FINAL REPORT

DEVELOPMENT OF IMPROVED EMISSION INVENTORY FOR RUBBER PRODUCT MAKERS AND PROCESSORS

Contract No. 00041

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EXECUTIVE SUMMARY

The rubber products manufacturing industry produces a wide variety of industrial and consumer products from more than two dozen types of natural and synthetic rubber. A limited amount of research has demonstrated that many of the processes involved in rubber manufacturing, including use of mold release compounds and adhesives, result in emissions of fine particulate matter, volatile organic compounds (VOC) and many toxic air contaminants (TACs).

One of the proposed measures in the South Coast Air Quality Management District's recently approved draft Air Toxics Control Plan is AT-STA-08, "Control of Emissions from Rubber Products Manufacturing, Proposed Rule 1427." The Air Toxics Control Plan projects that adoption of the control measure would reduce emissions of TACs from the industry by 45 percent.

As a first step in developing PR 1427, the South Coast Air Quality Management District (AQMD) needs basic information on the rubber products manufacturing industry in its jurisdiction. The questions include:

- How many rubber products manufacturers are in the District?
- What is the population of each type and size of rubber manufacturing equipment?
- How much of which types of rubber are processed in each type of equipment?
- What toxic air contaminants are emitted from which processes?
- What is the current inventory of emissions of particulate matter, volatile organic compounds and individual air toxics species?
- Which types of emission control devices are applied to which types of equipment, and how effective are they?

OBJECTIVES

The objectives of this research program, which was conducted by Pacific Environmental Services, Inc. (PES) under contract to the AQMD, were (1) to identify criteria and toxic air pollutants released by rubber making and processing facilities; (2) to identify rubber making and processing facilities in the jurisdiction of the South Coast Air Quality Management District; and (3) to develop a comprehensive industrywide emission inventory of the rubber making and processing industry in the AQMD.

KEY FINDINGS

(1) There are about 144 rubber products manufacturers in the AQMD. Emission inventory data were received from 48 of them.

(2) The 48 facilities in the inventory use 607 piece of rubber products manufacturing equipment, including 21 mixers, 51 mills, 6 calenders, 20 extruders, 475 curing devices and 34 grinders.

(3) The inventoried facilities use 51 million lb of rubber in mixing, 53 million lb in milling, 5 million in calendering, 31 million in extrusion, 42 million in curing, and 5 million in grinding. The facilities also use 50,100 lb of mold release compounds and 111,800 lb of adhesives.

(4) Basin-wide uncontrolled and net emissions[1] of total particulate matter (TPM) are 24,500 and 400 lb/yr, respectively.

(5) Basin-wide uncontrolled and net emissions of volatile organic compounds (VOC) are 203,200 and 134,500 lb/yr, respectively.

(6) Four of the inventoried facilities account for 89 percent of the uncontrolled TPM emissions. One inventoried facility accounts for about half of the uncontrolled VOC emissions.

(7) The Rule 1401/1402 compounds with the highest net emissions are toluene (16,100 lb/yr), carbon disulfide (9,000 lb/yr), methylene chloride (8,900 lb/yr), isopropyl alcohol (2,800 lb/yr) and isomers of xylene (2,300 lb/yr). The three hazardous air pollutants that are not Rule 1401/1402 compounds with the highest net emissions are methyl isobutyl ketone (5,300 lb/yr), hexane (1,800 lb/yr), and carbonyl sulfide (1,700 lb/yr).

(8) The majority of particulate emissions are from mixing. Application of adhesives and curing operations are responsible for most of the VOC emissions. For most volatile and semi-volatile organic pollutants not in mold releases or adhesives, curing and grinding account for most of the emissions.

SURVEY METHODS

The contractor obtained emission inventory data through a mail and telephone survey of facilities believed *a priori* to be rubber products manufacturers. The survey excluded facilities outside the AQMD's jurisdiction; those that were only distributors, retailers, sales offices, or other non-manufacturing establishments; and those that only formulated elastomers and other rubber products ingredients.[2] The names of potential

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[1] Net emissions are emissions after application of controls, where applicable.

[2] Formulation of elastomers is a type of chemical products manufacturing. This project was to be limited to manufacture of products from elastomers and other raw materials.

rubber products manufacturers were obtained from AQMD permit files, a commercial mailing list provider, and paper and online telephone and business directories.

After elimination of facilities that were duplicated on the various lists, and those that did not meet the aforementioned criteria, the final survey list comprised 442 facilities. About 87 percent of these were from the AQMD permit files and the commercial mailing list provider. Survey packages consisting of cover letters from the contractor and the AQMD, a seven-page questionnaire, and a postage-paid return envelope, were mailed and/or faxed to the 442 facilities. The questionnaire asked each respondent to indicate, by placing "Xs" in a matrix, which elastomer types were used in each of its production processes. The respondent was then asked to report how many pounds per year of rubber of each elastomer type was used in each process. Finally, the questionnaire asked for information on air pollution capture and control equipment.

The status of each facility's response was tracked using a Microsoft Access™ database. Responses were received by mail, fax and telephone. At least two attempts were made to telephone every facility that did not respond, and many facilities were called to clarify information that they had reported. Data from the survey forms were entered into a results database in Access.

Manufacturers and distributors of mold release compounds and adhesives reported by survey respondents were asked to provide material safety data sheets (MSDSs) for their formulations. Density and composition data from the MSDSs were entered into another Access database for later use in emission calculations.

EMISSION CALCULATIONS

Emissions of criteria pollutants and hazardous air pollutants (HAPs) from rubber products manufacturing (other than tire manufacturing) have not been thoroughly characterized. The U.S. Environmental Protection Agency (USEPA) recently distributed a draft section of *AP-42, Compilation of Air Pollutant Emission Factors* that contains emission factors developed through a program sponsored by the Rubber Manufacturers Association. These provisional emission factors were used in conjunction with rubber consumption data to develop estimates of uncontrolled emissions of total particulate matter (TPM), volatile organic compounds (VOC), and individual HAPs, including many AQMD Rule 1401/1402 compounds.

Survey respondents reported using seven different types of emission control equipment. For each combination of control device type and rubber manufacturing process, the contractor estimated a "release fraction," which is the fraction of uncontrolled emissions that are actually emitted. The sources of the release fraction data included several best available control technology (BACT) evaluations and a USEPA control technology evaluation for the tire manufacturing industry. Net emissions (i.e. emissions after application of controls) were calculated, where applicable, by multiplying uncontrolled emission values by the appropriate release fraction.

For mold release compounds and adhesives, it was assumed that all volatile components were emitted to the atmosphere. For these formulations, the annual consumption was multiplied by the weight fraction of each pollutant and/or VOC to obtain emissions.

RESULTS

Survey Response

Useful information (i.e. emission inventory data or evidence of ineligibility for the inventory) was received from 273 firms, representing 61.8 percent of all firms surveyed, and 74.0 percent of the firms that are in business. From the responses, it was determined that the probable size of the universe of rubber products manufacturers in the District is 144 facilities. Responses with emission inventory data were received from 48 facilities, or 33.3 percent of the universe.

Nature of the Survey Sample

The distribution by county of the survey sample does not differ significantly from that of the potential universe of rubber products manufacturers. The number of employees per facility ranged from 1 to 280, with a median of 23. About 19 percent of the facilities that reported employment values had 10 or fewer employees, 57 percent had 11 to 50, 11 percent had 51 to 100 and 13 percent had more than 100.

The facilities in the inventory are in 16 four-digit standard industrial classification (SIC) codes. Three-eighths are in SIC 3069 (Fabricated Rubber Products, Not Elsewhere Classified) or 3061 (Molded, Extruded, and Lathe-Cut Mechanical Rubber Goods). More than 40 types of rubber products are manufactured by these firms. The types with the highest reported frequency are seals, gaskets, and rollers.

Equipment Inventory

The facilities responding to the survey reported using 607 pieces of rubber products manufacturing equipment.[3] For a given type of equipment (e.g. mills), individual machines varied mainly by batch size. Only 11 facilities reported using mixers. Many fabricators purchase pre-mixed (and sometimes pre-cured) rubber from formulators and then use it in machines other than mixers. Most mixer users had only one mixing machine. A little less than half the facilities reported using mills, all 51 of which had two rollers. The number of mills per plant ranged from one to eight, with a mean of about two.

Only six calenders were reported by survey respondents. All but one of the five facilities with calenders had only one such device. Eleven facilities reported having extruders. All had one, two or three machines. Thirty-nine facilities reported having molds, presses, ovens, and other types of curing devices. Of the 475 curing devices reported, 432 were characterized as platen presses. The number of curing devices per firm ranged from 1 to 73, and the median value was 5 devices. Only 15 facilities reported performing grinding. The number of grinding machines per facility ranged from one to five.

[3] Rubber manufacturing process descriptions are in Section 1.2.

Materials Processed

Rubber and mold release or adhesives consumption data were received from 46 of the 48 respondents. These facilities reported combined use of 80.9 million lb in mixing, 52.7 million lb in milling, 4.9 million lb in calendering, 30.7 million lb in extrusion, 41.9 million lb in curing devices, and 5.3 million lb in grinding.[4] A significant fraction of this rubber use was at one facility.

The survey respondents reported using 50,060 lb of mold release compounds, of which 21,355 lb (42.7 percent) contained neither VOC nor air toxics compounds. About 98 percent of the VOC and/or toxics-containing mold releases whose type was reported were external; i.e. they were applied to the outer surface(s) in contact during molding.

The survey respondents reported using 111,835 lb of adhesives, of which only 420 lb (0.4 percent) contained neither VOC nor air toxics compounds. The main types of adhesives used were: rubber-to-rubber (84 percent), rubber-to-fabric (12 percent), and rubber-to-metal (4 percent).

Emissions

Annual emissions (lb/yr) were calculated for total particulate matter (TPM), volatile organic compounds (VOC) and individual air toxics species. Results are summarized as follows.

(1) Basin-wide uncontrolled and net emissions of TPM are 24,500 and 400 lb/yr, respectively. Basin-wide uncontrolled and net emissions of VOC are 203,200 and 134,500 lb/yr, respectively.

(2) Basin-wide uncontrolled emissions exceeded 1 lb/yr for 33 Rule 1401/1402 pollutants and 20 Title III hazardous air pollutants (HAPs) that are not Rule 1401/1402 compounds.

(3) The five Rule 1401/1402 compounds with the highest net emissions are toluene (16,100 lb/yr), carbon disulfide (9,000 lb/yr), methylene chloride (8,900 lb/yr), isopropyl alcohol (2,800 lb/yr), and isomers of xylene (2,300 lb/yr).

(4) The three HAPs that are not Rule 1401/1402 compounds that have the highest net emissions are methyl isobutyl ketone (5,300 lb/yr), hexane (1,800 lb/yr), and carbonyl sulfide (1,700 lb/yr). It should be noted that AQMD is proposing to add hexane to Rule 1401 by August, 2000.

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[4] Rubber consumption in the different processes cannot be added to determine basin-wide rubber use, since the same mass of material may be processed by two or more types of equipment at a given facility.

(5) The geographical distributions of emissions vary with pollutant type. Most of the uncontrolled TPM and VOC emissions occur in Los Angeles and San Bernardino Counties.

(6) Los Angeles County is the source of most of the toluene and methylene chloride emissions. Riverside County is the source of most of the isopropyl alcohol emissions. Most of the xylene emissions occur in San Bernardino County. For all pollutants examined, Orange County is a minor source (less than 4 percent) of emissions.[5]

(7) For all pollutants, the range of values of emissions per facility is quite large (up to eight orders of magnitude), and median emissions per facility are small; the bulk of emissions of most pollutants are from relatively few facilities.

(8) A screening analysis was performed to determine how many facilities' emissions would lead to a maximum individual cancer risk (MICR) exceeding 25 in 1 million at 25 meters from the facility. The MICR of 25×10^{-6} would be exceeded at at least one facility[6] for emissions of acrylonitrile, benzene, benzidine, 1,3-butadiene, chromium, methylene chloride or nickel.

(9) Taking mass emissions and unit risk factors into account, the five pollutants of highest concern for cancer risk are dibenzofurans, chromium, benzidine, acrylonitrile and 1,3-butadiene.

(10) Taking mass emissions and relative exposure levels into account, the five pollutants of highest concern for chronic noncancer risk are chromium, dibenzofurans, acrolein, nickel and acrylonitrile.

(11) The great majority of particulate emissions are from mixing operations.

(12) Application of adhesives accounts for about 44 percent of the uncontrolled VOC emissions, and curing adds another 23 percent.

(13) For most volatile and semi-volatile organic pollutants not found in mold releases or adhesives, curing and grinding account for most of the emissions.

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[5] The contractor is aware of four Orange County facilities that may have significant emissions but did not respond to the survey.

[6] The 25×10^{-6} MICR would be exceeded at different facilities for different pollutants.

RECOMMENDATIONS

The contractor recommends that regulatory agencies and/or industry conduct or sponsor a focused program of emission factor development tests at representative rubber manufacturing facilities. The tests should focus upon those pollutants that, on the basis of screening, would trigger notification and/or risk reduction planning requirements. The tests should include the following:

- Testing with temporary total enclosures that meet the criteria of USEPA Method 204;

- Use of a more efficient method for collecting samples of semi-volatiles, such as adsorption on polyurethane foam (PUF) in a Method 5 sampling train; and

- Conducting a detailed mass balance on emissions of volatile organic compounds, such as methylene chloride, that are in mold release compounds and adhesives and are reportedly (in *AP-42*) emitted from various rubber production processes, such as grinding.

The contractor also recommends an investigation of the state-of-the-art of low-VOC, non-toxic adhesives applicable to this industry. The study should include an assessment of the advantages and drawbacks of these alternative formulations, prospects for their coming on the market in the near future, and the economics of substitution.

1.0
INTRODUCTION

This report describes the methods and results of a 1999-2000 survey of rubber products manufacturers in the jurisdiction of the South Coast Air Quality Management District (AQMD). The product of the survey is a detailed inventory of equipment and emissions of criteria pollutants and toxic air contaminants (TACs).

1.1 PURPOSE AND OBJECTIVES

1.1.1 Regulatory Background

Under AQMD Rules 201 and 203, any equipment that has the potential to emit air pollutants or that controls air pollutant emissions needs a permit, unless it is specifically exempted by Rule 219. Until 1998, almost all rubber products manufacturing equipment was exempt from permit requirements. On September 11, 1998, the Board amended Rule 219 to remove the exemption for larger rubber presses (those with ram diameters greater than 26 inches and/or operating at temperatures above 400°F). Many rubber products manufacturing firms are in the AQMD's database, however, because they have equipment (such as boilers) that does require a permit. In addition, Rule 219 allows the AQMD to require a permit for equipment that would otherwise be exempt, if that equipment violates another AQMD rule. For example, a few facilities have had to obtain permits for rubber products processing equipment because the equipment was found to violate the AQMD's nuisance rule.

In addition to its permit rules, the AQMD has many rules regarding the use of specific types of equipment. These rules specify emission limits, control requirements, recordkeeping requirements, etc. To date, no AQMD rules specific to rubber products manufacturing equipment have been promulgated. However, Rule 1168 (Adhesives Applications) covers the use of adhesives in many rubber products manufacturing processes. A February 1998 amendment to this rule extended an exemption for certain types of rubber sheeting applications, but the exemption expired on January 1, 2000.

At its March 17, 2000 meeting the AQMD Board approved a draft air toxics control plan (SCAQMD, 2000a). This document examined the current state of knowledge of air toxics exposure and risk in the South Coast Air Basin, as well as Federal, State, and local regulatory programs intended to reduce air toxics emissions and risks. Although the air toxics control plan is not required by State or Federal law, and is not legally binding, it proposes several measures that, if adopted and implemented, would reduce the risks of air toxics exposures to levels below those resulting from current regulations.

One of the proposed measures in the Air Toxics Control Plan is AT-STA-08, "Control of Emissions from Rubber Products Manufacturing" (Proposed Rule 1427). Noting that the rubber manufacturing industry "results in emissions of numerous TACs including formaldehyde, methylene chloride, 1,3-butadiene, toluene, benzene and vinyl chloride," the draft Air Toxics Control Plan projects that adoption of the control measure

would reduce TAC emissions from this industry by 45 percent. The "Rule and Control Measure Forecast" presented by AQMD staff at the March 17, 2000 Board meeting (SCAQMD, 2000b) states that Proposed Rule (PR) 1427 "will be evaluated for possible command-and-control rules to reduce toxic emissions..."

1.1.2 Previous Emission Estimates

Very little information on emissions from rubber products manufacturing in the Basin is available. In the socioeconomic impact assessment for the aforementioned amendments to Rule 219 (Kneisel, 1998), it was estimated that there were 500 pieces of rubber products manufacturing equipment that processed more than 200 pounds per day.[1] These 500 molds and presses were assumed by staff to emit an aggregate of 1000 lb of volatile organic compounds (VOC) per day, or 365,000 lb per year (Lee et al., 1998). The emission factor used by the staff reportedly was based upon tests at two facilities.

1.1.3 Objectives of This Project

As a first step in developing PR 1427, the AQMD needs basic information on the rubber products manufacturing industry in its jurisdiction. The questions include:

- How many rubber products manufacturers are in the AQMD?
- What is the population of each type and size of rubber manufacturing equipment?
- How much of which types of rubber are processed in each type of equipment?
- What toxic air contaminants are emitted from which processes?
- What is the current inventory of emissions of particulate matter, volatile organic compounds and individual air toxics species?
- Which types of emission control devices are applied to which types of equipment, and how effective are they?

The purpose of this project was to answer these questions as thoroughly as possible. Specific objectives were to:

(1) Identify criteria and toxic air pollutants released by rubber making and processing facilities;

(2) Identify rubber making and processing facilities in the jurisdiction of the South Coast Air Quality Management District; and

[1] The AQMD staff had originally recommended changing Rule 219(j) to require permits for rubber presses or molds that processed more than 200 pounds of rubber per day.

(3) Develop a comprehensive industrywide emission inventory of the rubber making and processing industry in the AQMD.

1.2 MANUFACTURING PROCESSES

Although tire manufacturing and retreading have been the focus of previous emissions characterization work, the majority of rubber manufacturing facilities produce other engineered rubber products, such as seals, gaskets, floor tiles, sheeting, hoses, and belts. However, the processes used in these diverse industries are similar. The following is a brief description of the major processes common to most rubber manufacturing and processing facilities (Danielson, 1973; RMA, 1997; Smith, 1993; USEPA, 1995; USEPA, 1997; USEPA, 1998). Also described are two types of materials commonly used in the industry: mold releases and adhesives.

1.2.1 Mixing

As the first step in most types of rubber manufacturing, raw rubber (natural or synthetic) is mixed with a variety of additives in an internal batch mixer. The main types of additives, many of which include hazardous air pollutants (HAPs), include the following:

Vulcanizing Agents, which are commonly composed of inorganic or organic sulfur compounds, cross-link rubber molecules to form a durable polymer. For several types of rubber (e.g. polychloroprene, fluoroelastomers and EPDM[2]), zinc or magnesium oxides or peroxides are used as vulcanizers (White, 1995). The most common peroxides are 1,4-dichlorobenzyl peroxide and benzoyl peroxide (Lynch, 1978).

Accelerators and Activators decrease the time and temperature required for vulcanization. They include metal oxides (zinc, lead and magnesium oxide) and a large variety of sulfur- and nitrogen-containing organic compounds (e.g. benzothiazoles, benzothiazolesulfonamides, dithiocarbamates, dithiophosphates, guanidines, thioureas, and thiurams),

Retarders prevent premature vulcanization. Typical retarders include salicylic and benzoic acids, phthalic anhydride and N-(cyclohexylthio)phthalimide.

Antioxidants, which are usually high molecular weight alkylated amine compounds, help prevent oxidative deterioration of the final product.

Softeners are used to improve resiliency and flexibility, and to facilitate mixing, extrusion and molding processes. The predominant softener in the rubber industry is petroleum oil.

[2] Ethylene/propylene/nonconjugated diene.

Fillers are added to the rubber mix to reinforce the final product and add color. They also reduce cost by decreasing the quantity of more expensive materials needed for the rubber matrix. The most common filler is carbon black.

Mixers create a homogeneous mass of rubber using two helical blades moving at different speeds; the blades shear materials against the wall of the machine's body. Mixing usually takes place in two stages, one at about 330°F and the second at about 230°F. The high temperatures, combined with the shearing action of the mixer, lead to volatilization of many constituents of the raw rubber and the additives. Other emissions occur during handling of finely divided fillers and other processing aids.

1.2.2 Milling

After mixing, the material is passed between two rollers that rotate in opposite directions. This process forms the rubber into a long strip or sheet, which can be used in other processes. Sometime a previously milled sheet is put through the mill again to "warm up" the rubber for further processing in extruders and calenders.

1.2.3 Calendering

This step consists of applying a rubber coat onto synthetic or steel fibers, such as in the manufacture of steel-belted radial tires. The rubber and the solid matrix are squeezed between rollers, which may be heated.

1.2.4 Extrusion

Extrusion consists of forcing one or more previously mixed rubber compounds through a stationary cylinder. A die attached to the head of a power-driven screw produces the desired shape or cross section of the extruded rubber.

1.2.5 Vulcanization (Curing)

The purpose of vulcanization is to impart certain qualities, such as strength, elasticity, and solvent resistance, to rubber. In sulfur cure processes, the polymers of the rubber compounds are cross-linked with sulfur compounds; the higher the percentage of sulfur, the harder the rubber. *Press mold curing* uses high temperatures and high pressures (600 to 10,000 pounds per square inch) to force the product into a desired shape. *Autoclave curing* uses saturated steam to cure a product that has already been shaped; it is the most common vulcanization method for non-tire rubber products. In *hot air curing*, pre-formed products are passed through a heated chamber.

1.2.6 Grinding

Grinding is performed to remove rough edges and other undesired features from the final product. Sometimes it is used to form and/or shape the product.

1.2.7 Mold Releases

The purpose of a mold release agent is to allow easy demolding (removal of molded parts from molds). A good mold release is inert to chemical reaction and will not transfer to the part. It must also be durable enough to allow many molding operations between applications. *External mold releases* are sprayed or brushed onto the inner surfaces of the mold, where they form a chemical bond. Some formulations contain reactive resin solutions that cross-link and cure on the mold. Water-based mold releases consist of large polymers (typically fluoropolymers) and alcohols and/or glycol ethers. *Internal mold releases* are used in situations in which it is difficult to reach all the inner surfaces of the mold. The internal mold release is mixed with the elastomer to be molded and then migrates to the outer surface.

1.2.8 Adhesives

Adhesives are widely used in the rubber processing industry, largely to bind rubber parts together, or to join rubber with metal. They are available in a variety of formulations, and may be solvent- or water-borne.

1.3 OUTLINE OF THE REPORT

Section 2 describes the methods used to conduct the emission inventory survey. Emission calculation and data management procedures are discussed in Section 3. The results of the survey, including a detailed presentation of emission estimates, is provided in Section 4. Findings and conclusions are in Section 5. References are found in Section 6. Copies of the survey instruments are presented in Appendix A. Finally, Appendix B contains emission factor tables for various rubber products manufacturing processes.

2.0
SURVEY METHODS

2.1 DEVELOPMENT OF LIST OF FACILITIES TO SURVEY

The first step in the survey was to assemble a list of facilities that potentially would be in the improved emission inventory. Several criteria were used to assemble and refine the list:

- Facilities had to be within the jurisdiction of the SCAQMD;
- At least part of the facility's business activity had to be manufacturing of rubber products;
- Facilities that were only distributors, retailers, sales offices, headquarters, or other non-manufacturing establishments were excluded; and
- Facilities that only formulated rubber product ingredients (e.g. elastomers) or ancillary chemicals (e.g. adhesives) were excluded

2.1.1 Information Sources

The contractor obtained the names, addresses, telephone numbers, and other facility information from five sources:

(1) AQMD permit files
(2) InfoUSA.com (a commercial mailing list provider)
(3) The online version of the Thomas Register
(4) Pacific Bell's "Business to Business" yellow pages for Los Angeles County
(5) Miscellaneous sources

Data from these sources were compiled in a Microsoft Access™ database that was used for tracking survey responses. The database is described in Section 2.3.

<u>South Coast Air Quality Management District</u>

On October 7, 1999, the contractor received facility and process information from AQMD permit files. The facilities were selected for having four-digit standard industrial classification (SIC) codes and/or AQMD basic equipment category (BCAT) codes corresponding to rubber processing. The initial list had 204 entries.

InfoUSA.com Mailing List

The contractor obtained another set of names, addresses, telephone numbers and other facility information from InfoUSA.com, a commercial mailing list company. The first step was to determine the appropriate SIC codes to use in requesting the mailing list. First, all the *manufacturing* four-digit codes associated with the facilities on the AQMD's list were identified. To those were added several four-digit codes known from preliminary research to be associated with rubber products manufacturing. The combined list of four-digit codes was entered into a form on InfoUSA.com's Internet web site. The web site then reported a list of six-digit (i.e., more detailed) SIC codes corresponding to the four-digit codes that had been entered. Table 2-1 lists the six-digit codes that were selected for the mailing list purchase. InfoUSA.com was instructed to find all businesses that were in the selected SIC codes and were in Los Angeles, Orange, Riverside or San Bernardino counties. On October 21, 1999, InfoUSA.com provided the contractor with a data file with 339 facility records, each of which included, but was not limited to, the following information:

- Business name
- Mailing address
- Contact name, title and gender
- Telephone and fax numbers
- County where facility is located
- SIC code specified in the search
- Primary SIC code

Note that the primary SIC code was in many cases different from the SIC code used as a selection criterion. This is discussed further in Section 2.1.2.

Thomas Register Online

The contractor also searched the Internet version of the *Thomas Register of American Manufacturers*.[1] This database is not comprehensive, inasmuch as companies must pay to be listed. However, it can be searched by very specific product types and by state. The first product type searched was "rubber." The *Thomas Register* has 650 product headings containing the word "rubber." The next search was limited to firms that were in 39 of these product headings and were located in California.[2] Table 2-2 lists the headings. This search found 47 companies that were listed under the chosen headings, were in the four-county area, and were not in the previously described data sets. Information included name, address, and telephone and fax numbers.

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[1] The URL for the online version is www.thomasregister.com.

[2] Additional categories were not searched because the same companies that were in the broad categories (e.g. "rubber goods") were also in the very specific product categories.

Table 2-1

SIX-DIGIT STANDARD INDUSTRIAL CLASSIFICATION CODES USED FOR MAILING LIST REQUEST

SIC Code	Description	SIC Code	Description
2499-18	Rollers-Wooden Metal Rubber Etc-Mfrs	3069-03	Latex Products (Manufacturers)
2672-01	Labels-Paper (Manufacturers)	3069-04	Rubber (Manufacturers)
2672-02	Pressure Sensitive Materials-Mfrs	3069-05	Balloons-Novelty & Toy-Manufacturers
2672-07	Tapes-Pressure Sensitive (Manufacturers)	3069-06	Cable Grips-Manufacturers
2672-98	Coated & Laminated Paper NEC (Mfrs)	3069-07	Heels-Manufacturers
3011-01	Tire-Manufacturers	3069-08	Mats & Matting-Manufacturers
3011-98	Tire & Innertube-Manufacturers	3069-09	Brake Lining-Manufacturers
3021-98	Rubber & Plastics-Footwear (Mfrs)	3069-10	Sponges-Manufacturers
3052-01	Rubber Products-Manufacturers	3069-12	Rolls-Rubber Covered (Manufacturers)
3052-02	Belting & Belting Supplies-Manufacturers	3069-18	Rubber Rolls (Manufacturers)
3052-04	Vacuum Cleaners-Supplies & Parts-Mfrs	3069-19	Rubber Reclaiming (Manufacturers)
3052-05	Conveyors-Belting (Manufacturers)	3069-20	Rubberized Fabrics (Manufacturers)
3052-06	Hose & Tubing-Rubber & Plastic-Mfrs	3069-22	Life Preservers-Manufacturers
3052-98	Rubber & Plastics-Hose & Belting (Mfrs)	3069-23	Life Rafts & Floats-Manufacturers
3053-01	Seals-Oil, Grease, Etc (Manufacturers)	3069-24	Condoms-Manufacturers
3053-02	Gaskets-Manufacturers	3069-25	Pulley Coverings (Manufacturers)
3053-03	Seals-Metal (Manufacturers)	3069-26	Diaphragms-Industrial (Manufacturers)
3053-05	Seals-O-Ring-Manufacturers	3069-28	Balls-Rubber (Manufacturers)
3053-98	Gaskets-Packing & Sealing Devices (Mfrs)	3069-29	Type-Rubber (Manufacturers)
3061-98	Molded Extruded/Lathe Cut Rubber Goods (Mfr)	3442-12	Weather Strips-Manufacturers
3069-01	Rubber Clothing & Footwear (Mfrs)	3965-03	Hair Pins (Manufacturers)
3069-02	Rubber Bands (Manufacturers)		

Table 2-2

PRODUCT CATEGORIES FOR SEARCH OF THOMAS REGISTER ONLINE

Rubber	Rubber: Transfer Molded
Rubber: Calendered	Rubber: Urethane
Rubber: Cloth Inserted	Rubber: Weatherstrip
Rubber: Compression Molded	Rubber Bonded to Metal
Rubber: Die Cut	Rubber Bumpers
Rubber: Extruded	Rubber Compounding and Mixing
Rubber: Fabric Reinforced	Rubber Fabrication
Rubber: Injection Molded	Rubber Goods
Rubber: Lathe Cut	Rubber Goods: Synthetic
Rubber: Liquid Injection Molded	Rubber Parts: Die Cut
Rubber: Molded	Rubber Tubing
Rubber: Neoprene	Aprons: Rubber, Rubberized
Rubber: Perforated	Bags: Rubber
Rubber: Sheet	Balls: Rubber
Rubber: Silicone	Bands: Rubber
Rubber: Slab	Bellows: Rubber
Rubber: Sponge	Belting: Rubber
Rubber: Strip	Boots & Shoes: Rubber
Rubber: Styrene-Butadiene	Bumpers: Rubber
Rubber: Thermoplastic	

Pacific Bell Yellow Pages

Additional names were obtained from Pacific Bell's printed "Business to Business" yellow pages for Los Angeles County, under the heading "Rubber Products." (Although the focus of this directory is on Los Angeles County, listings for facilities in other counties are also included.) This search found 38 new sets of names, addresses and telephone numbers from this source.

Other

While searching the Internet for information on a particular company already on one of our lists, the contractor came upon the name and address of a rubber automotive parts manufacturer that was not listed by any of the previously mentioned sources.

2.1.2 Refinement of the Facilities List

Because it was based upon a deliberately broad search, the AQMD's list included ten facilities that were not rubber manufacturers. These were deleted from the survey.

About 45 of the facilities in the InfoUSA.com database were duplicates of facilities on the AQMD list. In each of those cases, the AQMD's information was updated with values from the InfoUSA.com list[3] and then the InfoUSA.com record was deleted. The InfoUSA.com's selection of facilities included *any* record in its database for which any of several SIC codes (primary, secondary, tertiary etc.) matched the search terms. The InfoUSA.com compilation therefore contained a large number of facilities for which the search term was a secondary, rather than a primary, SIC code. In many of those cases, the primary term corresponded to a wholesale or retail establishment, rather than a manufacturer. The contractor attempted to call all facilities with non-manufacturing primary SIC codes to verify that they actually manufactured rubber products on site. The great majority of these facilities was *not* manufacturers, and was eliminated.

Many of the firms found through the Pacific Bell Business to Business yellow pages also appeared to be wholesale or retail establishments, rather than manufacturers. The contractor telephoned all the facilities whose names were obtained from this source and eliminated those that were not actually rubber products manufacturers.

The contractor attempted to call all 23 firms on the list that had "tire" in their names. Of these, only one—a wheel chair tire manufacturer—made tires. The others were eliminated. The contractor also called 16 firms that had "supply" or "service" in their names. Only one was eligible for the survey.

The final step was to eliminate facilities that were located outside the jurisdiction of the AQMD. ZIP codes of all facilities remaining in the database were compared with a list furnished to the contractor by the AQMD during a previous study (Perryman, 1998). On December 10, 1999, the contractor sent the AQMD a list of seven facilities whose ZIP codes were on the boundary of the AQMD. Two of these boundary facilities were outside the AQMD (Lee, 1999) and were deleted.

2.1.3 Characteristics of the Final Survey List

The final survey list comprised 442 facilities. Table 2-3 shows how these facilities are distributed by county, and Table 2-4 shows their distribution by data source.

[3] The InfoUSA.com information was assumed to be more recent.

Table 2-3

DISTRIBUTION OF FACILITIES IN THE SURVEY, BY COUNTY

County	No. of Facilities	Percent of Total
Los Angeles	270	61
Orange	102	23
Riverside	26	6
San Bernardino	44	10
Total	442	100

Table 2-4

DISTRIBUTION OF FACILITIES IN THE SURVEY, BY SOURCE OF FACILITY DATA

Origin	No. of Facilities	Percent of Total
SCAQMD Permit Files	163	37
InfoUSA Mailing List	224	51
Thomas Register Online	41	9
Pacific Bell Yellow Pages	13	3
Other	1	0
Total	442	100

2.2 SURVEY PACKAGE DESIGN

Before designing the survey package, the contractor reviewed the literature on rubber products manufacturing. One purpose of the review was to make sure that the forms would use nomenclature understandable by the facilities surveyed. Another was to gain familiarity with variations in equipment within equipment classes, e.g. to know that calenders come with various numbers of rolls. Common brand names for each type of elastomer used in the industry were identified. Mentioning these brand names in the survey would help the facilities identify the appropriate elastomer.

Examples of survey materials are provided in Appendix A. Each survey package included two cover letters, a seven-page questionnaire and a postage-paid return envelope[4] with the contractor's address. These materials were sent in manila clasp envelopes with pre-printed addressee and return address labels; each addressee label included the facility's survey ID number.[5]

[4] About 100 return envelopes were inadvertently sent without prepaid postage.
[5] Survey ID numbers are discussed in Section 2.3.

2.2.1 Cover Letters

The survey package contained two cover letters. The first, which was on the contractor's stationery, stated that the purpose of the survey was to gather information that could be used to estimate emissions of air pollutants from facilities that manufacture rubber products. The letter assured that the final report would not contain information about individual facilities and referred the recipient to the AQMD for clarification about confidentiality and the purposes of the survey.

The second letter, which was on AQMD letterhead, confirmed that PES was the AQMD's contractor and stated that any information given to the contractor that is identified as "confidential" or "trade secret" would be held as such. The letter noted, however, that emissions data are not trade secret.

2.2.2 Questionnaire

The questionnaire was designed with two competing objectives:

- To obtain as much information as possible about equipment, processes, and materials used by the rubber products manufacturing industry; and
- To minimize the information-gathering burden on those who would fill out the forms

The final questionnaire design thus represented a compromise. For example, respondents were allowed to group pieces of similar equipment, rather than reporting operating data on each individual device. The questionnaire consisted of five forms, described as follows.

Form I – Facility Information

The main purpose of this form was to obtain basic information on the facility, including street and mailing address, telephone and fax numbers, SIC code, and number of employees. These data were later used to update each responding facility's record in the project database. The form also asked what types of rubber products the respondent manufactures. Finally, Section B of the form enabled the facility to state why it should *not* be included in survey. If the facility was exempt, it was instructed to mail or fax back Form I and ignore the rest of the questionnaire.

Form II – Materials/Process Matrix

This form was a matrix whose rows were major categories of elastomers and whose columns were rubber products processing categories. The elastomer categories included those in the 23 "recipes" upon which the U.S. Environmental Protection Agency's provisional rubber products manufacturing emission factors are based.[6] To these were added nine other elastomers known to be used by this industry. To aid the respondent in

[6] These emission factors are discussed in detail in Section 3.1.1.

placing its elastomers into the correct row, the matrix included each elastomer's American Society for Testing and Materials (ASTM) abbreviation (e.g. HNBR for hydrogenated nitrile rubber), its commonly used chemical name, and example trade names. The column labeled "EPA Code" referred to the "recipe" number in the emission factor compilation.[7]

The last eight columns of the matrix corresponded to the processes for which emission factors were available. Respondents were asked to place an "X" at the intersection of each elastomer category and each process.

The matrix had two purposes. The first was to obtain the minimum amount of information on materials and processes used by each respondent. If the respondent did not complete any other forms, at least some useful data would have been obtained. The second purpose was to enable a cross-check on the data provided elsewhere in the questionnaire. For example, if the facility placed an "X" in the "Calenders" column but provided no information on calendering, they were contacted and asked to explain the discrepancy.

Form III – Equipment and Rubber Use Information

This form was divided into six sections, one for each major type of equipment and/or process. Each section had brief instructions and a table. Each table had two major rows, each of which contained three subsidiary rows. (Respondents could photocopy the form if they needed more space). The major rows corresponded to individual machines or, at the facility's option, groups of similar machines. The subsidiary rows corresponded to elastomer categories. Facilities were asked to fill out one subsidiary row for each combination of machine (or group of machines) and rubber type.

In the tables on this form, equipment was characterized in one or two ways. For all processes, the respondent was to report the maximum and average batch size. This information could be used to develop machine size categories. For mills and calenders, the facility was asked to report the number of rolls. For extruders, the length-to-diameter (L/D) ratio was requested. Finally, for rubber products curing (which includes molds, presses and ovens), the facility was asked to specify the type of cure (platen press, autoclave, hot air, or other). For all processes, the information requested included the typical operating schedule (hours per day and hours per year) and pounds of rubber processed[8] in 1999.

Form IV – Use of Mold Release and Adhesive Compounds

The purpose of this form was to gather data on the types and amounts of mold release compounds and adhesives used by this industry. Respondents were asked to provide the names and telephone numbers of their material suppliers. The suppliers were then contacted to obtain composition information. (See Section 2.5.2.)

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[7] Because of an error in preparing Form II for printing, most of the "EPA Code" numbers on the form are incorrect. However, survey respondents did not use those numbers to guide their responses.

[8] For grinding, respondents were asked for the pounds of rubber *removed*.

Form V – Emission Controls

This form requested information on the ways (if any) that emissions from rubber products manufacturing equipment are captured and directed to the outside air. It also asked for data on emission control equipment and stack parameters. The main purpose of the form was to obtain an idea of the extent of air pollution control in this industry.

2.3 SURVEY TRACKING DATABASE

To track the fate of the mailed survey packages, the contractor constructed a database in Microsoft Access™. Table 2-5 describes the major elements of the database, which is called "Rubber Track.mdb."[9] The facilities table contains a variety of information on each facility, including many that were not included in the survey.[10] Each facility was assigned a unique survey ID number when it was first entered into the database. The same ID numbers were retained throughout the study, even though many facilities were eliminated before the first mailing. The Status table kept track of interactions with the facilities and processing of the data they provided. It included a field for recording miscellaneous information that was useful for managing the survey. Sections 2.4 and 2.5 discuss in more detail how this database was used.

2.4 PRINTING AND MAILOUT

The cover letters and questionnaire forms were photocopied, stapled and folded for mailing by the contractor. To minimize mailing weight and conserve paper, the last six pages of the questionnaire were copied double-sided.

The Rubber Mailing Labels report in the survey tracking database was used to generate outgoing mailing labels. On the first line of each label was the survey ID number. The second line contained the name of the contact at the facility or "Plant Manager" if the contact was unknown. In cases in which mailing addresses differed from physical location addresses, the mailing addresses were used.

The surveys were mailed in six batches, ranging from 17 to 146, from December 24, 1999 to January 14, 2000. The reason for using several batches was to minimize the time between mailing and follow-up calls.

2.5 FOLLOW-UP

2.5.1 Facility Contacts

Several types of follow-up activities were necessary. First, a large number of survey packages were returned by the U.S. Postal Service (USPS). For each one, the contractor tried at least one of the following measures to obtain a corrected or new address:

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[9] The table does not include many ad hoc queries that are used occasionally.

[10] The emission inventory database will include only those facilities that are eligible to be in the inventory and provided data.

Table 2-5

MAJOR ELEMENTS OF THE RUBBER PRODUCTS MANUFACTURERS SURVEY TRACKING DATABASE

	Name	Purpose
Tables	COUNTY CODES	A lookup table for names of counties
	ELIMINATION CODES	A lookup table for reasons for eliminating facilities
	FACILITIES	Stores basic facility data (name, address, contact, etc.)
	STATUS	Stores information on survey status (eliminated, follow-up calls, etc.)
	TITLE CODES	A lookup table for titles of facility contacts
Queries	FOLLOWUP CALL LIST	Prints contacts, phone numbers, etc. for facilities to be called
	LEFT MESSAGE	Updates STATUS in batch mode with information on facilities that were left messages
	PROMISED	Identifies facilities that have said that they would return the question-naire
	SECOND PACKAGE	Updates STATUS in batch mode with information on facilities that were mailed or faxed a second survey package
	TRACKER	Updates STATUS with survey status information, one facility at a time
Forms	UPDATE FACILITY DATA	Updates FACILITIES with facility information
	UPDATE STATUS	To enter data for updating survey status, one facility at a time
Reports	RETURN ADDRESS LABELS	Prints return address labels
	RUBBER MAILING LABELS	Prints customized mailing labels for facilities in survey

- Calls to the telephone number listed for the facility (if in the database);
- Directory assistance;
- Local printed telephone directories;
- Various Internet-based address and telephone number search services, such as Switchboard.com; and
- Searches for the company's web site on the Internet

Similar measures were used for facilities whose telephone numbers had been disconnected.

Another type of follow-up call was required when the facility submitted an incomplete, illegible, or ambiguous response. In some cases, the corrected data were obtained by telephone, and in others the facility mailed or faxed the requested information.

At least two attempts were made to telephone every facility that had not responded to the survey. As many as six unfruitful attempts were made in some cases. Facilities were asked whether they had received the survey, and whether they needed any help filling it out. If they said that they were not rubber products manufacturers, then they were eliminated from the survey. Reasons for their elimination were recorded in the survey tracking database. Many facilities stated that they had not received the survey, or had discarded it. The contractor re-mailed survey packages to 5 companies and faxed the forms to 50.

Follow-up activities began on January 3, 2000 and continued until February 3, 2000, when the AQMD and the contractor mutually agreed that further effort was not likely to be productive (Lee, 2000). Responses continued to arrive, however. The last one was received on February 18, 2000.

2.5.2 Material Safety Data Sheets

Survey respondents reported using 59 different mold release and adhesive formulations that contained VOC and/or TACs. Material safety data sheets (MSDSs) were requested from the manufacturers and/or distributors of these products. All MSDSs received were archived in a three-ring binder for ready reference during the survey. MSDSs for 30 formulations that contained no toxic air pollutants and no VOC were also archived but were not used in the emission calculations. Relevant data from the MSDSs were entered into a special Microsoft Access™ database called "Rubber MSDS.mdb." This database contained three main tables. "Manufacturers" was a lookup table containing one record for each manufacturer of mold releases and/or adhesives. "Not Applicable" stored the names and manufacturers of formulations that contained no toxics or VOC. "MSDS Data" had one record for each pollutant in each formulation. Its fields are described in Table 2-6.

Table 2-6

STRUCTURE OF POLLUTANT DATA TABLE IN MSDS DATABASE

Field	Description
ProdName	Commercial name of the product, e.g. Chemlok 218
ProdType	General type (mold release or adhesive)
Density	Density in pounds per gallon
CAS	Chemical Abstract Services number or assigned acronym[a]
WtPct	Mass of pollutant per unit mass of the formulation, as a percentage
MFR	Manufacturer
MSDSDate	Date the MSDS was last updated
Initial	Initials of person entering the data for this record

[a]Acronyms assigned for groups of compounds, e.g. MPXYL = m-xylene + p-xylene

3.0

EMISSION CALCULATION AND DATA MANAGEMENT

3.1 EMISSION FACTORS

3.1.1 *AP-42* Emission Factors

Emissions of criteria pollutants and hazardous air pollutants (HAPs) from rubber products manufacturing (other than tire manufacturing) have not been thoroughly characterized. Except for some background information on the *AP-42* emission factors to be discussed below, the U.S. Environmental Protection Agency's Technical Transfer Network (TTN) web site did not contain any useful information. A brief review of the general literature found a few articles on workplace exposures to pollutants released during rubber manufacturing. For example, Cocheo et al. (1983) collected samples of workplace air during various operations at a shoe sole factory, a tire retreading factory and an electrical cable insulation plant. Using gas chromatography with mass spectrometry (GC/MS), they identified and quantified 99 chemical species.

In 1994 and 1995, the Rubber Manufacturers Association (RMA) sponsored an extensive program of laboratory tests to determine emission factors for nine rubber manufacturing processes. In November, 1996, the results of the tests were submitted to the U.S. Environmental Protection Agency (USEPA) for consideration for inclusion as Section 4.12 in *AP-42, Compilation of Air Pollutant Emission Factors* (USEPA, 1997). On December 17, 1997, the USEPA made a draft Section 4.12 available for public comment, and on June 8, 1999 the agency published revised emission factors for two processes and stated that, while the RMA-derived emission factors did not have an "EPA 'blessing,'" there was no reason to doubt the veracity of the information, and no other sources of data for estimating emissions from this industry (Anon., 1999).

The RMA conducted emissions tests on the following nine processes (RMA, 1997):

- Internal mixing and milling
- Milling
- Extruding
- Calendering
- Platen press curing
- Autoclave curing
- Hot air curing
- Tire curing
- Grinding

For each manufacturing process except grinding, tests were conducted with up to 23 rubber "recipes," comprising the majority of the types of rubber used in the United States. Each recipe consisted of a type of elastomer, plus a typical mix of accelerators, retarders,

antioxidants, softeners, fillers and vulcanizing agents. Table 3-1 summarizes the recipes.[1]

Table 3-1

RUBBER COMPOUND RECIPES IN *AP-42*

Recipe	Name	Elastomer Type	
		ASTM Designation	Generic Name
1	Tire Inner Liner	BrIIR/NR	Brominated natural rubber/natural rubber
2	Tire Ply Coat	IIR/NR	Natural rubber/synthetic rubber
3	Tire Belt Coat	NR	Natural rubber
4	Tire Base/Sidewall	BR/NR	Natural rubber/polybutadiene rubber
5	Tire Apex	SMR	Standard Malaysian rubber
6	Tire Tread	BR	Styrene butadiene rubber/polybutadiene rubber
7	Tire Bladder	IIR	Isobutyl isoprene
8	EPDM Sulfur Cure	EPDM	Ethylene/propylene/nonconjugated diene
9	EPDM Peroxide Cure	EPDM	Ethylene/propylene/nonconjugated diene
10	EPDM Non-Black Sulfur Cure	EPDM	Ethylene/propylene/nonconjugated diene
11	Polychloroprene W Type	CRW	Polychloroprene (W Type)
12	Polychloroprene G Type	CRW	Polychloroprene (G Type)
13	Paracryl OZO	NBR/PVC	Acrylonitrile-butadiene/polyvinyl chloride
14	Paracryl BLT	NBR	Acrylonitrile-butadiene
15	Hypalon	CSM	Chlorosulfonated polyethylene
16	Viton	FKM	Fluoroelastomer
17	Vamac	AEM	Ethylene/acrylic elastomer
18	Hydrogenated Nitrile	HNBR	Hydrogenated nitrile rubber
19	Silicone	VMQ	Dimethyl silicone polymer with vinyl side groups
20	Acrylate Rubber	ACM	Polyacrylate elastomer
21	Chlorinated Polyethylene	CPE	Chlorinated polyethylene
22	Emulsion SBR	SBR	Styrene-butadiene
23	Epichlorohydric	ECO	Epichlorohydrin

Several survey respondents reported using elastomers other than those incorporated in the *AP-42* recipes. As no other sources of emission factors were available, the contractor assigned each of these elastomers to one of the *AP-42* recipes, taking into account structural similarities. Table 3-2 shows how the additional elastomers were categorized.

The *AP-42* emission factors are published for the following pollutant classes:

- Total Method 25A organics;
- Total speciated organics;
- Total organic hazardous air pollutants (HAPs);[2]
- Total metal HAPs;

[1] Detailed information on the composition of each recipe is provided in *AP-42* Section 4.12.
[2] As listed in accordance with Section 112(b) of the 1990 Clean Air Act.

Table 3-2

EQUIVALENT RECIPES FOR FORMULATIONS REPORTED BUT NOT IN *AP-42*

Reported by Survey Respondent		Equivalent Category		
ASTM	Name	Name	Recipe No.	Comments
XNBR	Carboxylated nitrile	NBR	14	Paracryl BLT is a form of nitrile rubber
CIIR	Chlorinated isobutylene isoprene	BrIIR/NR	1	Contains IIR; did not count bromoform or bromomethane emissions
CR	Chloroprene	CRW	11	
MQ	Dimethyl silicone polymer	VMQ	19	Silicone
SBR	Emulsion styrene-butadiene	Emulsion SBR	22	
EPDM	EPDM steam cure	EPDM peroxide cure	9	
FVMQ	Fluorosilicone with vinyl groups	VMQ	19	Silicone
IIR	Isobutyl isoprene ("Butyl")	Butyl rubber	7	
CR	Neoprene	CRW	11	
NBR	Nitrile	NBR	14	Paracryl BLT is a form of nitrile rubber
SBR	Oil-extended styrene-butadiene	Emulsion SBR	22	
BR	Polybutadiene rubber	Natural Rubber/ Polybutadiene blend	4	Polybutadiene rubber is usually blended with other types
PVMQ	Silicon rubber	VMQ	19	Silicone
SBR	Solution styrene-butadiene	Emulsion SBR	22	
IR	Synthetic polyisoprene	Natural Rubber	5	Natural rubber is polyisoprene, with some other components

- Total particulate matter; and
- Individuals HAPs

These pollutant categories were defined principally by the methods used to collect and analyze samples during the RMA-sponsored emission factor tests. Table 3-3 summarizes EPA's definitions of the categories and the methods used to develop the emission factors. In addition, *AP-42* Section 4.12 contains emission factors for many individual HAPs. These are listed in Table 3-4, which also shows which pollutants are subject to the District's Rule 1401. A full set of *AP-42* emission factors for rubber products manufacturing is provided in Appendix B.

3.1.2 Adjustments and Additions to *AP-42* Emission Factors

In 1998, as part of a work assignment from EPA, the contractor reviewed a portion of the RMA's submittal, to determine whether the recommended emission factors were truly supported by the test data. A number of problems were found in the emission factor values for milling, platen press curing and grinding (Grable, 1998). These included the following:

Table 3-3

DEFINITIONS OF POLLUTANT CATEGORIES IN *AP-42* SECTION 4.12

Pollutant Category	Abbrev-iation	Criteria for Inclusion	Quantification Method	
			Collection	Analysis[a]
Total Method 25A Organics	TOG	All quantifiable organic gases	Continuous monitoring	FID
Total Speciated Organics	TSO	All quantifiable organics	Evacuated canister (TO-14)	GC/MS (speciated volatiles) GC/FID (volatile ozone precursors) Method 8270 (semivolatiles)
Total Organic Hazardous Air Pollutants	TOHAP	Organic hazardous air pollutants as listed in Section 112(b) of the Clean Air Aict	Evacuated canister (TO-14)	GC/MS (speciated volatiles) Method 8240 (volatiles) Method 8270 (semivolatiles) GC/FPD (sulfur compounds)
Total Metal Hazardous Air Pollutants	TMHAP	Metallic hazardous air pollutants as listed in Section 112(b) of the Clean Air Aict		Method 6010 (ICP-AES) Method 7000 (AA)
Total Hazardous Air Pollutants	THAP	Hazardous air pollutants as listed in Section 112(b) of the Clean Air Aict	Sum of TOHAP and TMHAP	
Total Particulate Matter	TPM	All particulate matter	EPA Method 5 (filter and impingers)	Gravimetric

[a]FID = Flame ionization detection; GC/MS = Gas chromatography/mass spectrometry; GC/FID = Gas chromatography/flame ionization detection
GC/FPD = Gas chromatography/flame photometric detection; ICP-AES = Inductively coupled plasma - atomic emission spectrometry;
AA = atomic absorption spectrophotometry

Table 3-4

HAZARDOUS AIR POLLUTANTS IN *AP-42*, SECTION 4.12

Pollutant	CAS No.	MIX	CAL	EXT	TIR	AUT	HOT	PLA	GRI	MIL	HAP	1401
Acetaldehyde	75-07-0	X	X	X		X	X	X	X	X	X	X
Acetonitrile	75-05-8	X	X	X		X	X	X		X	X	
Acetophenone	98-86-2	X	X	X	X	X	X	X	X	X	X	
Acrolein	107-02-8	X	X	X	X	X	X	X	X	X	X	a
Acrylonitrile	107-13-1	X	X	X		X	X	X		X	X	X
Aminobiphenyl, 4-	92-67-1		X							X	X	
Aniline	62-53-3	X	X	X	X	X	X	X	X	X	X	X
Benzene	71-43-2	X	X	X	X	X	X	X	X	X	X	X
Benzidine	92-87-5	X	X	X		X	X	X		X	X	X
Benzyl chloride	100-44-7				X					X	X	X
Biphenyl	92-52-4	X	X	X	X	X	X	X	X	X	X	
bis(2-Ethylhexyl)phthalate	117-81-7	X	X	X	X	X	X	X	X	X	X	X
Bromoform	75-25-2	X	X	X		X	X			X	X	
Butadiene, 1,3-	106-99-0	X	X	X		X	X	X	X	X	X	X
Butyl methyl ether, t-	1634-04-4	X	X	X	X	X	X	X		X	X	
Cadmium (Cd) compounds		X							X		X	X
Carbon disulfide	75-15-0	X	X	X	X	X	X	X	X	X	X	a
Carbon tetrachloride	56-23-5	X	X	X		X	X	X		X	X	X
Carbonyl sulfide	463-58-1	X	X	X	X	X	X	X	X	X	X	
Chloro-1,3-butadiene, 2-	126-99-8					X		X	X		X	
Chloroacetophenone, 2-	532-27-4	X	X	X	X	X	X			X	X	
Chlorobenzene	108-90-7					X					X	
Chloroform	67-66-3	X	X	X	X	X	X	X		X	X	X
Chromium (Cr) Compounds		X		X					X		X	X
Cobalt (Co) Compounds				X					X		X	
Cresol, o-	95-48-7	X	X	X	X	X	X	X	X	X	X	
Cumene	98-82-8	X	X	X	X	X	X	X	X	X	X	
Dibenzofuran	132-64-9	X	X	X	X	X	X	X	X	X	X	
Dibromo-3-chloropropane, 1,2-	96-12-8				X						X	X
Dichlorobenzene, 1,4	106-46-7	X	X	X	X	X		X	X	X	X	X
Dichloroethane, 1-2	107-06-2									X	X	
Dimethylaminoazobenzene, p-	60-11-7	X	X	X			X	X		X	X	X
Dimethylphthalate	131-11-3	X	X	X	X	X	X	X		X	X	
Di-n-butylphthalate	84-74-2	X	X	X	X	X	X	X	X	X	X	
Dinitrophenol, 2-4	51-28-5	X	X	X		X	X			X	X	
Dioxane, 1,4-	123-91-1			X							X	X
Epichlorohydrin	106-89-8					X					X	X
Ethyl acrylate	140-88-5	X	X	X		X	X			X	X	
Ethyl chloride	75-00-3	X	X	X			X	X		X	X	a
Ethylbenzene	100-41-4	X	X	X	X	X	X	X	X	X	X	a
Ethylene dichloride	107-06-2		X								X	X
Ethylidene dichloride	75-34-3				X						X	X
Hexachlorobenzene	118-74-1	X	X	X		X	X				X	X
Hexachlorobutadiene	87-68-3			X	X	X		X			X	
Hexachloroethane	67-72-1	X	X	X		X	X	X		X	X	
Hexane	110-54-3	X	X	X	X	X	X	X	X	X	X	a
Hydroquinone	123-31-9	X	X	X			X	X		X	X	
Isooctane	540-84-1	X	X	X		X	X	X	X	X	X	

[a]Proposed for addition to Rule 1401 by August, 2000.

Table 3-4

HAZARDOUS AIR POLLUTANTS IN *AP-42*, SECTION 4.12

(Continued)

Pollutant	CAS No.	MIX	CAL	EXT	TIR	AUT	HOT	PLA	GRI	MIL	HAP	1401
Isophorone	78-59-1	X	X	X	X	X	X	X	X	X	X	
Lead (Pb) Compounds		X							X		X	X
Methyl bromide	74-83-9	X	X	X	X	X	X			X	X	a
Methyl chloride	74-87-3	X	X	X	X	X	X	X	X	X	X	
Methyl ethyl ketone	78-93-3	X	X	X	X	X	X	X	X	X	X	a
Methyl isobutyl ketone	108-10-1		X	X	X		X	X	X	X	X	
Methyl-2-Pentanone, 4-	108-10-1	X				X					X	
Methylene chloride	75-09-2	X	X	X	X	X	X	X	X	X	X	X
N,N-Dimethylaniline	121-69-7			X			X				X	
Naphthalene	91-20-3	X	X	X	X	X	X	X	X	X	X	a
Nickel (Ni) compounds		X		X					X		X	X
Nitrobenzene	98-95-3	X	X	X			X			X	X	
Nitrobiphenyl, 4-	92-93-3		X						X		X	
Nitrophenol, 4-	100-02-7	X	X	X		X	X			X	X	
N-Nitrosodimethylamine	62-75-9	X				X				X	X	X
Pentachlorophenol	87-86-5	X	X	X		X	X			X	X	X
Phenol	108-95-2	X	X	X	X	X	X	X	X	X	X	a
Propanal	123-38-6	X	X	X		X	X			X	X	
Propylene oxide	75-56-9	X	X	X		X	X	X	X	X	X	X
Quinoline, substituted	91-22-5						X				X	
Styrene	100-42-5	X	X	X	X	X	X	X	X	X	X	a
Tetrachloroethane, 1,1,2,2-	79-34-5				X						X	X
Tetrachloroethene	127-18-4	X	X	X	X	X	X	X	X	X	X	X
Toluene	108-88-3	X	X	X	X	X	X	X	X	X	X	a
Toluidine, o-	95-53-4	X	X	X	X	X	X	X	X	X	X	
Trichlorobenzene, 1,2,4-	120-82-1				X	X		X			X	
Trichloroethane, 1,1,1-	71-55-6	X	X	X	X	X	X	X	X	X	X	
Trichloroethylene	79-01-6	X	X	X	X	X	X		X	X	X	X
Vinyl acetate	108-05-4	X	X	X						X	X	
Vinyl chloride	75-01-4	X	X	X			X	X		X	X	X
Vinylidene chloride	75-35-4	X	X	X	X	X	X	X		X	X	
Xylene, m-	108-38-3						X				X	a
Xylene, m- + p-Xylene	1210	X	X	X	X	X	X	X	X	X	X	
Xylene, o-	95-47-6	X	X	X	X	X	X	X	X	X	X	a
Xylene, p-	106-42-3						X				X	a

[a]Proposed for addition to Rule 1401 by August, 2000.

- Links between some of the reported emission factors and the original test data could not always be ascertained;
- For only one process were all 23 recipes tested; results were "extrapolated" to combinations of process and recipe that were not tested;
- Test methods are not clearly described in several cases;

- For milling, platen press curing and grinding, emissions for 1,555 tests were reported as above detection limits, yet the corresponding emission factors were reported as zero; and

- For milling, platen press curing and grinding, the contractor could find supporting test data for only 295 out of 2,508 reported results (11.8 percent)

Nevertheless, as no alternative values were available, the *AP-42* factors were used.

Finally, the contractor added the category "Volatile Organic Compounds" (VOC) to those listed in *AP-42*. VOC was defined according to AQMD Rule 102. For each combination of process and recipe in *AP-42*, VOC was calculated by subtracting all non-VOC emission factors (e.g. that for methylene chloride) from the emission factor for TOG or TSO, whichever was larger.[3]

3.1.3 Mold Release Compounds and Adhesives

The *AP-42* compilation specifically excludes emissions from "manufacturing aids," such as solvents, adhesives and mold release compounds. It is possible that emissions measured in the RMA studies may have included volatile constituents of mold releases and/or adhesives applied "upstream" of the measurement point. Therefore, facilitywide emission inventories that include both emissions from the production processes in *AP-42* and those from application of manufacturing aids could double-count some emissions. It would also explain the presence in the process emission factors of several compounds (e.g. 1,1,1-trichloroethane and methylene chloride) that neither are in the original recipes nor are expected to form from decomposition or reaction products.

To estimate emissions from mold release compounds and adhesives, the contractor obtained material safety data sheets (MSDSs) for most of the formulations reported by the survey respondents.[4] In many cases, the MSDS reported the VOC content as defined by AQMD Rule 102, by the Bay Area Air Quality Management District, or by the Clean Air Act. Where VOC was not stated explicitly, it was calculated by subtracting Rule 102 exempt compounds from the reported value for total organic compounds. Table 3-5 lists the pollutants that were determined to be present in mold release compounds and adhesives.

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[3] Because of differences in analytical methods, TOG and TSO emission factors differed for many combinations of elastomer recipe and process.

[4] See Section 2.5.2.

Table 3-5

POLLUTANTS IN REPORTED MOLD RELEASES AND ADHESIVES

Compound	CAS Number	Rule 1401
Benzene	71-43-2	X
Ethyl benzene	100-41-4	
Formaldehyde	50-00-0	X
Hexane	110-54-3	
Isopropyl alcohol	67-63-0	X
Methanol	67-56-1	X
Methyl ethyl ketone (2-Butanone)	78-93-3	X
Methyl isobutyl ketone (Hexone)	108-10-1	a
Methylene chloride (Dichloromethane)	75-09-2	X
Methylene diphenyl diisocyanate (MDI)	101-68-8	
Tetrachloroethylene (Perchloroethylene)	127-18-4	X
Toluene	108-88-3	X
Trichloroethylene	79-01-6	X
Volatile Organic Compounds	VOC	
Xylenes (isomers and mixture)	1330-20-7	X

[a]Proposed for addition to Rule 1401 by August, 2000.

3.1.4 Release Fractions

As will be discussed in detail in Section 4.3.7, seven types of emission control equipment were reported by survey respondents. The survey form did not ask for capture and control information, so it was necessary to estimate, for each combination of control device and controlled process, a reasonable value for overall control efficiency.[5] In this report, "release fraction" (RF) is defined as the fraction of uncontrolled emissions that are actually emitted. Where no emission controls are used, the release fraction is assumed to be 1. If CE is the overall control efficiency, then RF = 1 – CE.

The contractor obtained values for CE by reviewing several best available control technology (BACT) evaluations and a USEPA document, *Presumptive Maximum Achievable Control Technology, Rubber Tire Manufacturing Source Category* (USEPA, 1998). Table 3-6 lists the control equipment reported by survey respondents, the control efficiencies and release fractions assumed by the contractor, and the references to the CE values.

[5] One respondent reported the overall control efficiency of its regenerative thermal oxidizer.

Table 3-6

CONTROL EFFICIENCIES AND RELEASE FRACTIONS USED IN THE EMISSION CALCULATIONS

Type of Control Device	Process Controlled	CE	RF	Reference
Baghouse, Ambient Temperature	Grinding	0.98	0.02	USEPA, 1998
	Mill	0.99	0.01	SCAQMD, 1999a
	Mixer	0.99	0.01	SCAQMD, 1999a
Adsorber, Activated Carbon	Curing	0.74	0.26	SJVUAPCD, 1997
Afterburner, Catalytic	Adhesives Application	0.9	0.1	USEPA, 1998
Cyclone	Grinding	0.994	0.006	USEPA, 1990
Electrostatic Precipitator (< 3000 cfm)	Curing	0.3	0.7	USEPA, 1998
Electrostatic Precipitator (> 3000 cfm)	Curing	0.6	0.4	USEPA, 1998
Regenerative Thermal Oxidizer	Adhesives Application	0.83	0.17	Survey response

Some of the control efficiencies and release fractions require comment. In the BACT determination for the carbon adsorber (SJVUAPCD, 1997), the capture efficiency was reported as 65 to 90 percent. A midpoint value of 77.5 percent was assumed. It was also assumed that the removal efficiency of the carbon adsorber was 95 percent. Therefore the overall control efficiency was (0.775)(0.95) = 0.74.

For the cyclone, the RACT/BACT/LAER determination cited showed net emissions of 0.617 lb/hr for a process rate of 1,848 lb/hr of rubber tires. It was assumed that the rate of rubber *removal* was 10 percent of 1,848 lb/hr, or 184.8 lb/hr[6]. The uncontrolled emission factor used in this report for particulate matter is 0.545 lb TPM per lb rubber removed. Therefore the release fraction is 0.617/(0.545*184.8) = 0.006.

Finally, one facility reported a VOC capture and destruction efficiency of 82.6 percent for its regenerative thermal oxidizer. That value was used for the same facility, as well as for another that used the same type of control device.

3.2 CALCULATION METHODS

3.2.1 Uncontrolled Emissions

***AP-42* Process Emissions**

The rubber products manufacturing emission factors in *AP-42* are presented in a set of Word Perfect™ tables, each table corresponding to one production process (e.g. milling) and several recipes. The columns of the tables correspond to recipes and the

[6] For the ten facilities for which data were available, a 95-percent confidence interval for the mean of the ratio of pounds rubber removed by grinding to pounds cured was 0.022 to 0.10. Use of the upper bound of this confidence interval results in an inventory-wide TPM emission rate that is 6 lb/yr lower than if the mean ratio were used.

rows correspond to pollutants. The contractor converted these tables into a set of Microsoft Excel 97™ worksheets, one for each of the following processes:

- Mixing
- Milling
- Calendering
- Extrusion
- Autoclave Curing
- Hot Air Curing
- Platen Press Curing
- Grinding

For a given process, the emission factors for all pollutant-recipe combinations were entered into a single worksheet. For many combinations of pollutant species and recipe, the pollutant concentration was below the detection limit of the test used to establish the emission factor. Those cases are designated by a "<" symbol in the *AP-42* tables. The contractor converted all these symbols to zeroes. The next step was to eliminate all worksheet rows that consisted entirely of zeroes.

To calculate emissions from survey responses, the contractor set up one template workbook for each process. The workbook consisted of three worksheets. The first was the emission factor matrix described above. The second, which was called "Inputs," contained a blank row for entering values for the pounds of rubber of each recipe. In each column of "Inputs," the annual rubber use was multiplied by the emission factor in each row to yield a matrix of emissions by recipe and process. The total emissions of each pollutant were calculated by summing across the corresponding row. The third worksheet, called "AnnEmiss," was used to store the results of the emission calculations in a format suitable for transfer to the Emissions table of the Results database (discussed in the next section).

Figure 3-1 illustrates, with hypothetical numbers, how the template was used to calculate emissions. First, one workbook was created for each facility. Next, the three-worksheet template for each process at the facility was copied to the facility workbook. Then rubber use values were entered into the Inputs worksheet. In the example in Figure 3-1, the facility uses 10,000 lb/yr of Recipe #1 and 25,000 lb/yr of Recipe #3. Emissions were calculated in the Input worksheet, for each combination of pollutant and recipe. The rightmost column of the Input worksheet contains the sum of the emissions of each pollutant. The next step was to use Excel's filter commands to eliminate all rows with zero emission sums. In the example, 1,1,1-dichloroethene would be filtered out.

The pollutant ID values and the total emissions from all non-zero rows were then copied into the appropriate columns of the AnnEmiss worksheet. The equipment code for the process in question was copied into each row of this worksheet. The "Release-Frac" and "NetEmiss" columns of AnnEmiss are discussed in the next section.

A. PORTION OF EMISSION FACTOR MATRIX FOR MIXING

		AP-42 Recipe Number			
Analyte Name	Pollutant ID	1	2	3	4
Total Method 25A Organics	TOG	6.17E-05	3.91E-05	1.36E-04	3.88E-05
Total Speciated Organics	TSO	5.08E-05	5.53E-05	8.92E-05	5.31E-05
Total Organic HAPs	TOHAP	2.10E-05	1.33E-05	5.90E-05	2.54E-05
Total Metal HAPs	TMHAP	9.67E-08	9.71E-09	1.74E-07	7.06E-08
Total HAPs	THAP	2.11E-05	1.33E-05	5.91E-05	2.55E-05
Total Particulate Matter	TPM	1.75E-04	4.02E-04	9.00E-04	3.00E-04
1,1,1-Trichloroethane	71-55-6	0	8.03E-08	3.19E-07	4.23E-08
1,1-Dichloroethene	75-35-4	0	0	0	5.47E-07
1,3-Butadiene	106-99-0	9.78E-08	0	0	2.17E-07

B. PORTION OF "INPUTS" WORKSHEET FOR MIXING

		AP-42 Recipe Number				
		1	2	3	4	Emissions (lb/yr)
Annual Rubber Use (lb) →		10000	0	25000	0	
	TOG	6.17E-01	0.00E+00	3.40E+00	0.00E+00	4.02E+00
	TSO	5.08E-01	0.00E+00	2.23E+00	0.00E+00	2.74E+00
	TOHAP	2.10E-01	0.00E+00	1.48E+00	0.00E+00	1.69E+00
	TMHAP	9.67E-04	0.00E+00	4.35E-03	0.00E+00	5.32E-03
	THAP	2.11E-01	0.00E+00	1.48E+00	0.00E+00	1.69E+00
	TPM	1.75E+00	0.00E+00	2.25E+01	0.00E+00	2.43E+01
	71-55-6	0.00E+00	0.00E+00	7.98E-03	0.00E+00	7.98E-03
	75-35-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	106-99-0	9.78E-04	0.00E+00	0.00E+00	0.00E+00	9.78E-04

C. PORTION OF "ANNEMISS" WORKSHEET FOR MIXING

EquipCode	PollutantID	LbYr	ReleaseFrac	NetEmiss
999001	TOG	4.017	1	4.017
999001	TSO	2.738	1	2.738
999001	TOHAP	1.685	1	1.685
999001	TMHAP	0.005317	1	0.005317
999001	THAP	1.6885	1	1.6885
999001	TPM	24.25	1	24.25
999001	71-55-6	0.007975	1	0.007975
999001	106-99-0	0.000978	1	0.000978

Figure 3-1. Example of Emission Calculation Using *AP-42* Emission Factors.

Mold Releases and Adhesives

Evaporative emissions from use of mold releases and adhesives were calculated within the Rubber MSDS database in Access.[7] It was assumed that 100 percent of the volatile ingredients were emitted. The calculations were performed one formulation at a time. First, a specially designed query found all the MSDS database entries for the formulation. It then prompted the user for the annual use of the formulation (in gallons or pounds) and the equipment code. Emissions were then calculated by multiplying the annual use times the weight percentages of each pollutant. The results were stored in a temporary Access table. The process was repeated for the next formulation, and the results were appended to the temporary table. After all formulations were processed, a totals query summed the emissions for each pollutant and formatted the data for export to the Emissions table in the Results database. (See Section 3.3.)

3.2.2 Controlled Emissions

For each case in which emission controls were reported by the facility, the uncontrolled emissions were multiplied by the appropriate release fraction to obtain "net emissions." First, the contractor set up a spreadsheet matrix in which each row represented a pollutant and each column represented a combination of production process and control process. For example, the matrix contained three columns for baghouses, corresponding to mixing, milling and grinding. In each cell was the corresponding release fraction. The first column of each matrix was a list of pollutant ID numbers (e.g. CAS numbers).

The next step was to copy the appropriate columns of the control matrix into the emission calculation workbook for each facility. The control matrix was then used as a "lookup table" to find the appropriate values for the "ReleaseFrac" column in the AnnEmiss worksheet. (See Figure 3-1.) The release fraction was multiplied by the uncontrolled emission rate to obtain the net emission rate. Results were exported to the Emissions Table in the Results database.

3.3 RESULTS DATABASE

To store the information reported by survey respondents and the results of the emission calculations, the contractor set up a Microsoft Access™ database called "Rubber Results.mdb." Table 3-7 lists the tables in the database and describes their purpose. The database also contains about 30 queries for calculating and summarizing emissions and other survey variables.

[7] This database is described in Section 2.5.2.

Table 3-7

TABLES IN THE RUBBER RESULTS DATABASE

Name	Purpose
CAS Numbers	A lookup table for pollutants; also shows whether pollutant is subject to Rule 1401/1402
Emissions	Stores annual and net emissions, release fractions by facility, equipment code and pollutant
Equipment	Stores data on each piece of equipment: type, size, batch size, hours, pounds rubber, and control equipment code
Facilities	Stores basic facility data (name, address, contact, etc.)
MoldRelAdh	Stores data on mold release and adhesives: type, number of formulations, pounds used, and control equipment code
Release Parameters	Stores data on stack height, temperature, flow rate, etc.

4.0

SURVEY RESULTS

4.1 COMPLETENESS OF THE INVENTORY

4.1.1 Summary of Survey Responses

Figure 4-1 and Table 4-1 summarize the response to the survey. Of the 442 facilities surveyed, 73 were apparently no longer in business in the District. The potential sample was therefore 369. Useful information (i.e. emission inventory data or evidence of ineligibility for the inventory) was received from 273 firms,[1] representing 61.8 percent of all firms surveyed, and 74.0 percent of the potential sample.

Of the 273 firms that responded, 225 were ineligible, for reasons shown in Table 4-1 and discussed further in Section 4.1.2. The potential size of the universe of rubber products manufacturers in the District is therefore 369 – 225 = 144. Twelve firms explicitly refused to participate; they were assumed to qualify for the inventory. The 48 responses with data therefore represent 33.3 percent of the universe of rubber products manufacturers in the District, and 36.1 percent of the *possible* inventory.

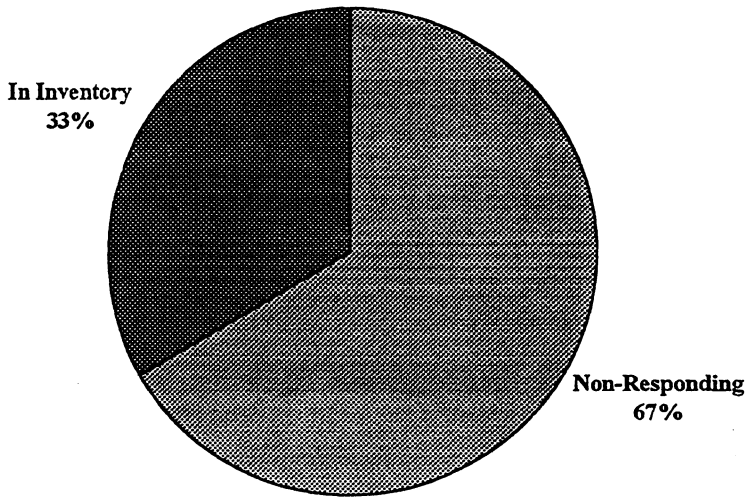

Figure 4-1. Percent of Facilities in the Inventory.

[1] Information from 225 ineligible firms plus 48 firms that submitted inventory data.

Table 4-1

CHARACTERISTICS OF THE SURVEY RESPONSE

Surveys Mailed					442
Out of Business	Returned by US Postal Service		38		73
	Telephone Disconnected		35		
Potential Sample	Ineligible	Manufacturer, but not Rubber	164	225	369
		Wholesaler or Retailer Only	24		
		Administrative or Sales Location	22		
		Did Not Operate in 1999	4		
		Use Prefabricated Rubber to Die-Cut Parts	10		
		Duplicate Facility	1		
	Eligible	Did Not Submit Data	96	144	
		Submitted Data	48		

The distribution of inventoried facilities by source of facility information for the survey was as follows:

AQMD	22
InfoUSA	19
Thomas Register	3
Pacific Bell	4
	48

4.1.2 Elimination of Facilities From the Survey

Of the 298 facilities eliminated from the survey, 164 (55.2 percent) were manufacturers, but did not fabricate any products from rubber. Another 10 facilities manufactured gaskets and other small parts by stamping prefabricated, pre-cured rubber with dies; because this process results in negligible air pollutant emissions, it was not included in the inventory. The fact that such a high percentage of facilities in the survey was ineligible indicates deficiencies in their characterization in the five data sources identified in Section 2.1.

Table 4-2 shows the distribution of the ineligible facilities by source of facility information. Comparing the last row of Table 4-2 with the last column of Table 2-4, one sees that the "errors" in identification of facilities are roughly in proportion to the contributions of the different sources to the total list of names.

The manufacturing plants that did not make rubber products from elastomer "recipes" reported that they made the following types of products:

- Adhesives and sealants
- Adhesive-coated labels
- Plastics
- Silicone (elastomer)

- Polyurethane foam

In addition, one facility reported that it assembled pre-manufactured rubber parts that it obtained elsewhere.

Table 4-2

SOURCES OF NAMES OF INELIGIBLE FACILITIES

	AQMD	InfoUSA	Thomas Register	Pacific Bell
Out of Business	50	13	6	4
Non-Rubber Manufacturer	34	120	10	
Die Cutters	1	6	2	1
Wholesale or Retail	3	13	8	
Administrative or Sales		16	6	
Duplicate Facility				1
No 1999 Operations	4			
Total Ineligible	92	168	32	6
Total Facilities Identified	163	224	41	13
Percent Ineligible	56.4	75	78	46.2
Percent of Incorrect Listings	31	56	11	2

4.2 NATURE OF THE SURVEY SAMPLE

4.2.1 Geographical and Size Distribution

Table 4-3 shows the distribution of the 48 inventoried facilities by county. Included in the table is the geographical distribution of the 144 facilities in the potential universe of rubber products manufacturers. A chi-square analysis of the results shows that the sample's geographic distribution is essentially the same as that of the universe ($\chi^2 = 0.852$, d.f. = 3).

The number of employees per facility in the inventory ranged from 1 to 280. The median firm size was 23. Figure 4-2 shows the frequency distribution of the reported number of employees per facility. Most of the companies that reported employment values (57 percent) had 11 to 50 employees. About 19 percent of the facilities had 10 or fewer employees, 11 percent had 51 to 100, and 13 percent had more than 100.

Table 4-3

DISTRIBUTION OF THE INVENTORY SAMPLE BY COUNTY

County	No. of Responses	Percent of Total	No. in Universe	Percent of Total
Los Angeles	28	58.3	84	58.3
Orange	8	16.7	30	20.8
Riverside	6	12.5	14	9.7
San Bernardino	6	12.5	16	11.1
Total	48	100.0	144	99.9

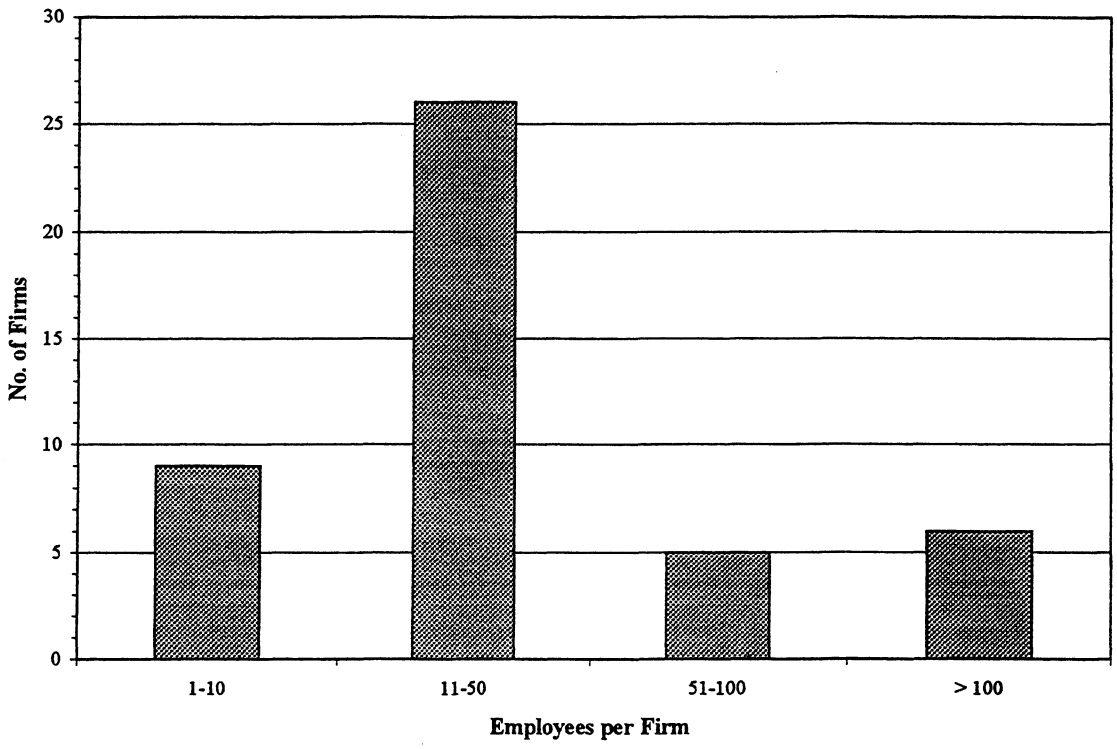

Figure 4-2. Distribution of Inventoried Facilities, by Number of Employees.

4.2.2 Distribution by Industry and Product

As was discussed in Section 2, the standard industrial classification (SIC) codes for most of the facilities in the survey were known in advance, either because they were included in the AQMD data set or were specified in the mailing list search request to InfoUSA.com. Nevertheless, each responding facility was asked to state its SIC code. In many cases, the SIC codes reported by the facilities were different from the ones associated with them *a priori*. Assuming that each facility knows its own business best, the

contractor used the self-reported SIC code wherever one was available and reasonable. Table 4-4 shows the four-digit SIC codes for the inventoried facilities, in decreasing order of frequency.[2] Three-eighths of the facilities were in SIC codes 3069 (Fabricated Rubber Products, Not Elsewhere Classified) or 3061 (Molded, Extruded, and Lathe-Cut Mechanical Rubber Goods).[3]

Table 4-4

FOUR-DIGIT STANDARD INDUSTRIAL CLASSIFICATION CODES FOR FACILITIES IN INVENTORY

4-Digit SIC Code	Description	No. of Facilities
3069	Fabricated Rubber Products, NEC[a]	10
	Not Reported	9
3061	Molded, Extruded, and Lathe-Cut Mechanical Rubber Goods	8
3052	Rubber and Plastics Hose and Belting	4
3728	Aircraft Parts and Auxiliary Equipment, NEC	3
3599	Industrial and Commercial Machinery and Equipment, NEC	2
3678	Electronic Connectors	2
2273	Carpets and Rugs	1
2671	Packaging Paper and Plastics Film, Coated and Laminated	1
2821	Plastics Materials, Synthetic Resins, and Nonvulcanizable Elastomers	1
2834	Pharmaceutical Preparations	1
2891	Adhesives and Sealants	1
3011	Tires and Inner Tubes	1
3053	Gaskets, Packing, and Sealing Devices	1
3087	Custom Compounding of Purchased Plastics Resins	1
3272	Concrete Products, Except Block and Brick	1
3479	Coating, Engraving, and Allied Services, NEC	1

[a]NEC = Not Elsewhere Classified

The survey respondents reported manufacturing a wide variety of rubber products. Table 4-5 lists the product categories reported. Where more than one facility reported producing a given product type, the number of facilities is shown in parentheses.

[2] Although more than one SIC code may apply to many, if not most, of the facilities, only one is reported here.

[3] Many facilities in SIC 3069 had SIC 3061 as a secondary SIC code, and vice versa.

Table 4-5

RUBBER PRODUCTS PRODUCED BY THE INVENTORIED FACILITIES

Agriculture Products
Air Filtration Hose/Connectors
Aircraft Engine Mountings
Automotive Hoses (Air Conditioning & Power Steering)
Bladders For Use In Hydraulic Accumulators
Bumpers
Calendered Rubber Products
Carpet Pads
Commercial/Aerospace Gaskets
Commercial/Aerospace Seals
Electronic Connector Components (2)
Extruded Rubber Products (3)
Film Adhesive For Aircraft/Automotive
Floor Mats
Gaskets (6)
Grommets (2)
Knee Pads
Latex
Lathe Cut Washers
Medical Components (2)
Molds
Neoprene
Oil Tube Products
O-Rings (2)
Pipe Couplings
Plumbing Supplies
Pressure- Sensitive Adhesive Masking Tapes
Products for Construction Industry
Retread Tires
Rollers (6)
Rubber Mounts
Sealants
Seals (7)
Sheets
Silcone Rubber
Silicone Rubber Keypads
Sponge Rubber Pads
Stoppers
Tread Rubber for Retreading Truck Tires
Truck Parts
Truck Tire Retreads

4.3 EQUIPMENT INVENTORY

The facilities in the inventory reported using 607 pieces of rubber products manufacturing equipment. Although some facilities did not provide materials use information, all reported the numbers and types of the major categories of production equipment of interest. Table 4-6 shows the number of devices of each type, and the number of facilities having each type of device.

Table 4-6

RUBBER PROCESSING EQUIPMENT REPORTED BY SURVEY RESPONDENTS

Process Equipment Type			Number of Devices	Number of Facilities	Mean Devices per Firm
Mixers			21	11	1.9
Mills			51	22	2.3
Calenders			6	5	1.2
Extruders			20	11	1.8
Curing Devices	Autoclave	18	475	39	12.2
	Hot Air	25			
	Platen Press	432			
Grinders			34	15	2.3

4.3.1 Mixers

Only eleven facilities reported using mixers. Many facilities purchase pre-mixed (and sometimes pre-cured) rubber from formulators and then use it in their other devices. Of the eleven facilities having mixers, seven had only one device. The maximum number of mixers per plant was seven. As seen in Table 4-7, the maximum and average batch sizes of the mixers appear to be divided into three ranges.[4]

4.3.2 Mills

A little less than half the facilities reported having mills. All mills were reported as having two rollers. As seen in Figure 4-3, the number of mills per facility varied from one to eight. Table 4-8 shows the maximum and mean batch size ranges reported.

[4] For each device type, the batch sizes appeared to cluster within definable ranges. Other definitions of size ranges are possible.

Table 4-7

SIZE RANGES OF MIXERS IN THE INVENTORY

Maximum Batch (lbs)	No. of Machines	Average Batch (lbs)	No. of Machines
25 - 65	5	20 - 65	3
175 - 720	11	140 - 720	11
2700 - 3500	2	2500 - 3000	2
Not Reported	3	Not Reported	5
Total	21	Total	21

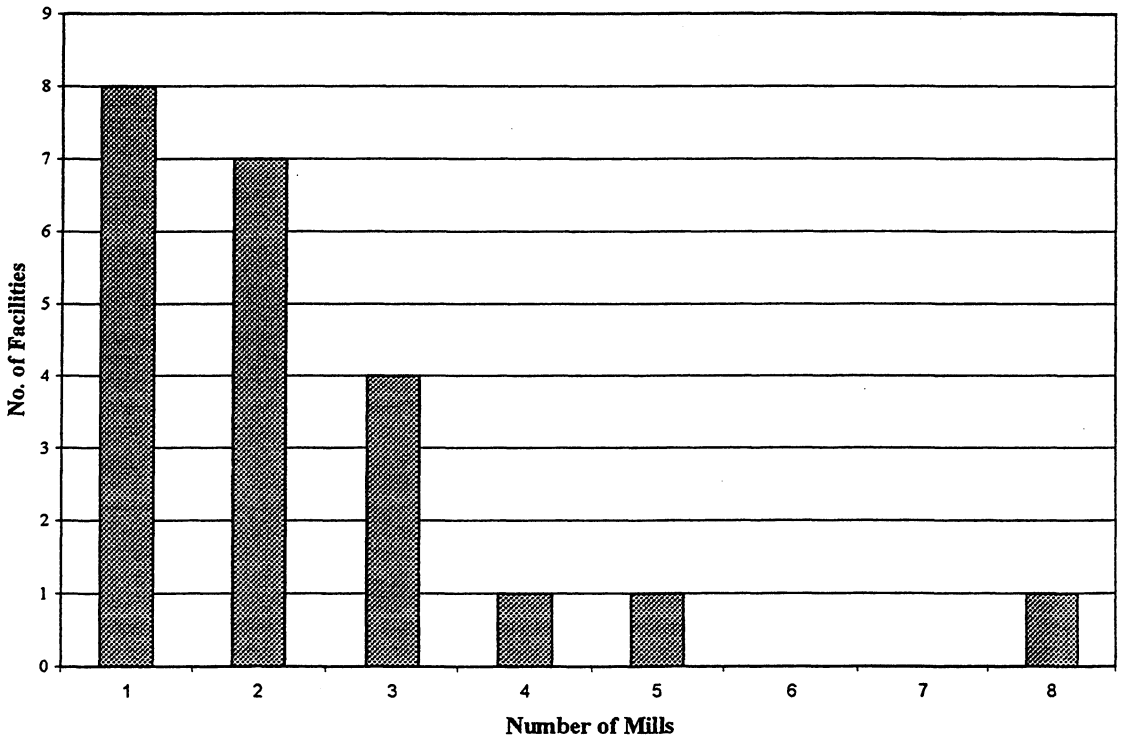

Figure 4-3. Distribution of Number of Mills per Facility.

Table 4-8

SIZE RANGES OF MILLS IN THE INVENTORY

Maximum Batch (lbs)	No. of Machines	Average Batch (lbs)	No. of Machines
5 - 90	16	4 - 30	12
100 - 220	13	50 - 100	10
300-500	11	150 - 300	18
Not Reported	11	220 - 500	4
Total	51	Not Reported	7
		Total	51

4.3.3 Calenders

Only six calenders were reported by the survey respondents. Three were reported as having two rolls. Two were reported as having one roll, which does not appear to be consistent with the definition of a calender. Only two facilities reported batch sizes. The maximum batch sizes reported were 90 and 400 lb and the mean batches reported were 90 and 350 lb.

4.3.4 Extruders

Eleven facilities reported having extruders. At the six facilities that reported length-diameter (L/D) ratios, the ratio ranged from 6:1 to 17:1. Too few facilities reported the maximum batch size to enable determination of maximum size ranges. Table 4-9 shows the mean batch size ranges reported. As seen in Figure 4-4, the number of extruders per facility varied from one to three.

Table 4-9

SIZE RANGES OF EXTRUDERS IN THE INVENTORY

Average Batch (lbs)	No. of Machines
17 - 67	8
150 - 463	3
714 - 1000	3
Not Reported	6
Total	20

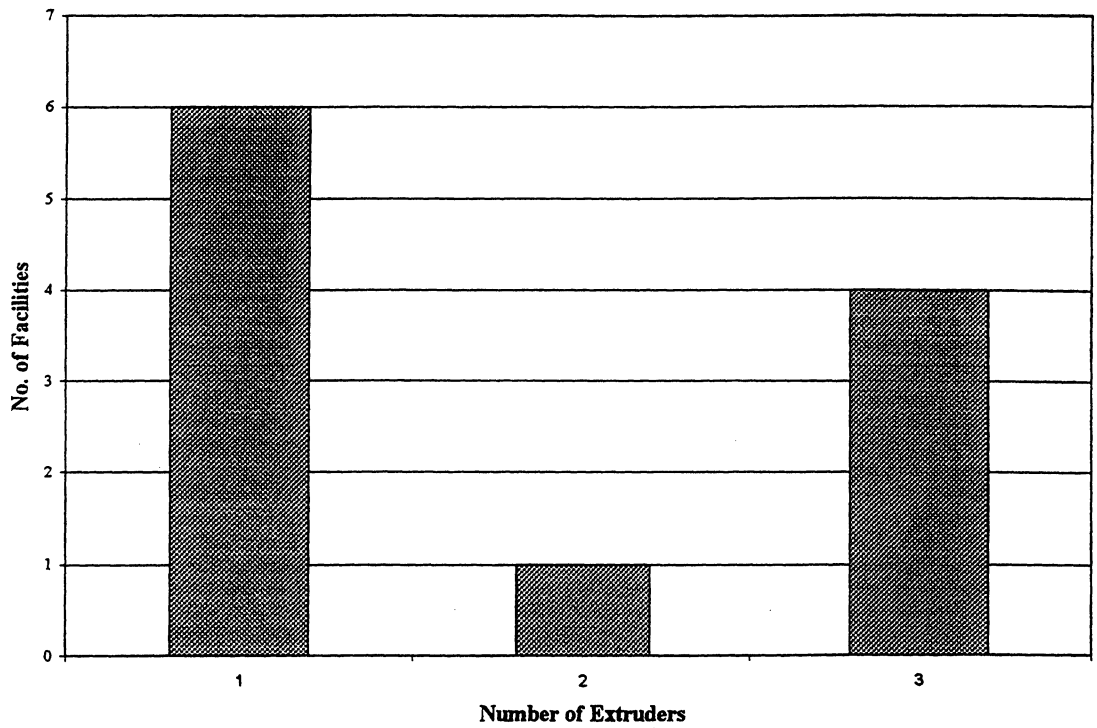

Figure 4-4. Distribution of Number of Extruders Per Facility.

4.3.5 Curing Devices

Thirty-nine facilities reported having molds, presses, ovens and other types of curing devices. Of the 475 curing devices, 432 were "platen presses." The number of curing devices per facility varied from 1 to 73. Figure 4-5 shows the distribution of the number of devices per facility. The median value was 5 devices. The maximum and mean batch sizes for curing equipment varied over six orders of magnitude (0.05 lb to 1600 lb). Table 4-10 shows the maximum and mean batch size ranges reported.

4.3.6 Grinding

Only 15 of the 48 facilities in the inventory perform grinding. The number of grinding machines per facility ranged from one to five. Figure 4-6 shows the distribution of the numbers of devices per firm. The maximum and mean batch sizes are reported in Table 4-11.

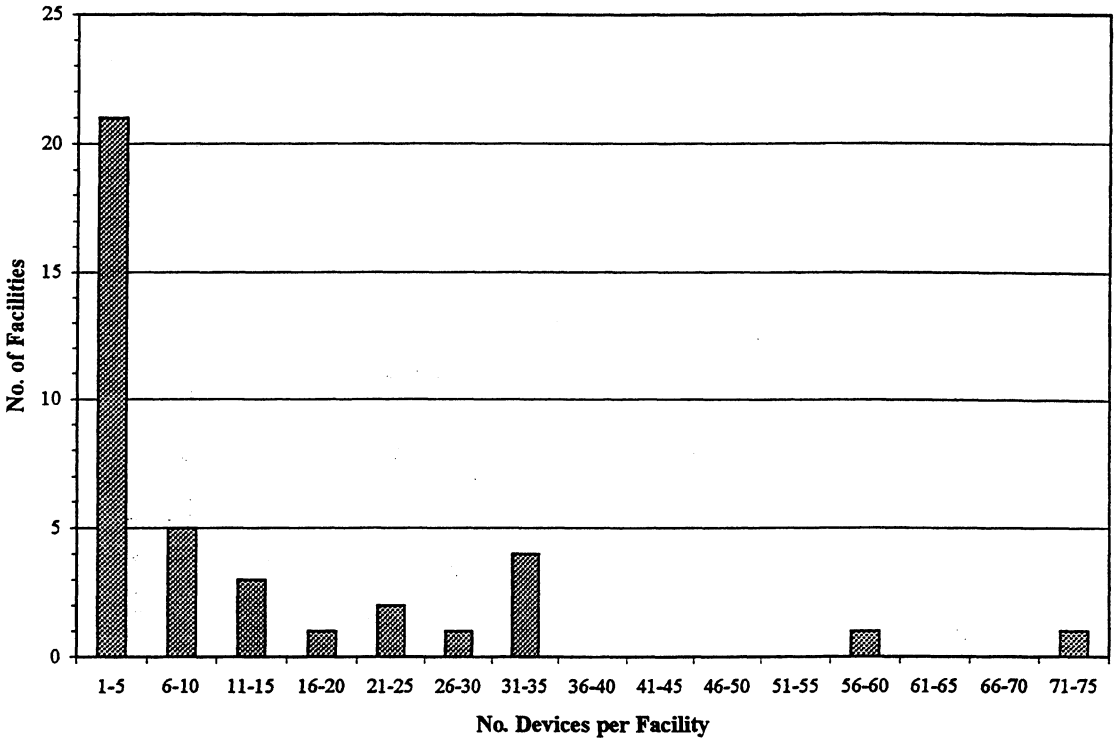

Figure 4-5. Distribution of Curing Devices Per Facility.

Table 4-10

SIZE RANGES OF CURING DEVICES IN THE INVENTORY

Maximum Batch (lbs)	No. of Machines	Average Batch (lbs)	No. of Machines
<1	5	<1	40
1 - 10	59	1 - 13	86
15 - 80	110	20 - 88	109
100 - 750	43	100 - 463	26
1600	1	1000 - 1400	3
Not Reported	257	Not Reported	211
Total	475	Total	475

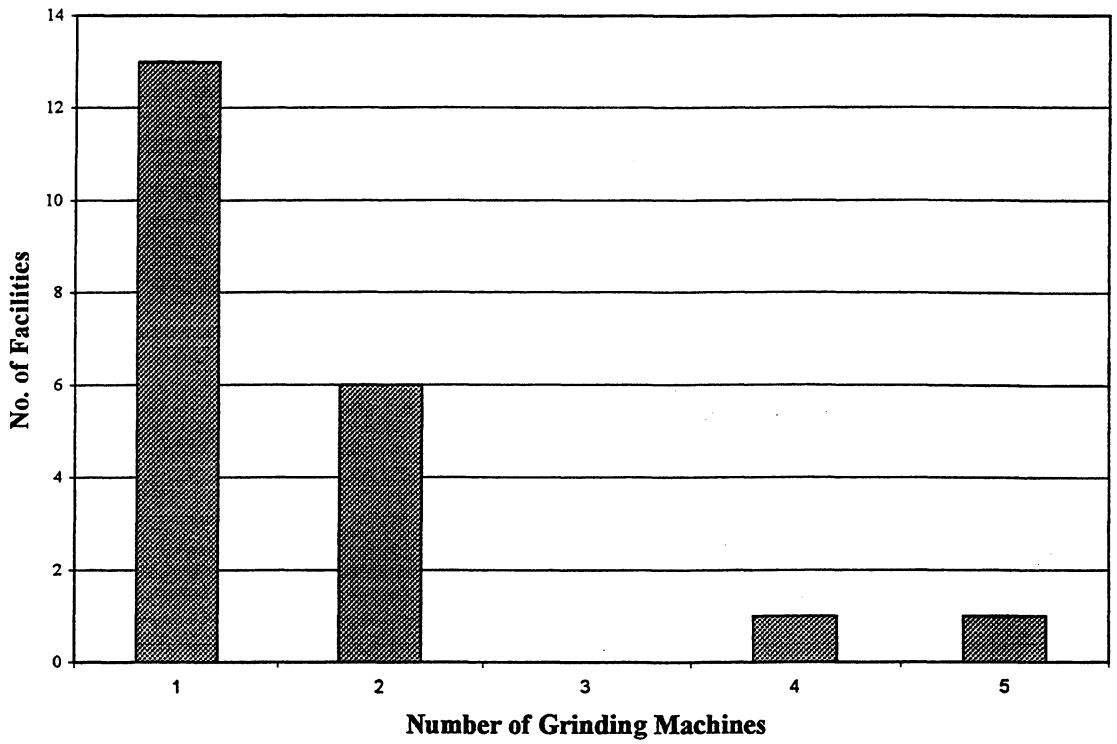

Figure 4-6. Distribution of Number of Grinding Machines per Facility

Table 4-11

SIZE RANGES OF GRINDERS IN THE INVENTORY

Maximum Batch (lbs)	No. of Machines	Average Batch (lbs)	No. of Machines
<1	1	< 1	5
8 - 13	5	5 - 16	5
20 - 50	2	104 - 675	9
500	2	Not Reported	15
Not Reported	24	Total	34
Total	34		

4.3.7 Emission Control Equipment

Seventeen facilities (35 percent of the total in the inventory) reported having some type of emission control equipment. Only 93 major pieces of equipment out of 607 (15.3 percent) in the inventory are controlled. Table 4-12 summarizes the controls and the devices served. The most common type of control is the ambient temperature baghouse, which is used to control emissions from mixing, milling and grinding operations. As seen in the table, a single control device serves more than one piece of rubber processing

equipment at many facilities. Removal efficiencies for baghouses and the other types of control equipment were discussed in Section 3.1.4.

Table 4-12

EMISSION CONTROL EQUIPMENT REPORTED BY INVENTORIED FACILITIES

Type of Control Device	Process Controlled	No. Facilities	No. Control Devices	No. of Devices Controlled
Baghouse, Ambient Temperature	Grinding	5	6	11
	Mill	4	4	9
	Mixer	5	6	13
Adsorber, Activated Carbon	Curing	1	1	15
Afterburner, Catalytic	Adhesives Application	1	1	2
Cyclone	Grinding	2	2	5
Electrostatic Precipitator (< 3000 cfm)	Curing	2	3	15
Electrostatic Precipitator (> 3000 cfm)	Curing	1	1	25
Regenerative Thermal Oxidizer	Adhesives Application	2	2	2

4.4 MATERIALS PROCESSED

Before presenting the results of this portion of the survey, it should be noted that two facilities could not or would not provide information on the amounts of rubber, mold release compounds, or adhesives that they processed. This report includes only the amounts reported; no attempt was made to estimate values for the non-reporting companies. In addition, one facility used about half the total materials reported by the survey respondents.

4.4.1 Rubber Consumption

Table 4-13 shows the pounds of rubber formulations reported for each process. Note that, since the same mass of rubber may go through more than one process, rubber use for the various categories cannot be summed to yield total rubber consumption by the inventoried firms. Rubber use in curing devices is broken down by type of cure in Table 4-14.

4.4.2 Mold Releases and Adhesives

Table 4-15 shows the total amounts of mold release compounds and adhesives reported by the inventoried firms and distinguishes between those formulations that contain volatile organic compounds (VOC) and/or air toxics compounds and those that do not. The inventoried firms reported using 50,060 lb of mold releases and 111,835 lb of adhesives. Water-based formulations and other compounds with no VOC and no air toxics ingredients have evidently penetrated the mold release market; they account for about 43 percent of the consumption. In contrast, water-based formulations constitute less than 1 percent of the adhesives reported.

Table 4-13

REPORTED ANNUAL RUBBER USE, BY PROCESS

Process Equipment Type	Lb/Yr Processed
Mixers	50,872,840
Mills	52,742,383
Calenders	4,854,800
Extruders	30,705,858
Curing Devices	41,876,059
Grinders	5,279,650

Table 4-14

REPORTED ANNUAL RUBBER CURED, BY TYPE OF CURE

Type of Cure	Lb/Yr Processed
Autoclave	965,500
Hot Air	1,138,184
Platen Press	39,772,375

Table 4-15

CONSUMPTION OF MOLD RELEASES AND ADHESIVES

Material	Subcategory	Use[a]	Total VOC and/or Toxic	Non-VOC, Non-Toxic	Total Consumption
Mold Releases	External	27,950	28,705	21,355	50,060
	Internal	495			
	Not Reported	260			
Adhesives	Rubber	93,130	111,415	420	111,835
	Fabric	13,660			
	Metal	4,446			
	Plastic	151			
	Other or Not Reported	28			

[a]Use of compounds containing VOC and/or toxic compounds.

4.5 EMISSIONS

4.5.1 Total Emissions by Pollutant

Basin-wide emissions from the facilities in the inventory sample were calculated by summing the emissions from each process. Table 4-16 shows basin-wide emissions of total particulate matter (TPM), volatile organic compounds (VOC) and Rule 1401 compounds and compound classes. Table 4-17 shows basin-wide emissions of Title III hazardous air pollutants (HAPs) that are not covered by Rule 1401. Only pollutants whose basin-wide emissions exceeded 1 lb were included.

In both tables, the column "Maximum Emissions" represents total potential emissions, assuming no controls. "Net Emissions" are actual emissions, considering existing emission controls. The latter category is subdivided into emissions from controlled processes and emissions from uncontrolled processes. The last column of each table shows, for each pollutant, the percentage of the potential emissions that are removed by existing control equipment.

Table 4-16

TOTAL INVENTORIED EMISSIONS OF TOTAL PARTICULATE MATTER, VOLATILE ORGANIC COMPOUNDS AND RULE 1401 COMPOUNDS

(Emissions in Pounds/Year)

Pollutant ID	Pollutant	Maximum Emissions	Net Emissions			Percent Control[a]
			Controlled Processes	Uncon-trolled Processes	Total Net	
TPM	Total Particulate Matter	24,513	238	122	361	98.5
VOC	Volatile Organic Compounds	203,199	13,649	120,846	134,495	33.8
106-99-0	1,3-Butadiene	283	0.02	283	283	<0.1
75-07-0	Acetaldehyde	96	0.002	96	96	<0.1
107-02-8	Acrolein	36	0	36	36	0
107-13-1	Acrylonitrile	364	0	364	364	0
62-53-3	Aniline	924	0.0002	924	924	<0.1
71-43-2	Benzene	121	0.01	121	121	<0.1
92-87-5	Benzidine	26	5	18	23	8.8
117-81-7	Bis(2-ethylhexyl) phthalate (DEHP)	149	12	69	80	46.2
CD	Cadmium	3	0.017	0.012	0.029	98.9
75-15-0	Carbon disulfide	8,956	2	8,948	8,950	<0.1
56-23-5	Carbon tetrachloride	14	0	14	14	0
67-66-3	Chloroform	2	0	2	2	0
126-99-8	Chloroprene	77	0.01	77	77	<0.1
CR	Chromium	31	0.15	7	7	77.5
132-64-9	Dibenzofurans	2	0.0001	2	2	<0.1
75-00-3	Ethyl chloride (Chloroethane)	2	0	2	2	0.2
50-00-0	Formaldehyde	20	2	9	11	44.5
67-63-0	Isopropyl alcohol	2,790	0	2,790	2,790	0
PB	Lead	28	0.17	0.10	0.27	99
67-56-1	Methanol	184	0	184	184	0
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)	126	0.04	126	126	<0.1
78-93-3	Methyl ethyl ketone (2-Butanone)	1,048	4	1,026	1,030	1.7
75-09-2	Methylene chloride (Dichloromethane)	8,937	0.01	8,937	8,937	<0.1
91-20-3	Naphthalene	81	6	60	65	19.3
NI	Nickel	27	0	10	11	61.5
108-95-2	Phenol	100	5	37	42	58.2
75-56-9	Propylene oxide	158	0.04	158	158	<0.1
100-42-5	Styrene	120	0	120	120	0
127-18-4	Tetrachloroethylene (Perchloroethylene)	214	0	214	214	0
108-88-3	Toluene	16,115	0.1	16,115	16,115	<0.1
79-01-6	Trichloroethylene	335	0	335	335	0
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)	150	0	150	150	0
1330-20-7	Xylenes (isomers and mixture)	9,563	821	1,477	2,298	76.0

[a]Percent of Maximum Emissions that is removed by control devices.

Table 4-17

TOTAL INVENTORIED EMISSIONS OF TITLE III HAZARDOUS AIR POLLUTANTS THAT ARE NOT RULE 1401 COMPOUNDS

(Emissions in Pounds/Year)

Pollutant ID	Pollutant	Maximum Emissions	Net Emissions			Percent Control[a]
			Controlled Processes	Uncon-trolled Processes	Total Net	
540-84-1	2,2,4-Trimethylpentane	267	0	267	267	0.0
75-05-8	Acetonitrile	29	0	29	29	0.0
98-86-2	Acetophenone	211	0.003	211	211	<0.1
92-52-4	Biphenyl	5	0.3	4	4	8.8
463-58-1	Carbonyl sulfide	1,689	0.04	1,689	1,689	<0.1
98-82-8	Cumene	20	0.0001	20	20	<0.1
84-74-2	Dibutylphthalate	21	0.0006	21	21	<0.1
131-11-3	Dimethyl phthalate	3	0.0001	3	3	<0.1
100-41-4	Ethyl benzene	2,384	202	385	588	75.3
110-54-3	Hexane	1,825	0.3	1,823	1,824	<0.1
123-31-9	Hydroquinone	748	5	282	287	61.7
78-59-1	Isophorone	30	0	30	30	0.0
74-87-3	Methyl chloride (Chloromethane)	19	0.002	19	19	<0.1
108-10-1	Methyl isobutyl ketone (Hexone)	5,831	115	5,170	5,285	9.4
1634-04-4	Methyl tert butyl ether	5	0	5	5	0.0
101-68-8	Methylene diphenyl diisocyanate (MDI)	422	42	6	47	88.8
95-53-4	o-Toluidine	6	0.002	6	6	<0.1
123-38-6	Propionaldehyde	1	0	1	1	0.0
91-22-5	Quinoline	21	0	21	21	0.0
108-05-4	Vinyl acetate	48	0	48	48	0.0

[a]Percent of Maximum Emissions that is removed by control devices.

Net annual mass emissions of TPM and VOC from inventoried facilities are about 0.18 and 67 tons per year (0.00049 and 0.18 ton/day), respectively. The five Rule 1401 compounds with the highest mass emissions are toluene, carbon disulfide, methylene chloride, isopropyl alcohol, and isomers of xylene. The three non-Rule 1401 HAPs with the highest mass emissions are methyl isobutyl ketone, hexane, and carbonyl sulfide.

4.5.2 Geographical Distribution of Emissions

Table 4-18 shows the distribution of maximum (uncontrolled) and total net emissions of TPM, VOC and the top five Rule 1401 compounds by county. It is clear that each pollutant has a different geographical distribution. Los Angeles County accounts for almost all the toluene and methylene chloride emissions, while Riverside County has the highest isopropyl alcohol emissions. Over half the VOC emissions, as well as almost

Table 4-18

DISTRIBUTION OF PARTICULATE MATTER, VOC AND MAJOR RULE 1401 POLLUTANT EMISSIONS BY COUNTY

County		TPM	VOC	Toluene	Carbon Disulfide	Methylene Chloride	Isopropyl Alcohol	Xylenes
Los Angeles	Maximum Lbs/yr	9,479	68,759	15,409	2,311	8,315	8	961
	Net Lbs/yr	176	68,073	15,409	2,311	8,315	8	825
	County Pct of Maximum	**38.7**	**33.8**	**95.6**	**25.8**	**93.0**	**0.3**	**10.1**
Orange	Maximum Lbs/yr	22	5,329	18	27	2	104	137
	Net Lbs/yr	22	5,299	17	21	2	104	137
	County Pct of Maximum	**0.1**	**2.6**	**0.1**	**0.3**	**<0.1**	**3.7**	**1.4**
Riverside	Maximum Lbs/yr	5,596	15,391	135	3,391	34	2,643	57
	Net Lbs/yr	56	15,391	135	3,391	34	2,643	57
	County Pct of Maximum	**22.8**	**7.6**	**0.8**	**37.9**	**0.4**	**94.7**	**0.6**
San Bernardino	Maximum Lbs/yr	9,415	113,720	554	3,227	586	36	8,408
	Net Lbs/yr	107	45,732	554	3,227	586	36	1,280
	County Pct of Maximum	**38.4**	**56**	**3.4**	**36**	**6.6**	**1.3**	**87.9**

90 percent of the xylene emissions, are in San Bernardino County. For all the pollutants listed, Orange County facilities constitute a very small fraction of the emission inventory (less than 4 percent). Note that the contractor is aware of four Orange County facilities that may have significant emissions but did not respond to the survey.

4.5.3 Distribution of Emissions by Facility

To preserve the confidentiality of survey responses, results for individual facilities will not be presented in this report. However, useful information was obtained by analyzing the facility-specific data for distribution, Rule 1401/1402 applicability, and relationships between emissions and employment.

Distribution

Table 4-19 shows the minimum, maximum and median uncontrolled and net emissions per facility for TPM, VOC and the top Rule 1401 compounds. For all the pollutants listed, the range of emissions per facility is quite large. Median emissions (values exceeded by half the facilities) are small, indicating that the bulk of the emissions are from relatively few facilities.

Table 4-19

EMISSIONS PER FACILITY FOR SELECTED POLLUTANTS

	Uncontrolled Emissions (lb/yr)			Net Emissions (lb/yr)		
Pollutant	Minimum	Maximum	Median	Minimum	Maximum	Median
TPM	0.00015	9,376	1.6	0.00015	94	0.3
VOC	0.021	98,277	246.1	0.021	98,277	246.1
Carbon Disulfide	0.0040	3,367	7.1	0.0040	3,367	6.3
Isopropyl Alcohol	0.72	2,632	3.0	0.72	2,632	3.0
Methylene Chloride	0.000056	6,580	0.3	0.000056	6,580	0.3
Toluene	0.000066	15,251	1.0	0.000066	15,251	1.0
Xylenes	0.000074	8,029	7.1	0.000074	901	7.1

Inequalities of distribution of emissions per facility can be visualized by means of Lorenz curves. The horizontal axis of these curves is the cumulative percentage of facilities. The vertical axis is the cumulative percentage of total emissions. If all facilities had the same emissions, the Lorenz curve would be a straight line. The more unequal the distribution, the closer the curve moves to the lower right corner.

Figure 4-7 shows the Lorenz curves for *uncontrolled* emissions of TPM and VOC. It is clear that relatively few facilities account for the great majority of the emissions of these pollutant categories. As exemplified in Figure 4-8, which has Lorenz curves for *uncontrolled* emissions of carbon disulfide and xylenes, a small number of facilities also account for most of the individual HAP emissions.

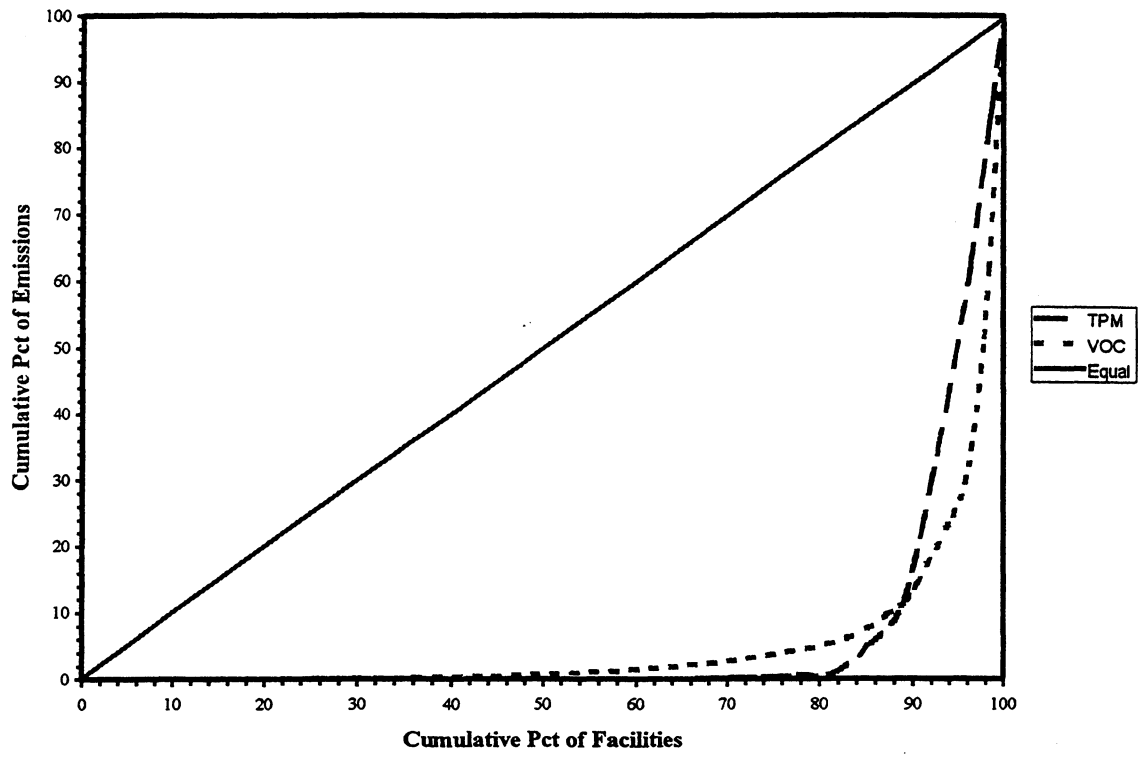

Figure 4-7. Lorenz Curves for Emissions of Particulate Matter and Volatile Organic Compounds.

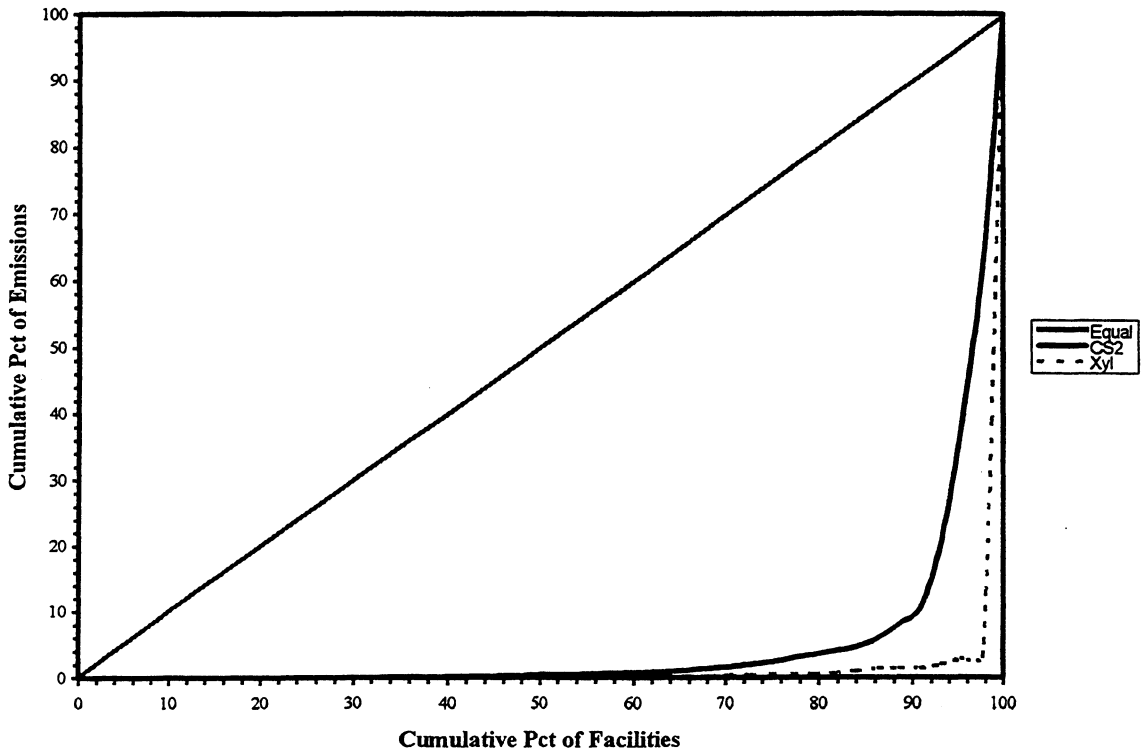

Figure 4-8. Lorenz Curves for Emissions of Carbon Disulfide and Xylenes.

Rule 1402 Screening

It is also of interest to know how many facilities would be subject to the risk reduction requirements of AQMD Rule 1402, "Control of Toxic Air Contaminants From Existing Sources." To ascertain this, a "Tier 1" analysis, as prescribed by the AQMD (SCAQMD, 1999) for Rule 1401, was performed for each facility.[5] Only the worst-case screening emission levels, i.e., those corresponding to a receptor at 25 meters from the facility, were used. The 25-meter screening emission levels were multiplied by 25 to correspond to the Rule 1402 action risk level of 25 in 1 million. Table 4-20 lists the Rule 1401/1402 compounds for which the 25-meter screening emission level is exceeded at at least one facility. For each pollutant, the table shows the percentage of the responding facilities for which this screening level is exceeded. It should be noted that the Tier 1 analysis is highly conservative, and that more refined analyses, using dispersion modeling with local meteorological data, frequently indicate no significant risk for cases that do not pass Tier 1.

Table 4-20

TOXIC AIR CONTAMINANTS FOR WHICH THE MAXIMUM INDIVIDUAL CANCER RISK EXCEEDS 25 IN 1 MILLION OR THE CHRONIC HAZARD INDEX EXCEEDS 3

Toxic Air Contaminant	No. of Facilities	Pct. of Respondents
Acrylonitrile	8	17
Benzene	2	4
Benzidine	13	28
Butadiene, 1,3-	8	17
Chromium[a]	9	19
Methylene chloride	2	4
Nickel	1	2

[a]Emission factor reported as "chromium;" assumed here to be hexavalent.

[5] The Tier 1 analysis is designed to determine whether emissions of a given pollutant would result in a maximum individual cancer risk (MICR) of equal to or greater than one in one million or a chronic hazard index (HIC) greater than one.

Emissions and Employment

Survey results were analyzed to determine whether a relationship between emissions and employment could be found. Examination of the particulate matter and VOC emission data did not reveal any useful relationship.

4.5.4 Emissions by Process

Tables 4-21 through 4-26 summarize total inventoried emissions for each of the rubber products production processes. Tables 4-27 and 4-28 show emissions from use of mold release compounds and adhesives, respectively. Finally, Figures 4-9 through 4-12 show the distribution by process of TPM, VOC and two Rule 1401 compounds (1,3-butadiene and methylene chloride).

The bulk of the particulate emissions are from mixing operations. This is expected, because of the nature of the process. Application of adhesives accounts for about 44 percent of the uncontrolled volatile organic compound emissions, and curing adds another 23 percent. Use of the AP-42 emission factors resulted in a rather high estimate of VOC emissions from grinding, which may be overstated.

Figure 4-12 is an example of the distribution of emissions of a volatile organic compound that is not present in mold release compounds or adhesives. Curing processes account for about two-thirds of the 1,3-butadiene emissions. The bulk of the remainder of the emissions of 1,3-butadiene are from grinding, presumably from the breakdown of butadiene copolymers.

That grinding is apparently the predominant source of methylene chloride emissions from rubber products manufacturing may be due to carry-over of methylene chloride from mold releases. If grinding emissions are considered to be another form of mold release emissions, then use of mold release compounds would account for 92 percent of this TAC's emissions.

Table 4-21

INVENTORIED EMISSIONS FROM MIXING EQUIPMENT

(Emissions in lb/yr)

Pollutant ID	Pollutant	Maximum Emissions	Net Emissions			Percent Control[a]
			Controlled Processes	Uncon-trolled Processes	Total Net	
TPM	Total Particulate Matter	22,965.8	228.6	107.1	335.7	98.5
VOC	Volatile Organic Compounds	6,995.4	0.0	6,995.4	6,995.4	0
106-99-0	1,3-Butadiene	7.2	0.0	7.2	7.2	0
106-46-7	1,4-Dichlorobenzene (p)	0.03	0.0003	0.0	0.0003	99
75-07-0	Acetaldehyde	0.1	0.0	0.1	0.1	0
107-02-8	Acrolein	11.6	0.0	11.6	11.6	0
107-13-1	Acrylonitrile	88.8	0.0	88.8	88.8	0
62-53-3	Aniline	13.7	0.0	13.7	13.7	0
71-43-2	Benzene	10.3	0.0	10.3	10.3	0
92-87-5	Benzidine	0.0005	0.00001	0.0	0.00001	99
117-81-7	Bis(2-ethylhexyl) phthalate (DEHP)	0.7	0.0	0.1	0.1	90
CD	Cadmium	0.2	0.002	0.001	0.003	98.2
75-15-0	Carbon disulfide	72.8	0.0	72.8	72.8	0
56-23-5	Carbon tetrachloride	1.4	0.0	1.4	1.4	0
67-66-3	Chloroform	0.2	0.0	0.2	0.2	0
CR	Chromium	0.7	0.007	0.004	0.011	98.4
132-64-9	Dibenzofurans	0.04	0.0	0.04	0.04	0
60-11-7	Dimethyl aminoazobenzene, p-	0.0005	0.000005	0.000000	0.000005	99
140-88-5	Ethyl acrylate	0.3	0.0	0.3	0.3	0
75-00-3	Ethyl chloride (Chloroethane)	0.5	0.0	0.5	0.5	0
PB	Lead	0.4	0.004	0.002	0.006	98.5
74-83-9	Methyl bromide (Bromomethane)	0.001	0.0	0.0	0.0	0
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)	4.0	0.0	4.0	4.0	0
78-93-3	Methyl ethyl ketone (2-Butanone)	131.1	0.0	131.1	131.1	0
75-09-2	Methylene chloride (Dichloromethane)	60.6	0.0	60.6	60.6	0
62-75-9	N-Nitrosodimethylamine	0.0	0.0	0.0	0.0	0
91-20-3	Naphthalene	3.9	0.039	0.012	0.051	98.7
NI	Nickel	0.8	0.008	0.008	0.016	98.1
98-95-3	Nitrobenzene	0.009	0.00009	0.0	0.00009	99
95-48-7	o-Cresol	0.15	0.0015	0.0	0.0015	99
87-86-5	Pentachlorophenol	0.0009	0.000003	0.0006	0.0006	30.5
108-95-2	Phenol	20.9	0.2	0.1	0.3	98.5
75-56-9	Propylene oxide	52.6	0.0	52.6	52.6	0
100-42-5	Styrene	27.0	0.0	27.0	27.0	0
127-18-4	Tetrachloroethylene (Perchloroethylene)	35.4	0.0	35.4	35.4	0
108-88-3	Toluene	84.8	0.0	84.8	84.8	0
79-01-6	Trichloroethylene	0.031	0.0	0.031	0.031	0
75-01-4	Vinyl chloride	0.0004	0.0	0.0004	0.0004	0
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)	8.6	0.0	8.6	8.6	0
1330-20-7	Xylenes (isomers and mixture)	38.4	0.0	38.4	38.4	0

[a]Percent of Maximum Emissions that is removed by control devices.

Table 4-22

INVENTORIED EMISSIONS FROM MILLING EQUIPMENT

(Emissions in lb/yr)

Pollutant ID	Pollutant	Maximum Emissions	Net Emissions			Percent Control[a]
			Controlled Processes	Uncon-trolled Processes	Total Net	
VOC	Volatile Organic Compounds	10,647.7	0.0	10,647.7	10,647.7	0
106-99-0	1,3-Butadiene	1.8	0.0	1.8	1.8	0
106-46-7	1,4-Dichlorobenzene (p)	0.012	0.0001	0.0020	0.0021	82.8
75-07-0	Acetaldehyde	0.04	0.00	0.0	0.04	0
107-02-8	Acrolein	4.7	0.0	4.7	4.7	0
107-13-1	Acrylonitrile	28.7	0.0	28.7	28.7	0
62-53-3	Aniline	47.7	0.0	47.7	47.7	0
71-43-2	Benzene	5.3	0.0	5.3	5.3	0
92-87-5	Benzidine	0.00020	0.0	0.00016	0.00016	19.2
100-44-7	Benzyl chloride	0.09	0.0	0.09	0.09	0
117-81-7	Bis(2-ethylhexyl) phthalate (DEHP)	1.7	0.002	1.5	1.5	11.5
75-15-0	Carbon disulfide	21.1	0.0	21.1	21.1	0
56-23-5	Carbon tetrachloride	0.5	0.0	0.5	0.5	0
67-66-3	Chloroform	0.1	0.0	0.1	0.1	0
132-64-9	Dibenzofurans	0.1	0.0	0.1	0.1	0
60-11-7	Dimethyl aminoazobenzene, p-	0.00018	0.0000003	0.00015	0.00015	19.2
140-88-5	Ethyl acrylate	0.01	0.00	0.01	0.01	0
75-00-3	Ethyl chloride (Chloroethane)	0.19	0.00	0.19	0.19	0
74-83-9	Methyl bromide (Bromomethane)	0.1	0.0	0.1	0.1	0
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)	2.3	0.0	2.3	2.3	0
78-93-3	Methyl ethyl ketone (2-Butanone)	57.5	0.0	57.5	57.5	0
75-09-2	Methylene chloride (Dichloromethane)	25.8	0.0	25.8	25.8	0
91-20-3	Naphthalene	4.6	0.019	2.8	2.8	39.8
98-95-3	Nitrobenzene	0.0007	0.0000	0.0006	0.0006	6.6
62-75-9	N-Nitrosodimethylamine	0.00003	0.00000	0.00003	0.00003	0
95-48-7	o-Cresol	0.10	0.001	0.016	0.017	83.7
87-86-5	Pentachlorophenol	0.015	0.00010	0.0048	0.0049	66.4
108-95-2	Phenol	12.3	0.1	5.4	5.5	55.5
75-56-9	Propylene oxide	17.0	0.0	17.0	17.0	0
100-42-5	Styrene	13.3	0.0	13.3	13.3	0
127-18-4	Tetrachloroethylene (Perchloroethylene)	17.4	0.0	17.4	17.4	0
108-88-3	Toluene	43.3	0.0	43.3	43.3	0
79-01-6	Trichloroethylene	0.002	0.0	0.002	0.002	0
75-01-4	Vinyl chloride	0.0001	0.0	0.0001	0.0	0
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)	0.5	0.0	0.5	0.5	0
MPXYL	Xylenes (isomers and mixtures)	18.0	0.0	18.0	18.0	0

[a]Percent of Maximum Emissions that is removed by control devices.

Table 4-23

INVENTORIED EMISSIONS FROM CALENDER EQUIPMENT

(Emissions in lb/yr)

Pollutant ID	Pollutant	Maximum Emissions	Net Emissions			Percent Control[a]
			Controlled Processes	Uncon-trolled Processes	Total Net	
VOC	Volatile Organic Compounds	771.8	0.0	771.8	771.8	0
106-99-0	1,3-Butadiene	0.4	0.0	0.4	0.4	0
75-07-0	Acetaldehyde	0.004	0.0	0.004	0.004	0
107-02-8	Acrolein	1.31	0.0	1.3	1.31	0
107-13-1	Acrylonitrile	13.9	0.0	13.9	13.9	0
62-53-3	Aniline	0.5	0.0	0.5	0.5	0
71-43-2	Benzene	1.1	0.0	1.1	1.1	0
92-87-5	Benzidine	0.0002	0.0	0.0002	0.0002	0
117-81-7	Bis(2-ethylhexyl) phthalate (DEHP)	0.04	0.0	0.04	0.04	0
75-15-0	Carbon disulfide	7.2	0.0	7.2	7.2	0
56-23-5	Carbon tetrachloride	0.4	0.0	0.4	0.4	0
67-66-3	Chloroform	0.03	0.0	0.03	0.03	0
132-64-9	Dibenzofurans	0.003	0.0	0.003	0.003	0
60-11-7	Dimethyl aminoazobenzene, p-	0.0001	0.0	0.0001	0.0001	0
75-00-3	Ethyl chloride (Chloroethane)	0.001	0.0	0.001	0.001	0
74-83-9	Methyl bromide (Bromomethane)	0.00002	0.0	0.00002	0.00002	0
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)	0.32	0.0	0.32	0.32	0
78-93-3	Methyl ethyl ketone (2-Butanone)	6.9	0.0	6.9	6.9	0
75-09-2	Methylene chloride (Dichloromethane)	3.7	0.0	3.7	3.7	0
91-20-3	Naphthalene	0.3	0.0	0.3	0.3	0
98-95-3	Nitrobenzene	0.001	0.0	0.001	0.001	0
95-48-7	o-Cresol	0.01	0.0	0.01	0.01	0
87-86-5	Pentachlorophenol	0.00001	0.0	0.00001	0.00001	0
108-95-2	Phenol	1.7	0.0	1.7	1.7	0
75-56-9	Propylene oxide	8.2	0.0	8.2	8.2	0
100-42-5	Styrene	1.7	0.0	1.7	1.7	0
127-18-4	Tetrachloroethylene (Perchloroethylene)	2.3	0.0	2.3	2.3	0
108-88-3	Toluene	6.6	0.0	6.6	6.6	0
79-01-6	Trichloroethylene	0.0001	0.0	0.0001	0.0001	0
75-01-4	Vinyl chloride	0.0001	0.0	0.0001	0.0001	0
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)	0.3	0.0	0.3	0.3	0
MPXYL	Xylenes (isomers and mixtures)	2.1	0.0	2.1	2.1	0

[a]Percent of Maximum Emissions that is removed by control devices.

Table 4-24

INVENTORIED EMISSIONS FROM EXTRUDING EQUIPMENT

(Emissions in lb/yr)

Pollutant ID	Pollutant	Maximum Emissions	Net Emissions			Percent Control[a]
			Controlled Processes	Uncon-trolled Processes	Total Net	
TPM	Total Particulate Matter	0.9	0.0	0.9	0.9	0
VOC	Volatile Organic Compounds	737.5	0.0	737.5	737.5	0
106-99-0	1,3-Butadiene	2.5	0.0	2.5	2.5	0
106-46-7	1,4-Dichlorobenzene (p)	0.1	0.0	0.1	0.1	0
123-91-1	1,4-Dioxane (1,4-Diethyleneoxide)	0.02	0.0	0.02	0.02	0
75-07-0	Acetaldehyde	0.0001	0.0	0.0001	0.0001	0
107-02-8	Acrolein	4.6	0.0	4.6	4.6	0
107-13-1	Acrylonitrile	11.2	0.0	11.2	11.2	0
62-53-3	Aniline	9.1	0.0	9.1	9.1	0
71-43-2	Benzene	3.3	0.0	3.3	3.3	0
92-87-5	Benzidine	0.001	0.0	0.001	0.001	0
117-81-7	Bis(2-ethylhexyl) phthalate (DEHP)	4.6	0.0	4.6	4.6	0
75-15-0	Carbon disulfide	11.5	0.0	11.5	11.5	0
56-23-5	Carbon tetrachloride	0.02	0.0	0.02	0.02	0
67-66-3	Chloroform	0.6	0.0	0.6	0.6	0
CR	Chromium	6.7	0.0	6.7	6.7	0
132-64-9	Dibenzofurans	0.08	0.0	0.08	0.08	0
60-11-7	Dimethyl aminoazobenzene, p-	0.000004	0.0	0.000004	0.000004	0
75-00-3	Ethyl chloride (Chloroethane)	0.8	0.0	0.8	0.8	0
74-83-9	Methyl bromide (Bromomethane)	0.004	0.0	0.004	0.004	0
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)	1.7	0.0	1.7	1.7	0
78-93-3	Methyl ethyl ketone (2-Butanone)	4.7	0.0	4.7	4.7	0
75-09-2	Methylene chloride (Dichloromethane)	21.3	0.0	21.3	21.3	0
91-20-3	Naphthalene	2.6	0.0	2.6	2.6	0
NI	Nickel	9.8	0.0	9.8	9.8	0
98-95-3	Nitrobenzene	0.002	0.0	0.002	0.002	0
95-48-7	o-Cresol	0.01	0.0	0.01	0.01	0
87-86-5	Pentachlorophenol	0.0010	0.0	0.0010	0.0010	0
108-95-2	Phenol	4.9	0.0	4.9	4.9	0
75-56-9	Propylene oxide	13.5	0.0	13.5	13.5	0
100-42-5	Styrene	0.8	0.0	0.8	0.8	0
127-18-4	Tetrachloroethylene (Perchloroethylene)	3.4	0.0	3.4	3.4	0
108-88-3	Toluene	10.6	0.0	10.6	10.6	0
79-01-6	Trichloroethylene	5.1	0.0	5.1	5.1	0
75-01-4	Vinyl chloride	0.5	0.0	0.5	0.5	0
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)	0.2	0.0	0.2	0.2	0
MPXYL	Xylenes (isomers and mixture)	19.0	0.0	19.0	19.0	0

[a]Percent of Maximum Emissions that is removed by control devices.

Table 4-25

INVENTORIED EMISSIONS FROM CURING EQUIPMENT

(Emissions in lb/yr)

Pollutant ID	Pollutant	Maximum Emissions	Net Emissions			Percent Control[a]
			Controlled Processes	Uncon-trolled Processes	Total Net	
VOC	Volatile Organic Compounds	45,917.9	10.6	45,877.6	45,888.2	<0.1
106-99-0	1,3-Butadiene	187.5	0.02	187.4	187.5	<0.1
106-46-7	1,4-Dichlorobenzene (p)	0.44	0.11	0.27	0.38	13.9
75-07-0	Acetaldehyde	92.5	0.002	92.5	92.5	<0.1
107-02-8	Acrolein	8.7	0.0	8.7	8.7	0
107-13-1	Acrylonitrile	221.7	0.0	221.7	221.7	0
62-53-3	Aniline	190.7	0.0002	190.7	190.7	<0.1
71-43-2	Benzene	53.9	0.007	53.9	53.9	<0.1
92-87-5	Benzidine	25.8	5.2	18.3	23.5	8.8
117-81-7	Bis(2-ethylhexyl) phthalate (DEHP)	76.2	11.1	59.0	70.1	7.9
75-15-0	Carbon disulfide	8,750.5	2.2	8,742.1	8,744.3	<0.1
56-23-5	Carbon tetrachloride	11.9	0.0	11.9	11.9	0
108-90-7	Chlorobenzene	0.000003	0.0	0.000003	0.000003	0
67-66-3	Chloroform	0.7	0.0	0.7	0.7	0
126-99-8	Chloroprene	61.9	0.01	61.8	61.8	<0.1
132-64-9	Dibenzofurans	1.5	0.0001	1.5	1.5	<0.1
60-11-7	Dimethyl aminoazobenzene, p-	0.0036	0.0021	0.0005	0.0026	25.6
106-89-8	Epichlorohydrin	0.3	0.0	0.3	0.3	0
140-88-5	Ethyl acrylate	0.1	0.0	0.1	0.1	0
75-00-3	Ethyl chloride (Chloroethane)	0.4	0.001	0.4	0.4	1.0
74-83-9	Methyl bromide (Bromomethane)	0.1	0.0	0.1	0.1	0
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)	117.3	0.037	117.1	117.1	<0.1
78-93-3	Methyl ethyl ketone (2-Butanone)	728.9	0.015	728.9	728.9	<0.1
75-09-2	Methylene chloride (Dichloromethane)	578.5	0.009	578.5	578.5	<0.1
91-20-3	Naphthalene	62.0	5.8	53.7	59.4	4.2
98-95-3	Nitrobenzene	0.07	0.0	0.07	0.07	0
95-48-7	o-Cresol	0.3	0.0002	0.3	0.3	<0.1
87-86-5	Pentachlorophenol	0.033	0.009	0.011	0.020	39.3
108-95-2	Phenol	30.4	4.6	23.8	28.3	6.6
75-56-9	Propylene oxide	61.1	0.0	61.0	61.0	0.2
100-42-5	Styrene	50.8	0.0	50.8	50.8	0
127-18-4	Tetrachloroethylene (Perchloroethylene)	22.3	0.0	22.3	22.3	0
108-88-3	Toluene	384.8	0.1	384.6	384.7	<0.1
79-01-6	Trichloroethylene	0.04	0.0	0.04	0.04	0
75-01-4	Vinyl chloride	0.003	0.0	0.003	0.003	0
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)	140.4	0.0	140.4	140.4	0
MPXYL	Xylenes (isomers and mixture)	427.5	0.0	427.5	427.5	0

[a]Percent of Maximum Emissions that is removed by control devices.

Table 4-26

INVENTORIED EMISSIONS FROM GRINDING EQUIPMENT

(Emissions in lb/yr)

Pollutant ID	Pollutant	Maximum Emissions	Net Emissions			Percent Control[a]
			Controlled Processes	Uncon-trolled Processes	Total Net	
TPM	Total Particulate Matter	1,545.9	9.6	14.3	23.9	98.5
VOC	Volatile Organic Compounds	45,376.0	0.0	45,376.0	45,376.0	0
106-99-0	1,3-Butadiene	83.48	0.0	83.48	83.48	0
106-46-7	1,4-Dichlorobenzene (p)	0.034	0.00007	0.023	0.023	31.6
75-07-0	Acetaldehyde	2.9	0.0	2.9	2.9	0
107-02-8	Acrolein	4.8	0.0	4.8	4.8	0
62-53-3	Aniline	662.7	0.0	662.7	662.7	0
71-43-2	Benzene	46.8	0.0	46.8	46.8	0
117-81-7	Bis(2-ethylhexyl) phthalate (DEHP)	65.6	0.5	3.3	3.7	94.3
CD	Cadmium	2.5	0.015	0.011	0.026	99.0
75-15-0	Carbon disulfide	93.0	0.0	93.0	93.0	0
126-99-8	Chloroprene	15.6	0.0	15.6	15.6	0
CR	Chromium	23.7	0.1	0.2	0.3	98.6
132-64-9	Dibenzofurans	0.6	0.0	0.6	0.6	0
PB	Lead	27.6	0.2	0.1	0.3	99.0
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)	0.6	0.0	0.6	0.6	0
78-93-3	Methyl ethyl ketone (2-Butanone)	48.4	0.0	48.4	48.4	0
75-09-2	Methylene chloride (Dichloromethane)	6,589.3	0.0	6,589.3	6,589.3	0
91-20-3	Naphthalene	7.7	0.05	0.25	0.31	96.0
NI	Nickel	16.7	0.1	0.6	0.7	95.9
95-48-7	o-Cresol	0.012	0.00004	0.0059	0.006	50.8
108-95-2	Phenol	29.4	0.2	0.7	0.9	97.1
75-56-9	Propylene oxide	5.9	0.0	5.9	5.9	0
100-42-5	Styrene	26.6	0.0	26.6	26.6	0
127-18-4	Tetrachloroethylene (Perchloroethylene)	26.6	0.0	26.6	26.6	0
108-88-3	Toluene	15,509.5	0.0	15,509.5	15,509.5	0
79-01-6	Trichloroethylene	3.0	0.0	3.0	3.0	0
MPXYL	Xylene (isomers and mixture)	85.0	0.0	85.0	85.0	0

[a]Percent of Maximum Emissions that is removed by control devices.

Table 4-27

INVENTORIED EMISSIONS FROM USE OF MOLD RELEASES

(Emissions in lb/yr)

Pollutant ID	Pollutant	Maximum Emissions	Net Emissions			Percent Control[a]
			Controlled Processes	Uncon-trolled Processes	Total Net	
VOC	Volatile Organic Compounds	4,270.8	0.0	4,270.8	4,270.8	0
71-43-2	Benzene	0.0	0.0	0.0	0.0	0
50-00-0	Formaldehyde	0.3	0.0	0.3	0.3	0
67-63-0	Isopropyl alcohol	2,731.6	0.0	2,731.6	2,731.6	0
78-93-3	Methyl ethyl ketone (2-Butanone)	0.6	0.0	0.6	0.6	0
75-09-2	Methylene chloride (Dichloromethane)	1,657.9	0.0	1,657.9	1,657.9	0
108-88-3	Toluene	0.8	0.0	0.8	0.8	0
1330-20-7	Xylenes (isomers and mixture)	52.3	0.0	52.3	52.3	0

[a]Percent of Maximum Emissions that is removed by control devices.

Table 4-28

INVENTORIED EMISSIONS FROM USE OF ADHESIVES

(Emissions in lb/yr)

Pollutant ID	Pollutant	Maximum Emissions	Net Emissions			Percent Control[a]
			Controlled Processes	Uncon-trolled Processes	Total Net	
VOC	Volatile Organic Compounds	88,482.4	13,638.6	6,169.5	19,808.1	78
50-00-0	Formaldehyde	20.1	1.9	9.1	11.0	45
67-63-0	Isopropyl alcohol	58.7	0.0	58.7	58.7	0
67-56-1	Methanol	183.8	0.0	183.8	183.8	0
78-93-3	Methyl ethyl ketone (2-Butanone)	70.1	3.8	48.0	51.9	26
127-18-4	Tetrachloroethylene (Perchloroethylene)	107.0	0.0	107.0	107.0	0
108-88-3	Toluene	74.8	0.0	74.8	74.8	0
79-01-6	Trichloroethylene	326.8	0.0	326.8	326.8	0
1330-20-7	Xylenes (isomers and mixture)	8,920.9	820.8	835.4	1,656.2	81

[a]Percent of Maximum Emissions that is removed by control devices.

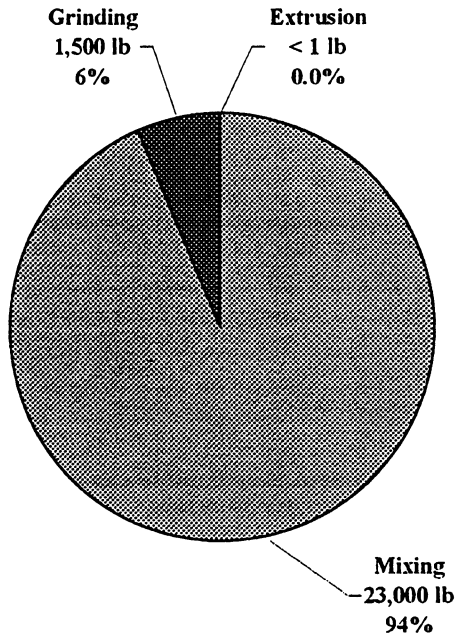

Figure 4-9. Distribution of Annual Emissions by Process: Total Particulate Matter.

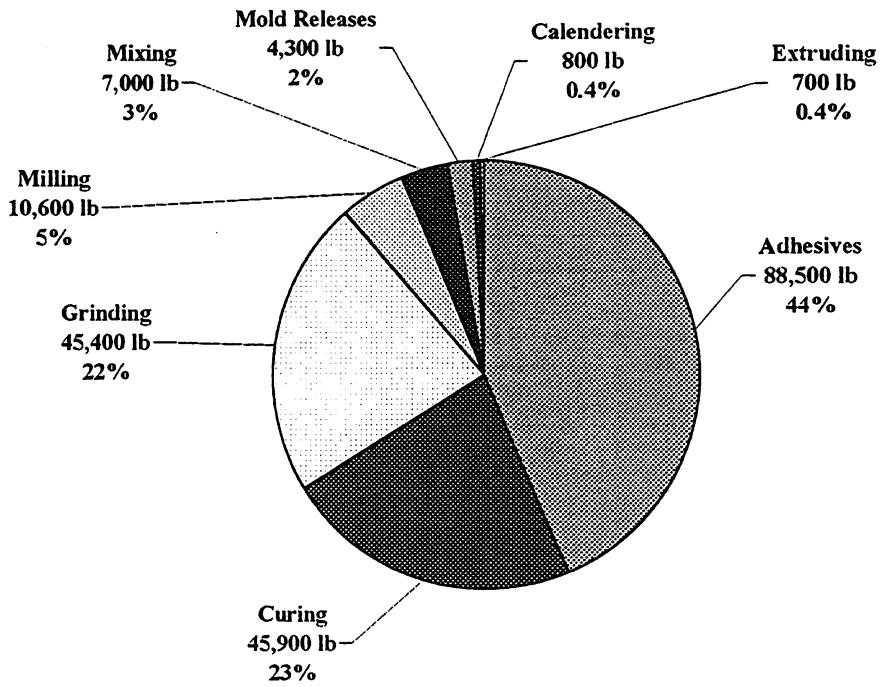

Figure 4-10. Distribution of Annual Emissions by Process: VOC.

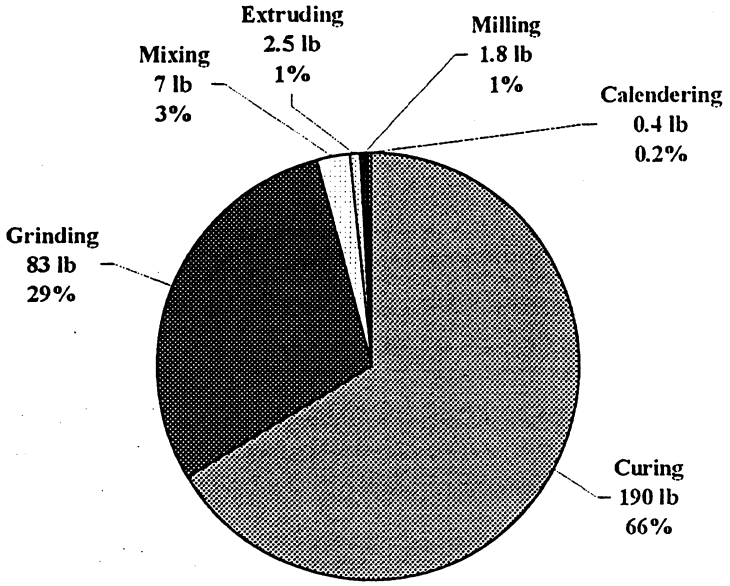

Figure 4-11. Distribution of Annual Emissions by Process: 1,3-Butadiene.

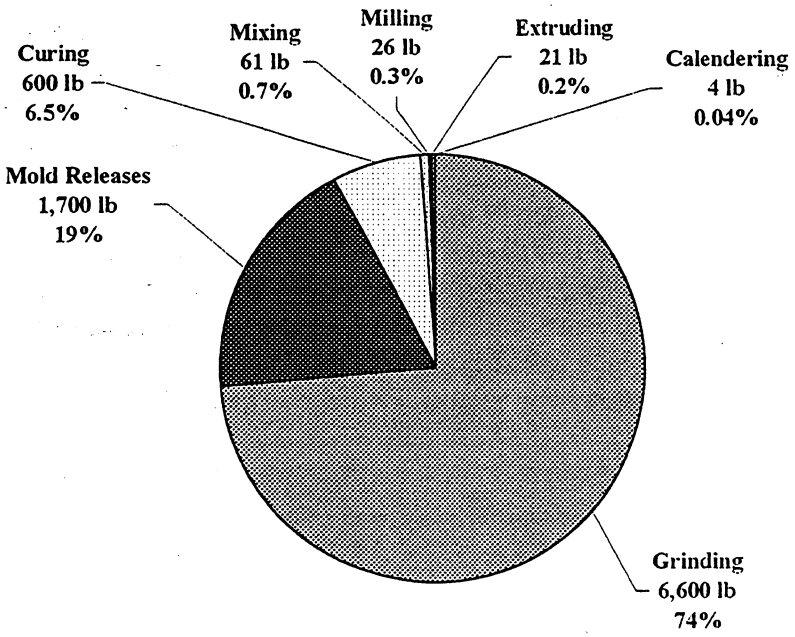

Figure 4-12. Distribution of Annual Emissions by Process: Methylene Chloride.

4.5.5 Ranking of Rule 1401/1402 Pollutant Emissions

One way to evaluate the importance of the Rule 1401/1402 pollutants is to rank them by some measure of risk. To do this, one must first define a score for ranking purposes. For cancer risk, the score was defined as the product of annual emissions (lb/yr) and the unit risk factor $(\mu g/m^3)^{-1}$. For noncancer chronic risk, the score was defined as annual emissions (lb/yr) divided by the chronic noncancer relative exposure level (REL), as adopted by the AQMD (SCAQMD, 1999b) or published in the risk assessment guidelines for AB 2588 (CAPCOA, 1993). Tables 4-29 and 4-30 show the rankings for cancer and chronic noncancer risk, respectively. Compounds are listed in order of decreasing score, number one having the highest score.

For cancer risk, the five highest-ranked Rule 1401/1402 pollutants are dibenzofurans, chromium, benzidine, acrylonitrile and 1,3-butadiene. For chronic noncancer risk, the five highest-ranked are chromium, dibenzofurans, acrolein, nickel and acrylonitrile..

4.6 DISCUSSION

As was noted in Section 4.5.3, emissions of all pollutants are distributed unevenly through the inventoried population. For example, four facilities account for 89 percent of the uncontrolled particulate emissions and 80 percent of the net particulate emissions.[6] One facility accounts for half of the uncontrolled VOC emissions. Because of the presence of a relatively high-emissions facilities (and to the absence of a response from at least two facilities known to have comparable emissions), it is not feasible to "scale up" the results of this survey to the rubber products manufacturing industry as a whole.

This industry does not appear to be a significant source of particulate emissions, 98.5 percent of which are already controlled. In contrast, VOC emissions, which are mostly uncontrolled, total about 67 tons per year. These are distributed among several processes; adhesives application, curing, grinding and milling are all significant sources.

Perhaps the most practical way to evaluate the air toxics emissions results is to observe how the industry would be affected by the recent revisions to Rule 1402. The "Tier 1" analysis presented in Section 4.5.3 showed that many of the plants in the inventory might have to prepare risk reduction plans or do noticing under Rule 1402. As was stated in Section 4.5.3, this is a conservative estimate, since more detailed analyses would likely indicate lower risks at individual plants.

One useful aspect of the results is the identification of areas where further emission reductions are possible. Particulate matter emissions are already over 98 percent controlled, leaving little room for improvement. VOC and most organic air toxic compounds, on the other hand, are largely uncontrolled. Only 19 devices out of the 607 in the inventory have any type of organic gas emission control.

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[6] Not the same facilities for the uncontrolled emissions and controlled emissions.

Table 4-29

RANKING OF RULE 1401/1402 POLLUTANTS BY CANCER RISK

Pollutant ID	Pollutant	Uncontrolled Emissions (lb/yr)	Unit Risk Factor[a] $(\mu g/m^3)^{-1}$	Rank
132-64-9	Dibenzofurans	2.4E+00	3.8E+01	1
CR	Chromium	3.1E+01	1.5E-01	2
92-87-5	Benzidine	2.6E+01	1.4E-01	3
107-13-1	Acrylonitrile	3.6E+02	2.9E-04	4
106-99-0	1,3-Butadiene	2.8E+02	1.7E-04	5
CD	Cadmium	2.7E+00	4.2E-03	6
75-09-2	Methylene chloride (Dichloromethane)	8.9E+03	1.0E-06	7
NI	Nickel	2.7E+01	2.6E-04	8
71-43-2	Benzene	1.2E+02	2.9E-05	9
62-53-3	Aniline	9.2E+02	1.6E-06	10
127-18-4	Tetrachloroethylene (Perchloroethylene)	2.1E+02	5.9E-06	11
79-01-6	Trichloroethylene	3.4E+02	2.0E-06	12
56-23-5	Carbon tetrachloride	1.4E+01	4.2E-05	13
75-56-9	Propylene oxide	1.6E+02	3.7E-06	14
117-81-7	Bis(2-ethylhexyl) phthalate (DEHP)	1.5E+02	2.4E-06	15
PB	Lead	2.8E+01	1.2E-05	16
75-07-0	Acetaldehyde	9.6E+01	2.7E-06	17
50-00-0	Formaldehyde	2.0E+01	6.0E-06	18
100-42-5	Styrene[b]	1.2E+02	5.7E-07	19
75-01-4	Vinyl chloride	5.1E-01	7.8E-05	20
126-99-8	Chloroprene[c]	7.7E+01	1.3E-07	21
67-66-3	Chloroform	1.7E+00	5.3E-06	22
106-46-7	1,4-Dichlorobenzene (p)	6.4E-01	1.1E-05	23
106-89-8	Epichlorohydrin	2.6E-01	2.3E-05	24
60-11-7	Dimethyl aminoazobenzene, p-	4.4E-03	1.3E-03	25
100-44-7	Benzyl chloride	8.7E-02	4.9E-05	26
62-75-9	N-Nitrosodimethylamine	9.7E-05	4.6E-03	27
123-91-1	1,4-Dioxane (1,4-Diethyleneoxide)	1.7E-02	7.7E-06	28

[a]Unit risk factors are from SCAQMD, 1999b, Table 8A, unless otherwise noted.

[b]Unit risk factor from CAPCOA, 1993, Table III-7.

[c]Unit risk factor from CAPCOA, 1993, Table III-6.

Table 4-30

RANKING OF POLLUTANTS BY CHRONIC NONCANCER RISK

Pollutant ID	Pollutant	Uncontrolled Emissions (lb/yr)	Chronic Relative Exposure Level[a] ($\mu g/m^3$)	Score
CR	Chromium	3.1E+01	2.0E-03	1
132-64-9	Dibenzofurans	2.4E+00	4.0E-04	2
107-02-8	Acrolein	3.6E+01	2.0E-02	3
NI	Nickel	2.7E+01	5.0E-02	4
107-13-1	Acrylonitrile	3.6E+02	2.0E+00	5
126-99-8	Chloroprene	7.7E+01	1.0E+00	6
108-88-3	Toluene	1.6E+04	3.0E+02	7
95-48-7	o-Cresol	5.5E-01	1.8E-02	8
75-09-2	Methylene chloride (Dichloromethane)	8.9E+03	4.0E+02	9
PB	Lead	2.8E+01	1.5E+00	10
MPXL	Xylenes (isomers and mixture)	9.6E+03	7.0E+02	11
75-07-0	Acetaldehyde	9.6E+01	9.0E+00	12
91-20-3	Naphthalene	8.1E+01	9.0E+00	13
50-00-0	Formaldehyde	2.0E+01	3.0E+00	14
56-23-5	Carbon tetrachloride	1.4E+01	2.4E+00	15
127-18-4	Tetrachloroethylene (Perchloroethylene)	2.1E+02	4.0E+01	16
75-56-9	Propylene oxide	1.6E+02	3.0E+01	17
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)	1.5E+02	3.2E+01	18
92-87-5	Benzidine	2.6E+01	1.0E+01	19
71-43-2	Benzene	1.2E+02	6.0E+01	20
106-89-8	Epichlorohydrin	2.6E-01	3.0E-01	21
CD	Cadmium	2.7E+00	3.5E+00	22
79-01-6	Trichloroethylene	3.4E+02	6.0E+02	23
108-95-2	Phenol	1.0E+02	2.0E+02	24
67-63-0	Isopropyl alcohol	2.8E+03	7.0E+03	25
100-42-5	Styrene	1.2E+02	9.0E+02	26
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)	1.3E+02	1.0E+03	27
67-56-1	Methanol	1.8E+02	4.0E+03	28
98-95-3	Nitrobenzene	7.8E-02	1.7E+00	29
74-83-9	Methyl bromide (Bromomethane)	2.1E-01	5.0E+00	30
75-01-4	Vinyl chloride	5.1E-01	2.6E+01	31
140-88-5	Ethyl acrylate	3.6E-01	4.8E+01	32
100-44-7	Benzyl chloride	8.7E-02	1.2E+01	33
67-66-3	Chloroform	1.7E+00	3.0E+02	34
106-46-7	1,4-Dichlorobenzene (p)	6.4E-01	7.0E+02	35

[a]The AQMD has officially adopted chronic relative exposure level values only for acetaldehyde, propylene oxide, and tetrachloroethylene (perchloroethylene). The other RELs used here are those established by the Office of Environmental Health Hazard Assessment and finalized by the Scientific Review Panel in February and April 2000; any REL not included in the February and April 2000 OEHHA/SRP list are from CAPCOA, 1993.

As was seen earlier, use of solvent-borne adhesives is the largest source of VOC emissions, while mold releases account for 18 percent of the methylene chloride emissions. If the methylene chloride emission factor for grinding is indeed spurious,[7] then the mold releases' contribution to emissions of this toxic air pollutant would be 70 percent. These ancillary formulations are important emission sources of other Rule 1401 and 1402 pollutants, such as isopropyl alcohol and xylenes. A large fraction of the VOC emissions from adhesives is controlled directly. On the other hand, no emissions from use of mold releases are currently controlled directly.

[7] See Section 4.5.4.

5.0

CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

5.1.1 Completeness of the Inventory

(1) The likely universe of rubber products manufacturing facilities in the South Coast Air Quality Management District is 144.

(2) Responses with useful emission inventory data were received from 48 facilities, or 33.3 percent of the universe of rubber products manufacturers in the District.

5.1.2 Nature of the Survey Sample

(1) The survey sample has the same geographic distribution as the universe of rubber products manufacturers. About 58 percent are in Los Angeles County.

(2) The number of employees per facility in the inventory ranged from 1 to 280, and the median firm size was 23. About 19.5 percent of the inventoried firms that reported employment values had 10 or fewer employees, 11 percent had 51 to 100, and 13 percent had more than 100.

(3) Inventoried facilities are in 16 known standard industrial classification (SIC) codes. Three-eighths of the facilities are in SIC 3069 (Fabricated Rubber Products, Not Elsewhere Classified) or 3061 (Molded, Extruded, and Lathe-Cut Mechanical Rubber Goods).

(4) Survey respondents manufacture a wide variety of rubber products. The most frequently reported products were seals (seven facilities), gaskets (six facilities), and rollers (six facilities).

5.1.3 Equipment Inventory

(1) The facilities in the inventory reported using 607 pieces of rubber products manufacturing equipment.

(2) For a given type of equipment (e.g. mills), individual machines varied mainly by batch size.

(3) Only eleven facilities reported using mixers. Many fabricators purchase pre-mixed (and sometimes pre-cured) rubber from formulators and then use it in machines other than mixers. Most mixer users had only one mixing machine.

(4) A little less than half the facilities reported using mills, all 51 of which had two rollers. The number of mills per plant ranged from one to eight, with a mean of about two.

(5) Only six calenders were reported by survey respondents. All but one of the five facilities with calenders had only one such device.

(6) Eleven facilities reported having extruders. All had one, two or three machines.

(7) Thirty-nine facilities reported having molds, presses, ovens, and other types of curing devices. Of the 475 curing devices reported, 432 (91 percent) were characterized as platen presses. The number of curing devices per firm ranged from 1 to 73, and the median value was 5 devices.

(8) Only 15 facilities reported performing grinding. The number of grinding machines per facility ranged from one to five.

5.1.4 Materials Processed

(1) Rubber and mold release or adhesives consumption data were received from 46 of the 48 respondents.

(2) The facilities in the inventory reported combined use of 50.9 million lb in mixing, 52.7 million lb in milling, 4.9 million lb in calendering, 30.7 million lb in extrusion, 41.9 million lb in curing devices, and 5.3 million lb in grinding.

(3) Rubber consumption in the different processes cannot be added to determine basin-wide rubber use, since the same mass of material may be processed by two or more types of equipment at a given facility.

(4) The survey respondents reported using 50,060 lb of mold release compounds, of which 21,355 lb (42.7 percent) contained neither VOC nor air toxics compounds.

(5) About 98 percent of the VOC- and/or toxics-containing mold releases whose type was reported were external; i.e. they were applied to the outer surface(s) in contact during molding.

(6) The survey respondents reported using 111,835 lb of adhesives, of which only 420 lb (0.4 percent) contained neither VOC nor air toxics compounds.

(7) The main types of adhesives used were: rubber-to-rubber (83.6 percent), rubber-to-fabric (12.3 percent), and rubber-to-metal (4.0 percent).

5.1.5 Emissions

Annual emissions (lb/yr) were calculated for total particulate matter (TPM), volatile organic compounds (VOC) and individual air toxics species. Results are summarized as follows.

(1) Basin-wide uncontrolled and net emissions[1] of TPM are 24,513 and 361 lb/yr, respectively.

(2) Basin-wide uncontrolled and net emissions of VOC are 203,199 and 134,495 lb/yr, respectively.

(3) Basin-wide uncontrolled emissions exceeded 1 lb/yr for 33 Rule 1401/1402 pollutants and 20 Title III hazardous air pollutants (HAPs) that are not Rule 1401/1402 compounds.

(4) The five Rule 1401/1402 compounds with the highest net mass emissions are toluene (16,115 lb/yr), carbon disulfide (8,950 lb/yr), methylene chloride (8,937 lb/yr), isopropyl alcohol (2,790 lb/yr), and isomers of xylene (2,298 lb/yr).

(5) The three HAPs that are not Rule 1401/1402 compounds that have the highest net mass emissions are methyl isobutyl ketone (5,285 lb/yr), hexane (1,824 lb/yr), and carbonyl sulfide (1,689 lb/yr).

(6) The geographical distributions of emissions vary with pollutant type. Most of the uncontrolled TPM and VOC emissions occur in Los Angeles and San Bernardino Counties.

(7) Los Angeles County is the source of most of the toluene and methylene chloride emissions. Riverside County is the source of most of the isopropyl alcohol emissions. Most of the xylene emissions occur in San Bernardino County. For all pollutants examined, Orange County is a minor source (less than 4 percent) of emissions.[2]

(8) For all pollutants, the range of values of emissions per facility is quite large (up to eight orders of magnitude), and median emissions per facility are small; the bulk of emissions of most pollutants are from relatively few facilities.

(9) A "Tier 1" screening analysis was performed to determine how many facilities' emissions would lead to a maximum individual cancer risk (MICR) exceeding 25 in 1 million at 25 meters from the facility. The MICR of 25×10^{-6}

[1] Net emissions are emissions after application of controls, where applicable.
[2] The contractor is aware of four Orange County facilities that may have significant emissions but did not respond to the survey.

would be exceeded at at least one facility[3] for emissions of acrylonitrile, benzene, benzidine, 1,3-butadiene, chromium, methylene chloride, or nickel.

(10) The great majority of particulate emissions are from mixing operations.

(11) Application of adhesives accounts for about 44 percent of the uncontrolled VOC emissions, and curing adds another 23 percent.

(12) For most volatile and semi-volatile organic pollutants not found in mold releases or adhesives, curing and grinding account for most of the emissions.

(13) Under a scoring system based upon uncontrolled emissions and unit risk factors, the Rule 1401/1402 pollutants of the highest concern for cancer risk were dibenzofurans, chromium, benzidine, acrylonitrile and 1,3-butadiene.

(14) Under a scoring system based upon uncontrolled emissions and relative exposure levels, the pollutants of the highest concern for chronic noncancer risk were chromium, dibenzofurans, acrolein, nickel and acrylonitrile.

5.2 RECOMMENDATIONS

The contractor recommends the following actions.

5.2.1 Better Characterization of Emissions

As was discussed in Chapters 3 and 4, many of the emission factors developed by the Rubber Manufacturers Association and distributed to the public as part of *AP-42* are of uncertain validity. It was beyond the scope of this project to develop new or alternative emission factors, so the published ones were used with several caveats.

On the basis of emissions estimates derived from the *AP-42* emission factors, it appears that some facilities might be subject to the new risk reduction and/or noticing requirements of AQMD Rule 1402. Given the provisional nature of the emission factors, risk assessments performed under the rule would have questionable validity. The contractor therefore recommends that regulatory agencies and/or private industry conduct or sponsor a focused program of emission factor development tests at representative rubber products manufacturing facilities.

Unlike the laboratory test sponsored by the RMA, the tests recommended here would be on working equipment at real facilities, under a variety of operating conditions. They should focus upon those Rule 1401/1402 pollutants that appear to trigger notification and/or risk reduction planning requirements from these types of facilities. Although it is beyond the scope of this contract to outline a testing program, the contractor recommends strongly that it include the following:

[3] The 25 x 10^{-6} MICR would be exceeded at different facilities for different pollutants.

(1) Testing with temporary total enclosures that meet the criteria of USEPA Method 204;

(2) Use of a more efficient method for collecting samples of semi-volatiles,[4] such as adsorption on polyurethane foam (PUF) in a Method 5 sampling train; and

(3) Conducting a detailed mass balance on emissions of volatile organic compounds, such as methylene chloride, that are in mold release compounds and adhesives and are reportedly (in *AP-42*) emitted from various rubber production processes, such as grinding.

5.2.2 Investigation of Water-Based Mold Releases and Adhesives

Use of mold releases and adhesives accounts for a significant fraction of volatile organic compound emissions and those of several Rule 1401/1402 compounds. Water-based mold releases have already penetrated the market to a significant extent, but water-based adhesives have not. The contractor recommends an investigation of the state-of-the-art of low-VOC adhesives applicable to this industry. The study should include an assessment of the advantages and drawbacks of these alternative formulations, prospects for their coming on the market in the near future, and the economics of substitution.

[4] The evacuated canisters used in the RMA tests would have captured semi-volatiles but may not have released all the mass for speciation and quantification.

6.0

REFERENCES CITED

Anon. 1999. "DO4S12RD.TXT." Preface to posting of Draft *AP-42* Chapter 4, Section 12. U.S. Environmental Protection Agency, Emission Factors and Inventory Group (June 8).

CAPCOA (California Air Pollution Control Officers Association). 1993. *Air Toxics "Hot Spots" Program. Revised 1992 Risk Assessment Guidelines.* Prepared by the Toxics Committee of the California Air Pollution Control Officers Association.

Cocheo, V., M.L. Bellomo and G.G. Bombi. 1983. "Rubber Manufacture: Sampling and Identification of Volatile Pollutants," *American Industrial Hygiene Association Journal* 44(7): 521-527.

Danielson, J.A. (Ed.). 1973. *Air Pollution Engineering Manual.* U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, Publication No. AP-40.

Grable, P. 1998. Letter from Pacific Environmental Services, Inc. to R. Ryan, U.S. Environmental Protection Agency, Emissions Monitoring and Analysis Division, Office of Air Quality Planning and Standards, Research Triangle Park, NC (December 22).

Kneisel, R. 1998. *Addendum to Staff Report. Final Socioeconomic Impact Statement. Proposed Amended Rule 219, Proposed Rule 22, Proposed Amended Rule 401.* South Coast Air Quality Management District, Diamond Bar, CA.

Lee, A., L.H. Mirisola, P. Perryman, and C. Marshall. 1998. *Final Staff Report for Permit Streamlining Project. Proposed Amended Rule 219 – Equipment Not Requiring a Written Permit Pursuant to Regulation II; Proposed Rule 222 – Filing Requirements for Specific Emission Sources Not Requiring a Written Permit Pursuant to Regulation II; Proposed Amended Rule 401 – Visible Emissions.* South Coast Air Quality Management District, Diamond Bar, CA (September 11).

Lee, A. 1999. Faxed communication of data from South Coast Air Quality Management District, Diamond Bar, CA to Michael Rogozen, Pacific Environmental Services, Inc. (December 14).

Lee, A. 2000. Personal communication from South Coast Air Quality Management District, Diamond Bar, CA to Michael Rogozen, Pacific Environmental Services, Inc. (February 3).

Lynch, W. 1978. *Handbook of Silicone Rubber Fabrication.* Van Nostrand Reinhold Company, New York, 257 p.

MR (Minnesota Rubber). 1996. "Rubber and Thermoplastic Fact Book and Design Guide." [http://www.mnrubber.com/factbook].

Perryman, P. 1998. Faxed communication of data from South Coast Air Quality Management District, Diamond Bar, CA to Michael Rogozen, Pacific Environmental Services, Inc. (April 28).

RMA (Rubber Manufacturers Association). 1997. *Emission Factor Background Report for AP-42 Section 4.12, Manufacture of Rubber Products. Prepared for U.S. Environmental Protection Agency, Emission Factors and Inventory Group, D04S12B.WPD.*

SCAQMD (South Coast Air Quality Management District). 1999a. "AQMD BACT Determinations, Application No.: 35068, Equipment Category – Rubber Compounding, Roll Mill (August 3).

SCAQMD (South Coast Air Quality Management District). 1999b. *Risk Assessment Procedures for Rules 1401 and 212, Version 5.0,* Diamond Bar, CA.

SCAQMD (South Coast Air Quality Management District). 2000a. *An Air Toxics Control Plan for the Next Ten Years, Final Draft.* Diamond Bar, CA (March).

SCAQMD (South Coast Air Quality Management District). 2000b. "Rule and Control Measure Forecast." Board Meeting Agenda No. 18 (March 17).

SJVUAPCD (San Joaquin Valley Unified Air Pollution Control District). 1997. "Best Available Control Technology (BACT) Guideline 4.9.2A (September 11).

Smith, L.P. 1993. *The Language of Rubber. An Introduction to the Specification and Testing of Elastomers.* Butterworth Heinemann, Oxford, 257 p.

USEPA (U.S. Environmental Protection Agency). 1990. RACT/BACT/LAER Clearinghouse ID No. CT-0057.

USEPA (U.S. Environmental Protection Agency). 1995. *EPA Office of Compliance Sector Notebook Project. Profile of the Rubber and Plastics Industry.* Office of Compliance, Office of Enforcement and Compliance Assurance, Washington, DC, EPA/310-R-95-016.

USEPA (U.S. Environmental Protection Agency). 1997. "Manufacture of Rubber Products," *AP-42, Compilation of Air Pollutant Emission Factors,* Section 4.12, Office of Air Quality Planning and Standards, Research Triangle Park, NC.

USEPA (U.S. Environmental Protection Agency). 1998. *Presumptive Maximum Achievable Control Technology, Rubber Tire Manufacturing Source Category,* Office of Air Quality Planning and Standards, Emission Standards Division, Policy Planning and Standards Group, Research Triangle Park, NC.

White, J.L. 1995. *Rubber Processing. Technology, Materials and Principles.* Hanser Publishers, Munich, 586p.

APPENDIX A
SURVEY PACKAGE

PACIFIC ENVIRONMENTAL SERVICES, INC.

Celebrating the Test of Time 25 1971-1996

13100 Brooks Drive, Suite 100
Baldwin Park, CA 91706
(626) 856-1400
FAX (626) 814-0820
http://www.pes.com

December, 1999

Dear Plant Manager:

The South Coast Air Quality Management District (AQMD) has selected Pacific Environmental Services, Inc. (PES) to conduct a survey of facilities that manufacture rubber products. The purpose of the survey is to gather information that can be used to estimate emissions of air pollutants from these operations. We ask that you help us with this research by filling out the attached questionnaire and mailing it back to us in the enclosed envelope within two weeks.

If this plant does not manufacture rubber products on-site, then please fill out the first page of the enclosed questionnaire (Form I) and fax or mail the page back to us.

The final report for this project will not contain any information about individual facilities. The information you and other companies provide will be used only in summary format. You may be assured that any information given to PES that you identify as "confidential" or "trade secret" will be held as such by PES and the AQMD. (Please see the attached letter from the AQMD for more information, including assurances of confidentiality.)

If you have any questions about the forms do not hesitate to call us at (626) 856-1400, fax us at (626) 814-0820, or send an e-mail to mike.rogozen@pes.com. Ask for Dr. Michael Rogozen or the "rubber products survey staff." If you would like more information about the reasons for the survey, you may call the AQMD's Contract Managers: Andrew Lee at (909) 396-2643 or Cheryl Marshall at (909) 396-2567.

Thank you for your help.

Sincerely yours,

Pacific Environmental Services, Inc.

Michael B. Rogozen, D.Env.
AQMD Rubber Products Survey Manager

Attachments

South Coast
Air Quality Management District
AQMD
21865 E. Copley Drive, Diamond Bar, CA 91765-4182
(909) 396-2000 · http://www.aqmd.gov

November 29, 1999

Dear Rubber Products Manufacturer:

Pacific Environmental Services, Inc. (PES) is under contract to conduct a research study for the South Coast Air Quality Management District (AQMD). The purpose of the study is to gather pertinent information and develop an emissions inventory for facilities that manufacture rubber products.

During this process, PES will be surveying all identified rubber products manufacturing facilities regarding their operations and use of various elastomers, additives, adhesives, solvents, and other materials. Any information given to PES that is identified as "CONFIDENTIAL" or "TRADE SECRET" will be held as such by PES and the AQMD. The final report for this effort will not contain any facility-specific information. The information you and other companies provide will be used only in summary format and will not be distinguishable to any particular facility.

It should be noted that the AQMD is subject to the California Public Records Act (Government Code section 6250 *et seq.*) and information received may be subject to public disclosure if ordered by a court after finding the information was not properly declared trade secret. Information that is considered trade secret includes, but is not limited to, formulas, software, plan patterns, processes, tools, mechanisms, compounds, procedures, production data, or compilation of information which is not patented. Information used to calculate air emissions may be trade secret. However, emissions data are not trade secret.

We ask that you assist us with this research by completing PES' questionnaire. If you have any questions concerning the reason for the survey, please contact the District Contract Managers for this effort, Andrew Lee at (909) 396-2643 or Cheryl Marshall at (909) 396-2567. If you have questions concerning the content of the survey, please call Dr. Michael Rogozen of PES at (626) 856-1400.

Thank you for your assistance.

Sincerely,

Jill Whynot

Jill Whynot
Planning and Rules Manager

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
RUBBER PRODUCTS MANUFACTURERS SURVEY

56

FORM I. FACILITY INFORMATION

A. Please provide all the following information:

Facility Name _____

Facility Address _____

City _____ ZIP _____ - _____

Contact Person _____ Title _____

Telephone ( ) _____ Ext _____ Fax ( ) _____

E-Mail _____

Standard Industrial Classification (SIC) Code (if known) _____

South Coast AQMD ID Number (if applicable) _____

Number of Employees at This Location _____

Mailing Address (if different from location address):

_____

_____

_____

_____

B. Did your facility, on its own premises, manufacture products from rubber in 1999?

- ☐ Yes.
- ☐ No - We do not manufacture anything from rubber (elastomers).
- ☐ No - We are a wholesaler or retailer only.
- ☐ No - This is an administrative or sales location only.
- ☐ No - This facility did not operate at all in 1999.
- ☐ No - _____ (Give other reason)

If you checked any of the "No" boxes, skip the rest of this form. Please return this page and we will remove you from the survey.

C. What are the main types of rubber products that you manufacture?

_____

_____

_____

_____

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
RUBBER PRODUCTS MANUFACTURERS SURVEY

FORM II. MATERIALS/PROCESS MATRIX

A. Instructions

The purpose of this form is to report which major categories of elastomers are used in which rubber manufacturing processes at your facility. First, identify the categories of elastomer(s) that form the basis for the rubber compounds you use. Then identify all the manufacturing processes in which each category of elastomer is used. Show each combination of an elastomer category and a process by placing an "X" in the table where the row and column intersect. *If you use any categories of elastomers that are not shown on the form, use the three blank rows at the bottom. For each, write the ASTM designation (if you know it), a description, and the trade name. (Ignore the "EPA Code" column.)*

NOTE: If you manufacture tires, please contact PES at (626) 856-1400 for special forms.

ASTM Name	EPA Code	Description	Example Trade Names	Internal Mixers (With or Without Milling)	Mills	Extruders	Calenders	Platen Press Curing	Autoclave Curing	Hot Air Curing	Grinding
ACM	17	Polyacrylate elastomer Acrylate Rubber	Cyanacryl HyTemp Thiacril								
AEM	21	Ethylene/Acrylic elastomer	Vamac								
BR	32	Polybutadiene rubber	Diene								
CPE	11	Chlorinated polyethylene	Daisolac								
CRW	12	Polychloroprene (W Type)	Baypren Butaclor Neoprene W								
CRG	15	Polychloroprene (G Type)	Baypren Butaclor Neoprene GW								
CSM	23	Chlorosulfonated polyethylene	Hypalon								
ECO	8	Epichlorohydrin	Gechron Hydrin								
EPDM	9	Ethylene/propylene/nonconjugated diene (Sulfur cure)	Nordel Vistalon								
EPDM	10	Ethylene/propylene/nonconjugated diene (Peroxide cure)	Nordel Vistalon								
EPDM	27	Ethylene/propylene/nonconjugated diene (Non-black, sulfur cure)	Nordel								
EVA	28	Ethylene-vinyl acetate copolymer	Elvax								
FFKM	16	Perfluoroelastomer	Chemraz Kalrez								
FKM	18	Fluoroelastomer	Viton								
HNBR	29	Hydrogenated nitrile rubber	Therban Tornac Zetpol								
MQ	13	Dimethyl silicone polymer									
NBR	14	Acrylonitrile-Butadiene	Baymod Chemigum Hycar Krynac Paracil Paracryl BLT Perbunan								
NBR	22	Acrylonitrile-Butadiene/Polyvinyl chloride	Paracryl OZO								
SBR	24	Emulsion styrene-butadiene	SBR 1502								
SBR	25	Oil-extended styrene-butadiene	SBR 1712								
SBR	26	Emulsion styrene-butadiene	SBR 1500								
SBR	30	Solution styrene-butadiene	Duradene								
SMR	19	Standard Malaysian (natural) rubber									
VMQ	31	Dimethyl silicone polymer with vinyl side groups									

FORM III. EQUIPMENT AND RUBBER USE INFORMATION (CONTINUED)

C. CALENDERS

☐ We do no calendering of rubber on the premises.

☐ Please fill out one row of the following table for each combination of calender machine and rubber type. In the first column, number your machines 1, 2, etc. Get the "EPA Rubber Code" from Form II. There is space for three types of rubber for each calender. If you use more, then make copies of the form.

Machine No.	Number of Rolls	EPA Rubber Code From Form II	Batch Size (lbs)		Typical Operating Schedule for This Machine		Pounds of Rubber Processed in 1999
			Maximum	Average	Hrs/Day	Hrs/Yr	

D. EXTRUDERS

☐ We do no extrusion of rubber on the premises.

☐ Please fill out one row of the following table for each combination of extruder and rubber type. In the first column, number your machines 1, 2, etc. Get the "EPA Rubber Code" from Form II. There is space for three types of rubber for each extruder. If you use more, then make copies of the form.

Machine No.	L/D Ratio	EPA Rubber Code From Form II	Batch Size (lbs)		Typical Operating Schedule for This Machine		Pounds of Rubber Processed in 1999
			Maximum	Average	Hrs/Day	Hrs/Yr	

FORM IV. USE OF MOLD RELEASE AND ADHESIVE COMPOUNDS

Please provide the following information about your use of mold release compounds and adhesives. Include only those materials that were used in manufacturing rubber products. Make more copies of the form if necessary.

A. MOLD RELEASE COMPOUNDS

Product Name and No. (e.g. Axel Mold Wiz #F-57NC)	Supplier	Supplier's Phone	Type: E = External I = Internal	Estimated Use in 1999 (Pounds)

B. ADHESIVES USED IN RUBBER PRODUCTS MANUFACTURING

For "Bond," use the following abbreviations: **R** = rubber-to-rubber, **M** = rubber-to-metal, **F** = rubber-to-fabric, **P** = rubber-to-plastic, **O** = other (please explain).

Product Name and No. (e.g. Thixon XAB-936 or Chemlok 218)	Supplier	Supplier's Phone	Bond	Estimated Use in 1999 (Pounds)

APPENDIX B

AP-42 EMISSION FACTORS

EMISSION FACTORS FOR MIXING RECIPES 1-10

Analyte Name	Pollutant	EPA AP-42 Recipe Number									
		1	2	3	4	5	6	7	8	9	10
Total Method 25A Organics	TOG	6.17E-05	3.91E-05	1.36E-04	3.88E-05	2.15E-04	3.86E-05	1.22E-04	1.47E-05	2.91E-05	2.91E-04
Total Speciated Organics	TSO	5.08E-05	5.53E-05	8.92E-05	5.31E-05	6.18E-05	9.84E-05	8.89E-05	7.38E-05	5.74E-05	2.81E-04
Total Organic HAPs	TOHAP	2.10E-05	1.33E-05	5.90E-05	2.54E-05	4.19E-05	4.87E-05	4.19E-05	5.58E-05	1.52E-05	1.20E-04
Total Metal HAPs	TMHAP	9.67E-08	9.71E-09	1.74E-07	7.06E-08	7.72E-08	6.43E-09	1.37E-07	3.91E-08	2.65E-09	5.19E-08
Total HAPs	THAP	2.11E-05	1.33E-05	5.91E-05	2.55E-05	4.19E-05	4.87E-05	4.21E-05	5.58E-05	1.52E-05	1.20E-04
Total Particulate Matter	TPM	1.75E-04	4.02E-04	9.00E-04	3.00E-04	9.25E-04	4.00E-04	5.66E-04	2.22E-04	4.92E-05	3.58E-04
1,1,1-Trichloroethane	71-55-6	0.00E+00	8.03E-08	3.19E-07	4.23E-08	1.84E-07	0.00E+00	0.00E+00	2.67E-08	7.30E-08	1.34E-07
1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	5.47E-07	0.00E+00	0.00E+00	0.00E+00	1.00E-07	1.90E-07	0.00E+00
1,3-Butadiene	106-99-0	9.78E-08	0.00E+00	0.00E+00	2.17E-07	0.00E+00	0.00E+00	4.67E-07	1.13E-07	1.70E-07	0.00E+00
1,4-Dichlorobenzene	106-46-7	0.00E+00	0.00E+00	2.86E-09	7.30E-10	1.52E-09	1.22E-09	1.82E-09	4.48E-09	0.00E+00	5.95E-10
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	5.91E-06	1.59E-06	9.01E-07	2.74E-06	1.53E-06	4.40E-07	1.40E-06	5.08E-07	4.92E-07	1.18E-06
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.46E-10
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	8.64E-08	8.34E-10	1.30E-08	6.00E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-Pentanone	108-10-1	0.00E+00	1.97E-07	1.26E-05	1.49E-05	0.00E+00	3.06E-05	0.00E+00	1.27E-07	1.24E-07	4.15E-07
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	6.95E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde + Isobutane	ACETISO	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.12E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	2.32E-06	2.13E-08	5.13E-08	3.75E-09	1.85E-08	7.67E-08	1.23E-07	1.29E-08	1.47E-06	8.46E-08
Acrolein	107-02-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.81E-08	0.00E+00	0.00E+00
Aniline	62-53-3	0.00E+00	4.80E-07	0.00E+00	4.30E-07	0.00E+00	9.97E-08	0.00E+00	7.70E-09	5.13E-09	4.71E-09
Benzene	71-43-2	5.46E-08	4.62E-08	1.13E-07	1.14E-07	2.98E-07	0.00E+00	9.13E-08	0.00E+00	4.90E-08	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl	92-52-4	0.00E+00	0.00E+00	5.63E-08	5.42E-09	0.00E+00	1.17E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	3.91E-08	3.01E-08	1.19E-07	0.00E+00	2.29E-08	1.79E-07	3.34E-08	0.00E+00	7.07E-09	0.00E+00
Bromoform	75-25-2	2.78E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bromomethane	74-83-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cadmium (Cd) Compounds	CD	9.35E-09	2.40E-09	7.01E-09	2.55E-09	5.05E-09	2.18E-09	3.89E-09	9.09E-10	1.12E-09	4.08E-09
Carbon Disulfide	75-15-0	0.00E+00	0.00E+00	0.00E+00	1.99E-07	1.84E-07	3.83E-06	0.00E+00	2.81E-05	6.66E-07	1.03E-04
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	1.19E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbonyl Sulfide	463-58-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.34E-07	1.59E-06	0.00E+00	2.24E-05	1.15E-06	0.00E+00
Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloromethane	74-87-3	0.00E+00	3.12E-08	0.00E+00	2.98E-08	0.00E+00	3.25E-07	0.00E+00	3.74E-08	3.17E-08	9.27E-08
Chromium (Cr) Compounds	CR	3.18E-08	6.99E-09	5.91E-08	2.38E-08	2.72E-08	4.26E-09	1.23E-07	4.41E-09	1.53E-09	1.56E-08

EMISSION FACTORS FOR MIXING
RECIPES 1-10

Analyte Name	Pollutant	EPA AP-42 Recipe Number									
		1	2	3	4	5	6	7	8	9	10
Cumene	98-82-8	2.92E-09	0.00E+00	4.00E-09	1.67E-09	1.41E-09	1.21E-08	8.31E-08	9.65E-08	3.17E-06	8.81E-07
Di-n-butylphthalate	84-74-2	8.00E-08	1.61E-08	5.49E-08	0.00E+00	0.00E+00	1.50E-08	0.00E+00	7.47E-09	1.31E-09	1.47E-08
Dibenzofuran	132-64-9	0.00E+00	2.11E-09	3.42E-08	1.41E-09	0.00E+00	3.31E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	1.57E-08	1.56E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl Acrylate	140-88-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	100-41-4	0.00E+00	1.45E-07	2.13E-07	1.17E-07	1.18E-07	2.43E-07	4.32E-06	1.11E-07	7.36E-08	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	0.00E+00	9.29E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexane	110-54-3	8.24E-06	1.08E-06	1.58E-06	1.56E-06	5.91E-06	1.49E-06	1.08E-05	1.28E-06	3.21E-06	1.66E-06
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	8.10E-07	2.62E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isooctane	540-84-1	8.95E-08	7.69E-07	2.87E-07	9.60E-08	1.03E-07	1.59E-07	2.11E-07	2.46E-07	3.86E-07	3.19E-07
Isophorone	78-59-1	0.00E+00	6.63E-07	0.00E+00	5.93E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead (Pb) Compounds	PB	6.35E-09	3.24E-10	1.25E-08	3.42E-09	2.03E-08	0.00E+00	1.03E-08	0.00E+00	0.00E+00	8.16E-09
m-Xylene + p-Xylene	MPXYL	2.62E-07	5.79E-07	7.11E-07	5.15E-07	4.11E-07	6.24E-07	1.44E-05	4.35E-07	4.82E-07	1.08E-06
Methylene Chloride	75-09-2	1.10E-06	9.51E-07	3.86E-05	1.86E-06	4.18E-07	2.49E-06	1.14E-06	4.81E-07	6.98E-07	9.04E-06
N-Nitrosodimethylamine	62-75-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	91-20-3	2.50E-08	3.33E-08	3.08E-07	1.73E-08	2.52E-07	5.11E-08	4.32E-08	2.72E-08	2.79E-08	8.18E-09
Nickel (Ni) Compounds	NI	4.92E-08	0.00E+00	9.53E-08	4.09E-08	2.47E-08	0.00E+00	0.00E+00	3.38E-08	0.00E+00	2.40E-08
Nitrobenzene	98-95-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Toluidine	95-53-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.23E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	9.60E-08	3.89E-07	3.20E-07	3.77E-07	1.52E-07	9.51E-07	7.73E-06	1.55E-07	1.66E-07	3.91E-07
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	7.21E-08	4.90E-08	2.77E-07	1.47E-08	7.61E-07	4.43E-08	2.39E-08	3.19E-08	5.95E-08	1.21E-08
Propanal	123-38-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	100-42-5	0.00E+00	0.00E+00	0.00E+00	4.44E-08	0.00E+00	4.25E-06	0.00E+00	4.12E-08	1.63E-07	2.18E-07
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.25E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	0.00E+00	4.10E-06	9.65E-08	6.59E-08	0.00E+00	1.01E-07	0.00E+00	7.75E-08	1.13E-07	1.22E-07
Toluene	108-88-3	1.65E-06	2.06E-06	2.11E-06	5.99E-07	1.73E-06	5.45E-07	1.05E-06	1.32E-06	2.26E-06	1.84E-06
Trichloroethene	79-01-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Acetate	108-05-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VOC	VOC	6.06E-05	5.02E-05	9.70E-05	5.11E-05	2.14E-04	9.58E-05	1.21E-04	7.32E-05	5.65E-05	2.82E-04

EMISSION FACTORS FOR MIXING

RECIPES 11-16

		EPA AP-42 Recipe Number					
Analyte Name	**Pollutant**	**11**	**12**	**13**	**14**	**15**	**16**
Total Method 25A Organics	TOG	3.28E-05	1.54E-05	2.28E-04	2.30E-04	9.39E-06	8.16E-05
Total Speciated Organics	TSO	3.52E-05	3.28E-05	1.54E-05	2.28E-04	2.30E-04	9.39E-06
Total Organic HAPs	TOHAP	1.14E-05	3.52E-05	6.69E-05	1.53E-04	1.52E-04	6.12E-05
Total Metal HAPs	TMHAP	1.82E-09	1.14E-05	5.55E-05	1.61E-05	4.23E-05	5.56E-05
Total HAPs	THAP	1.14E-05	1.82E-09	2.86E-08	4.85E-08	1.28E-08	2.54E-08
Total Particulate Matter	TPM	7.83E-05	1.14E-05	5.55E-05	1.61E-05	4.24E-05	5.56E-05
1,1,1-Trichloroethane	71-55-6	0.00E+00	7.83E-05	1.83E-04	2.46E-04	1.30E-04	1.42E-04
1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	2.94E-08	5.32E-08	3.61E-08	1.83E-08
1,3-Butadiene	106-99-0	3.82E-07	0.00E+00	0.00E+00	0.00E+00	2.19E-07	1.39E-08
1,4-Dichlorobenzene	106-46-7	1.50E-09	3.82E-07	8.57E-08	1.12E-07	2.39E-07	6.17E-08
2,4-Dinitrophenol	51-28-5	0.00E+00	1.50E-09	3.30E-09	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	8.64E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Chloroacetophenone	532-27-4	0.00E+00	8.64E-08	8.20E-07	3.22E-07	3.10E-07	8.78E-08
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-Pentanone	108-10-1	6.79E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	100-02-7	0.00E+00	6.79E-08	0.00E+00	9.87E-08	8.26E-07	4.90E-08
Acetaldehyde	75-07-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde + Isobutane	ACETISO	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.12E-07
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	2.29E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acrolein	107-02-8	0.00E+00	2.29E-07	3.45E-07	5.21E-08	1.70E-08	1.10E-08
Acrylonitrile	107-13-1	0.00E+00	0.00E+00	0.00E+00	7.10E-07	8.26E-07	0.00E+00
Aniline	62-53-3	2.39E-08	0.00E+00	0.00E+00	9.54E-07	1.17E-05	0.00E+00
Benzene	71-43-2	0.00E+00	2.39E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	3.64E-08	6.61E-07	5.24E-07	1.74E-08
Biphenyl	92-52-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-08
bis(2-Ethylhexyl)phthalate	117-81-7	2.69E-07	0.00E+00	0.00E+00	0.00E+00	1.24E-09	0.00E+00
Bromoform	75-25-2	0.00E+00	2.69E-07	8.93E-09	7.40E-07	0.00E+00	4.60E-08
Bromomethane	74-83-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cadmium (Cd) Compounds	CD	1.27E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Disulfide	75-15-0	8.64E-06	1.27E-09	7.29E-10	5.94E-10	3.38E-09	1.66E-09
Carbon Tetrachloride	56-23-5	0.00E+00	8.64E-06	4.52E-05	8.32E-07	4.26E-06	1.54E-07
Carbonyl Sulfide	463-58-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.68E-05
Chloroethane	75-00-3	0.00E+00	0.00E+00	6.14E-06	5.85E-07	1.13E-05	2.73E-06
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloromethane	74-87-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E-08	6.51E-07
Chromium (Cr) Compounds	CR	0.00E+00	0.00E+00	2.31E-08	6.43E-08	3.61E-08	1.02E-07
Cumene	98-82-8	2.68E-09	0.00E+00	6.44E-09	6.58E-09	4.05E-09	1.96E-09
Di-n-butylphthalate	84-74-2	0.00E+00	2.68E-09	9.05E-08	9.86E-08	0.00E+00	2.92E-09
Dibenzofuran	132-64-9	0.00E+00	0.00E+00	5.94E-09	3.34E-07	8.95E-09	0.00E+00
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E-09	7.41E-10
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-08
Ethyl Acrylate	140-88-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-09	2.18E-09
Ethylbenzene	100-41-4	6.81E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	6.81E-08	5.74E-08	2.08E-07	6.12E-08	4.84E-08
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexane	110-54-3	2.84E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-06
Hydroquinone	123-31-9	0.00E+00	2.84E-07	4.68E-07	2.05E-06	6.78E-07	7.88E-07
Isooctane	540-84-1	7.33E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isophorone	78-59-1	0.00E+00	7.33E-08	2.47E-07	2.37E-07	2.60E-07	4.78E-08

EMISSION FACTORS FOR MIXING

RECIPES 11-16

		EPA AP-42 Recipe Number					
Analyte Name	**Pollutant**	**11**	**12**	**13**	**14**	**15**	**16**
Lead (Pb) Compounds	PB	5.51E-10	0.00E+00	7.10E-09	5.39E-09	2.27E-10	0.00E+00
m-Xylene + p-Xylene	MPXYL	1.51E-07	3.65E-07	7.96E-07	3.35E-07	3.07E-07	1.07E-07
Methylene Chloride	75-09-2	5.00E-07	6.51E-07	2.22E-07	1.68E-06	7.02E-07	5.00E-07
N-Nitrosodimethylamine	62-75-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.34E-09	0.00E+00
Naphthalene	91-20-3	8.87E-09	3.02E-08	1.14E-08	0.00E+00	2.78E-08	1.13E-08
Nickel (Ni) Compounds	NI	0.00E+00	2.15E-08	3.42E-08	0.00E+00	2.16E-08	0.00E+00
Nitrobenzene	98-95-3	2.02E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Toluidine	95-53-4	0.00E+00	8.24E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	1.33E-07	1.68E-07	3.55E-07	1.71E-07	8.07E-08	5.49E-08
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	4.53E-09	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	9.20E-09	2.72E-08	4.20E-08	5.33E-08	2.69E-08	4.56E-08
Propanal	123-38-6	0.00E+00	0.00E+00	3.33E-06	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	6.97E-06	0.00E+00	0.00E+00
Styrene	100-42-5	5.01E-08	0.00E+00	5.40E-08	6.50E-08	0.00E+00	0.00E+00
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	2.41E-08	7.88E-08	1.33E-07	1.42E-07	6.95E-07	0.00E+00
Toluene	108-88-3	3.92E-07	5.72E-07	2.79E-06	1.55E-06	3.16E-07	1.75E-07
Trichloroethene	79-01-6	0.00E+00	0.00E+00	2.22E-07	0.00E+00	0.00E+00	0.00E+00
Vinyl Acetate	108-05-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-08	0.00E+00
VOC	VOC	#VALUE!	-4.62E-05	4.46E-05	-1.78E-05	9.86E-05	-6.09E-05

EMISSION FACTORS FOR MIXING

RECIPES 17-23

		EPA AP-42 Recipe Number						
Analyte Name	**Pollutant**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Total Method 25A Organics	TOG	4.44E-04	6.50E-05	2.76E-05	7.52E-06	1.57E-04	1.23E-04	3.07E-05
Total Speciated Organics	TSO	2.99E-04	1.23E-04	1.98E-05	1.38E-05	1.34E-04	8.38E-05	3.54E-05
Total Organic HAPs	TOHAP	1.40E-04	4.66E-05	3.69E-06	6.66E-06	1.13E-05	2.98E-05	2.97E-05
Total Metal HAPs	TMHAP	7.67E-08	4.04E-08	2.90E-08	1.07E-08	1.70E-09	1.16E-08	5.15E-08
Total HAPs	THAP	1.40E-04	4.66E-05	3.71E-06	6.67E-06	1.13E-05	2.98E-05	2.97E-05
Total Particulate Matter	TPM	8.96E-05	1.92E-04	6.90E-05	7.84E-04	7.50E-05	4.50E-04	3.39E-04
1,1,1-Trichloroethane	71-55-6	6.03E-08	0.00E+00	1.14E-07	7.31E-07	1.04E-08	6.55E-08	0.00E+00
1,1-Dichloroethene	75-35-4	0.00E+00	8.80E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	0.00E+00	1.80E-07	5.79E-08	0.00E+00	0.00E+00	1.31E-07	1.43E-07
1,4-Dichlorobenzene	106-46-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	1.62E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	1.04E-06	1.26E-06	6.30E-08	1.30E-07	4.73E-07	4.37E-06	0.00E+00
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	0.00E+00	1.01E-09	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-Pentanone	108-10-1	1.65E-07	4.57E-06	0.00E+00	1.91E-07	2.76E-08	1.37E-05	0.00E+00
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	9.90E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde + Isobutane	ACETISO	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	4.63E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	1.45E-08	5.72E-08	2.48E-08	1.61E-07	1.76E-08	2.92E-08	9.02E-09
Acrolein	107-02-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.27E-07	3.00E-07	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	8.00E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aniline	62-53-3	5.13E-07	1.66E-07	0.00E+00	7.20E-09	0.00E+00	4.68E-07	2.23E-07
Benzene	71-43-2	0.00E+00	3.77E-08	1.42E-07	5.92E-08	0.00E+00	8.87E-08	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl	92-52-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.77E-09	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	2.40E-09	2.20E-08	1.31E-08	4.53E-08	1.31E-07	8.41E-09	6.74E-07
Bromoform	75-25-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bromomethane	74-83-9	0.00E+00	0.00E+00	5.62E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cadmium (Cd) Compounds	CD	2.65E-09	1.47E-09	6.06E-10	1.35E-09	6.27E-10	2.79E-09	1.04E-09
Carbon Disulfide	75-15-0	0.00E+00	3.54E-05	0.00E+00	2.60E-07	4.36E-08	9.56E-08	5.07E-07
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-07
Carbonyl Sulfide	463-58-1	0.00E+00	0.00E+00	1.69E-07	1.58E-06	3.52E-07	0.00E+00	2.88E-06
Chloroethane	75-00-3	2.01E-07	0.00E+00	0.00E+00	4.24E-07	0.00E+00	0.00E+00	0.00E+00
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-08	0.00E+00	0.00E+00

EMISSION FACTORS FOR MIXING

RECIPES 17-23

		EPA AP-42 Recipe Number						
Analyte Name	**Pollutant**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Chloromethane	74-87-3	8.86E-07	0.00E+00	1.48E-07	3.35E-07	3.93E-07	3.82E-08	0.00E+00
Chromium (Cr) Compounds	CR	4.20E-08	0.00E+00	0.00E+00	9.37E-09	1.08E-09	3.81E-09	2.11E-08
Cumene	98-82-8	9.43E-09	1.21E-07	1.06E-06	5.22E-09	2.80E-08	5.61E-08	1.99E-09
Di-n-butylphthalate	84-74-2	0.00E+00	8.27E-08	2.91E-08	2.17E-08	2.86E-07	3.57E-08	8.78E-08
Dibenzofuran	132-64-9	0.00E+00	0.00E+00	0.00E+00	9.63E-10	3.06E-10	0.00E+00	5.31E-10
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl Acrylate	140-88-5	4.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	100-41-4	0.00E+00	2.78E-07	3.24E-08	7.92E-08	0.00E+00	1.28E-07	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.06E-09
Hexane	110-54-3	1.13E-04	4.03E-07	2.37E-07	4.86E-07	2.53E-07	7.75E-07	6.22E-07
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isooctane	540-84-1	0.00E+00	7.47E-08	4.56E-08	6.90E-08	2.12E-07	7.95E-07	0.00E+00
Isophorone	78-59-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E-09	3.37E-07	0.00E+00
Lead (Pb) Compounds	PB	0.00E+00	0.00E+00	1.86E-09	0.00E+00	0.00E+00	4.97E-09	2.73E-10
m-Xylene + p-Xylene	MPXYL	4.76E-07	8.83E-07	1.01E-07	3.36E-07	1.42E-07	4.22E-07	1.18E-07
Methylene Chloride	75-09-2	1.65E-05	8.68E-07	3.74E-07	1.03E-06	2.82E-07	1.01E-06	1.10E-06
N-Nitrosodimethylamine	62-75-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	91-20-3	4.01E-08	3.30E-08	1.23E-08	1.71E-08	1.25E-08	5.52E-08	3.18E-08
Nickel (Ni) Compounds	NI	3.21E-08	3.89E-08	2.65E-08	0.00E+00	0.00E+00	0.00E+00	2.91E-08
Nitrobenzene	98-95-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Toluidine	95-53-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	5.09E-07	3.66E-07	4.81E-08	1.25E-07	1.59E-07	3.62E-07	0.00E+00
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	1.25E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	1.27E-06	5.63E-08	0.00E+00	1.84E-08	9.35E-09	6.87E-07	1.25E-08
Propanal	123-38-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	100-42-5	0.00E+00	5.45E-08	0.00E+00	0.00E+00	6.32E-08	1.48E-06	0.00E+00
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-06	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	0.00E+00	7.66E-08	2.81E-08	7.59E-08	0.00E+00	1.91E-06	0.00E+00
Toluene	108-88-3	1.04E-06	6.88E-07	4.34E-07	4.75E-07	1.38E-07	2.47E-06	2.31E-05
Trichloroethene	79-01-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Acetate	108-05-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VOC	VOC	4.27E-04	1.22E-04	2.71E-05	1.20E-05	1.57E-04	1.20E-04	3.43E-05

EMISSION FACTORS FOR MILLING
RECIPES 1-10

Analyte Name	Pollutant	EPA AP-42 Recipe Number									
		1	2	3	4	5	6	7	8	9	10
Total Method 25A Organics	TOG	8.99E-05	1.10E-04	1.13E-04	8.37E-05	3.14E-04	5.64E-05	1.78E-04	2.14E-05	4.25E-05	4.25E-04
Total Speciated Organics	TSO	2.63E-05	3.48E-05	4.31E-05	5.04E-05	3.21E-05	5.10E-05	4.61E-05	3.83E-05	2.98E-05	1.46E-04
Total Organic HAPs	TOHAP	1.09E-05	6.39E-06	2.06E-05	1.59E-05	2.17E-05	2.53E-05	2.17E-05	2.89E-05	7.90E-06	6.22E-05
Total HAPs	THAP	1.09E-05	6.39E-06	2.06E-05	1.59E-05	2.17E-05	2.53E-05	2.17E-05	2.89E-05	7.90E-06	6.22E-05
1,1,1-Trichloroethane	71-55-6	0.00E+00	3.32E-08	0.00E+00	0.00E+00	9.52E-08	0.00E+00	0.00E+00	1.39E-08	3.78E-08	6.96E-08
1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.19E-08	9.87E-08	0.00E+00
1,2-Dichloroethane	107-06-2	0.00E+00	4.06E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	5.07E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E-07	5.84E-08	8.79E-08	0.00E+00
1,4-Dichlorobenzene	106-46-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.90E-10	6.32E-10	9.44E-10	2.32E-09	0.00E+00	3.09E-10
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	3.07E-06	8.12E-07	7.61E-08	4.06E-07	7.93E-07	2.28E-07	7.26E-07	2.63E-07	2.55E-07	6.14E-07
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.83E-10
2-Methylphenol	95-48-7	0.00E+00	1.99E-08	0.00E+00	0.00E+00	6.72E-09	3.11E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Aminobiphenyl	92-67-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-pentanone	108-10-1	0.00E+00	1.57E-07	1.14E-06	9.12E-06	0.00E+00	1.59E-05	0.00E+00	6.58E-08	6.42E-08	2.15E-07
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	3.61E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde + Isobutane	ACISOB	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.17E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	1.20E-06	0.00E+00	2.80E-07	2.84E-08	9.60E-09	3.97E-08	6.40E-08	6.69E-09	7.64E-07	4.39E-08
Acrolein	107-02-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	1.29E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E-08	0.00E+00	0.00E+00
Aniline	62-53-3	0.00E+00	7.50E-08	5.32E-06	3.48E-06	0.00E+00	5.17E-08	0.00E+00	3.99E-09	2.66E-09	2.44E-09
Benzene	71-43-2	2.83E-08	5.99E-08	1.76E-08	5.39E-08	1.55E-07	0.00E+00	4.73E-08	0.00E+00	2.54E-08	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzyl Chloride	100-44-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl	92-52-4	0.00E+00	3.55E-08	3.65E-08	4.16E-08	0.00E+00	6.09E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	2.03E-08	3.25E-08	8.63E-07	1.09E-07	1.19E-08	9.27E-08	1.73E-08	0.00E+00	3.66E-09	0.00E+00
Bromoform	75-25-2	1.44E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bromomethane	74-83-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Disulfide	75-15-0	0.00E+00	5.90E-07	9.67E-08	3.76E-07	9.52E-08	1.99E-06	0.00E+00	1.45E-05	3.46E-07	5.32E-05
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbonyl Sulfide	463-58-1	0.00E+00	8.38E-07	0.00E+00	0.00E+00	2.77E-07	8.26E-07	0.00E+00	1.16E-05	5.95E-07	0.00E+00
Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloromethane	74-87-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-07	0.00E+00	1.94E-08	1.65E-08	4.81E-08

EMISSION FACTORS FOR MILLING
RECIPES 1-10

Analyte Name	Pollutant	EPA AP-42 Recipe Number									
		1	2	3	4	5	6	7	8	9	10
Cumene	98-82-8	1.51E-09	0.00E+00	1.47E-08	1.44E-09	7.29E-10	6.27E-09	4.31E-08	5.00E-08	1.65E-06	4.57E-07
Di-n-butylphthalate	84-74-2	4.15E-08	2.49E-09	1.37E-07	1.70E-07	0.00E+00	7.76E-09	0.00E+00	3.87E-09	6.81E-10	7.64E-09
Dibenzofuran	132-64-9	0.00E+00	1.73E-08	0.00E+00	1.06E-08	0.00E+00	1.71E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	7.21E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl Acrylate	140-88-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	100-41-4	0.00E+00	1.12E-07	0.00E+00	7.78E-08	6.13E-08	1.26E-07	2.24E-06	5.74E-08	3.82E-08	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexane	110-54-3	4.27E-06	7.16E-07	1.21E-07	2.48E-07	3.07E-06	7.71E-07	5.59E-06	6.62E-07	1.67E-06	8.58E-07
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isooctane	540-84-1	4.64E-08	0.00E+00	2.98E-08	3.50E-08	5.34E-08	8.26E-08	1.10E-07	1.28E-07	2.00E-07	1.65E-07
Isophorone	78-59-1	0.00E+00	6.50E-09	1.12E-05	3.07E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
m-Xylene + p-Xylene	MPXYL	1.36E-07	6.11E-07	3.50E-08	2.56E-07	2.13E-07	3.23E-07	7.47E-06	2.26E-07	2.50E-07	5.60E-07
Methylene Chloride	75-09-2	5.71E-07	1.01E-06	4.13E-07	6.80E-07	2.17E-07	1.29E-06	5.91E-07	2.49E-07	3.62E-07	4.69E-06
N-Nitrosodimethylamine	62-75-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	91-20-3	1.30E-08	1.30E-07	3.73E-07	1.66E-07	1.31E-07	2.65E-08	2.24E-08	1.41E-08	1.45E-08	4.24E-09
Nitrobenzene	98-95-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Toluidine	95-53-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	4.98E-08	3.46E-07	0.00E+00	1.37E-07	7.88E-08	4.93E-07	4.01E-06	8.03E-08	8.63E-08	2.03E-07
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	3.74E-08	4.65E-08	0.00E+00	0.00E+00	3.94E-07	2.30E-08	1.24E-08	1.65E-08	3.08E-08	6.25E-09
Propanal	123-38-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	100-42-5	0.00E+00	1.55E-07	0.00E+00	0.00E+00	0.00E+00	2.20E-06	0.00E+00	2.14E-08	8.47E-08	1.13E-07
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	0.00E+00	8.39E-08	0.00E+00	0.00E+00	0.00E+00	5.26E-08	0.00E+00	4.02E-08	5.84E-08	6.33E-08
Toluene	108-88-3	8.56E-07	3.28E-07	3.71E-07	1.95E-07	8.98E-07	2.83E-07	5.46E-07	6.83E-07	1.17E-06	9.56E-07
Trichloroethene	79-01-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Acetate	108-05-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VOC	VOC	8.93E-05	1.09E-04	1.13E-04	8.30E-05	3.14E-04	5.51E-05	1.77E-04	3.80E-05	4.20E-05	4.20E-04

EMISSION FACTORS FOR MILLING
RECIPES 11-16

		EPA AP-42 Recipe Number					
Analyte Name	**Pollutant**	**11**	**12**	**13**	**14**	**15**	**16**
Total Method 25A Organics	TOG	4.79E-05	4.97E-07	3.32E-04	3.35E-04	1.37E-05	1.19E-04
Total Speciated Organics	TSO	1.83E-05	9.31E-07	7.95E-05	7.88E-05	3.17E-05	1.58E-05
Total Organic HAPs	TOHAP	5.92E-06	3.00E-07	8.33E-06	2.20E-05	2.88E-05	2.44E-06
Total HAPs	THAP	5.92E-06	3.00E-07	8.33E-06	2.20E-05	2.88E-05	2.44E-06
1,1,1-Trichloroethane	71-55-6	0.00E+00	0.00E+00	2.76E-08	1.87E-08	9.48E-09	9.10E-09
1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	1.14E-07	7.20E-09	0.00E+00
1,2-Dichloroethane	107-06-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	1.98E-07	0.00E+00	5.82E-08	1.24E-07	3.20E-08	0.00E+00
1,4-Dichlorobenzene	106-46-7	7.79E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	4.48E-08	0.00E+00	1.67E-07	1.61E-07	4.55E-08	2.05E-08
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylphenol	95-48-7	0.00E+00	2.31E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Aminobiphenyl	92-67-1	0.00E+00	6.99E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-pentanone	108-10-1	3.52E-08	2.21E-09	5.12E-08	4.28E-07	2.54E-08	4.48E-08
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-07	0.00E+00
Acetaldehyde + Isobutane	ACISOB	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	1.19E-07	3.06E-10	2.70E-08	8.82E-09	5.70E-09	5.74E-09
Acrolein	107-02-8	0.00E+00	0.00E+00	3.68E-07	4.28E-07	0.00E+00	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	0.00E+00	4.94E-07	6.09E-06	0.00E+00	0.00E+00
Aniline	62-53-3	1.24E-08	2.30E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	71-43-2	0.00E+00	3.47E-10	3.43E-07	2.72E-07	9.04E-09	1.35E-08
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.34E-09	0.00E+00
Benzyl Chloride	100-44-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl	92-52-4	0.00E+00	9.50E-11	0.00E+00	6.41E-10	0.00E+00	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	1.40E-07	1.41E-09	3.84E-07	0.00E+00	2.38E-08	1.84E-08
Bromoform	75-25-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bromomethane	74-83-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Disulfide	75-15-0	4.48E-06	1.76E-07	4.31E-07	2.21E-06	7.96E-08	2.34E-08
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.43E-05	0.00E+00
Carbonyl Sulfide	463-58-1	0.00E+00	0.00E+00	3.04E-07	5.87E-06	1.41E-06	0.00E+00
Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.82E-07
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	1.27E-08	3.37E-07	6.38E-09
Chloromethane	74-87-3	0.00E+00	0.00E+00	3.33E-08	1.87E-08	5.31E-08	7.47E-09
Cumene	98-82-8	1.39E-09	2.48E-11	5.11E-08	0.00E+00	1.52E-09	0.00E+00
Di-n-butylphthalate	84-74-2	0.00E+00	2.22E-10	1.73E-07	4.64E-09	0.00E+00	1.91E-09
Dibenzofuran	132-64-9	0.00E+00	2.89E-11	0.00E+00	1.25E-09	3.84E-10	0.00E+00
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.49E-09	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	0.00E+00	1.56E-09	1.13E-09	1.62E-09
Ethyl Acrylate	140-88-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	100-41-4	3.53E-08	2.61E-10	1.08E-07	3.18E-08	2.51E-08	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.39E-07	0.00E+00
Hexane	110-54-3	1.47E-07	2.94E-08	1.06E-06	3.52E-07	4.09E-07	9.41E-07
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isooctane	540-84-1	3.80E-08	1.63E-09	1.23E-07	1.35E-07	2.48E-08	0.00E+00
Isophorone	78-59-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
m-Xylene + p-Xylene	MPXYL	7.81E-08	1.14E-09	4.13E-07	1.74E-07	1.59E-07	5.55E-08
Methylene Chloride	75-09-2	2.59E-07	4.66E-08	1.15E-07	8.69E-07	3.64E-07	2.59E-07
N-Nitrosodimethylamine	62-75-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-09	0.00E+00

EMISSION FACTORS FOR MILLING
RECIPES 11-16

		EPA AP-42 Recipe Number					
Analyte Name	**Pollutant**	**11**	**12**	**13**	**14**	**15**	**16**
Naphthalene	91-20-3	4.60E-09	2.87E-10	5.93E-09	0.00E+00	1.44E-08	5.84E-09
Nitrobenzene	98-95-3	1.05E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Toluidine	95-53-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	6.89E-08	1.68E-10	1.84E-07	8.86E-08	4.19E-08	2.85E-08
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	2.35E-09	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	4.77E-09	6.99E-10	2.18E-08	2.76E-08	1.40E-08	2.37E-08
Propanal	123-38-6	0.00E+00	0.00E+00	1.72E-06	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	3.61E-06	0.00E+00	0.00E+00
Styrene	100-42-5	2.60E-08	0.00E+00	2.80E-08	3.37E-08	0.00E+00	0.00E+00
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	1.25E-08	0.00E+00	6.90E-08	7.36E-08	3.60E-07	0.00E+00
Toluene	108-88-3	2.03E-07	3.86E-08	1.45E-06	8.06E-07	1.64E-07	9.07E-08
Trichloroethene	79-01-6	0.00E+00	0.00E+00	1.15E-07	0.00E+00	0.00E+00	0.00E+00
Vinyl Acetate	108-05-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.83E-09	0.00E+00
VOC	VOC	4.76E-05	8.84E-07	3.32E-04	3.34E-04	3.10E-05	1.19E-04

EMISSION FACTORS FOR MILLING

RECIPES 17-23

		EPA AP-42 Recipe Number						
Analyte Name	**Pollutant**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Total Method 25A Organics	TOG	6.48E-04	9.48E-05	4.03E-05	1.10E-05	2.28E-04	1.79E-04	4.47E-05
Total Speciated Organics	TSO	1.55E-04	6.37E-05	1.03E-05	7.17E-06	6.94E-05	4.34E-05	1.84E-05
Total Organic HAPs	TOHAP	7.28E-05	2.42E-05	1.91E-06	3.45E-06	5.84E-06	1.54E-05	1.54E-05
Total HAPs	THAP	7.28E-05	2.42E-05	1.91E-06	3.45E-06	5.84E-06	1.54E-05	1.54E-05
1,1,1-Trichloroethane	71-55-6	3.13E-08	0.00E+00	5.91E-08	3.79E-07	5.41E-09	3.40E-08	0.00E+00
1,1-Dichloroethene	75-35-4	0.00E+00	4.56E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,2-Dichloroethane	107-06-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	0.00E+00	9.33E-08	3.00E-08	0.00E+00	0.00E+00	6.77E-08	7.40E-08
1,4-Dichlorobenzene	106-46-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	8.39E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	5.39E-07	6.52E-07	3.27E-08	6.73E-08	2.45E-07	2.27E-06	0.00E+00
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	0.00E+00	5.26E-10	0.00E+00	0.00E+00	0.00E+00
4-Aminobiphenyl	92-67-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-pentanone	108-10-1	8.58E-08	2.37E-06	0.00E+00	9.92E-08	1.43E-08	7.08E-06	0.00E+00
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	5.13E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde + Isobutane	ACISOB	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	2.40E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	7.53E-09	2.96E-08	1.29E-08	8.33E-08	9.11E-09	1.51E-08	4.68E-09
Acrolein	107-02-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-07	1.56E-07	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	4.15E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aniline	62-53-3	2.66E-07	8.62E-08	0.00E+00	3.73E-09	0.00E+00	2.43E-07	1.15E-07
Benzene	71-43-2	0.00E+00	1.96E-08	7.34E-08	3.07E-08	0.00E+00	4.60E-08	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzyl Chloride	100-44-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.07E-09	0.00E+00
Biphenyl	92-52-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	1.25E-09	1.14E-08	6.78E-09	2.35E-08	6.81E-08	4.36E-09	3.49E-07
Bromoform	75-25-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bromomethane	74-83-9	0.00E+00	0.00E+00	2.92E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Disulfide	75-15-0	0.00E+00	1.84E-05	0.00E+00	1.35E-07	2.26E-08	4.96E-08	2.63E-07
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-07
Carbonyl Sulfide	463-58-1	0.00E+00	0.00E+00	8.75E-08	8.19E-07	1.82E-07	0.00E+00	1.49E-06
Chloroethane	75-00-3	1.04E-07	0.00E+00	0.00E+00	2.20E-07	0.00E+00	0.00E+00	0.00E+00
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.92E-09	0.00E+00	0.00E+00

EMISSION FACTORS FOR MILLING

RECIPES 17-23

		EPA AP-42 Recipe Number						
Analyte Name	**Pollutant**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Chloromethane	74-87-3	4.60E-07	0.00E+00	7.69E-08	1.74E-07	2.04E-07	1.98E-08	0.00E+00
Cumene	98-82-8	4.89E-09	6.25E-08	5.48E-07	2.71E-09	1.45E-08	2.91E-08	1.03E-09
Di-n-butylphthalate	84-74-2	0.00E+00	4.29E-08	1.51E-08	1.13E-08	1.48E-07	1.85E-08	4.55E-08
Dibenzofuran	132-64-9	0.00E+00	0.00E+00	0.00E+00	4.99E-10	1.59E-10	0.00E+00	2.75E-10
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl Acrylate	140-88-5	2.45E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	100-41-4	0.00E+00	1.44E-07	1.68E-08	4.11E-08	0.00E+00	6.64E-08	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.14E-09
Hexane	110-54-3	5.85E-05	2.09E-07	1.23E-07	2.52E-07	1.31E-07	4.02E-07	3.22E-07
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isooctane	540-84-1	0.00E+00	3.87E-08	2.37E-08	3.58E-08	1.10E-07	4.12E-07	0.00E+00
Isophorone	78-59-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-09	1.75E-07	0.00E+00
m-Xylene + p-Xylene	MPXYL	2.47E-07	4.58E-07	5.21E-08	1.74E-07	7.38E-08	2.19E-07	6.11E-08
Methylene Chloride	75-09-2	8.58E-06	4.50E-07	1.94E-07	5.32E-07	1.46E-07	5.24E-07	5.68E-07
N-Nitrosodimethylamine	62-75-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	91-20-3	2.08E-08	1.71E-08	6.38E-09	8.86E-09	6.48E-09	2.86E-08	1.65E-08
Nitrobenzene	98-95-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Toluidine	95-53-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	2.64E-07	1.90E-07	2.49E-08	6.46E-08	8.26E-08	1.88E-07	0.00E+00
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	6.49E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	6.58E-07	2.92E-08	0.00E+00	9.56E-09	4.85E-09	3.56E-07	6.47E-09
Propanal	123-38-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	100-42-5	0.00E+00	2.82E-08	0.00E+00	0.00E+00	3.28E-08	7.67E-07	0.00E+00
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.14E-06	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	0.00E+00	3.97E-08	1.46E-08	3.93E-08	0.00E+00	9.91E-07	0.00E+00
Toluene	108-88-3	5.37E-07	3.57E-07	2.25E-07	2.46E-07	7.15E-08	1.28E-06	1.20E-05
Trichloroethene	79-01-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Acetate	108-05-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VOC	VOC	6.39E-04	9.43E-05	4.00E-05	1.00E-05	2.28E-04	1.77E-04	4.41E-05

EMISSION FACTORS FOR CALENDERING
RECIPES 1-10

Analyte Name	Pollutant	EPA AP-42 Recipe Number									
		1	2	3	4	5	6	7	8	9	10
Total Method 25A Organics	TOG	5.33E-05	5.59E-05	1.17E-04	3.35E-05	1.86E-04	3.34E-05	1.05E-04	1.27E-05	2.52E-05	2.52E-04
Total Speciated Organics	TSO	3.68E-05	7.66E-05	6.47E-05	3.85E-05	4.48E-05	7.14E-05	6.45E-05	5.35E-05	4.16E-05	2.04E-04
Total Organic HAPs	TOHAP	1.52E-05	1.27E-05	4.28E-05	1.84E-05	3.03E-05	3.53E-05	3.04E-05	4.05E-05	1.11E-05	8.70E-05
Acetaldehyde	75-07-0	5.04E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde + Isobutane	ACISOB	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	1.68E-06	4.94E-07	3.72E-08	2.72E-09	1.34E-08	5.56E-08	8.95E-08	9.35E-09	1.07E-06	6.14E-08
Acrolein	107-02-8	0.00E+00	7.82E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.94E-08	0.00E+00	0.00E+00
4-Aminobiphenyl	92-67-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aniline	62-53-3	0.00E+00	9.44E-08	0.00E+00	3.12E-07	0.00E+00	7.23E-08	0.00E+00	5.59E-09	3.72E-09	3.42E-09
Benzene	71-43-2	3.96E-08	4.54E-08	8.21E-08	8.30E-08	2.16E-07	0.00E+00	6.62E-08	0.00E+00	3.55E-08	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl	92-52-4	0.00E+00	1.78E-08	4.08E-08	3.93E-09	0.00E+00	8.52E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bis(2-ethylhexyl)phthalate	117-81-7	2.83E-08	7.34E-07	8.63E-08	0.00E+00	1.66E-08	1.30E-07	2.42E-08	0.00E+00	5.12E-09	0.00E+00
Bromoform	75-25-2	2.02E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methyl bromide	74-83-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	7.09E-08	0.00E+00	0.00E+00	1.57E-07	0.00E+00	0.00E+00	3.39E-07	8.17E-08	1.23E-07	0.00E+00
Carbon disulfide	75-15-0	0.00E+00	2.41E-06	0.00E+00	1.44E-07	1.33E-07	2.78E-06	0.00E+00	2.03E-05	4.83E-07	7.43E-05
Carbon tetrachloride	56-23-5	0.00E+00	0.00E+00	8.63E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbonyl sulfide	463-58-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E-07	1.16E-06	0.00E+00	1.63E-05	8.32E-07	0.00E+00
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.96E-10
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Cresol	95-48-7	0.00E+00	0.00E+00	6.26E-08	6.05E-10	9.39E-09	4.35E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cumene	98-82-8	2.11E-09	1.29E-06	2.90E-09	1.21E-09	1.02E-09	8.77E-09	6.02E-08	7.00E-08	2.30E-06	6.39E-07
Dibenzofuran	132-64-9	0.00E+00	0.00E+00	2.48E-08	1.02E-09	0.00E+00	2.40E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dibutylphthalate	84-74-2	5.80E-08	0.00E+00	3.98E-08	0.00E+00	0.00E+00	1.09E-08	0.00E+00	5.41E-09	9.52E-10	1.07E-08
1,4-Dichlorobenzene	106-46-7	0.00E+00	3.49E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	1.14E-08	1.13E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl acrylate	140-88-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl benzene	100-41-4	0.00E+00	1.57E-07	1.55E-07	8.46E-08	8.57E-08	1.76E-07	3.14E-06	8.02E-08	5.34E-08	0.00E+00
Ethyl chloride	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylene dichloride	107-06-2	0.00E+00	1.22E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	0.00E+00	6.74E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

EMISSION FACTORS FOR CALENDERING
RECIPES 1-10

Analyte Name	Pollutant	EPA AP-42 Recipe Number									
		1	2	3	4	5	6	7	8	9	10
Hexane	110-54-3	5.98E-06	5.59E-07	1.15E-06	1.13E-06	4.29E-06	1.08E-06	7.82E-06	9.26E-07	2.33E-06	1.20E-06
Hydroquinone	123-31-9	0.00E+00	3.73E-08	0.00E+00	5.87E-07	1.90E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isophorone	78-59-1	0.00E+00	1.30E-07	0.00E+00	4.30E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methyl chloride	74-87-3	0.00E+00	2.18E-08	0.00E+00	2.16E-08	0.00E+00	2.36E-07	0.00E+00	2.71E-08	2.30E-08	6.73E-08
Methyl chloroform	71-55-6	0.00E+00	3.89E-08	2.31E-07	3.07E-08	1.33E-07	0.00E+00	0.00E+00	1.94E-08	5.29E-08	9.73E-08
Methyl ethyl ketone	78-93-3	4.29E-06	2.61E-07	6.53E-07	1.98E-06	1.11E-06	3.19E-07	1.02E-06	3.68E-07	3.57E-07	8.58E-07
Methyl isobutyl ketone	108-10-1	0.00E+00	6.42E-07	9.10E-06	1.08E-05	0.00E+00	2.22E-05	0.00E+00	9.20E-08	8.97E-08	3.01E-07
Methyl tert butyl ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methylene chloride	75-09-2	7.98E-07	4.71E-08	2.80E-05	1.35E-06	3.03E-07	1.80E-06	8.26E-07	3.49E-07	5.06E-07	6.56E-06
Naphthalene	91-20-3	1.81E-08	1.21E-07	2.24E-07	1.25E-08	1.82E-07	3.70E-08	3.13E-08	1.97E-08	2.02E-08	5.93E-09
Nitrobenzene	98-95-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrobiphenyl	92-93-3	0.00E+00	2.04E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	5.23E-08	1.49E-07	2.01E-07	1.07E-08	5.52E-07	3.21E-08	1.74E-08	2.31E-08	4.31E-08	8.74E-09
Propionaldehyde	123-38-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Propylene oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	100-42-5	0.00E+00	4.86E-07	0.00E+00	3.22E-08	0.00E+00	3.08E-06	0.00E+00	2.99E-08	1.18E-07	1.58E-07
Tetrachloroethylene	127-18-4	0.00E+00	0.00E+00	7.00E-08	4.78E-08	0.00E+00	7.36E-08	0.00E+00	5.62E-08	8.17E-08	8.85E-08
Toluene	108-88-3	1.20E-06	3.92E-06	1.53E-06	4.34E-07	1.26E-06	3.95E-07	7.63E-07	9.55E-07	1.64E-06	1.34E-06
o-Toluidine	95-53-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Trichloroethylene	79-01-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,2,4-Trimethylpentane	540-84-1	6.49E-08	2.69E-07	2.08E-07	6.96E-08	7.47E-08	1.15E-07	1.53E-07	1.78E-07	2.80E-07	2.31E-07
Vinyl acetate	108-05-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinylidene chloride	75-35-4	0.00E+00	0.00E+00	0.00E+00	3.97E-07	0.00E+00	0.00E+00	0.00E+00	7.26E-08	1.38E-07	0.00E+00
o-Xylene	95-47-6	6.96E-08	2.84E-07	2.32E-07	2.74E-07	1.10E-07	6.90E-07	5.61E-06	1.12E-07	1.21E-07	2.83E-07
m-Xylene + p-Xylene	MPXYL	1.90E-07	2.86E-07	5.15E-07	3.73E-07	2.98E-07	4.52E-07	1.05E-05	3.15E-07	3.49E-07	7.83E-07
VOC	VOC	3.60E-05	7.65E-05	3.64E-05	3.71E-05	4.44E-05	6.95E-05	6.36E-05	5.31E-05	4.10E-05	1.97E-04

EMISSION FACTORS FOR CALENDERING
RECIPES 11-16

		EPA AP-42 Recipe Number					
Analyte Name	**Pollutant**	**11**	**12**	**13**	**14**	**14**	**16**
Total Method 25A Organics	TOG	2.84E-05	4.62E-06	1.97E-04	1.98E-04	8.12E-06	7.06E-05
Total Speciated Organics	TSO	2.55E-05	4.47E-06	1.11E-04	1.10E-04	4.44E-05	2.20E-05
Total Organic HAPs	TOHAP	8.28E-06	2.81E-06	1.16E-05	3.07E-05	4.03E-05	3.41E-06
Acetaldehyde	75-07-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.71E-07	0.00E+00
Acetaldehyde + Isobutane	ACISOB	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	1.66E-07	1.17E-09	3.78E-08	1.23E-08	7.97E-09	8.03E-09
Acrolein	107-02-8	0.00E+00	0.00E+00	5.15E-07	5.99E-07	0.00E+00	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	0.00E+00	6.91E-07	8.51E-06	0.00E+00	0.00E+00
4-Aminobiphenyl	92-67-1	0.00E+00	1.27E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aniline	62-53-3	1.73E-08	9.64E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	71-43-2	0.00E+00	1.33E-09	4.79E-07	3.80E-07	1.26E-08	1.89E-08
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-08	0.00E+00
Biphenyl	92-52-4	0.00E+00	8.88E-10	0.00E+00	8.96E-10	0.00E+00	0.00E+00
Bis(2-ethylhexyl)phthalate	117-81-7	1.95E-07	9.35E-10	5.36E-07	0.00E+00	3.33E-08	2.57E-08
Bromoform	75-25-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methyl bromide	74-83-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	2.77E-07	0.00E+00	8.14E-08	1.74E-07	4.47E-08	0.00E+00
Carbon disulfide	75-15-0	6.27E-06	2.61E-06	6.03E-07	3.09E-06	1.11E-07	3.27E-08
Carbon tetrachloride	56-23-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.39E-05	0.00E+00
Carbonyl sulfide	463-58-1	0.00E+00	4.19E-08	4.25E-07	8.20E-06	1.98E-06	0.00E+00
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	1.78E-08	4.72E-07	8.92E-09
o-Cresol	95-48-7	0.00E+00	1.86E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cumene	98-82-8	1.94E-09	7.05E-10	7.15E-08	0.00E+00	2.12E-09	0.00E+00
Dibenzofuran	132-64-9	0.00E+00	1.95E-10	0.00E+00	1.75E-09	5.37E-10	0.00E+00
Dibutylphthalate	84-74-2	0.00E+00	2.62E-10	2.42E-07	6.49E-09	0.00E+00	2.67E-09
1,4-Dichlorobenzene	106-46-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-08	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	0.00E+00	2.18E-09	1.58E-09	2.26E-09
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl acrylate	140-88-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl benzene	100-41-4	4.94E-08	2.06E-09	1.51E-07	4.44E-08	3.51E-08	0.00E+00
Ethyl chloride	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-06
Ethylene dichloride	107-06-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.93E-07	0.00E+00
Hexane	110-54-3	2.06E-07	3.83E-08	1.48E-06	4.92E-07	5.71E-07	1.32E-06
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isophorone	78-59-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methyl chloride	74-87-3	0.00E+00	0.00E+00	4.66E-08	2.62E-08	7.42E-08	1.04E-08
Methyl chloroform	71-55-6	0.00E+00	0.00E+00	3.86E-08	2.62E-08	1.33E-08	1.27E-08
Methyl ethyl ketone	78-93-3	6.27E-08	0.00E+00	2.33E-07	2.24E-07	6.36E-08	2.87E-08
Methyl isobutyl ketone	108-10-1	4.92E-08	0.00E+00	7.16E-08	5.99E-07	3.55E-08	6.26E-08
Methyl tert butyl ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methylene chloride	75-09-2	3.62E-07	3.25E-08	1.61E-07	1.22E-06	5.09E-07	3.63E-07
Naphthalene	91-20-3	6.43E-09	2.21E-09	8.29E-09	0.00E+00	2.01E-08	8.16E-09
Nitrobenzene	98-95-3	1.46E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrobiphenyl	92-93-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

EMISSION FACTORS FOR CALENDERING
RECIPES 11-16

		EPA AP-42 Recipe Number					
Analyte Name	**Pollutant**	**11**	**12**	**13**	**14**	**14**	**16**
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	3.28E-09	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	6.67E-09	0.00E+00	3.04E-08	3.86E-08	1.95E-08	3.31E-08
Propionaldehyde	123-38-6	0.00E+00	0.00E+00	2.41E-06	0.00E+00	0.00E+00	0.00E+00
Propylene oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	5.05E-06	0.00E+00	0.00E+00
Styrene	100-42-5	3.64E-08	7.73E-10	3.92E-08	4.71E-08	0.00E+00	0.00E+00
Tetrachloroethylene	127-18-4	1.75E-08	0.00E+00	9.65E-08	1.03E-07	5.04E-07	0.00E+00
Toluene	108-88-3	2.84E-07	5.73E-08	2.03E-06	1.13E-06	2.29E-07	1.27E-07
o-Toluidine	95-53-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Trichloroethylene	79-01-6	0.00E+00	0.00E+00	1.61E-07	0.00E+00	0.00E+00	0.00E+00
2,2,4-Trimethylpentane	540-84-1	5.32E-08	2.27E-09	1.72E-07	1.89E-07	3.46E-08	0.00E+00
Vinyl acetate	108-05-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.54E-09	0.00E+00
Vinylidene chloride	75-35-4	0.00E+00	0.00E+00	0.00E+00	1.59E-07	1.01E-08	0.00E+00
o-Xylene	95-47-6	9.63E-08	2.45E-09	2.57E-07	1.24E-07	5.85E-08	3.98E-08
m-Xylene + p-Xylene	MPXYL	1.09E-07	6.09E-09	5.77E-07	2.43E-07	2.22E-07	7.76E-08
VOC	VOC	2.80E-05	4.59E-06	1.97E-04	1.97E-04	4.34E-05	7.02E-05

EMISSION FACTORS FOR CALENDERING
RECIPES 17-23

		EPA AP-42 Recipe Number						
Analyte Name	**Pollutant**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Total Method 25A Organics	TOG	3.84E-04	5.62E-05	2.39E-05	6.50E-06	1.35E-04	1.06E-04	2.65E-05
Total Speciated Organics	TSO	2.17E-04	8.90E-05	1.44E-05	1.00E-05	9.71E-05	6.07E-05	2.57E-05
Total Organic HAPs	TOHAP	1.02E-04	3.38E-05	2.67E-06	4.83E-06	8.17E-06	2.16E-05	2.15E-05
Acetaldehyde	75-07-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde + Isobutane	ACISOB	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	3.36E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	1.05E-08	4.15E-08	1.80E-08	1.16E-07	1.27E-08	2.12E-08	6.54E-09
Acrolein	107-02-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-07	2.18E-07	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	5.80E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Aminobiphenyl	92-67-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aniline	62-53-3	3.72E-07	1.20E-07	0.00E+00	5.22E-09	0.00E+00	3.40E-07	1.61E-07
Benzene	71-43-2	0.00E+00	2.74E-08	1.03E-07	4.29E-08	0.00E+00	6.43E-08	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl	92-52-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.08E-09	0.00E+00
Bis(2-ethylhexyl)phthalate	117-81-7	1.74E-09	1.60E-08	9.48E-09	3.28E-08	9.53E-08	6.09E-09	4.88E-07
Bromoform	75-25-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methyl bromide	74-83-9	0.00E+00	0.00E+00	4.08E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	0.00E+00	1.31E-07	4.20E-08	0.00E+00	0.00E+00	9.47E-08	1.03E-07
Carbon disulfide	75-15-0	0.00E+00	2.57E-05	0.00E+00	1.88E-07	3.16E-08	6.93E-08	3.68E-07
Carbon tetrachloride	56-23-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-07
Carbonyl sulfide	463-58-1	0.00E+00	0.00E+00	1.22E-07	1.14E-06	2.55E-07	0.00E+00	2.09E-06
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-08	0.00E+00	0.00E+00
o-Cresol	95-48-7	0.00E+00	0.00E+00	0.00E+00	7.35E-10	0.00E+00	0.00E+00	0.00E+00
Cumene	98-82-8	6.84E-09	8.75E-08	7.66E-07	3.78E-09	2.03E-08	4.07E-08	1.44E-09
Dibenzofuran	132-64-9	0.00E+00	0.00E+00	0.00E+00	6.98E-10	2.22E-10	0.00E+00	3.85E-10
Dibutylphthalate	84-74-2	0.00E+00	6.00E-08	2.11E-08	1.58E-08	2.07E-07	2.59E-08	6.37E-08
1,4-Dichlorobenzene	106-46-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	1.17E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl acrylate	140-88-5	3.43E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl benzene	100-41-4	0.00E+00	2.01E-07	2.35E-08	5.75E-08	0.00E+00	9.29E-08	0.00E+00
Ethyl chloride	75-00-3	1.46E-07	0.00E+00	0.00E+00	3.07E-07	0.00E+00	0.00E+00	0.00E+00

EMISSION FACTORS FOR CALENDERING
RECIPES 17-23

		EPA AP-42 Recipe Number						
Analyte Name	**Pollutant**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Ethylene dichloride	107-06-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.39E-09
Hexane	110-54-3	8.19E-05	2.92E-07	1.72E-07	3.52E-07	1.84E-07	5.62E-07	4.51E-07
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isophorone	78-59-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E-09	2.44E-07	0.00E+00
Methyl chloride	74-87-3	6.43E-07	0.00E+00	1.08E-07	2.43E-07	2.85E-07	2.77E-08	0.00E+00
Methyl chloroform	71-55-6	4.37E-08	0.00E+00	8.27E-08	5.30E-07	7.57E-09	4.75E-08	0.00E+00
Methyl ethyl ketone	78-93-3	7.54E-07	9.11E-07	4.57E-08	9.42E-08	3.43E-07	3.17E-06	0.00E+00
Methyl isobutyl ketone	108-10-1	1.20E-07	3.31E-06	0.00E+00	1.39E-07	2.00E-08	9.90E-06	0.00E+00
Methyl tert butyl ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.79E-06	0.00E+00	0.00E+00
Methylene chloride	75-09-2	1.20E-05	6.30E-07	2.71E-07	7.44E-07	2.05E-07	7.33E-07	7.94E-07
Naphthalene	91-20-3	2.91E-08	2.40E-08	8.92E-09	1.24E-08	9.06E-09	4.00E-08	2.30E-08
Nitrobenzene	98-95-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrobiphenyl	92-93-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	7.18E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	9.07E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	9.21E-07	4.08E-08	0.00E+00	1.34E-08	6.78E-09	4.98E-07	9.04E-09
Propionaldehyde	123-38-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Propylene oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	100-42-5	0.00E+00	3.95E-08	0.00E+00	0.00E+00	4.58E-08	1.07E-06	0.00E+00
Tetrachloroethylene	127-18-4	0.00E+00	5.55E-08	2.04E-08	5.50E-08	0.00E+00	1.39E-06	0.00E+00
Toluene	108-88-3	7.51E-07	4.99E-07	3.14E-07	3.45E-07	1.00E-07	1.79E-06	1.67E-05
o-Toluidine	95-53-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Trichloroethylene	79-01-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,2,4-Trimethylpentane	540-84-1	0.00E+00	5.41E-08	3.31E-08	5.00E-08	1.53E-07	5.76E-07	0.00E+00
Vinyl acetate	108-05-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinylidene chloride	75-35-4	0.00E+00	6.38E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	3.69E-07	2.65E-07	3.49E-08	9.03E-08	1.16E-07	2.62E-07	0.00E+00
m-Xylene + p-Xylene	MPXYL	3.45E-07	6.40E-07	7.29E-08	2.44E-07	1.03E-07	3.06E-07	8.54E-08
VOC	VOC	3.72E-04	8.83E-05	2.35E-05	8.69E-06	1.35E-04	1.04E-04	2.57E-05

EMISSION FACTORS FOR EXTRUDING
RECIPES 1-10

Analyte Name	Pollutant	EPA AP-42 Recipe Number									
		1	2	3	4	5	6	7	8	9	10
Total Method 25A Organics	TOG	1.48E-05	9.37E-06	3.25E-05	5.67E-06	5.15E-05	1.23E-05	2.92E-05	3.52E-06	1.24E-05	6.97E-05
Total Speciated Organics	TSO	2.72E-05	2.97E-05	4.78E-05	2.11E-05	3.31E-05	9.04E-05	4.76E-05	3.95E-05	3.51E-05	1.51E-04
Total Particulate Matter	TPM	2.12E-08	4.85E-08	1.08E-07	3.11E-08	1.12E-07	7.77E-09	6.83E-08	2.67E-08	1.51E-08	4.32E-08
Total Organic HAPs	TOHAP	1.13E-05	7.14E-06	3.16E-05	9.87E-06	2.24E-05	3.51E-05	2.25E-05	2.99E-05	1.87E-05	6.43E-05
Total Metal HAPs	TMHAP	5.00E-09	4.31E-10	9.52E-09	4.67E-07	3.20E-09	1.05E-07	7.57E-09	2.35E-09	1.95E-07	2.45E-09
Total HAPs	THAP	1.13E-05	7.14E-06	3.16E-05	1.03E-05	2.24E-05	3.52E-05	2.25E-05	2.99E-05	1.89E-05	6.43E-05
1,1,1-Trichloroethane	71-55-6	0.00E+00	4.31E-08	1.71E-07	8.47E-08	9.84E-08	9.37E-08	0.00E+00	1.43E-08	6.58E-08	7.19E-08
1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.37E-08	7.04E-08	0.00E+00
1,3-Butadiene	106-99-0	5.24E-08	0.00E+00	0.00E+00	8.92E-08	0.00E+00	5.06E-07	2.50E-07	6.04E-08	6.01E-08	0.00E+00
1,4-Dichlorobenzene	106-46-7	0.00E+00	0.00E+00	0.00E+00	8.36E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,4-Dioxane	123-91-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E-07	0.00E+00
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	3.17E-06	8.52E-07	4.83E-07	1.34E-07	8.20E-07	1.17E-07	7.50E-07	2.72E-07	1.15E-07	6.34E-07
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	6.48E-09	0.00E+00	1.68E-09	0.00E+00	0.00E+00	3.83E-09	2.92E-10
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	4.63E-08	0.00E+00	6.94E-09	0.00E+00	0.00E+00	0.00E+00	9.28E-09	0.00E+00
4-Methyl-2-Pentanone	108-10-1	0.00E+00	1.05E-07	6.73E-06	5.54E-06	0.00E+00	2.66E-06	0.00E+00	6.80E-08	2.85E-07	2.22E-07
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	3.73E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde + Isobutane	ACETISO	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	1.09E-07	0.00E+00	2.19E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	1.24E-06	1.14E-08	2.75E-08	3.65E-08	9.92E-09	3.32E-06	6.61E-08	6.91E-09	8.18E-06	4.53E-08
Acrolein	107-02-8	0.00E+00	0.00E+00	0.00E+00	2.03E-07	0.00E+00	3.10E-07	0.00E+00	0.00E+00	9.10E-08	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.65E-08	0.00E+00	0.00E+00
Aniline	62-53-3	0.00E+00	2.57E-07	0.00E+00	5.08E-07	0.00E+00	2.19E-07	0.00E+00	4.13E-09	5.52E-09	2.52E-09
Benzene	71-43-2	2.93E-08	2.47E-08	6.07E-08	4.46E-08	1.60E-07	2.69E-07	4.89E-08	0.00E+00	7.51E-08	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-08	0.00E+00
Biphenyl	92-52-4	0.00E+00	0.00E+00	3.02E-08	4.65E-09	0.00E+00	1.68E-08	0.00E+00	0.00E+00	3.27E-09	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	2.09E-08	1.61E-08	6.37E-08	1.94E-07	1.22E-08	1.13E-07	1.79E-08	0.00E+00	6.70E-08	0.00E+00
Bromoform	75-25-2	1.49E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bromomethane	74-83-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Disulfide	75-15-0	0.00E+00	0.00E+00	0.00E+00	1.09E-07	9.84E-08	2.66E-07	0.00E+00	1.50E-05	9.06E-08	5.49E-05
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	6.38E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbonyl Sulfide	463-58-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.86E-07	0.00E+00	0.00E+00	1.20E-05	0.00E+00	0.00E+00
Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloromethane	74-87-3	0.00E+00	1.67E-08	0.00E+00	7.06E-08	0.00E+00	6.64E-08	0.00E+00	2.00E-08	5.16E-08	4.97E-08

EMISSION FACTORS FOR EXTRUDING
RECIPES 1-10

Analyte Name	Pollutant	EPA AP-42 Recipe Number									
		1	2	3	4	5	6	7	8	9	10
Chromium (Cr) Compounds	CR	1.96E-09	4.31E-10	3.65E-09	2.45E-07	1.68E-09	2.25E-08	7.57E-09	2.72E-10	7.82E-08	9.63E-10
Cobalt (Co) Compounds	COB	0.00E+00	0.00E+00	0.00E+00	1.90E-08	0.00E+00	9.92E-09	0.00E+00	0.00E+00	1.51E-08	0.00E+00
Cumene	98-82-8	1.56E-09	0.00E+00	2.15E-09	3.66E-08	7.54E-10	1.36E-07	4.45E-08	5.17E-08	1.82E-06	4.72E-07
Di-n-butylphthalate	84-74-2	4.29E-08	8.64E-09	2.94E-08	1.87E-07	0.00E+00	1.98E-07	0.00E+00	4.00E-09	3.65E-07	7.89E-09
Dibenzofuran	132-64-9	0.00E+00	1.13E-09	1.83E-08	3.52E-09	0.00E+00	3.24E-09	0.00E+00	0.00E+00	2.51E-09	0.00E+00
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	8.43E-09	0.00E+00	0.00E+00	4.27E-09	0.00E+00	0.00E+00	3.32E-09	0.00E+00
Ethyl Acrylate	140-88-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	100-41-4	0.00E+00	7.76E-08	1.14E-07	3.30E-08	6.34E-08	8.10E-08	2.32E-06	5.93E-08	3.03E-08	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	0.00E+00	4.98E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachlorobutadiene	87-68-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-07	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexane	110-54-3	4.42E-06	5.77E-07	8.49E-07	1.02E-07	3.17E-06	3.94E-07	5.78E-06	6.84E-07	8.38E-07	8.87E-07
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isooctane	540-84-1	4.80E-08	4.12E-07	1.54E-07	3.81E-08	5.52E-08	4.51E-08	1.13E-07	1.32E-07	2.36E-08	1.71E-07
Isophorone	78-59-1	0.00E+00	3.55E-07	0.00E+00	3.50E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.65E-09	0.00E+00
m-Xylene + p-Xylene	MPXYL	1.41E-07	3.10E-07	3.81E-07	7.01E-08	2.20E-07	3.32E-07	7.72E-06	2.33E-07	1.53E-07	5.78E-07
Methylene Chloride	75-09-2	5.90E-07	5.10E-07	2.07E-05	1.60E-06	2.24E-07	1.32E-05	6.10E-07	2.58E-07	2.69E-06	4.85E-06
N,N-Dimethylaniline	121-69-7	0.00E+00	0.00E+00	0.00E+00	5.45E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	91-20-3	1.34E-08	1.78E-08	1.65E-07	1.08E-07	1.35E-07	1.98E-07	2.31E-08	1.46E-08	1.96E-06	4.39E-09
Nickel (Ni) Compounds	NI	3.03E-09	0.00E+00	5.88E-09	1.99E-07	1.53E-09	7.24E-08	0.00E+00	2.08E-09	1.02E-07	1.48E-09
Nitrobenzene	98-95-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Toluidine	95-53-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	5.14E-08	2.09E-07	1.71E-07	3.49E-08	8.15E-08	2.58E-07	4.14E-06	8.30E-08	7.55E-08	2.09E-07
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	3.86E-08	2.63E-08	1.48E-07	3.11E-07	4.08E-07	1.84E-07	1.28E-08	1.71E-08	1.73E-07	6.46E-09
Propanal	123-38-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	100-42-5	0.00E+00	0.00E+00	0.00E+00	9.61E-09	0.00E+00	7.25E-07	0.00E+00	2.21E-08	2.38E-08	1.17E-07
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	0.00E+00	2.20E-06	5.17E-08	5.32E-08	0.00E+00	4.44E-08	0.00E+00	4.15E-08	7.39E-08	6.54E-08
Toluene	108-88-3	8.84E-07	1.11E-06	1.13E-06	1.07E-07	9.28E-07	9.26E-06	5.64E-07	7.05E-07	8.95E-07	9.88E-07
Trichloroethene	79-01-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Acetate	108-05-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VOC	VOC	2.66E-05	2.69E-05	2.69E-05	1.94E-05	5.12E-05	7.71E-05	4.70E-05	3.92E-05	3.23E-05	1.46E-04

EMISSION FACTORS FOR EXTRUDING RECIPES 11-16

		EPA AP-42 Recipe Number					
Analyte Name	**Pollutant**	**11**	**12**	**13**	**14**	**15**	**16**
Total Method 25A Organics	TOG	7.86E-06	3.69E-06	5.46E-05	5.50E-05	2.25E-06	1.96E-05
Total Speciated Organics	TSO	1.89E-05	3.59E-05	8.21E-05	8.14E-05	3.28E-05	1.63E-05
Total Particulate Matter	TPM	9.45E-09	2.20E-08	2.97E-08	1.57E-08	1.72E-08	3.82E-08
Total Organic HAPs	TOHAP	6.12E-06	2.97E-05	8.61E-06	2.27E-05	2.98E-05	2.52E-06
Total Metal HAPs	TMHAP	0.00E+00	1.72E-09	2.52E-09	2.50E-10	1.45E-09	5.11E-11
Total HAPs	THAP	6.12E-06	2.97E-05	8.61E-06	2.27E-05	2.98E-05	2.52E-06
1,1,1-Trichloroethane	71-55-6	0.00E+00	1.58E-08	2.85E-08	1.94E-08	9.80E-09	9.40E-09
1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	1.18E-07	7.44E-09	0.00E+00
1,3-Butadiene	106-99-0	2.05E-07	4.59E-08	6.02E-08	1.28E-07	3.31E-08	0.00E+00
1,4-Dichlorobenzene	106-46-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,4-Dioxane	123-91-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	4.63E-08	4.39E-07	1.72E-07	1.66E-07	4.70E-08	2.12E-08
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-Pentanone	108-10-1	3.64E-08	0.00E+00	5.29E-08	4.42E-07	2.63E-08	4.63E-08
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.74E-07	0.00E+00
Acetaldehyde + Isobutane	ACETISO	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	1.23E-07	1.85E-07	2.79E-08	9.11E-09	5.89E-09	5.93E-09
Acrolein	107-02-8	0.00E+00	0.00E+00	3.80E-07	4.42E-07	0.00E+00	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	0.00E+00	5.11E-07	6.29E-06	0.00E+00	0.00E+00
Aniline	62-53-3	1.28E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	71-43-2	0.00E+00	1.95E-08	3.54E-07	2.81E-07	9.34E-09	1.40E-08
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.65E-09	0.00E+00
Biphenyl	92-52-4	0.00E+00	0.00E+00	0.00E+00	6.62E-10	0.00E+00	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	1.44E-07	4.79E-09	3.96E-07	0.00E+00	2.46E-08	1.90E-08
Bromoform	75-25-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bromomethane	74-83-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Disulfide	75-15-0	4.63E-06	2.42E-05	4.46E-07	2.28E-06	8.23E-08	2.41E-08
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.51E-05	0.00E+00
Carbonyl Sulfide	463-58-1	0.00E+00	3.29E-06	3.14E-07	6.06E-06	1.46E-06	0.00E+00
Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.12E-07
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	1.31E-08	3.49E-07	6.59E-09
Chloromethane	74-87-3	0.00E+00	1.24E-08	3.45E-08	1.94E-08	5.49E-08	7.72E-09
Chromium (Cr) Compounds	CR	0.00E+00	3.97E-10	4.06E-10	2.50E-10	1.21E-10	5.11E-11
Cobalt (Co) Compounds	COB	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cumene	98-82-8	1.43E-09	4.85E-08	5.28E-08	0.00E+00	1.57E-09	0.00E+00
Di-n-butylphthalate	84-74-2	0.00E+00	3.18E-09	1.79E-07	4.79E-09	0.00E+00	1.97E-09
Dibenzofuran	132-64-9	0.00E+00	0.00E+00	0.00E+00	1.29E-09	3.97E-10	0.00E+00
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.77E-09	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	0.00E+00	1.61E-09	1.17E-09	1.67E-09
Ethyl Acrylate	140-88-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	100-41-4	3.65E-08	3.08E-08	1.12E-07	3.28E-08	2.60E-08	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachlorobutadiene	87-68-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.60E-07	0.00E+00
Hexane	110-54-3	1.52E-07	2.51E-07	1.10E-06	3.63E-07	4.22E-07	9.72E-07
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isooctane	540-84-1	3.93E-08	1.32E-07	1.27E-07	1.40E-07	2.56E-08	0.00E+00

EMISSION FACTORS FOR EXTRUDING RECIPES 11-16

		EPA AP-42 Recipe Number					
Analyte Name	**Pollutant**	**11**	**12**	**13**	**14**	**15**	**16**
Isophorone	78-59-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
m-Xylene + p-Xylene	MPXYL	8.07E-08	1.96E-07	4.26E-07	1.79E-07	1.64E-07	5.73E-08
Methylene Chloride	75-09-2	2.68E-07	3.49E-07	1.19E-07	8.99E-07	3.76E-07	2.68E-07
N,N-Dimethylaniline	121-69-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	91-20-3	4.75E-09	1.62E-08	6.12E-09	0.00E+00	1.49E-08	6.03E-09
Nickel (Ni) Compounds	NI	0.00E+00	1.32E-09	2.11E-09	0.00E+00	1.33E-09	0.00E+00
Nitrobenzene	98-95-3	1.08E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Toluidine	95-53-4	0.00E+00	4.41E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	7.12E-08	9.01E-08	1.90E-07	9.16E-08	4.33E-08	2.94E-08
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	2.43E-09	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	4.93E-09	1.46E-08	2.25E-08	2.85E-08	1.44E-08	2.44E-08
Propanal	123-38-6	0.00E+00	0.00E+00	1.78E-06	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	3.73E-06	0.00E+00	0.00E+00
Styrene	100-42-5	2.69E-08	0.00E+00	2.90E-08	3.48E-08	0.00E+00	0.00E+00
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	1.29E-08	4.22E-08	7.13E-08	7.60E-08	3.72E-07	0.00E+00
Toluene	108-88-3	2.10E-07	3.07E-07	1.50E-06	8.33E-07	1.69E-07	9.37E-08
Trichloroethene	79-01-6	0.00E+00	0.00E+00	1.19E-07	0.00E+00	0.00E+00	0.00E+00
Vinyl Acetate	108-05-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.05E-09	0.00E+00
VOC	VOC	1.86E-05	3.55E-05	8.19E-05	8.04E-05	3.20E-05	1.93E-05

EMISSION FACTORS FOR EXTRUDING
RECIPES 17-23

		EPA AP-42 Recipe Number						
Analyte Name	**Pollutant**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Total Method 25A Organics	TOG	1.06E-04	1.56E-05	6.61E-06	1.80E-06	3.75E-05	8.30E-06	7.35E-06
Total Speciated Organics	TSO	1.60E-04	6.58E-05	1.06E-05	7.41E-06	7.17E-05	1.81E-05	1.90E-05
Total Particulate Matter	TPM	1.08E-08	2.31E-08	8.32E-09	9.47E-08	9.05E-09	2.34E-08	4.10E-08
Total Organic HAPs	TOHAP	7.52E-05	2.50E-05	1.97E-06	3.57E-06	6.04E-06	8.54E-06	1.59E-05
Total Metal HAPs	TMHAP	4.57E-09	2.40E-09	1.63E-09	5.78E-10	6.63E-11	7.55E-07	3.09E-09
Total HAPs	THAP	7.52E-05	2.50E-05	1.98E-06	3.57E-06	6.04E-06	9.30E-06	1.59E-05
1,1,1-Trichloroethane	71-55-6	3.23E-08	0.00E+00	6.11E-08	3.92E-07	5.59E-09	3.48E-08	0.00E+00
1,1-Dichloroethene	75-35-4	0.00E+00	4.71E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	0.00E+00	9.64E-08	3.10E-08	0.00E+00	0.00E+00	7.83E-08	7.65E-08
1,4-Dichlorobenzene	106-46-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-09	0.00E+00
1,4-Dioxane	123-91-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	8.67E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	5.57E-07	6.74E-07	3.37E-08	6.96E-08	2.53E-07	9.28E-08	0.00E+00
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.35E-09	0.00E+00
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	0.00E+00	5.43E-10	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-Pentanone	108-10-1	8.87E-08	2.45E-06	0.00E+00	1.03E-07	1.48E-08	1.63E-06	0.00E+00
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	5.30E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde + Isobutane	ACETISO	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	2.48E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	7.79E-09	3.06E-08	1.33E-08	8.61E-08	9.41E-09	1.65E-08	4.83E-09
Acrolein	107-02-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-07	1.04E-07	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	4.29E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aniline	62-53-3	2.75E-07	8.90E-08	0.00E+00	3.86E-09	0.00E+00	2.23E-07	1.19E-07
Benzene	71-43-2	0.00E+00	2.02E-08	7.59E-08	3.17E-08	0.00E+00	1.28E-07	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl	92-52-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.42E-09	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	1.29E-09	1.18E-08	7.01E-09	2.43E-08	7.04E-08	1.55E-07	3.61E-07
Bromoform	75-25-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bromomethane	74-83-9	0.00E+00	0.00E+00	3.01E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Disulfide	75-15-0	0.00E+00	1.90E-05	0.00E+00	1.39E-07	2.34E-08	1.16E-07	2.72E-07
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-07
Carbonyl Sulfide	463-58-1	0.00E+00	0.00E+00	9.04E-08	8.46E-07	1.89E-07	0.00E+00	1.54E-06
Chloroethane	75-00-3	1.08E-07	0.00E+00	0.00E+00	2.27E-07	0.00E+00	5.36E-08	0.00E+00
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.21E-09	3.81E-08	0.00E+00
Chloromethane	74-87-3	4.75E-07	0.00E+00	7.95E-08	1.79E-07	2.11E-07	1.88E-07	0.00E+00
Chromium (Cr) Compounds	CR	2.59E-09	0.00E+00	0.00E+00	5.78E-10	6.63E-11	2.54E-07	1.30E-09

EMISSION FACTORS FOR EXTRUDING
RECIPES 17-23

		EPA AP-42 Recipe Number						
Analyte Name	**Pollutant**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Cobalt (Co) Compounds	COB	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-08	0.00E+00
Cumene	98-82-8	5.05E-09	6.46E-08	5.66E-07	2.80E-09	1.50E-08	1.24E-07	1.07E-09
Di-n-butylphthalate	84-74-2	0.00E+00	4.43E-08	1.56E-08	1.16E-08	1.53E-07	5.01E-08	4.71E-08
Dibenzofuran	132-64-9	0.00E+00	0.00E+00	0.00E+00	5.16E-10	1.64E-10	2.67E-09	2.84E-10
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl Acrylate	140-88-5	2.53E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	100-41-4	0.00E+00	1.49E-07	1.73E-08	4.25E-08	0.00E+00	3.57E-07	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachlorobutadiene	87-68-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.25E-09
Hexane	110-54-3	6.05E-05	2.16E-07	1.27E-07	2.60E-07	1.36E-07	2.49E-06	3.33E-07
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isooctane	540-84-1	0.00E+00	4.00E-08	2.45E-08	3.70E-08	1.13E-07	3.71E-09	0.00E+00
Isophorone	78-59-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-09	6.45E-08	0.00E+00
m-Xylene + p-Xylene	MPXYL	2.55E-07	4.73E-07	5.39E-08	1.80E-07	7.63E-08	5.22E-07	6.31E-08
Methylene Chloride	75-09-2	8.87E-06	4.65E-07	2.00E-07	5.49E-07	1.51E-07	8.18E-08	5.87E-07
N,N-Dimethylaniline	121-69-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	91-20-3	2.15E-08	1.77E-08	6.59E-09	9.15E-09	6.70E-09	6.30E-08	1.70E-08
Nickel (Ni) Compounds	NI	1.98E-09	2.40E-09	1.63E-09	0.00E+00	0.00E+00	4.91E-07	1.79E-09
Nitrobenzene	98-95-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Toluidine	95-53-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	2.73E-07	1.96E-07	2.58E-08	6.67E-08	8.54E-08	4.77E-07	0.00E+00
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	6.70E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	6.80E-07	3.02E-08	0.00E+00	9.88E-09	5.01E-09	5.07E-08	6.68E-09
Propanal	123-38-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.42E-07	0.00E+00
Styrene	100-42-5	0.00E+00	2.92E-08	0.00E+00	0.00E+00	3.39E-08	3.93E-08	0.00E+00
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.28E-06	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	0.00E+00	4.10E-08	1.51E-08	4.07E-08	0.00E+00	1.71E-07	0.00E+00
Toluene	108-88-3	5.55E-07	3.69E-07	2.32E-07	2.55E-07	7.39E-08	3.67E-07	1.24E-05
Trichloroethene	79-01-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.30E-07	0.00E+00
Vinyl Acetate	108-05-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.26E-08	0.00E+00
VOC	VOC	1.51E-04	6.53E-05	1.03E-05	6.43E-06	7.15E-05	1.78E-05	1.84E-05

EMISSION FACTORS FOR AUTOCLAVE CURING

RECIPES 1 - 10

Analyte Name	Pollutant	EPA AP-42 Recipe Number									
		1	2	3	4	5	6	7	8	9	10
Total Method 25A Organics	TOG	1.78E-04	1.13E-04	3.93E-04	1.49E-04	1.56E-04	1.29E-04	3.53E-04	6.65E-05	2.47E-04	8.42E-04
Total speciated organics	TSO	8.60E-04	9.36E-04	1.51E-03	2.33E-04	3.75E-04	3.00E-04	1.50E-03	6.15E-03	6.43E-04	4.76E-03
Total organic HAPs	TOHAP	3.56E-04	2.25E-04	9.98E-04	1.24E-04	1.81E-04	6.73E-05	7.09E-04	6.04E-03	4.70E-04	2.03E-03
Total HAPs	THAP	3.56E-04	2.25E-04	9.98E-04	1.24E-04	1.81E-04	6.73E-05	7.09E-04	6.04E-03	4.70E-04	2.03E-03
1,1,1-Trichloroethane	71-55-6	0.00E+00	1.36E-06	5.39E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.27E-06
1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,2,4-Trichlorobenzene	120-82-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	1.65E-06	0.00E+00	0.00E+00	1.11E-06	2.88E-06	5.33E-07	7.91E-06	0.00E+00	4.19E-07	0.00E+00
1,4-Dichlorobenzene	106-46-7	0.00E+00	0.00E+00	4.84E-08	1.35E-08	1.21E-08	6.86E-09	3.08E-08	2.53E-08	1.17E-07	1.01E-08
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	1.00E-04	2.69E-05	1.52E-05	8.08E-08	4.78E-07	3.48E-08	2.37E-05	1.24E-06	3.02E-07	2.00E-05
2-Chloro-1,3-Butadiene	126-99-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.29E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.23E-09
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	1.46E-06	0.00E+00	3.13E-09	0.00E+00	0.00E+00	6.93E-09	0.00E+00	0.00E+00
4-Methyl-2-Pentanone	108-10-1	0.00E+00	3.33E-06	2.12E-04	3.61E-05	2.71E-07	1.35E-05	0.00E+00	0.00E+00	2.05E-06	7.02E-06
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	1.18E-05	0.00E+00	0.00E+00	0.00E+00	1.41E-06	0.00E+00	0.00E+00	3.22E-07	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	3.92E-05	3.60E-07	8.68E-07	4.41E-06	2.64E-07	6.08E-06	2.09E-06	9.76E-08	4.19E-04	1.43E-06
Acrolein	107-02-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-07	0.00E+00	0.00E+00	0.00E+00	9.22E-08	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aniline	62-53-3	0.00E+00	8.13E-06	0.00E+00	4.20E-06	1.07E-06	7.35E-06	0.00E+00	0.00E+00	2.41E-07	7.97E-08
Benzene	71-43-2	9.24E-07	7.81E-07	1.92E-06	1.09E-05	5.48E-06	8.59E-06	1.54E-06	2.07E-05	2.93E-06	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.68E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl	92-52-4	0.00E+00	0.00E+00	9.53E-07	6.25E-08	2.27E-07	2.65E-07	0.00E+00	3.14E-08	6.31E-08	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	6.61E-07	5.10E-07	2.01E-06	2.29E-07	1.57E-07	9.68E-07	5.66E-07	2.73E-07	1.52E-07	0.00E+00
Bromoform	75-25-2	4.71E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bromomethane	74-83-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Disulfide	75-15-0	0.00E+00	0.00E+00	0.00E+00	4.56E-07	2.74E-06	5.51E-07	0.00E+00	5.93E-03	7.62E-06	1.73E-03
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	2.01E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbonyl Sulfide	463-58-1	0.00E+00	0.00E+00	0.00E+00	8.54E-07	1.16E-06	8.08E-07	0.00E+00	4.17E-05	1.41E-06	0.00E+00
Chlorobenzene	108-90-7	0.00E+00	0.00E+00	0.00E+00	5.22E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloromethane	74-87-3	0.00E+00	5.27E-07	0.00E+00	0.00E+00	0.00E+00	6.79E-08	0.00E+00	0.00E+00	1.86E-07	1.57E-06
Cumene	98-82-8	4.93E-08	0.00E+00	6.77E-08	3.79E-07	3.73E-07	7.93E-07	1.41E-06	1.46E-06	7.90E-06	1.49E-05

EMISSION FACTORS FOR AUTOCLAVE CURING

RECIPES 1 - 10

Analyte Name	Pollutant	EPA AP-42 Recipe Number									
		1	2	3	4	5	6	7	8	9	10
Di-n-butylphthalate	84-74-2	1.35E-06	2.73E-07	9.29E-07	2.43E-09	2.37E-09	2.12E-08	0.00E+00	0.00E+00	7.06E-08	2.49E-07
Dibenzofuran	132-64-9	0.00E+00	3.57E-08	5.78E-07	1.61E-08	3.32E-08	1.02E-08	0.00E+00	2.81E-09	3.98E-09	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	2.66E-07	0.00E+00	6.99E-10	0.00E+00	0.00E+00	3.02E-09	0.00E+00	0.00E+00
Epichlorohydrin	106-89-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00
Ethyl Acrylate	140-88-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	100-41-4	0.00E+00	2.45E-06	3.61E-06	3.11E-06	1.32E-06	2.24E-06	7.32E-05	2.55E-06	2.53E-06	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	0.00E+00	1.57E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachlorobutadiene	87-68-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-07	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexane	110-54-3	1.39E-04	1.82E-05	2.68E-05	1.43E-06	2.00E-06	7.85E-07	1.82E-04	3.22E-06	1.76E-06	2.80E-05
Isooctane	540-84-1	1.51E-06	1.30E-05	4.85E-06	2.69E-07	4.55E-07	2.00E-07	3.58E-06	5.23E-07	1.31E-07	5.40E-06
Isophorone	78-59-1	0.00E+00	1.12E-05	0.00E+00	1.95E-07	9.12E-08	0.00E+00	0.00E+00	0.00E+00	9.10E-09	0.00E+00
m-Xylene + p-Xylene	MPXYL	4.44E-06	9.80E-06	1.20E-05	3.40E-05	5.37E-05	6.88E-06	2.44E-04	1.34E-05	8.67E-06	1.83E-05
Methylene Chloride	75-09-2	1.86E-05	1.61E-05	6.53E-04	9.15E-06	9.11E-05	1.50E-06	1.93E-05	2.02E-06	2.72E-06	1.53E-04
N-Nitrosodimethylamine	62-75-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.17E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	91-20-3	4.23E-07	5.63E-07	5.22E-06	2.74E-07	2.04E-07	6.08E-07	7.31E-07	1.64E-07	1.33E-07	1.38E-07
o-Toluidine	95-53-4	0.00E+00	0.00E+00	0.00E+00	9.82E-08	0.00E+00	5.37E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	1.62E-06	6.59E-06	5.41E-06	3.13E-06	3.87E-06	2.39E-06	1.31E-04	3.44E-06	4.99E-06	6.61E-06
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	1.22E-06	8.29E-07	4.69E-06	0.00E+00	1.13E-07	0.00E+00	4.05E-07	4.75E-08	8.49E-07	2.04E-07
Propanal	123-38-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	100-42-5	0.00E+00	0.00E+00	0.00E+00	9.96E-07	4.99E-07	2.72E-06	0.00E+00	1.86E-07	6.42E-07	3.69E-06
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	6.63E-09	1.24E-07	8.48E-09	0.00E+00	7.31E-09	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	0.00E+00	6.94E-05	1.63E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.06E-06
Toluene	108-88-3	2.79E-05	3.49E-05	3.58E-05	1.30E-05	9.36E-06	5.01E-06	1.78E-05	1.59E-05	4.85E-06	3.12E-05
Trichloroethene	79-01-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VOC	VOC	8.41E-04	8.49E-04	8.50E-04	2.24E-04	2.84E-04	2.99E-04	1.48E-03	6.15E-03	6.40E-04	4.60E-03

EMISSION FACTORS FOR AUTOCLAVE CURING

Recipes 11-16

		EPA AP-42 Recipe Number					
Analyte Name	**Pollutant**	**11**	**12**	**13**	**14**	**15**	**16**
Total Method 25A Organics	TOG	6.21E-05	4.46E-05	6.59E-04	6.64E-04	2.88E-05	2.36E-04
Total speciated organics	TSO	4.87E-04	1.13E-03	2.59E-03	2.57E-03	9.03E-04	5.14E-04
Total organic HAPs	TOHAP	3.18E-04	9.39E-04	2.72E-04	7.16E-04	7.20E-04	7.96E-05
Total HAPs	THAP	3.18E-04	9.39E-04	2.72E-04	7.16E-04	7.20E-04	7.96E-05
1,1,1-Trichloroethane	71-55-6	0.00E+00	4.98E-07	9.01E-07	6.11E-07	0.00E+00	2.97E-07
1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	3.71E-06	0.00E+00	0.00E+00
1,2,4-Trichlorobenzene	120-82-1	3.41E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	1.91E-07	1.45E-06	1.90E-06	4.05E-06	0.00E+00	0.00E+00
1,4-Dichlorobenzene	106-46-7	9.13E-09	5.59E-08	0.00E+00	0.00E+00	5.86E-08	0.00E+00
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	3.33E-07	1.39E-05	5.44E-06	5.24E-06	0.00E+00	6.69E-07
2-Chloro-1,3-Butadiene	126-99-8	8.79E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Chloroacetophenone	532-27-4	1.03E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-Pentanone	108-10-1	0.00E+00	0.00E+00	1.67E-06	1.40E-05	0.00E+00	1.46E-06
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	1.36E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	9.64E-08	5.83E-06	8.82E-07	2.88E-07	1.03E-07	1.87E-07
Acrolein	107-02-8	0.00E+00	0.00E+00	1.20E-05	1.40E-05	5.90E-07	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	0.00E+00	1.61E-05	1.99E-04	0.00E+00	0.00E+00
Aniline	62-53-3	6.39E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	71-43-2	1.64E-06	6.16E-07	1.12E-05	8.86E-06	6.92E-06	4.41E-07
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl	92-52-4	1.64E-09	0.00E+00	0.00E+00	2.09E-08	1.33E-09	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	5.37E-07	1.51E-07	1.25E-05	0.00E+00	6.49E-07	6.00E-07
Bromoform	75-25-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bromomethane	74-83-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Disulfide	75-15-0	2.68E-04	7.64E-04	1.41E-05	7.20E-05	5.10E-04	7.62E-07
Carbon Tetrachloride	56-23-5	7.25E-08	0.00E+00	0.00E+00	0.00E+00	9.59E-05	0.00E+00
Carbonyl Sulfide	463-58-1	3.98E-06	1.04E-04	9.91E-06	1.91E-04	2.75E-06	0.00E+00
Chlorobenzene	108-90-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E-05
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	4.15E-07	2.13E-05	2.08E-07
Chloromethane	74-87-3	9.29E-08	3.91E-07	1.09E-06	6.11E-07	0.00E+00	2.44E-07
Cumene	98-82-8	1.89E-08	1.53E-06	1.67E-06	0.00E+00	1.96E-07	0.00E+00
Di-n-butylphthalate	84-74-2	1.57E-08	1.01E-07	5.65E-06	1.51E-07	2.86E-07	6.22E-08
Dibenzofuran	132-64-9	0.00E+00	0.00E+00	0.00E+00	4.08E-08	3.83E-09	0.00E+00
Dimethylphthalate	131-11-3	4.31E-09	0.00E+00	0.00E+00	5.08E-08	0.00E+00	5.28E-08
Epichlorohydrin	106-89-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl Acrylate	140-88-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	100-41-4	8.07E-07	9.72E-07	3.52E-06	1.04E-06	6.24E-06	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachlorobutadiene	87-68-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachloroethane	67-72-1	6.48E-08	0.00E+00	0.00E+00	0.00E+00	4.33E-07	0.00E+00
Hexane	110-54-3	6.90E-07	7.91E-06	3.46E-05	1.15E-05	1.21E-06	3.07E-05
Isooctane	540-84-1	4.97E-06	4.17E-06	4.01E-06	4.41E-06	7.50E-07	0.00E+00
Isophorone	78-59-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
m-Xylene + p-Xylene	MPXYL	3.42E-07	6.18E-06	1.35E-05	5.66E-06	2.24E-05	1.81E-06
Methylene Chloride	75-09-2	5.75E-07	1.10E-05	3.75E-06	2.84E-05	2.08E-05	8.46E-06
N-Nitrosodimethylamine	62-75-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

EMISSION FACTORS FOR AUTOCLAVE CURING

Recipes 11-16

		EPA AP-42 Recipe Number					
Analyte Name	**Pollutant**	**11**	**12**	**13**	**14**	**15**	**16**
Naphthalene	91-20-3	3.15E-07	5.11E-07	1.93E-07	0.00E+00	1.47E-07	1.90E-07
o-Toluidine	95-53-4	0.00E+00	1.39E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	1.78E-05	2.85E-06	6.01E-06	2.89E-06	5.14E-06	9.29E-07
Pentachlorophenol	87-86-5	6.29E-09	0.00E+00	7.66E-08	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	3.54E-08	4.61E-07	7.10E-07	9.01E-07	7.58E-08	7.72E-07
Propanal	123-38-6	0.00E+00	0.00E+00	5.63E-05	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	5.19E-08	0.00E+00	0.00E+00	1.18E-04	0.00E+00	0.00E+00
Styrene	100-42-5	3.44E-08	0.00E+00	9.14E-07	1.10E-06	5.05E-07	0.00E+00
t-Butyl Methyl Ether	1634-04-4	9.50E-07	0.00E+00	0.00E+00	0.00E+00	1.51E-09	0.00E+00
Tetrachloroethene	127-18-4	0.00E+00	1.33E-06	2.25E-06	2.40E-06	2.59E-06	0.00E+00
Toluene	108-88-3	5.11E-06	9.69E-06	4.73E-05	2.63E-05	2.12E-05	2.96E-06
Trichloroethene	79-01-6	0.00E+00	0.00E+00	3.75E-06	0.00E+00	0.00E+00	0.00E+00
VOC	VOC	4.86E-04	1.12E-03	2.58E-03	2.54E-03	8.80E-04	5.05E-04

EMISSION FACTORS FOR AUTOCLAVE CURING

RECIPES 17 - 23

Analyte Name	Pollutant	EPA AP-42 Recipe Number						
		17	18	19	20	21	22	23
Total Method 25A Organics	TOG	1.29E-03	7.72E-05	7.99E-05	2.18E-05	1.83E-04	8.68E-05	8.88E-05
Total speciated organics	TSO	5.06E-03	2.21E-03	3.35E-04	2.34E-04	1.39E-03	1.57E-04	5.99E-04
Total organic HAPs	TOHAP	2.38E-03	1.38E-03	6.24E-05	1.13E-04	3.38E-04	6.02E-05	5.02E-04
Total HAPs	THAP	2.38E-03	1.38E-03	6.24E-05	1.13E-04	3.38E-04	6.02E-05	5.02E-04
1,1,1-Trichloroethane	71-55-6	1.02E-06	0.00E+00	1.93E-06	1.24E-05	0.00E+00	0.00E+00	0.00E+00
1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,2,4-Trichlorobenzene	120-82-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	0.00E+00	6.47E-08	9.80E-07	0.00E+00	0.00E+00	2.21E-07	2.41E-06
1,4-Dichlorobenzene	106-46-7	0.00E+00	2.41E-09	0.00E+00	0.00E+00	3.76E-09	3.74E-09	0.00E+00
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	2.74E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	1.76E-05	3.09E-08	1.07E-06	2.20E-06	2.03E-06	1.07E-07	0.00E+00
2-Chloro-1,3-Butadiene	126-99-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	0.00E+00	1.71E-08	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-Pentanone	108-10-1	2.80E-06	1.96E-05	0.00E+00	3.24E-06	0.00E+00	1.25E-05	0.00E+00
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	1.67E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-06	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	7.84E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	2.46E-07	2.15E-07	4.20E-07	2.72E-06	5.52E-08	4.90E-06	1.53E-07
Acrolein	107-02-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-06	0.00E+00	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aniline	62-53-3	8.68E-06	4.33E-07	0.00E+00	1.22E-07	0.00E+00	3.87E-06	3.77E-06
Benzene	71-43-2	0.00E+00	3.75E-07	2.40E-06	1.00E-06	4.69E-06	1.07E-05	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl	92-52-4	0.00E+00	5.22E-09	0.00E+00	0.00E+00	0.00E+00	3.69E-07	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	4.06E-08	3.08E-08	2.21E-07	7.66E-07	2.44E-06	1.17E-07	1.14E-05
Bromoform	75-25-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bromomethane	74-83-9	0.00E+00	0.00E+00	9.52E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Disulfide	75-15-0	0.00E+00	1.17E-03	0.00E+00	4.39E-06	1.04E-06	1.86E-06	8.59E-06
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.16E-07	0.00E+00	4.00E-06
Carbonyl Sulfide	463-58-1	0.00E+00	1.80E-04	2.85E-06	2.67E-05	2.69E-07	6.41E-07	4.87E-05
Chlorobenzene	108-90-7	0.00E+00	4.34E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroethane	75-00-3	3.40E-06	0.00E+00	0.00E+00	7.17E-06	0.00E+00	0.00E+00	0.00E+00
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.97E-07	0.00E+00	0.00E+00
Chloromethane	74-87-3	1.50E-05	0.00E+00	2.51E-06	5.67E-06	6.05E-06	1.29E-07	0.00E+00
Cumene	98-82-8	1.60E-07	3.53E-07	1.79E-05	8.83E-08	5.68E-07	1.51E-06	3.37E-08

EMISSION FACTORS FOR AUTOCLAVE CURING

RECIPES 17 - 23

Analyte Name	Pollutant	EPA AP-42 Recipe Number						
		17	18	19	20	21	22	23
Di-n-butylphthalate	84-74-2	0.00E+00	1.90E-09	4.93E-07	3.68E-07	1.70E-07	3.52E-07	1.49E-06
Dibenzofuran	132-64-9	0.00E+00	0.00E+00	0.00E+00	1.63E-08	0.00E+00	0.00E+00	8.98E-09
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Epichlorohydrin	106-89-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl Acrylate	140-88-5	8.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	100-41-4	0.00E+00	1.47E-07	5.47E-07	1.34E-06	2.00E-06	1.14E-06	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachlorobutadiene	87-68-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.29E-09	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-07
Hexane	110-54-3	1.91E-03	9.67E-08	4.00E-06	8.22E-06	1.44E-06	2.91E-07	1.05E-05
Isooctane	540-84-1	0.00E+00	0.00E+00	7.72E-07	1.17E-06	4.23E-06	1.14E-07	0.00E+00
Isophorone	78-59-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.58E-07	0.00E+00
m-Xylene + p-Xylene	MPXYL	8.06E-06	1.63E-06	1.70E-06	5.68E-06	7.36E-06	3.40E-06	1.99E-06
Methylene Chloride	75-09-2	2.80E-04	1.33E-07	6.32E-06	1.73E-05	4.83E-05	1.24E-05	1.85E-05
N-Nitrosodimethylamine	62-75-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	98-95-3	6.78E-07	8.54E-08	2.08E-07	2.89E-07	7.08E-08	2.45E-07	5.37E-07
o-Toluidine	95-53-4	0.00E+00	1.66E-08	0.00E+00	0.00E+00	0.00E+00	1.28E-07	0.00E+00
o-Xylene	95-47-6	8.61E-06	3.77E-08	8.14E-07	2.11E-06	9.89E-05	2.04E-06	0.00E+00
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	2.12E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	2.15E-05	8.28E-09	0.00E+00	3.12E-07	6.21E-08	0.00E+00	2.11E-07
Propanal	123-38-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	100-42-5	0.00E+00	2.25E-07	0.00E+00	0.00E+00	1.39E-09	8.24E-07	0.00E+00
t-Butyl Methyl Ether	1634-04-4	0.00E+00	1.62E-10	0.00E+00	0.00E+00	1.35E-04	7.80E-09	0.00E+00
Tetrachloroethene	127-18-4	0.00E+00	0.00E+00	4.76E-07	1.28E-06	1.59E-07	0.00E+00	0.00E+00
Toluene	108-88-3	1.75E-05	4.18E-06	7.34E-06	8.04E-06	1.50E-05	2.02E-06	3.90E-04
Trichloroethene	79-01-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VOC	VOC	4.78E-03	2.21E-03	3.26E-04	2.03E-04	1.34E-03	1.45E-04	5.81E-04

EMISSION FACTORS FOR HOT AIR CURING
RECIPES 1-10

Analyte Name	Pollutant	EPA AP-42 Recipe Number									
		1	2	3	4	5	6	7	8	9	10
Total Method 25A Organics	TOG	3.46E-03	2.19E-03	7.62E-03	2.17E-03	9.37E-04	2.17E-03	6.84E-03	8.25E-04	1.63E-03	1.63E-02
Total Speciated Organics	TSO	1.25E-03	1.36E-03	2.20E-03	1.31E-03	7.50E-04	2.42E-03	2.19E-03	1.90E-03	1.41E-03	6.93E-03
Total HAPs	THAP	5.18E-04	3.28E-04	1.45E-03	6.25E-04	3.65E-05	1.20E-03	1.03E-03	9.76E-04	3.75E-04	2.96E-03
Total Organic HAPs	TOHAP	5.18E-04	3.28E-04	1.45E-03	6.25E-04	3.65E-05	1.20E-03	1.03E-03	9.76E-04	3.75E-04	2.96E-03
1,1,1-Trichloroethane	71-55-6	0.00E+00	1.98E-06	7.85E-06	1.04E-06	1.12E-06	0.00E+00	0.00E+00	0.00E+00	1.80E-06	3.31E-06
1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	1.35E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.69E-06	0.00E+00
1,3-Butadiene	106-99-0	2.41E-06	0.00E+00	0.00E+00	5.34E-06	0.00E+00	0.00E+00	1.15E-05	1.24E-06	4.18E-06	0.00E+00
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	1.46E-04	3.92E-05	2.22E-05	6.74E-05	1.62E-06	1.08E-05	3.45E-05	0.00E+00	1.21E-05	2.92E-05
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-08
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	2.13E-06	2.05E-08	0.00E+00	1.48E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-pentanone	108-10-1	0.00E+00	4.85E-06	3.09E-04	3.67E-04	0.00E+00	7.54E-04	0.00E+00	0.00E+00	3.05E-06	1.02E-05
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	1.71E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.31E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	5.71E-05	5.25E-07	1.26E-06	9.24E-08	3.06E-07	1.89E-06	3.04E-06	2.13E-04	3.63E-05	2.08E-06
Acrolein	107-02-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.92E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aniline	62-53-3	0.00E+00	1.18E-05	0.00E+00	1.06E-05	0.00E+00	2.46E-06	0.00E+00	1.48E-07	1.26E-07	1.16E-07
Benzene	71-43-2	1.35E-06	1.14E-06	2.79E-06	2.82E-06	1.46E-06	0.00E+00	2.25E-06	4.88E-05	1.21E-06	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl	92-52-4	0.00E+00	0.00E+00	1.39E-06	1.33E-07	3.77E-07	2.89E-07	0.00E+00	3.92E-07	0.00E+00	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	9.62E-07	7.42E-07	2.93E-06	0.00E+00	0.00E+00	4.40E-06	8.23E-07	2.74E-07	1.74E-07	0.00E+00
Bromoform	75-25-2	6.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bromomethane	74-83-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Disulfide	75-15-0	0.00E+00	0.00E+00	0.00E+00	4.90E-06	1.60E-06	9.43E-05	0.00E+00	6.43E-04	1.64E-05	2.52E-03
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	2.93E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbonyl Sulfide	463-58-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.92E-05	0.00E+00	0.00E+00	2.83E-05	0.00E+00
Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloromethane	74-87-3	0.00E+00	7.67E-07	0.00E+00	7.35E-07	4.21E-07	8.02E-06	0.00E+00	0.00E+00	7.82E-07	2.28E-06
Cumene	98-82-8	7.18E-08	0.00E+00	9.86E-08	4.11E-08	0.00E+00	2.98E-07	2.05E-06	8.08E-08	7.82E-05	2.17E-05
Di-n-butylphthalate	84-74-2	1.97E-06	3.97E-07	1.35E-06	0.00E+00	7.61E-06	3.69E-07	0.00E+00	0.00E+00	3.23E-08	3.63E-07
Dibenzofuran	132-64-9	0.00E+00	5.20E-08	8.42E-07	3.47E-08	1.95E-06	8.14E-08	0.00E+00	2.10E-06	0.00E+00	0.00E+00
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

EMISSION FACTORS FOR HOT AIR CURING
RECIPES 1-10

Analyte Name	Pollutant	EPA AP-42 Recipe Number									
		1	2	3	4	5	6	7	8	9	10
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	3.87E-07	3.85E-08	4.65E-08	0.00E+00	0.00E+00	3.19E-08	0.00E+00	0.00E+00
Ethyl Acrylate	140-88-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	100-41-4	0.00E+00	3.57E-06	5.25E-06	2.87E-06	0.00E+00	5.99E-06	1.06E-04	0.00E+00	1.81E-06	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	0.00E+00	2.29E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexane	110-54-3	2.03E-04	2.65E-05	3.90E-05	3.85E-05	3.90E-06	3.66E-05	2.66E-04	3.13E-06	7.91E-05	4.08E-05
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	1.99E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isooctane	540-84-1	2.20E-06	1.89E-05	7.06E-06	2.36E-06	1.79E-06	3.92E-06	5.21E-06	0.00E+00	9.52E-06	7.85E-06
Isophorone	78-59-1	0.00E+00	1.63E-05	0.00E+00	1.46E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
m-Xylene	108-38-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E-06	0.00E+00	0.00E+00
m-Xylene + p-Xylene	MPXYL	6.46E-06	1.43E-05	1.75E-05	1.27E-05	0.00E+00	1.54E-05	3.55E-04	0.00E+00	1.19E-05	2.66E-05
Methylene Chloride	75-09-2	2.71E-05	2.34E-05	9.51E-04	4.59E-05	2.38E-06	6.13E-05	2.81E-05	3.61E-06	1.72E-05	2.23E-04
N,N-Dimethylaniline	121-69-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	91-20-3	6.15E-07	8.19E-07	7.59E-06	4.26E-07	3.23E-06	1.26E-06	1.06E-06	1.07E-06	6.87E-07	2.02E-07
Nitrobenzene	98-95-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Toluidine	95-53-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	2.36E-06	9.59E-06	7.88E-06	9.30E-06	5.44E-07	2.34E-05	1.90E-04	4.92E-05	4.10E-06	9.62E-06
p-Xylene	106-42-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-06	0.00E+00	0.00E+00	2.95E-06	0.00E+00	0.00E+00
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	1.78E-06	1.21E-06	6.82E-06	3.62E-07	1.20E-06	1.09E-06	5.90E-07	3.41E-07	1.46E-06	2.97E-07
Propanal	123-38-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	100-42-5	0.00E+00	0.00E+00	0.00E+00	1.09E-06	8.61E-07	1.05E-04	0.00E+00	4.25E-07	4.02E-06	5.37E-06
Substituted Quinoline	91-22-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.02E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	0.00E+00	1.01E-04	2.38E-06	1.62E-06	0.00E+00	2.50E-06	0.00E+00	0.00E+00	2.77E-06	3.01E-06
Toluene	108-88-3	4.06E-05	5.09E-05	5.21E-05	1.48E-05	2.75E-06	1.34E-05	2.59E-05	4.37E-06	5.56E-05	4.54E-05
Trichloroethene	79-01-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VOC	VOC	3.43E-03	2.06E-03	6.66E-03	2.12E-03	9.34E-04	2.36E-03	6.81E-03	1.90E-03	1.61E-03	1.61E-02

EMISSION FACTORS FOR HOT AIR CURING
RECIPE NUMBERS 11-16

		EPA AP-42 Recipe Number					
Analyte Name	**Pollutant**	**11**	**12**	**13**	**14**	**15**	**16**
Total Method 25A Organics	TOG	1.84E-03	8.65E-04	1.28E-02	1.29E-02	5.27E-04	4.58E-03
Total Speciated Organics	TSO	8.67E-04	1.65E-03	3.77E-03	3.74E-03	1.51E-03	7.48E-04
Total HAPs	THAP	2.81E-04	1.37E-03	3.96E-04	1.04E-03	1.37E-03	1.16E-04
Total Organic HAPs	TOHAP	2.81E-04	1.37E-03	3.96E-04	1.04E-03	1.37E-03	1.16E-04
1,1,1-Trichloroethane	71-55-6	0.00E+00	7.25E-07	1.31E-06	8.89E-07	4.50E-07	4.32E-07
1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	5.40E-06	3.42E-07	0.00E+00
1,3-Butadiene	106-99-0	9.41E-06	2.11E-06	2.77E-06	5.90E-06	1.52E-06	0.00E+00
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	2.13E-06	2.02E-05	7.92E-06	7.62E-06	2.16E-06	9.74E-07
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-pentanone	108-10-1	1.67E-06	0.00E+00	2.43E-06	2.03E-05	1.21E-06	2.13E-06
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-05	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	5.64E-06	8.49E-06	1.28E-06	4.19E-07	2.71E-07	2.73E-07
Acrolein	107-02-8	0.00E+00	0.00E+00	1.75E-05	2.03E-05	0.00E+00	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	0.00E+00	2.35E-05	2.89E-04	0.00E+00	0.00E+00
Aniline	62-53-3	5.88E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	71-43-2	0.00E+00	8.97E-07	1.63E-05	1.29E-05	4.29E-07	6.43E-07
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-07	0.00E+00
Biphenyl	92-52-4	0.00E+00	0.00E+00	0.00E+00	3.04E-08	0.00E+00	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	6.63E-06	2.20E-07	1.82E-05	0.00E+00	1.13E-06	8.73E-07
Bromoform	75-25-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bromomethane	74-83-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Disulfide	75-15-0	2.13E-04	1.11E-03	2.05E-05	1.05E-04	3.78E-06	1.11E-06
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-03	0.00E+00
Carbonyl Sulfide	463-58-1	0.00E+00	1.51E-04	1.44E-05	2.79E-04	6.72E-05	0.00E+00
Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.19E-05
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	6.04E-07	1.60E-05	3.03E-07
Chloromethane	74-87-3	0.00E+00	5.69E-07	1.58E-06	8.89E-07	2.52E-06	3.55E-07
Cumene	98-82-8	6.59E-08	2.23E-06	2.43E-06	0.00E+00	7.20E-08	0.00E+00
Di-n-butylphthalate	84-74-2	0.00E+00	1.46E-07	8.22E-06	2.20E-07	0.00E+00	9.06E-08
Dibenzofuran	132-64-9	0.00E+00	0.00E+00	0.00E+00	5.94E-08	1.82E-08	0.00E+00
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.03E-07	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	0.00E+00	7.39E-08	5.38E-08	7.69E-08
Ethyl Acrylate	140-88-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	100-41-4	1.68E-06	1.41E-06	5.13E-06	1.51E-06	1.19E-06	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.03E-05	0.00E+00
Hexane	110-54-3	6.99E-06	1.15E-05	5.04E-05	1.67E-05	1.94E-05	4.47E-05
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isooctane	540-84-1	1.81E-06	6.07E-06	5.84E-06	6.42E-06	1.18E-06	0.00E+00
Isophorone	78-59-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
m-Xylene	108-38-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
m-Xylene + p-Xylene	MPXYL	3.71E-06	9.00E-06	1.96E-05	8.24E-06	7.56E-06	2.63E-06
Methylene Chloride	75-09-2	1.23E-05	1.60E-05	5.46E-06	4.13E-05	1.73E-05	1.23E-05
N,N-Dimethylaniline	121-69-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	91-20-3	2.18E-07	7.44E-07	2.81E-07	0.00E+00	6.84E-07	2.77E-07

EMISSION FACTORS FOR HOT AIR CURING
RECIPE NUMBERS 11-16

		EPA AP-42 Recipe Number					
Analyte Name	**Pollutant**	**11**	**12**	**13**	**14**	**15**	**16**
Nitrobenzene	98-95-3	4.97E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Toluidine	95-53-4	0.00E+00	2.03E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	3.27E-06	4.14E-06	8.74E-06	4.21E-06	1.99E-06	1.35E-06
p-Xylene	106-42-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	1.12E-07	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	2.27E-07	6.71E-07	1.03E-06	1.31E-06	6.63E-07	1.12E-06
Propanal	123-38-6	0.00E+00	0.00E+00	8.19E-05	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	1.72E-04	0.00E+00	0.00E+00
Styrene	100-42-5	1.23E-06	0.00E+00	1.33E-06	1.60E-06	0.00E+00	0.00E+00
Substituted Quinoline	91-22-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	5.93E-07	1.94E-06	3.28E-06	3.49E-06	1.71E-05	0.00E+00
Toluene	108-88-3	9.65E-06	1.41E-05	6.88E-05	3.83E-05	7.79E-06	4.31E-06
Trichloroethene	79-01-6	0.00E+00	0.00E+00	5.46E-06	0.00E+00	0.00E+00	0.00E+00
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.24E-07	0.00E+00
VOC	VOC	1.83E-03	1.63E-03	1.28E-02	1.29E-02	1.48E-03	4.57E-03

EMISSION FACTORS FOR HOT AIR CURING
RECIPES 17-23

		EPA AP-42 Recipe Number						
Analyte Name	**Pollutant**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Total Method 25A Organics	TOG	2.49E-02	3.64E-03	1.55E-03	4.22E-04	8.78E-03	2.94E-03	1.72E-03
Total Speciated Organics	TSO	7.36E-03	3.02E-03	4.88E-04	3.40E-04	3.30E-03	3.01E-03	8.72E-04
Total HAPs	THAP	3.46E-03	1.15E-03	9.08E-05	1.64E-04	2.77E-04	1.74E-03	7.31E-04
Total Organic HAPs	TOHAP	3.46E-03	1.15E-03	9.08E-05	1.64E-04	2.77E-04	1.74E-03	7.31E-04
1,1,1-Trichloroethane	71-55-6	1.48E-06	0.00E+00	2.81E-06	1.80E-05	2.57E-07	0.00E+00	0.00E+00
1,1-Dichloroethene	75-35-4	0.00E+00	2.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	0.00E+00	4.43E-06	1.43E-06	0.00E+00	0.00E+00	0.00E+00	3.52E-06
2,4-Dinitrophenol	51-28-5	0.00E+00	0.00E+00	3.98E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone	78-93-3	2.56E-05	3.10E-05	1.55E-06	3.20E-06	1.16E-05	0.00E+00	0.00E+00
2-Chloroacetophenone	532-27-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	0.00E+00	2.50E-08	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-pentanone	108-10-1	4.08E-06	1.13E-04	0.00E+00	4.71E-06	6.81E-07	0.00E+00	0.00E+00
4-Nitrophenol	100-02-7	0.00E+00	0.00E+00	2.44E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	1.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	3.58E-07	1.41E-06	6.11E-07	3.96E-06	4.33E-07	1.46E-05	2.22E-07
Acrolein	107-02-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.60E-06	9.34E-06	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	1.97E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aniline	62-53-3	1.26E-05	4.09E-06	0.00E+00	1.77E-07	0.00E+00	8.85E-07	5.48E-06
Benzene	71-43-2	0.00E+00	9.30E-07	3.49E-06	1.46E-06	0.00E+00	4.04E-06	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl	92-52-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.96E-06	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	5.92E-08	5.42E-07	3.22E-07	1.12E-06	3.24E-06	1.05E-06	1.66E-05
Bromoform	75-25-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bromomethane	74-83-9	0.00E+00	0.00E+00	1.39E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Disulfide	75-15-0	0.00E+00	8.72E-04	0.00E+00	6.40E-06	1.07E-06	1.53E-03	1.25E-05
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.82E-06
Carbonyl Sulfide	463-58-1	0.00E+00	0.00E+00	4.16E-06	3.89E-05	8.67E-06	0.00E+00	7.09E-05
Chloroethane	75-00-3	4.95E-06	0.00E+00	0.00E+00	1.04E-05	0.00E+00	0.00E+00	0.00E+00
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.23E-07	0.00E+00	0.00E+00
Chloromethane	74-87-3	2.18E-05	0.00E+00	3.65E-06	8.25E-06	9.68E-06	0.00E+00	0.00E+00
Cumene	98-82-8	2.32E-07	2.97E-06	2.60E-05	1.29E-07	6.89E-07	3.86E-07	4.90E-08
Di-n-butylphthalate	84-74-2	0.00E+00	2.04E-06	7.17E-07	5.35E-07	7.03E-06	1.00E-06	2.16E-06
Dibenzofuran	132-64-9	0.00E+00	0.00E+00	0.00E+00	2.37E-08	7.53E-09	3.29E-06	1.31E-08
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

EMISSION FACTORS FOR HOT AIR CURING
RECIPES 17-23

		EPA AP-42 Recipe Number						
Analyte Name	**Pollutant**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl Acrylate	140-88-5	1.16E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	100-41-4	0.00E+00	6.84E-06	7.97E-07	1.95E-06	0.00E+00	0.00E+00	0.00E+00
Hexachlorobenzene	118-74-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-07
Hexane	110-54-3	2.78E-03	9.92E-06	5.83E-06	1.20E-05	6.23E-06	6.86E-06	1.53E-05
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isooctane	540-84-1	0.00E+00	1.84E-06	1.12E-06	1.70E-06	5.21E-06	0.00E+00	0.00E+00
Isophorone	78-59-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.68E-08	0.00E+00	0.00E+00
m-Xylene	108-38-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
m-Xylene + p-Xylene	MPXYL	1.17E-05	2.18E-05	2.48E-06	8.27E-06	3.51E-06	0.00E+00	2.90E-06
Methylene Chloride	75-09-2	4.08E-04	2.14E-05	9.20E-06	2.53E-05	6.96E-06	1.32E-06	2.70E-05
N,N-Dimethylaniline	121-69-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-06	0.00E+00
Naphthalene	91-20-3	9.87E-07	8.14E-07	3.03E-07	4.21E-07	3.08E-07	2.32E-06	7.82E-07
Nitrobenzene	98-95-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Toluidine	95-53-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	1.25E-05	9.01E-06	1.18E-06	3.07E-06	3.92E-06	0.00E+00	0.00E+00
p-Xylene	106-42-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.53E-05	0.00E+00
Pentachlorophenol	87-86-5	0.00E+00	0.00E+00	3.08E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	108-95-2	3.13E-05	1.39E-06	0.00E+00	4.54E-07	2.30E-07	2.16E-06	3.07E-07
Propanal	123-38-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	100-42-5	0.00E+00	1.34E-06	0.00E+00	0.00E+00	1.56E-06	4.51E-07	0.00E+00
Substituted Quinoline	91-22-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-04	0.00E+00
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-04	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	0.00E+00	1.89E-06	6.93E-07	1.87E-06	0.00E+00	0.00E+00	0.00E+00
Toluene	108-88-3	2.55E-05	1.70E-05	1.07E-05	1.17E-05	3.40E-06	5.25E-06	5.68E-04
Trichloroethene	79-01-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VOC	VOC	2.45E-02	3.62E-03	1.54E-03	3.77E-04	8.77E-03	3.01E-03	1.69E-03

EMISSION FACTORS FOR PLATEN PRESS CURING
RECIPES 1-10

Analyte Name	Pollutant	EPA AP-42 Recipe Number									
		1	2	3	4	5	6	7	8	9	10
Total Method 25A Organics	TOG	8.27E-04	4.04E-04	1.04E-03	1.18E-03	5.87E-04	1.18E-03	2.36E-04	4.49E-04	1.75E-03	8.66E-04
Total Speciated Organics	TSO	2.54E-04	9.19E-04	5.15E-04	1.04E-03	2.92E-04	1.92E-03	1.46E-04	1.44E-03	1.04E-03	1.63E-03
Total HAPs	THAP	2.99E-05	7.23E-04	1.57E-04	4.96E-04	8.36E-05	9.52E-04	4.85E-05	1.09E-03	5.05E-04	1.34E-03
Total Organic HAPs	TOHAP	2.99E-05	7.23E-04	1.57E-04	4.96E-04	8.36E-05	9.52E-04	4.85E-05	1.09E-03	5.05E-04	4.35E-04
1,1,1-Trichloroethane	71-55-6	3.54E-06	2.52E-06	3.15E-06	8.26E-07	3.80E-06	0.00E+00	4.19E-06	5.22E-07	4.20E-06	2.52E-06
1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	1.07E-05	0.00E+00	0.00E+00	0.00E+00	1.96E-06	0.00E+00	0.00E+00
1,2,4-Trichlorobenzene	120-82-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	0.00E+00	1.20E-05	0.00E+00	4.24E-06	5.84E-06	0.00E+00	9.42E-06	2.20E-06	7.53E-06	7.43E-06
1,4-Dichlorobenzene	106-46-7	1.03E-07	7.63E-08	5.52E-08	0.00E+00	0.00E+00	0.00E+00	5.42E-08	0.00E+00	0.00E+00	5.53E-08
2-Butanone	78-93-3	1.84E-06	2.77E-06	2.89E-06	5.35E-05	2.04E-06	8.61E-06	0.00E+00	9.92E-06	3.02E-06	0.00E+00
2-Chloro-1,3-Butadiene	126-99-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	2.98E-08	1.63E-08	0.00E+00	1.17E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-pentanone	108-10-1	0.00E+00	0.00E+00	-1.16E-04	2.92E-04	0.00E+00	5.99E-04	0.00E+00	2.48E-06	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.69E-06	0.00E+00	0.00E+00	0.00E+00	7.64E-06	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.47E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	5.09E-07	1.39E-06	4.25E-07	7.33E-08	0.00E+00	1.50E-06	8.74E-07	2.52E-07	4.40E-04	4.36E-07
Acrolein	107-02-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E-06	0.00E+00	0.00E+00
Aniline	62-53-3	0.00E+00	4.16E-07	7.08E-07	8.40E-06	2.01E-06	1.95E-06	0.00E+00	1.51E-07	0.00E+00	0.00E+00
Benzene	71-43-2	1.08E-06	1.36E-06	1.18E-06	2.24E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.53E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl	92-52-4	0.00E+00	0.00E+00	1.40E-07	1.06E-07	3.06E-07	2.30E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	4.20E-06	2.48E-06	2.14E-06	0.00E+00	3.83E-06	3.49E-06	1.15E-05	0.00E+00	2.60E-06	2.83E-06
Carbon Disulfide	75-15-0	2.16E-06	5.35E-04	3.15E-06	3.89E-06	3.46E-06	7.49E-05	0.00E+00	5.48E-04	4.20E-06	1.32E-03
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbonyl Sulfide	463-58-1	0.00E+00	3.65E-05	0.00E+00	0.00E+00	0.00E+00	3.11E-05	0.00E+00	4.39E-04	0.00E+00	0.00E+00
Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloromethane	74-87-3	1.06E-06	0.00E+00	7.87E-07	5.83E-07	0.00E+00	6.36E-06	0.00E+00	7.31E-07	0.00E+00	0.00E+00
Cumene	98-82-8	3.64E-08	5.90E-08	5.96E-08	3.26E-08	9.03E-08	2.36E-07	7.43E-08	1.89E-06	2.76E-06	3.20E-08
Di-n-butylphthalate	84-74-2	5.47E-08	2.11E-06	3.01E-07	0.00E+00	1.39E-07	2.93E-07	7.80E-07	1.46E-07	7.16E-06	8.30E-08
Dibenzofuran	132-64-9	6.38E-08	5.04E-08	1.54E-07	2.75E-08	0.00E+00	6.46E-08	0.00E+00	0.00E+00	0.00E+00	2.77E-08
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	7.78E-08	0.00E+00	3.06E-08	1.80E-07	0.00E+00	0.00E+00	0.00E+00	6.72E-08	0.00E+00
Ethylbenzene	100-41-4	0.00E+00	0.00E+00	0.00E+00	2.28E-06	1.34E-06	4.75E-06	0.00E+00	2.16E-06	0.00E+00	0.00E+00
Hexachlorobutadiene	87-68-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E-07	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

EMISSION FACTORS FOR PLATEN PRESS CURING
RECIPES 1-10

Analyte Name	Pollutant	EPA AP-42 Recipe Number									
		1	2	3	4	5	6	7	8	9	10
Hexane	110-54-3	7.49E-06	1.03E-05	6.96E-06	3.05E-05	1.66E-05	2.91E-05	9.22E-06	2.50E-05	1.64E-05	4.12E-06
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	1.58E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isooctane	540-84-1	0.00E+00	0.00E+00	0.00E+00	1.88E-06	0.00E+00	3.11E-06	0.00E+00	4.81E-06	0.00E+00	0.00E+00
Isophorone	78-59-1	0.00E+00	0.00E+00	0.00E+00	1.16E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
m-Xylene + p-Xylene	MPXYL	1.01E-06	1.91E-06	9.03E-06	1.01E-05	9.24E-06	1.22E-05	3.20E-06	8.50E-06	0.00E+00	0.00E+00
Methylene Chloride	75-09-2	1.61E-06	1.57E-06	1.57E-06	3.65E-05	1.67E-06	4.87E-05	1.61E-06	9.40E-06	1.84E-06	1.57E-06
Naphthalene	91-20-3	3.29E-07	4.59E-07	5.78E-07	3.38E-07	1.57E-06	9.98E-07	2.37E-06	5.32E-07	4.04E-06	2.81E-07
o-Toluidine	95-53-4	0.00E+00	1.59E-06	0.00E+00	0.00E+00	0.00E+00	4.36E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	0.00E+00	0.00E+00	0.00E+00	7.38E-06	2.01E-06	1.86E-05	1.78E-06	3.03E-06	0.00E+00	0.00E+00
Phenol	108-95-2	6.12E-07	5.37E-07	5.19E-07	2.87E-07	9.68E-07	8.66E-07	4.22E-07	6.23E-07	1.28E-06	4.18E-07
Propylene Oxide	75-56-9	0.00E+00	1.04E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	100-42-5	0.00E+00	0.00E+00	0.00E+00	8.69E-07	0.00E+00	8.31E-05	0.00E+00	8.06E-07	0.00E+00	0.00E+00
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.36E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	0.00E+00	0.00E+00	5.35E-07	1.29E-06	0.00E+00	1.98E-06	0.00E+00	1.51E-06	0.00E+00	0.00E+00
Toluene	108-88-3	4.23E-06	6.20E-06	6.03E-06	1.17E-05	1.18E-05	1.07E-05	3.00E-06	2.57E-05	2.72E-06	2.76E-06
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VOC	VOC	8.22E-04	9.15E-04	1.03E-03	1.14E-03	5.82E-04	1.87E-03	2.30E-04	1.43E-03	1.74E-03	1.63E-03

EMISSION FACTORS FOR PLATEN PRESS CURING
RECIPES 11-16

		EPA AP-42 Recipe Number					
Analyte Name	**Pollutant**	**11**	**12**	**13**	**14**	**15**	**16**
Total Method 25A Organics	TOG	2.40E-04	6.66E-04	1.42E-03	5.30E-04	2.87E-04	8.08E-04
Total Speciated Organics	TSO	7.31E-04	9.76E-04	1.57E-03	1.33E-03	1.20E-03	3.49E-04
Total HAPs	THAP	4.35E-04	6.68E-04	1.36E-03	1.03E-03	1.09E-03	6.37E-05
Total Organic HAPs	TOHAP	6.68E-04	1.36E-03	1.03E-03	1.09E-03	6.37E-05	1.06E-03
1,1,1-Trichloroethane	71-55-6	0.00E+00	3.03E-05	3.56E-04	2.05E-06	3.57E-07	2.45E-06
1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-07	0.00E+00
1,2,4-Trichlorobenzene	120-82-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	0.00E+00	0.00E+00	0.00E+00	2.17E-05	1.21E-06	0.00E+00
1,4-Dichlorobenzene	106-46-7	0.00E+00	5.78E-08	0.00E+00	8.94E-08	0.00E+00	9.15E-08
2-Butanone	78-93-3	0.00E+00	1.18E-06	0.00E+00	0.00E+00	1.72E-06	1.20E-06
2-Chloro-1,3-Butadiene	126-99-8	9.08E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-pentanone	108-10-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.58E-07	0.00E+00
Acetaldehyde	75-07-0	1.65E-06	0.00E+00	0.00E+00	0.00E+00	1.00E-05	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	0.00E+00	2.17E-06	5.05E-07	2.16E-06	2.15E-07	6.44E-07
Acrolein	107-02-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	0.00E+00	0.00E+00	3.02E-05	0.00E+00	0.00E+00
Aniline	62-53-3	2.46E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	71-43-2	0.00E+00	0.00E+00	0.00E+00	1.15E-06	3.41E-07	9.88E-07
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.52E-07	0.00E+00
Biphenyl	92-52-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	1.67E-06	3.63E-06	1.78E-05	2.41E-06	8.98E-07	3.07E-06
Carbon Disulfide	75-15-0	3.47E-04	5.75E-04	9.50E-04	8.67E-04	3.00E-06	5.66E-06
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.15E-04	0.00E+00
Carbonyl Sulfide	463-58-1	6.60E-07	4.39E-05	3.32E-05	8.80E-05	5.33E-05	0.00E+00
Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-06
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-05	0.00E+00
Chloromethane	74-87-3	0.00E+00	8.77E-07	0.00E+00	0.00E+00	2.00E-06	6.61E-07
Cumene	98-82-8	3.44E-08	4.00E-08	4.55E-08	5.08E-08	5.71E-08	0.00E+00
Di-n-butylphthalate	84-74-2	0.00E+00	2.58E-07	0.00E+00	4.78E-07	0.00E+00	5.40E-08
Dibenzofuran	132-64-9	0.00E+00	5.64E-08	3.27E-08	5.70E-08	1.45E-08	4.05E-08
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-07	0.00E+00
Dimethylphthalate	131-11-3	0.00E+00	0.00E+00	0.00E+00	6.62E-08	4.27E-08	5.55E-08
Ethylbenzene	100-41-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.47E-07	0.00E+00
Hexachlorobutadiene	87-68-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachloroethane	67-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E-05	0.00E+00
Hexane	110-54-3	3.12E-05	2.69E-06	0.00E+00	6.50E-06	1.54E-05	5.25E-06
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isooctane	540-84-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.34E-07	0.00E+00
Isophorone	78-59-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
m-Xylene + p-Xylene	MPXYL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.00E-06	0.00E+00
Methylene Chloride	75-09-2	2.83E-06	1.64E-06	1.67E-06	1.54E-06	1.37E-05	1.57E-06
Naphthalene	91-20-3	1.62E-06	3.71E-07	3.31E-07	6.12E-07	5.42E-07	3.50E-07
o-Toluidine	95-53-4	0.00E+00	2.21E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-06	0.00E+00
Phenol	108-95-2	4.53E-07	5.37E-07	7.79E-07	2.67E-06	5.26E-07	5.19E-07
Propylene Oxide	75-56-9	3.63E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	100-42-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

EMISSION FACTORS FOR PLATEN PRESS CURING
RECIPES 11-16

		EPA AP-42 Recipe Number					
Analyte Name	**Pollutant**	**11**	**12**	**13**	**14**	**15**	**16**
Tetrachloroethene	127-18-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-05	0.00E+00
Toluene	108-88-3	2.30E-06	2.98E-06	0.00E+00	3.87E-06	6.18E-06	3.96E-05
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.57E-07	0.00E+00
VOC	VOC	7.28E-04	9.44E-04	1.21E-03	1.33E-03	1.17E-03	8.04E-04

EMISSION FACTORS FOR PLATEN PRESS CURING
RECIPES 17-23

		EPA AP-42 Recipe Number						
Analyte Name	Pollutant	17	18	19	20	21	22	23
Total Method 25A Organics	TOG	6.23E-03	1.98E-03	6.68E-03	6.13E-04	4.78E-03	4.78E-04	2.83E-04
Total Speciated Organics	TSO	2.78E-03	2.40E-03	3.29E-03	3.23E-04	2.62E-03	2.95E-04	2.30E-04
Total HAPs	THAP	1.06E-03	9.11E-04	3.47E-04	7.45E-05	2.20E-04	2.06E-04	7.26E-05
Total Organic HAPs	TOHAP	9.11E-04	3.47E-04	0.00E+00	7.45E-05	2.20E-04	2.06E-04	7.26E-05
1,1,1-Trichloroethane	71-55-6	1.51E-05	0.00E+00	2.25E-06	3.34E-06	2.04E-07	4.51E-06	2.04E-06
1,1-Dichloroethene	75-35-4	0.00E+00	1.72E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,2,4-Trichlorobenzene	120-82-1	1.66E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	106-99-0	0.00E+00	3.52E-06	1.00E-05	2.56E-05	0.00E+00	0.00E+00	6.77E-06
1,4-Dichlorobenzene	106-46-7	5.27E-08	0.00E+00	5.11E-08	9.11E-08	0.00E+00	0.00E+00	8.08E-08
2-Butanone	78-93-3	0.00E+00	2.46E-05	1.30E-05	1.76E-06	9.24E-06	0.00E+00	1.30E-06
2-Chloro-1,3-Butadiene	126-99-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.01E-06	0.00E+00
2-Methylphenol	95-48-7	0.00E+00	0.00E+00	0.00E+00	1.42E-08	0.00E+00	0.00E+00	0.00E+00
4-Methyl-2-pentanone	108-10-1	0.00E+00	8.93E-05	0.00E+00	0.00E+00	5.40E-07	0.00E+00	0.00E+00
Acetaldehyde	75-07-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.01E-06	0.00E+00
Acetonitrile	75-05-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetophenone	98-86-2	6.49E-07	1.12E-06	2.25E-07	8.33E-07	3.43E-07	4.01E-06	3.37E-07
Acrolein	107-02-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-06	0.00E+00	0.00E+00
Acrylonitrile	107-13-1	0.00E+00	1.56E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aniline	62-53-3	1.02E-03	3.25E-06	0.00E+00	0.00E+00	0.00E+00	4.25E-06	2.83E-06
Benzene	71-43-2	1.06E-06	7.38E-07	5.62E-06	1.00E-06	0.00E+00	0.00E+00	0.00E+00
Benzidine	92-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.81E-07	0.00E+00
Biphenyl	92-52-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
bis(2-Ethylhexyl)phthalate	117-81-7	4.14E-06	4.30E-07	4.41E-06	2.57E-06	2.57E-06	2.67E-06	6.50E-06
Carbon Disulfide	75-15-0	6.29E-06	6.92E-04	0.00E+00	4.25E-06	8.52E-07	1.63E-04	8.64E-06
Carbon Tetrachloride	56-23-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbonyl Sulfide	463-58-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.88E-06	0.00E+00	2.65E-05
Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.36E-07	0.00E+00	0.00E+00
Chloromethane	74-87-3	1.04E-06	0.00E+00	0.00E+00	9.73E-07	7.68E-06	0.00E+00	1.05E-06
Cumene	98-82-8	4.82E-08	2.36E-06	0.00E+00	4.27E-08	5.47E-07	9.44E-08	2.24E-08
Di-n-butylphthalate	84-74-2	9.64E-06	1.62E-06	2.16E-07	4.47E-07	5.58E-06	1.35E-07	3.59E-06
Dibenzofuran	132-64-9	3.31E-08	0.00E+00	0.00E+00	3.99E-08	5.98E-09	0.00E+00	4.19E-08
Dimethylaminoazobenzene	60-11-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylphthalate	131-11-3	6.18E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.87E-08	0.00E+00
Ethylbenzene	100-41-4	0.00E+00	5.43E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexachlorobutadiene	87-68-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

EMISSION FACTORS FOR PLATEN PRESS CURING
RECIPES 17-23

		EPA AP-42 Recipe Number						
Analyte Name	Pollutant	17	18	19	20	21	22	23
Hexachloroethane	67-72-1	0	0	0	0	0	0	0
Hexane	110-54-3	5.26E-06	7.87E-06	3.00E-04	2.63E-05	4.95E-06	8.53E-06	4.96E-06
Hydroquinone	123-31-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isooctane	540-84-1	0.00E+00	1.46E-06	0.00E+00	0.00E+00	4.14E-06	0.00E+00	0.00E+00
Isophorone	78-59-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.69E-08	0.00E+00	0.00E+00
m-Xylene + p-Xylene	MPXYL	0.00E+00	1.73E-05	0.00E+00	0.00E+00	2.78E-06	0.00E+00	0.00E+00
Methylene Chloride	75-09-2	1.57E-06	1.70E-05	1.56E-06	1.71E-06	5.52E-06	2.34E-06	1.60E-06
Naphthalene	91-20-3	5.23E-07	6.46E-07	0.00E+00	3.70E-07	2.44E-07	3.00E-06	3.71E-07
o-Toluidine	95-53-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	95-47-6	0.00E+00	7.15E-06	0.00E+00	0.00E+00	3.11E-06	0.00E+00	0.00E+00
Phenol	108-95-2	0.00E+00	1.10E-06	0.00E+00	5.85E-07	1.83E-07	5.52E-07	3.96E-07
Propylene Oxide	75-56-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	100-42-5	0.00E+00	1.06E-06	0.00E+00	0.00E+00	1.24E-06	0.00E+00	0.00E+00
t-Butyl Methyl Ether	1634-04-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-04	0.00E+00	0.00E+00
Tetrachloroethene	127-18-4	0.00E+00	1.50E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	108-88-3	3.27E-06	1.35E-05	9.94E-06	4.49E-06	2.69E-06	4.22E-06	5.57E-06
Vinyl Chloride	75-01-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VOC	VOC	6.21E-03	2.38E-03	6.68E-03	6.08E-04	4.77E-03	4.71E-04	2.79E-04

EMISSION FACTORS FOR GRINDING

		Material Processed			
Analyte Name	**Pollutant**	**Belt lb/lb rubber removed**	**Carcass lb/lb rubber removed**	**Retread lb/lb rubber processed**	**Sidewall/ Whitewall lb/lb rubber removed**
Total Method 25A Organics	TOG	1.78E-03	5.21E-04	2.43E-04	1.59E-02
Total Speciated Organics	TSO	2.66E-03	1.63E-02	6.36E-04	1.10E-02
Total Organic HAPs	TOHAP	2.15E-03	1.39E-02	1.33E-05	1.12E-03
Total Metal HAPs	TMHAP	1.34E-05	6.35E-06	6.44E-08	3.72E-05
Total HAPs	THAP	2.17E-03	1.39E-02	1.33E-05	1.16E-03
Total Particulate Matter	TPM	2.26E-04	5.45E-01	9.09E-07	1.96E-04
1,1,1-Trichloroethane	71-55-6	0	3.58E-07	2.19E-08	0
1,3-Butadiene	106-99-0	2.41E-05	2.65E-05	4.39E-08	2.40E-05
1,4-Dichlorobenzene	106-46-7	0	0	6.77E-09	0
2-Butanone	78-93-3	6.22E-06	5.13E-07	1.51E-08	2.97E-05
2-Chloro-1,3-Butadiene	126-99-8	8.16E-05	0	0	0
2-Methylphenol	95-48-7	0	0	3.91E-09	0
4-Methyl-2-pentanone	108-10-1	0	1.92E-05	8.44E-07	0
4-Nitrobiphenyl	92-93-3	3.80E-07	0	0	0
Acetaldehyde	75-07-0	1.53E-05	0	0	0
Acetophenone	98-86-2	1.77E-05	7.13E-07	1.89E-08	3.37E-06
Acrolein	107-02-8	6.44E-06	1.68E-06	4.70E-07	0
Aniline	62-53-3	0	1.97E-05	6.66E-08	4.05E-04
Benzene	71-43-2	0	4.13E-06	9.96E-06	1.33E-05
Biphenyl	92-52-4	0	0	6.63E-09	0
bis(2-Ethylhexyl)phthalate	117-81-7	5.30E-05	7.94E-06	1.99E-08	2.76E-05
Cadmium (Cd) Compounds	CD	1.40E-07	8.58E-07	0	7.38E-07
Carbon Disulfide	75-15-0	3.03E-04	2.58E-06	6.77E-07	1.90E-05
Carbonyl Sulfide	463-58-1	7.14E-06	8.70E-06	0	0
Chloromethane	74-87-3	0	0	7.12E-09	0

EMISSION FACTORS FOR GRINDING

		Material Processed			
Analyte Name	**Pollutant**	**Belt lb/lb rubber removed**	**Carcass lb/lb rubber removed**	**Retread lb/lb rubber processed**	**Sidewall/ Whitewall lb/lb rubber removed**
Chromium (Cr) Compounds	CR	2.58E-06	1.44E-06	3.79E-08	1.34E-05
Cobalt (Co) Compounds	COB	0	0	8.74E-09	0
Cumene	98-82-8	0	0	0	1.13E-06
Di-n-butylphthalate	84-74-2	3.31E-06	2.24E-06	3.87E-08	2.54E-06
Dibenzofuran	132-64-9	0	1.59E-07	0	0
Ethylbenzene	100-41-4	0	0	0	5.70E-05
Hexane	110-54-3	4.18E-05	1.60E-05	0	1.24E-04
Isooctane	540-84-1	0	1.09E-05	0	1.15E-04
Isophorone	78-59-1	0	0	6.46E-09	0
Lead (Pb) Compounds	PB	1.59E-06	2.02E-06	0	1.55E-05
m-Xylene + p-Xylene	MPXYL	8.51E-06	2.23E-06	5.36E-08	3.18E-05
Methylene Chloride	75-09-2	4.98E-05	4.19E-03	1.67E-07	2.76E-05
Naphthalene	91-20-3	4.02E-06	5.81E-07	2.11E-08	3.81E-06
Nickel (Ni) Compounds	NI	9.13E-06	2.03E-06	1.78E-08	7.51E-06
o-Toluidine	95-53-4	0	2.55E-06	0	0
o-Xylene	95-47-6	5.40E-06	0	4.17E-08	1.86E-05
Phenol	108-95-2	8.88E-06	1.66E-06	3.04E-07	1.57E-05
Propylene Oxide	75-56-9	3.06E-05	0	0	0
Styrene	100-42-5	0	0	9.86E-08	1.69E-05
Tetrachloroethene	127-18-4	1.39E-04	0	7.58E-09	0
Toluene	108-88-3	1.35E-03	9.59E-03	3.82E-07	1.86E-04
Trichloroethene	79-01-6	0	1.95E-06	0	0
VOC	VOC	2.47E-03	1.21E-02	6.36E-04	1.59E-02