Therefore, for inventory purposes the graphic arts industry is considered to have both a point and area contribution.

Table 3-9 provides information used to estimate both total annual emissions and typical summer day emissions for this source type. The emission factor shown was developed by the EPA and applies only to facilities that emit less than 100 tons of VOC per year. Larger graphic arts facilities have been included in the point source inventory. However, for those point sources releasing less than 100 tons per year of emissions, an adjustment to the area source total was made to avoid double-counting. No additional assumptions, references, or example calculations were necessary for this source category. Emissions from graphic arts as an area source therefore is less than two tons per day during the ozone season.

Assumptions used to calculate daily emissions reflect activities representative of the smaller facilities that the emission factor would include. No variations in schedule during the ozone season was expected and typical operations were assumed to run six days per week.

3.5.2.5 Cutback Asphalt Paving. Cutback asphalt is a type of liquefied road surface that is prepared by blending or "cutting back" asphalt cement with various kinds of petroleum distillates. Cutback asphalt is used as a pavement sealant, tack coat, and as a bonding agent between layers of paving material. Volatile organic compounds are emitted as the cutback asphalt cures and as the petroleum distillates evaporate.

Table 3-10 provides the data used in emissions estimation along with the resulting emissions. Because of the nature of the operation, all emissions are considered to be an area source. The EPA Procedures Document included mixing plants as an emission source; however, no mixing plants are located in the MSA.

TABLE 3-9. SUMMARY OF EMISSIONS FROM GRAPHIC ARTS FACILITIES

County	Subcategory	Multiplier (Persons)	Emission Factor (lbs/capita)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)
A	Graphic Arts	407,497	0.8	163.00	1,016.6
B	Graphic Arts	205,259	0.8	82.10	512.0
C	Graphic Arts	368,314	0.8	147.33	918.8
D	Graphic Arts	301,077	0.8	120.43	751.1
	SUBTOTAL			512.86	3,198.5
	Less Point Source Contribution			48.4	372.1
	TOTAL			464.46	2,826.4

TABLE 3-10. SUMMARY OF EMISSIONS FROM CUTBACK ASPHALT PAVING OPERATIONS

County	Subcategory	Multiplier (tons cutback asphalt)	Emission Factor (tons/ton material)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)
A	Paving	137.5	0.23	31.63	237.7
B	Paving	79.8	0.23	18.35	137.4
C	Paving	126.8	0.23	29.16	218.2
D	Paving	121.5	0.23	27.95	209.2
	TOTAL			107.09	802.5

Since no emission factor was available, emissions were estimated from information provided in the EPA Procedures Document and by the Asphalt Institute in College Park, Maryland.[15] The use of cutback asphalt in each county was derived from an estimate for the State published by the Asphalt Institute.[16] State usage was apportioned to the county level by assuming the ratio of paved roads, County:State, was proportional to paving activities. This ratio was determined from data provided by the District Office of the State Department of Transportation.[17] For County A, paved roads are 1.55 percent of the State's total; in County B, 0.90 percent; County C, 1.43 percent, and County D, 1.37 percent. Calculation sheets in Appendix B (B.3.) outline the emission factor derivation procedures. The emission factor that appears in Table 3-10 was derived from the total estimated emissions for the State and the quantity of cutback asphalt materials used state-wide. For the Ozoneville MSA, emissions during the ozone season were estimated to be less than one ton per day.

Although the EPA Procedures Document indicates no activity by this industry during the ozone season, paving was assumed to be done throughout the year since the Ozoneville MSA has a mild climate. Furthermore, as a routine highway maintenance type of activity, cutback asphalt paving is assumed to occur five days per week.

3.5.2.6 Roofing Operations. Three types of roofing operations are generally practiced: built-up membrane systems, polymer-modified bitumen membrane systems, and single-ply rubber membrane systems. In the built-up membrane system, asphalt and coal tar are the bitumens in use. The roofing process requires heating the bitumen to a molten state and applying it between layers of roofing felt. Upon cooling, the bitumens applied fuse the layers together. Polymer-modified bitumen membranes are bitumen membranes that contain polymers such as styrene-butadiene which improve membrane properties. Although a number of installment techniques may be used, torch application is more common. A propane torch is used to heat a modified asphalt coating on the membrane surface and fusing of the layers takes place as the materials cool.[18,19]

Unlike the bitumen-based membrane, single-ply rubber membrane systems do not rely on the fusion of bitumen and membrane layers. Instead, sealants and adhesives are used to join and attach the roofing material. Three different means of holding the single-ply rubber membrane in place are the ballasted system, the mechanical system, and the adhered system. The ballasted system requires ballast, generally rounded stone; the mechanical system involves fasteners; and the adhered system uses adhesive.[18,19]

As emission sources, built-up membrane systems and torch-applied modified bitumen systems are much smaller sources of VOC than the single-ply rubber membrane systems. This is because emissions result from fuel combustion, liquified petroleum gas (LPG) and kerosene, rather than solvent evaporation. As a high boiling point petroleum distillate, few additional VOC are expected from heating the asphalt material itself. Conversely, single-ply rubber membrane systems are not sources of CO and NO_x because of the solvent use.

A summary of the information used to estimate roofing emissions is given in Tables 3-11, 3-12, and 3-13. The fuel combustion emission factors were primarily taken from AP-42,[20] with one other reference used.[6] Estimates of national average fuel use for each system were provided by the National Roofing Contractors Association.[19] The emission factor for the single-ply rubber membrane system was calculated from the estimated emissions and the number of gallons of solvent-containing material used in the four counties by this type of system. The primary source for information was the National Roofing Contractors Association. Additional county-specific information was gathered by contacting local contractors.[21,22] This included percent use of each system and application technique and types of fuels used. All the data collected are presented and incorporated in the emissions estimation calculations in Appendix B (B.4.). As an emissions source, roofing activities contribute less than half a ton per day of VOC and even smaller quantities of NO_x and CO, less than 10 pounds per day total.

The seasonal adjustment factor used in deriving daily emissions assumed uniform activity during the year by this industry. Furthermore, standard hours of operation, five days per week, were assumed.

TABLE 3-11. SUMMARY OF VOC EMISSIONS FROM ROOFING OPERATIONS

County	System	Multiplier Value	Units of the Multiplier	VOC Emission Factor (lbs/10^3 gal)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)
A	- Built up membrane	27.6	10^3 gal LPG	0.5[a]	0.014	0.105
		8.2	10^3 gal kerosene	1.13[b]	0.0046	0.035
	- Torch-applied modified bitumen membrane[c]	5.8	10^3 gal propane	0.5[a]	0.0015	0.011
	- Single-ply membrane	14.8	10^3 gal solvent-containing materials used.	5,236	38.75	290.0
B	- Built up membrane	14.0	10^3 gal LPG	0.5[a]	0.0035	0.026
		4.1	10^3 gal kerosene	1.13[b]	0.0023	0.017
	- Torch-applied modified bitumen membrane[c]	3.0	10^3 gal propane	0.5[a]	0.0008	0.006
	- Single-ply membrane	7.5	10^3 gal solvent-containing materials used.	5,236	19.63	146.95
C	- Built up membrane	23.8	10^3 gal LPG	0.5[a]	0.0060	0.045
		7.0	10^3 gal kerosene	1.13[b]	0.0040	0.030
	- Torch-applied modified bitumen membrane[c]	5.0	10^3 gal propane	0.5[a]	0.0013	0.009
	- Single-ply membrane	12.8	10^3 gal solvent-containing materials used.	5,236	33.51	250.79
D	- Built up membrane	9.0	10^3 gal LPG	0.5[a]	0.0023	0.017
		6.4	10^3 gal kerosene	1.13[b]	0.0036	0.027
	- Torch-applied modified bitumen membrane[c]	4.6	10^3 gal propane	0.5[a]	0.0012	0.009
	- Single-ply membrane	11.6	10^3 gal solvent-containing materials used.	5,236	30.37	227.28
	TOTAL				122.31	915.4

[a]Emission factors taken from AP-42

[b]Emission factor taken from Reference 6.

[c]Emission factor is for LPG.

TABLE 3-12. SUMMARY OF NO_x EMISSIONS FROM ROOFING OPERATIONS

County	System	Multiplier Value	Units of the Multiplier	NO_x Emission Factor (lbs/10^3 gal)	Annual NO_x Emissions (tons/yr)	Daily NO_x Emissions (lbs/day)
A	- Built up membrane	27.6	10^3 gal LPG	9.1[a]	0.126	0.94
		8.2	10^3 gal kerosene	55.0[b]	0.226	1.69
	- Torch-applied modified bitumen membrane[c]	5.8	10^3 gal propane	9.1[a]	0.026	0.20
B	- Built up membrane	14.0	10^3 gal LPG	9.1[a]	0.064	0.48
		4.1	10^3 gal kerosene	55.0[b]	0.113	0.84
	- Torch-applied modified bitumen membrane[c]	3.0	10^3 gal propane	9.1[a]	0.014	0.10
C	- Built up membrane	23.8	10^3 gal LPG	9.1[a]	0.108	0.81
		7.0	10^3 gal kerosene	55.0[b]	0.193	1.44
	- Torch-applied modified bitumen membrane[c]	5.0	10^3 gal propane	9.1[a]	0.023	0.17
D	- Built up membrane	9.0	10^3 gal LPG	9.1[a]	0.041	0.31
		6.4	10^3 gal kerosene	55.0[b]	0.176	1.32
	- Torch-applied modified bitumen membrane[c]	4.6	10^3 gal propane	9.1[a]	0.021	0.16
	TOTAL				1.13	8.5

[a] Emission factors taken from AP-42

[b] Emission factor taken from Reference 6.

[c] Emission factor is for LPG.

TABLE 3-13. SUMMARY OF CO EMISSIONS FROM ROOFING OPERATIONS

County	System	Multiplier Value	Units of the Multiplier	CO Emission Factor (lbs/10^3 gal)	Annual CO Emissions (tons/yr)	Daily CO Emissions (lbs/day)
A	- Built up membrane	27.6	10^3 gal LPG	1.9[a]	0.026	0.20
		8.2	10^3 gal kerosene	5.0[b]	0.021	0.15
	- Torch-applied modified bitumen membrane[c]	5.8	10^3 gal propane	1.9[a]	0.006	0.04
B	- Built up membrane	14.0	10^3 gal LPG	1.9[a]	0.013	0.10
		4.1	10^3 gal kerosene	5.0[b]	0.010	0.08
	- Torch-applied modified bitumen membrane[c]	3.0	10^3 gal propane	1.9[a]	0.003	0.02
C	- Built up membrane	23.8	10^3 gal LPG	1.9[a]	0.023	0.17
		7.0	10^3 gal kerosene	5.0[b]	0.018	0.13
	- Torch-applied modified bitumen membrane[c]	5.0	10^3 gal propane	1.9[a]	0.005	0.04
D	- Built up membrane	9.0	10^3 gal LPG	1.9[a]	0.005	0.06
		6.4	10^3 gal kerosene	5.0[b]	0.016	0.12
	- Torch-applied modified bitumen membrane[c]	4.6	10^3 gal propane	1.9[a]	0.004	0.03
	TOTAL				0.15	1.1

[a]Emission factors taken from AP-42

[b]Emission factor taken from Reference 6.

[c]Emission factor is for LPG.

3.5.2.7 Pesticide Application. As described in this document, the pesticide category includes both organic pesticides and herbicides. Inorganic pesticides are excluded because they contain no organic fraction. This source category broadly includes any substances used to kill or retard the growth of insects, rodents, fungi, weeds, or microorganisms. The three basic categories are synthetics, nonsynthetics (petroleum products), and inorganics. Formulations are often a combination of synthetic materials, the toxicologically active ingredient, and petroleum products, the toxicologically inert ingredient. Both components have a reactive VOC fraction which evaporates upon application. Some direct application of petroleum products is practiced, also resulting in evaporative emissions.

Pesticide use in the counties is predominantly agriculturally related. Other uses include those by municipal programs; highway, utilities and railroad maintenance; and exterminators. Pesticides use in homes and gardens is included in the commercial/consumer solvent use source type, Section 3.5.2.8.

The EPA Procedures Document suggests a crude estimation procedure of multiplying the annual organic pesticide use by a factor of 0.9 to calculate emissions. A data-intensive procedure was also referenced, however, use of the factor was chosen because of resource limitations. Estimates of organic pesticide use in agriculture for 1987 was supplied by the Ozoneville Agricultural Extension Service.[23] These are listed in Table 3-14 for each county, as well as emission estimates.

For nonagricultural pesticide use, estimates of pesticide use were collected by contacting a number of local county agencies and other users. The results are summarized in Table 3-14. For municipal pesticides use, the Ozoneville Department of Public Health, Vector Control Section, supplied a 1986 figure for County C. No significant change in use between 1986 and 1987 was assumed. No other municipalities are located in the four-county area. Pesticides use associated with highways maintenance was provided by the Ozoneville Department of Transportation, Highway Maintenance Division.[24] Although given a 1985 number, use was reported to be the same from year to year.

The primary electrical utility, Friendly Power and Light Company, was contacted for their estimated pesticide use in 1987.[25] Because emissions from

TABLE 3-14. SUMMARY OF EMISSIONS FROM PESTICIDE APPLICATION

County	Use	Multiplier (tons pesticide applied)	VOC Emission Factor (ton/ton applied)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)
A	Agriculture	63	0.9	56.7	463.35
B	Agriculture	42	0.9	37.8	308.90
C	Agriculture	30	0.9	27.0	220.65
D	Agriculture	81	0.9	72.9	595.74
SUBTOTAL				194.4	1,588.64
A	Nonagriculture				
	- Municipal	0.09	0.9	0.08	0.61
	- Highway	0.9	0.9	0.81	6.06
	- Utilities	0.5	0.9	0.45	3.37
	- Railroad	0.08	0.9	0.07	0.54
	- Exterminators	5.1	0.9	4.59	34.35
B	Nonagriculture				
	- Highway	0.6	0.9	0.54	4.04
	- Utilities	0.3	0.9	0.27	2.02
	- Railroad	0.04	0.9	0.04	0.27
	- Exterminators	2.7	0.9	2.43	18.19
C	Nonagriculture				
	- Highway	0.8	0.9	0.72	5.39
	- Utilities	0.4	0.9	0.36	2.69
	- Railroad	0.06	0.9	0.05	0.40
	- Exterminators	4.0	0.9	3.60	26.94
D	Nonagriculture				
	- Highway	0.7	0.9	0.63	4.71
	- Utilities	0.4	0.9	0.36	2.69
	- Railroad	0.07	0.9	0.06	0.47
	- Exterminators	3.1	0.9	2.79	20.88
SUBTOTAL				17.85	133.62
TOTAL				212.25	1,722.3

nonagricultural pesticide use is small related to emissions from agricultural uses, no adjustment to include other utilities was made. Similarly, for pesticide use associated with railroad maintenance, only the major railroad company, Atlantic Railroad, was contacted.[26]

To estimate pesticide use by exterminators, two local companies that service the four county area were contacted.[27,28] Each provided company use data for the four counties, which were then summed.

Emissions from agriculture pesticide use accounts for 92 percent (0.8 tons/day) of the emissions from pesticide use but pesticides overall contribute less than one ton per day to the Ozoneville VOC inventory.

Both types of pesticide uses show some seasonal dependence with higher uses occurring during the ozone season. In estimating daily emissions from agricultural pesticide use, a seasonal adjustment factor of 0.76 is applied based on discussions with the Ozoneville Agricultural Extension Service.[23] For nonagricultural uses, over 75 percent of application is done by exterminators, year-round. Information on when the remaining 25 percent is used is less specific. Because a large proportion is used uniformly and the source size overall is small, a seasonal adjustment factor of 0.58 was assigned. Weekly activity for agricultural and nonagricultural pesticide use was assumed to be six days per week and five days per week, respectively.

3.5.2.8 Commercial/Consumer Solvent Use. Many commercial/consumer products in common use contain VOC. Some examples are household and automobile cleaners and polishes. These products have varying VOC content and the quantities used are difficult to estimate; therefore, the resulting VOC emissions are considered to be an area source.

The emission estimates were calculated from the per capita emission factor given in the EPA Procedures Document which includes ten commercial and consumer solvent uses. The ten are aerosol products, household products, laundry treatment products, products used for moth control, non-industrial adhesives, polishes and waxes, rubbing compounds, space deodorants, toiletries and windshield washing products. The emission factor is based on national estimates of solvent use that are associated with the use of these products.[36] Table 3-15 also provides the estimated emissions by county, annual and daily during the ozone season, as well as a total for the subcategory of 10.8 tons

TABLE 3-15. SUMMARY OF EMISSIONS FROM COMMERCIAL/CONSUMER SOLVENT USE

County	Multiplier (Persons)	Emission Factor (lbs/capita)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)
A	407,497	6.3	1,283.62	6,861.7
B	205,259	6.3	646.57	3,456.3
C	368,314	6.3	1,160.19	6,201.9
D	301,077	6.3	948.39	5069.8
TOTAL			4,038.77	21,589.7

per day. This represents over a seven percent contribution to the solvent evaporation source category which is the third highest in the category.

For purposes of allocating annual emissions to the ozone season, uniform use was assumed throughout the year. Furthermore, emissions were assumed to occur seven days per week.

3.5.3 Waste Management Practices

The handling and management of solid and liquid waste depends on such factors as the type of waste generated and the form and composition of the waste. Typical management practices for aqueous waste include treatment by publicly-owned treatment works (POTWs) and treatment using on-site facilities. The latter is more commonly found at industrial facilities which generate a sufficient volume of wastewater to warrant such practices. For more concentrated liquid wastes and hazardous liquid waste, treatment, storage, and disposal facilities (TSDFs) may be used. Methods of solid waste disposal include municipal landfills, combustion, and TSDFs.

Information supplied by the State Department of Environmental Regulation (DER) for the Ozoneville MSA on the number of source types included the type of waste management facilities in the Ozoneville MSA. One industrial wastewater treatment facility was identified in the MSA, as well as one TSDF (a solvent reclamation processor), four landfills (three of which are closed), and two solid waste incinerators, one of which is included in the point source inventory. Each type of waste handling is discussed in the following subsections.

Volatile organic compound emissions from waste treatment depend both on the volatile organic content of the waste and the treatment method. Since these parameters vary from facility to facility, the best estimates would be obtained through an examination of specific practices. Due to the overall lack of information at this level of detail, some general assumptions were necessary. Each subsection provides a description and summary of the assumptions used in each emission estimation procedure.

Volatile organic compound emissions are summarized in Table 3-16. Accounting for 3.5 percent (8 tons per day) of the Ozoneville inventory, approximately 73 percent is generated by open burning in County A. The second

TABLE 3-16. SUMMARY OF VOC EMISSIONS FROM WASTE MANAGEMENT PRACTICES

County	Source	Value of the Multiplier	Multiplier Units	Value of the Emission Factor	Emission Factor Units	Annual Emissions (tons/yr)	Daily Emissions (lbs/day)
A	POTWs	2,050	10^6 gals/industrial ww discharged to a POTW	0.055	tons/10^6 gals ww discharged	112.75	602.7
	Industrial Wastewater	0.5	10^6 gals/ww processed	0.055	tons/10^6 gals ww processed	0.03	0.1
	Landfills	9.5	10^6 tons waste	14.7	tons/10^6 tons waste	139.65	746.5
	Solid Waste Combustion:						
	industrial incineration	27,104	tons waste burned	3	lbs/ton waste burned	40.66	217.3
	open burning	146,069	tons waste burned	30	lbs/ton waste burned	2,191.04	11,712.4
SUBTOTAL						2,484.12	13,279.0
C	POTWs	4,190	10^6 gals/industrial ww discharged	0.055	tons/10^6 ww discharged	230.45	1,231.9
	Solid Waste Combustion: -open burning[a]	5,790	tons waste burned	30	lbs/ton waste burned	86.85	464.3
SUBTOTAL						317.30	1,696.2
D[b]	TSDFs	1,300	tons solvent processed	0.13	tons/ton solvent processed	47.32[c]	253.0[c]
	Landfills	11.7	10^6 tons waste	14.7	tons/10^6 tons waste	171.99	919.4
SUBTOTAL						219.31	1,172.4
TOTAL						3,020.73	16,147.6

[a]Only open burning at industrial facilities is allowed by the County.
[b]The County prohibits open burning by any sector.
[c]Includes emission reduction due to State regulation requirement.

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highest source is the POTWs in Counties A and C which releases 0.9 tons per day (11 percent). Table 3-17 contains NO_x and CO data for emissions from solid waste Table 3-15 combustion only, as no other waste management activities in the MSA generate NO_x and CO. Emissions totaled 1.3 tons of NO_x per day and 17.6 tons of CO per day. This is primarily attributable to open burning in County A which burns almost 150,000 tons annually.

In estimating daily emissions during the ozone season, waste treatment and disposal activities were assumed to be uniform and to show no seasonal dependance. Therefore, a seasonal adjustment factor of 0.58 was applied to annual emissions. Typically, operations at these facilities were expected to continue seven days per week; this was used to calculate daily emission rates.

3.5.3.1 Publicly Owned Treatment Works. Wastewater treatment processes at publicly-owned treatment works are grouped into three categories: primary, secondary, and tertiary. Primary treatment processes include bar screens, grit chambers, and primary clarifiers. Secondary treatment processes include biological systems such as activated sludge systems, trickling filters, or biological towers. Tertiary treatment processes, such as filtration units, biological nitrification systems, and activated carbon beds, can be used to remove materials remaining after secondary treatment.

Emissions from a particular POTW depend on the waste streams received and the treatment processes used. The major source of VOC emissions is believed to be industrial discharges, although stormwater runoff and residential discharges are also thought to be lesser yet quantifiable contributors. Emissions result from the volatilization of VOC as the wastewater passes through the POTW treatment processes, especially during aeration processes associated with secondary treatment.

Table 3-16 contains information used to estimate emissions in addition to the resulting estimated annual and daily totals. During the ozone season, the two POTWs release 0.3 tons per day (County A) and 0.6 tons per day (County D). The source for the emission factor was the EPA Procedures Document; the gallons of industrial wastewater processed by POTWs in County A and C was supplied by the DER.[29] According to the DER, few industrial facilities process their own wastewater; this subset is discussed later in the section on industrial wastewater.

TABLE 3-17. SUMMARY OF NO_x AND CO EMISSIONS FROM SOLID WASTE COMBUSTION

County	Combustion Method	Value of Multiplier (tons waste burned)	NO_x Emission Factor (lbs/tons waste burned)	CO Emission Factor (lbs/tons waste burned)	Annual NO_x Emissions (tons/yr)	Annual CO Emissions (tons/yr)	Daily NO_x Emissions (lbs/day)	Daily CO Emissions (lbs/day)
A	Industrial Incineration	27,104	3	10	40.66	135.52	217.33	724.44
	Open burning[a]	146,069	6	85	438.21	6,207.93	2,342.49	33,185.26
C	Open burning	5,790	6	85	17.37	246.08	92.85	1,315.42
TOTAL					496.24	6,589.53	2,652.6	35,225.1

[a]Only open burning at industrial facilities is allowed by the County.

3.5.3.2 Industrial Wastewater. Industrial wastewater generally passes through a series of collection and treatment units similar to those used at POTWs before being discharged from a facility. The general scheme used to collect and treat process wastewater varies from facility to facility and depends on factors such as the pollutants contained in the wastewater streams leaving different process areas, the flow rate of these streams, the general equipment layout in the process area, the terrain around the facility, and the age of the facility.

Many collection and treatment units in industrial wastewater treatment systems are open to the atmosphere and allow organic-laden wastewaters to contact ambient air. Atmospheric VOC emissions occur as the organic pollutants volatilize from the wastewater. Wastewater collection components that may be sources of emissions include: drains, junction boxes, lift stations, manholes, trenches, weirs, sumps, and surface impoundments. Wastewater treatment units that may be sources of emissions include: oil-water separators; equalization or neutralization basins; clarifiers, aeration basins; pH adjustment tanks; and flocculation tanks. The magnitude of emissions depends greatly on many factors such as the physical properties of the pollutants, the temperature of the wastewater, and the design of the individual collection and treatment units.[30]

According to information provided by the State DER, only one facility in the four-county MSA operated its own wastewater treatment plant during 1987. The State DER also indicated that other facilities in the four-county area periodically use oil-water separators to pretreatment wastewater prior to discharging to the municipal system. Since no specific information on the number of oil-water separators was available and because associated VOC emissions were accounted for in the POTW emission estimate, oil-water separators were excluded from consideration in this category.

The EPA Procedures Document recommends using air emissions models developed by EPA's Emission Standards Division of the Office of Air Quality Planning and Standards. However, only one major facility in County A treats their own wastewater. Therefore, instead of performing this more rigorous procedure, the emission factor used to estimate VOC emissions from POTWs was used. This decision was based on the limited potential for one facility's emissions from wastewater treatment to significantly affect the emissions from waste management practices subcategory overall and the high level of effort required to use the models.

Total area source VOC emissions from industrial wastewater treatment are estimated to be less than one pound per day. Using the POTW emission factor and data on the one facility's wastewater processing capacity,[29] annual and daily emissions have been calculated and are shown in Table 3-16.

3.5.3.3 Hazardous Waste TSDFs. Atmospheric emissions from hazardous waste treatment, storage, and disposal facilities can vary widely depending on the size, type, and design of waste management processes in use and on the characteristics of wastes being handled. Potential waste management processes include combustion; surface impoundments; wastewater treatment tanks; land treatment; landfills; waste piles; and/or transfer, storage, and handling operations. Emissions of VOC result from either incomplete waste combustion or from volatilization during handling and storage.

The emission factor seen in Table 3-16 was derived from data for the one solvent reclamation facility identified by the DER in County D.[29] Several assumptions were applied to the known quantity of solvent processed in 1987 to estimate emissions. An adjustment was also made to reflect the impact of the State regulation requiring control of VOC emissions on all solvent reclamation processes at TSDFs. The details of the estimation procedure appear in Appendix B (B.5.). Once an estimate was calculated, an emission factor was developed by dividing the total annual emissions by the weight of solvent processed. Using information from Table 3-3, daily emissions were derived from the annual total equal to less than one ton per day (see Table 3-16).

Actual facility emissions reflect reduction due to controls required by the State. The regulation requires that all facilities (rule penetration is 100 percent) achieve a 90 percent reduction. Using the 80 percent rule effectiveness factor, the emission estimate presented in the table reflected an overall control of 72 percent of emissions.

Other treatment, storage, or disposal facilities may be in operation in the County but are an integral part of on-site waste handling and treatment. Emissions therefore would be included in the point source total(s) for the facility at which the process(es) take place.

3.5.3.4 Municipal Landfills. For the purposes of this document, a municipal landfill is defined as a landfill that is regulated under Subtitle D of the Resource Conservation and Recovery Act (RCRA) and receives primarily household and/or commercial waste. Emissions of VOC are produced from municipal landfills by three mechanisms: vaporization, chemical reaction, and biological decomposition of liquid and solid compounds into other chemical species. Factors affecting vaporization include partial pressure of the constituent; constituent concentration at the liquid-air interface; temperature; and confining pressure. Chemical reactions are also affected by temperature, as well as waste composition; moisture content; and the practice of separate disposal areas for different waste types. Factors affecting biological decomposition are nutrient and oxygen availability; refuse composition; age of the landfill; moisture content; temperature; pH; and waste that is toxic to bacteria.[31]

The emission factor appearing in Table 3-16 that was used to estimate emissions was taken from the EPA Procedures Document. In order to calculate emissions, the amount of refuse in place at each landfill was needed. The DER in supplied quantities for the two landfills present in Counties A and D, only one of which is still active (County D).[29]

Annual and daily emission rates are also given in Table 3-16. Neither landfill has been permitted; thus, no adjustment to avoid double-counting was necessary. Both had approximately the same amount of waste in place in 1987; therefore, produced similar emissions for a total of 0.8 tons per day during ozone season.

3.5.3.5 Solid Waste Burning. Solid waste burning is of two types: incineration and open burning. Solid waste incineration includes the enclosed incineration of discarded materials from industrial, commercial, and residential sources. Open burning is also practiced by these same sectors but is done in open dumps, pits, and drums. Emissions from solid waste burning (VOC, NO_x, CO) are products of combustion.

3.5.3.5.1 Incineration. Two incinerators are in use in the Ozoneville MSA: one industrial incinerator in County A and a municipal waste incinerator in

County D. The incinerator in County A accepts all industrial waste for the county. The incinerator in County D services the other counties, but is included in the point source inventory. Since there is no overlap of the two, no adjustment to the area source emission estimate was necessary.

Tables 3-16 and 3-17 contain a summary of the data used to estimate emissions as well as results of the estimation procedure. The emission factors were taken from AP-42.[32] The industrial incinerator in County A is an uncontrolled, multiple-chamber incinerator. In the absence of species data, the use of non-methane VOC emission factors was assumed to represent the fraction of VOC emissions that are considered to be reactive.

To estimate the amount of waste burned, a regional factor from the EPA Procedures Document was multiplied by the number of employees in the manufacturing sector. The calculation to estimate solid waste burned is given in Appendix B, B.6.

3.5.3.5.2 Open Burning. Solid waste opening burning is often used to dispose of bulky waste such as landscaping refuse and can be done by all sectors. No residential open burning is allowed in Ozoneville city limits, however. Furthermore, Counties B and D prohibit all open burning and County C only permits open burning by the industrial sector.

Emission factors for VOC are listed in Table 3-16; those for NO_x and CO appear in Table 3-17. The tables also provide estimates of annual and daily emissions for each pollutant. Emission factors for municipal refuse from AP-42 were used to estimate emissions.[33] Because of the large volume of wasted burned and the inefficiency in combustion, open burning is the highest source of emissions for all three pollutants in the waste management practices source category. It contributes approximately six tons of VOC, one ton of NO_x and 17 tons of CO daily during the ozone season.

Estimates of waste burned by the residential, commercial/institutional, and industrial sectors were derived from factors given by the EPA Procedures Document, knowing rural population[34] and the number of employees in manufacturing. The solid waste estimation procedure is given in Appendix B, B.6.

3.5.4 Small Stationary Source Fossil and Other Fuel Combustion.

This source category includes small boilers, furnaces, heaters, and other heating units too small to be considered point sources. Four types of fuels are used in the Ozoneville study area: bituminous coal, oil, natural gas, and wood. Area source fuel use can be categorized into three user types: residential, commercial/institutional, and light industrial.

Residential dwellings are defined as structures containing fewer than 20 living units. Fuel use by this sector is primarily for heating such as in furnaces, woodstoves, fireplaces, water heaters, and for cooking.

Commercial and institutional facilities are establishments engaging in retail and wholesale trade, schools, hospitals, government buildings, and larger apartment complexes. All facilities in SICs 50 through 99 (wholesale and retail trade; finance, insurance and real estate; services; public administration; and nonclassifiable establishments) are thus included. Fuel consumption is through the use of small boilers, furnaces, heaters, and other heating units and does not usually include wood.

Industrial facilities included in this subcategory are those defined by SICs 20 through 39, the manufacturing SICs, but which are smaller than industrial facilities considered to be point sources. Combustion sources are similar to those used by commercial/institutional facilities.

For the residential and commercial/institutional sectors, the principal emission source in the MSA is natural gas combustion for cooking and water heating. Emissions from space heating are expected to be negligible during the ozone season. Emissions from the industrial sector result from the use of coal, residual and distillate oils, and natural gas, primarily for process heat.

Table 3-18 provides emission factors for the fuel combustion pollutants. These commodity consumption-based factors were primarily taken from AP-42,[35] with a few coal emission factors taken from the EPA NAPAP emission factor document.[36] The fuel consumption values appear in Tables 3-19 and 3-20. These were supplied by the 1985 NEDS Fuel Summary Report[37] with the exception of the natural gas numbers that were provided by the local gas company, Blue Ridge Natural Gas.[38] Tables 3-19 and 3-20 also contain emission estimates,

TABLE 3-18. SUMMARY OF FUEL COMBUSTION EMISSION FACTORS FOR SMALL FUEL COMBUSTION SOURCES

Fuel	Type of Combustion	VOC Emission Factor	NO_x Emission Factor	CO Emissions Factor	Units of the Emission Factor
Natural Gas[a]	Residential	5.3	100	20	$lbs/10^6$ cu. ft.
	Commercial/ Institutional	5.3	100	20	$lbs/10^6$ cu. ft.
	Industrial	2.8	140	35	$lbs/10^6$ cu. ft.
Coal[b]	Industrial[c]	0.69	22.25	5.8	lbs/ton
Distillate Oil[d]	Industrial	0.2	20	5	$lbs/10^3$ gal
Residual Oil[d]	Industrial	0.28	55	5	$lbs/10^3$ gal

[a]AP-42 Emission factors, Table 1.4-1.
[b]AP-42 Emission factors, Table 1.1-1.
[c]Bituminous coal use was assumed. Emission factors are the midpoint of ranges set by several firing methods.
[d]AP-42 Emission factors, Table 1.3-1.

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TABLE 3-19. SUMMARY OF EMISSIONS FROM NATURAL GAS COMBUSTION, ALL SECTORS

County	Consumer sector	Multiplier (10x6 cu ft)	Annual VOC Emissions (tons/yr)	Annual NOx Emissions (tons/yr)	Annual CO Emissions (tons/yr)	Daily VOC Emissions (lbs/day)	Daily NOx Emissions (lbs/day)	Daily CO Emissions (lbs/day)
A	Residential	7,780	20.62	389.00	77.80	34.2	645.3	129.1
	Commercial/institutional	5,500	14.58	275.00	55.00	54.9	1034.9	207.0
	Industrial	7,640	10.70	534.80	133.70	57.2	2,858.8	714.7
COUNTY TOTAL			45.89	1,198.80	266.50	146.23	4,539.13	1,050.77
B	Residential	3,590	9.51	179.50	35.90	15.8	297.8	59.6
	Commercial/institutional	1,230	3.26	61.50	12.30	12.3	231.5	46.3
	Industrial	2,200	3.08	154.00	38.50	16.5	823.2	205.8
COUNTY TOTAL			15.85	395.00	86.70	44.51	1,352.47	311.65
C	Residential	7,140	18.92	357.00	71.40	31.4	592.3	118.5
	Commercial/institutional	3,710	9.83	185.50	37.10	37.0	698.1	139.6
	Industrial	3,780	5.29	264.60	66.15	28.3	1,414.5	353.6
COUNTY TOTAL			34.04	807.10	174.65	96.68	2,704.83	611.69
D	Residential	5,730	15.18	286.50	57.30	25.2	475.3	95.1
	Commercial/institutional	2,360	6.25	118.00	23.60	23.5	444.1	88.8
	Industrial	3,170	4.44	221.90	55.48	23.7	1,186.2	296.5
COUNTY TOTAL			25.88	626.40	136.38	72.45	2,105.58	480.43
TOTAL			121.66	3,027.30	664.23	359.9	10,702.0	2,454.5

TABLE 3-20. SUMMARY OF EMISSIONS FROM COAL AND OIL COMBUSTION IN THE INDUSTRIAL SECTOR

Fuel type	County	Value of the Multiplier	Units of the Multiplier	Annual VOC Emissions (tons/yr)	Annual NOx Emissions (tohs/yr)	Annual CO Emissions (tons/yr)	Daily VOC Emissions (lbs/day)	Daily NOx Emissions (lbs/day)	Daily CO Emissions (lbs/day)
Coal	A	71,063	tons	24.52	790.58	206.08	131.1	4,226.1	1,101.6
	B	26,034	tons	8.98	289.63	75.50	48.0	1,548.2	403.6
	C	43,623	tons	15.05	485.31	126.51	80.5	2,594.3	676.3
	D	36,587	tons	12.62	407.03	106.10	67.5	2,175.8	567.2
SUBTOTAL				61.17	1,972.54	514.19	327.00	10,544.46	2,748.67
Distillate oil	A	1,110	10x3 gals	0.11	11.10	2.78	0.6	59.3	14.8
	B	406	10x3 gals	0.04	4.06	1.02	0.2	21.7	5.4
	C	681	10x3 gals	0.07	6.81	1.70	0.4	36.4	9.1
	D	571	10x3 gals	0.06	5.71	1.43	0.3	30.5	7.6
SUBTOTAL				0.28	27.68	6.92	1.48	147.97	36.99
Residual oil	A	6,226	10x3 gals	0.87	171.22	15.57	4.7	915.3	83.2
	B	2,280	10x3 gals	0.32	62.70	5.70	1.7	335.2	30.5
	C	3,822	10x3 gals	0.54	105.11	9.56	2.9	561.9	51.1
	D	3,205	10x3 gals	0.45	88.14	8.01	2.4	471.1	42.8
SUBTOTAL				2.17	427.16	38.83	11.62	2,283.42	207.58
TOTAL				63.62	2,427.38	559.94	340.1	12,975.8	2,993.2

Table 3-19 for natural gas combustion and Table 3-20 for coal and oil combustion. Totals from all small stationary source fuel combustion by county are as follows:

County A: 71.39 tons/yr, 282.6 lbs/day;
County B: 25.19 tons/yr, 94.4 lbs/day;
County C: 49.70 tons/yr, 180.5 lbs/day; and
County D: 39.01 tons/yr, 142.7 lbs/day.

The total for all counties by consumer sector is presented in Table 3-20.

Since the NEDS Fuel Summary Report was only available by State, the ratio of county employment to State employment was applied to estimate industrial fuel use by the counties. Furthermore, data were required for updating fuel consumption values to the base year 1987. Average annual employment growth for the four counties (1985-1987), 4.2 percent, was applied to the industrial fuel use.[39] The allocation of State fuel use to the county level is shown in Appendix B, B.7.

The Report aggregates LPG and natural gas consumption and kerosene and distillate oil. No information on the percent of each fuel type was available; therefore, the values were not adjusted and emissions have been overestimated.

A number of assumptions have been made to calculate daily emissions from the annual totals. Industrial sources were expected to operate seven days per week, independent of season. Both commercial/institutional and residential sectors exhibit some seasonal variations in gas use, according to the EPA Procedures Document. Only eighteen percent of gas use by these sectors is expected to occur during the seven-month ozone season. The EPA Procedures Document also provided values for weekly activity, six days for commercial/institutional combustion and seven for residential.

3.5.5 Other Area Sources

Sources included in this category are commercial bakeries, miscellaneous combustion sources, and leaking underground storage tanks. Volatile organic compound emissions account for less than two percent of the Ozoneville inventory with the highest contribution made by leaking underground storage tanks (41 percent of the area source category total). Bakeries and miscellaneous combustion contribute 31 percent and 28 percent, respectively. Miscellaneous combustion is the only source of NO_x and CO in this area source category and contributes less than one percent to each emissions inventory overall.

3.5.5.1 Commercial Bakeries. The baking industry, SIC 2051, represents a potentially significant source of VOC. The yeast fermentation process in bread making produces pyruvic acid and acetaldehyde as intermediate products and almost equal amounts of ethanol and carbon dioxide as final products.

Table 3-21 presents the information used to estimate bakery emissions in the Ozoneville MSA. Two emission factors have been developed from source testing done by EPA, one that depends on the weight of bread baked, the second relates emissions to population. Since values for county population were readily available, the latter emission factor was used. No adjustment for point source contributions from large bakeries was needed because none are located in the MSA. Emissions during the ozone season therefore equal 1.1 tons per day.

In allocating annual emission to daily emission rates, typical activities for small bakeries were considered. Although no seasonal variation in production was expected, smaller bakeries were assumed to operate six days per week.

3.5.5.2 Miscellaneous Combustion Sources. Several types of fires and burning activities potentially contribute to this subcategory which yields not only VOC emissions, but also NO_x and CO. These are as follows:

- grass fires,
- forest fires,
- structure fires,
- trash fires,
- vehicle fires,

TABLE 3-21. SUMMARY OF EMISSIONS FROM COMMERCIAL BAKERIES

County	Multiplier (Persons)	VOC Emission Factor (lbs/capita)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)
A	407,497	0.573	116.75	728.1
B	205,259	0.573	58.81	366.8
C	368,314	0.573	105.52	658.1
D	301,077	0.573	86.26	538.0
TOTAL			367.34	2,291.0

- agricultural burning,
- prescribed and slash burning, and
- orchard heaters.

According to the Ozoneville Agricultural Extension Service, the last three subcategories--agricultural, prescribed and slash burning, and orchard heaters sources--are uncommon in the MSA, therefore, do not contribute significantly to emissions.[23]

Table 3-22 summarizes the data used to estimate emissions. The emission factors appearing there are modified AP-42 emission factors that have been derived by making assumptions about the material consumed in a fire.[40,41] Calculation sheets in Appendix B (B.8.) provide the details and derivation process for each. Information about the numbers and types of fires was supplied by the Regional and Ozoneville Fire Marshalls.[42,43] Since neither group distinguished between grass and forest fires in their records, the two were combined into one source category.

The total emissions estimated for this subcategory appearing in Table 3-22 is considered to be a minimum estimate. Several other fires associated with spills and explosions (3,060 and 3,112, respectively) were recorded by the Ozoneville Fire Marshall. No estimates for these have been made because of the lack of specific information about the material involved.

Daily emissions from miscellaneous combustion account for one ton VOC during the ozone season. The only source of NO_x and CO in the "other" area source category, emissions were estimated at 0.4 tons NO_x per day and 18.5 tons CO per day. Structure fires were the most significant source for all three pollutants followed by forest and grass fires. Together they represent 94 percent of VOC emissions, 97 percent of NO_x emission and 95 percent of CO emissions for the subcategory.

Because the different categories of fires can generally be assumed to be accidental, no seasonal pattern of activity was expected. No data on the distribution of fires throughout the week was available; therefore, seven days per week was assumed.

TABLE 3-22. SUMMARY OF EMISSIONS FROM MISCELLANEOUS COMBUSTION SOURCES

County	Source	Multiplier (No. of fires)	VOC Emissions Factor (lbs/fire)	NO_x Emissions Factor (lbs/fire)	CO Emissions Factor (lbs/fire)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)	Annual NO_x Emissions (tons/yr)	Daily NO_x Emissions (lbs/day)	Annual CO Emissions (tons/yr)	Daily CO Emissions (lbs/day)
A	- Forest and grass fires	2,510	30.5	12.2	579.5	38.28	204.62	15.31	81.85	727.27	3,887.72
	- Structure fires	2,112	74.2	27.0	1,315.7	78.36	418.86	28.51	152.41	1,389.38	7,427.10
	- Trash fires	3,006	3.8	0.8	74.4	5.71	30.53	1.20	6.43	111.82	597.76
	- Vehicle fires	1,065	2.4	0.3	9.4	1.28	6.83	0.16	0.85	5.01	26.76
SUBTOTAL						123.63	660.84	45.18	241.54	2,233.48	11,939.34
B	- Forest and grass fires	1,456	30.5	12.2	579.5	22.20	118.69	8.88	47.48	421.88	2,255.19
	- Structure fires	1,002	74.2	27.0	1,315.7	37.17	198.72	13.53	72.31	659.17	3,523.65
	- Trash fires	1,495	3.8	0.8	74.4	2.84	15.18	0.60	3.20	55.61	297.29
	- Vehicle fires	1,600	2.4	0.3	9.4	1.92	10.26	0.24	1.28	7.52	40.20
SUBTOTAL						64.13	342.85	23.25	124.27	1,144.18	6,116.33
C.	- Forest and grass fires	1,370	30.5	12.2	579.5	20.89	111.68	8.36	44.67	396.96	2,121.98
	- Structure fires	1,975	74.2	27.0	1,315.7	73.27	391.69	26.66	142.53	1,299.25	6,945.32
	- Trash fires	2,717	3.8	0.8	74.4	5.16	27.60	1.09	5.81	101.07	540.29
	- Vehicle fires	2,469	2.4	0.3	9.4	2.96	15.84	0.37	1.98	11.60	62.03
SUBTOTAL						102.28	546.81	36.48	194.99	1,808.88	9,669.62
D.	- Forest and grass fires	1,897	30.5	12.2	579.5	28.93	154.64	11.57	61.86	549.66	2,938.25
	- Structure fires	1,655	74.2	27.0	1,315.7	61.40	328.22	22.34	119.43	1,088.74	5,820.00
	- Trash fires	2,221	3.8	0.8	74.4	4.22	22.56	0.89	4.75	82.62	441.66
	- Vehicle fires	837	2.4	0.3	9.4	1.00	5.37	0.13	0.67	3.93	21.03
SUBTOTAL						95.55	510.79	34.93	186.71	1,724.95	9,220.94
TOTAL						385.59	2,061.3	139.84	747.5	6,911.49	36,946.2

3.5.5.3 Leaking Underground Storage Tanks. Leakage of VOC from underground storage tanks is usually an event that occurs over a period of time. As a result, no episodic release occurs; instead the VOC volatilize at a rate determined by a complex relationship that continues to be studied by EPA's Office of Underground Storage Tanks. Some variables affecting emissions include VOC properties and concentrations, soil characteristics, and climate. Emissions primarily occur from the remediation activities for contaminated soil and groundwater. Left undisturbed, emissions from soil and groundwater are generally low. However, once efforts to clean up are initiated, the potential for emissions increases and vary depending on the level of contamination and the remediation technology used. The three more common technologies include soil aeration, vacuum extraction, and air stripping.

The ORPA and DER developed a methodology for estimating emissions from this category since the EPA procedures document did not provide specific guidance, and since the agencies recognized that the number of leaking underground storage tank remediation projects in the MSA is significant.

Table 3-23 gives the data used in estimating emissions during remediation, as well as the annual and typical summer day estimates. The emission factor was derived from the annual estimate of emissions and the estimated number of remediation projects. The daily estimate totaled 1.5 tons per day during the ozone season.

Since reporting of leaking underground storage tanks has only recently been required by Federal Regulation, no record of the number removed was available for 1987. An estimate of the number of leaking tanks was made using the population of tanks in the County and information supplied by the Office of Underground Storage Tanks (OUST).[44] The OUST information indicated that 20 percent of-tanks are likely to be leaking, 10 percent of which are expected to be undergoing some form of remediation activity.

Knowing the number of remediation projects, emissions were estimated by making assumptions about the type of technology used and the project duration. In the absence of specific information, no preference for one technology over another was assumed. General information on project duration and emissions from the OUST was used to establish average conditions of one month and 5 lbs VOC per hour, respectively. A calculation sheet in Appendix B (B.9.) shows

TABLE 3-23. SUMMARY OF EMISSIONS FROM LEAKING UNDERGROUND STORAGE TANKS

County	Multiplier (No. of remediation project)	VOC Emissions Factor (tons/project)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)
A	84	1.8	151.2	808.3
B	70	1.8	126.0	673.6
C	78	1.8	140.4	750.5
D	86	1.8	154.8	827.5
TOTAL			572.4	3,059.9

the emission factor development process.

The derivation of daily emissions on a typical summer day included the assumption that remediation would occur year-round. Also, emissions from these activities would be evenly distributed throughout the ozone season, seven days per week.

3.5.6 Nonhighway Mobile Sources

Several categories of mobile sources do not serve as modes of highway transportation. These include aircraft; marine vessels; construction, farm and industrial equipment; off-highway use of motorcycles and railroad locomotives. As sources of emissions, each unit generates relatively low VOC emissions compared to NO_x and CO. All emissions are products of diesel and gasoline combustion. Mobile sources are the highest contributor to both the NO_x and CO emissions inventories, accounting for 92 percent of the total in both cases. This is primarily due to construction equipment which contributes over 70 percent of emissions to the area source category totals. Each of the eight nonhighway mobile sources is discussed below with an emphasis placed on presenting the method of emissions estimation.

3.5.6.1 Aircraft. Aircraft engines are of two major categories, reciprocating piston and gas turbine. Piston engine aircraft are primarily used for general aviation, whereas gas turbine aircraft are used in commercial and military air travel. Gas turbine engines are of three types--turbojet, turbofan, and turboprop. All engines, whether piston or gas turbine, have different emission characteristics. Emissions are related to aircraft activity which is an index of fuel consumption. Landing/takeoff (LTO) cycles are the common measure of activity and consist of all the normal flight and ground operation modes including descent and approach, touchdown, landing run, taxi in, idle and shutdown, start-up and idle, checkout, taxi out, takeoff, and climbout.

Table 3-24 is a summary of emission factors grouped by aircraft use at the one public airport and the four private runways in the MSA. The weighted emission factor for commercial aviation were developed from emission factors given in AP-42 for each aircraft type.[45] The derivation process is shown in

TABLE 3-24. SUMMARY OF EMISSIONS FROM AIRCRAFT

County	Class of Operation	Number of LTOs	VOC Emissions Factor (lbs/LTO)	NO_x Emissions Factor (lbs/LTO)	CO Emissions Factor (lbs/LTO)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)	Annual NO_x Emissions (tons/yr)	Daily NO_x Emissions (lbs/day)	Annual CO Emissions (tons/yr)	Daily CO Emissions (lbs/day)
A	<u>Public Facilities (1)</u>										
	- Commercial	264,444	11.19[a]	17.57[a]	36.64[a]	1,479.56	7,909.19	2,323.14	12,418.63	4,844.61	25,897.[illegible]7
	- General	104,116	0.41	0.028	18.8	21.34	114.10	1.46	7.79	978.69	5,231.71
	- Military	4,051	27.1	9.16	48.8	54.89	293.43	18.55	99.18	98.84	528.38
	SUBTOTAL					1,555.79	8,316.72	2,343.15	12,525.6	5,922.14	31,657.[illegible]
	<u>Private Facilities (4)</u>										
A	- General	1,872	0.41	0.028	18.8	0.38	2.43	0.03	0.19	17.60	112.8[illegible]
B	- General	1,872	0.41	0.028	18.8	0.38	2.43	0.03	0.19	17.60	112.8[illegible]
C	- General	1,872	0.41	0.028	18.8	0.38	2.43	0.03	0.19	17.60	112.8[illegible]
D	- General	1,872	0.41	0.028	18.8	0.38	2.43	0.03	0.19	17.60	112.8[illegible]
	SUBTOTAL					1.52	9.74	0.12	0.77	70.4	451.[illegible]
	TOTAL					1,557.31	8,326.46	2,343.27	12,526.37	5,992.54	32,108.[illegible]

[a]Weighted emission factor that includes aircraft types (see Appendix B, B.10.).

Appendix B, B.10. The selection of emission factors from AP-42 was based on the percentage of operations by any one aircraft type for the major airport, Ozoneville International, that were taken from flight schedules in the Official Airline Guide: North American Edition (Dun and Bradstreet Corporation, Oakbrook, IL) published in May 1987.[46] Although not specific to the base year 1987, significant changes were not expected. For general aviation and military operations, two emission factors from an EPA document Procedures for Emission Inventory Preparation, Volume IV: Mobile Source were used.[47]

Landing/takeoff data for the public-use airport were available from the State Department of Transportation, Aviation Division,[48] which maintains annual records (Airport Master Records) as required by the Federal Aviation Administration. Appropriation of the total number of LTOs to the different engine types was based on the percentage of operations of each aircraft type.

Records on airport activity at private facilities were not available. Four such facilities have been identified from the county-specific Sectional Aeronautical Chart, one in each county.[49] To estimate emissions, the emission factor for general aviation was used and the number of LTOs were assumed to average six per day, six days per week, year-round.

Details of the emission estimation approach for Ozoneville International Airport appear in Appendix B (B.10.). Since the LTOs at the four private facilities were not assigned to different types of aircraft, aircraft-specific emission factors were not used. Instead, all activities at the private airports were assumed to be in the "general" category. The results provided in Table 3-24 show that almost all of the 4.2 tons VOC per day, 6.3 tons NO_x per day, and 16 tons CO per day are attributed to Ozoneville International Airport.

No seasonal variability was assumed for any of the airports in the daily emissions calculations.

3.5.6.2 Marine Vessels. As discussed in Section 3.2.1, the Ozoneville MSA has no coastline, therefore, marine vessel refers to a recreational vessel used on inland lakes and waterways. The only lake is in County D with associated waterways running through County A. However, because of the difficulty of estimating boating activity on the waterways, all are assumed to occur on the lake.

Two categories of engines are common to recreational vessels, outboard and inboard. Based on 1987 registration information from the State Wildlife Commission, about 97 percent of vessels have outboard engines, 3 percent have inboard.[50] Most outboard motors are 2-stroke engines.[51] Inboard motors are more variable and can consume either diesel or gasoline; however, the State Wildlife Commission indicated the majority are gasoline powered. Using the water surface area approach outlined in the procedures document,[53] the number of boats in the MSA was estimated at 52,521.

From an emissions standpoint, outboard engines emit higher levels of VOC and CO, but lower NO_x. Estimates for VOC and CO emissions place marine vessels as the second highest contributor to the nonhighway mobile sources category, or 23 percent (12 tons/day), and 9 percent of emissions (42 tons/day), respectively. The NO_x emissions total less than one ton per day. Table 3-25 provides emission factors for both engine types. The primary source for these was AP-42.[51] An adjustment to the emission factors for hydrocarbons was made because about 90 percent of the hydrocarbon emissions are assumed reactive.[52] Thus, the VOC emission factor used is the hydrocarbon emission factor times 0.90.

Since the emission factors are commodity-consumption based, fuel consumption estimates were needed to calculate emissions. The EPA Procedures Document for mobile sources estimated hourly fuel use at 3 gallons per hour for inboard engines and 1.5 gallons per hour for outboard engines.[53] Hours of boat usage were assumed to be 10 hours per month, eight months of the year. From this, annual boat fuel consumption was determined and is shown in Table 3-25 by engine type. The derivation of fuel consumption is provided in Appendix B (B.11.).

Table 3-25 also gives the estimated annual and daily emissions. Boating is primarily a warm weather activity that occurs approximately eight months per year. The O_3 season activity level is therefore 7 months of ozone season divided by 8 months of activity per year = 0.88. Activity is probably highest on weekends, however, uniform use of boats throughout the week was assumed.

TABLE 3-25. EMISSIONS FROM MARINE VESSELS

Engine Category[a]	Multiplier (10^3 gal fuel used)	VOC Emissions Factor[b] (lbs/10^3 gal)	NO_x Emissions Factor (lbs/10^3 gal)	CO Emissions Factor (lbs/10^3 gal)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)	Annual NO_x Emissions (tons/yr)	Daily NO_x Emissions (lbs/day)	Annual CO Emissions (tons/yr)	Daily CO Emissions (lbs/day)
Inboard	341	77	131	1,240	13.13	106.48	22.34	181.15	211.42	1,714.74
Outboard	6,132	986	6.6	3,300	3,073.08	24,518.95	20.24	164.12	10,117.8	82,061.41
TOTAL					3,086.21	24,625.43	42.58	345.62	10,329.22	83,776.15

[a]1,421 boats with inboard engines, 51,100 boats with outboard engines.
[b]Adjusted for fraction of reactive VOC.

3.5.6.3 Construction Equipment. The equipment categories in this section include track-type tractors, track-type loaders, motor graders, wheel tractor scrapers, off-highway trucks, wheeled loaders, wheeled tractors, rollers and miscellaneous machines. This last category contains a small number of mobile and semi-mobile machines used in construction such as log skidders, hydraulic excavators/crawlers, trenchers, concrete pavers, compact loaders, crane lattice booms, cranes, hydraulic excavator wheels and bituminous pavers.

Emissions from this subcategory are generated during diesel and gasoline consumption by the equipment. Construction equipment is the major contributor to the nonhighway mobile source category, generating 42 percent of the VOC emissions (23 tons/day), 82 percent of the NO_x emissions (133 tons/day), and 70 percent of the CO emissions (312 tons/day). The emission estimation approach recommended by the EPA is to apportion national fuel use to the State level using the ratio of State to national employment in SIC 16. Then the State fuel use estimate is allocated to the county using the ratio of county population to State population. However, a more industry-specific approach was taken that is based on construction equipment counts. This is described in Appendix B (B.12.).

Table 3-26 summarizes the data used to estimate emissions along with the resulting annual and typical summer day VOC, NO_x and CO emission totals. The emission factor appearing in the table is a weighted factor derived from AP emission factors for diesel-and gasoline-powered equipment for the nine categories listed above.[54] The units of the AP-42 emission factors are hourly emissions per unit. Using annual hours of operation also provided by AP-42, these were converted to annual emissions per unit. An additional adjustment of the emission factor was needed so that it would reflect reactive VOC which are estimated to be 98 percent of the hydrocarbons emitted. This value was calculated from data for diesel-powered engines in the 1980 VOC Species Data Manual.[55] No equivalent data were available for gasoline-powered vehicles that are similar to those used in construction. However, a profile for heavy duty gasoline trucks in the revised VOC Species Data Manual shows about 3 percent of hydrocarbon emissions are non-reactive.[56]

Emissions calculated using these factors required that the number of equipment units, by type, be known for the county. The most recent estimates available were 1975 national totals.[57,58] In order to update the numbers, the

TABLE 3-26. SUMMARY OF EMISSIONS FROM CONSTRUCTION EQUIMENT

County	Multiplier (hrs oper)	Weighted[a] VOC Emission Factor (lbs/hr oper)	Weighted[a] NOx Emission Factor (lbs/hr oper)	Weighted[a] CO Emission Factor (lbs/hr oper)	Annual VOC Emissions (tons/yr)	Annual NOx Emissions (tons/yr)	Annual CO Emissions (tons/yr)	Daily VOC Emissions (lbs/day)	Daily NOx Emissions (lbs/day)	Daily CO Emissions (lbs/day)
A	24,519,749	0.236	1.37	3.21	2,893.33	16,796.03	39,354.20	20,800.0	120,745.6	282,915.0
B	6,237,920	0.236	1.37	3.21	736.07	4,272.98	10,011.86	5,291.6	30,718.2	71,974.7
C	12,788,059	0.236	1.37	3.21	1,508.99	8,759.82	20,524.83	10,848.0	62,973.8	147,551.8
D	10,518,401	0.236	1.37	3.21	1,241.17	7,205.10	16,882.03	8,922.7	51,797.1	121,363.9
TOTAL					6,379.57	37,033.93	86,772.93	45,862.3	266,234.7	623,805.4

[a]Weighted emission rates were derived using the sum of emissions from all equipment types divided by the combined hours of operation for all equipment types. Tables B-4.1 through B-4.4 in Appendix B list the information used in deriving weighted emission rates.

annual growth rate of the construction industry from 1976-1985 was applied to the 1975 values to estimate 1987 equipment counts.[59] Apportioning these to the counties was achieved by applying the ratio of construction employment, County:National from 1985 Census Bureau data to the national counts. Using the 1985 ratio assumed the ratio had remained unchanged between 1985 and 1987.

In the Ozoneville MSA construction activity is reduced during the winter months and ceases during the months beginning mid-December through mid-March. The seasonal activity level applied to calculate daily emissions is: (7 months of ozone season ÷ 9 months per year of activity) = 0.78. Construction is generally restricted to the five-day work week; this was incorporated into the daily emission estimates.

3.5.6.4 Agriculture Equipment. Agriculture equipment can be separated into two major categories: wheeled tractors and other farm machinery. The "other" category includes combines, balers, harvesters, and cotton pickers. Both gasoline and diesel may be used as fuels, although some types use only one or the other. Emissions, as with other nonhighway mobile sources, results from fuel combustion.

Table 3-27 gives a weighted emission factor for all agriculture equipment. Also shown are the number of units in operation for each and estimated VOC, NO_x and CO emissions for 1987, both on an annual and typical summer day basis.

The weighted emission factor was developed from AP-42 values of hourly emission rates for diesel- and gasoline-powered equipment in the two categories.[60] Multiplying these values by annual hours of usage for each unit that were taken from 1985 Census of Agriculture,[61] an emission factor with units of emissions per equipment unit were obtained. Another multiplication of these resulting factors by the fraction of VOC emissions that are reactive, 98 percent,[55,56] produced the emission factors for each category. These adjusted emission factors appear in Appendix B (B.13.), along with the annual equipment usage estimation procedure.

Next, estimates of equipment counts were needed. County data compiled by the Commerce Department in the Census of Agriculture in 1985[61] were updated using industry growth (1982-1985) for the State. AP-42 provided the percentage of each equipment type that uses diesel and gasoline. Section

Table 3-27. SUMMARY OF EMISSIONS FROM AGRICULTURAL EQUIPMENT

County	Multiplier (hrs oper)	Weighted[a] VOC Emission Factor (g/hr oper)	Weighted[a] NOx Emission Factor (g/hr oper)	Weighted[a] CO Emission Factor (g/hr oper)	Annual VOC Emissions (tons/yr)	Annual NOx Emissions (tons/yr)	Annual CO Emissions (tons/yr)	Daily VOC Emissions (lbs/day)	Daily NOx Emissions (lbs/day)	Daily CO Emissions (lbs/day)
A	288,733	141.4	292.6	1,840.3	45.01	93.15	585.84	365.1	755.5	4,751.5
B	151,634	141.4	292.6	1,840.3	23.64	48.92	307.66	191.7	396.7	2,495.3
C	140,813	141.4	292.6	1,840.3	21.95	45.43	285.71	178.0	368.4	2,317.3
D	259,341	141.4	292.6	1,840.3	40.43	83.66	526.20	327.9	678.6	4,267.8
TOTAL					131.04	271.15	1,705.41	1,062.7	2,199.2	13,831.9

[a]Weighted emission rates were derived using the sum of emissions from all equipment types divided by the combined hours of operation for all equipment types. Table B-5.1 through B-5.4 in Appendix B list the information used in deriving weighted emission rates.

B.13. in Appendix B illustrates the procedure used to estimate equipment counts.

Once the annual emissions were calculated, daily emissions during the ozone season were derived. Use of agriculture equipment was assumed to be insignificant during the mid-November to mid-March time period. The seasonal adjustment factor applied, therefore, was 0.88. The number of days per week of equipment use was assumed to be seven. The resulting estimates were as follows: 0.5 tons VOC per day, 1.1 tons NO_x per day, and 6.9 tons CO per day.

3.5.6.5 Industrial Equipment. This category includes forklifts, portable generators, pumps, mobile refrigeration units, small tractors, wheel-loaders amongst other mobile equipment, all of which have industrial applications. The source of emissions is gasoline and diesel fuel consumption by the internal combustion engines in the equipment.

Overall contribution to the VOC inventory by industrial equipment is less than three tons per day; however, industrial equipment is the second highest source of NO_x emissions in the nonhighway mobile source category at 10 percent (17 tons/day). It is also the third highest CO source, contributing 8 percent (36 tons/day) to the source category total.

Table 3-28 provides a summary of the data for this subcategory: a weighted emission factor, total equipment counts and estimated emissions. The industrial equipment emission factor was developed from individual AP-42 emission factors for heavy-duty equipment using diesel and gasoline and for light-duty equipment using diesel,[62] weighted according to each equipment type's emissions contribution. The AP-42 values appear as hourly emission rates per unit and were multiplied by the estimated hours of operation per unit per year; 600 for heavy-duty, diesel-powered, 300 for heavy-duty, gasoline-powered and 300 for light-duty, diesel-powered. A further adjustment to the AP-42 values for VOC was made to reflect the reactive fraction: 0.856 for diesel engines, and 0.88 (exhaust) and 1.0 (evaporative and crank case) for gasoline engines.[52,62,63]

The most recent equipment count information is 1985 values.[64] Using national industrial employment growth (1980-1985) as an index of growth in equipment usage,[14] 1987 counts were estimated. These 1987 estimates were then

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TABLE 3-28. SUMMARY OF EMISSIONS FROM INDUSTRIAL EQUIPMENT

County	Multiplier (No. of units)	Weighted[a] VOC Emission Factor (Mg/unit)	Weighted[a] NOx Emission Factor (Mg/unit)	Weighted[a] CO Emission Factor (Mg/unit)	Annual VOC Emissions (tons/yr)	Annual NOx Emissions (tons/yr)	Annual CO Emissions (tons/yr)	Daily VOC Emissions (lbs/day)	Daily NOx Emissions (lbs/day)	Daily CO Emissions (lbs/day)
A	9,606	0.039	0.243	0.529	413.05	2,573.60	5,602.62	2,208.0	13,757.5	29,949.5
B	3,828	0.039	0.243	0.529	164.60	1,025.58	2,232.65	879.9	5,482.4	11,934.9
C	5,066	0.039	0.243	0.529	217.83	1,357.26	2,954.70	1,164.4	7,255.4	15,794.7
D	4,846	0.039	0.243	0.529	208.37	1,298.32	2,826.39	1,113.9	6,940.3	15,108.8
TOTAL					1,003.85	6,254.76	13,616.36	5,366.2	33,435.6	72,787.9

[a]Weighted emission rates were derived using the sum of emissions from all equipment types divided by the total number of equipment counts (all types). Tables B-6.1 through B-6.4 in Appendix B list the information used in deriving weighted emission rates.

apportioned to the County using the ratio of 1985 employment, County: United States, in the manufacturing SIC codes. The adjusted emission factors estimates of equipment counts and resulting emissions appear in Appendix B, Section B.14.

No seasonal variations were expected to be associated with industrial equipment use. The daily emissions were calculated using a seasonal adjustment factor of 0.58, 7 days per week of operation.

3.5.6.6 Lawn and Garden Equipment. Motorized lawn and garden equipment include riding and walking lawn mowers, garden tractors, and tillers, all of which have either 2- or 4-stroke internal combustion engines. More recently, equipment such as string-trimmers and leaf-blowers have come into use; these also contribute to the subcategory emissions.

The VOC, NO_x and CO emissions resulting from gasoline consumption by these types of equipment are given in Table 3-29. Lawn and garden equipment produce significantly higher CO emissions than VOC or NO_x, 28 tons CO per day compared to 10 tons VOC and less than one ton NO_x per day. The derivation procedure is provided in Appendix B, Section B.15. Emission factors for 2-stroke and 4-stroke equipment were supplied by AP-42[65] on a per unit basis; these assumed 50 hours of operating time per unit per year. The VOC emission factors were adjusted for the reactive hydrocarbon fraction, 88 percent for exhaust emissions, 100 percent from evaporative emissions.[52] These were taken from the 1980 VOC Species Data Manual because they represent uncontrolled emissions from light-duty vehicles. The weighted emission factor was derived from the total estimated emissions divided by the number of equipment units in use.

Current equipment counts for lawn and garden equipment were not readily available. The most recent estimates were from 1980, reported in Reference 64. These were scaled up using the increase in occupied housing units in the United States (2.03 percent) as a measure of growth in equipment use.

To determine daily emissions during the ozone season, lawn and garden equipment use was limited to the 282 freeze-free days in the Ozoneville MSA. Since this includes the ozone season, the seasonal adjustment factor used was: (217 days in the ozone season ÷ 282 days of equipment use) = 0.76. Furthermore, activity was assumed to occur on any of the seven days per week.

TABLE 3-29. SUMMARY OF EMISSIONS FROM LAWN AND GARDEN EQUIPMENT

County	Multiplier (No. of units)	Weighted VOC Emission Factor (Mg/unit)	Weighted NOx Emission Factor (Mg/unit)	Weighted CO Emission Factor (Mg/unit)	Annual VOC Emissions (tons/yr)	Annual NOx Emissions (tons/yr)	Annual CO Emissions (tons/yr)	Daily VOC Emissions (lbs/day)	Daily NOx Emissions (lbs/day)	Daily CO Emissions (lbs/day)
A	100,314	0.0085	0.0002	0.0225	940.10	22.12	2,488.50	6,585.0	154.9	17,430.9
B	51,906	0.0085	0.0002	0.0225	486.44	11.45	1,287.64	3,407.3	80.2	9,019.4
C	87,042	0.0085	0.0002	0.0225	815.72	19.19	2,159.26	5,713.8	134.4	15,124.7
D	78,582	0.0085	0.0002	0.0225	736.44	17.33	1,949.39	5,158.4	121.4	13,654.7
TOTAL					2,978.69	70.09	7,884.77	20,864.6	490.9	55,229.8

3.5.6.7 Motorcycles. Emissions from motorcycles are addressed both in this chapter (off-highway) and in Chapter 4 (highway). The purpose of this subsection is to specifically account for emissions resulting from off-highway motorcycle use. Emissions are determined using an estimate of the number of off-highway motorcycles combined with an estimate of annual fuel consumption during off-highway use. The total number of motorcycles in each of the MSA counties was determined from State vehicle registration data using the ratio of county population to State population.[67] Using information from the Motorcycle Industry Council,[68] the ORPA estimates that 53 percent of the motorcycles in the Ozoneville MSA are used off-road.

The VOC, NO_x and CO emissions are based on fuel consumption. The EPA guidance on mobile sources indicates that an average of 700 miles is travelled per motorcycle with an associated fuel consumption of 2.35 gallons per 100 miles travelled. Therefore, annual fuel consumption is 16.5 gallons per motorcycle.

The emission factors in Table 3-30 is based on AP-42 values that have units of emissions per mile.[66] Assuming 700 miles of use per year per motorcycle, the emission factor was converted to units of emissions per motorcycle. An additional adjustment to the VOC emission factors was made to account for reactive VOC; the reactive fractions are 0.88 for exhaust emissions and 1.0 for evaporative emissions.[52]

Estimated annual and daily emissions also appear in Table 3-30. Motorcycles contribute less than one ton of VOC and NO_x per day and about 1.1 ton CO per day during the ozone season. In order to estimate ozone season daily emissions, 45 percent of off-road motorcycle use was taken to occur during the ozone season.

3.5.6.8 Railroad Locomotives. Railroad locomotives generally follow one of two use patterns: railyard switching or road-haul service. Locomotives can be classified into five categories on the basis of engine configuration and use pattern: 2-stroke switch locomotives (supercharged), 4-stroke switch locomotives, 2-stroke road service locomotives (supercharged), 2-stroke road service locomotives (turbocharged), and 4-stroke road service locomotives. Railyard and switching operations are characterized by short hauls with

TABLE 3-30. SUMMARY OF EMISSIONS FROM MOTORCYCLES

County	Multiplier[a] (No. of units)	VOC Emission Factor (Mg/unit)	NOx Emission Factor (Mg/unit)	CO Emission Factor (Mg/unit)	Annual VOC Emissions (tons/yr)	Annual NOx Emissions (tons/yr)	Annual CO Emissions (tons/yr)	Daily VOC Emissions (lbs/day)	Daily NOx Emissions (lbs/day)	Daily CO Emissions (lbs/day)
A	6,502	0.0039	0.0004	0.017	27.96	2.87	121.87	177.8	18.2	775.0
B	3,859	0.0039	0.0004	0.017	16.59	1.70	72.33	105.5	10.8	460.0
C	4,007	0.0039	0.0004	0.017	17.23	1.77	75.10	109.6	11.2	477.6
D	4,771	0.0039	0.0004	0.017	20.51	2.10	89.42	130.5	13.4	568.7
TOTAL					82.30	8.44	358.72	523.4	53.7	2,281.3

[a]Number of motorcycles used off-road, based on 53% of the motorcycle population.

several stops, starts, and accelerations. Road-haul service usually transports over longer distances at relatively constant speeds.

Emissions result from fuel combustion which produces VOC, NO_x and CO. Table 3-31 presents average emission factors that are based on the quantity of fuel used. These factors were provided by AP-42 and have been modified to reflect the reactive VOC fraction of emissions, 98 percent, based on the VOC Species Profile for diesel-powered engines.[55] Fuel use, also shown, was derived from the 1985 NEDS Fuel Summary Report.[37] Updating the 1985 figure to 1987 was based on the annual increase in fuel use calculated from 1983 and 1985 data, 1.5 percent per year. As discussed before, data by County have not yet been compiled; therefore apportionment is based on the 1983 report. The County consumption calculations appear in Appendix B, B.16.

Resulting annual and daily emissions appear in Table 3-31. Emissions from railroad locomotives in the MSA were estimated at 1.2 tons VOC per day, 5.0 tons NO_x per day, and 1.7 tons CO per day. The daily emission estimates were derived from the annual totals assuming no seasonal variation in railroad activity and full-time operation of the locomotives.

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TABLE 3-31. SUMMARY OF EMISSIONS FROM RAILROAD LOCOMOTIVES

County	Multiplier (10x3 gal)	VOC Emission Factor (tons/10x3gal)	NOx Emission Factor (tons/10x3gal)	CO Emission Factor (tons/10x3gal)	Annual VOC Emissions (tons/yr)	Annual NOx Emissions (tons/yr)	Annual CO Emissions (tons/yr)	Daily VOC Emissions (lbs/day)	Daily NOx Emissions (lbs/day)	Daily CO Emissions (lbs/day)
A	2,930	0.046	0.185	0.065	134.78	542.05	190.45	720.5	2,897.6	1,018.1
B	2,350	0.046	0.185	0.065	108.10	434.75	152.75	577.9	2,324.0	816.5
C	2,133	0.046	0.185	0.065	98.12	394.61	138.65	524.5	2,109.4	741.1
D	2,655	0.046	0.185	0.065	122.13	491.18	172.58	652.9	2,625.6	922.5
TOTAL					463.13	1,862.59	654.43	2,475.8	9,956.6	3,498.2

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4.0 HIGHWAY VEHICLES

The Ozoneville MSA highway vehicle emissions inventory for reactive volatile organic compounds (VOC), oxides of nitrogen (NO_x), and carbon monoxide (CO) is presented in this section. The inventory addresses highway vehicles using gasoline and diesel fuels (e.g., cars, light-duty trucks, heavy-duty trucks, motorcycles). The emission estimates in the inventory are for a typical weekday during the summer ozone season.

Guidance for the preparation of the highway vehicle portion of the inventory was provided by the following references.[1-3]

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Demographic and employment data used in the travel modeling process were presented in Section 1.0. The transportation models used to generate vehicle miles traveled (VMT) were run by the Ozoneville Regional Planning Authority (ORPA), with technical assistance provided by the Ozoneville Department of Transportation (ODOT). The lead/technical person from ODOT and the person to whom questions should be addressed is Jim Summer (phone 111-987-6543). Supplementary traffic data were supplied by various other State and local agencies. Emission factors for highway vehicle classes were obtained from EPA's recently released MOBILE4 model. All MOBILE4 runs were made by the ODOT. The ORPA contact directly responsible for the preparation of the highway vehicles portion of the inventory and the person to whom all questions should be addressed is Ms. Mary Brown (111-123-5500).

The highway vehicles inventory discussion is divided into four primary sections. The first section, Section 4.1, addresses the highway configuration in the Ozoneville MSA and the generation of VMT estimates. Section 4.2 describes how emission factors were generated by MOBILE4 and how those were used to develop the emissions inventory. The third major section, Section 4.3, summarizes the quality assurance (QA) procedures employed on the overall highway vehicles inventory process and data. References for Section 4.0 are given in Section 4.4.

4.1 TRAVEL ESTIMATION PROCESS

4.1.1 Overview

The ORPA is the responsible agency for preparing the highway vehicle emissions estimates. The emissions estimates were generated by multiplying MOBILE4 emission factors by 1987 VMT estimates for the Ozoneville MSA. This section focuses on how ORPA developed the VMT estimates used in the inventory. The method used to generate VMT estimates was a Federal Highway Administration (FHA) model known as the Urban Transportation Planning System (UTPS) model. The UTPS model was used for the generation of VMT in all four counties (County A, County B, County C, and County D) of the Ozoneville MSA. Since the population of each county in the MSA is greater than 50,000, all were treated as urban areas. The EPA guidance in Reference 2 indicates that rural areas are defined by populations of 50,000 people or less and that non-modeling techniques may be used to generate VMT estimates for rural areas.

The UTPS model used for the Ozoneville analysis consists of four sub-models that simulate typical summer daytime traffic in all four MSA counties. The sub-models address: 1) trip generation; 2) trip distribution; 3) mode choice; and 4) traffic assignment. For Ozoneville, the four sub-models of the UTPS model were calibrated using data from a 1985 home interview survey on vehicle use and driving habits conducted jointly by ORPA and ODOT. The predictions of the modeling process were validated using ODOT traffic count data for 1987. The ORPA actually ran the UTPS model, but significant technical input was received from the ODOT.

One of the most significant inputs of the ODOT was the specification of the transportation or highway planning network for the Ozoneville MSA. The transportation planning network includes expressways and interstates, major and minor arterial roads, some collector/distributor streets, and selected local streets. The ODOT had previously defined a network for basic regional transportation planning purposes; the same network was applied to the highway vehicle emissions inventory task. In the case of the Ozoneville MSA, all geographic parts of the MSA are included in the ODOT transportation planning area. However, not every road is a part of the network. As stated above, the network is designed to represent the roads with the greatest traffic volumes. Minor local streets (e.g., neighborhood streets) are not likely to be in the network; however, VMT estimates were prepared for them. The major roads in the Ozoneville MSA network are shown in Figure 4-1.

The ODOT has the network divided into zones of varying sizes. The denser the road configuration and population, the smaller the zone size. Within the detailed scale of a zone, individual roads are separated into links by natural divisions such as intersections, zone boundaries, rivers, etc. Each link is characterized by such parameters as the average daily traffic level, typical operating speed, vehicle capacity, lane width, parking restrictions, etc. In running the UTPS model, Ozoneville MSA-specific data on the network and individual links were used whenever possible. When required data were not available, model defaults were used.

A detailed description of the entire network was judged by ORPA and ODOT to be too cumbersome and unnecessary for the purpose of this document. However, a detailed copy of the entire network by zone, all supporting documentation (such as the 1985 home interview survey and traffic count data), and all computer programs, data input and output files are maintained by Jim Summer of ODOT. If necessary, these supporting data will be duplicated and made available to the reviewing agency.

Section 4.1.2 contains a discussion of how the UTPS models were run by the ORPA to determine VMT for the Ozoneville MSA, a description of the methodology used to assess roads not in the planning network, and summary tables containing the results of the UTPS model runs.

4.1.2 Ozoneville MSA VMT Determination

4.1.2.1 Trip Generation Model. The trip generation model of the UTPS was used to estimate the number of person trips for home-based work (HBW), home-based non-work (HBNW), and non-home-based (NHB) trip purposes and to predict vehicle trips for trucks and taxis. Input variables to the model include population, number of households, and number of employees overlain with the structure of the highway network. The population and demographic data used in the analysis were previously presented in Section 1.0. The trip generation total was predicted using a cross classification model based on the 1985 home interview survey, scaled up according to population to account for the slightly increased size of the study area since 1985. The updates were made by applying ratios based on the population increases created by the expanded area. The number of trips was scaled up according to the corresponding increase in people. The total forecasted number of daily vehicle trips in the Ozoneville MSA in the base year is summarized in Table 4-1.

4.1.2.2 Trip Distribution Model. A production constrained gravity model was used to distribute estimated vehicle trips (Table 4-1) across the transportation network. This model is stratified by trip purpose and distributes truck and taxi trips using impedances set equal to the network travel times. For the other trip purposes, the impedance was a more complicated function of both auto and transit travel times. To develop the impedance for these trip purposes, the highway travel time was multiplied by a factor of 0.75 to account for the impact that a low transit travel time (as compared to highway travel time) has on trip distribution.

4.1.2.3 Mode Choice Model. A probit modal split model, calibrated from the 1985 home survey data, was used for the travel mode choice analysis. This model was stratified by three trip purposes, two transit service types, and two auto ownership categories. Time and cost for transit and highway trips were used as input variables. The mode choice model allocated person trips for each of the trip purposes (HBW, HBNW and NHB) into two modes--auto and transit. The auto trips were then subdivided into drivers and passengers using an auto occupancy model. This modeling exercise was also based on 1985 home interview data and is stratified by trip purposes. Non-home-based trips were assumed to have a constant occupancy of 1.34, while occupancies for the other purposes were assumed to be functions of highway travel time. The occupancy level was based on data from the 1985 home interview survey.

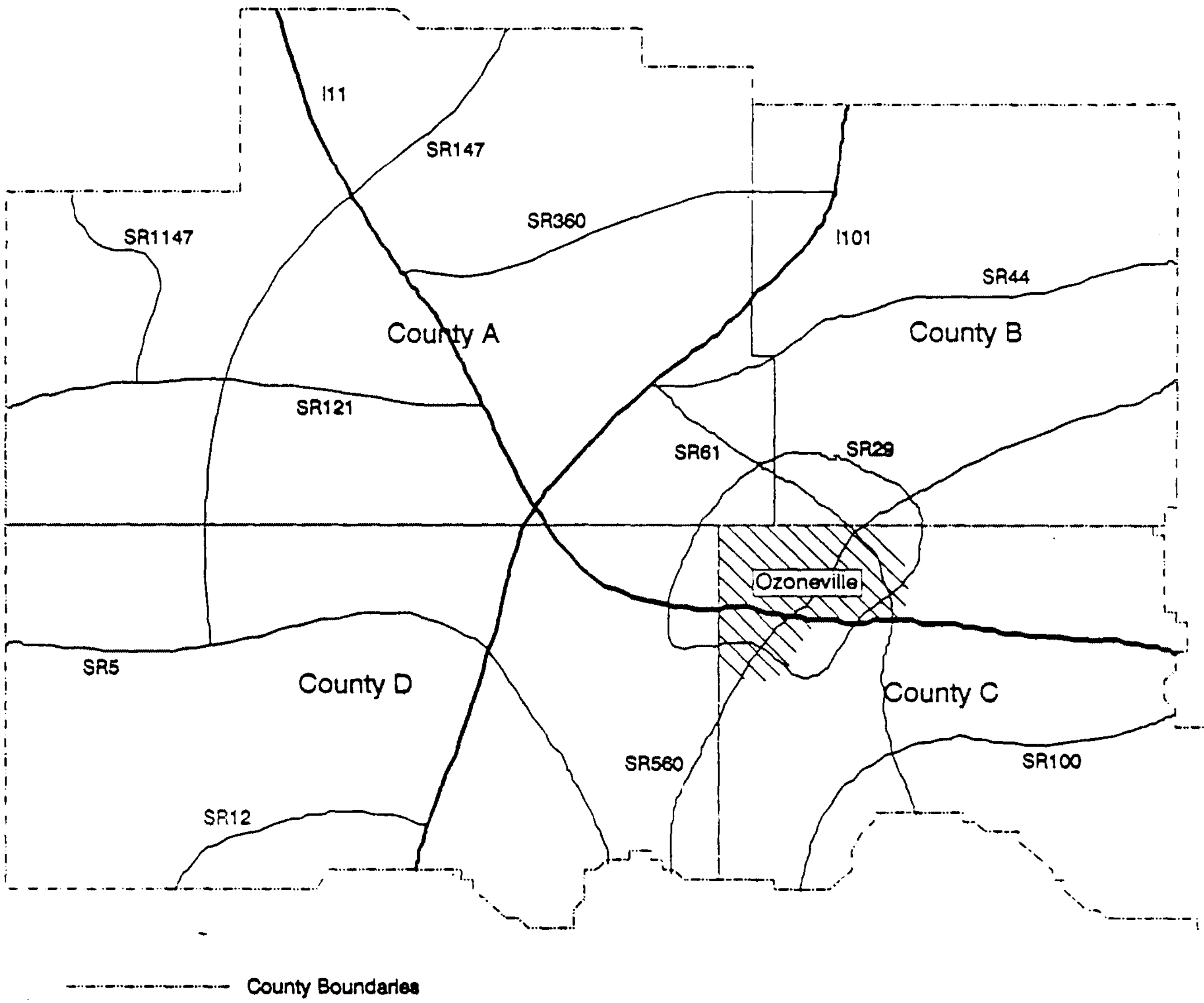

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Figure 4-1. Overview of the Major Roads in the Ozoneville MSA Transportation Planning Area Network

TABLE 4-1. TOTAL FORECASTED DAILY VEHICLE TRIPS IN OZONEVILLE MSA

County	Number of Trips by Type	
	Auto	Truck
County A	1,151,664	127,645
County B	625,869	70,425
County C	1,369,111	154,053
County D	765,129	88,031
TOTAL	3,911,773	440,154

Finally, the transit trips were subdivided into the two submodes (i.e., bus and commuter rail) based on the assumption that all travelers will use the shortest-time transit path to reach their destination. Trip tables were produced for the base year according to trip purpose and mode.

4.1.2.4 Traffic Assignment Model. An iterative, capacity-restraint technique was used to effectively load the forecasted number of vehicle trips onto the Ozoneville MSA highway network. Specifically, vehicle trips were loaded onto network links. Trips were loaded onto the network using an all-or-nothing assignment technique. Travel times were readjusted on each link using volume to capacity relationships and then the trips were re-loaded onto the revised network. This process was repeated three times. The results from each iteration were then averaged to produce a single set of link traffic volumes. The loadings were combined with speed estimates and link distances to yield VMT levels for each link (or equivalently road type) in the network. The speed estimates used were taken from an Ozoneville MSA-specific study conducted in 1985 by the ODOT. This study, Freeway and Arterial Operating Speeds,[4] related speed for all vehicle types to link volume, capacity, legal speed limits, and link traffic signal density. Copies of this study are included with the inventory submittal. These same speeds were input to MOBILE4 for emission factor generation purposes thus ensuring consistency between the travel estimation process and the emissions estimation process. The vehicle speeds used are summarized in Table 4-2 by highway type.

The summer ozone season daily VMT estimates determined for the Ozoneville MSA are shown in Table 4-3 by road type. The Table 4-3 estimates were stratified by eight vehicle classes using the national average VMT mix values in MOBILE4 for the base year to yield VMT estimates by vehicle class. The vehicle class VMT estimates are given in Table 4-4. The values reported in Tables 4-3 and 4-4 were used to calculate base year highway vehicle emissions for the Ozoneville MSA.

4.1.3 Quality Assurance of the Ozoneville MSA VMT Estimates

The ORPA has documented and assured the quality of the VMT estimates to the extent possible using the general guidelines expressed in the following reports:

TABLE 4-2. AVERAGE DAILY VEHICLE OPERATING SPEEDS BY HIGHWAY CLASSIFICATION

Highway Classification	Average Operating Speed (miles/hr)
Interstate/Freeway/Expressway	45
Major Arterial	32
Minor Arterial	22
Collector	22
Local	20
Average Daily Speed	28.2

Source: ODOT, Freeway and Arterial Operating Speeds.

TABLE 4-3. OZONEVILLE MSA DAILY VMT BY COUNTY AND ROAD TYPE[a]

Road Type	County A VMT	County B VMT	County C VMT	County D VMT	Grand Totals
Interstate/Freeway/ Expressway	1,027,384	558,329	1,221,366	697,961	3,489,640
Major Arterial	2,935,383	1,595,226	3,489,617	1,994,174	9,970,400
Minor Arterial	1,541,076	837,494	1,832,049	1,046,941	5,234,560
Collector	733,845	398,806	872,404	498,543	2,492,599
Local	1,100,769	598,211	1,308,606	747,816	3,738,901
TOTAL	7,338,457	3,988,066	8,724,042	4,985,435	24,926,000

[a]Numbers represent VMT for a typical summer weekday.

TABLE 4-4. OZONEVILLE MSA DAILY VMT BY COUNTY AND VEHICLE CLASS

Vehicle Class[a]	VMT Mix Percentage[b]	County A VMT	County B VMT	County C VMT	County D VMT	Grand Totals
LDGV	70.8	5,195,628	2,823,551	6,176,622	3,529,688	17,725,489
LDGT1	12.8	939,322	510,472	1,116,677	638,136	3,204,607
LDGT2	8.6	631,107	342,974	750,268	428,747	2,153,096
HDGV	1.5	110,077	59,821	130,861	74,782	375,541
LDDV	1.3	95,400	51,849	113,413	64,811	325,473
LDDT	0.4	29,354	15,952	34,896	19,942	100,144
HDDV	3.6	264,184	143,570	314,067	179,476	901,297
MC	1.0	73,385	39,877	87,238	49,854	250,354
TOTAL	100	7,338,457	3,988,066	8,724,042	4,985,435	24,926,000

[a]LDGV = light-duty gasoline vehicle
LDGT1 = light-duty gasoline trucks up to 6000 lbs gross vehicle weight
LDGT2 = light-duty gasoline trucks from 6001-8500 lbs gross vehicle weight
HDGV = heavy-duty gasoline vehicle over 8500 lbs gross vehicle weight
LDDV = light-duty diesel vehicle
LDDT = light-duty diesel truck (0-8500 lbs gross vehicle weight)
HDDV = heavy-duty diesel vehicle (over 8500 lbs gross vehicle weight)
MC = motorcycles
[b]Obtained from MOBILE4 national average values

Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources. EPA 405/4-81-926d (Revised) July 1989;[2] and

Quality Assurance Program for Post-1987 Ozone and Carbon Monoxide State Implementation Plan Emission Inventories (EPA-450/4-89-004) February 1989.[4]

General completeness and accuracy checks were performed by having independent doublechecking of all UTPS model inputs and data entry procedures. The information to be entered into the models was checked against a master data file by independent reviewers. Once entered, the data in the model were validated for accuracy by having two independent reviewers check all entries. All data entry errors were corrected and the model inputs re-checked to ensure the proper corrections were made.

The reasonableness of the VMT estimates produced by the UTPS link-based modeling approach described in Section 4.1.2 was primarily validated using ground counts made by the ODOT. Ground counts made in 1984 and 1986 for several screenlines across the highway network were compared to the simulated values produced by the models for 1987. The results of this comparison showed that the estimated error was within 10 percent for 9 of the 12 screenlines and that the total simulated traffic crossing all screenlines overestimated the observed traffic by 3 percent. These comparisons are shown in Table 4-5. Since EPA guidance states that assigned-to-measured volume closure to within 10 percent is acceptable,[2] the traffic assignments simulated by the ORPA UTPS modeling and the resulting VMT estimates were judged to be reasonable and valid for the purposes of the inventory.

An additional QA check was made by comparing 1986 observed crossings of the Flood River Cordon line to model simulated crossings of this cordon. The results show that the maximum error for the various segments of the cordon was 13 percent, while the error for the entire cordon was 5 percent. Finally, 1987 simulated and observed transit patronage (by submode) was compared (see Table 4-6). Although the simulation models underestimated commuter rail travel by 15 percent, total transit patronage was estimated to within about 1 percent.

TABLE 4-5. SUMMARY OF UTPS MODEL TRAFFIC ASSIGNMENT VALIDATION

Screenline	ODOT[a] Ground Count	UTPS Traffic[b] Model Assignment	Ratio of Assignment/Ground Count
A	348,088	354,451	1.02
B	191,127	200,525	1.05
C	395,446	439,049	1.11
D	228,271	260,778	1.14
E	223,546	208,984	0.93
F	137,507	131,057	0.96
G	55,846	43,655	0.78
H	162,410	156,854	0.97
I	57,455	56,181	0.98
J	84,319	82,810	0.98
K	152,648	164,541	1.08
L	227,482	224,662	0.99
TOTAL	2,264,145	2,323,547	1.03

[a]ODOT = Ozoneville Department of Transportation
[b]UTPS = Urban Transportaiton Planning System

TABLE 4-6. QA COMPARISON CHECK OF 1987 PASSENGER COUNTS TO MODEL-ASSIGNED VOLUMES FOR OZONEVILLE MSA TRANSIT PATRONAGE

Transit Submode	1987 Passenger Counts	1987 Assigned Volumes	Differences (Percentages)
Commuter Rail	3,600	3,060	15
Bus	548,400	543,420	- 0.9
Total	552,000	546,480	1

4.2 EMISSIONS ESTIMATION PROCESS

4.2.1 Overview of Highway Vehicle Emissions Estimates

Highway vehicle emission estimates for the Ozoneville MSA were calculated using the VMT estimates presented in Section 4.1 and EPA's mobile source emission factor model MOBILE4. The emission factors produced by MOBILE4 in grams/mile (g/mile) were multiplied by the VMT estimates to generate total emissions. Emission estimates were calculated for VOC, NO_x, and CO. Estimates of VOC emissions were made for vehicle exhaust, evaporative, and running losses. The only sources of NO_x and CO emissions were vehicle exhaust emissions. The base year of all highway vehicle emission estimates is 1987. The agencies principally involved in producing the highway vehicle emission estimates were the ODOT and the ORPA. All MOBILE4 runs were made by the ODOT. The overall contact for all MOBILE4 highway vehicle emissions estimates is Mr. Jim Summer (111-987-6543).

The inputs used to run the MOBILE4 model are described and presented in Section 4.2.2. The emission factors generated by MOBILE4 are presented in Section 4.2.3. The combination of the MOBILE4 emission factors with VMT estimates to yield Ozoneville MSA highway vehicle emissions estimates is described in Section 4.2.4. Emissions are summarized in tabular form by county, road type, and vehicle class.

The approaches and procedures used to assure the quality of the vehicle emissions estimates are discussed in Section 4.3. References for this section are listed in Section 4.4.

4.2.2 Inputs to MOBILE4

The chief inputs to MOBILE4 can be grouped into two categories: one-time data and scenario-specific data. As the name implies, one-time data were established for the Ozoneville MSA analysis and not changed. Scenario-specific data can be varied to reflect a variable set of local conditions. The values used for each grouping in the Ozoneville MSA analysis are presented below and justified.

4.2.2.1 One-time Data. Eleven separate parameters fall into the one-time data grouping. The values used for these parameters reflect a combination of Ozoneville MSA-specific values and MOBILE4 default values. Each is described below.

Tampering Rates - Vehicle tampering rates supplied in MOBILE4 were used in this analysis; therefore, in the "control" section of MOBILE4 TAMFLG was set equal to 1. Ozoneville MSA-specific values were not available.

VMT Mix by Vehicle Type - This parameter specified the fraction of total highway VMT that is accumulated by each of eight vehicle classes. For the purposes of the Ozoneville MSA work, the national average VMT mix values in MOBILE4 were used (i.e., VMFLAG=1). The Ozoneville area was judged to be typical of the urban areas on which the national data were based.

Annual Mileage Accumulation Rates Based on the guidance in the MOBILE4 User's Guide, mileage accumulation rates included in MOBILE4 were used for this analysis. The control parameter MYMRFG was set equal to 1 indicating that both MOBILE4 mileage accumulation rates and registration distributions were used. As a quick check, Ozoneville MSA vehicle registrations were determined for light-duty gasoline vehicles and light-duty diesel vehicles. For these vehicle classes across all vehicle age groups, the Ozoneville MSA-specific values varied less than 5 percent on average from the MOBILE4 values. This check reinforced the use of the MOBILE4 defaults.

Basic Emission Rates - The basic vehicle emission rates contained in MOBILE4 were used for Ozoneville. The User's Guide specifies that alternative rates are not to be used without prior EPA approval. The ORPA did not have any alternative rates and felt the MOBILE4 values were appropriate for the MSA.

Inspection and Maintenance (I&M) Program - This parameter requires the specification of whether or not the area has an I&M program and if so what its components are. The Ozoneville MSA has an I&M program in operation in all four counties of the MSA. The effects of this program were factored into the MOBILE4 analysis. MOBILE4 requires that the I&M program in effect be characterized by the following parameters.

- Program start year (calendar year that program begins)
- Stringency level (percent)
- First (earliest) and last (latest) model years of vehicles subject to the requirements of the program
- Waiver rates (percent of failed vehicles; one rate applicable to pre-model year 1981 vehicles and one applicable to 1981 and later model year vehicles)
- Compliance rate (percent)
- Program type (centralized; decentralized and computerized; or decentralized and manual)
- Frequency of inspection (annual or biennial) whether or not each of four possible vehicle types (LDGV, LDGT1, LDGT2, HDGV) are covered by the program
- Test type (idle, 2500/idle, loaded/idle)

The values used for each of these parameters for Ozoneville MSA MOBILE4 analysis are listed below.

Start year (January 1):	1982
Pre-1981 MYR stringency rate:	10%
First model year covered:	1975
Last model year covered:	2020
Waiver rate (pre-1981):	10%
Waiver rate (1981 and newer):	10%
Compliance Rate:	90%
Inspection type:	Computerized, decentralized
Inspection frequency	Annual
Vehicle types covered:	LDGV - Yes
	LDGT1 - Yes
	LDGT2 - Yes
	HDGV - Yes
1981 & later MYR test type:	Idle

Anti-tampering Program - An anti-tampering program is in effect in Ozoneville MSA counties and this program was factored into the MOBILE4 run. Like the I&M component, several local parameters must be specified. These are listed below:

- Start year (calendar year in which the program begins)
- First (earliest) and last (most recent) model years of vehicles subject to the program
- Whether or not each of four possible vehicle types (LDGV, LDGT1, LDGT2, HDGV) are covered by the program
- Program type (centralized or decentralized)
- Frequency of inspection (annual or biennial)
- Compliance rate (percent)
- Inspections performed (air system, catalyst, fuel inlet restrictor, tailpipe lead deposit test, EGR system, evaporative system, PCV, gas cap)

The Ozoneville MSA values for these parameters are summarized as follows:

Start year (January 1):	1982
First model year covered:	1975
Last model year covered:	2020
Vehicle types covered:	LDGV, LDGT1, LDGT2, HDGV
Type:	Decentralized
Frequency:	Annual
Compliance rate:	90.0%
Inspections performed:	
Air pump system disablement:	Yes
Catalyst removals:	Yes
Fuel inlet restrictor disablement:	Yes
Tailpipe lead deposit test:	No
EGR disablement:	No
Evaporative system disablement:	Yes
PCV system disablement:	Yes
Missing gas caps:	No

Refueling Emissions - Refueling emissions for the Ozoneville MSA were not evaluated using MOBILE4. Instead, they were handled as area sources under the gasoline marketing/distribution area sources category in Section 3. For this reason the refueling emissions control in MOBILE4, RLFLAG, was set equal to: 5-account for refueling emissions elsewhere in the inventory.

ASTM Volatility Class - The ASTM volatility class for the Ozoneville MSA is C.

Minimum and Maximum Daily Temperature - Data on minimum and maximum daily temperatures for the Ozoneville MSA were collected from the National Climatological Data Center for the three-year design period. An average was taken of the minimum and maximum values that occurred on the 10 days in which the highest ozone concentrations were observed over the three-year design period. These minimum and maximum averages are:

minimum daily temperature - 71°F
maximum daily temperature - 95°F.

Base Reid Vapor Pressure (RVP) - The base year RVP for the Ozoneville MSA was determined from a publication by the National Institute for Petroleum and Energy Research (NIPER).[6] The NIPER publication indicated that the average RVP for summertime gasolines in this part of the country is 10.8. 10.8 was used as the base year RVP for all Ozoneville MOBILE4 runs.

In-use RVP/Start Year - This feature of MOBILE4 allows the effect of a fuel volatility control program on emissions to be modeled over time. Since this document addresses base year emissions only, this feature of MOBILE4 will not be used. The default values to exclude the analysis of fuel volatility control effects require the specification of in-use RVP to be the same as base RVP (10.8) and the start year as 2020.

4.2.2.2 Scenario-specific Data. This part of MOBILE4 allows the specification of data for several parameters that can be varied to evaluate many different mobile source emission scenarios. These parameters are defined as follows:

- Region (low or high altitude)

  Calendar Year (of the estimates)

  Speed (specify average speed for each vehicle class)

- Ambient Temperature (average during ozone season)

- Operating Modes (percent hot-start, cold-start, stabilized start)

- Additional Correction Factors for LDGVs and LDGTs (account for air conditioning usage, extra loading, trailer towing, and humidity)

The values of these parameters used for the Ozoneville MSA emissions inventory are summarized below.

Region This parameter requires the specification of the geographic area in terms of altitude. Ozoneville was characterized as low altitude for the purposes of the MOBILE4 analysis.

Calendar Year - The base calendar year for the analysis was 1987.

Speed - A single speed was assumed for all vehicle classes. The speed was derived from the ODOT study Freeway and Arterial Operating Speeds.[5] The average speed determined from this study for all road types of 28.2 miles per hour was applied to each of the eight vehicle classes in MOBILE4.

Ambient Temperature - The mean ambient daytime temperature was determined from National Climatological Data Center information for 1987 and 1986. The mean daytime temperatures for days in these years on which ozone standard exceedances occurred were averaged to yield a single ambient temperature. The temperature used for all MOBILE4 purposes was 89.5°F.

Operating Modes - Ozoneville MSA-specific data on operating modes were not available. Therefore, as strongly recommended in the MOBILE4 User's Guide, MOBILE4 operating mode default values were used for all Ozoneville MSA analyses. The three principal values that must be expressed are percent cold-start/non-catalyst VMT (PCCN), percent cold-start/catalyst VMT (PCCC), and percent hot-start/catalyst VMT (PCHC). The MOBILE4 default values used for these parameters are:

PCCN - 20.6%
PCCC - 20.6%
PCHC - 27.3%

The other relevant operating mode conditions of stabilized-start/catalyst VMT, stabilized-start/non-catalyst VMT, and hot-start/non-catalyst VMT are derived internally by MOBILE4 using PCCN, PCCC, and PCHC.

Additional Correction Factors - MOBILE4 provides the user the opportunity to provide additional minor corrections to the emission factors for light-duty gas vehicles and gas trucks (LDGVs, LDGT1s, and LDGT2s). Exhaust emission factors can be adjusted to account for air conditioning usage, extra loading, and trailer towing. There is also a humidity correction factor that can be applied to NO_x exhaust emissions only. The humidity factor can be applied for motorcycles as well as LDGVs and LDGTs.

Based on the guidance in the MOBILE4 User's Guide, no additional correction factors were used in the Ozoneville MSA MOBILE4 analysis. The guidance indicated that such corrections are rarely necessary and many of the assumptions underlying the corrections have not been updated since the release of MOBILE2. For these reasons, they were not applied to the Ozoneville analysis.

4.2.3 Outputs from MOBILE4

The input structure described in Section 4.2.2 was put into MOBILE4 for the Ozoneville MSA by the ODOT. The emission factors generated by MOBILE4 for the Ozoneville MSA situation in the base year 1987 are presented in Table 4-7. The complete MOBILE4 output run for the base year modeled is shown in Table 4-8.

4.2.4 Summary of Highway Vehicle Emissions

Highway vehicle emission estimates were calculated by multiplying the MOBILE4-generated emission factors (Table 4-7) by the VMT data in Table 4-4.

TABLE 4-7. EMISSION FACTORS GENERATED BY MOBILE4 FOR OZONEVILLE MSA BASE YEAR HIGHWAY VEHICLE INVENTORY

Vehicle Type[a]		Composite Emission Factors (grams/mile)				
	No-Mth HC[b]	Exhst HC[c]	Evap HC[d]	Running HC[e]	Exhst CO[f]	Exhst NOx[g]
LDGV	5.42	2.06	1.58	1.78	29.78	1.61
LDGT1	4.85	2.65	1.05	1.15	36.02	1.95
LDGT2	5.73	2.89	1.66	1.18	35.79	2.10
LDGT	5.21	2.74	1.30	1.16	35.93	2.01
HDGV	11.05	4.42	3.93	2.70	97.81	5.22
LDDV	0.62	0.62	NE[h]	NE	1.59	1.56
LDDT	0.80	0.80	NE	NE	1.77	1.78
HDDV	2.80	2.80	NE	NE	12.94	19.71
MC	6.45	2.78	3.66	NE	26.55	0.73
All Vehicles	5.29	2.26	1.49	1.55	31.02	2.40

[a]LDGV = light-duty gasoline vehicle
LDGT1 = light-duty gasoline trucks up to 6000 lbs gross vehicle weight
LDGT2 = light-duty gasoline trucks from 6001-8500 lbs gross vehicle weight
HDGV = heavy-duty gasoline vehicle over 8500 lbs gross vehicle weight
LDDV = light-duty diesel vehicle
LDDT = light-duty diesel truck (0-8500 lbs gross vehicle weight)
HDDV = heavy-duty diesel vehicle (over 8500 lbs gross vehicle weight)
MC = motorcycles
[b]No-Mth HC = Non-methane hydrocaron emissions. No-Mth HC = Exhst HC + Evap HC + Running HC
[c]Exhst HC = Exhaust hydrocarbon emissions
[d]Evap HC = Evaporative hydrocarbon emissions
[e]Running HC = Running loss hydrocarbon emissions
[f]Exhst CO = Exhaust carbon monoxide emissions
[g]Exhst NO_x = Exhaust nitrogen oxides emissions
[h]NE = Not evaluated in MOBILE4

TABLE 4-8. COMPLETE MOBILE4 OUTPUT FOR THE OZONEVILLE MSA

1987 Ozoneville/RVP 10.8/Speed 19.6/With Current I/M Prog

I/M program selected:

Start year (January 1):	1982
Pre-1981 MYR stringency rate:	10%
First model year covered:	1975
Last model year covered:	2020
Waiver rate (pre-1981)	10%
Waiver rate (1981 and newer):	10%
Compliance Rate:	90%
Inspection type:	Computerized, decentralized
Inspection frequency:	Annual
Vehicle types covered:	LDGV Yes LDGT1 - Yes LDGT2 - Yes HDGV - Yes
1981 & later MYR test type:	Idle

Anti-tampering program selected:

Start year (January 1):	1982
First model year covered:	1975
Last model year covered:	2020
Vehicle types covered:	LDGV, LDGT1, LDGT2, HDGV
Type:	Decentralized
Frequency:	Annual
Compliance Rate:	90.0%
Air pump system disablements:	Yes
Catalyst removals:	Yes
Fuel inlet restrictor disablements:	Yes
Tailpipe lead deposit test:	No
EGR disablement:	No
Evaporative system disablements:	Yes
PCV system disablements:	Yes
Missing gas caps:	No

Ozoneville, USA ASTM Class: C
Minimum Temp: 71°(F) Maximum Temp: 95° (F)
Base RVP: 10.8 In-use (IU) RVP: 10.8 IU 1st Yr: 2020

Non-methane HC emission factors include evaporative HC emission factors

Cal. Year: 1987 Region: Low Altitude: 500. Ft.
I/M Program: Yes Ambient Temp: 89.5/ 89.5/ 89.5 F
Anti-tam. Program: Yes Operating Mode: 20.6/ 27.3/ 20.6

Veh. Type Veh:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh		
Veh.Spd:	28.2	28.2	28.2	28.2			28.2	28.2	28.2	28.2	28.2	28.2
VMT Mix:		.708	.128	.086		.015	.013	.004	.036	.010		
Composite Emission Factors (GM/Mile)												
No-Mth HC:	5.42	4.85	5.73	5.21	11.05	.62	.80	2.80	6.45	5.29		
Exhst HC:	2.06	2.65	2.89	2.74	4.42	.62	.80	2.80	2.78	2.26		
Evap HC:	1.58	1.05	1.66	1.30	3.93				3.66	1.49		
Runing HC:	1.78	1.15	1.18	1.16	2.70					1.55		
Exhst CO:	29.78	36.02	35.79	35.93	97.81	1.59	1.77	12.94	26.55	31.02		
Exhst NOx:	1.61	1.95	2.10	2.01	5.22	1.56	1.78	19.71	.73	2.40		

Total VOC, NO_x, and CO highway vehicle emissions by county are listed in Table 4-9. Ozoneville MSA highway vehicle emissions by vehicle class are provided in Tables 4-10, 4-11, and 4-12 respectively for VOC, CO, and NO_x. A similar presentation of emissions data is given in Tables 4-13, 4-14, and 4-15 for emissions expressed as a function of roadway type. The roadway type emissions distribution was keyed off the daily VMT presented in Table 4-3.

4.3 QUALITY ASSURANCE PROCESS

The quality assurance (QA) process performed on the highway vehicle emission estimates included accuracy, completeness, and reasonability checks. For accuracy and completeness, a system was used that included a two-layer, independent reviewer set-up. All hard copy and computer-based data entries were reviewed independently for accuracy and completeness by two different people. All calculations procedures were similarly reviewed. Any errors were brought to the attention of the ODOT inventory coordinator. Once corrected, the changes were re-checked by the reviewers. The entire highway vehicle emissions inventory was reviewed by ODOT and ORPA members that did not directly participate in its development. All comments were addressed to the satisfaction of the ODOT and ORPA mobile sources inventory coordinators.

The reasonability of the highway vehicle emissions inventory was evaluated using guidelines published in the EPA document Guidelines for the Review of Emissions Inventories for Highway Emissions (EPA-440/12-80-002).[1] This document provided values and comparison parameters that could be compared against the Ozoneville MSA inventory to gauge the overall reasonability of the emissions inventory. The specific parameters evaluated are summarized in Table 4-16. As shown in the table, the Ozoneville values were predominantly well within the tolerance ranges for reasonability. The traffic count programs summarized in Section 4.1.3 reinforce the reasonability of the VMT estimates. The combination of these values with the MOBILE4-generated emission factors indicates that the Ozoneville MSA highway vehicle emissions estimated in Table 4-9 are reasonable for an area with the demographics stated in Section 1.

TABLE 4-9. OZONEVILLE MSA VOC, NO_x, AND CO EMISSIONS FROM HIGHWAY VEHICLES

County	Ozoneville MSA Emissions (tons/day)[a]		
	VOC	CO	NO_x
A	42.8	250.7	19.4
B	23.3	136.3	10.5
C	50.9	298.1	23.0
D	29.1	170.4	13.1
Total for the MSA	146.1	855.5	66.0

[a]Emissions are for the base year 1987. They represent daily emission estimates during the summer ozone season.

TABLE 4-10. SUMMARY OF OZONEVILLE MSA HIGHWAY VEHICLE VOC EMISSIONS BY VEHICLE CLASS

	Ozoneville MSA Emissions (tons/day)[a]				
Vehicle Class	County A	County B	County C	County D	Total MSA
LDGV	31.0	16.9	36.9	21.1	105.9
LDGT1	5.0	2.7	6.0	3.4	17.1
LDGT2	4.0	2.2	4.7	2.7	13.6
HDGV	1.3	0.7	1.6	0.9	4.6
LDDV	0.1	0.04	0.1	0.04	0.2
LDDT	0.03	0.01	0.03	0.02	0.1
HDDV	0.8	0.4	1.0	0.6	2.8
MC	0.5	0.3	0.6	0.4	1.8
TOTAL	42.8	23.3	50.9	29.1	146.1

[a]Emissions are for the base year 1987. They represent daily emission estimates during the summer ozone season. Numbers may not sum to the totals due to rounding.

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TABLE 4-11. SUMMARY OF OZONEVILLE MSA HIGHWAY VEHICLE CO EMISSIONS BY VEHICLE CLASS

	Ozoneville MSA Emissions (tons/day)[a]				
Vehicle Class	County A	County B	County C	County D	Total MSA
LDGV	170.6	92.7	202.8	115.9	581.9
LDGT1	37.3	20.3	44.3	25.3	127.2
LDGT2	24.9	13.5	29.6	16.9	84.9
HDGV	11.9	6.4	14.1	8.1	40.5
LDDV	0.2	0.1	0.2	0.1	0.6
LDDT	0.1	0.03	0.1	0.04	0.2
HDDV	3.8	2.0	4.5	2.6	12.9
MC	2.1	1.2	2.6	1.5	7.3
TOTAL	250.8	136.3	298.1	170.4	855.5

[a]Emissions are for the base year 1987. They represent daily emission estimates during the summer ozone season. Numbers may not sum to the totals due to rounding.

TABLE 4-12. SUMMARY OF OZONEVILLE MSA HIGHWAY VEHICLE NO_x EMISSIONS BY VEHICLE CLASS

	Ozoneville MSA Emissions (tons/day)[a]				
Vehicle Class	County A	County B	County C	County D	Total MSA
LDGV	9.2	5.0	11.0	6.3	31.5
LDGT1	2.0	1.1	2.4	1.4	6.9
LDGT2	1.5	0.8	1.7	1.0	5.0
HDGV	0.6	0.3	0.8	0.4	2.2
LDDV	0.2	0.1	0.2	0.1	0.6
LDDT	0.1	0.03	0.1	0.04	0.2
HDDV	5.7	3.1	6.8	3.9	19.6
MC	0.1	0.03	0.1	0.04	0.2
TOTAL	19.4	10.5	23.0	13.1	66.0

[a]Emissions are for the base year 1987. They represent daily emission estimates during the summer ozone season. Numbers may not sum to the totals due to rounding.

TABLE 4-13. SUMMARY OF OZONEVILLE MSA HIGHWAY VEHICLE VOC EMISSIONS BY ROADWAY TYPE

	Ozoneville MSA Emissions (tons/day)[a]				
Roadway Type	County A	County B	County C	County D	Total MSA
Interstate/Freeway/ Expressway	6.0	3.3	7.1	4.1	20.5
Major Arterial	17.1	9.3	20.4	11.6	58.4
Minor Arterial	9.0	4.9	10.7	6.1	30.7
Collector	4.3	2.3	5.1	2.9	14.6
Local	6.4	3.5	7.6	4.4	21.9
TOTAL	42.8	23.3	50.9	29.1	146.1

[a]Emissions are for the base year 1987. They represent daily emission estimates during the summer ozone season. Numbers may not sum to the totals due to rounding.

TABLE 4-14. SUMMARY OF OZONEVILLE MSA HIGHWAY VEHICLE CO EMISSIONS BY ROADWAY TYPE

	Ozoneville MSA Emissions (tons/day)[a]				
Roadway Type	County A	County B	County C	County D	Total MSA
Interstate/Freeway/ Expressway	35.1	19.1	41.7	23.9	119.8
Major Arterial	100.3	54.5	119.2	68.2	342.2
Minor Arterial	52.6	28.6	62.6	35.8	179.7
Collector	25.1	13.6	29.8	17.0	85.5
Local	37.6	20.4	44.7	25.6	128.3
TOTAL	250.7	136.3	298.1	170.4	855.5

[a]Emissions are for the base year 1987. They represent daily emission estimates during the summer ozone season. Numbers may not sum to the totals due to rounding.

TABLE 4-15. SUMMARY OF OZONEVILLE MSA HIGHWAY VEHICLE NO_x EMISSIONS BY ROADWAY TYPE

	Ozoneville MSA Emissions (tons/day)[a]				
Roadway Type	County A	County B	County C	County D	Total MSA
Interstate/Freeway/ Expressway	2.7	1.5	3.2	1.8	9.2
Major Arterial	7.8	4.2	9.2	5.2	26.4
Minor Arterial	4.1	2.2	4.8	2.8	13.9
Collector	1.9	1.1	2.3	1.3	6.6
Local	2.9	1.6	3.5	2.0	9.9
TOTAL	19.4	10.5	23.0	13.1	66.0

[a]Emissions are for the base year 1987. They represent daily emission estimates during the summer ozone season. Numbers may not sum to the totals due to rounding.

TABLE 4-16. SUMMARY OF QUALITY ASSURANCE REASONABLENESS CHECKS FOR THE OZONEVILLE MSA HIGHWAY VEHICLE EMISSIONS INVENTORY

Parameter	Ozoneville Inventory Value	Reasonableness Criteria[a]	Comments
Average Daily VMT per Capita	19.4 miles/person	15-21 miles/person	In the reasonable range
% VMT by Functional Road Class			
- Interstate	14%	10 - 31%	In the reasonable range
- Major Arterial	40%	20 - 46%	In the reasonable range
- Minor Arterial	21%	21 - 23%	In the reasonable range
- Collector	10%	8 - 14%	In the reasonable range
- Local	15%	14 - 23%	In the reasonable range
Average Daily Operating Speed by Functional Class			
- Interstate	45 mph	35 - 50 mph	In the reasonable range
- Major Arterial	32 mph	25 - 30 mph	7% over range maximum
- Minor Arterial	22 mph	20 - 25 mph	In the reasonable range
- Collector	22 mph	20 - 25 mph	In the reasonable range
- Local	20 mph	20 - 25 mph	In the reasonable range
Average Daily Operating Speed for the System	28.2 mph	20 - 35 mph	In the reasonable range
Average Daily Trip Length	19.2 min	15 - 19 min	1% over the range maximum

[a]Source: Guidelines for the Review of Emissions Inventories for Highway Emissions (EPA-440/12-80-002)

4.4 REFERENCES FOR SECTION 4

1. U. S. Environmental Protection Agency. Guidelines for Review of Highway Source Emission Inventories for 1982 State Implementation Plans. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. December 1980.

2. U. S. Environmental Protection Agency. Procedures for Emission Inventory Preparation, Volume IV; Mobile Sources.. EPA-450/4-81-026d (Revised). Office of Air Quality Planning and Standards and Office of Mobile Sources, Research Triangle Park, North Carolina. July 1989.

3. U. S. Environmental Protection Agency. Quality Assurance Program for Post-1987 Ozone and Carbon Monoxide State Implementation Plan Emission Inventories. EPA-450/4-89-004. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. March 1989.

4. U. S. Environmental Protection Agency. User's Guide to MOBILE4. EPA-AA-TEB-89-01. Office of Mobile Sources, Ann Arbor, Michigan. February 1989.

5. Ozoneville Department of Transportation. Freeway and Arterial Operating Speeds. Ozoneville, USA. November 1985.

6. National Institute for Petroleum and Energy Research. Motor Gasolines, Summer 1987. NIPER-149PPS, 88/1. Bartlesville, Oklahoma. March 1988.

5.0 QUALITY ASSURANCE

A major component of the Ozoneville Emission Inventory effort was the development of and implementation of an overall quality assurance (QA) program. The purpose of this program was to define a planned and systematic pattern of activities that would provide confidence that the resulting emission inventory would be of such quality to meet the overall requirements of EPA and of sufficient quality to be the basis of reliable strategy planning and attainment demonstration. The key elements of this overall plan were outlined in a document[1] submitted to the Regional EPA by the State Department of Environmental Regulation (DER) in October 1988. The QA program was administered by the State-wide QA coordinator, and executed by joint cooperation between the DER, the Ozoneville Department of Transportation (ODOT), and the Ozoneville Regional Planning Authority (ORPA).

The three specific goals of the QA program were to ensure the development of an emission inventory that was complete, accurate, and in compliance with the content and reporting requirements outlined in the post-87 Policy. The following subsections describes elements of the QA program that were performed by the ORPA and ODOT during the course of preparing this inventory. The results of the external QA performed by the State DER has been prepared and submitted in a separate report.[2] Each of the following subsections address quality assurance/quality control (QA/QC) actions as they relate to the three overall program goals; completeness, accuracy, and compliance with EPA requirements.

5.1 COMPLETENESS

EPA guidance materials were closely followed to ensure that all categories (i.e., point, area and mobile) of emission producing activity were included in the MSA inventory. As described in Section 2, a concerted effort was made on the part of the ORPA to ensure that all potential point source facilities were identified and screened as part of the inventory effort. This was accomplished by developing an exhaustive listing of plant/facilities and businesses compiled from the existing point source inventory, State Directory of Manufacturing Firms, County Business Directories, and Electronic Yellow Pages. Data collected through survey responses, telephone calls, and plant visits were then used to verify the preliminary listing and to develop a refined and complete point source listing. Further checks on the completeness of the inventory were made by cross-referencing the area-wide listing with other industrial listings such as those developed for water permits, SARA 313 data submittals, etc.

The completeness of the mobile and area source component of the inventory was ensured by closely adhering to the EPA guidance documents,[3,4] thereby ensuring that all components and aspects of each of the inventory types were adequately addressed.

5.2 ACCURACY

The QA/QC activities were designed to address accuracy by focusing on two aspects. The first included the assessment of each of the emission estimates in light of their "reasonableness". The second aspect involved specific procedures for checking the accuracy of calculations and confirming data entry.

5.2.1 Reasonableness Checks

Potential data outliers were identified by comparing the relative magnitudes of emission estimates from facilities performing similar activities. Data points that appeared as outliers in relation to other data were investigated fully and corrections made if errors were found.

A systematic way of uniformly performing reasonableness checks on point source estimates was accomplished by using experienced permit engineers. Several permit engineers who were not involved in the inventory development process were used to peer review the compiled data. Based on their experience with a wide variety of industrial sources, they were able to quickly identify values that were unreasonable in light of the process being described. In each of those cases, re-checking of the calculations led to the identification and correction of arithmetic errors.

Reasonableness checks were performed for several area source category estimates by comparing the results from two independent estimation approaches. For example, emission results derived using per capita emission factors, were compared to emission results based on activity estimates. For area sources, emission estimates were considered to be reasonable if independent approaches yielded estimates that did not deviate by more than 50 percent. In cases where multiple estimation approaches were not feasible, internal consistency checks were made to verify the reasonableness of the numbers. For example, emission estimates derived for several categories that involved small businesses (i.e., dry cleaning, service stations, etc.) were evaluated by obtaining business counts from county business directories and converting the category wide emission estimates to a per facility basis. Using activity/emissions relationships noted in AP-42[5] or in gathered data, activity throughput data were estimated on a per facility basis. Activity throughput estimates (tons of clothes cleaned per year, gallons of gasoline sold per year, etc.) on a facility basis were then assessed for reasonableness and obvious outliers were re-evaluated.

The reasonableness of the highway vehicle emissions inventory was evaluated using guidelines published in the EPA document Guidelines for the Review of Emissions Inventories for Highway Emissions (EPA-440/12-80-002).[6] This document provided values and comparison parameters that could be compared against the Ozoneville MSA inventory to gauge the overall reasonableness of the emissions inventory. The Ozoneville MSA values were predominantly well within the tolerance ranges for reasonableness.[6] The traffic count programs which were performed as part of this study reinforce the reasonability of the VMT estimates. The combination of these values with the MOBILE4-generated emission factors indicates that the Ozoneville MSA highway vehicle emissions estimates are reasonable for an area with the demographics stated in Chapter 1.

5.2.2 Data Entry and Calculation Checks

Data entry errors in the point source inventory component were minimized by entering information into the SAMS system using pre-formatted data entry forms. Independent data entry checks were also performed on all data entries.

Features built into the SAMS system also served to identify and minimize keypunch errors. Examples include the quality control features that will not allow assignment of non-existent SIC codes, features that mandate consistency of the operations schedules and daily emission calculations, etc. Independent checks were made for each facility to ensure that the process data and emissions data were internally consistent. During the review process, several inconsistencies were found where the maximum hourly process rate, emission factor, and annual operating schedule data reported by industries did not match with estimates of annual and daily emissions. In each case, follow-up contacts were made with the plants and the discrepancies were resolved.

Data entry and calculation errors were minimized in the area and mobile source inventory components by independent check and review of all calculations. Any errors identified during the review procedures were brought to the attention of the ODOT inventory coordinator for mobile inventory and the ORPA coordinator for the area sources inventory. Once corrected, the changes were re-checked by the reviewers. The entire mobile and area emissions inventory components were reviewed by ODOT and ORPA members that did not directly participate in their development. All comments were addressed to the satisfaction of the ODOT and ORPA inventory coordinators.

5.3 COMPLIANCE WITH EPA CONTENT AND REPORTING REQUIREMENTS

EPA guidance documents were used as the basis for all inventory development activities. These documents, as well as information learned in the Regional workshop, were used in all stages of the inventory development planning, data collection, data compilation and reporting activities. The SAMS data management system was also used to ensure that inventory reporting activities were consistent and compatible with EPA review procedures. Finally, the EPA Quality Assurance checklist was used as a self examination tool to identify any potential aspect of the inventory that could be viewed as deficient by EPA reviewers. Appendix D of this document contains this self evaluation checklist (from the Requirements Document[7]).

5.4 REFERENCES FOR SECTION 5

1. State Department of Environmental Regulation. Quality Assurance Plan to Support the Ozoneville MSA Emission Inventory Development. Draft Report. October 1988.

2. State Department of Environmental Regulation. Summary of Quality Assurance/Quality Control Results for the Ozoneville MSA Emission Inventory Development. Draft Report. July 1989.

3. U. S. Environmental Protection Agency. Procedures for the Preparation of Emission Inventories for Precursors of Ozone.

4. U. S. Environmental Protection Agency. Procedures for Emission Inventory Preparation, Volume IV; Mobile Sources. EPA-450/4-81-026d (Revised). Office of Air Quality Planning and Standards and Office of Mobile Sources, Research Triangle Park, North Carolina. July 1989.

5. U. S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors, Fourth Edition and Supplements, AP-42. Research Triangle Park, North Carolina. September 1985.

6. U. S. Environmental Protection Agency. Guidelines for Review of Highway Source Emission Inventories for 1982 State Implementation Plans. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. December 1980.

7. U.S. Environmental Protection Agency. Emission Inventory Requirements for Post-1987 Ozone State Implementation Plans. EPA-450/4-88-019. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. December 1988.

APPENDIX A   POINT SOURCE INVENTORY DATA

APPENDIX A.1 COUNTY A POINT SOURCES

- Jiffy Cleaners
- Same Day Cleaners
- Pinetree Metals
- Bash-It Auto Body Repair Shop
- Imperial Coatings
- Four-Day Cleaners

Jiffy Cleaners
111 Oak Avenue
Jeffersonville, USA

General Facility Information:

Jiffy Cleaners, which employs 35 people in County A, is a commercial dry cleaning facility that uses perchloroethylene as a cleaning solvent, reportedly cleaning 625 tons of clothing in 1987. The amount of perchloroethylene purchased in 1987 was 150,340 pounds. Assuming that all of the solvent purchased during 1987 was lost to the atmosphere through evaporation and because perchloroethylene is considered reactive, the emissions are 150,340 of reactive VOC per year. Since the reported cleaning activity for this plant stayed essentially constant throughout the year, no seasonal adjustment was applied to the emissions. Since this facility is not subject to air emission regulations and is uncontrolled, no rule effectiveness factor is applied. The plant is open 6 days per week.

Calculations:

(150,340 lb/yr)/(6 days/wk x 52 wks/yr) = 481.9 lb VOC/O_3 day

SMALL PLANT INFORMATION

Plant Name: JIFFY CLEANERS Last Updated by: GDR on 07/31/89
State: GEORGIA County: APPLING CO
NEDS Plant ID: 0279
Street Address: 111 OAK AVENUE City: JEFFERSONVILLE, USA Zip Code: 22222-2222
SIC Codes: 7216
Source Category: Dry Cleaning - Perchloroethylene
Number of Employees: 35
Activity Level (Per Day): 481.9 LB PERC USED
Emission Factor: 1 LB VOC/LB PERC USED
VOC Emissions: 482(pounds per day)
Small Plant Level Comment: UNIFORM ACTIVITY; 312 DAYS/YEAR

County A

Same Day Cleaners
812 Sycamore Road
Lincoln, USA

General Facility Information:

Same Day Cleaners, a commercial facility that uses perchloroethylene, is located in County A, employs 5 people and reported cleaning 60 tons of clothing in 1987. The company purchased 24,000 pounds of perchloroethylene in 1987. Assuming that all perchloroethylene was lost through evaporation, the emissions are 24,000 pounds VOC per year. Cleaning activity remained constant throughout the year, 6 days per week, 52 weeks per year. Since this facility is currently uncontrolled and not subject to air emission regulations, no rule effectiveness factor is applied.

Calculations:

(24,000 lb/yr)/(6 days/wk x 52 wks/yr) = 77 lb VOC/O_3 day

SMALL PLANT INFORMATION

Plant Name: SAME DAY CLEANERS Last Updated by: GDR on 07/31/89
State: GEORGIA County: APPLING CO
NEDS Plant ID: 0887
Street Address: 812 SYCAMORE ROAD City: LINCOLN, USA Zip Code: 33333-3333
SIC Codes: 7216
Source Category: Dry Cleaning - Perchloroethylene
Number of Employees: 5
Activity Level (Per Day): 76.9 LBS OF PERC USED
Emission Factor: 1 LB VOC/LB PERC USED
VOC Emissions: 77(pounds per day)
Small Plant Level Comment: UNIFORM ACTIVITY; 312 DAYS/YEAR

Pinetree Metals
9234 Pinetree Lane
Jeffersonville, USA

General Facility Information:

Pinetree Metals in County A operates two open-top vapor degreasers. In 1987, 40,360 pounds of perchloroethylene were purchased and none was recovered or recycled. The company employs 18 people and operates 5 days per week, 52 weeks per year. Based on their survey response, Pinetree Metals does not have significant variation in production. Since this facility is currently uncontrolled and not subject to air emission regulations, no rule effectiveness factor is applied.

Calculations:

(40,360 lb/yr)/(5 days/wk x 52 wks/yr) = 155 lbs VOC/O_3 day

SMALL PLANT INFORMATION

Plant Name: PINETREE METALS Last Updated by: GDR on 07/31/89
State: GEORGIA County: APPLING CO
NEDS Plant ID: 0556
Street Address: 9234 City: JEFFERSONVILLE, USA Zip Code: 22222-2222
SIC Codes: 3491
Source Category: Solvent Metal Cleaning - Open Top Vapor Degreasers
Number of Employees: 18
Activity Level (Per Day): 155.2 LBS OF SOLVENT USED
Emission Factor: 1 LB VOC/LB SOLVENT
VOC Emissions: 155(pounds per day)
Small Plant Level Comment: UNIFORM ACTIVITY; 260 DAYS/YEAR

County A

Bash-It Auto Body Repair Shop
421 Birch Road
Jeffersonville, USA

General Facility Information:

Bash-It Company is an auto body repair shop located in County A. The company did not maintain records on paint or solvent consumption for the year 1987. Bash-It body shop employs 5 persons and operates 5 days per week, 52 weeks per year.

Calculations:

Since no company-specific data were available, emissions for the 1987 base year were estimated using an employee-based emission factor derived from other auto body shops in the MSA. Since this source category is currently unregulated, no rule effectiveness factor is applied.

The following information was used to develop the emission factor.

Company	County	VOC Emissions (lb/Ozone day)	No. of Employee	Employee based Emission Factor (lb VOC/Employee)
Jacksonville	C	115.7	4	28.9
King's	D	163.3	7	23.3
Twinkies	B	96.3	3	32.1
			AVERAGE =	28.1

- $\frac{28.1 \text{ lb VOC}}{\text{employee } O_3 \text{ day}} \times 5 \text{ employees} = \frac{140.5 \text{ lb VOC}}{O_3 \text{ day}}$

SMALL PLANT INFORMATION

Plant Name: BASH-IT AUTO BODY REPAIR SHOP Last Updated by: GDR on 07/31/89
State: GEORGIA County: APPLING CO
NEDS Plant ID: 0530
Street Address: 421 BIRCH ROAD City: JEFFERSONVILLE, USA Zip Code: 22222-2222
SIC Codes: 7532
Source Category: Non-Industrial Surface Coating - Auto Refinishing
Number of Employees: 5
Activity Level (Per Day): 5 EMPLOYEES
Emission Factor: 28.1 LB VOC/EMPLOYEE
VOC Emissions: 140.5(pounds per day)
Small Plant Level Comment: BASED ON EF FROM OTHER MSA BODY SHOPS; 260 DAYS/YR

Imperial Coatings
1811 Hemlock Parkway
Lincoln, USA

General Facility Information:

Imperial Coatings in County A coats fabric for electrical insulating tapes and for making hoses. VOC emissions occur from storage and handling of purchased solvent, and during incineration of solvent vapors captured from coating and mixing operations. A plant visit to Imperial Coatings revealed the following solvent usage for 1987.

Operation	Solvent	Solvent Usage (gal/yr)
Coating lines	toluene	1,431,500
Mixing	toluene	75,000
Equipment clean-up	toluene	165,000

VOC vapors from the coating and mixing operations are captured and vented to an incinerator. The overall capture and control efficiency of the hood and incineration system is estimated at 95%.

Imperial Coatings operates 7 days a week, 365 days a year, with throughput remaining constant throughout the year. The company employs 85 workers. Toluene is purchased monthly and is stored in a 150,000-gallon fixed roof tank in new condition.

Calculations:

1987 base year emissions are estimated based on the reported annual solvent consumption and assumed control efficiency. A rule effectiveness value of 80% is applied to account for estimated temporal variations in control efficiency.

- Coating Lines:
  *1,431,500 gal/yr x 7.3 lb/gal x yr/365 days = 28,630 lb/day
  *28,630 lb/day x [1-(.95)(.80)] = 6,871 lb VOC/O_3 day

- Mixing Operations:
  *75,000 gal/yr x 7.3 lb/gal x yr/365 days = 1,500 lb/day
  *1,500 lb/day x [1-(.95)(.80)] = 360 lb VOC/O_3 day

Equipment Cleanup:
*165,000 gal/yr x 7.3 lb/gal x yr/365 days = 3,300 lb/day
*3,300 lb/day x [1-(.95)(.80)] = 792 lb VOC/O_3 day

Tank Breathing and Working Losses:

Breathing Losses:

$Lb=(2.26 \times 10^{-2}) \times Mv(P/Pa-P)^{0.68} \times D^{1.73} \times H^{0.51} \times dT^{0.50} \times FpCKc$

92 Mv: average molecular weight of vapor in storage tank (lb/lb-mole)
0.6 P: true vapor pressure at average actual liquid storage temperature (psia)
14.7 Pa: average atmosphere pressure, (psia)
15 D: tank diameter, (FT)
5 H: average vapor space height, (FT)
15 dT: average ambient diurnal change, (F)
1 Fp: paint factor from AP-42, Table 4.3.1, (dimensionless)
0.75 C: adjustment factor for small diameter tanks from AP-42, Figure 4.3.4, (dimensionless)
1 Kc: product factor, crude oil =.65, all other organic liquid=1, (dimensionless)

BREATHING LOSSES:	= 174 lbs of VOC per year
	= 0.1 tons of VOC per year
	= 1.16 lbs/1000 gal capacity

Working Losses:

$Lw = (2.40 \times 10^{-5}) \times Mv \times P \times V \times N \times Kn \times Kc$

92 Mv: average molecular weight of vapor in storage tank (lb/lb mole)
0.6 P: true vapor pressure at average actual liquid storage temperature (psia)
150000 V: tank capacity, (gallons)
1671500 AN: total throughput per year (gallons)
11.14 N: *number of turnovers per year*
1 Kn: turnover factor from AP-42, Figure 4.3.7, (dimensionless)
1 Kc: product factor, crude oil=.65, all other organic liquid=1, (dimensionless)

Working Losses = 2214 lbs of VOC per year = 1.1 tons VOC per year = 1.32 lbs/1000 gal throughput

TOTA BREATHING AND WORKING LOSSES = 2388 lbs of VOC per year
1.2 tons VOC per year

*2388 lbs/yr x yr/365 days = 6.5 lbs VOC/O_3 day

Total Daily Ozone Season VOC Emissions

Coating Lines	= 6,871.2
Mixing Operations	= 360.0
Equipment Cleanup	= 792.0
Tank Breathing and Working	= 6.5
	= 8,029.7 lb VOC/O_3 day

PLANT INFORMATION

Plant Name: IMPERIAL COATNGS/LINCOLN Last Updated by: GDR on 07/28/89
Type of Inventory: 2
State: GEORGIA County: APPLING CO AQCR: 54
NEDS Plant ID: 0132 CDS Plant ID: Local Plant ID:
Street Address: 1811 HEMLOCK PARKWAY City: LINCOLN,USA Zip Code: 44444-4444
City Code: UTM Zone: 17 UTM Easting: 222.2 UTM Northing: 3333.3
Township/Modeling Grid Code:
SIC Codes - Primary: 3069 Secondary: Tertiary:
Principal Product: CT FABRIC Employees: 85 Plant Area: 10.0 acres
Plant Contact: JEAN SMITH Telephone Number: (919) 111-1212
Plant Level Comment: MFG OF COATED FABRIC FOR TAPE AND RUBBER HOSES

POINT INFORMATION

Point ID: 01 Local Point ID: Last Updated by: GDR on 07/31/89
SIC: 3069
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - Longitude:
Operating Schedule Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: 25 March through May: 25
June through August: 25 September through November: 25
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/28/89
Primary Control Device: DIRECT FLAME AFTERBURNER
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 95.0 %
Measured Emissions: 261 Units: 1 Method of Emissions Measurement:
Estimated Emissions: 261 Estimation Method: STACK TEST RESULTS OR OTHER EMISSION MEASUREMENT
SIP Regulation in Place (Y/N)? Y Compliance Year: 85 Emission Limitation: 825 TONS/YEAR

Point Emissions Level Comment: FABRIC COATING LINES #1-3

PROCESS INFORMATION

SCC Number: 3-30-002-02 SCC Sequence Number: 01 Last Updated by: GDR on 07/28/89
SCC Description: RUBBER/PLASTICS RUBBERIZED FABRIC WET COATING GENERAL
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: GALLONS OF SOLVENT
Actual Annual Process Rate: 477166 Maximum Design Rate: 82.000
O3 Season Daily Process Rate: 1308 CO Season Max 8-Hour Process Rate: 432
Process Level Comment: FABRIC COATING LINE #1

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/31/89
Primary Control Device: DIRECT FLAME AFTERBURNER
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 95.0 %
SIP Regulation in Place (Y/N)? Y Compliance Year: 84 Emission Limitation: 150 TONS/YEAR
Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 7.3
Annual Nonbanked Emissions: 87 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: 80
O3 Season Daily Emissions: 2292 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment: COATING LINE #1

PROCESS INFORMATION

SCC Number: 3-30-002-02 SCC Sequence Number: 02 Last Updated by: GDR on 07/28/89
SCC Description: RUBBER/PLASTICS RUBBERIZED FABRIC WET COATING GENERAL
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: GALLONS OF SOLVENT
Actual Annual Process Rate: 477166 Maximum Design Rate: 85.000
O3 Season Daily Process Rate: 1308 CO Season Max 8-Hour Process Rate: 436
Process Level Comment: FABRIC COATING LINE #2

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/28/89
Primary Control Device: FLARING
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 95.0 %
SIP Regulation in Place (Y/N)? Y Compliance Year: 85 Emission Limitation: 275 TONS/YEAR
Estimation Method: STACK TEST RESULTS OR OTHER EMISSION MEASUREMENT Emission Factor: 7.3
Annual Nonbanked Emissions: 87 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: 80
O3 Season Daily Emissions: 2291 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment: COATING LINE #2

PROCESS INFORMATION

SCC Number: 3-30-002-02 SCC Sequence Number: 03 Last Updated by: GDR on 07/28/89
SCC Description: RUBBER/PLASTICS RUBBERIZED FABRIC WET COATING GENERAL
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: GALLONS OF SOLVENT
Actual Annual Process Rate: 477166 Maximum Design Rate: 85.000
O3 Season Daily Process Rate: 1308 CO Season Max 8-Hour Process Rate: 436
Process Level Comment: FABRIC COATING LINE #3

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/31/89
Primary Control Device: DIRECT FLAME AFTERBURNER
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 95.0 %
SIP Regulation in Place (Y/N)? Y Compliance Year: 85 Emission Limitation: 150 TONS/YEAR
Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 7.3
Annual Nonbanked Emissions: 87 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: 80
O3 Season Daily Emissions: 2292 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment: COATING LINE #3

POINT INFORMATION

Point ID: 02 Local Point ID: Last Updated by: GDR on 07/28/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - - Longitude: - -
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: 25 March through May: 25
June through August: 25 September through November: 25
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment: MIXING OPERATIONS

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/28/89
Primary Control Device: DIRECT FLAME AFTERBURNER
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 95.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 66 Estimation Method: MATERIAL BALANCE
SIP Regulation in Place (Y/N)? Y Compliance Year: 85 Emission Limitation: 130 TONS/YEAR
Point Emissions Level Comment: MIXING OPERATIONS

PROCESS INFORMATION

SCC Number: 3-01-014-01 SCC Sequence Number: 01 Last Updated by: GDR on 07/28/89
SCC Description: CHEMICAL MFG PAINT MFG MIXING/BLENDING TANKS
Type of Source: Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: GALLONS OF TOLUENE USED
Actual Annual Process Rate: 75000 Maximum Design Rate: 10.000
O3 Season Daily Process Rate: 205 CO Season Max 8-Hour Process Rate: 68
Process Level Comment: COATING MIXING OPERATION

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/31/89
Primary Control Device: DIRECT FLAME AFTERBURNER
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 95.0 %
SIP Regulation in Place (Y/N)? Y Compliance Year: 85 Emission Limitation: 150 TONS/YEAR
Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 7.3
Annual Nonbanked Emissions: 14 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: 80
O3 Season Daily Emissions: 359 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment: COATING MIXING OPERATION

POINT INFORMATION

Point ID: 03 Local Point ID: Last Updated by: GDR on 07/28/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: Longitude:
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: March through May:
June through August: September through November:
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment: EQUIPMENT CLEAN-UP

PROCESS INFORMATION

SCC Number: 4-02-011-05 SCC Sequence Number: 01 Last Updated by: GDR on 07/28/89
SCC Description: ORGANIC SOLVENT SURFACE COATING FABRIC COATING EQUIPMENT CLEANUP
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: TONS SOLVENT IN COATING
Actual Annual Process Rate: 602 Maximum Design Rate: 0.100
O3 Season Daily Process Rate: 1.65 CO Season Max 8-Hour Process Rate: 0.55
Process Level Comment: EQUIPMENT CLEAN-UP

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/28/89
Primary Control Device: DIRECT FLAME AFTERBURNER
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 95.0 %
SIP Regulation in Place (Y/N)? Y Compliance Year: 85 Emission Limitation: 90 TONS PER YEAR
Estimation Method: MATERIAL BALANCE Emission Factor:
Annual Nonbanked Emissions: 30 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: 80
O3 Season Daily Emissions: 0.4 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment: EQUIPMENT CLEAN-UP

POINT INFORMATION

Point ID: 04 Local Point ID: Last Updated by: GDR on 07/28/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - - Longitude: -
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs December through Febraury: March through May:
June through August: September through November:
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment: STORAGE TANK

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/28/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 1 Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:
Point Emissions Level Comment: STORAGE TANK

PROCESS INFORMATION

SCC Number: 4-07-036-15 SCC Sequence Number: 01 Last Updated by: GDR on 07/28/89
SCC Description: ORGANIC CHEM STRG FIXED ROOF TANKS TOLUENE BREATHING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: 150 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 0.4 CO Season Max 8-Hour Process Rate: 0.1
Process Level Comment: DAILY PROCESS RATE - STORAGE CAPACITY/365

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/28/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:
Estimation Method: CALCULATED USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 1.16
Annual Nonbanked Emissions: 0 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 0 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment: STORAGE TANK BREATHING LOSSES

PROCESS INFORMATION

SCC Number: 4-07-036-16 SCC Sequence Number: 01 Last Updated by: GDR on 07/28/89
SCC Description: ORGANIC CHEM STRG FIXED ROOF TANKS TOLUENE WORKING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: 1672 Maximum Design Rate: 8.000
03 Season Daily Process Rate: 4.6 CO Season Max 8-Hour Process Rate: 1.5
Process Level Comment: STORAGE TANK - WORKING LOSSES

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/28/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:
Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 1.32
Annual Nonbanked Emissions: 1 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
03 Season Daily Emissions: 6 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment: STORAGE TANK - WORKING LOSSES

Four-Day Cleaners
4239 Ash Boulevard
Lincoln, USA

General Facility Information:

Four-Day Cleaners is a dry cleaning facility located in County A. The company was identified through review of business listing in the yellow pages. The company did not respond to the survey questionnaire. Follow-up telephone calls revealed that the company did not maintain any records for the year 1987. The manager did however reveal that the cleaners employed 6 people in 1987, and operated 6 days per week, 52 weeks per year.

Calculations:

- Since no company-specific data were available, emissions for the 1987 base year were estimated using an employee-based emission factor derived from survey responses from other dry cleaners in the MSA.
- Since dry cleaning is unregulated, no rule effectiveness factor is applied.
- The following information was used to develop the emission factor:

Company	County	No. of Employees	lb VOC Ozone per day	lb VOC Employee per day
Jiffy Cleaners	C	35	482	13.8
JR's Laundry & Car Wash	D	23	400	17.4
Same Day Cleaners	A	5	77	15.4
Klutz Cleaning Service	D	8	64	8.0
People's Cleaners	C	7	74	10.6
			AVERAGE:	13.0

- 13.0 lb VOC/emp day x 6 employees = 78 lb/O_3 day

SMALL PLANT INFORMATION

Plant Name: FOUR-DAY CLEANERS Last Updated by: GDR on 07/31/89
State: GEORGIA County: APPLING CO
NEDS Plant ID: 0825
Street Address: 4239 ASH BOULEVARD City: LINCOLN, USA Zip Code: 22222-2222
SIC Codes: 7216
Source Category: Dry Cleaning - Perchloroethylene
Number of Employees: 6
Activity Level (Per Day): 6 EMPLOYEES
Emission Factor: 13.0 LB VOC/EMPLOYEE
VOC Emissions: 78(pounds per day)
Small Plant Level Comment: EF BASED ON SURVEY DATA; 312 DAY/YR OPERATION

APPENDIX A.2 COUNTY B POINT SOURCES

- Bubba's Printing, Inc.
- United Metal Works
- Specialty Packaging
- Paper Designs, Inc.
- Twinkies Body Shop
- Squeeky Cleaners
- Town And City Cleaners
- Friendly Power Company

Bubba's Printing, Inc.
949 Walnut Drive
Washington, USA

General Facility Information

Bubba's Printing, Inc., is a graphic arts company located in County B. The firm publishes books using offset lithography. VOC emissions occur from solvent contained in the ink, and solvent used for dampening and for clean-up purposes. The company operates two printing lines, each with vapor hood systems to capture evaporative solvent emissions from the dryer. The vapors are vented from the dryer to a thermal incinerator. Control efficiency of the incinerator is estimated to be 95%. The rule effectiveness factor for this source category is 80%.

The following contains a list of data provided by Bubba's Printing for the base year 1987.

Solvent/ink	Gallons Used in 1987	Solvent Content Percent by Volume	Solvent VOC Content lb VOC/gal
isopropanol	1,600	100	6.5
ink	12,500	40	6.2
MEK	800	100	6.7

operates 5 days per week, 52 weeks per year
8 Employees

Calculations:

- Isopropanol is used in the dampening process, approximately 50% evaporates prior to the dryer, 50% evaporates in the dryer

$$\frac{*800 \text{ gal}}{\text{year}} \times \frac{100 \text{ gal solvent}}{100 \text{ gal}} \times \frac{6.5 \text{ lb VOC}}{\text{gal solv}} = \frac{5{,}200 \text{ lb VOC}}{\text{year}}$$

*(5200 lb VOC/yr)/(5 days/wk x 52 wks/yr) = 20 lb VOC/O_3 day

Dryer isopropoṇal emissions:

*800 x 100/100 x 6.5 = 5200 lb VOC per year

*5,200 lb VOC/yr x [1-(.95)(Rule Effectiveness 0.80)] = 1,248 lb VOC/yr

*(1,248 lb VOC/yr)/(5 day/wk x 52 wks/yr) = 4.8 lb VOC/O_3 day

- MEK Emissions

$$*\frac{800 \text{ gals}}{\text{year}} \times \frac{100 \text{ gal solvent}}{100 \text{ gal}} \times \frac{6.7 \text{ lb VOC}}{\text{gallon}} = \frac{5360 \text{ lb VOC}}{\text{year}}$$

*(5360 lb VOC/yr)/(5 x 52) = 20.6 lb VOC/O_3 day

- Ink Solvent Emissions

$$*\frac{12,500 \text{ gal}}{\text{year}} \times \frac{40 \text{ gal solvent}}{100 \text{ gal ink}} \times \frac{6.2 \text{ lb VOC}}{\text{gal solvent}} = \frac{31,000 \text{ lb VOC}}{\text{year}}$$

*31,000 lb/yr x [1-(.95)(.80)] = 7,440 lb VOC/year

*(7,440 lb VOC/yr)/(5 x 52) = 28.6 lb VOC/O_3 day

<u>Total Ozone Season daily Emissions</u>:

Isopropanol	24.8
MEK	20.6
Ink Solvent	28.6
	74 lb VOC/O_3 day

SMALL PLANT INFORMATION

Plant Name: BUBBA'S PRINTING, INC. Last Updated by: GDR on 07/31/89
State: GEORGIA County: BACON CO
NEDS Plant ID: 0183
Street Address: 949 WALNUT DRIVE City: WASHINGTON, USA Zip Code: 44444-4444
SIC Codes: 2731
Source Category: Graphic Arts - Flexography
Number of Employees: 8
Activity Level (Per Day): 57.3 GALLONS OF SOLVENT
Emission Factor: 1.29
VOC Emissions: 74(pounds per day)
Small Plant Level Comment: BASED ON MATERIAL BALANCE ADJUSTED FOR RULE EFFEC.

County B

United Metal Works
123 Beech Way
Madison, USA

General Facility Information:

United Metal Works in County B operates two conveyorized vapor degreasers. In 1987, the company purchased 65,000 pounds of perchloroethylene and 43,000 pounds of 1,1,1-trichloroethane, and the company sent to a waste solvent recovery firm outside of the nonattainment area 16,300 pounds of perchloroethylene and 10,800 pounds of 1,1,1-trichloroethane for recycling. Since 1,1,1-trichloroethane is a nonreactive VOC, it is exempt from the inventory; only the perchloroethylene was inventoried. Assuming that all of the perchloroethylene purchased during the year (less the amount recycled) evaporated, the reactive VOC emissions equal 48,700 pounds per year. Since this facility is not subject to air emission regulations and is uncontrolled, no rule effectiveness factor is applied. United Metal Works operates 5 days per week, 52 weeks per year. The company employs 65 persons.

Calculations:

(48,700 lbs/yr)/(5 days/wk)(52 wks/yr) = 187.3 lb/day.

The average throughput during the summer quarter is actually 28% because of scheduled maintenance shutdowns during the winter. A factor of 28%/25% or 1.12 was applied to the daily emissions to account for the increase during the ozone season. Thus, the seasonally adjusted or baseline emissions are 210 pounds of reactive VOC per day.

SMALL PLANT INFORMATION

Plant Name: UNITED METAL WORKS Last Updated by: GDR on 07/31/89
State: GEORGIA County: BACON CO
NEDS Plant ID: 0512
Street Address: 123 BEECH WAY City: MADISON, USA Zip Code: 22222-2222
SIC Codes: 3448
Source Category: Solvent Metal Cleaning - Conveyorized Degreasers
Number of Employees: 65
Activity Level (Per Day): 210 LBS SOLVENT USED
Emission Factor: 1 LB VOC/LB SOLVENT
VOC Emissions: 210(*pounds per day*)
Small Plant Level Comment: SEASON ADJ. FACTOR = 0.65; 260 DAYS/YEAR

Specialty Packaging
1934 Cottonwood Drive
Madison, USA

General Facility Information:

Specialty Packaging is a manufacturer of printed flexible packaging material located in County B. Printing is accomplished with flexography using alcohol base inks. The company has 22 employees and operates 3 printing lines. VOC emissions occur from solvent contained in the ink, and solvents used for equipment clean-up. Each of the potential emission points along the printing lines is controlled by a vapor capture system combined with a carbon bed adsorption/solvent recovery control system. A rule effectiveness factor of 80% is applied to account for variations in control efficiency over time. The following information for the 1987 base year was provided by Specialty Packaging, and is based on material balances.

- Total ink consumption, 1987 = 35,000 gallons
- Total clean-up solvent consumption, 1987 = 5,000 gallons
- Total quantity of VOC vented to the carbon adsorption system = 193,750 lbs/yr
- Solvent recovery system measured efficiency = 75% (.75 lb recovered/lb captured)
- 22 employees
  5 days per week, 52 weeks per year

Calculations:

- *193,750 lbs VOC/yr x [1-(0.75)(0.80) Rule Eff.] = 77,500 lbs VOC/yr
- *(77,500 lb VOC/yr)/(5 x 52) = 298.1 lb VOC/O_3 day

PLANT INFORMATION

Plant Name: SPECIALTY PACKAGING Last Updated by: GDR on 07/31/89
Type of Inventory: 2
State: GEORGIA County: BACON CO AQCR: 54
NEDS Plant ID: 0615 CDS Plant ID: Local Plant ID:
Street Address: 1934 COTTONWOOD DRIVE City: MADISON, USA Zip Code: 44444-4444
City Code: UTM Zone: 17 UTM Easting: 222.2 UTM Northing: 3333.3
Township/Modeling Grid Code:
SIC Codes Primary: 2673 Secondary: Tertiary:
Principal Product: PACKAGING Employees: 22 Plant Area: 10.0 acres
Plant Contact: JEAN SMITH Telephone Number: (919) 111-1212
Plant Level Comment:

POINT INFORMATION

Point ID: 01 Local Point ID: Last Updated by: GDR on 07/31/89
SIC: 2671
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: 33-33-33 Longitude: 666-66-66
Operating Schedule - Hours per day: 16 Days per week: 5 Weeks per year: 52
Start time: 07:00 Ending time: 23:00
Throughputs - December through Febraury: 25 March through May: 25
June through August: 25 September through November: 25
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: ACTIVATED CARBON ADSORPTION
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 75.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 25 Estimation Method: MATERIAL BALANCE
SIP Regulation in Place (Y/N)? Y Compliance Year: 85 Emission Limitation: 37 TONS/YEAR

Point Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-05-003-01 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: PRINTING/PUBLISH PRINTING PROCESS FLEXOGRAPHIC GENERAL
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: GALLONS OF INK
Actual Annual Process Rate: 35000 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 135 CO Season Max 8-Hour Process Rate: 67.3
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/31/89
Primary Control Device: ACTIVATED CARBON ADSORPTION
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 75.0 %
SIP Regulation in Place (Y/N)? Y Compliance Year: 85 Emission Limitation: 25 TONS/YEAR

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 4.84
Annual Nonbanked Emissions: 21 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: 80
O3 Season Daily Emissions: 261 lbs CO Season Max 8-Hour Emissions: 130 lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-05-003-04 SCC Sequence Number: 01 Last Updated by: GDR on 07/31/89
SCC Description: PRINTING/PUBLISH PRINTING PROCESS INK THIN SOLVENT ETHYL ALCOHOL
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: TONS SOLVENT ADDED
Actual Annual Process Rate: 5000 Maximum Design Rate: 2.500
O3 Season Daily Process Rate: 19.2 CO Season Max 8-Hour Process Rate: 6.8
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/31/89
Primary Control Device: ACTIVATED CARBON ADSORPTION
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 75.0 %
SIP Regulation in Place (Y/N)? Y Compliance Year: 85 Emission Limitation: 5 TONS/YEAR

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 4.84
Annual Nonbanked Emissions: 3 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: 80
O3 Season Daily Emissions: 37 lbs CO Season Max 8-Hour Emissions: 18 lbs
Process Emissions Level Comment:

Paper Designs, Inc.
341 Redwood Parkway
Washington, USA

General Facility Information:

Paper Designs, Inc., in County B coats paper used for decorative purposes. The company reported the solvent usage data for 1987. Coating lines were estimated to account for 95% and solvent losses during mixing for 5% of the 1987 toluene/methanol usage. VOC vapors from the coating lines are captured and vented to an incinerator with a 99% destruction efficiency. A rule effectiveness factor of 80% is applied to account for variation in control efficiency over time.

Operations	Solvent	Solvent Usage (lb/day)
Coating lines & mixing	toluene	5,600
Coating lines & mixing	methanol	5,600
Equipment clean-up	isopropanol	584

The operating schedule is 16 hours a day, 5 days a week, 52 weeks per year. The toluene and methanol are stored in 80,000-liter fixed-roof tanks; the isopropanol is stored in a 10,000-liter fixed-roof tank. All tanks are in old condition. All three of the solvents are reactive; thus all emissions are reactive VOC's.

Calculations:

Baseline emissions are estimated based on daily solvent consumption, control efficiency, rule effectiveness, and 5 day per wk, 52 week per year operation.

- Coating lines utilize (.95)(11,200) = 10,640 lb/day of solvent; for inventory purposes, emissions are:
  10,640 lb/day x [1-(.99)(.80) Rule Eff] = 2,213 lb/day, or 287.7 tons/yr

Mixing operations are uncontrolled, and utilize (0.05)(11,200) = 560 lb/day or 72.8 tons/year. All of these solvent vapors evaporate. Equipment clean-up operations utilize 584 lb per day or 75.9 tons per year.

Calculations for Solvent Storage

Solvent storage emissions are from tanks breathing and working losses.

Tank Breathing Losses

$L_B = 2.26 \times 10^{-2} M_v (P/P_a - P)^{0.68} D^{1.73} H^{0.51} T^{0.50} F_p C K_c$

M_v = Molecular weight of vapor (lb/lb-mole); Isopropanol = 60, Toluene 92, Methanol = 32

P = True vapor pressure at average actual liquid storage temperature (psia); Isopropanol = 0.9, Toluene = 0.6, Methanol = 2.6

P_A = 14.7, average atmosphere pressure (psia)

D = tank diameter

Isopropanol = 5 ft
Toluene = 10 ft
Methanol = 10 ft

H = Average vapor space height

Isopropanol = 5 ft
Toluene = 5 ft
Methanol = 5 ft

T = 15°F, average ambient diurnal change

F_p = 1.15, white tank roof and shell in poor condition

C = adjustment factor for small diameter tanks

Isopropanol = 0.26
Toluene = 0.50
Methanol = 0.50

K_c = 1, product factor

\- *Breathing Losses

Isopropanol:

$(2.26 \times 10^{-2})(60)(0.9/14.7-0.9)^{0.68}(5)^{1.73}(5)^{0.51}(15)^{0.50}(1.15)(0.26)(1)$

= 9.0 lb/yr

Toluene:
$(2.26 \times 10^{-2})(92)(0.6/14.7\text{-}0.6)^{0.68}(10)^{1.73}(5)^{0.51}(15)^{0.50}(1.15)(0.50)(1)$
= 66.3 lb/yr
Methanol:
$(2.26 \times 10^{-2})(32)(2.6/14.7\text{-}2.6)^{0.68}(10)^{1.73}(5)^{0.51}(15)^{0.50}(1.15)(0.50)(1)$
= 69.3 lb/yr

- *Total Tank Breathing Losses
9 + 66.3 + 69.3 = 144.6 lb/yr
144.6 lb/yr x (1/365) = 0.39 lb VOC/O_3 season day

- *Working Losses:
$L_v = 2.40 \times 10^{-5}\ M_vPVNK_nK_c$
M_v = 60, Isopropanol
92, Toluene
32, Methanol
P = 0.9, Isopropanol
0.6, Toluene
2.6, Methanol
V = 2,600 gal, Isopropanol
21,100 gal, Toluene
21,100 gal, Methanol
N = number of turnovers per year,
10, Isopropanol
12, Toluene
12, Methanol
K_N = 1
K_c = 1
- *L_v Isopropanol:
$(2.40 \times 10^{-5})(60)(0.9)(2600)(10)(1)(1)$ = 33.7 lb/yr
L_v Toluene:
$(2.40 \times 10^{-5})(92)(0.6)(21,100)(12)(1)(1)$ = 335.4 lb/yr

L_v Methanol:

$(2.40 \times 10^{-5})(32)(2.6)(21,100)(12)(1)(1) = 505.6$ lb/yr

- *Total Working Losses:

33.7 + 335.4 + 505.6 = 874.7 lb/yr

874.7 lb/yr x 1/(5 x 52) = 3.36 lb VOC/O_3

TOTAL DAILY OZONE SEASON VOC EMISSIONS:

Coating lines	=	2,213 lb/day
Mixing Operations	=	560.0 lb/day
Equipment Clean-up	=	584.0 lb/day
Tank Breathing	=	0.6 lb/day
Tank Working	=	3.4 lb day
		3,361.0 lb/day

PLANT INFORMATION

Plant Name: PAPER DESIGNS, INC. Last Updated by: CAO on 07/28/89
Type of Inventory: 2
State: GEORGIA County: BACON CO AQCR: 54
NEDS Plant ID: 0186 CDS Plant ID: Local Plant ID:
Street Address: 341 REDWOOD PARKWAY City: WASHINGTON,USA Zip Code: 44444-4444

City Code: UTM Zone: 17 UTM Easting: 222.2 UTM Northing: 3333.3
Township/Modeling Grid Code:
SIC Codes - Primary: 3011 Secondary: Tertiary:
Principal Product: Employees: 120 Plant Area: 10.0 acres
Plant Contact: JEAN SMITH Telephone Number: (919) 111-1212
Plant Level Comment:

POINT INFORMATION

Point ID: 01 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - - Longitude: -
Operating Schedule - Hours per day: 16 Days per week: 5 Weeks per year: 52
Start time: 07:00 Ending time: 23:00
Throughputs - December through Febraury: March through May:
June through August: September through November:
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: DIRECT FLAME AFTERBURNER
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 99.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 437 Estimation Method:
SIP Regulation in Place (Y/N)? Y Compliance Year: 86 Emission Limitation:

Point Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-02-013-01 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC SOLVENT SURFACE COATING PAPER COATING COATING OPERATION
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: TONS SOLVENT IN COATING
Actual Annual Process Rate: 1383 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 5.32 CO Season Max 8-Hour Process Rate: 2.66
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: DIRECT FLAME AFTERBURNER
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 99.0 %
SIP Regulation in Place (Y/N)? Y Compliance Year: 86 Emission Limitation: 25 TONS/YEAR

Estimation Method: MATERIAL BALANCE Emission Factor:
Annual Nonbanked Emissions: 0 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: 80
O3 Season Daily Emissions: 2213 lbs CO Season Max 8-Hour Emissions: 1107 lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-02-013-03 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC SOLVENT SURFACE COATING PAPER COATING COATING MIXING
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: TONS OF SOLVENT LOST
Actual Annual Process Rate: 73 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 0.280 CO Season Max 8-Hour Process Rate: .140
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: MATERIAL BALANCE Emission Factor:
Annual Nonbanked Emissions: 73 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 560 lbs CO Season Max 8-Hour Emissions: 280 lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-02-013-05 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC SOLVENT SURFACE COATING PAPER COATING EQUIPMENT CLEANUP
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: TONS OF SOLVENT USED
Actual Annual Process Rate: 76 Maximum Design Rate: 0.350
O3 Season Daily Process Rate: 0.290 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS INFORMATION

SCC Number: 4-07-008-13 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC CHEM STRG FIXED ROOF TANKS ISOPROPYL ALCOHOL BREATHING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: 3 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 3 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 0.000
Annual Nonbanked Emissions: 0 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 0 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-07-008-14 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC CHEM STRG FIXED ROOF TANKS ISOPROPYL ALCOHOL WORKING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 0.071 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 0.000
Annual Nonbanked Emissions: tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 0 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-07-008-15 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC CHEM STRG FIXED ROOF TANKS METHYL ALCOHOL BREATHING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: 21 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 21 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 0.000
Annual Nonbanked Emissions: 0 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 0 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-07-008-16 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC CHEM STRG FIXED ROOF TANKS METHYL ALCOHOL WORKING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: Maximum Design Rate: 21.000
O3 Season Daily Process Rate: 21 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 0.000
Annual Nonbanked Emissions: tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 0 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-07-036-15 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC CHEM STRG FIXED ROOF TANKS TOLUENE BREATHING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 21 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 0.000
Annual Nonbanked Emissions: tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 0 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-07-036-16 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC CHEM STRG FIXED ROOF TANKS TOLUENE WORKING LOSS
Type of Source: Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 0.69 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 0.000
Annual Nonbanked Emissions: tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 0 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

County B

Twinkies Body Shop
482 Mimosa Boulevard
Madison, USA

General Facility Information:

Twinkies is an auto body repair shop and massage parlor, located in County B. In reply to the survey questionnaire, the company provided information regarding the types of quantities of paint and solvents used during 1987. Twinkies is open for auto body work 5 days per week, 52 weeks per year. Since this source category is unregulated, no rule effectiveness factor is applied. Three people are employed at the company. The following data were provided:

- o 6,500 gallons of paint & solvent consumed
- o 7.7 lbs/gal (average density)
- o 50 wt% solvent

Calculations:

6,500 gal/yr x 7.7 lb/gal x 50 lb VOC/100 lb paint = 25,025 lb VOC/yr

(25,025 lb VOC/yr)(5 day/wk x 52 wks/yr) = 96.3 lbs VOC/O_3 day

SMALL PLANT INFORMATION

Plant Name: TWINKIES BODY SHOP Last Updated by: GDR on 07/31/89
State: GEORGIA County: BACON CO
NEDS Plant ID: 0787
Street Address: 482 MIMOSA BOULEVARD City: MADISON, USA Zip Code: 44444-4444
SIC Codes: 7532
Source Category: Non-Industrial Surface Coating - Auto Refinishing
Number of Employees: 3
Activity Level (Per Day): 25 GALLONS PAINT & SOLVENT
Emission Factor: 3.85 LB VOC/GALLON PAINT & SOLVENT
VOC Emissions: 96.3(pounds per day)
Small Plant Level Comment: EF IS WEIGHTED AVG; UNIFORM ACTIVITY; 260 DAYS/YR

County B

Squeeky Cleaners
4190 Poplar Road
Washington, USA

General Facility Information:

Squeeky Cleaners is a dry cleaning business located in County B. The current owners purchased the business in 1988 and therefore could not provide solvent consumption or cleaning activity for the 1987 base year. The current owner did, however, know that 11 people were employed in the base year 1987.

Calculations:

Since no company-specific data were available, emissions for the 1987 base year were estimated using an employee-based emission factor derived from survey responses from other dry cleaners in the MSA.

- Since this source category is unregulated, no rule effectiveness factor is applied.
- The following information was used to develop the emission factor:

Company	County	No of Employees	lb VOC per Ozone day	lb VOC per Employee-Day
Jiffy Cleaners	C	35	482	13.8
JR's Laundry & Car Wash	D	23	400	17.4
Same Day Cleaners	A	5	77	15.4
Klutz Cleaning Service	D	8	64	8.0
People's Cleaners	C	7	74	10.6
			AVERAGE:	13.0

- 13.0 lb VOC/emp-day x 11 employees = 143 lb/O_3 day

SMALL PLANT INFORMATION

Plant Name: SQUEEKY CLEANERS Last Updated by: GDR on 07/31/89
State: GEORGIA County: BACON CO
NEDS Plant ID: 0498
Street Address: 4190 POPLAR ROAD City: WASHINGTON, USA Zip Code: 33333-3333
SIC Codes: 7216
Source Category: Dry Cleaning - Perchloroethylene
Number of Employees: 11
Activity Level (Per Day): 11 EMPLOYEES
Emission Factor: 13.0 LB VOC/EMPLOYEE
VOC Emissions: 143(pounds per day)
Small Plant Level Comment: EF BASED ON SURVEY DATA; UNIFORM ACTIVITY;

Town and City Cleaners
9782 Laurel Drive
Madison, USA

General Facility Information:

Town and City Cleaners is a dry cleaning facility located in County B. The company was identified through review of business listing in the yellow pages. The company did not respond to the survey questionnaire. Follow-up telephone calls revealed that the company did not maintain any records for the year 1987. The manager did, however, reveal that the cleaners employed 8 people in 1987, and operated 6 days per week, 52 weeks per year.

Calculations:

- Since no company-specific data were available, emissions for the 1987 base year were estimated using an employee-based emission factor derived from survey responses from the other dry cleaners in the MSA.
- Since this source category is unregulated, no rule effectiveness factor is applied.
- The following information was used to develop the emission factor:

Company	County	No of Employee	lb VOC per Ozone day	lb VOC per Employee-day
Jiffy Cleaners	C	35	482	13.8
JR's Laundry & Car Wash	D	23	400	17.4
Same Day Cleaners	A	5	77	15.4
Klutz Cleaning Service	D	8	64	8.0
People's Cleaners	C	7	74	10.6
			AVERAGE:	13.0

13.0 lb VOC/emp-day x 8 employees = 104 lb/O_3 day

SMALL PLANT INFORMATION

Plant Name: TOWN AND CITY CLEANERS Last Updated by: GDR on 07/31/89
State: GEORGIA County: BACON CO
NEDS Plant ID: 0306
Street Address: 9782 LAUREL DRIVE City: MADISON, USA Zip Code: 55555-5555
SIC Codes: 7216
Source Category: Dry Cleaning - Perchloroethylene
Number of Employees: 8
Activity Level (Per Day): 8 EMPLOYEES
Emission Factor: 13.0 LB VOC/EMPLOYEE
VOC Emissions: 104(pounds per day)
Small Plant Level Comment: EF BASED ON SURVEY DATA; UNIFORM ACTIVITY

County B

Friendly Power Company
62 Old Ponderosa Pine Hwy
Madison, USA

General Facility Information:

Friendly Power Company operates a base-load steam electric generating plant with seven coal-fired boilers in County B. Stack tests conducted on the boilers in March 1986 indicated NO_x and VOC emissions of 4,118.6 and 18.1 pounds per hour, respectively and that 70% (12.6 lb/hr) of the VOCs emitted from these boilers is reactive. During the emission test, coal consumption was reported as 95 tons/hr (2280 tons per day). The plant continuously operates at maximum generating capacity so no seasonal or weekday adjustments were applied.

Calculations:

- NO_x: 4118.6 lb/hr x 24 hr/O_3 day = 98,846.4 lb/O_3 day
- VOC: 12.6 lb/hr x 24 hr/O_3 day = 302 lb/O_3 day

  CO: 2280 tons coal/day x 5 lb CO/ton coal = 11,400 lb CO/O_3 day

SMALL PLANT INFORMATION

Plant Name: FRIENDLY POWER COMPANY Last Updated by: GDR on 07/31/89
State: GEORGIA County: BACON CO
NEDS Plant ID: 0180
Street Address: 62 OLD PONDEROSA PINE HIGHWAY City: MADISON, USA Zip Code: 66666-6666
SIC Codes: 4911
Source Category: Stationary External Combustion - Coal
Number of Employees:
Activity Level (Per Day): 2280 TONS OF COAL BURNED
Emission Factor: 0.133 LB VOC/TON OF COAL BURNED
VOC Emissions: 302(pounds per day)
Small Plant Level Comment: EF BASED ON EMISSION TESTS; UNIFORM ACTIVITY;365

APPENDIX A.3 COUNTY C POINT SOURCES

- Daily Gazette Publishing Co.
- Jacksonville Auto Body Repair
- Petro Excel Oil Company
- Metal Products, Inc.
- Goodblimp Tire Company
- People's Cleaners
- Ozoneville Cleaners
- Spotless Cleaners

Daily Gazette Publishing Co.
4329 Appletree Trail
Ozoneville, USA

General Facility Information:

The Daily Gazette Publishing Co. is a newspaper publishing company located in County C. The Daily Gazette Company uses webb offset lithography as their publishing process. VOC emissions occur from solvent contained in the ink, solvent used in the dampening processes, and solvent used for equipment clean-up purposes.

The following contains a list of data provided by The Daily Gazette for the base year 1987:

Solvent/Ink	Gallons used in 1987	Solvent content % volume	Solvent VOC content lb VOC/gal
ethyl glycol mixture	7,500	100	8.0
ink	365,000	5	6.2
methyl ethyl ketone	8,000	100	6.7
isopropanol	12,500	100	6.5

- 35 employees
- operates 7 days per week, 52 weeks per yr, no seasonal variation.

Calculations:

- No emission controls. No rule effectiveness factor needs to be applied.
- Estimates based on 100% evaporation of solvent.
- Ethyl glycol mixture:

$$*\frac{7{,}500 \text{ gal}}{\text{year}} \times \frac{100 \text{ gal solv}}{100 \text{ gal}} \times \frac{8 \text{ lb VOC}}{\text{gal solv}} = \frac{60{,}000 \text{ lb VOC}}{\text{year}}$$

$$*\frac{60{,}000 \text{ lb VOC}}{\text{year}} \times \frac{\text{Year}}{365} = \frac{164.4 \text{ lb VOC}}{\text{day}}$$

- Ink:
  *365,000 x 5/100 x 6.2 = 113,150 lb VOC/year
  *113,150 x yr/365 = 310 lb VOC/day

- Methyl Ethyl Ketone:
  *8,000 x 100/100 x 6.7 = 53,600 lb VOC/year
  *53,600 x yr/365 = 146.8 lb VOC/day

  Isopropanol:
  *12,500 x 100/100 x 6.5 = 81,250 lb VOC/year
  *81,250 x yr/365 = 222.6 lb VOC/day

Total Ozone Season Daily Emissions:

Ethyl Glycol Mixture	164.4 lb/day
Ink Solvent	310.0 lb/day
Methyl Ethyl Ketone	146.8 lb/day
Isopropanol	222.6 lb/day
	843.8 lb/day

Report Date: 07/31/89 DETAILED POINT SOURCE LISTING
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PLANT INFORMATION

Plant Name: DAILY GAZETTE PUBLISHING CO Last Updated by: CAO on 07/28/89
Type of Inventory: 2
State: GEORGIA County: CALHOUN CO AQCR: 54
NEDS Plant ID: 0769 CDS Plant ID: Local Plant ID:
Street Address: 4329 APPLETREE TRAIL City: OZONEVILLE, USA Zip Code: 44444-4444
City Code: UTM Zone: 17 UTM Easting: 222.2 UTM Northing: 3333.3
Township/Modeling Grid Code:
SIC Codes Primary: 2711 Secondary: Tertiary:
Principal Product: NEWSPAPER Employees: 35 Plant Area: 15.0 acres
Plant Contact: JEAN SMITH Telephone Number: (919) 111-1212
Plant Level Comment:

POINT INFORMATION

Point ID: 01 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: Longitude:
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: March through May:
June through August: September through November:
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

PROCESS INFORMATION

SCC Number: 4-05-003-05 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: PRINTING/PUBLISH PRINTING PROCESS INK THIN SOLVENT ISOPROPYL ALCOHOL
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: GALLONS F SOLVENT USED
Actual Annual Process Rate: 12500 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 34 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: MATERIAL BALANCE Emission Factor:
Annual Nonbanked Emissions: 41 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 223 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-05-004-01 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: PRINTING/PUBLISH PRINTING PROCESS LITHOGRAPHIC GENERAL
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: GALLONS OF INK
Actual Annual Process Rate: 365000 Maximum Design Rate: 65.000
O3 Season Daily Process Rate: 1000 CO Season Max 8-Hour Process Rate: 333
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: MATERIAL BALANCE Emission Factor:
Annual Nonbanked Emissions: 57 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 310 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-05-005-06 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: PRINTING/PUBLISH PRINTING PROCESS INK THIN SOLVENT METHYL ETHYL KETN
Type of Source: Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: GALLONS OF SOLVENT
Actual Annual Process Rate: 8000 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 22 CO Season Max 8-Hour Process Rate: 7.3
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: MATERIAL BALANCE Emission Factor:
Annual Nonbanked Emissions: 27 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 147 lbs CO Season Max 8-Hour Emissions: 49 lbs
Process Emissions Level Comment:

DETAILED POINT SOURCE LISTING

PROCESS INFORMATION

SCC Number: 4-05-005-98 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: PRINTING/PUBLISH PRINTING PROCESS INK THIN SOLVENT SEE COMMENT
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: GALLONS OF SOLVENT
Actual Annual Process Rate: 7500 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 20.5 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: MATERIAL BALANCE Emission Factor:
Annual Nonbanked Emissions: 30 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 164 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

Jacksonville Auto Body Repair
1958 Fruitwood Lane
Jacksonville, USA

General Facility Information:

Jacksonville Auto Body Repair is located in County C. In reply to the survey questionnaire, the company provided data on the types and quantities of paint and solvent used during 1987. Jacksonville Auto Body Repair is open 5 days per week, 52 weeks per year. Four people are employed at the company. This source category is unregulated, rule effectiveness does not need to be applied.

Coating/Solvent	1987 Consumption (gallon/year)	Coating Density (lb/gal)	WT % Solvent
Enamel	1,500	7.6	49
Acrylic Enamel	2,650	8.9	52
Primer Surfacer	800	9.4	64
Thinner	1,000	7.4	100

Calculations:

- 100% of solvent evaporates
- *Enamel: 1500 gal/yr x 7.6 lb/gal x 49 lb VOC/100 lb paint
  = 5,586 lb VOC/year
  (5,586 lb VOC/yr)/(5 day/wk x 52 wks/yr) = 21.5 lb VOC/O_3 day
- *Acrylic Enamel: 2650 x 8.9 x 52/100 = 12,264 lb VOC/year
  (12,264)/(5 x 52) = 47.2 lb VOC/O_3 day
- *Primer Surfacer: 800 x 9.4 x 64/100 = 4,813 lb VOC/year
  (4813)/(5 x 52) = 18.5 lb VOC/O_3 day
- *Thinner: 1000 x 7.4 100/100 = 7,400 lb VOC/year
  (7,400)/(5 x 52) = 28.5 lb VOC/O_3 day

Daily Ozone Season VOC Emissions:

- *21.5 + 47.2 + 18.5 + 28.5 = 115.7 lb VOC/O_3 day

SMALL PLANT INFORMATION

Plant Name: JACKSONVILLE AUTO BODY REPAIR Last Updated by: GDR on 07/31/89
State: GEORGIA County: CALHOUN CO
NEDS Plant ID: 0830
Street Address: 1958 FRUITWOOD LANE City: JACKSONVILLE, USA Zip Code: 66666-6666
SIC Codes: 7532
Source Category: Non-Industrial Surface Coating - Auto Refinishing
Number of Employees: 4
Activity Level (Per Day): 22.9 GALLONS OF PAINT & THINNER
Emission Factor: 5.1 LB VOC/GALLON OF PAINT & THINNER
VOC Emissions: 115.7(pounds per day)
Small Plant Level Comment: EF BASED ON WEIGHTED AVG; UNIFORM ACTIVITY;260DAYS

Petro Excel Oil Company
893 Old Rosewood Hwy
Ozoneville, USA

General Facility Information:

The Petro Excel Oil Company operates a gasoline distribution facility "bulk plant" in County C. The facility consists of two identical internal floating roof tanks, each 100 ft in diameter, and one submerged fill and vapor balance loading rack system. The bulk plant stores and distributes only gasoline and has no daily variation in either the stored or daily throughput quantity (8000 gal/day).

VOC emissions from the plant come from two main categories: storage tank losses, and loading losses. VOC emissions were calculated using the approach outlined in AP-42 along with specific equipment specifications and throughput information supplied by company officials.

The following contains a list of specific data on the Petro bulk plant and is followed by calculations showing the derivation of the VOC emission estimates.

Climate and General Data from USA

- Average ozone season temperature: 83°F
- Average ozone season windspeed: 10 miles/hr
- Average ozone season atmospheric pressure: 14.7 psia
- Typical gasoline Reid vapor pressure during ozone season: 10.8 psia

Plant Data

- Tank description: Freely vented internal floating roof tank; contact deck made of welded 5 ft wide continuous sheets, with vapor-mounted resilient seal; the fixed roof is supported by 6 pipe columns; tank shell and roof painted aluminum; 100 ft diameter.

- Stored products: Motor gasoline (petroleum liquid); Reid vapor pressure of 10.8 psia; 5.6 lb/gal liquid density; no vapor or liquid composition given; 1.74×10^6 gallons throughput for the 7 months (55,100) bbl.
- Loading system: Dedicated vapor balance service practicing vapor recovery with a measured efficiency of 95%. Gasoline tank truck volume is 8000 gallons.

Calculations:

- Total VOC Emissions = Tank Losses (rim seal + withdrawal loss + deck fitting loss) + Loading Losses.

- RIM seal losses:

  $L_R = K_s V^n P^* D M_v K_c$

  L_R = rim seal loss (lb/yr)

  K_s = 6.7, seal factor (lb-mole/(ft (mi/hr)^n yr))

  V = 10, average wind speed at tank site (mi/hr)

  n = 0, seal related wind speed exponent (dimensionless)

  P = 8.6, true vapor pressure at average actual liquid storage temperature (psia), [For 10.8 psia Reid Vapor Pressure gasoline and average temperature of 83°F]

  P^* = 0.216, vapor pressure function (dimensionless), [Based on true vapor pressure of 8.6 psia and atmosphere pressure of 14.7 psia]

  D = 100, tank diameter (ft)

  M_v = 65, average molecular weight of vapor in storage tank (lb/lb-mole),

  K_c = 1, product factor (dimensionless)

- Rim seal loss for both tanks:

  = 2 L_R

  = 2 (6.7)(1)(0.216)(100)(1)

  = 18,850 lb/year x year/365 day

  = 51.6 lb VOC/O_3 day

- Withdrawal Losses:

  $$L_w = \frac{(0.943)\ QCW_L}{D} \times [1 + \frac{N_c F_c}{D}]$$

  L_w = withdrawal loss (lb/year)

  Q = 92.7 x 10^3, total throughput (bbl/year)

  C = 0.0015, shell clingage factor (bbl/1000 ft^2)

  W_L = 5.6, average gasoline density (lb/gal)

  D = 100, tank diameter (ft)

  N_c = 6, number of columns (dimensionless)

  F_c = 1, effective column diameter (ft)

- Withdrawal loss for both tanks = L_w

  $$= \frac{(0.943)(92.7 \times 10^3)(0.0015)(5.6)}{100} [1 + \frac{(6)(1)}{100}]$$

  = 7.8 lb/yr x yr/365 days = 0.02 lb VOC/ozone Season day

- Deck fitting losses:

  $L_f = F_f P^* M_v K_c$

  L_f = deck fitting losses (lb/yr)

  F_f = 700, total deck fitting loss factor (lb-mole/yr)

  P^* = 0.216

  M_v = 65 lb/lb-mole

  K_c = 1

  Deck Fitting losses for both tanks = 2 L_f

  = 2(700)(0.216)(65)(1.0)

  = 19,694 lb VOC/yr x yr/365 days = 54.0 lb VOC/ozone season day

- Loading Losses - from tank truck loading (displacement of organic vapors from "empty" tanks)

  $L_L = 12.46\ SPM_v/T\ (1 - eff_x\ RE/100)$

County C
Petro Excel Oil Company

L_L = loading loss (lb/10^3 gal loaded)
S = 1, saturation factor
P = 8.6, true vapor pressure (psia)
M_v = 65 lb/lb-mole
T = 540°R, temperature of gasoline
eff = 95%, control efficiency
RE = 0.8, rule effectiveness

- Loading losses:

$$= (12.46)\ \frac{(1)(8.6)(6.5)}{540}\ (1 - (.80)(.95)) = 0.31 \text{ lb VOC}/10^3 \text{ gal loaded}$$

$$= \frac{0.31 \text{ lb VOC}}{10^3 \text{ gal loaded}} \times \frac{1.74 \times 10^6 \text{ gal loaded}}{\text{ozone season}} \times \frac{\text{season}}{217 \text{ ozone season days}}$$

= 2.48 lb VOC/ozone season day

- Daily ozone season emissions for Petro Excel bulk gasoline plant are:

Rim losses	=	51.6 lbs/day
Withdrawal losses	=	0.0 lbs/day
Deck Fitting losses	=	54.0 lbs/day
Loading losses	=	2.5 lbs/day
		108.1 lbs/day

SMALL PLANT INFORMATION

Plant Name: PETRO EXCEL BULK PLANT Last Updated by: GDR on 07/31/89
State: GEORGIA County: CALHOUN CO
NEDS Plant ID: 0771
Street Address: 893 OLD ROSEWOOD HIGHWAY City: OZONEVILLE, USA Zip Code: 33333-3333
SIC Codes: 5171
Source Category: Gasoline Bulk Plants
Number of Employees: 17
Activity Level (Per Day): 90,000 GALLON STORAGE CAPACITY
Emission Factor: 1.2 LB/10^3 GALL STORAGE CAPACITY
VOC Emissions: 108.1(pounds per day)
Small Plant Level Comment: EF CALC'D BASED ON RIM+DECK+LOADING LOSSES

County C

Metal Products, Inc.
312 Dogwood Circle
Jacksonville, USA

General Facility Information:

Metal Products, Inc., is a metal fabrication company located in County C. The company manufactures specialty metal parts on a contract basis. The company operates six open top vapor degreasers. In 1987, 145,000 pounds of perchloroethylene were purchased and 60,000 pounds were recovered for recycling. Since this facility is currently uncontrolled and not subject to air emission regulations, no rule effectiveness factor is applied. Metal Products employed 75 persons during 1987.

Calculations:

- Evaporated solvent: 145,000 - 60,000 = 85,000 lbs
  (85,000 lbs/yr)/(5 days/wk x 52 wks/yr) = 327 lb VOC/O_3 day

SMALL PLANT INFORMATION

Plant Name: METAL PRODUCTS, INC. Last Updated by: GDR on 07/31/89
State: GEORGIA County: CALHOUN CO
NEDS Plant ID: 0873
Street Address: 312 DOGWOOD CIRCLE City: JACKSONVILLE, USA Zip Code: 44444-4444
SIC Codes: 3491
Source Category: Solvent Metal Cleaning - Open Top Vapor Degreasers
Number of Employees: 75
Activity Level (Per Day): 327 LB SOLVENT CONSUMED
Emission Factor: 1 LB VOC/LB SOLVENT CONSUMED
VOC Emissions: 327(pounds per day)
Small Plant Level Comment: UNIFORM ACTIVITY; 260 DAYS/YEAR

DETAILED POINT SOURCE LISTING

PLANT INFORMATION

Plant Name: METAL PRODUCTS, INC. Last Updated by: CAO on 07/28/89
Type of Inventory: 2
State: GEORGIA County: CALHOUN CO AQCR: 54
NEDS Plant ID: 0873 CDS Plant ID: Local Plant ID:
Street Address: 312 DOGWOOD CIRCLE City: JACKSONVILLE,USA Zip Code: 44444-4444
City Code: UTM Zone: 17 UTM Easting: 222.2 UTM Northing: 3333.3
Township/Modeling Grid Code:
SIC Codes - Primary: 3011 Secondary: Tertiary:
Principal Product: Employees: 75 Plant Area: 10.0 acres
Plant Contact: JEAN SMITH Telephone Number: (919) 111-1212
Plant Level Comment:

POINT INFORMATION

Point ID: 01 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - - Longitude:
Operating Schedule - Hours per day: 16 Days per week: 5 Weeks per year: 52
Start time: 07:00 Ending time: 23:00
Throughputs - December through Febraury: 25 March through May: 25
June through August: 25 September through November: 25
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 43 Estimation Method: MATERIAL BALANCE
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Point Emissions Level Comment: 6 OPEN TOP DEGREASERS

PROCESS INFORMATION

SCC Number: 4-01-002-17 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC SOLVENT VAPOR DEGREASING OPEN TOP ENTIRE UNIT
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: LBS OF SOLVENT USED
Actual Annual Process Rate: 14167 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 54 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: MATERIAL BALANCE Emission Factor:
Annual Nonbanked Emissions: 7 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 55 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-01-002-17 SCC Sequence Number: 02 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC SOLVENT VAPOR DEGREASING OPEN TOP ENTIRE UNIT
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: LBS OF SOLVENT USED
Actual Annual Process Rate: 14167 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 55 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: MATERIAL BALANCE Emission Factor:
Annual Nonbanked Emissions: 7 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 55 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-01-002-17 SCC Sequence Number: 03 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC SOLVENT VAPOR DEGREASING OPEN TOP ENTIRE UNIT
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: LBS OF SOLVENT USED
Actual Annual Process Rate: 14167 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 55 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: MATERIAL BALANCE Emission Factor:
Annual Nonbanked Emissions: 7 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 55 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-01-002-17 SCC Sequence Number: 04 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC SOLVENT VAPOR DEGREASING OPEN TOP ENTIRE UNIT
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: LBS OF SOLVENT USED
Actual Annual Process Rate: 14167 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 55 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: MATERIAL BALANCE Emission Factor:
Annual Nonbanked Emissions: 7 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 55 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-01-002-17 SCC Sequence Number: 05 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC SOLVENT VAPOR DEGREASING OPEN TOP ENTIRE UNIT
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: LBS OF SOLVENT USED
Actual Annual Process Rate: 14167 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 55 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: MATERIAL BALANCE Emission Factor:
Annual Nonbanked Emissions: 7 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 55 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-01-002-17 SCC Sequence Number: 06 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC SOLVENT VAPOR DEGREASING OPEN TOP ENTIRE UNIT
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: LBS OF SOLVENT USED
Actual Annual Process Rate: 14167 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 55 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: MATERIAL BALANCE Emission Factor:
Annual Nonbanked Emissions: 7 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 55 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

Goodblimp Tire Company
43 N. Frasier Fir Hwy
Ozoneville, USA

General Facility Information:

Goodblimp Tire Company manufactures rubber tires and is located in County C. In reply to the survey questionnaire, Goodblimp Co. was unable to provide solvent usage data for each operation, but did supply the 1987 operating information which follows.

Goodblimp operates on a 7-day work week, 52 weeks per year and produces tires at a rate of 12,000 per day. Hexane, which is reactive, is the solvent used in all the company's tire manufacturing operations. It is stored in a 75,000-gallon fixed-roof tank and an average of 45,000 gallons per month are purchased. A rule effectiveness factor of 80% is applied to all regulated processes at the plant. The company employs 380 workers.

Plant Data

12,000 tires per day

- Process Information:

Operation	Uncontrolled Emission Factor (lb VOC/tire)	Vapor Capture Efficiency (%)	Incineration Destruction Efficiency (%)
Undertread Cementing	0.209	85	90
Bead dipping	0.018	85	90
Tire building	0.073	0	0
Treadend cementing	0.033	85	90
Green tire spraying	0.220	90	90
Molding & curing	0.013	0	0
Finishing	0.004	0	0
Sidewall cementing	0.105	0	0

- VOL Storage tank data

  Tank type: fixed roof, new condition

  Number of tanks: one

  Tank diameter: 35 ft

  Tank height: 12 ft

  Average diurnal temperature change: 15°F

  Solvent stored: hexane

  Average temperature for ozone season: 83°F

  Tank capacity: 75,000 gallons

  Tank paint: specular aluminum

  Throughput: 1500 gal/day

  Average vapor space height: 1.2 ft

<u>Calculations:</u>

- Undertread cementing daily emissions are equal to uncontrolled emissions times control efficiency adjusted for rule effectiveness.

  *12000 tires/O_3 season day x 0.209 lb VOC/tire x [1 - (0.85)(0.90)(0.80)] = 973 lb VOC/O_3 season day
- Bead dipping:

  *12000 x 0.018 x [1 - (0.85)(0.90)(0.80)] = 83.8 lb VOC/O_3 season day
- Tire building:

  *12000 x 0.073 lb VOC/tire = 876 lb VOC/O_3 day
- Treadend cementing:

  *12000 x 0.033 x [1-(0.85)(0.90)(0.80)] = 153.6 lb VOC/O_3 day
- Green tire spraying:

  *12000 x 0.220 x [1-(0.90)(0.90)(0.80)] = 929 lb VOC/O_3 day
- Molding and Curing:

  *12000 x 0.013 = 156 lb VOC/O_3 day
- Finishing:

  *12000 x 0.004 = 48 lb VOC/O_3 day
- Sidewall cementing:

  *12000 x 0.105 = 1,260 lb VOC/O_3 day

- Tank loss emissions = breathing + working

  *Breathing losses (L_B)

  $L_B = 2.26 \times 10^{-2} M_v(P/P_A - P)^{0.68} D^{1.73} H^{0.51} T^{0.50} F_p C K_c$

  M_v = 80, average molecular weight of vapor in storage tank (lb/lb-mole)

  P = 2.5, true vapor pressure at average actual liquid storage temperatures (psia),

  P_A = 14.7, average atmospheric pressure (psia)

  D = 35, tank diameter (ft)

  H = 1.2, average vapor space height (ft)

  T = 15, average ambient diurnal change (^{0}F)

  F_p = 1.2, paint factor (dimensionless)

  C = 1, adjustment factor for small diameter tanks (dimensionles

  K_c = 1, product factor

$(2.26 \times 10^{-2})(80)(2.5/14.7-2.5)^{0.68}(35)^{1.73}(1.2)^{0.51}(15)^{0.50}(1.2)(1)(1)$

= 1,469 lb/yr x yr/365 days = 4.0 lb VOC/O_3 day

- Working Losses (L_W)

  $L_W = 2.40 \times 10^{-5} M_v P V N K_N K_c$

  M_v = 80 lb/lb-mole

  P = 2.5 psia

  V = 75,000 gal tank capacity

  N = 7.3, turnovers per year

  K_N = 1

  K_c = 1

$(2.40 \times 10^{-5})(80)(2.5)(75,000)(7.3)(1)(1)$=2,628 lb/yr x yr/365 = 7.2 lb/day O_3

<u>Daily Ozone Season Emissions:</u>

Undertread Cementing	973 lb/day
Bead dipping	84 lb/day
Tire building	876 lb/day
Treadend cementing	154 lb/day

County C

Goodblimp Tire Company

Green tire spraying	929 lb/day
Molding & curing	156 lb/day
Finishing	48 lb/day
Sidewall cementing	1,260 lb/day
Tank breathing losses	4 lb/day
Tank working losses	7 lb/day
TOTAL:	4,491 lb/day

PLANT INFORMATION

Plant Name: GOODBLIMP TIRE COMPANY Last Updated by: CAO on 07/28/89
Type of Inventory: 2
State: GEORGIA County: CALHOUN CO AQCR: 54
NEDS Plant ID: 0097 CDS Plant ID: Local Plant ID:
Street Address: 43 N FRASIER FIR HIGHWAY City: OZONEVILLE, USA Zip Code: 44444-4444
City Code: UTM Zone: 17 UTM Easting: 222.2 UTM Northing: 3333.3
Township/Modeling Grid Code:
SIC Codes - Primary: 3011 Secondary: Tertiary:
Principal Product: Employees: 380 Plant Area: 50.0 acres
Plant Contact: JEAN SMITH Telephone Number: (919) 111-1212
Plant Level Comment:

POINT INFORMATION

Point ID: 01 Local Point ID: Last Updated by: GDR on 07/30/89
SIC: 3011
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: Longitude:
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: March through May:
June through August: September through November:
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

PROCESS INFORMATION

SCC Number: 3-08-001-02 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: RUBBER/PLASTICS TIRE MFG BEAD DIPPING
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 TIRES PRODUCED
Actual Annual Process Rate: 4380 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 12 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: DIRECT FLAME AFTERBURNER
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 76.5 %
SIP Regulation in Place (Y/N)? Y Compliance Year: 84 Emission Limitation: 50 TONS/YEAR

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 18.0
Annual Nonbanked Emissions: 9 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: 80
O3 Season Daily Emissions: 84 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 3-08-001-05 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: RUBBER/PLASTICS TIRE MFG TREAD END CEMENTG
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 TIRES PRODUCED
Actual Annual Process Rate: 4380 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 12 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: DIRECT FLAME AFTERBURNER
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 76.5 %
SIP Regulation in Place (Y/N)? Y Compliance Year: 84 Emission Limitation: 25 TONS PER YEAR

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 33
Annual Nonbanked Emissions: 17 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: 80
O3 Season Daily Emissions: 154 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 3-08-001-06 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: RUBBER/PLASTICS TIRE MFG GREEN TIRE SPRAY
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 TIRES PRODUCED
Actual Annual Process Rate: 4380 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 12 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: DIRECT FLAME AFTERBURNER
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 81.0 %
SIP Regulation in Place (Y/N)? Y Compliance Year: 84 Emission Limitation: 150 TONS/YEAR

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 220
Annual Nonbanked Emissions: 92 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: 80
O3 Season Daily Emissions: 929 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 3-08-001-20 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: RUBBER/PLASTICS TIRE MFG UNDERTREAD & SIDE CEMENTING
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: 1000 TIRES PRODUCED
Actual Annual Process Rate: 4380 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 12 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: DIRECT FLAME AFTERBURNER
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 76.5 %
SIP Regulation in Place (Y/N)? Y Compliance Year: 84 Emission Limitation: 320 TONS PER YEAR

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 209
Annual Nonbanked Emissions: 108 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: 80
O3 Season Daily Emissions: 973 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

POINT INFORMATION

Point ID: 02 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: Longitude:
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: March through May:
June through August: September through November:
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 427 Estimation Method:
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Point Emissions Level Comment:

DETAILED POINT SOURCE LISTING

PROCESS INFORMATION

SCC Number: 3-08-001-01   SCC Sequence Number: 01   Last Updated by: GDR on 07/30/89
SCC Description: RUBBER/PLASTICS   TIRE MFG   UNDERTREAD & SIDE WALL CEMENTING
Type of Source: Percent Sulfur: 0.0   Percent Ash: 0.0   Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 TIRES PRODUCED
Actual Annual Process Rate: 4380   Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 12   CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS   Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N   Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC   Emission Factor: 105
Annual Nonbanked Emissions: 230 tons per year   Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58   Rule Effectiveness: N/A
O3 Season Daily Emissions: 1260 lbs   CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 3-08-001-04   SCC Sequence Number: 01   Last Updated by: GDR on 07/30/89
SCC Description: RUBBER/PLASTICS   TIRE MFG   TIRE BUILDING
Type of Source: Process   Percent Sulfur: 0.0   Percent Ash: 0.0   Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 TIRES PRODUCED
Actual Annual Process Rate: 4380   Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 12   CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS   Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N   Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC   Emission Factor: 73
Annual Nonbanked Emissions: 160 tons per year   Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58   Rule Effectiveness: N/A
O3 Season Daily Emissions: 876 lbs   CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 3-08-001-07 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: RUBBER/PLASTICS TIRE MFG TIRE CURING
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 TIRES PRODUCED
Actual Annual Process Rate: 4380 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 12 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 13
Annual Nonbanked Emissions: 28 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 156 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 3-08-001-97 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: RUBBER/PLASTICS TIRE MFG NOT CLASSIFIED SEE COMMENT
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 TIRES PRODUCED
Actual Annual Process Rate: 4380 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 12 CO Season Max 8-Hour Process Rate:
Process Level Comment: TIRE FINISHING PROCESS

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 4
Annual Nonbanked Emissions: 9 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 48 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

POINT INFORMATION

Point ID: 03 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - - Longitude: - -
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: 25 March through May: 25
June through August: 25 September through November: 25
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 1 Estimation Method: MATERIAL BALANCE
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Point Emissions Level Comment: FIXED ROOF TANK BREATHING AND WORKING LOSSES

PROCESS INFORMATION

SCC Number: 4-07-016-97 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC CHEM STRG FIXED ROOF TANKS SPECIFY ALKANE BREATHING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: 75 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 75 CO Season Max 8-Hour Process Rate:
Process Level Comment: HEXANE STORAGE

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: MATERIAL BALANCE Emission Factor: 0.000
Annual Nonbanked Emissions: 1 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 4 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-07-016-98 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: ORGANIC CHEM STRG FIXED ROOF TANKS SPECIFY ALKANE WORKING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: 540 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 1.5 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: MATERIAL BALANCE Emission Factor:
Annual Nonbanked Emissions: 1 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 7 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

County C

People's Cleaners
1412 Red Maple Drive
Jacksonville, USA

General Facility Information:

People's Cleaners is located in County C, employs 7 people and reported cleaning 56 tons of clothing in 1987. The company purchased 23,000 pounds of perchloroethylene in 1987. Assuming all perchloroethylene was lost through evaporation, the emissions are 23,000 pounds per year. Since this source category is unregulated, no rule effectiveness needs to be applied. Cleaning activity remained constant throughout the year (6 days per wk, 52 wks per yr).

Calculations:

*(23,000 lb/yr)/(6 day/wk x 52 wks/yr) = 73.7 lb VOC/O_3 day

SMALL PLANT INFORMATION

Plant Name: PEOPLE'S CLEANERS Last Updated by: GDR on 07/31/89
State: GEORGIA County: CALHOUN CO.
NEDS Plant ID: 0940
Street Address: 1412 RED MAPEL DRIVE City: JACKSONVILLE, USA Zip Code: 66666-6666
SIC Codes: 7216
Source Category: Dry Cleaning - Perchloroethylene
Number of Employees: 7
Activity Level (Per Day): 73.7 LBS OF PERC CONSUMED
Emission Factor: 1 LB VOC/LB OF PERC CONSUMED
VOC Emissions: 73.7(pounds per day)
Small Plant Level Comment: UNIFORM ACTIVITY; 312 DAYS/YEAR

County C

Ozoneville Cleaners
5900 Black Oak Parkway
Ozoneville, USA

General Facility Information:

Ozoneville Cleaners is a dry cleaning facility located in County C. The company was identified through a review of businesses listed in the yellow pages. The company did not respond to the survey questionnaire. Follow-up telephone calls revealed that the company did not maintain any records for the year 1987. The manager did however reveal that the cleaners employed 18 people in 1987, and operated 6 days per week, 52 weeks per year. He estimated that 95% of all activity took place during the summer months.

Calculations:

- Since no company-specific data were available, emissions for the 1987 base year were estimated using an employee-based emission factor derived from survey responses from other dry cleaners in the MSA.
- Since this source category is unregulated, no rule effectiveness factor needs to be applied.

  The following information was used to develop the emission factor:

Company	County	No of Employee	lb VOC per Ozone day	lb VOC per Employee-day
Jiffy Cleaners	C	35	482	13.8
JR's Laundry & Car Wash	D	23	400	17.4
Same Day Cleaners	A	5	77	15.4
Klutz Cleaning Service	D	8	64	8.0
People's Cleaners	C	7	74	10.6
			AVERAGE:	13.0

- 13.0 lb VOC/emp day x 18 employees = 234.0 lb/O_3 day
- Annual tonnage was estimated as follows:

  X lb/yr x 0.95 x 1/(6 x 30) = 234 lb/O_3 day

  X = 44,337 lb/yr = 22 tons VOC/yr

SMALL PLANT INFORMATION

Plant Name: OZONEVILLE CLEANERS Last Updated by: GDR on 07/31/89
State: GEORGIA County: CALHOUN CO
NEDS Plant ID: 0859
Street Address: 5900 BLACK OAK PARKWAY City: OZONEVILLE, USA Zip Code: 77777-7777
SIC Codes: 7216
Source Category: Dry Cleaning - Perchloroethylene
Number of Employees: 18
Activity Level (Per Day): 18 EMPLOYEES
Emission Factor: 13.0 LB VOC/EMPLOYEE
VOC Emissions: 234(pounds per day)
Small Plant Level Comment: SEASON ADJ. = 0.95; EF BASED ON SURVEY DATA

Spotless Cleaners
878 Basswood Drive
Jacksonville, USA

General Facility Information:

Spotless Cleaners is a dry cleaning business located in County C. The current owners purchased the business in 1988 and therefore could not provide solvent consumption or cleaning activity for the 1987 base year. The current owner did, however, know that 9 people were employed in the base year 1987.

Calculations:

- Since no company-specific data were available, emissions for the 1987 base year were estimated using an employee-based emission factor derived from survey responses form other dry cleaners in the MSA.
- Since this source category is unregulated, no rule effectiveness factor needs to be applied.
- The following information was used to develop the emission factor:

Company	County	No. of Employees	lb VOC per Ozone day	lb VOC per Employee-day
Jiffy Cleaners	C	35	482	13.8
JR's Laundry & Car Wash	D	23	400	17.4
Same Day Cleaners	A	5	77	15.4
Klutz Cleaning Service	D	8	64	8.0
People's Cleaners	C	7	74	10.6
			AVERAGE:	13.0

- 13.0 lb VOC/emp day x 9 employee = 117.0 lb/O_3 day

SMALL PLANT INFORMATION

Plant Name: SPOTLESS CLEANERS Last Updated by: GDR on 07/31/89
State: GEORGIA County: CALHOUN CO
NEDS Plant ID: 0612
Street Address: 878 BASSWOOD DRIVE City: JACKSONVILLE, USA Zip Code: 77777-7777
SIC Codes: 7216
Source Category: Dry Cleaning - Perchloroethylene
Number of Employees: 9
Activity Level (Per Day): 9 EMPLOYEES
Emission Factor: 13.0 LBS/EMPLOYEE
VOC Emissions: 117(pounds per day)
Small Plant Level Comment: EF BASED ON SURVEY DATA: UNIFORM ACTIVITY

APPENDIX A.4 COUNTY D POINT SOURCES

- University Publishing
- Fender Bender Repair
- King's Auto Body Repair
- Waste Busters, Inc.
- Joe's Oil Company
- JR's Laundry and Car Wash
- Klutz Cleaning Service
- Bob's Cleaners & Used Clothes

University Publishing
6789 Magnolia Parkway
Hamlin, USA

General Facility Information:

University Publishing is located in County D and is a gravure printing facility specializing in the production of magazines. The company operates two production presses consisting of eight units each, and a single proof press. VOC emissions are controlled at the facility using solvent vapor capture systems combined with carbon bed adsorption/solvent recovery control systems. The company operates 6 days per week, 52 weeks per year during the 1987 base year. University Publishing reported employing 38 persons during 1987.

VOC emissions are calculated for the 1987 base year using material balances. Material balances for the company were based on information supplied during the survey response and during a follow-up plant visit. Based on the composite ink and solvent usage, total annual quantity of solvent directed to the carbon absorption system is 3,525 tons per year. A rule effectiveness factor of 80% is applied to account for variations in control efficiency over time.

Calculations:

- Assuming a solvent recovery efficiency of 80%, and using the 80% rule effectiveness value, emissions are estimated as follows:
  *3,525 tons VOC/yr x [1-(.80)(.80)] = 1,269 tons VOC/yr
  *(1,269 tons/yr)/(6 days/wk x 52 wks/yr) = 4.07 tons VOC/O_3 day
  = 8.134 lbs VOC/O_3 day

PLANT INFORMATION

Plant Name: UNIVERSITY PUBLISHING Last Updated by: CAO on 07/28/89
Type of Inventory: 2
State: GEORGIA County: DADE CO AQCR: 54
NEDS Plant ID: 0137 CDS Plant ID: Local Plant ID:
Street Address: 6789 MAGNOLIA PARKEAY City: HAMLIN, USA Zip Code: 44444-4444
City Code: UTM Zone: 17 UTM Easting: 222.2 UTM Northing: 3333.3
Township/Modeling Grid Code:
SIC Codes - Primary: 2754 Secondary: Tertiary:
Principal Product: MAGAZINES Employees: 38 Plant Area: 5.0 acres
Plant Contact: JEAN SMITH Telephone Number: (919) 111-1212
Plant Level Comment:

County D

Fender Bender Repair
9876 Aspen Pike
Misenville, USA

General Facility Information:

Fender Bender Repair is an auto body repair shop located in County D. The company did not respond to the survey questionnaire. Follow-up telephone contacts were made to gather paint and solvent consumption data. The company did not maintain records for 1987 and was unable to estimate paint/solvent usage. The only information available was that 4 persons were employed during 1987.

Calculations:

- Emissions were estimated based on the number of employees. An employee -based emission factor was derived using paint/solvent consumption and employee data from three other area body shops.
- This source category is uncontrolled, so no rule effectiveness factor needs to be applied.

Company	County	VOC Emissions (lb/Ozone-day)	No of Employees	Employee Based Emission Factor (lb VOC/Employee)
Jacksonville	C	115.7	4	28.9
Kings	D	163.3	7	23.3
Twinkies	B	96.3	3	32.1
			AVERAGE:	28.1

- $\frac{28.1 \text{ lb VOC}}{\text{employee}} \times \frac{4 \text{ employees}}{O_3 \text{ day}} = \frac{112.4 \text{ lb VOC}}{O_3 \text{ day}}$

- Assuming 6 day per week, 52 weeks per year, annual emissions are estimated at 17.5 tons per year.

SMALL PLANT INFORMATION

Plant Name: FENDER BENDER REPAIR Last Updated by: GDR on 07/31/89
State: GEORGIA County: DADE CO
NEDS Plant ID: 0987
Street Address: 9876 ASPEN PIKE City: MISENVILLE, USA Zip Code: 22222-2222
SIC Codes: 7532
Source Category: Non-Industrial Surface Coating - Auto Refinishing
Number of Employees: 4
Activity Level (Per Day): 4 EMPLOYEES
Emission Factor: 112.4 LB VOC/EMPLOYEE
VOC Emissions: 112.4(pounds per day)
Small Plant Level Comment: EF BASED ON SURVEY DATA; UNIFORM ACTIVITY

King's Auto Body Repair
458 Mesquite Parkway
Hamlin, USA

General Facility Information:

King's Auto Body Repair shop is located in County D. In reply to the survey questionnaire, the company provided information regarding the types and quantities of paint and solvent used during 1987. King's employs 7 persons and operates 6 days per week, 52 weeks per year. Since this facility is not subject to air emission regulations and is uncontrolled, no rule effectiveness factor is applied. The following specific paint and solvent consumption data were provided:

Coating/Solvent	1987 Consumption gallons/yr	Coating Density (lb/gal)	WT% Solvent
Chassis paint	450	9.6	52
Primer	1600	9.4	54
Enamel	2900	7.6	47
Acrylic enamel	3300	8.9	49
Wax	100	7.9	42
Thinner	1800	7.4	100

Calculations:

- 100% of solvent evaporates
- Chassis paint:
  *450 gal/yr x 9.6 lb/gal x 52 lb VOC/100 lb paint = 2,246 lb VOC/yr
  *(2,246 lb VOC/yr)/(6 day/wk x 52 wks/yr) = 7.2 lb VOC/O_3 day
- Primer:
  *1600 x 9.4 x 54/100 = 8121.6 lb VOC/yr
  *(8121.6)/(6 x 52) = 26.0 lb VOC/O_3 day

- Enamel:
  *2900 x 7.6 x 47/100 = 10,358.8 lb VOC/yr
  *(10,358.8)/(6 x 52) = 33.2 lb VOC/O_3 day
- Acrylic enamel:
  *3,300 x 8.9 x 49/100 = 14,391.3 lb VOC/yr
  *(14,391.3)/(6 x 52) = 46.1 lb VOC/O_3 day
  Wax:
  *100 x 7.9 x 42/100 = 331.8 lb VOC/yr
  *(331.8)/(6 x 52) = 1.06 lb VOC/O_3 day
- Thinner:
  *1800 x 7.4 x 100/100 = 13.320 lb VOC/yr
  *(13.320)/(6 x 52) = 42.2 lb VOC/O_3 day

<u>Daily Ozone Season VOC Emissions:</u>

7.2 + 26.0 + 33.2 + 46.1 + 1.06 + 42.7 = 156.3 lb VOC/O_3 day

SMALL PLANT INFORMATION

Plant Name: KING'S AUTO BODY REPAIR Last Updated by: GDR on 07/31/89
State: GEORGIA County: DADE CO
NEDS Plant ID: 0684
Street Address: 458 MESQUITE PARKWAY City: HAMLIN, USA Zip Code: 88888-8888
SIC Codes: 7532
Source Category: Non-Industrial Surface Coating - Auto Refinishing
Number of Employees: 7
Activity Level (Per Day): 32.5 GALLONS PAINT & THINNER/DAY
Emission Factor: 4.8 LB/GALLON OF PAINT & THINNER
VOC Emissions: 156.3(pounds per day)
Small Plant Level Comment: EF BASED ON WEIGHTED AVG;UNIFORM ACTIVITY; 312 DAYS

County D

Waste Busters, Inc.
5392 E. Buckeye Hwy
Misenville, USA

General Facility Information:

Waste Busters, Inc., operates a municipal waste incinerator in County D. The facility consists of two identical mass burn waterwall furnaces, each designed to incinerate 1000 tons of refuse per day. In 1987, the facility operated at 100% of capacity for a total of 318 days. Operation was uniformly distributed throughout the year. The company has 24 on-site employees.

Emissions from the plant that were included in the O_3/CO inventory include: carbon monoxide, nitrogen oxides, and VOCs. Emission measurements performed during compliance tests form the basis for the emission estimates. Rule effectiveness was not applied since this source category is not currently subject to any air emission regulations.

Calculations:

- CO:
  2.2 lb CO/ton x 2000 ton/day = 4,400 lb CO/day
  4,400 lb CO/day x 318 days/year = 700 tons/year
- NO_x:
  3.6 lb NO_x/ton x 2000 ton/day = 7,200 lb NO_x/day
- VOC:
  0.10 lb VOC/ton x 2000 ton/day = 200 lb VOC/day
  200 lb VOC/day x 318 days/year = annual emissions of 32 tons

DETAILED POINT SOURCE LISTING

PLANT INFORMATION

Plant Name: WASTE BUSTERS, INC. Last Updated by: CAO on 07/28/89
Type of Inventory: 2
State: GEORGIA County: DADE CO AQCR: 54
NEDS Plant ID: 0767 CDS Plant ID: Local Plant ID:
Street Address: 5392 E BUCKEYE HWY City: MISENVILLE, USA Zip Code: 44444-4444
City Code: UTM Zone: 17 UTM Easting: 222.2 UTM Northing: 3333.3
Township/Modeling Grid Code:
SIC Codes - Primary: 3011 Secondary: Tertiary:
Principal Product: Employees: 24 Plant Area: 30.0 acres
Plant Contact: JEAN SMITH Telephone Number: (919) 111-1212
Plant Level Comment:

POINT INFORMATION

Point ID: 01 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - Longitude:
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: March through May:
June through August: September through November:
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

PROCESS INFORMATION

SCC Number: 5-01-001-01 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: SOLID WASTE DISPL GOVERNMENT MUNICIPAL INCIN MULTIPLE CHAMBER
Type of Source: Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: TONS BURNED
Actual Annual Process Rate: 318000 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 1000 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: CARBON MONOXIDE Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 2.2
Annual Nonbanked Emissions: 350 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 2200 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: NITROGENOUS COMPOUNDS (NOx) Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 3.6
Annual Nonbanked Emissions: 572 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 3600 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 0.1
Annual Nonbanked Emissions: 16 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.48 Rule Effectiveness: N/A
O3 Season Daily Emissions: 100 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment: UNIT #1

PROCESS INFORMATION

SCC Number: 5-01-001-01 SCC Sequence Number: 02 Last Updated by: GDR on 07/30/89
SCC Description: SOLID WASTE DISPL GOVERNMENT MUNICIPAL INCIN MULTIPLE CHAMBER
Type of Source: Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: TONS BURNED
Actual Annual Process Rate: 318000 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 1000 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: CARBON MONOXIDE Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 2.2
Annual Nonbanked Emissions: 350 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 2200 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: NITROGENOUS COMPOUNDS (NOx) Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 3.6
Annual Nonbanked Emissions: 572 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 3600 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 0.10
Annual Nonbanked Emissions: 16 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: Rule Effectiveness: N/A
O3 Season Daily Emissions: 100 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

County D

Joe's Oil Company
9846 Mulberry Road
Petersburg, USA

General Facility Information:

Joe's Oil Company operates a tank farm and truck loading facility in County D. The facility consists of 10 identical fixed-roof tanks, each 100 ft in diameter and having an average vapor space height of 7 ft. Each tank has a white roof and shell in good condition. The tank farm stores only gasoline (RVP=10.8) and has no daily variation in either the quantity stored or the daily throughput of 192,000 gallons per tank.

VOC emissions from the facility originate from two main sources: tank losses, which include breathing and working losses, and loading losses, which occur when organic vapors in "empty" cargo tanks are displaced to the atmosphere by the liquid being loaded into the tanks. VOC emissions were calculated using the approach outlined in AP-42. A rule effectiveness factor of 80% was applied to the loading losses to account for temporal variations in control efficiency.

The following list of specific data was provided by Joe's Oil Company and was the basis of the calculated emission estimates.

Climate and General Data for Ozoneville USA

- Average ozone season temperature: 83°F
- Average ozone season diurnal temperature variation: 15°F
- Average ozone season atmospheric pressure: 14.7 psia
- Length of ozone season: 7 months (217 days)
- Typical gasoline Reid vapor pressure during ozone season: 10.8 psia

Plant Data:

- Tank Description: Fixed roof tanks; 100 ft diameter; 40 ft height; tank shells and roof painted white.

County D

Joe's Oil Company

- Stored product: Motor gasoline (petroleum liquid); Reid vapor pressure of 10.8 psia; 5.6 lb/gal liquid density; no vapor or liquid composition given; 192,000 gal/day throughput for each tank.

- Loading system: Dedicated vapor balance service practicing vapor recovery with a measured efficiency of 95%. Gasoline tank truck volume is 8000 gallons, 240 trucks loaded each day.

<u>Calculations:</u>

- Total VOC emissions = Tank losses (breathing + working) + loading losses.
- Tank losses: Breathing losses

  $L_B = 2.26 \times 10^{-2}\ M_v(P/P_A-P)^{0.68}D^{1.73}H^{0.51}\ T^{0.50}F_pCK_c$

  L_B = breathing loss (lb/yr)

  M_v = 65, average molecular weight of vapor in storage tank (lb/lb-mole)

  P = 8.6, true vapor pressure at average actual liquid storage temperature (psia),

  P_A = 14.7, average atmosphere pressure (psia)

  D = 100, tank diameter

  H = 7, average vapor space height (ft)

  T = 15, average ambient diurnal change (°F)

  F_p = 1, paint factor (dimensionless)

  C = 1, adjustment factor for small diameter tanks (dimensionless)

  K_c = 1, product factor

  *Breathing losses for all 10 tanks = 10 L_B

  $= (10)(2.26 \times 10^{-2})(65)(8.6/14.7-8.6)^{0.68}(100)^{1.73(7)}0.51(15)^{0.50}(1)(1)(1)$

  = 559,107 lb/year

  *559,107 lb VOC/yr x yr/365 day = 1,531.8 lb VOC/ozone season day

- Tank Losses: Working losses:

  $L_w = 2.40 \times 10^{-5} M_vPVNK_NK_c$

  L_w = fixed roof working loss (lb/year)

  M_v = 65 lb/lb-mole

  P = 8.6 psia

  V = 1.94×10^6 gallons tank capacity

  N = 36, number of turnovers per year ($70.0 \times 10^6/1.94 \times 10^6$)

  K_N = 1, turnover factor (dimensionless)

  K_c = 1, product factor (dimensionless)

  *Working losses for all 10 tanks = 10 L_w

  = $(10)(2.40 \times 10^{-5})(65)(8.6)(1.94 \times 10^6)(36)(1)(1)$

  = 9,369,700 lb/year

  *9,369,700 lb/yr x yr/365 days = 25,670 lb VOC/ozone season day

  Loading losses - from tank truck loading (displacement of organic vapors from "empty" tanks).

  $L_L = 12.46\ SPM_v/T \times (1 - eff \times RE/100)$

  L_L = loading loss (lb/10^3 gal loaded)

  S = 1, saturation factor

  P = 8.6 psia

  M_v = 65 lb/lb-mole

  T = 543°R, temperature of gasoline

  eff = 95%, control efficiency

  RE = 0.80, rule effectiveness

  *loading losses = [(12.46)(1)(8.6)(6.5)/543](1 - (0.80)(0.95))

  = 0.31 lb VOC/10^3 gal loaded

  = 0.31 lb VOC/10^3 gal loaded x 1,920,000 gal loaded/day

  = 595.2 lb VOC/ozone season day

Daily ozone season VOC emissions for Joe's Oil Company are:

Breathing losses	=	1,531.8 lbs/day
Working losses	=	25,670 lbs/day
Loading losses	=	595 lbs/day
TOTAL:		27,797 lbs/day

DETAILED POINT SOURCE LISTING

PLANT INFORMATION

Plant Name: JOE'S OIL COMPANY Last Updated by: CAO on 07/28/89
Type of Inventory: 2
State: GEORGIA County: DADE CO AQCR: 54
NEDS Plant ID: 0228 CDS Plant ID: Local Plant ID:
Street Address: 9846 MULBERRY ROAD City: PETERSBURG, USA Zip Code: 44444-4444
City Code: UTM Zone: 17 UTM Easting: 222.2 UTM Northing: 3333.3
Township/Modeling Grid Code:
SIC Codes - Primary: 5171 Secondary: Tertiary:
Principal Product: GASOLINE Employees: 37 Plant Area: 20.0 acres
Plant Contact: JOE BLOW Telephone Number: (919) 111-1212
Plant Level Comment:

POINT INFORMATION

Point ID: 01 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - - Longitude:
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: March through May:
June through August: September through November:
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 497 Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Point Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-02 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 67K BBL-BREATHING
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: 2379 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 6.52 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 23.500
Annual Nonbanked Emissions: 28 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 153 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment: TANK #1

PROCESS INFORMATION

SCC Number: 4-04-001-08 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 WORKING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: 70000 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 191.8 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 13.4
Annual Nonbanked Emissions: 469 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 2570 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-19 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS VAR.VAPOR SP.TNKS GASOLINE-RVP 10 10.5K BBL-FILL LS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: 1920 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 5.26 CO Season Max 8-Hour Process Rate:
Process Level Comment:

POINT INFORMATION

Point ID: 02 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - - Longitude: - -
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: 25 March through May: 25
June through August: 25 September through November: 25
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 497 Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Point Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-02 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 67K BBL-BREATHING
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: 2379 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 6.52 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 23.500
Annual Nonbanked Emissions: 28 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 153 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

DETAILED POINT SOURCE LISTING

PROCESS INFORMATION

SCC Number: 4-04-001-08 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 WORKING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: 70000 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 191.8 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 13.4
Annual Nonbanked Emissions: 469 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 2570 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

POINT INFORMATION

Point ID: 03 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - - Longitude:
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs December through Febraury: 25 March through May: 25
June through August: 25 September through November: 25
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 497 Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Point Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-02 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 67K BBL-BREATHING
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: 2379 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 6.52 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION .

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 23.500
Annual Nonbanked Emissions: 28 tons per year . Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 153 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-08 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 WORKING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: 70000 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 191.8 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 13.4
Annual Nonbanked Emissions: 469 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 2570 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

POINT INFORMATION

Point ID: 04 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - - Longitude: - -
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: March through May:
June through August: September through November:
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 497 Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Point Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-02 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 67K BBL-BREATHING
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: 2379 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 6.52 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 23.500
Annual Nonbanked Emissions: 28 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 153 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-08 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 WORKING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: 70000 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 191.8 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 13.4
Annual Nonbanked Emissions: 469 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 2570 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

POINT INFORMATION

Point ID: 05 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - - Longitude:
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: 25 March through May: 25
June through August: 25 September through November: 25
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 497 Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Point Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-02 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 67K BBL-BREATHING
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: 2379 Maximum Design Rate: 6.520
O3 Season Daily Process Rate: 6.520 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 23.500
Annual Nonbanked Emissions: 28 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 153 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-08 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 WORKING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: 70000 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 191.8 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 13.4
Annual Nonbanked Emissions: 469 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: Rule Effectiveness: N/A
O3 Season Daily Emissions: 2570 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

POINT INFORMATION

Point ID: 06 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - - Longitude: - -
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: 25 March through May: 25
June through August: 25 September through November: 25
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 497 Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Point Emissions Level Comment: -

PROCESS INFORMATION

SCC Number: 4-04-001-02 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 67K BBL-BREATHING
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: 2379 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 6.52 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 23.500
Annual Nonbanked Emissions: 28 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 153 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-08 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 WORKING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: 70000 Maximum Design Rate: 0.000
03 Season Daily Process Rate: 191.8 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 13.4
Annual Nonbanked Emissions: 469 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
03 Season Daily Emissions: 2570 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

POINT INFORMATION

Point ID: 07 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: Longitude:
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: 25 March through May: 25
June through August: 25 September through November: 25
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 497 Estimation Method:
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Point Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-02 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 67K BBL-BREATHING
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: 2379 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 6.52 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 23.500
Annual Nonbanked Emissions: 28 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 153 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-08 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 WORKING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: 70000 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 191.8 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 13.4
Annual Nonbanked Emissions: 469 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: Rule Effectiveness: N/A
O3 Season Daily Emissions: 2570 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

POINT INFORMATION

Point ID: 08 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - - Longitude: -
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: 25 March through May: 25
June through August: 25 September through November: 25
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 497 Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Point Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-02 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 67K BBL-BREATHING
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: 2379 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 6.52 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 23.500
Annual Nonbanked Emissions: 28 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 153 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-08 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 WORKING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: 70000 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 191.8 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 13.4
Annual Nonbanked Emissions: 469 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: Rule Effectiveness: N/A
O3 Season Daily Emissions: 2570 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

POINT INFORMATION

Point ID: 09 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - - Longitude:
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: 25 March through May: 25
June through August: 25 September through November: 25
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 497 Estimation Method:
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Point Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-02 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 67K BBL-BREATHING
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: 2379 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 191.8 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 23.500
Annual Nonbanked Emissions: 28 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 4507 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-08 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 WORKING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: 70000 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 191.8 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 13.4
Annual Nonbanked Emissions: 469 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 2570 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

POINT INFORMATION

Point ID: 10 Local Point ID: Last Updated by: GDR on 07/30/89
SIC:
UTM Easting: 0.0 UTM Northing: 0.0 Latitude: - - Longitude: - -
Operating Schedule - Hours per day: 24 Days per week: 7 Weeks per year: 52
Start time: : Ending time: :
Throughputs - December through Febraury: 25 March through May: 25
June through August: 25 September through November: 25
Stack Parameters - Height: Diameter: 0.0 Temperature: Plume Rise:
Flowrate: Exit Velocity: 0.0 Points with Common Stack:
Boiler Capacity: Space Heat Percentage: 0.0
Point Level Comment:

POINT EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
Measured Emissions: Units: Method of Emissions Measurement:
Estimated Emissions: 497 Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Point Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-04-001-02 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 67K BBL-BREATHING
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS STORAGE CAPACITY
Actual Annual Process Rate: 2379 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 6.52 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALCULATED USING FEDERAL EMISSION FACTOR Emission Factor: 23.500
Annual Nonbanked Emissions: 28 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: 0.58 Rule Effectiveness: N/A
O3 Season Daily Emissions: 153 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

DETAILED POINT SOURCE LISTING

PROCESS INFORMATION

SCC Number: 4-04-001-08 SCC Sequence Number: 01 Last Updated by: GDR on 07/30/89
SCC Description: BULK TERMINALS FIXED ROOF TANKS GASOLINE-RVP 10 WORKING LOSS
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content:
Confidentiality: Not available for public review
Process Rate Units: 1000 GALLONS THROUGHPUT
Actual Annual Process Rate: 70000 Maximum Design Rate: 0.000
O3 Season Daily Process Rate: 191.8 CO Season Max 8-Hour Process Rate:
Process Level Comment:

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: GDR on 07/30/89
Primary Control Device: NO EQUIPMENT
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 0.0 %
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:

Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 13.4
Annual Nonbanked Emissions: 469 tons per year Annual Banked Emissions: 0 tons per year
Seasonal Adjustment Factor: Rule Effectiveness: N/A
O3 Season Daily Emissions: 2570 lbs CO Season Max 8-Hour Emissions: lbs
Process Emissions Level Comment:

County D

JR's Laundry and Car Wash
873 Juniper Way
Misenville, USA

General Facility Information:

JR's Laundry and Car Wash is located in County D, employs 23 people, and reported cleaning 500 tons of clothes and 800 cars during 1987. The company purchased 125,000 pounds of perchloroethylene in 1987. Assuming that all perchloroethylene was lost through evaporation, the emissions are 43,000 pounds per year. The company reported that cleaning activity stayed essentially constant throughout the year. The cleaning service operated 6 days per week, 52 weeks per year in 1987. Since this source category is unregulated, no rule effectiveness factor needs to be applied.

Calculations:

(43,000 lb/yr)/(6 days/wk x 52 wks/yr) = 138 lb VOC/O_3 day

SMALL PLANT INFORMATION

Plant Name: JR'S LAUNDRY AND CAR WASH Last Updated by: GDR on 07/31/89
State: GEORGIA County: DADE CO
NEDS Plant ID: 0686
Street Address: 873 JUNIPER WAY City: MISENVILLE, USA Zip Code: 44444-4444
SIC Codes: 7216
Source Category: Dry Cleaning - Perchloroethylene
Number of Employees: 23
Activity Level (Per Day): 142 LBS OF PERC
Emission Factor: 1 LB VOC/LB OF PERC
VOC Emissions: 138(pounds per day)
Small Plant Level Comment: UNIFORMED ACTIVITY; 312 DAYS PER YEAR

County D

Klutz Cleaning Service
5629 Paper Birch Parkway
Hamlin, USA

General Facility Information:

Klutz Cleaning Service is located in County D, employs 8 people and reported cleaning 49 tons of clothing in 1987. The company purchased 20,000 pounds of perchloroethylene in 1987. Assuming that all perchloroethylene was lost through evaporation, the emissions are 20,000 pounds VOC per year. Cleaning activity remained constant throughout the year (6 day per week, 52 weeks per year). Since this source category is unregulated, no rule effectiveness factor needs to be applied.

Calculations:

(20,000 lb VOC/yr)/(6 days/wk x 52 wks/yr) = 64 lb VOC/O_3 day

SMALL PLANT INFORMATION

Plant Name: KLUTZ CLEANING SERVICE Last Updated by: GDR on 07/31/89
State: GEORGIA County: DADE CO
NEDS Plant ID: 0755
Street Address: 5629 PAPER BIRCH PARKWAY City: HAMLIN, USA Zip Code: 44444-4444
SIC Codes: 7216
Source Category: Dry Cleaning - Perchloroethylene
Number of Employees: 8
Activity Level (Per Day): 64 LBS OF PERC
Emission Factor: 1 LB OF VOC/LB OF PERC
VOC Emissions: 64(pounds per day)
Small Plant Level Comment: UNIFORM ACTIVITY; 312 DAYS A YEAR

Bob's Cleaners & Used Clothes
783 Butternut Trail
Petersburg, USA

General Facility Information:

Bob's Cleaners is a dry cleaning facility and used clothing store located in County D. The company was identified through review of business listing in the yellow pages. The company did not respond to the survey questionnaire. Follow-up telephone calls revealed that the company did not maintain any records for the year 1987. The manager did, however, reveal that the cleaners employed 7 people in 1987, and operated 6 days per week, 52 weeks per year.

Calculations:

- Since no company-specific data were available, emissions for the 1987 base year were estimated using an employee-based emission factor derived from survey responses from other dry cleaners in the MSA.
- Since this source category is unregulated, no rule effectiveness factor needs to be applied.
- The following information was used to develop the emission factor:

Company	County	No of Employees	lb VOC per Ozone-day	lb VOC per Employee-day
Jiffy Cleaner	C	35	482	13.8
JR's Laundry & Car Wash	D	23	400	17.4
Same Day Cleaners	A	5	77	15.4
Klutz Cleaning Service	D	8	64	8.0
People's Cleaners	C	7	74	10.6
			AVERAGE:	13.0

- 13.0 lb VOC/emp day x 7 emp = 91 lb/O_3 day

SMALL PLANT INFORMATION

Plant Name: BOB'S CLEANERS & USED CLOTHES Last Updated by: GDR on 07/31/89
State: GEORGIA County: DADE CO
NEDS Plant ID: 0892
Street Address: 783 BUTTERNUT TRAIL City: PETERSBURG, USA Zip Code: 44444-3333
SIC Codes: 7216
Source Category: Dry Cleaning - Perchloroethylene
Number of Employees: 7
Activity Level (Per Day): 7 EMPLOYEES
Emission Factor: 13.0 LBS/EMPLOYEE
VOC Emissions: 91(pounds per day)
Small Plant Level Comment: EF BASED ON SURVEY DATA;UNIFORM ACTIVITY 312 DAYS

APPENDIX A.5 25-MILE BOUNDARY POINT SOURCES

- Static Power and Light Company

Static Power and Light
41 Sweetgum Hwy
Smithfield, USA

General Facility Information:

Static Power and Light in County E has four coal-fired boilers that act as peaking units. Stack tests performed in August 1987 provided an emission estimate for NO_x of 617.7 lb/hr. Coal consumption at the time of the stack test was 16 tons per hour per unit. This facility is not subject to regulations and therefore no rule effectiveness factor is applied.

Calculations:

- VOC emissions based on emission factor derived from stack test at Friendly Power Co. in County B. (0.133 lb VOC/ton of coal).
  *16 tons coal/hr x (0.133 lb VOC/ton coal) = 2.1 lb VOC/hr

- The company reported that between 6 a.m. and 12 p.m. (midnight) during the summer months, the units operated at 80% generating capacity. No power generation occurs from 12 p.m. to 6 a.m. The seasonal power generation is: summer 30%, fall 20%, winter 30%, spring 20%. Estimates for 1987 are based on these values and on the assumption that the results from the test represents weekday rates.
  *NO_x: 617.7 lb/hr x 18 hr/day = 11,118.6 lb/O_3 day
  *VOC: 2.1 lb/hr x 18 hr/day = 37.8 lb VOC/O_3 day
  *CO: 5 lb/ton coal x 16 ton coal/unit hr x 4 units x 18 hr/day = 5,760 lb CO/O_3 day

Appendix B

Additional Documentation for the Area Sources Inventory

Section

B.1. Emissions from Gasoline Marketing - Emission Factor Derivation Procedures for Storage Tank Filling

Storage Tank Filling, No Vapor Recovery

From AP-42 (ref 1): $L_L = 12.46 \frac{SPM}{T}$

Where L_L = loading loss, lb/10^3 gal loaded
S = saturation factor
P = true vapor pressure of liquid loaded, psia
M = molecular weight of vapors, lb/lb mole
T = temperature of bulk liquid loaded, °R

Let S = 1.45 (assumes splash loading; dedicated normal service)
P = 6.6 psia (assumes liquid temperature of 70° F)
M = 66 lbs/lb mole (assumes liquid temperature of 60° because no readily available data were identified)
T = (460 + 70) = 530 °R

Therefore $L_L = \frac{12.46 \times 1.45 \times 6.6 \times 66}{530} = 14.85$ lb/10^3 gal

Storage Tank Filling Submerged Filling, No Vapor Recovery

$$L_L = 12.46 \frac{SPM}{T}$$

Let S = 1.0
P = 6.6 psia
M = 66 lb/lb mole
T = 530 °R

Then $L_L = \frac{12.46 \times 1 \times 6.6 \times 66}{530} = 10.24$ lb/10^3 gal

REFERENCES:

1. U. S. EPA, OAQPS. Compilation of Air Pollutant Emission Factors, Volume I: Stationary Sources. 4th ed. AP-42. Research Triangle Park, North Carolina. September 1985. p.4.4-5.

B.1. TABLE B-1. SUMMARY OF EMISSIONS FROM GASOLINE MARKETING

County	Emission Source	Multiplier (10x3 gal)	VOC Emission Factor (lbs/10x3 gal)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)
A	Storage tank breathing and working losses	198,108	1	99.05	529.5
	Storage tank filling (splash loading, no vapor balance)	138,676	14.85	1029.67	6421.6
	Storage tank filling (submerged loading, no vapor recovery)	59,432	10.24	304.29	1897.7
	Vehicle refueling - displacement	198,108	11	1089.59	5824.6
	Vehicle refueling - spillage	198,108	0.7	69.34	370.7
	Tank truck transit losses--typical	198,108	0.12	11.89	74.1
SUBTOTAL				2603.83	15118.17
B	Storage tank breathing and working losses	91,188	1	45.59	243.7
	Storage tank filling (splash loading, no vapor balance)	63,832	14.85	473.95	2955.8
	Storage tank filling (submerged loading, no vapor recovery)	27,356	10.24	140.06	873.5
	Vehicle refueling - displacement	91,188	11	501.53	2681.0
	Vehicle refueling - spillage	91,188	0.7	31.92	170.6
	Tank truck transit losses--typical	91,188	0.12	5.47	34.1
SUBTOTAL				1198.53	6958.81
C	Storage tank breathing and working losses	179,712	1	89.86	480.3
	Storage tank filling (splash loading, no vapor balance)	125,798	14.85	934.05	5825.3
	Storage tank filling (submerged loading, no vapor recovery)	53,914	10.24	276.04	1721.5
	Vehicle refueling - displacement	179,712	11	988.42	5283.7
	Vehicle refueling - spillage	179,712	0.7	62.90	336.2
	Tank truck transit losses--typical	179,712	0.12	10.78	67.2
SUBTOTAL				2362.04	13714.32
D	Storage tank breathing and working losses	134,856	1	67.43	360.4
	Storage tank filling (splash loading, no vapor balance)	94,399	14.85	700.91	4371.3
	Storage tank filling (submerged loading, no vapor recovery)	40,457	10.24	207.14	1291.8
	Vehicle refueling - displacement	134,856	11	741.71	3964.9
	Vehicle refueling - spillage	134,856	0.7	47.20	252.3
	Tank truck transit losses--typical	134,856	0.12	8.09	50.5
SUBTOTAL				1772.48	10291.23
TOTAL		603,864	26.29	7936.89	46082.53

B.2. Emissions from Diesel Marketing Emission Factor Derivation Procedures

Since no emission factors for diesel emissions have been developed, the ratio of true vapor pressures, diesel; gasoline, is applied to the gasoline emission factors to derive diesel emission factors.

Diesel true vapor pressure ~ 0.1 psia at 125 ^{O}F
Gasoline ~ 6.6 psia at 70 ^{O}F
Ratio ~ $\frac{0.1}{6.6}$ = 0.015

Source	Gasoline Emission Factor		Ratio of Vapor Pressure		Diesel Emission Factor
1. Storage tank breathing and working losses	1.0	X	.030	=	.030 $lb/10^3$ gal
2. Storage tank filling (splash fill)	14.25	X	.030	=	.4275 $lb/10^3$ gal
3. Storage tank filling (submerged fill)	10.24	X	.030	=	.3072 $lb/10^3$ gal
4. Vehicle refueling	11.7	X	.030	=	.351 $lb/10^3$ gal
5. Truck transit losses (typical)	0.12	X	.030	=	.0036 $lb/10^3$ gal

B.2. TABLE B-2. SUMMARY OF EMISSIONS FROM DIESEL MARKETING

County	Emission Source	Multiplier (10x3 gal)	VOC Emission Factor (lbs/10x3 gal)	Annual VOC Emissions (tons/yr)	Daily VOC Emissions (lbs/day)
A	Storage tank breathing and working losses	1,734	0.015	0.013	0.07
	Storage tank filling (splash loading, no vapor balance)	1,214	0.223	0.135	0.84
	Storage tank filling (submerged loading, no vapor recovery)	520	0.154	0.040	0.25
	Vehicle refueling - displacement	1,734	0.165	0.143	0.76
	Vehicle refueling - spillage	1,734	0.010	0.009	0.05
	Tank truck transit losses--typical	1,734	0.002	0.002	0.01
SUBTOTAL				0.342	1.985
B	Storage tank breathing and working losses	775	0.015	0.006	0.03
	Storage tank filling (splash loading, no vapor balance)	543	0.223	0.060	0.38
	Storage tank filling (submerged loading, no vapor recovery)	233	0.154	0.018	0.11
	Vehicle refueling - displacement	775	0.165	0.064	0.34
	Vehicle refueling - spillage	775	0.010	0.004	0.02
	Tank truck transit losses--typical	775	0.002	0.001	0.00
SUBTOTAL				0.153	0.887
C	Storage tank breathing and working losses	1,623	0.015	0.012	0.07
	Storage tank filling (splash loading, no vapor balance)	1,136	0.223	0.127	0.79
	Storage tank filling (submerged loading, no vapor recovery)	487	0.154	0.037	0.23
	Vehicle refueling - displacement	1,623	0.165	0.134	0.72
	Vehicle refueling - spillage	1,623	0.010	0.009	0.05
	Tank truck transit losses--typical	1,623	0.002	0.001	0.01
SUBTOTAL				0.320	1.858
D	Storage tank breathing and working losses	1,157	0.015	0.009	0.05
	Storage tank filling (splash loading, no vapor balance)	810	0.223	0.090	0.56
	Storage tank filling (submerged loading, no vapor recovery)	347	0.154	0.027	0.17
	Vehicle refueling - displacement	1,157	0.165	0.095	0.51
	Vehicle refueling - spillage	1,157	0.010	0.006	0.03
	Tank truck transit losses--typical	1,157	0.002	0.001	0.01
SUBTOTAL				0.228	1.324
TOTAL		5,289	0.394	1.043	6.054

B.3. Emissions from Cutback Asphalt Paving - Emission Factor Derivation Procedure

Cutback asphalt consumption in the State 1987 = 8800.7 metric tons (including solvent content)(ref 1).

The following assumptions were made in order to develop an emission factor:

- Medium cure with solvent content = 35% by volume (ref 2)

  Solvent is kerosene, specific gravity = 0.80 (ref 3)

  Asphalt cement specific gravity = 1.00 (ref 3)

  70% of solvent evaporates (ref 2)

- 100% solvent that evaporates is reactive

Volume occupied by 8800.7 tons = weight cutback asphalt x average specific gravity of cutback asphalt

- At 65% asphalt cement, 35% solvent, average specific gravity =

$$(0.65 \times 1.00) + (0.35 \times 0.80) = 0.93$$

Therefore, volume used in 1987 = $\dfrac{8800.7 \text{ tons}}{0.93 \text{ g/ml}} \times \dfrac{10^6 \text{ liters}}{\text{ton}} \times \dfrac{\text{liter}}{10^3 \text{ ml}}$

$= 9.46 \times 10^6$ liter

At 35% solvent solvent content $= 0.35 \times (9.46 \times 10^6 \text{ liters})$
$= 3.31 \times 10^6$ liters

At 70% evaporation emissions $= 0.7 \times (3.31 \times 10^9 \text{ ml}) \times 0.80 \text{ g/ml}$
$= 1.85 \times 10^3$ Mg
$= 2.04 \times 10^3$ tons

The emission factor is: $\dfrac{2.04 \times 10^3 \text{ tons VOC}}{8800.7 \text{ tons cutback asphalt used}}$

$= 0.23$ tons VOC/ton cutback asphalt used

REFERENCES

1. Asphalt Usage 1987 - United States and Canada. 1987 Survey. Asphalt Institute, College Park, MD, April 1988, p.3.

2. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Technical Support Division, Monitoring and Reports Branch. Procedures for the Preparation of Emissions Inventories for Precursors of Ozone: Volume I. 3rd ed. EPA-450/4-88-021. December 1988. p. 4-24.

3. Telecon. Ozoneville SIP task force, to the Asphalt Institute. Information on Cutback Asphalt Use and Properties. November 1988.

4. Telecon. Ozoneville SIP task force to the State Dept. of Transportation. Number of Miles of Paved Highways in the Four County Area. November 1988.

B.4. Emissions from Roofing Operations - Procedures for Fuel Consumption Estimation and Emission Factor Derivation

According to the EPA Procedures Document (p. 4-25), emissions primarily result from fuel used to heat the asphalt. From national asphalt use figures, the State uses 121,680 metric tons(ref 1).

Assuming roofing activity is proportional to the number of households, the ratio of county:State can be used to estimate asphalt consumption in each county.

County A: $\frac{\text{154,355 households in the County}}{\text{2,390,000 households in the State}} = 0.065$

County B: $\frac{79{,}868}{2{,}390{,}000} = 0.033$

County C: $\frac{133{,}932}{2{,}390{,}000} = 0.056$

County D: $\frac{120{,}915}{2{,}390{,}000} = 0.051$

Therefore, county consumption is:

County A:	121,680 metric tons	x	0.065	=	7909.2
County B:	121,680 metric tons	x	0.033	=	4015.4
County C:	121,680 metric tons	x	0.056	=	6814.1
County D:	121,680 metric tons	x	0.051	=	6205.7
				total	24,944.4 tons

Information provided by a local contractor indicates that average asphalt content per square (100 ft^2) is 218 lbs (ref 2); therefore the counties use:

County A:	7909.2 tons	x 2000 lbs/ton	x	square/218 lbs	=	72,527 squares
County B:	4015.4	x	(9.17)		=	36,821
County C:	6814.1	x	(9.17)		=	62,485
County D:	6205.17	x	(9.17)		=	56,906
						228,739 squares

Information provided by a second local contractor indicates that the built-up membrane system is used 90% of the time, the torch-applied modified bitumen membrane system, 10% of the time in the area (ref 3). Therefore, on a county basis the numbers of squares laid by the two systems are as follows:

	Built-up	Torch-applied
County A:	72,527 x 0.9 = 65274 sq	72,527 x 0.1 = 7253 sq
County B:	36,821 x 0.9 = 33139 sq	36,821 x 0.1 = 3682 sq
County C:	62,485 x 0.9 = 56237 sq	62,485 x 0.1 = 6249 sq
County D:	56,906 x 0.9 = 51215 sq	56,906 x 0.1 = 5691 sq
	205865 sq	22875 sq

According to the National Roofing Contractors' Association, 75% of built-up membrane systems use LPG as heating fuel; 75% use kerosene. Furthermore, 2.4 lbs LPG/square and 0.5 gallons kerosene/square are consumed, respectively (ref 4). Fuel consumption for built-up membrane system is:

County	LPG(lbs)	kerosene (gals)
A	65274 x 0.75 x 2.4 = 117,493	65274 x 0.25 x 0.5 = 8159
B	33139 x 0.75 x 2.4 = 59,650	33139 x 0.25 x 0.5 = 4142
C	56237 x 0.75 x 2.4 = 101,227	56237 x 0.25 x 0.5 = 7030
D	51215 x 0.75 x 2.4 = 38,409	51215 x 0.25 x 0.5 = 6402
	316,779 lbs	25,733 gals

Assuming LPG density equals that of propane, 4.25 lbs/gal, weight LPG is converted to volume (ref 5). The National Roofing Contractors' Association also supplied data on fuel use with torch-applied systems. Typically, propane is used as the heating fuel with 0.8 gallons propane required per square (ref 4). Propane consumption by county is:

County A:	7253 x 0.8 =	5802 gals propane
County B:	3682 x 0.8 =	2946 gals propane
County C:	6249 x 0.8 =	4999 gals propane
County D:	5691 x 0.8 =	4553 gals propane
		18,300 gals propane

Both the National Roofing Contractors' Association and local contractors indicated that asphalt membranes are used 50-60% of the time, single-ply rubber membranes 40-50% of the time (refs 2,3,4). Assuming 55% asphalt, 45% rubber, the number of squares of rubber membranes laid can be estimated:

County A: $\frac{72,527}{55} \times 45 =$ 59,340 squares

County B: $\frac{36,821}{55} \times 45 =$ 30,126

County C: $\frac{62,485}{55} \times 45 =$ 51,124

County D: $\frac{56,906}{55} \times 45 =$ 46,559

187,149 squares

One local contractor reported information on the different systems of single-ply rubber membrane application. The systems differ in their use of solvent-containing materials on which he was also able to provide average numbers (ref 2).

Ballasted systems are used 50% of the time and require 0.05 gallons sealant and adhesive per square.

Adhered systems are used 35% of the time and require 0.6 gallons sealant and adhesive per square.

Mechanical systems are used 15% of the time and require 0.1 gallons sealant and adhesive per square.

According to a local contractor, 70% of the adhesive/sealant is solvent; average density is 7.0 lbs/gallon (ref 2). All the solvent is assumed to volatilise. Gallons of solvent-containing materials used is:

County A:

Ballasted	= [59,340 sq x 0.5 x 0.05 gals/sq] =	1484
Adhered	= [59,340 sq x 0.35 x 0.6 gals/sq] =	12461
Mechanical	= [59,340 sq x 0.15 x 0.1 gals/sq] =	890
		14840 gals

Similar calculations for the other counties:

County B: 753 + 6326 + 452 = 7531

County C: 1278 + 10736 + 767 = 12781

County D: 1164 + 9777 + 698 = 11639

total 46791 gals (four county total)

The emission factor is calculated as follows:

$$\frac{46,791 \text{ gals used} \times 70\% \text{ solvent} \times 7 \text{ lbs/gal}}{46.791 \times 10^3 \text{ gals used}} = 5236 \frac{\text{lbs}}{10^3 \text{ gals}}$$

REFERENCES

1. Asphalt Institute. Asphalt Use 1987 - United States and Canada, 1987 Survey. College Park, Maryland. April 1988. p.3.

2. Telecon. Ozoneville SIP task force to Delta Roofing Co. Industry Practices in the Ozoneville MSA. February 1989.

3. Telecon. Ozoneville SIP task force to Lang Roofing and Waterproofing Co. Industry Practices in the Ozoneville MSA. February 1989.

4. Telecon. Ozoneville SIP task force to National Roofing Contractors Association. Roofing Industry Practices. February 1989.

B.5. Emissions from Hazardous Waste Treatment, Storage, and Disposal Facilities Estimation Procedure

One solvent reclamation facility is reported by the Department of Environmental Regulation to be in operation in the county (ref 1). Using facility- specific data and an assumption about the solvent recovery efficiency, an estimate of emissions can be derived.

In 1987, the company processed 1300 tons solvent, 60-65% of which were volatile organic compounds. Assuming 80% recovery efficiency, the remaining 20% that is routed to a control device is:

$$1300 \times 0.65 \times 0.2 = 169.00 \text{ tons/yr}$$

The control device, a carbon adsorber designed to remove 95% of VOC, removes 90% of the VOC according to stack test data; the remainder is released to the atmosphere. A rule effectiveness factor of 80% is required in the absence of better documentation, however.

Therefore, estimated emissions are:

$$169.00 \text{ tons/yr} \times (1 - (0.9 \times 0.8)) = 47.32 \text{ tons/yr}$$

REFERENCES

1. Correspondence from the Dept. of Environmental Regulation to the Ozoneville SIP task force. Waste Management Practices in the Four-County Area. October 1988.

B.6. Emissions from Solid Waste Combustion - Procedure for Estimating Solid Waste Consumption

County A

Two types of combustion: industrial incineration
open burning

For industrial incineration, tons of solid waste burned is estimated from a factor provided by the EPA Procedures Document (p. 4-34):

395 tons/1000 mfg employees/year

From Census Bureau data, County A has 68,617 employees in manufacturing, therefore tons of solid waste burned is:

$$\frac{395 \text{ tons}}{1000 \text{ mfg employees}} \times 68.617 \times 10^3 \text{ mfg employees} = 27,104 \text{ tons}$$

For open burning, tons of solid waste burned is estimated from a factor also provided by the EPA Procedures Document (p. 4-34):

Residential = 450 tons/1000 rural popul/yr
Commercial/institution = 24 tons/1000 rural popul/yr
Industrial = 160 tons/1000 mfg employees/yr

Rural population is about 70% of the County population (ref 1); therefore, tons solid waste burned is:

$$\text{Residential} = \frac{450 \text{ tons}}{1000 \text{ rural popul}} \times 285 \times 10^3 \text{ rural popul} = 128,250$$

$$\text{Commercial/institutional} = \frac{24 \text{ tons}}{1000 \text{ rural popul}} \times 285 \times 10^3 \text{ rural popul} = 6,840$$

$$\text{Industrial} = \frac{160 \text{ tons}}{1000 \text{ mfg employees}} \times 68.617 \times 10^3 \text{ mfg employees} = 10,979$$

146,069 tons

County C

One type of combustion: open burning by the industrial sector

The factor to estimate tons of solid waste burned by this method is:

160 tons/1000 mfg employees/yr

From Census Bureau data, County C has 36,185 employees in manufacturing; therefore, tons of solid waste burned is:

$$\frac{160 \text{ tons}}{1000 \text{ mfg employees}} \quad X \quad 36.185 \times 10^3 \text{ mfg employees} \quad = \quad 5790 \text{ tons}$$

REFERENCES

1. Telecon. Ozoneville SIP task force to the Ozoneville Regional Planning Commission. Rural Population in County A in 1987. October 1988.

B.7. Emissions from Fuel Combustion - Procedure for Estimating Fuel Consumption in the Industrial Sector

From the 1985 NEDS Fuel Summary Report (ref 1), State fuel consumption by industrial area sources was as follows:

coal	648,020 tons
distillate oil	56,770 10^3 gals
residual oil	10,120 10^3 gals

Natural gas use data were provided by the local gas company by county for the base year, 1987, and are presented in the text.

To apportion State fuel use for industrial area sources to the county level, the ratio of county employment to State employment was calculated:

County A:	224,534/2,219,878	=	0.101
County B:	82,835/2,219,878	=	0.037
County C:	137,194/2,219,878	=	0.062
County D:	115,184/2,219,878	=	0.052

and applied to the NEDS data:

Fuel types:	Coal	Distillate oil	Residual oil
County A:	65450 tons	5734 x 10^3 gals	1022 x 10^3 gals
County B:	23977 tons	2100 x 10^3 gals	374 x 10^3 gals
County C:	40177 tons	3520 x 10^3 gals	627 x 10^3 gals
County D:	33697 tons	2952 x 10^3 gals	526 x 10^3 gals

Updating the 1985 fuel data to the base year, 1987, was achieved by applying average annual employment growth for the four counties (1985-1987); 4.2 percent (ref 2). The following equation was used with the 1985 data to calculate 1987 use shown in the text.

$$X_{1987} = X_{1985}(1 + 0.042)^2 \quad \text{where X is fuel use}$$

REFERENCES:

1. U. S. EPA. 1985 NEDS Annual Fuel Summary Report. Requested by the Ozoneville SIP task force. October 1988.

2. Ozoneville Regional Planning Commission. Employment and Household Projections: A Synoptic Report. February 1985.

B.8. Emissions from Miscellaneous Combustion - Emission Factor Derivation Procedure

These calculation sheets include the following:

1. Forest fires
2. Structure fires
3. Grass fires
4. Trash fires
5. Vehicle fires

A. Forest Fires/Grass Fires

Since the number of forest fires is not recorded separate from grass fires, average fuel loading factors and emission factors were used. From AP-42, Sections 2.4 (Open Burning) and 11.1 (Forest Wildfires):

	Fuel Loading Factor
woods, unspecified:	3.2 tons/acre
Southern region forests:	9 tons/acre
average:	6.1 tons/acre

Furthermore, Section 11.1 of AP-42 does not list non-methane VOC emissions data. Therefore, an average emission factor is calculated for each pollutant from the Section 2.4.

	VOC	NOx	CO
weeds, unspecified:	9 lbs/ton	---	85 lbs/ton
Ponderosa pine residue:	11 lbs/ton	4 lbs/ton	195 lbs/ton
average:	10 lbs/ton	4 lbs/ton	190 lbs/ton

One additional assumption made: 0.5 acres is burned per fire.

Emission factors, therefore, are:

$$\text{VOC} - \frac{6.1 \text{ tons burned}}{\text{fire}} \times \frac{0.5 \text{ acres}}{\text{fire}} \times \frac{10 \text{ lbs VOC emitted}}{\text{ton grass burned}} = \frac{30.5 \text{ lbs VOC}}{\text{fire}}$$

$$NO_x - 6.1 \times 0.5 \times 4 = \frac{12.2 \text{ lbs } NO_x}{\text{fire}}$$

$$CO - 6.1 \times 0.5 \times 190 = \frac{579.5 \text{ lbs CO}}{\text{fire}}$$

B. Structural Fires

The following assumptions are made in calculating emission factors:

15,000 board ft/structure
0.0833 ft^3/board $feet^3$
0.02 tons of board/ft^3
27% of structure is burned*
boards are ponderosa pine

AP-42 emission factors for open burning of ponderosa pine (section 2.4) are:

11 lbs VOC emitted/ton board burned
4 lbs NO_x emitted/ton board burned
195 lbs CO emitted/ton board burned

Emission factors, therefore, are:

$$\underline{\text{VOC}} - 15{,}000\ \frac{\text{board ft}}{\text{structure}} \times 0.0833\ \frac{\text{ft}^3}{\text{board ft}} \times 0.02\ \frac{\text{tons board}}{\text{ft}^3} \times \frac{27}{100} \times 11\ \frac{\text{lbs VOC}}{\text{ton board}}$$

$$= 74.22\ \frac{\text{lbs VOC}}{\text{structure}}$$

$$\underline{NO_x} - 15{,}000 \times 0.0833 \times 0.02 \times \frac{27}{100} \times 4 = 26.99\ \frac{\text{lbs } NO_x}{\text{structure}}$$

$$\underline{\text{CO}}\quad 15{,}000 \times 0.0833 \times 0.02 \times \frac{27}{100} \times 195 = 1315.72\ \frac{\text{lbs CO}}{\text{structure}}$$

C. Trash fires

Two assumptions are made in order to calculate emission factors:

trash is primarily municipal refuse or is similar in composition
0.125 tons trash burned/trash fire

Using these assumptions AP-42 emission factors for open burning of municipal refuse (section 2.4) may be applied:

30 lbs VOC emitted/ton trash burned
6 lbs NO_x emitted/ton trash burned
85 lbs CO emitted/ton trash burned

Emission factors, therefore, are:

$$\underline{\text{VOC}} - 0.125\ \frac{\text{tons trash burned}}{\text{trash fire}} \times 30\ \frac{\text{lbs VOC emitted}}{\text{ton trash burned}} = 3.75\ \frac{\text{lbs VOC}}{\text{trash fire}}$$

$\underline{NO_x}$ - 0.125 x 6 = 0.75 lbs NO_x/trash fire

$\underline{CO}$ - 0.125 x 85 = 74.38 lbs CO/trash fire

---

* Calculated from estimate of 6.8 tons material burned per fire (ref 1)

D. Vehicle Fires

Assuming that 0.075 tons material is burned per vehicle fire, AP-42 emission factors for open burning of automotive components (section 2.4) can be used to develop emission factors for vehicle fires. The AP-42 emission factors are:

32 lbs VOC emitted/ton material burned
4 lbs NO_x emitted/ton material burned
125 lbs CO emitted/ton material burned

Emission factors, therefore, are:

$$\underline{\text{VOC}} - 0.075\ \frac{\text{tons material burned}}{\text{vehicle fire}} \times 32\ \frac{\text{lbs VOC emitted}}{\text{ton material burned}} = 2.4\ \frac{\text{lbs VOC}}{\text{vehicle fire}}$$

$\underline{NO_x}$ - 0.075 x 4 = 0.3 lbs NO_x/vehicle fire

$\underline{CO}$ - 0.075 x 125 = 9.38 lbs CO/vehicle fire

REFERENCES

1. U. S. EPA, OAQPS, Monitoring and Reports Branch. Procedures for the Preparation of Emission Inventories for Precursors of Ozone: Volume I. 3rd ed. Final Draft. EPA-450/4-88-021. Research Triangle Park, North Carolina. December 1988. p.4-41.

B.9. Emissions from Leaking Underground Storage Tanks Procedures for Estimating the Number of Remediation Projects and the Emission Factor Derivation

Per references 1 and 2, the following assumptions were made:

70% of tanks in the State leak
10% of these are involved in remedial activity/yr
tank population in County A = 4,200
County B = 3,500
County C = 3,900
County D = 4,300

From this, the number of leaking tanks:

County A = 840
County B = 700
County C = 780
County D = 860

and the number that are being remediated is:

County A = 84
County B = 70
County C = 78
County D = 86

Again from reference 1, preliminary estimates of emissions from three remediation technologies are as follows:

1. <u>Soil aeration</u>:
For 100 cubic yds, saturated with gasoline, max. emission = 300 lbs VOC/hr which rapidly decreases to 20 lbs VOC/hr and is almost completely volatilized in the period of a week.

2. <u>Vacuum extraction</u>:
Max. from saturated soils = 100 lbs VOC/hr decreasing to 10 lbs VOC/hr. Levels decrease to negligible amount over the period of a few months.

3. <u>Air Stripping</u>:
Generally VOC emissions are relatively low, much less than 5 lbs VOC/hr which decreases with time. Projects can continue in the range of a year.

Because of the lack of information about the types of remediation taking place, a value must be selected from the range to represent emissions from remediation in general.

Level of Contamination	Range of Emissions	Project Duration
1. saturated	300 lbs/hr -> 20 lbs/hr	1 wk
2. saturated	100 lbs/hr -> 10 lbs/hr	2-3 months
3. saturated	<< 5 lbs/hr	1 yr

Setting the emission rate at 5 lbs/hr, project duration of 1 month, the average emissions per project:

$$5 \frac{lbs}{hr} \times 24 \frac{hrs}{day} \times 30 \frac{days}{month} \times 1 \frac{month}{project} = 3600 \frac{lbs}{project}$$

$$= 1.8 \text{ tons/project}$$

REFERENCES

1. Telecon. Ozoneville SIP task force, with the EPA Office of Underground Storage Tanks. Emissions from Leak Cleanup Activities. April 1988.

2. Telecon. Ozoneville SIP task force, with the State Dept. of Natural Resources. Groundwater Section. Population of registered tanks in the Ozoneville U.S.A. February 1988.

B.10. TABLE B-3. SUMMARY OF EMISSIONS FROM AIRCRAFT FROM OZONEVILLE INTERNATIONAL AIRPORT

TYPE OF AIRCRAFT	PERCENT OF OPERATIONS (REF 1)	NO. OF LANDING/ TAKEOFFS: 6/86-5/87 (Note A) (REF 2)	--EMISSION FACTORS (LB/LTO)-- CO (REF 4,5)	VOC (REF 4,5)	NOX (REF 4,5)	-------EMISSIONS (TONS/YR)------ CO (1987)	VOC (1987)	NOX (1987)
COMMERCIAL AIRCRAFT: (Note B)								
Boeing 727-200	18.97	50142	55.95	13.44	29.64	1402.73	336.96	743.11
Boeing 727 (Note C)	2.46	6502	55.95	13.44	29.64	181.90	43.70	96.37
Boeing 737-200/200	31.86	84214	37.3	8.96	19.76	1570.58	377.28	832.03
Boeing 727-300 (Note D)	10.06	26591	37.3	8.96	19.76	495.92	119.13	262.72
MD DC9-10 & 20 (Note E)	0.78	2062	37.3	8.96	19.76	38.45	9.24	20.37
Short 330 (Note F)	2.42	6397	7.16	5.08	0.82	22.90	16.25	2.62
Short 360 (Note F)	6.53	17260	7.16	5.08	0.82	61.79	43.84	7.08
BA Jetstream 31 (Note F)	9.52	25164	7.16	5.08	0.82	90.09	63.92	10.32
BAC 111	1.4	3701	103.36	72.42	15.04	191.24	134.00	27.83
Beechcraft 99	3.28	8670	7.16	5.08	0.82	31.04	22.02	3.55
Fokker-VFW F28	6.16	16282	67.46	30.66	26.93	549.20	249.61	219.24
MD DC9-30,40,50 & 80 (Note E)	2.83	7480	37.3	8.96	19.76	139.51	33.51	73.91
MD DC9-50	0.78	2062	37.3	8.96	19.76	38.45	9.24	20.37
Dash-7 (Note F)	2.59	6846	7.16	5.08	0.82	24.51	17.39	2.81
Dash-8 (Note F)	0.37	978	7.16	5.08	0.82	3.50	2.48	0.40
TOTAL	100.01	264444	36.62	11.18	17.57	4844.61	1479.56	2323.14
GENERAL AVIATION	NA	104116	18.8	0.41	0.028	978.69	21.34	1.46
MILITARY	NA	4051	48.8	27.1	9.16	98.84	54.89	18.55
						5922.14	1555.79	2343.15

NOTE A: Roundoff error causes total to be higher than the reported 264444 value for commercial aircraft.
NOTE B: Air taxi and air carrier operations by aircraft type based on reference 1.
NOTE C: Assumed to be the same as a Boeing 727-200.
NOTE D: Assumed to be the same as a Boeing 737-200
NOTE E: Assumed to be the same as a McDonnell-Douglas DC9-50.
NOTE F: Assumed to be the same as a Beechcraft 99.

References:

1. Official Airline Guide: North American Edition. Dun and Bradstreet Corp., Oakbrook, IL. c. May 1987.

2. FAA Air Traffic Activity. December 1987.

3. Ozoneville Regional Planning Commission. Employment and Household Projections. February 1985 p 16.

4. U. S. EPA. Procedures for Emission Inventory Preparation. Volume IV: Mobile Sources. EPA 450/4 81 026d. Research Triangle Park, NC. September 1981 pp. 5 9.

5 U. S. EPA, 08/85. Compilation of Air Pollutant Emission Factors, Vol. II: Mobile Source. 4th ed. AP 42. Research Triangle Park, NC. pp. II 1 14 II 1 15.

B.11. Emissions from Marine Vessels - Procedure for Estimating Fuel Use

Assuming: 10 hrs/boat/month
8 months of boat use

Then, annual boat use = 80 hrs/boat/month

Hourly fuel use is as follows:

Outboard	=	1.5 gal/hr
Inboard	=	3.0 gal/hr (ref 1)

Fuel use per boat, therefore, is:

Outboard	=	1.5 gal/hr	X	80 hr/boat	=	120 gal/boat
Inboard	=	3.0 gal/hr	X	80 hr/boat	=	240 gal/boat

The State Wildlife Commission provided data on the total numbers of boats registered in the State (ref 2). They indicated that approximately 97% are outboard, 3% inboard. Using the water surface area approach described in the procedures document, the number of boats in the MSA is estimated at 52,521. Using the estimated split between outboard and inboard motors 97%/3% gives the following:

1,421 boats with inboard engines
51,100 boats with outboard engines

Annual fuel use is:

$$\text{Outboard} = 51{,}100 \text{ boats} \times \frac{12 \text{ gal}}{\text{boat yr}} = \frac{6{,}132{,}000 \text{ gal}}{\text{year}}$$

$$\text{Inboard} = 1{,}421 \text{ boats} \times \frac{240 \text{ gal}}{\text{boat yr}} = \frac{341{,}040 \text{ gal}}{\text{year}}$$

REFERENCES

1. U. S. EPA, OAQPS. Procedures for the Preparation of Emission Inventories for Precursors of Ozone. Volume 1. 3rd. ed. Revised Draft Report. Research Triangle Park, North Carolina. August 1988.

2. Telecon. Ozoneville SIP task force to the State Wildlife Commission. Number of Marine Vessels Registered in the Four Counties. October 1988.

B.12. TABLE B-4.1. SUMMARY OF EMISSIONS FROM CONSTRUCTION EQUIPMENT - COUNTY A

EQUIPMENT TYPE	FUEL TYPE	PERCENT EQUIP USING EA FUEL TYPE (NOTE A) (REF 1)	ESTIMATED EQUIP COUNTS U.S. - 1975 (REF 1,2)	% ANNUAL INDUSTRY GROWTH 1976-1985 (REF 3)	ESTIMATED EQUIP COUNTS U.S. - 1987	NO. EMPLOYEES IN SIC 16 U.S. - 1985 (REF 4)	NO. EMPLOYEES IN SIC 16 CO. - 1985 (REF 5)	RATIO OF EMPLOYEES IN SIC 16, CO:US	ESTIM EQUIPMENT COUNTS IN THE COUNTY (1987) (NOTE B)	ANNUAL HOURS OF OPERATION PER UNIT (REF 6)	TOTAL HOURS OF OPERATION BY UNIT TYPE
TRACKLAYING TRACTOR	DIESEL	100	197,000	0.02	197,079	691,223	15,157	0.0219	4,322	1050	4,537,580
TRACKLAYING LOADER	DIESEL	100	86,000	0.02	86,034	691,223	15,157	0.0219	1,887	1100	2,075,200
MOTOR GRADER	DIESEL	92	87,676	0.02	87,711	691,223	15,157	0.0219	1,923	830	1,596,348
MOTOR GRADER	GASOLINE	7.6	7,243	0.02	7,246	691,223	15,157	0.0219	159	830	131,872
SCRAPER	DIESEL	100	27,000	0.02	27,011	691,223	15,157	0.0219	592	2000	1,184,575
OFF-HIGHWAY TRUCK	DIESEL	100	20,800	0.02	20,808	691,223	15,157	0.0219	456	2000	912,561
WHEELED LOADER	DIESEL	70	93,800	0.02	93,838	691,223	15,157	0.0219	2,058	1140	2,345,722
WHEELED LOADER	GASOLINE	30	40,200	0.02	40,216	691,223	15,157	0.0219	882	1140	1,005,309
WHEELED TRACTOR	DIESEL	84.6	369,702	0.02	369,850	691,223	15,157	0.0219	8,110	740	6,001,396
WHEELED TRACTOR	GASOLINE	15.4	67,298	0.02	67,325	691,223	15,157	0.0219	1,476	740	1,092,453
ROLLER	DIESEL	30.8	25,133	0.02	25,143	691,223	15,157	0.0219	551	740	407,982
ROLLER	GASOLINE	69.2	56,467	0.02	56,490	691,223	15,157	0.0219	1,239	740	916,636
WHEELED DOZER (NOTE C)	DIESEL	100	2,700	0.02	2,701	691,223	15,157	0.0219	59	2000	118,457
MISCELLANEOUS	DIESEL	75	75,000	0.02	75,030	691,223	15,157	0.0219	1,645	1000	1,645,243
MISCELLANEOUS	GASOLINE	25	25,000	0.02	25,010	691,223	15,157	0.0219	548	1000	548,414
					1,181,491				25908		24,519,749

B.12. TABLE B-4.1 (Continued).

EQUIPMENT TYPE	FUEL TYPE	TOTAL HOURS OF OPERATION BY UNIT TYPE	VOC EMISSION FACTOR (G/HR OPERAT) (REF 6,7)	NOX EMISSION FACTOR (G/HR OPERAT) (REF 6)	CO EMISSION FACTOR (G/HR OPERAT) (REF 6)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
TRACKLAYING TRACTOR	DIESEL	4,537,580	55.06	570	157.01	275.46	2,851.62	785.50
TRACKLAYING LOADER	DIESEL	2,075,200	44.55	375.22	91.15	101.93	858.50	208.55
MOTOR GRADER	DIESEL	1,596,348	18.07	324.43	68.46	31.80	571.01	120.49
MOTOR GRADER	GASOLINE	131,872	253.1	145	5490	36.80	21.08	798.21
SCRAPER	DIESEL	1,184,575	128.15	1740.74	568.19	167.37	2,273.47	742.08
OFF-HIGHWAY TRUCK	DIESEL	912,561	86.84	1889.16	816.81	87.37	1,900.74	821.82
WHEELED LOADER	DIESEL	2,345,722	113.17	858.19	259.58	292.69	2,219.49	671.34
WHEELED LOADER	GASOLINE	1,005,309	318.9	235	7060	353.47	260.47	7,825.23
WHEELED TRACTOR	DIESEL	6,001,396	85.26	575.84	1622.77	564.14	3,810.19	10,737.47
WHEELED TRACTOR	GASOLINE	1,092,453	227.5	195	4320	274.02	234.87	5,203.30
ROLLER	DIESEL	407,982	30.58	392.9	137.97	13.76	176.73	62.06
ROLLER	GASOLINE	916,636	360.7	164	6080	364.53	165.74	6,144.59
WHEELED DOZER (NOTE C)	DIESEL	118,457						
MISCELLANEOUS	DIESEL	1,645,243	69.35	767.3	306.37	125.80	1,391.84	555.74
MISCELLANEOUS	GASOLINE	548,414	330.1	187	7720	199.59	113.07	4,667.87
		24,519,749				2,888.72	16,848.82	39,344.24

B.12. TABLE B-4.2. SUMMARY OF EMISSIONS FROM CONSTRUCTION EQUIPMENT - COUNTY B

EQUIPMENT TYPE	FUEL TYPE	PERCENT EQUIP USING EA FUEL TYPE (NOTE A) (REF 1)	ESTIMATED EQUIP COUNTS U.S. - 1975 (REF 1,2)	% ANNUAL INDUSTRY GROWTH 1976-1985 (REF 3)	ESTIMATED EQUIP COUNTS U.S. - 1987	NO. EMPLOYEES IN SIC 16 U.S. - 1985 (REF 4)	NO. EMPLOYEES IN SIC 16 CO. - 1985 (REF 5)	RATIO OF EMPLOYEES IN SIC 16, CO:US	ESTIM EQUIPMENT COUNTS IN THE COUNTY (1987) (NOTE B)	ANNUAL HOURS OF OPERATION PER UNIT (REF 6)	TOTAL HOURS OF OPERATION BY UNIT TYPE
TRACKLAYING TRACTOR	DIESEL	100	197,000	0.02	197,079	691,223	3,856	0.0056	1,099	1050	1,154,378
TRACKLAYING LOADER	DIESEL	100	86,000	0.02	86,034	691,223	3,856	0.0056	480	1100	527,939
MOTOR GRADER	DIESEL	92	87,676	0.02	87,711	691,223	3,856	0.0056	489	830	406,117
MOTOR GRADER	GASOLINE	7.6	7,243	0.02	7,246	691,223	3,856	0.0056	40	830	33,549
SCRAPER	DIESEL	100	27,000	0.02	27,011	691,223	3,856	0.0056	151	2000	301,360
OFF-HIGHWAY TRUCK	DIESEL	100	20,800	0.02	20,808	691,223	3,856	0.0056	116	2000	232,159
WHEELED LOADER	DIESEL	70	93,800	0.02	93,838	691,223	3,856	0.0056	523	1140	596,761
WHEELED LOADER	GASOLINE	30	40,200	0.02	40,216	691,223	3,856	0.0056	224	1140	255,755
WHEELED TRACTOR	DIESEL	84.6	369,702	0.02	369,850	691,223	3,856	0.0056	2,063	740	1,526,779
WHEELED TRACTOR	GASOLINE	15.4	67,298	0.02	67,325	691,223	3,856	0.0056	376	740	277,924
ROLLER	DIESEL	30.8	25,133	0.02	25,143	691,223	3,856	0.0056	140	740	103,792
ROLLER	GASOLINE	69.2	56,467	0.02	56,490	691,223	3,856	0.0056	315	740	233,196
WHEELED DOZER (NOTE C)	DIESEL	100	2,700	0.02	2,701	691,223	3,856	0.0056	15	2000	30,136
MISCELLANEOUS	DIESEL	75	75,000	0.02	75,030	691,223	3,856	0.0056	419	1000	418,556
MISCELLANEOUS	GASOLINE	25	25,000	0.02	25,010	691,223	3,856	0.0056	140	1000	139,519
					1,181,491				6591		6,237,920

B.12. TABLE B-4-2 (Continued).

EQUIPMENT TYPE	FUEL TYPE	VOC EMISSION FACTOR (G/HR OPERAT) (REF 6,7)	NOX EMISSION FACTOR (G/HR OPERAT) (REF 6)	CO EMISSION FACTOR (G/HR OPERAT) (REF 6)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
TRACKLAYING TRACTOR	DIESEL	55.06	570	157.01	70.08	725.46	199.83
TRACKLAYING LOADER	DIESEL	44.55	375.22	91.15	25.93	218.40	53.06
MOTOR GRADER	DIESEL	18.07	324.43	68.46	8.09	145.27	30.65
MOTOR GRADER	GASOLINE	253.1	145	5490	9.36	5.36	203.07
SCRAPER	DIESEL	128.15	1740.74	568.19	42.58	578.38	188.79
OFF-HIGHWAY TRUCK	DIESEL	86.84	1889.16	816.81	22.23	483.56	209.07
WHEELED LOADER	DIESEL	113.17	858.19	259.58	74.46	564.65	170.79
WHEELED LOADER	GASOLINE	318.9	235	7060	89.92	66.26	1,990.77
WHEELED TRACTOR	DIESEL	85.26	575.84	1622.77	143.52	969.33	2,731.65
WHEELED TRACTOR	GASOLINE	227.5	195	4320	69.71	59.75	1,323.74
ROLLER	DIESEL	30.58	392.9	137.97	3.50	44.96	15.79
ROLLER	GASOLINE	360.7	164	6080	92.74	42.17	1,563.21
WHEELED DOZER (NOTE C)	DIESEL						
MISCELLANEOUS	DIESEL	69.35	767.3	306.37	32.00	354.09	141.38
MISCELLANEOUS	GASOLINE	330.1	187	7720	50.78	28.77	1,187.52
					734.90	4,286.41	10,009.33

B.12. TABLE B-4.3. SUMMARY OF EMISSIONS FROM CONSTRUCTION EQUIPMENT - COUNTY C

EQUIPMENT TYPE	FUEL TYPE	PERCENT EQUIP USING EA FUEL TYPE (NOTE A) (REF 1)	ESTIMATED EQUIP COUNTS U.S. - 1975 (REF 1,2)	% ANNUAL INDUSTRY GROWTH 1976-1985 (REF 3)	ESTIMATED EQUIP COUNTS U.S. - 1987	NO. EMPLOYEES IN SIC 16 U.S. - 1985 (REF 4)	NO. EMPLOYEES IN SIC 16 CO. - 1985 (REF 5)	RATIO OF EMPLOYEES IN SIC 16, CO:US	ESTIM EQUIPMENT COUNTS IN THE COUNTY (1987) (NOTE B)	ANNUAL HOURS OF OPERATION PER UNIT (REF 6)
TRACKLAYING TRACTOR	DIESEL	100	197,000	0.02	197,079	691,223	7,905	0.0114	2,254	1050
TRACKLAYING LOADER	DIESEL	100	86,000	0.02	86,034	691,223	7,905	0.0114	984	1100
MOTOR GRADER	DIESEL	92	87,676	0.02	87,711	691,223	7,905	0.0114	1,003	830
MOTOR GRADER	GASOLINE	7.6	7,243	0.02	7,246	691,223	7,905	0.0114	83	830
SCRAPER	DIESEL	100	27,000	0.02	27,011	691,223	7,905	0.0114	309	2000
OFF-HIGHWAY TRUCK	DIESEL	100	20,800	0.02	20,808	691,223	7,905	0.0114	238	2000
WHEELED LOADER	DIESEL	70	93,800	0.02	93,838	691,223	7,905	0.0114	1,073	1140
WHEELED LOADER	GASOLINE	30	40,200	0.02	40,216	691,223	7,905	0.0114	460	1140
WHEELED TRACTOR	DIESEL	84.6	369,702	0.02	369,850	691,223	7,905	0.0114	4,230	740
WHEELED TRACTOR	GASOLINE	15.4	67,298	0.02	67,325	691,223	7,905	0.0114	770	740
ROLLER	DIESEL	30.8	25,133	0.02	25,143	691,223	7,905	0.0114	288	740
ROLLER	GASOLINE	69.2	56,467	0.02	56,490	691,223	7,905	0.0114	646	740
WHEELED DOZER (NOTE C)	DIESEL	100	2,700	0.02	2,701	691,223	7,905	0.0114	31	2000
MISCELLANEOUS	DIESEL	75	75,000	0.02	75,030	691,223	7,905	0.0114	858	1000
MISCELLANEOUS	GASOLINE	25	25,000	0.02	25,010	691,223	7,905	0.0114	286	1000
					1,181,491				13512	

B.12. TABLE B-4-3 (Continued).

EQUIPMENT TYPE	FUEL TYPE	VOC EMISSION FACTOR (G/HR OPERAT) (REF 6,7)	NOX EMISSION FACTOR (G/HR OPERAT) (REF 6)	CO EMISSION FACTOR (G/HR OPERAT) (REF 6)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
TRACKLAYING TRACTOR	DIESEL	55.06	570	157.01	143.66	1,487.24	409.67
TRACKLAYING LOADER	DIESEL	44.55	375.22	91.15	53.16	447.74	108.77
MOTOR GRADER	DIESEL	18.07	324.43	68.46	16.59	297.80	62.84
MOTOR GRADER	GASOLINE	253.1	145	5490	19.19	11.00	416.30
SCRAPER	DIESEL	128.15	1740.74	568.19	87.29	1,185.71	387.02
OFF-HIGHWAY TRUCK	DIESEL	86.84	1889.16	816.81	45.57	991.32	428.61
WHEELED LOADER	DIESEL	113.17	858.19	259.58	152.65	1,157.55	350.13
WHEELED LOADER	GASOLINE	318.9	235	7060	184.35	135.85	4,081.18
WHEELED TRACTOR	DIESEL	85.26	575.84	1622.77	294.22	1,987.17	5,600.03
WHEELED TRACTOR	GASOLINE	227.5	195	4320	142.91	122.50	2,713.74
ROLLER	DIESEL	30.58	392.9	137.97	7.17	92.17	32.37
ROLLER	GASOLINE	360.7	164	6080	190.12	86.44	3,204.66
WHEELED DOZER (NOTE C)	DIESEL						
MISCELLANEOUS	DIESEL	69.35	767.3	306.37	65.61	725.90	289.84
MISCELLANEOUS	GASOLINE	330.1	187	7720	104.10	58.97	2,434.49
					1,506.59	8,787.35	20,519.84

B.12. TABLE B-4.4. SUMMARY OF EMISSIONS FROM CONSTRUCTION EQUIPMENT - COUNTY D

EQUIPMENT TYPE	FUEL TYPE	PERCENT EQUIP USING EA FUEL TYPE (NOTE A) (REF 1)	ESTIMATED EQUIP COUNTS U.S. - 1975 (REF 1,2)	% ANNUAL INDUSTRY GROWTH 1976-1985 (REF 3)	ESTIMATED EQUIP COUNTS U.S. - 1987	NO. EMPLOYEES IN SIC 16 U.S. - 1985 (REF 4)	NO. EMPLOYEES IN SIC 16 CO. - 1985 (REF 5)	RATIO OF EMPLOYEES IN SIC 16, CO:US	ESTIM EQUIPMENT COUNTS IN THE COUNTY (1987) (NOTE B)	ANNUAL HOURS OF OPERATION PER UNIT (REF 6)	TOTAL HOURS OF OPERATION BY UNIT TYPE
TRACKLAYING TRACTOR	DIESEL	100	197,000	0.02	197,079	691,223	6,502	0.0094	1,854	1050	1,946,516
TRACKLAYING LOADER	DIESEL	100	86,000	0.02	86,034	691,223	6,502	0.0094	809	1100	890,212
MOTOR GRADER	DIESEL	92	87,676	0.02	87,711	691,223	6,502	0.0094	825	830	684,796
MOTOR GRADER	GASOLINE	7.6	7,243	0.02	7,246	691,223	6,502	0.0094	68	830	56,570
SCRAPER	DIESEL	100	27,000	0.02	27,011	691,223	6,502	0.0094	254	2000	508,155
OFF-HIGHWAY TRUCK	DIESEL	100	20,800	0.02	20,808	691,223	6,502	0.0094	196	2000	391,468
WHEELED LOADER	DIESEL	70	93,800	0.02	93,838	691,223	6,502	0.0094	883	1140	1,006,260
WHEELED LOADER	GASOLINE	30	40,200	0.02	40,216	691,223	6,502	0.0094	378	1140	431,254
WHEELED TRACTOR	DIESEL	84.6	369,702	0.02	369,850	691,223	6,502	0.0094	3,479	740	2,574,459
WHEELED TRACTOR	GASOLINE	15.4	67,298	0.02	67,325	691,223	6,502	0.0094	633	740	468,637
ROLLER	DIESEL	30.8	25,133	0.02	25,143	691,223	6,502	0.0094	237	740	175,015
ROLLER	GASOLINE	69.2	56,467	0.02	56,490	691,223	6,502	0.0094	531	740	393,215
WHEELED DOZER (NOTE C)	DIESEL	100	2,700	0.02	2,701	691,223	6,502	0.0094	25	2000	50,816
MISCELLANEOUS	DIESEL	75	75,000	0.02	75,030	691,223	6,502	0.0094	706	1000	705,771
MISCELLANEOUS	GASOLINE	25	25,000	0.02	25,010	691,223	6,502	0.0094	235	1000	235,257
					1,181,491				11114		10,518,401

B.12. TABLE B-4.4 (Continued).

EQUIPMENT TYPE	FUEL TYPE	VOC EMISSION FACTOR (G/HR OPERAT) (REF 6,7)	NOX EMISSION FACTOR (G/HR OPERAT) (REF 6)	CO EMISSION FACTOR (G/HR OPERAT) (REF 6)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
TRACKLAYING TRACTOR	DIESEL	55.06	570	157.01	118.16	1,223.28	336.96
TRACKLAYING LOADER	DIESEL	44.55	375.22	91.15	43.73	368.28	89.46
MOTOR GRADER	DIESEL	18.07	324.43	68.46	13.64	244.95	51.69
MOTOR GRADER	GASOLINE	253.1	145	5490	15.79	9.04	342.41
SCRAPER	DIESEL	128.15	1740.74	568.19	71.80	975.27	318.33
OFF-HIGHWAY TRUCK	DIESEL	86.84	1889.16	816.01	37.48	815.37	352.54
WHEELED LOADER	DIESEL	113.17	858.19	259.58	125.56	952.11	287.99
WHEELED LOADER	GASOLINE	318.9	235	7060	151.63	111.74	3,356.84
WHEELED TRACTOR	DIESEL	85.26	575.84	1622.77	242.00	1,634.48	4,606.12
WHEELED TRACTOR	GASOLINE	227.5	195	4320	117.55	100.75	2,232.10
ROLLER	DIESEL	30.58	392.9	137.97	5.90	75.81	26.62
ROLLER	GASOLINE	360.7	164	6080	156.38	71.10	2,635.89
WHEELED DOZER (NOTE C)	DIESEL						
MISCELLANEOUS	DIESEL	69.35	767.3	306.37	53.96	597.07	238.40
MISCELLANEOUS	GASOLINE	330.1	187	7720	85.62	48.50	2,002.41
					1,239.19	7,227.75	16,877.76

NOTE A: This means percent of total equipment using a particular fuel type (i.e., diesel + gas = 100 in most cases).
NOTE B: Equipment in use in the county determined by the ratio of county employment to national employment, 1985.
NOTE C: Wheeled dozer emissions are included in the off-highway truck category

References:

1. U. S. EPA. Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines - Part 5, Heavy-Duty Farm, Construction, and Industrial Engines. APTD-1494. Research Triangle Park, NC. October 1973.

2. U. S. EPA. Methodology for Estimating Emissions from Off Highway Mobile Sources for the PRS Program. EPA-450/3-75-002. Research Triangle Park, NC. October 1974.

3. CENDATA. Online Information Utility of the U.S. Bureau of the Census on DIALOG. Construction and Housing Data. July 1987.

4. U.S. Department of Commerce, Bureau of the Census. County Business Patterns 1985 U.S..

5. U.S. Department of Commerce, Bureau of the Census. County Business Patterns 1985 State.

6. U. S. EPA, OAQPS. Compilation of Air Pollutant Emission Factors Vol. II: Mobile Sources. 4th ed. AP 42. Research Triangle Park, NC. September 1985. p.11-7-2 to 11-7-6.

7. U.S. EPA, OAQPS. Volatile Organic Compound (VOC) Species Data Manual. 2nd. ed EPA 450/4 80-015. Research Triangle Park, NC. July 1980.

B.13. TABLE B-5.1. SUMMARY OF EMISSIONS FROM AGRICULTURE EQUIPMENT - COUNTY A

EQUIPMENT TYPE	TOTAL NO. OF UNITS IN THE CO. (1985) (REF 1)	% ANNUAL GROWTH (REF 2) (NOTE A)	ESTIM TOTAL NO. OF UNITS IN THE CO. (1987)	TYPE FUEL USED	PERCENT OF TOTAL USING EACH FUEL TYPE (REF 3)	ESTIM. NO. OF EACH TYPE OF UNIT	AVE HOURS OF OPERAT BY UNIT TYPE (REF 4)	TOTAL HRS OF OPERAT BY UNIT TYPE	VOC EMISSION FACTOR (G/HR OPER) (REF 4,5) (NOTE C)	NOX EMISSION FACTOR (G/HR OPER) (REF 5)	CO EMISSION FACTOR (G/HR OPER) (REF 5)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
TRACTORS	769	0.15	771	DIESEL	35	270	490	132,279	76.2	452	161	11.11	65.92	23.48
TRACTORS				GASOLINE	65	501	291	145,893	203.4	157	3380	32.72	25.25	543.68
COMBINES (NOTE B)	31	0.15	31	DIESEL	50	16	71	1,104	37.8	210	95.2	0.05	0.26	0.12
COMBINES (NOTE B)				GASOLINE	50	16	71	1,104	190.3	105	4360	0.23	0.13	5.31
PICKUP BALERS	117	0.15	117	GASOLINE	100	117	24	2,816	233.5	105	4360	0.73	0.33	13.54
HARVESTERS	46	0.15	46	DIESEL	100	46	120	5,537	37.8	210	95.2	0.23	1.28	0.58
								288,733	141.6	292.7	1843.0	45.06	93.17	586.70

B.13. TABLE B-5.2. SUMMARY OF EMISSIONS FROM AGRICULTURE EQUIPMENT - COUNTY B

EQUIPMENT TYPE	TOTAL NO. OF UNITS IN THE CO. (1985) (REF 1)	% ANNUAL GROWTH (REF 2) (NOTE A)	ESTIM TOTAL NO. OF UNITS IN THE CO. (1987)	TYPE FUEL USED	PERCENT OF TOTAL USING EACH FUEL TYPE (REF 3)	ESTIM. NO. OF EACH TYPE OF UNIT	AVE HOURS OF OPERAT BY UNIT TYPE (REF 4)	TOTAL HRS OF OPERAT BY UNIT TYPE	VOC EMISSION FACTOR (G/HR OPER) (REF 4,5) (NOTE C)	NOX EMISSION FACTOR (G/HR OPER) (REF 5)	CO EMISSION FACTOR (G/HR OPER) (REF 5)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
TRACTORS	402	0.15	403	DIESEL	35	141	490	69,150	76.2	452	161	5.81	34.46	12.27
TRACTORS				GASOLINE	65	262	291	76,267	203.4	157	3380	17.10	13.20	284.21
COMBINES (NOTE B)	17	0.15	17	DIESEL	50	9	71	605	37.8	210	95.2	0.03	0.14	0.06
COMBINES (NOTE B)				GASOLINE	50	9	71	605	190.3	105	4360	0.13	0.07	2.91
PICKUP BALERS	63	0.15	63	GASOLINE	100	63	24	1,517	233.5	105	4360	0.39	0.18	7.29
HARVESTERS	29	0.15	29	DIESEL	100	29	120	3,490	37.8	210	95.2	0.15	0.81	0.37
								151,634	141.2	292.2	1837.0	23.60	48.86	307.12

B.13. TABLE B-5.3. SUMMARY OF EMISSIONS FROM AGRICULTURE EQUIPMENT - COUNTY C

EQUIPMENT TYPE	TOTAL NO. OF UNITS IN THE CO. (1985) (REF 1)	% ANNUAL GROWTH (REF 2) (NOTE A)	ESTIM TOTAL NO. OF UNITS IN THE CO. (1987)	TYPE FUEL USED	PERCENT OF TOTAL USING EACH FUEL TYPE (REF 3)	ESTIM. NO. OF EACH TYPE OF UNIT	AVE HOURS OF OPERAT BY UNIT TYPE (REF 4)	TOTAL HRS OF OPERAT BY UNIT TYPE	VOC EMISSION FACTOR (G/HR OPER) (REF 4,5) (NOTE C)	NOX EMISSION FACTOR (G/HR OPER) (REF 5)	CO EMISSION FACTOR (G/HR OPER) (REF 5)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
TRACTORS	375	0.15	376	DIESEL	35	132	490	64,506	76.2	452	161	5.42	32.15	11.45
TRACTORS				GASOLINE	65	244	291	71,144	203.4	157	3380	15.95	12.31	265.12
COMBINES (NOTE B)	12	0.15	12	DIESEL	50	6	71	427	37.8	210	95.2	0.02	0.10	0.04
COMBINES (NOTE B)				GASOLINE	50	6	71	427	190.3	105	4360	0.09	0.05	2.05
PICKUP BALERS	59	0.15	59	GASOLINE	100	59	24	1,420	233.5	105	4360	0.37	0.16	6.83
HARVESTERS	24	0.15	24	DIESEL	100	24	120	2,889	37.8	210	95.2	0.12	0.67	0.30
								140,813	141.5	292.7	1840.9	21.97	45.44	285.80

B.13. TABLE B-5.4. SUMMARY OF EMISSIONS FROM AGRICULTURE EQUIPMENT - COUNTY D

EQUIPMENT TYPE	TOTAL NO. OF UNITS IN THE CO. (1985) (REF 1)	% ANNUAL GROWTH (REF 2) (NOTE A)	ESTIM TOTAL NO. OF UNITS IN THE CO. (1987)	TYPE FUEL USED	PERCENT OF TOTAL USING EACH FUEL TYPE (REF 3)	ESTIM. NO. OF EACH TYPE OF UNIT	AVE HOURS OF OPERAT BY UNIT TYPE (REF 4)	TOTAL HRS OF OPERAT BY UNIT TYPE	VOC EMISSION FACTOR (G/HR OPER) (REF 4,5) (NOTE C)	NOX EMISSION FACTOR (G/HR OPER) (REF 5)	CO EMISSION FACTOR (G/HR OPER) (REF 5)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
TRACTORS	690	0.15	692	DIESEL	35	242	490	118,690	76.2	452	161	9.97	59.15	21.07
TRACTORS				GASOLINE	65	450	291	130,905	203.4	157	3380	29.36	22.66	487.83
COMBINES (NOTE B)	28	0.15	28	DIESEL	50	14	71	997	37.8	210	95.2	0.04	0.23	0.10
COMBINES (NOTE B)				GASOLINE	50	14	71	997	190.3	105	4360	0.21	0.12	4.79
PICKUP BALERS	102	0.15	102	GASOLINE	100	102	24	2,455	233.5	105	4360	0.63	0.28	11.80
HARVESTERS	44	0.15	44	DIESEL	100	44	120	5,296	37.8	210	95.2	0.22	1.23	0.56
								259,341	141.4	292.6	1840.1	40.43	83.66	526.15

NOTE A: Based on percent growth (1982-1985) in the State.
NOTE B: Emission factors are for self-propelled types of combines.
The higher number of cotton pickers are assumed to be gasoline in order to give a conservative estimate of VOC emissions. (Gasoline units have higher VOC emissions.)
NOTE C: Original factor was adjusted to represent the fraction of VOC emissions that is reactive, 0.98.

References:

1. U.S. Department of Commerce, Bureau of the Census. 1985 Census of Agriculture, Volume I. Geographic Area Series Part 33 (State).
2. CENDATA. Online information Utility of the U.S. Bureau of the Census on DIALOG. Agriculture Data: 1985 - State.
3. U. S. EPA, OAQPS, Technical Support Division, Monitoring and Reports Branch. Procedures for the Preparation of Emission Inventories for Precursors of Ozone: Volume I. Final Draft, 3rd ed. September 1988.
4. U.S. EPA, OAQPS. Compilation of Air Pollutant Emission Factors, Vol. II: Mobile Sources. 4th ed. AP-42. Research Triangle Park, NC. September 1988. pp.II-6-1 to II-6-3.
5. U.S. EPA, OAQPS. Volatile Organic Compound (VOC) Species Data Manual. 2nd ed. EPA-450/4-80-015. Research Triangle Park, NC. July 1980.

B.14. TABLE B-6.1. SUMMARY OF EMISSIONS FROM INDUSTRIAL EQUIPMENT - COUNTY A

EQUIPMENT TYPE	NATIONAL EQUIP POPULATION (1985) (NOTE A) (REF 1)	AVERAGE ANNUAL INDUSTRY GROWTH (%) (NOTE A) (REF 2)	ESTIMATED NATIONAL EQUIPMENT POPULATION (1987)	NO. EMPLOYEES IN THE U.S. IN THE MFG SICS (1985) (REF 2)	NO. EMPLOYEES IN THE CO. IN THE MFG SICS (1985) (REF 3)	ESTIMATED EQUIPMENT POPULATION IN THE CO. (1987)	VOC EMISSION FACTOR (MG/UNIT) (REF 4,5,6) (NOTE B,C)	NOX EMISSION FACTOR (MG/UNIT) (REF 4) (NOTE B)	CO EMISSION FACTOR (MG/UNIT) (REF 4) (NOTE B)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
HEAVY-DUTY, DIESEL	417,000	-0.25	403,649	24,286,142	68,617	1,140	0.038	0.55	0.12	47.78	691.56	150.89
HEAVY-DUTY, GASOLINE	990,000	-0.25	958,303	24,286,142	68,617	2,708	0.081	0.044	1.7	241.80	131.35	5074.79
LIGHT-DUTY, DIESEL	2,105,400	-0.25	2,037,992	24,286,142	68,617	5,758	0.019	0.275	0.06	120.62	1745.83	380.91
TOTAL						9,606	0.039	0.243	0.529	410.20	2568.74	5606.58

B.14. TABLE B-6.2. SUMMARY OF EMISSIONS FROM INDUSTRIAL EQUIPMENT - COUNTY B

EQUIPMENT TYPE	NATIONAL EQUIP POPULATION (1985) (NOTE A) (REF 1)	AVERAGE ANNUAL INDUSTRY GROWTH (%) (NOTE A) (REF 2)	ESTIMATED NATIONAL EQUIPMENT POPULATION (1987)	NO. EMPLOYEES IN THE U.S. IN THE MFG SICS (1985) (REF 2)	NO. EMPLOYEES IN THE CO. IN THE MFG SICS (1985) (REF 3)	ESTIMATED EQUIPMENT POPULATION IN THE CO. (1987)	VOC EMISSION FACTOR (MG/UNIT) (REF 4,5,6) (NOTE B,C)	NOX EMISSION FACTOR (MG/UNIT) (REF 4) (NOTE B)	CO EMISSION FACTOR (MG/UNIT) (REF 4) (NOTE B)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
HEAVY-DUTY, DIESEL	417,000	-0.25	403,649	24,286,142	27,341	454	0.038	0.55	0.12	19.04	275.56	60.12
HEAVY-DUTY, GASOLINE	990,000	-0.25	958,303	24,286,142	27,341	1,079	0.081	0.044	1.7	96.35	52.34	2022.09
LIGHT-DUTY, DIESEL	2,105,400	-0.25	2,037,992	24,286,142	27,341	2,294	0.019	0.275	0.06	48.06	695.64	151.78
TOTAL						3,828	0.039	0.243	0.529	163.45	1023.53	2233.99

B.14. TABLE B-6.3. SUMMARY OF EMISSIONS FROM INDUSTRIAL EQUIPMENT - COUNTY C

EQUIPMENT TYPE	NATIONAL EQUIP POPULATION (1985) (NOTE A) (REF 1)	AVERAGE ANNUAL INDUSTRY GROWTH (%) (NOTE A) (REF 2)	ESTIMATED NATIONAL EQUIPMENT POPULATION (1987)	NO. EMPLOYEES IN THE U.S. IN THE MFG SICS (1985) (REF 2)	NO. EMPLOYEES IN THE CO. IN THE MFG SICS (1985) (REF 3)	ESTIMATED EQUIPMENT POPULATION IN THE CO. (1987)
HEAVY-DUTY, DIESEL	417,000	-0.25	403,649	24,286,142	36,185	601
HEAVY-DUTY, GASOLINE	990,000	-0.25	958,303	24,286,142	36,185	1,428
LIGHT-DUTY, DIESEL	2,105,400	-0.25	2,037,992	24,286,142	36,185	3,036
TOTAL						5,066

B.14. TABLE B-6.4. SUMMARY OF EMISSIONS FROM INDUSTRIAL EQUIPMENT - COUNTY D

EQUIPMENT TYPE	NATIONAL EQUIP POPULATION (1985) (NOTE A) (REF 1)	AVERAGE ANNUAL INDUSTRY GROWTH (%) (NOTE A) (REF 2)	ESTIMATED NATIONAL EQUIPMENT POPULATION (1987)	NO. EMPLOYEES IN THE U.S. IN THE MFG SICS (1985) (REF 2)	NO. EMPLOYEES IN THE CO. IN THE MFG SICS (1985) (REF 3)	ESTIMATED EQUIPMENT POPULATION IN THE CO. (1987)	VOC EMISSION FACTOR (MG/UNIT) (REF 4,5,6) (NOTE B,C)	NOX EMISSION FACTOR (MG/UNIT) (REF 4) (NOTE B)	CO EMISSION FACTOR (MG/UNIT) (REF 4) (NOTE B)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
HEAVY-DUTY, DIESEL	417,000	-0.25	403,649	24,286,142	34,619	575	0.038	0.55	0.12	24.11	348.91	76.13
HEAVY-DUTY, GASOLINE	990,000	-0.25	958,303	24,286,142	34,619	1,366	0.081	0.044	1.7	121.99	66.27	2560.36
LIGHT-DUTY, DIESEL	2,105,400	-0.25	2,037,992	24,286,142	34,619	2,905	0.019	0.275	0.06	60.86	880.81	192.18
TOTAL						4,846	0.039	0.243	0.529	206.96	1295.99	2828.66

NOTE A: Average annual industry growth based on average annual employment in U.S., for nine years between 1980-1985.
NOTE B: Emission factors are based on 600, 300, and 300 hours of annual operation per unit for heavy duty diesel, heavy duty gas, and light duty diesel, respectively.
NOTE C: Original factor for diesel was adjusted to represent the fraction of VOC emissions that is reactive, 0.846; gasoline: 0.88 exhaust, 1.0 evaporative and crankcase.

References:

1. Industry Statistics, Inc. Inventory of Equipment Usage. National Publishing Co., New York. c. 1986, p.265.
2. CENDATA. Online Information Utility of the U. S. Bureau of the Census. Industry Data: 1985 - U. S..
3. U. S. Department of Commerce, Bureau of the Census. County Business Patterns 1985 - State.
4. U. S. EPA, OAQPS. Compilation of Air Pollutant Emission Factors, Vol. I: Stationary Point and Area Sources. 4th ed. Research Triangle Park, NC. September 1988. pp.3.3-1 to 3.3-2.
5. U. S. EPA, OAQPS. Air Emissions Species Manual. Volume I. Volatile Organic Compound Species Profiles. EPA-450/2-88-003a. Research Triangle Park, NC. April 1988.
6. U. S. EPA, OAQPS. Volatile Organic Compound (VOC) Species Data Manual. EPA-450/4-80-015. Research Triangle Park, NC. July 1980.

B.15. TABLE B-7.1. SUMMARY OF EMISSIONS FROM LAWN & GARDEN EQUIPMENT - COUNTY A

ENGINE TYPE	EQUIPMENT COUNTS (1980) (REF 1)	% AVE. ANNUAL GROWTH IN THE NO. OF U.S. HOUSEHOLDS (REF 2) (NOTE A)	ESTIM EQUIP COUNTS IN THE U.S. (1987) (NOTE B)	HOUSEHOLDS IN THE U.S. (1987) (REF 2)	HOUSEHOLDS IN THE CO. (1987) (REF 3)	ESTIM NO. OF UNITS USED IN THE CO (1987) (NOTE C)	VOC EMISSION FACTOR (MG/UNIT) (REF 4,5) (NOTE D,E)	NOX EMISSION FACTOR (MG/UNIT) (REF 4) (NOTE D)	CO EMISSION FACTOR (MG/UNIT) (REF 4) (NOTE D)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
4-STROKE	36,200,000	2.03	49,603,846	90,031,000	154,355	85,044	0.0015	0.0002	0.0191	140.65	20.35	1790.89
2-STROKE	6,500,000	2.03	8,906,768	90,031,000	154,355	15,270	0.0130	0.0001	0.0334	218.87	1.82	562.33
TOTAL						100,314	0.0065	0.0002	0.0225	359.52	22.17	2353.22

B.15. TABLE B-7.2. SUMMARY OF EMISSIONS FROM LAWN & GARDEN EQUIPMENT - COUNTY B

ENGINE TYPE	EQUIPMENT COUNTS (1980) (REF 1)	% AVE. ANNUAL GROWTH IN THE NO. OF U.S. HOUSEHOLDS (REF 2) (NOTE A)	ESTIM EQUIP COUNTS IN THE U.S. (1987) (NOTE B)	HOUSEHOLDS IN THE U.S. (1987) (REF 2)	HOUSEHOLDS IN THE CO. (1987) (REF 3)	ESTIM NO. OF UNITS USED IN THE CO (1987) (NOTE C)	VOC EMISSION FACTOR (MG/UNIT) (REF 4,5) (NOTE D,E)	NOX EMISSION FACTOR (MG/UNIT) (REF 4) (NOTE D)	CO EMISSION FACTOR (MG/UNIT) (REF 4) (NOTE D)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
4-STROKE	36,200,000	2.03	49,603,846	90,031,000	79,868	44,004	0.0015	0.0002	0.0191	72.77	10.53	926.66
2-STROKE	6,500,000	2.03	8,906,768	90,031,000	79,868	7,901	0.0130	0.0001	0.0334	113.25	0.94	290.96
TOTAL						51,905	0.0035	0.0002	0.0225	186.02	11.47	1217.63

B.15. TABLE B-7.3. SUMMARY OF EMISSIONS FROM LAWN & GARDEN EQUIPMENT - COUNTY C

ENGINE TYPE	EQUIPMENT COUNTS (1980) (REF 1)	% AVE. ANNUAL GROWTH IN THE NO. OF U.S. HOUSEHOLDS (REF 2) (NOTE A)	ESTIM EQUIP COUNTS IN THE U.S. (1987) (NOTE B)	HOUSEHOLDS IN THE U.S. (1987) (REF 2)	HOUSEHOLDS IN THE CO. (1987) (REF 3)	ESTIM NO. OF UNITS USED IN THE CO (1987) (NOTE C)	VOC EMISSION FACTOR (MG/UNIT) (REF 4,5) (NOTE D,E)	NOX EMISSION FACTOR (MG/UNIT) (REF 4) (NOTE D)	CO EMISSION FACTOR (MG/UNIT) (REF 4) (NOTE D)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
4-STROKE	36,200,000	2.03	49,603,846	90,031,000	133,932	73,792	0.0015	0.0002	0.0191	122.04	17.65	1553.94
2-STROKE	6,500,000	2.03	8,906,768	90,031,000	133,932	13,250	0.0130	0.0001	0.0334	189.91	1.58	487.92
TOTAL						87,042	0.0085	0.0002	0.0225	311.95	19.23	2041.86

B.15. TABLE B-7.4. SUMMARY OF EMISSIONS FROM LAWN & GARDEN EQUIPMENT - COUNTY D

ENGINE TYPE	EQUIPMENT COUNTS (1980) (REF 1)	% AVE. ANNUAL GROWTH IN THE NO. OF U.S. HOUSEHOLDS (REF 2) (NOTE A)	ESTIM EQUIP COUNTS IN THE U.S. (1987) (NOTE B)	HOUSEHOLDS IN THE U.S. (1987) (REF 2)	HOUSEHOLDS IN THE CO. (1987) (REF 3)	ESTIM NO. OF UNITS USED IN THE CO (1987) (NOTE C)	VOC EMISSION FACTOR (MG/UNIT) (REF 4,5) (NOTE D,E)	NOX EMISSION FACTOR (MG/UNIT) (REF 4) (NOTE D)	CO EMISSION FACTOR (MG/UNIT) (REF 4) (NOTE D)	ANNUAL VOC EMISSIONS (TONS/YR)	ANNUAL NOX EMISSIONS (TONS/YR)	ANNUAL CO EMISSIONS (TONS/YR)
4-STROKE	36,200,000	2.03	49,603,846	90,031,000	120,915	66,620	0.0015	0.0002	0.0191	110.18	15.94	1402.91
2-STROKE	6,500,000	2.03	8,906,768	90,031,000	120,915	11,962	0.0130	0.0001	0.0334	171.45	1.42	440.50
TOTAL						78,582	0.0085	0.0002	0.0225	281.63	17.36	1843.41

NOTE A: Annual growth in the number of households in the U.S. was determined over 1970-87.
NOTE B: Assumes the increase in number of equipment is proportional to growth in the number of households.
NOTE C: Determined from the ratio of households in the county to U.S..
NOTE D: Emission factors are based on 50 hours of annual operation.
NOTE E: Original factor adjusted to represent the fraction of VOC emissions that is reactive, 0.88 for exhaust, 1.0 for evaporative.

References:

1. Industry Statistics, Inc. Inventory of Equipment Usage. National Publishing Co., New York. c. 1986. p.177.
2. CENDATA (Online Information Utility of the U.S. Bureau of Census on DIALOG). Provisional County Population Estimates. July 1, 1987.
3. Ozoneville Regional Planning Commission. Employment and Household Projections. February 1985. p.16.
4. U. S. EPA, OAQPS. Compilation of Air Pollutant Emission Factors, Vol. II: Mobile Sources. 4th ed. AP-42. Research Triangle Park, NC. p. II-5-2.
5. U.S. EPA, OAQPS. Volatile Organic Compound (VOC) Species Data Manual. 2nd ed. EPA-450/4-80-015. Research Triangle Park, NC. July 1980. pp.9.06-4 to 9.06-6.

B.16. Emissions from Railroad Locomotives - Procedure for Estimating Fuel Use

From the 1985 NEDS Fuel Summary Report, State consumption of fuel by railroad locomotives is 40,520 x 10^3 gals diesel (ref 1).

First adjusting to the base year, the growth rate, i, was calculated from 1983 and 1985 NEDS Fuel Summary Report data. In 1983, State use was 39,310 x 10^3 gals diesel (ref 2), therefore, the growth rate, i, =

$$(40,520/39,310)^{1/2}-1 = 0.015$$

State fuel use in 1987, therefore, is:

$$40,520 \times 10^3 (1 + 0.015)^{1987-1985} = 41,745 \times 10^3 \text{ gals}$$

County specific data provided by the 1983 NEDS Fuel Summary Report were used to derive county use data for 1987 from the 1987 State estimate:

	% of State use	1987 Fuel Use (10^3 gal)
County A:	7.02	2930
County B:	5.63	2350
County C:	5.11	2133
County D:	6.36	2655

REFERENCES:

1. U. S. EPA. 1985 NEDS Fuel Summary Report. Requested by the Ozoneville SIP task force. October 1988.

2. U. S. EPA. 1983 NEDS Fuel Summary Report. Requested by the Ozoneville SIP task force. October 1988.

APPENDIX C - PC-SAMS EMISSION SUMMARY REPORTS

C.1 Emission Summaries for County A

C.2 - Emission Summaries for County B

C.3 Emission Summaries for County C

C.4 - Emission Summaries for County D

APPENDIX C.1 PC-SAMS EMIISSION SUMMARY REPORTS FOR COUNTY A

- VOC Emissions
- NO_x Emissions
- CO Emissions

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY A
(tons per day)

	Applicable Regulation[1]	Base Year (1987) Point	Base Year (1987) Area
STORAGE, TRANSPORTATION AND MARKETING OF VOC			
Oil and Gas Production			
Natural Gas and Gasoline Processing			
Other Petroleum Processing			
Gasoline and Crude Oil Storage[3]			
Fixed Roof			
External Floating Roof			
Volatile Organic Liquid Storage	I,II- 0925,0933,0518,0524	0.0[2]	
VOL - Transfer			
Ship and Barge			
Other			
Barge and Tanker Cleaning			
Bulk Gasoline Terminals[4]	I- 0927,0518,0524,0525		
Gasoline Bulk Plants[5]	I- 0926,0518,0524,0525		
Service Stations			
Tank Truck Unloading	I- 0932,0928,0518		4.5
Vehicle Refueling			2.9
Tank Breathing Losses	I- 0518,0524		0.1
Tank Trucks in Transit			0.1
Others (specify)			
INDUSTRIAL PROCESSES			
Petroleum Refineries			
Vacuum Systems			
Fugitive Leaks			
Wastewater Separators			
Process Unit Turnarounds			
Miscellaneous			
Lube Oil Manufacture			
Organic Chemical Manufacture			
Polyethylene			
Propylene			
Styrene			
SOCMI			
Fugitive Leaks			
Air Oxidation			
Others			
Inorganic Chemical Manufacture			
Fermentation Processes			
Vegetable Oil Processing			
Pharmaceutical Manufacture			
Plastic Products Manfacture			
Rubber Tire Manufacture	II- 0937,0518,0524		

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY A
(tons per day)

	Applicable Regulation[1]	Base Year (1987) Point	Base Year (1987) Area
SBR Rubber Manufacture			
Textile Polymers Manufacture			
Resin Manufacture			
High Density Polyethylene			
Polypropylene			
Polystyrene			
Synthetic Fiber Manufacture			
Iron and Steel Manufacture			
Coke Ovens			
Others			
INDUSTRIAL SURFACE COATING			
Large Appliances			
Magnet Wire			
Autos and Light Trucks			
Cans			
Metal Coils			
Paper Products	I- 0920,0518,0524	0.6	
Fabric and Vinyl	I- 0921,0518,0524		
Metal Furniture			
Miscellaneous Metal Products			
Flatwood Products			
Plastic Products			
Large Ships			
Large Aircraft			
Others			
NON-INDUSTRIAL SURFACE COATING			
Architectural Coatings			3.3
Auto Refinishing		0.3	2.5
Others			
OTHER SOLVENT USE			
Solvent Metal Cleaning			
Cold Cleaners	I- 0930,0518		3.3
Open Top Vapor Degreasers	I- 0930,0518	0.2	29.7
Conveyorized Degreasers	I- 0930,0518	0.1	
Dry Cleaning			

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY A
(tons per day)

	Applicable Regulation[1]	Base Year (1987) Point	Area
Perchloroethylene	II- 0938,0518		0.3
Petroleum	II- 0938,0518,0524		0.1
Other			
Graphic Arts			
Rotogravure	I,II- 0936,0920,0518,0524	1.9	0.5
Flexography	I,II- 0936,0920,0518,0524	0.2	
Adhesives			0.0
Cutback Asphalt	I- 0931,0518,0524		0.1
Solvent Extraction Processes			
Consumer/Commercial Solvent Use			3.4
Others			
WASTE DISPOSAL			
Municipal Waste Landfills			0.4
Municipal Wastewater Treatment			0.3
Industrial Wastewater Treatment			0.0
Open Burning			6.0
On-site Incineration			
Residential			
Commercial/Institutional			
Industrial			
TSDFs			
Surface Impoundments			
Land Treatment			
Landfills			
Transfer, Storage & Handling			
Industrial Boiler Co-firing			
Others			
OTHER MISCELLANEOUS SOURCES			
Unpaved Roads			
Fiberglass Insulation Manufacture			
Commercial Bakeries			0.4
Pesticide Applications			0.2
Asphalt Roofing Kettles/Tankers			0.0
Stationary Internal Combustion Engines			
Stationary External Combustion			
Coal		0.0	0.1
Fuel Oil			0.0
Natural Gas			0.1

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY A
(tons per day)

	Applicable Regulation[1]	Base Year (1987) Point	Base Year (1987) Area
LP Gas			
Agricultural & Slash Burning			
Structure Fires			
Waste Disposal Combustion		0.1	
Open Burning Combustion			
Other VOC Sources (Leaking Underground Storage Tanks)			0.4
MOBILE SOURCES			
Highway Vehicles			
Light Duty Autos			33.6
Light Duty Trucks			6.1
Heavy Duty Gasoline Trucks			1.5
Heavy Duty Diesel Trucks			1.0
Other Highway Vehicles			0.6
Non-highway Vehicles			
Rail			0.2
Aircraft			10.2
Vessels			12.3
Off-Highway Vehicles			
Farm Equipment			0.2
Construction Equipment			10.4
Industrial Equipment			1.1
Lawn and Garden Equipment			3.3
Others			
TOTALS			
Stationary Sources Total		4.5	58.9
Mobile Sources Total		0.0	62.6
GRAND TOTAL FOR ALL SOURCES-->		126.0	

Footnotes:

1. I, II, III refer to CTG Category Groups. Four digit codes refer to State Regulations.
   0518 = Miscellaneous Volatile Organic Compound Emissions
   0524 = New Source Performance Standards (NSPS)
   0525 = National Emission Standards for Hazardous Air Pollutants (NESHAP)
   0920 = Paper Coating
   0921 = Fabric and Vinyl Coating
   0925 = Petroleum Liquid Storage in Fixed Roof Tanks
   0926 = Bulk Gasoline Plants
   0927 = Bulk Gasoline Terminals
   0930 = Solvent Metal Cleaning
   0931 = Cutback Asphalt
   0933 = Petroleum Liquid Storage in External Floating Roof Tanks
   0936 = Graphic Arts
   0938 - Perchloroethylene Dry Cleaning System
2. Emission values of 0.0 indicate that daily emission are >0 lbs/day but less than 100 lbs/day.
3. Includes all storage facilities except those at service stations and bulk plants.
4. Emissions from loading tank trucks and rail cars.
5. Emissions from storage and transfer operations.

Date of Report: 07/31/89	Summary Table of NOx Emissions for COUNTY A (tons per day)	Page 1 Last updated by: GDR Last updated on: 07/31/89 Population of County: 407,497

	Applicable Regulation[1]	Baseyear: 87 Point	Area
EXTERNAL FUEL COMBUSTION			
Utility Boilers	0524,40CFR 60.40a, Subpart Da		
Industrial Boilers	0524,40CFR 60.40b, Subpart Db		3.2
Commerical, Institutional & Residential	0524,40CFR 60.40b, Subpart Db		1.6
Other			
STATIONARY INTERNAL COMBUSTION			
Reciprocating Engines			
Gas Turbines	0524,40CFR 60.330, Subpart GG		
OTHER COMBUSTION			
Waste Disposal			
Open Burning			
Others			0.1
INDUSTRIAL PROCESSES			
Chemical Manufacturing			
Adipic Acid			
Nitric Acid			
Others			
Iron and Steel			
Mineral Products			
Cement			
Glass			
Others			
Petroleum Refining			
Others			
Mobile Sources			
Highway Vehicles			
Light Duty Autos			9.4
Light Duty Trucks			3.6
Heavy Duty Gasoline Trucks			0.6
Heavy Duty Diesel Trucks			5.7
Other Highway Vehicles			0.1
Non-Highway Vehicles			
Rail		1.5	
Aircraft		6.3	
Vessels			
Other		67.7	
Stationary Sources Total		0.0	4.9
Mobile Sources Total		0.0	0.0
Grand Total - All Sources		0.0	99.8

Footnotes:

1. Four digit code "0524" refers to State citations of New Source Performance Standards.
   - 40 CFR 60.40a Subpart Da - Standards of Performance for Fossil-Fuel-Fired Steam Generators
   - 40 CFR 60.40b, Subpart Db - Standards of Performance for Industrial-Commerical-Institutional Steam Generating Units
   - 40 CFR 60.330, Subpart GG - Standards of Performance for Stationary Gas Turbines

Date of Report: 07/31/89

Summary Table of CO Emissions
Ozone Inventory
for
COUNTY A
(tons per day)

Page: 1
Last updated by: GDR
Last updated on: 07/31/89
Population of County: 407,497

	Applicable Regulation	Baseyear: 87 Point	Area
EXTERNAL FUEL COMBUSTION			
Utility Boilers			
Industrial Boilers			0.8
Commerical, Institutional & Residential			0.4
Other			
STATIONARY INTERNAL COMBUSTION			
Reciprocating Engines			
Gas Turbines			
OTHER COMBUSTION			
Waste Disposal			17.0
Others			
INDUSTRIAL PROCESSES			
Chemical Manufacturing			
Iron and Steel			
Mineral Products			
Petroleum Refining			
Others			
MOBILE SOURCES			
Highway Vehicles			
Light Duty Autos			170.8
Light Duty Trucks			62.3
Heavy Duty Gasoline Trucks			11.9
Heavy Duty Diesel Trucks			3.8
Other Highway Vehicles			2.1
Non-Highway Vehicles			
Rail			0.5
Aircraft			15.9
Vessels			167.9
Other			
Stationary Sources Total		0.0	18.2
Mobile Sources Total		0.0	435.2
Grand Total - All Sources		0.0	453.4

APPENDIX C.2 PC-SAMS EMISSION SUMMARY REPORTS FOR COUNTY B

- VOC Emissions
- NO_x Emissions
- CO Emissions

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY B

	Applicable Regulation[1]	Base Year (1987) Point	Area
STORAGE, TRANSPORTATION AND MARKETING OF VOC			
Oil and Gas Production			
Natural Gas and Gasoline Processing			
Other Petroleum Processing			
Gasoline and Crude Oil Storage[3]			
Fixed Roof			
External Floating Roof			
Volatile Organic Liquid Storage	I,II- 0925,0933,0518,0524	0.0[2]	
VOL - Transfer			
Ship and Barge			
Other			
Barge and Tanker Cleaning			
Bulk Gasoline Terminals[4]	I- 0927,0518,0524,0525		
Gasoline Bulk Plants[5]	I- 0926,0518,0524,0525	0.0	
Service Stations			
Tank Truck Unloading	I- 0932,0928,0518		2.1
Vehicle Refueling			1.3
Tank Breathing Losses	I- 0518,0524		0.3
Tank Trucks in Transit			0.0
Others (specify)			
INDUSTRIAL PROCESSES			
Petroleum Refineries			
Vacuum Systems			
Fugitive Leaks			
Wastewater Separators			
Process Unit Turnarounds			
Miscellaneous			
Lube Oil Manufacture			
Organic Chemical Manufacture			
Polyethylene			
Propylene			
Styrene			
SOCMI			
Fugitive Leaks			
Air Oxidation			
Others			
Inorganic Chemical Manufacture			
Fermentation Processes			
Vegetable Oil Processing			
Pharmaceutical Manufacture			
Plastic Products Manfacture			
Rubber Tire Manufacture	II- 0937,0518,0524		

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY B

	Applicable Regulation[1]	Base Year (1987) Point	Area
SBR Rubber Manufacture			
Textile Polymers Manufacture			
Resin Manufacture			
High Density Polyethylene			
Polypropylene			
Polystyrene			
Synthetic Fiber Manufacture			
Iron and Steel Manufacture			
Coke Ovens			
Others			
INDUSTRIAL SURFACE COATING			
Large Appliances			
Magnet Wire			
Autos and Light Trucks			
Cans			
Metal Coils			
Paper Products	I- 0920,0518,0524	0.1	
Fabric and Vinyl	I- 0921,0518,0524		
Metal Furniture			
Miscellaneous Metal Products			
Flatwood Products			
Plastic Products			
Large Ships			
Large Aircraft			
Others			
NON-INDUSTRIAL SURFACE COATING			
Architectural Coatings		0.0	1.7
Auto Refinishing			1.0
Others			
OTHER SOLVENT USE			
Solvent Metal Cleaning			
Cold Cleaners	I- 0930,0518		2.0
Open Top Vapor Degreasers	I- 0930,0518	0.0	16.9
Conveyorized Degreasers	I- 0930,0518	0.0	
Dry Cleaning			

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY B

	Applicable Regulation(1)	Base Year (1987) Point	Area
Perchloroethylene	II- 0938,0518	0.0	0.3
Petroleum	II- 0938,0518,0524		0.1
Other			
Graphic Arts			
Rotogravure	I,II- 0936,0920,0518,0524	0.0	0.1
Flexography	I,II- 0936,0920,0518,0524	0.0	
Adhesives			0.0
Cutback Asphalt	I- 0931,0518,0524		0.1
Solvent Extraction Processes			
Consumer/Commercial Solvent Use			1.8
Others			
WASTE DISPOSAL			
Municipal Waste Landfills			0.8
Municipal Wastewater Treatment			0.9
Industrial Wastewater Treatment			0.0
Open Burning			6.1
On-site Incineration			
Residential			
Commercial/Institutional			
Industrial			0.1
TSDFs			
Surface Impoundments			
Land Treatment			
Landfills			
Transfer, Storage & Handling			0.1
Industrial Boiler Co-firing			
Others			
OTHER MISCELLANEOUS SOURCES			
Unpaved Roads			
Fiberglass Insulation Manufacture			
Commercial Bakeries			0.2
Pesticide Applications			0.2
Asphalt Roofing Kettles/Tankers			0.0
Stationary Internal Combustion Engines			
Stationary External Combustion			
Coal		0.0	0.0
Fuel Oil			0.0
Natural Gas			0.0

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY B

	Applicable Regulation(1)	Base Year (1987) Point	Base Year (1987) Area
LP Gas			
Agricultural & Slash Burning			
Structure Fires			
Waste Disposal Combustion		0.1	0.0
Open Burning Combustion			0.0
Other VOC Sources (Leaking Underground Storage Tanks)			0.4
MOBILE SOURCES			
Highway Vehicles			
Light Duty Autos			18.6
Light Duty Trucks			4.2
Heavy Duty Gasoline Trucks			0.3
Heavy Duty Diesel Trucks			0.2
Other Highway Vehicles			0.1
Non-highway Vehicles			
Rail			0.4
Aircraft			0.0
Vessels			0.1
Off-Highway Vehicles			
Farm Equipment			0.1
Construction Equipment			2.7
Industrial Equipment			0.4
Lawn and Garden Equipment			1.7
Others			0.0
TOTALS			
Stationary Sources Total		2.3	27.9
Mobile Sources Total		0.0	28.8
GRAND TOTAL FOR ALL SOURCES-->	59		

Footnotes:

1. I, II, III refer to CTG Category Groups. Four digit codes refer to State Regulations.
   0518 = Miscellaneous Volatile Organic Compound Emissions
   0524 = New Source Performance Standards (NSPS)
   0525 = National Emission Standards for Hazardous Air Pollutants (NESHAP)
   0920 = Paper Coating
   0921 = Fabric and Vinyl Coating
   0925 = Petroleum Liquid Storage in Fixed Roof Tanks
   0926 = Bulk Gasoline Plants
   0927 = Bulk Gasoline Terminals
   0930 = Solvent Metal Cleaning
   0931 = Cutback Asphalt
   0933 = Petroleum Liquid Storage in External Floating Roof Tanks
   0936 = Graphic Arts
   0938 = Perchloroethylene Dry Cleaning System
2. Emission values of 0.0 indicate that daily emission are >0 lbs/day but less than 100 lbs/day.
3. Includes all storage facilities except those at service stations and bulk plants.
4. Emissions from loading tank trucks and rail cars.
5. Emissions from storage and transfer operations.

Date of Report: 07/31/89

Summary Table of NOx Emissions
for
COUNTY B
(tons per day)

Page 1
Last updated by: GDR
Last updated on: 07/31/89
Population of County: 205,259

	Applicable Regulation	Baseyear: 87 Point	Area
EXTERNAL FUEL COMBUSTION			
Utility Boilers	0524,40CFR 60.40a,Subpart Da	49.4	
Industrial Boilers	0524,40CFR 60.40b,Subpart Db		1.1
Commerical, Institutional & Residential	0524,40CFR 60.40b,Subpart Db		0.5
Other			
STATIONARY INTERNAL COMBUSTION			
Reciprocating Engines			
Gas Turbines	0524,40CFR 60.330,Subpart GG		
OTHER COMBUSTION			
Waste Disposal			
Open Burning			
Others			0.1
INDUSTRIAL PROCESSES			
Chemical Manufacturing			
Adipic Acid			
Nitric Acid			
Others			
Iron and Steel			
Mineral Products			
Cement			
Glass			
Others			
Petroleum Refining			
Others			
Mobile Sources			
Highway Vehicles			
Light Duty Autos			6.1
Light Duty Trucks			2.0
Heavy Duty Gasoline Trucks			0.3
Heavy Duty Diesel Trucks			3.1
Other Highway Vehicles			0.0
Non-Highway Vehicles			
Rail			1.2
Aircraft			
Vessels			
Other			18.3
Stationary Sources Total		49.4	5.0
Mobile Sources Total		0.0	1.7
Grand Total - All Sources		49.4	32.7

Footnotes:

1. Four digit code "0524" refers to State citations of New Source Performance Standards.
   - 40 CFR 60.40a Subpart Da - Standards of Performance for Fossil-Fuel-Fired Steam Generators
   - 40 CFR 60.40b, Subpart Db - Standards of Performance for Industrial-Commerical-Institutional Steam Generating Units
   - 40 CFR 60.330, Subpart GG - Standards of Performance for Stationary Gas Turbines

Date of Report: 07/31/89

Summary Table of CO Emissions
Ozone Inventory
for
COUNTY B
(tons per day)

Page: 1
Last updated by: GDR
Last updated on: 07/31/89
Population of County: 205,259

	Applicable Regulation	Baseyear: 87 Point	Area
EXTERNAL FUEL COMBUSTION			
Utility Boilers		1.0	
Industrial Boilers			1.6
Commerical, Institutional & Residential			0.8
Other			
STATIONARY INTERNAL COMBUSTION			
Reciprocating Engines			
Gas Turbines			
OTHER COMBUSTION			
Waste Disposal			
Others			3.1
INDUSTRIAL PROCESSES			
Chemical Manufacturing			
Iron and Steel			
Mineral Products			
Petroleum Refining			
Others			
MOBILE SOURCES			
Highway Vehicles			
Light Duty Autos			92.8
Light Duty Trucks			33.8
Heavy Duty Gasoline Trucks			6.4
Heavy Duty Diesel Trucks			2.0
Other Highway Vehicles			1.2
Non-Highway Vehicles			
Rail			0.4
Aircraft			0.1
Vessels			
Other			47.9
Stationary Sources Total		1.0	5.5
Mobile Sources Total		0.0	184.6
Grand Total All Sources		1.0	190.1

APPENDIX C.3 PC-SAMS EMISSION SUMMARY REPORTS FOR COUNTY C

- VOC Emissions
- NO_x Emissions
- CO Emissions

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY C

	Applicable Regulation[1]	Base Year (1987) Point	Base Year (1987) Area
STORAGE, TRANSPORTATION AND MARKETING OF VOC			
Oil and Gas Production			
Natural Gas and Gasoline Processing			
Other Petroleum Processing			
Gasoline and Crude Oil Storage[3]			
Fixed Roof			
External Floating Roof			
Volatile Organic Liquid Storage	I,II- 0925,0933,0518,0524	0.0[2]	
VOL - Transfer			
Ship and Barge			
Other			
Barge and Tanker Cleaning			
Bulk Gasoline Terminals[4]	I- 0927,0518,0524,0525		
Gasoline Bulk Plants[5]	I- 0926,0518,0524,0525		
Service Stations			
Tank Truck Unloading	I- 0932,0928,0518		4.1
Vehicle Refueling			2.6
Tank Breathing Losses	I- 0518,0524		0.1
Tank Trucks in Transit			0.1
Others (specify)			
INDUSTRIAL PROCESSES			
Petroleum Refineries			
Vacuum Systems			
Fugitive Leaks			
Wastewater Separators			
Process Unit Turnarounds			
Miscellaneous			
Lube Oil Manufacture			
Organic Chemical Manufacture			
Polyethylene			
Propylene			
Styrene			
SOCMI			
Fugitive Leaks			
Air Oxidation			
Others			
Inorganic Chemical Manufacture			
Fermentation Processes			
Vegetable Oil Processing			
Pharmaceutical Manufacture			
Plastic Products Manfacture			
Rubber Tire Manufacture	II- 0937,0518,0524	2.2	

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY C

	Applicable Regulation(1)	Base Year (1987) Point	Base Year (1987) Area
SBR Rubber Manufacture			
Textile Polymers Manufacture			
Resin Manufacture			
High Density Polyethylene			
Polypropylene			
Polystyrene			
Synthetic Fiber Manufacture			
Iron and Steel Manufacture			
Coke Ovens			
Others			
INDUSTRIAL SURFACE COATING			
Large Appliances			
Magnet Wire			
Autos and Light Trucks			
Cans			
Metal Coils			
Paper Products	I- 0920,0518,0524		
Fabric and Vinyl	I- 0921,0518,0524		
Metal Furniture			
Miscellaneous Metal Products			
Flatwood Products			
Plastic Products			
Large Ships			
Large Aircraft			
Others			
NON-INDUSTRIAL SURFACE COATING			
Architectural Coatings			3.0
Auto Refinishing		0.1	1.1
Others			
OTHER SOLVENT USE			
Solvent Metal Cleaning			
Cold Cleaners	I- 0930,0518		3.2
Open Top Vapor Degreasers	I- 0930,0518	0.0	28.6
Conveyorized Degreasers	I- 0930,0518	0.0	
Dry Cleaning			

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY C

	Applicable Regulation(1)	Base Year (1987) Point	Base Year (1987) Area
Perchloroethylene	II- 0938,0518		0.4
Petroleum	II- 0938,0518,0524	0.3	0.1
Other			
Graphic Arts			
Rotogravure	I,II- 0936,0920,0518,0524	0.2	0.5
Flexography	I,II- 0936,0920,0518,0524	0.1	
Adhesives			0.0
Cutback Asphalt	I- 0931,0518,0524		0.1
Solvent Extraction Processes			
Consumer/Commercial Solvent Use			3.1
Others			
WASTE DISPOSAL			
Municipal Waste Landfills			0.8
Municipal Wastewater Treatment			0.6
Industrial Wastewater Treatment			0.0
Open Burning			0.2
On-site Incineration			
Residential			
Commercial/Institutional			
Industrial			0.1
TSDFs			
Surface Impoundments			
Land Treatment			
Landfills			
Transfer, Storage & Handling			0.1
Industrial Boiler Co-firing			
Others			
OTHER MISCELLANEOUS SOURCES			
Unpaved Roads			
Fiberglass Insulation Manufacture			
Commercial Bakeries			0.3
Pesticide Applications			0.9
Asphalt Roofing Kettles/Tankers			0.0
Stationary Internal Combustion Engines			
Stationary External Combustion			
Coal		0.1	0.0
Fuel Oil			0.0
Natural Gas			0.1

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY C

	Applicable Regulation[1]	Base Year (1987) Point	Base Year (1987) Area
LP Gas			
Agricultural & Slash Burning			
Structure Fires			
Waste Disposal Combustion		0.1	0.0
Open Burning Combustion			0.1
Other VOC Sources (Leaking Underground Storage Tanks)			0.4
MOBILE SOURCES			
Highway Vehicles			
Light Duty Autos			33.3
Light Duty Trucks			10.1
Heavy Duty Gasoline Trucks			2.1
Heavy Duty Diesel Trucks			0.5
Other Highway Vehicles			0.4
Non-highway Vehicles			
Rail			0.3
Aircraft			0.0
Vessels			12.3
Off-Highway Vehicles			
Farm Equipment			0.1
Construction Equipment			5.4
Industrial Equipment			0.6
Lawn and Garden Equipment			2.9
Others			0.1
TOTALS			
Stationary Sources Total		3.2	48.6
Mobile Sources Total		0.0	60.5
GRAND TOTAL FOR ALL SOURCES-->	112.3		

Footnotes:

1. I, II, III refer to CTG Category Groups. Four digit codes refer to State Regulations.
   0518 = Miscellaneous Volatile Organic Compound Emissions
   0524 = New Source Performance Standards (NSPS)
   0525 = National Emission Standards for Hazardous Air Pollutants (NESHAP)
   0920 = Paper Coating
   0921 = Fabric and Vinyl Coating
   0925 = Petroleum Liquid Storage in Fixed Roof Tanks
   0926 = Bulk Gasoline Plants
   0927 = Bulk Gasoline Terminals
   0930 = Solvent Metal Cleaning
   0931 = Cutback Asphalt
   0933 = Petroleum Liquid Storage in External Floating Roof Tanks
   0936 = Graphic Arts
   0938 = Perchloroethylene Dry Cleaning System
2. Emission values of 0.0 indicate that daily emission are >0 lbs/day but less than 100 lbs/day.
3. Includes all storage facilities except those at service stations and bulk plants.
4. Emissions from loading tank trucks and rail cars.
5. Emissions from storage and transfer operations.

Date of Report: 07/31/89	Summary Table of NOx Emissions for COUNTY C (tons per day)	Page 1 Last updated by: GDR Last updated on: 07/31/89 Population of County: 368,314

	Applicable Regulation	Baseyear: 87 Point	Area
EXTERNAL FUEL COMBUSTION			
Utility Boilers	0524,40CFR 60.40a,Subpart Da		
Industrial Boilers	0524,40CFR 60.40b,Subpart Db		2.0
Commerical, Institutional & Residential	0524,40CFR 60.40b,Subpart Db		1.0
Other			
STATIONARY INTERNAL COMBUSTION			
Reciprocating Engines			
Gas Turbines	0524,40CFR 60.330,Subpart GG		
OTHER COMBUSTION			
Waste Disposal			
Open Burning			
Others			0.1
INDUSTRIAL PROCESSES			
Chemical Manufacturing			
Adipic Acid			
Nitric Acid			
Others			
Iron and Steel			
Mineral Products			
Cement			
Glass			
Others			
Petroleum Refining			
Others			
Mobile Sources			
Highway Vehicles			
Light Duty Autos			13.6
Light Duty Trucks			4.1
Heavy Duty Gasoline Trucks			0.3
Heavy Duty Diesel Trucks			5.3
Other Highway Vehicles			0.1
Non-Highway Vehicles			
Rail			1.1
Aircraft			0.0
Vessels			
Other			35.4
Stationary Sources Total			
Mobile Sources Total		0.00	3.3
Grand Total - All Sources		0.00	28.7

Footnotes:

1. Four digit code "0524" refers to State citations of New Source Performance Standards.
   - 40 CFR 60.40a Subpart Da - Standards of Performance for Fossil-Fuel-Fired Steam Generators
   - 40 CFR 60.40b, Subpart Db - Standards of Performance for Industrial-Commerical-Institutional Steam Generating Units
   - 40 CFR 60.330, Subpart GG - Standards of Performance for Stationary Gas Turbines

Date of Report: 07/31/89

Summary Table of CO Emissions
Ozone Inventory
for
COUNTY C
(tons per day)

Page: 1
Last updated by: GDR
Last updated on: 07/31/89
Population of County: 368,314

	Applicable Regulation	Baseyear: 87 Point	Area
EXTERNAL FUEL COMBUSTION			
Utility Boilers			
Industrial Boilers			0.5
Commerical, Institutional & Residential			0.2
Other			
STATIONARY INTERNAL COMBUSTION			
Reciprocating Engines			
Gas Turbines			
OTHER COMBUSTION			
Waste Disposal		2.20	
Others			5.5
INDUSTRIAL PROCESSES			
Chemical Manufacturing			
Iron and Steel			
Mineral Products			
Petroleum Refining			
Others			
MOBILE SOURCES			
Highway Vehicles			
Light Duty Autos			203.0
Light Duty Trucks			74.1
Heavy Duty Gasoline Trucks			14.1
Heavy Duty Diesel Trucks			4.5
Other Highway Vehicles			2.6
Non-Highway Vehicles			
Rail			0.4
Aircraft			0.0
Vessels			
Other			90.6
Stationary Sources Total		2.20	6.2
Mobile Sources Total		0.00	298.2
Grand Total - All Sources		2.20	304.4

APPENDIX C.4 - PC-SAMS EMISSION SUMMARY REPORTS FOR COUNTY D

- VOC Emissions
- NO_x Emissions
- CO Emissions

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY D

	Applicable Regulation[1]	Base Year (1987) Point	Base Year (1987) Area
STORAGE, TRANSPORTATION AND MARKETING OF VOC			
Oil and Gas Production			
Natural Gas and Gasoline Processing			
Other Petroleum Processing			
Gasoline and Crude Oil Storage[3]			
Fixed Roof			
External Floating Roof			
Volatile Organic Liquid Storage	I,II- 0925,0933,0518,0524	0.0[2]	
VOL - Transfer			
Ship and Barge			
Other			
Barge and Tanker Cleaning			
Bulk Gasoline Terminals[4]	I- 0927,0518,0524,0525	13.9	
Gasoline Bulk Plants[5]	I- 0926,0518,0524,0525	0.0	
Service Stations			
Tank Truck Unloading	I- 0932,0928,0518		3.1
Vehicle Refueling			2.0
Tank Breathing Losses	I- 0518,0524		0.0
Tank Trucks in Transit			0.0
Others (specify)			
INDUSTRIAL PROCESSES			
Petroleum Refineries			
Vacuum Systems			
Fugitive Leaks			
Wastewater Separators			
Process Unit Turnarounds			
Miscellaneous			
Lube Oil Manufacture			
Organic Chemical Manufacture			
Polyethylene			
Propylene			
Styrene			
SOCMI			
Fugitive Leaks			
Air Oxidation			
Others			
Inorganic Chemical Manufacture			
Fermentation Processes			
Vegetable Oil Processing			
Pharmaceutical Manufacture			
Plastic Products Manfacture			
Rubber Tire Manufacture	II- 0937,0518,0524		

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY D

	Applicable Regulation[1]	Base Year (1987) Point	Base Year (1987) Area
SBR Rubber Manufacture			
Textile Polymers Manufacture			
Resin Manufacture			
High Density Polyethylene			
Polypropylene			
Polystyrene			
Synthetic Fiber Manufacture			
Iron and Steel Manufacture			
Coke Ovens			
Others			
INDUSTRIAL SURFACE COATING			
Large Appliances			
Magnet Wire			
Autos and Light Trucks			
Cans			
Metal Coils			
Paper Products	I- 0920,0518,0524		
Fabric and Vinyl	I- 0921,0518,0524		
Metal Furniture			
Miscellaneous Metal Products			
Flatwood Products			
Plastic Products			
Large Ships			
Large Aircraft			
Others			
NON-INDUSTRIAL SURFACE COATING			
Architectural Coatings			2.4
Auto Refinishing		0.1	1.7
Others			
OTHER SOLVENT USE			
Solvent Metal Cleaning			
Cold Cleaners	I- 0930,0518		2.6
Open Top Vapor Degreasers	I- 0930,0518	0.1	23.7
Conveyorized Degreasers	I- 0930,0518	0.0	
Dry Cleaning			

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY D

	Applicable Regulation(1)	Base Year (1987) Point	Area
Perchloroethylene	II- 0938,0518	0.5	0.2
Petroleum	II- 0938,0518,0524		0.1
Other			
Graphic Arts			
Rotogravure	I,II- 0936,0920,0518,0524	0.6	0.4
Flexography	I,II- 0936,0920,0518,0524	0.0	
Adhesives			0.0
Cutback Asphalt	I- 0931,0518,0524		0.0
Solvent Extraction Processes			
Consumer/Commercial Solvent Use			2.5
Others			
WASTE DISPOSAL			
Municipal Waste Landfills			0.5
Municipal Wastewater Treatment			
Industrial Wastewater Treatment			
Open Burning			0.0
On-site Incineration			
Residential			
Commercial/Institutional			
Industrial			0.1
TSDFs			
Surface Impoundments			
Land Treatment			
Landfills			
Transfer, Storage & Handling			0.1
Industrial Boiler Co-firing			
Others			
OTHER MISCELLANEOUS SOURCES			
Unpaved Roads			
Fiberglass Insulation Manufacture			
Commercial Bakeries			0.3
Pesticide Applications			0.3
Asphalt Roofing Kettles/Tankers			0.0
Stationary Internal Combustion Engines			
Stationary External Combustion			
Coal		0.1	0.2
Fuel Oil			0.0
Natural Gas			0.2

SUMMARY TABLE OF SEASONALLY ADJUSTED VOC EMISSIONS FOR COUNTY D

	Applicable Regulation(1)	Base Year (1987) Point	Base Year (1987) Area
LP Gas			
Agricultural & Slash Burning			
Structure Fires			
Waste Disposal Combustion		0.1	0.7
Open Burning Combustion			0.4
Other VOC Sources (Leaking Underground Storage Tanks)			0.4
MOBILE SOURCES			
Highway Vehicles			
Light Duty Autos			32.4
Light Duty Trucks			16.9
Heavy Duty Gasoline Trucks			1.3
Heavy Duty Diesel Trucks			0.4
Other Highway Vehicles			0.1
Non-highway Vehicles			
Rail			0.3
Aircraft			0.0
Vessels			12.3
Off-Highway Vehicles			
Farm Equipment			0.2
Construction Equipment			4.5
Industrial Equipment			0.6
Lawn and Garden Equipment			2.6
Others			0.1
TOTALS			
Stationary Sources Total		18.3	18.4
Mobile Sources Total		0.0	71.7
GRAND TOTAL FOR ALL SOURCES--->	108.4		

Footnotes:

1. I, II, III refer to CTG Category Groups. Four digit codes refer to State Regulations.
   0518 = Miscellaneous Volatile Organic Compound Emissions
   0524 - New Source Performance Standards (NSPS)
   0525 = National Emission Standards for Hazardous Air Pollutants (NESHAP)
   0920 = Paper Coating
   0921 = Fabric and Vinyl Coating
   0925 = Petroleum Liquid Storage in Fixed Roof Tanks
   0926 = Bulk Gasoline Plants
   0927 = Bulk Gasoline Terminals
   0930 = Solvent Metal Cleaning
   0931 = Cutback Asphalt
   0933 = Petroleum Liquid Storage in External Floating Roof Tanks
   0936 - Graphic Arts
   0938 = Perchloroethylene Dry Cleaning System
2. Emission values of 0.0 indicate that daily emission are >0 lbs/day but less than 100 lbs/day.
3. Includes all storage facilities except those at service stations and bulk plants.
4. Emissions from loading tank trucks and rail cars.
5. Emissions from storage and transfer operations.

Date of Report: 07/31/89	Summary Table of NOx Emissions for COUNTY D (tons per day)	Page 1 Last updated by: GDR Last updated on: 07/31/89 Population of County: 301,077

	Applicable Regulation	Baseyear: 87 Point	Area
EXTERNAL FUEL COMBUSTION			
Utility Boilers	0524,40CFR 60.40a,Subpart Da		
Industrial Boilers	0524,40CFR 60.40b,Subpart Db		1.6
Commerical, Institutional & Residential	0524,40CFR 60.40b,Subpart Db		0.3
Other			
STATIONARY INTERNAL COMBUSTION			
Reciprocating Engines			
Gas Turbines	0524,40CFR 60.330,Subpart GG		
OTHER COMBUSTION			
Waste Disposal		3.6	
Open Burning			
Others			0.1
INDUSTRIAL PROCESSES			
Chemical Manufacturing			
Adipic Acid			
Nitric Acid			
Others			
Iron and Steel			
Mineral Products			
Cement			
Glass			
Others			
Petroleum Refining			
Others			
Mobile Sources			
Highway Vehicles			
Light Duty Autos			7.8
Light Duty Trucks			2.4
Heavy Duty Gasoline Trucks			0.4
Heavy Duty Diesel Trucks			3.9
Other Highway Vehicles			0.0
Non-Highway Vehicles			
Rail			1.3
Aircraft			
Vessels			0.0
Other			65.1
Stationary Sources Total			2.5
Mobile Sources Total		0.00	80.9
Grand Total - All Sources		3.60	83.4

Footnotes:

1. Four digit code "0524" refers to State citations of New Source Performance Standards.
   - 40 CFR 60.40a Subpart Da - Standards of Performance for Fossil-Fuel-Fired Steam Generators
   - 40 CFR 60.40b, Subpart Db Standards of Performance for Industrial-Commerical-Institutional Steam Generating Units
   - 40 CFR 60.330, Subpart GG - Standards of Performance for Stationary Gas Turbines

Date of Report: 07/31/89	Summary Table of CO Emissions Ozone Inventory for COUNTY D (tons per day)	Page: 1 Last updated by: GDR Last updated on: 07/31/89 Population of County: 301,077

	Applicable Regulation	Baseyear: 87 Point	 Area
EXTERNAL FUEL COMBUSTION			
Utility Boilers			
Industrial Boilers			0.4
Commerical, Institutional & Residential			0.2
Other			
STATIONARY INTERNAL COMBUSTION			
Reciprocating Engines			
Gas Turbines			
OTHER COMBUSTION			
Waste Disposal		0.4	
Others			4.6
INDUSTRIAL PROCESSES			
Chemical Manufacturing			
Iron and Steel			
Mineral Products			
Petroleum Refining			
Others			
MOBILE SOURCES			
Highway Vehicles			
Light Duty Autos			141.2
Light Duty Trucks			42.3
Heavy Duty Gasoline Trucks			8.1
Heavy Duty Diesel Trucks			2.6
Other Highway Vehicles			1.5
Non-Highway Vehicles			
Rail			0.5
Aircraft			0.1
Vessels			41.9
Other			168.2
Stationary Sources Total		0.4	5.2
Mobile Sources Total		0.00	195.7
Grand Total All Sources		0.4	200.9

APPENDIX D

REQUIREMENTS DOCUMENT QUALITY ASSURANCE CHECKLIST

In an effort to improve the quality of the Ozoneville draft base year inventory, the ORPA reviewed and completed the Requirements document[1] QA checklist prior to submitting the inventory to EPA. Our review of the checklist prior to inventory submittal pointed out several improvements that needed to be made. The identification and accomplishment of these improvements in the inventory drafting process will make the inventory documentation more complete and provide EPA the information it needs to review and approve the draft inventory. This appendix contains a copy of the completed checklist for the Ozoneville MSA.

---

[1] Emission Inventory Requirements for Post-1987 Ozone State Implementation Plans. EPA-450/4-88-019. December 1988.

REQUIREMENTS DOCUMENT QUALITY ASSURANCE CHECKLIST

Note: "Post '87 requirements" refers to Emission Inventory Requirements For Post '87 Ozone State Implementation Plans.

1. $VOC/NO_x/CO$ Summary Tables

a. Does the submittal contain completed $VOC/NO_x/CO$ summary tables, per Table 1 in Post '87 Requirements, for:

i. the base year inventory (draft inventory)?

|X| Yes |_| No

ii. the base line projection year inventory (final inventory)?

|_| Yes |X| No

Comment? This document only addresses the base year inventory.

b. If the suggested format is not followed, is a format used that contains equivalent information?

|X| Yes |_| No

Comment?

c. In the $VOC/NO_x/CO$ summary tables, is the attainment year specified?

|_| Yes |X| No Year? 19___

Comment? Only base year inventory is reported

d. In the VOC/NO_x/CO summary tables, is the point/area source distinction made?

|XX| Yes |_| No

Comment? ______________________________

____

____

e. In the VOC/NO_x/CO summary tables, have the emissions been seasonally adjusted?

|X| Yes |_| No

Comment? ______________________________

____

____

f. Have the suggested RACT source category distinctions been maintained?

|X| Yes |_| No

Comment? ______________________________

____

____

g. Are emissions reported as reactive VOC?

|XX| Yes |_| No

Comment? ______________________________

____

____

h. Is the geographical area specified?

|X| Yes |_| No

Comment? ______________________________

____

____

2. Point Source Listing

a. Does the submittal contain a point source listing, per Table 2 in Post '87 Requirements, for the base year?

|X| Yes |_| No

Comment? The format is slightly altered from that given in Table 2, but the content is essentially complete.

b. Are the principal operations specified with corresponding emission totals?

|X| Yes |_| No

Comment?

3. Documentation - General Considerations

a. Is there documentation accompanying the summary tables and point source listing?

|X| Yes |_| No

Comment? Documentation is detailed in report appendices.

b. Does the documentation specify who did the inventory?

|X| Yes |_| No

Comment?

c. Does the documentation define the area covered by the inventory?

|X| Yes |_| No

Comment? ______________________________

d. Does the documentation tell how nonreactive VOC were excluded from the emission totals?

|X| Yes |_| No

Comment? It fully discusses which compounds were excluded from consideration.

e. Does the documentation describe how the seasonal and weekday adjustments were made?

|X| Yes |_| No

Comment? ______________________________

4. Specific Documentation - Point Sources

a. Are point source cutoff levels defined?

|X| Yes |_| No

What are they? same as specified in Post-87 Policy Do they exceed 25 kg/day (10 TPY) for VOC or 250 kg/day (100 TPY) for NO_x or CO?

|X| Yes |_| No

Comment? ______________________________

b. Has the inventory been scaled up in some manner to account for points emitting less than the cutoff level(s)?

|_| Yes |X| No

Comment? ______________________________

____

____

c. Do all major point source categories appear to be included?

|X| Yes |_| No

Have all VOC and NO_x emission source categories in NAPAP inventory been addressed in SIP inventory?

|X| Yes |_| No

Comment? ______________________________

____

____

d. Have material balance techniques been used to estimate VOC emissions from solvent-using facilities?

|X| Yes |_| No
In some cases

Have source test results been used to identify emissions?

|X| Yes |_| No

Typical age range if source test data: 2 to 4 years

Comment? ______________________________

____

____

e. Are summer conditions of higher temperatures (and appropriate Vapor Pressures for gaoline) reflected in the VOC emission estimates made for petroleum product marketing and storage operations?

|XX| Yes |_| No

Do other volatile organic chemical storage calculations use appropriate temperature and throughput assumptions?

|X| Yes |_| No

Comment? ______________________________

____

____

f. Are the latest (through Fourth Edition, Supplement A) AP-42 emission factors used for calculating VOC emission estimates for petroleum product marketing and storage operations?

|X| Yes |_| No

Have "gapfilling" emission factors from NAPAP been used?

|X| Yes |_| No

Comment? The predominant source of emission factors was AP-42.

____

____

g. Is the SIP emission inventory produced from a computer data base?

|X| Yes |_| No

If so, what emission inventory system is used? (e.g., SAM/EIS/P&R) PC_SAMS. Are example emission calculations shown for several major point source categories?

|X| Yes |_| No

Comment? ______________________________

____

____

5. Specific Documentation - Area Sources

a. Are all of the major area sources listed in Table 4.1-1 of Procedures For The Preparation Of Emission Inventories For Volatile Organic Compounds, Volume I, (Third Edition) included in the inventory?

|X| Yes |_| No

Comment? ____

b. When certain facilities within one of the source categories listed in Table 4.1-1 are covered as point sources, have the associated emissions been subtracted from those emissions estimated for the corresponding area source category?

|X| Yes |_| No

Comment? ____

c. Have the per capita factors from Procedures For The Preparation Of Emission Inventories For Volatile Organic Compounds, Volume I, (Third Edition) been used to compute emissions?

|X| Yes |_| No
In most cases

If not, have techniques been used that appear to be technically sound, and are these alternate methods documented?

|X| Yes |_| No

Comment? ____

d. Has local activity levels information been used?

|X| Yes |_| No

Comment? In many cases, local data had to be estimated from State data

e. Does gasoline usage fall in the range of 400 to 800 gallons per capita per year?

|X| Yes |_| No

Are emissions included from underground tank breathing and trucks in transit?

|X| Yes |_| No

Comment?

f. Have the technical points in Attachment I of the check list (regarding per capita factors) been considered?

|X| Yes |_| No

Comment?

6. Specific Documentation - Highway Vehicles

Is the following information reported?

a. Description of procedures and models used to estimate base year and future year transportation parameters.

|X| Yes |_| No

Comment?

b. Description of the travel data base and any subsequent updates. When possible, estimates of the degree of accuracy and other statistical parameters should be included.

|X| Yes |_| No

Comment? ______

c. Description of traffic counting programs. Estimates of the degree of accuracy of VMT estimates based on traffic counts should be included.

|X| Yes |_| No

Comment? ______

d. Description of methods used to estimate vehicle speeds. Special speed studies should be documented.

|X| Yes |_| No

Comment? Copy of speed estimating study included with inventory.

e. Description of methods for estimating traffic parameters (VMT, speed, etc.) for local (off-network) traffic.

|X| Yes |_| No

Comment? ______

f. Description of methods used to estimate vehicle hot and cold start soak emissions.

|X| Yes |_| No

Comment? MOBILE4 defaults

g. Description of methods used to calculate emissions, including a description of how data were aggregated and emission factors applied.

|X| Yes |_| No

Comment?

h. Description of how other emission parameters (such as vehicle age distribution, average annual miles driven by model year) were obtained.

|XX| Yes |_| No

Comment? Predominantly MOBILE4 defaults

7. Specific Documentation - Projections

a. Does the inventory submittal specify how growth is incorporated into the baseline projection inventory?

|_| Yes |X| No

Comment? Projections not included, is only a base year inventory

b. Are the population projections used in the SIP inventory consistent with those projections used in water quality planning and design of wastewater treatment facilities?

|_| Yes |_| No NOT APPLICABLE SEE 7A

Comment? ______

c. Are reasonable surrogates used for "growing" activity levels and emissions, such as those indicators shown in <u>Procedures For The Preparation Of Emission Inventories For Volatile Organic Compounds</u>, Volume I, (Third Edition)?

|_| Yes |_| No NOT APPLICABLE SEE 7A

Comment? ______

d. Does the baseline projection take into account "on-the-books" control measures, specifically those in earlier SIPS (1979, 1982)?

|_| Yes |_| No NOT APPLICABLE SEE 7A

Comment? ______

e. Are specific examples shown of how projections were made for specific source categories?

|_| Yes |_| No NOT APPLICABLE SEE 7A

Comment? ______

f. Are projections for very large VOC emitters generally considered on a plant-by-plant basis rather than in aggregate?

|_| Yes |_| No NOT APPLICABLE SEE 7A

Comment? ______________________________

8. Specific Documentation - Quality Assurance

a. Has a quality assurance effort been made?

|X| Yes |_| No

Comment? ______________________________

b. Were the RACT or other industrial directories compared with the point source file to determine the possibility of missing sources?

|X| Yes |_| No

Comment? ______________________________

c. Were emissions data and point source listings compared with other emissions inventories (i.e., 1985 NAPAP)?

|X| Yes |_| No

Comment? ______________________________

d. If the emission inventory was developed from a computer data base (mainframe, mini, micro, or PC), are the emission factor files used in calculations referenced (i.e., AP-42, source specific test, other)?

[X] Yes [ ] No

Are nonhighway area source inventory equations used in the file documented or referenced?

[X] Yes [ ] No

Comment? ______

e. Are any data reasonableness checks made on emissions (i.e., comparison with national or regional averages)?

[X] Yes [ ] No

Comment? ______

f. Do the base year travel and emission estimates fall within the ranges presented in Guidelines For Review Of Highway Emission Inventories For 1982 SIPs (EPA-400/12-80-002)?

[X] Yes [ ] No

Comment? ______

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16. ABSTRACT

This document supplements recent US EPA guidance on compiling emission inventories for reactive volatile organic compounds (VOC), oxides of nitrogen (NO_x), and carbon monoxide (CO), for use in developing post-1987 State Implementation Plans (SIPs) for demonstrating attainment of the ambient ozone standards. This document contains an example emissions inventory for reactive VOC, NO_x, and CO, which has been compiled and documented for a fictitious ozone nonattainment area called Ozoneville.

This document updates and generally supersedes an earlier EPA inventory guidance document for ozone SIPs entitled Example Emission Inventory Documentation For 1982 Ozone SIPs.

17. KEY WORDS AND DOCUMENT ANALYSIS		
a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Emission Inventories Ozone Carbon Monoxide State Implementation Plans Post-1987 SIPs		
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