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Development of Emission Factors for the Rubber Manufacturing Industry

Volume 1: Emission Factor Program Results - Final Report

Volume 3: Test Program Protocol - Jan '95

Presented to

Rubber Manufacturers Association

RMA

Presented by

TRC

TRC Environmental Corporation

May 1995

Vol 1 revised submitted by Dale Loude at 6-12-95 meeting

TRC Project No. 16157

May 1995

DEVELOPMENT OF EMISSION FACTORS FOR THE RUBBER MANUFACTURING INDUSTRY

Volume 1

Emission Factor Program Results
Final Report

Prepared for

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DISCLAIMER

DEVELOPMENT OF EMISSION FACTORS FOR THE RUBBER MANUFACTURING INDUSTRY

OVERVIEW

The contributions of the members of the Environment Committee of the Rubber Manufacturers Association in the preparation of this document are hereby gratefully acknowledged.

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The Rubber Manufacturers Association is a cooperative manufacturing trade association with more than 150 member companies. While RMA member companies are bound together by a common denominator--basic raw materials--the membership embraces several industries with often dissimilar problems. For this reason, the services of the RMA are organized into five business groups including: General Products, Information and Statistics, Public Affairs, Technical and Standards, and Finance and Administration. The goals of these groups are to: 1) serve as a forum for exchange of information with and among member companies on issues of common concern, and in areas of common interest; 2) provide a single voice for the industry in dealing with its publics, including government, consumers, and the general public; 3) monitor, recommend and promote the industry viewpoints on legislative and regulatory issues of concern, and investigate and report on the potential impact of these issues on the rubber industry; 4) coordinate formulation of industry positions on domestic and international standards; and 5) establish and maintain close working relationships with other organizations which share common interests and concerns.

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The companies which have participated in the Rubber Manufacturers Association Emission Factors Project are presented on the following page.

The following companies are participants in the RMA Emission Factors Development Project.

Abbott Laboratories
Acadia Elastomers Corporation
Albert Trostel Packings, Ltd.
Akron Rubber Lining
Ames Rubber Corporation
Ashtabula Rubber Company
Bandag, Inc.
Bando Manufacturing of America, Inc.
Beloit Manhattan
Boston Industrial Products, Div. of Dana Corp.
Bridgestone/Firestone, Inc.
Buckhorn Rubber Products, Inc.
Cadillac Rubber & Plastics, Inc.
Carlisle Tire & Rubber Company, Division of Carlisle Corp.
Caterpillar, Inc.
Central Rubber Company
Chardon Rubber Company
Chicago-Allis Manufacturing Company
Clevite Elastomers, a Pullman Company
Continental General Tire Inc.
Cooper Tire & Rubber Company
CR Industries
Cupples Rubber Company
Custom Rubber Corporation
Dawson Manufacturing Company
Dayco Products, Inc.
DTR Industries, Inc.
Dunlop Tire Corporation
Eagle-Picher Rubber Molding Division
Federal-Mogul Corporation, Sealing Products Group
Fenner Inc., Fenaplast Division
Freudenberg-NOK, General Partnership
Fulflex, Inc.
Garlock Mechanical Packing, Division of Colt Industries
GenCorp, Inc.
Georgia Duck & Cordage Mill
Globe International, Inc.
Goshen Rubber Company, Inc.
Hawkeye Rubber Manufacturing Company
HBD Industries, Inc.
John Crane, Inc.
Johnson Rubber Company
Kelly-Springfield Tire Company
Kismet Products Inc.
Latex Foam Products, Inc.
MBL (U.S.A.) Corporation
Michelin North America
Molded Dimensions, Inc.
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Patch Rubber Company
Pawling Corporation
Pirelli Armstrong Tire Corporation
Protective Coatings, Inc.
Rice-Chadwick Rubber Company
Robbins, Inc.
Rubber Rolls, Inc.
Scandura, Inc.
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Specification Rubber Products, Inc.
Sperry Rubber & Plastics Company, Inc.
Syntex Rubber Corporation
T & M Rubber, Inc.
TBMC, Inc.
The Gates Rubber Company
The Goodyear Tire & Rubber Company
The Standard Products Company
Titan Industries
Toyo Tire (U.S.A.) Corporation
Trellex Morse, Division of Svedala Industries, Inc.
Truflex/Pang Rubber Products Company
Vail Rubber Works, Inc.
Waukesha Rubber Company, Inc.
West American Rubber Company, Inc.
Western Consolidated Technologies
Yale-South Haven, Inc.
Yokohama Tire Corporation

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLES

TABLE OF CONTENTS (CONTINUED)

Number **Page**

FIGURES

Number **Page**

SECTION 1
INTRODUCTION

1.1 Program Overview and Objectives

The Clean Air Act Amendments (CAAA) of 1990 contain a variety of new programs and approaches designed to reduce emissions of hazardous air pollutants (HAPs), improve urban air quality and to control the precursors of acid rain (**Reference 1**). EPA and the state/local air agencies now have at their disposal an expanded authority base to meet the CAAA objectives including an expanded array of enforcement tools. As the CAAA implementation moves forward, industry will be faced with numerous complex and burdensome air compliance issues.

On July 21, 1992, EPA promulgated the Operating Permit Rule (**Reference 2**), which represents an expanded and very different approach to permitting air emission sources. The operating permit program commonly referred to as *Title V* is a national program which is now being implemented on a state by state (and in the case of California, county by county) basis. In other words, each state has been charged with developing and implementing a federally enforceable operating permit program which meets or exceeds the CAAA requirements.

Title V now requires each facility which exceeds major source thresholds to secure a facility wide permit. The Title V program defines major source applicability on the basis of **potential to emit**. All facilities which have the **potential to emit** more than any of the following must secure a facility operating permit:

- 100 tons/year of a criteria pollutant except in selected urban areas where the threshold can be as low as 10 tons/year
- 10 tons/year of a single HAP or 25 tons/year in aggregate of any listed HAPs

Title V requirements represent a significant departure from past state permitting programs which addressed some but not all sources at a facility on a process by process basis. Before the federal 1990 CAAA, fewer than 20 pollutants were federally regulated. Now there are in excess of 200 regulated pollutants when taking into account additional state air toxics requirements.

To prepare a facility Title V permit, there are several tasks which must be completed. One such activity is the development of the plant emissions inventory which is the largest part of the permitting effort and also one of the areas where accuracy is critical. An inaccurate inventory can result in future compliance problems.

The key to producing an accurate inventory is contingent upon the availability of sound emissions data or emission factors for each process in a facility. These factors coupled with commonly archived process and production data are used to calculate emissions and produce the inventory.

Unfortunately, emission factors have not been established by EPA or the states for many industrial processes, including the rubber manufacturing industry. In the absence of established emissions factors or readily available emissions data, EPA and the states typically adopt the fallback position of requiring emissions testing for each significant process within a facility, an endeavor which is expensive in addition to being very complex.

As a result of the lack of documented emissions factors for the industry, the Rubber Manufacturers Association (RMA), on behalf of its membership, embarked on a large project to address the emission factor issue. Specifically, the objectives of the project were as follows:

- Develop emission factors for the commonly used rubber manufacturing processes;
- Develop a consistent applications approach for developing plant-wide emissions inventories;
- Develop a standard protocol for estimating emissions related to future process changes;
- Provide background information for addressing Title V record keeping and compliance demonstration requirements;
- Provide support for addressing future enhanced monitoring requirements;
- Provide information sufficient to address equipment scale differences;

An intense testing-based project was conducted which resulted in emission factors for the commonly used rubber compounds and processes. The results of the project and the emission factors now available are discussed in the remainder of this report.

1.2 Emission Factor Project Definitions

The following is a brief list of key definitions which define pollutant categories measured in the test program, as well as terminologies which will assist the reader in interpreting the emission factor data provided in this volume.

1. *Total Speciated Volatiles:* The sum of the target volatile organic compounds as well as those compounds tentatively identified during a mass spectral library search.

2. *Total Speciated Semivolatiles:* The sum of the target semivolatile organic compounds as well as those compounds tentatively identified during a mass spectral library search.

3. *TVOC:* Total volatile organic compounds measured as total hydrocarbons (THC) calibrated to a methane standard. Measurements were made on a continuous basis using a THC analyzer in accordance with EPA Reference Method 25A.

4. *Total Metals:* The sum of the target analytes detected. The target analytes are cadmium, chromium, copper, lead, magnesium, nickel and zinc.

5. *Total Sulfur:* The sum of the target sulfur compounds detected during sample analysis using gas chromatography flame photometric detection (GC/FPD).

6. *Total Speciated Organics*, as used in the summary and speciation tables: The total speciated organic compounds measured in the test program. It is the sum of the semivolatile and volatile emissions for a given rubber compound minus any duplicate compounds. Where there is duplication of a chemical compound in the analyte list, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

7. *Speciation Factors:* The fraction, by weight, of a particular compound to the total for a specific pollutant category. For example, a speciation factor for benzene is determined by dividing the measured benzene emissions by the total speciated organic compound emissions (total speciated organics is defined above).

8. *Volatile Organic Compounds (VOCs)* as defined for permitting requirements is based on the EPA definition cited in 52.21:

> *Volatile Organic Compounds (VOC) means any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate which participates in atmospheric photochemical reactions. This includes any organic compound other than the following which have been determined to have negligible photochemical reactivity:*
>
> (a) Methane (CAS 74-82-8);
> (b) Ethane (CAS 74-84-0);
> (c) 1,1,1-Trichloroethane (CAS 71-55-6);
> (d) Methylene Chloride (CAS 75-09-2);
> (e) Trichlorofluoromethane (CAS 75-69-4);
> (f) Dichlorodifluoromethane (CAS 75-71-8);
> (g) Chlorodifluoromethane (CAS 75-45-6);
> (h) Trifluoromethane (CAS 75-46-7);
> (i) Trichlorotrifluoroethane (CAS 76-13-1);
> (j) Dichlorotetrafluoroethane (CAS 76-14-2);
> (k) Chloropentafluoroethane (CAS 76-15-3);
> (l) Dichlorotrifluoroethane (CAS 306-83-2);
> (m) Tetrafluoroethane (CAS 811-97-2);
> (n) Dichlorofluoroethane (CAS 1717-00-6);
> (o) Chlorodifluoroethane (CAS 75-68-3);
> (p) Chlorotetrafluoroethane (CAS 2837-89-0);
> (q) Pentafluoroethane (CAS 354-33-6);
> (r) Tetrafluoroethane (CAS 359-35-3);

(s) Trifluoroethane (CAS 420-46-2);
(t) Difluoroethane (CAS 75-37-6);
(u) Perchloroethylene (CAS 127-18-4); and,
(v) the following 4 classes of Perfluorocarbon compounds:

(1) Cyclic, branched, or linear, completely fluorinated alkanes;
(2) Cyclic, branched, or linear, completely fluorinated ethers with no unsaturation;
(3) Cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturation; and
(4) Sulfur-containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine.

1.3 Emission Factor Summary

Generic rubber compounds were used for the mixing/milling, platen press, extruder, autoclave, and warmup mill tests. Data for the calendering, grinding, and tire cure processes were generated in actual manufacturing settings. For tire curing, actual tires from several of the participating companies were used.

A summary of the average emission factors for each compound class are presented in Table 1-1. The data presented in this table are average emission factors for all runs conducted for each process. These averages are presented to provide an overview of the relative contribution of each process. Actual emission factor tables for a specific manufacturing process require a knowledge of the type of rubber formulation being utilized. In addition, graphic representations of the relative magnitudes of emissions for each process are provided in Figures 1-1 and 1-2. Emissions for carcass grinding, belt grinding, and sidewall grinding are presented separately in Figure 1-2 because the units for the emission factor (lb/lb rubber removed) are different than the other processes which are in terms of lb pollutant/lb rubber processed.

1.4 Report Series Format

The report for this project is presented in three volumes which are entitled as follows:

- Development of Emissions Factors for the Rubber Manufacturing Industry

  --Volume 1 Emission Factor Program Results

Table 1-1. Summary of Results--Showing Relative Contribution by Process on an Overall Average Basis--(lb Pollutant/lb Rubber)[1,2]

Process	# Compounds or Components Tested	Total VOC as Methane	Total Speciated Volatiles	Total Speciated Semivolatiles	Total Metals	Total Sulfur	Total Amines	Total Particulate Matter
Mixing/Milling	26	1.01E-04	8.28E-05	2.86E-06	1.90E-05	6.25E-06	n/a	2.86E-04
Internal Mixer Control	1	7.75E-06	4.30E-05	1.64E-06	2.23E-04	2.47E-07	n/a	2.62E-03
Extrusion	4	1.39E-05	2.63E-05	9.10E-06	1.06E-05	2.79E-08	n/a	1.44E-05
Tire Curing	10 ? ?	2.26E-04	1.50E-04	1.31E-05	n/a	5.36E-06	4.27E-08	n/a
Platen Press Curing	11 ? 17	6.14E-04	2.41E-03	1.13E-04	n/a	2.14E-04	n/a	n/a
Hot Air Oven Curing	3	2.16E-04	1.46E-03	6.65E-04	n/a	1.14E-03	n/a	n/a
Autoclave Curing[3]	10 (#9 Fuse)	1.50E-04	6.38E-04	2.48E-04	n/a	2.98E-04	1.01E-08	n/a
Warmup Mill - Eng. Prod. 3 runs	1	1.71E-06	9.31E-07	7.02E-09	n/a	1.42E-07	n/a	n/a
Warmup Mill - Tires	3	1.02E-04	1.94E-05	2.32E-05	n/a	5.81E-07	n/a	n/a
Calendering - Eng. Prod.	1 ✓	4.67E-06	4.14E-06	3.09E-08	n/a	2.04E-06	n/a	n/a
Tire Calendering	2 ? 17	5.31E-05	6.89E-05	3.51E-06	n/a	1.53E-06	n/a	n/a
Sidewall Grinding[4]	3	1.57E-02	9.90E-03	5.31E-04	2.07E-02	0.00E-0	n/a	1.25E-01
Tire Carcass Grinding[4]	3 3 runs	5.18E-04	1.57E-02	6.25E-04	1.38E-02	9.99E-06	n/a	5.45E-01
Retread Buffing[4]	3	2.40E-04	9.96E-06	9.99E-06	9.51E-05	9.04E-07	n/a	9.48E-03
Belt Grinding[4]	3	1.79E-03	2.46E-03	1.35E-04	4.79E-02	2.12E-02	n/a	1.19E+00

Same value as in Table 4.12-12

Note: These are averages of pollutant categories and are only provided to appraise the reader of the relative contribution of each process to facility emissions. These are not to be used in the development of emissions inventories.

[1]Sidewall grinding, tire carcass grinding, and belt grinding factors are lb pollutant/lb rubber removed. All other factors are lb pollutant/lb rubber processed.

[2]Table 2-3 details the test methods used for each process.

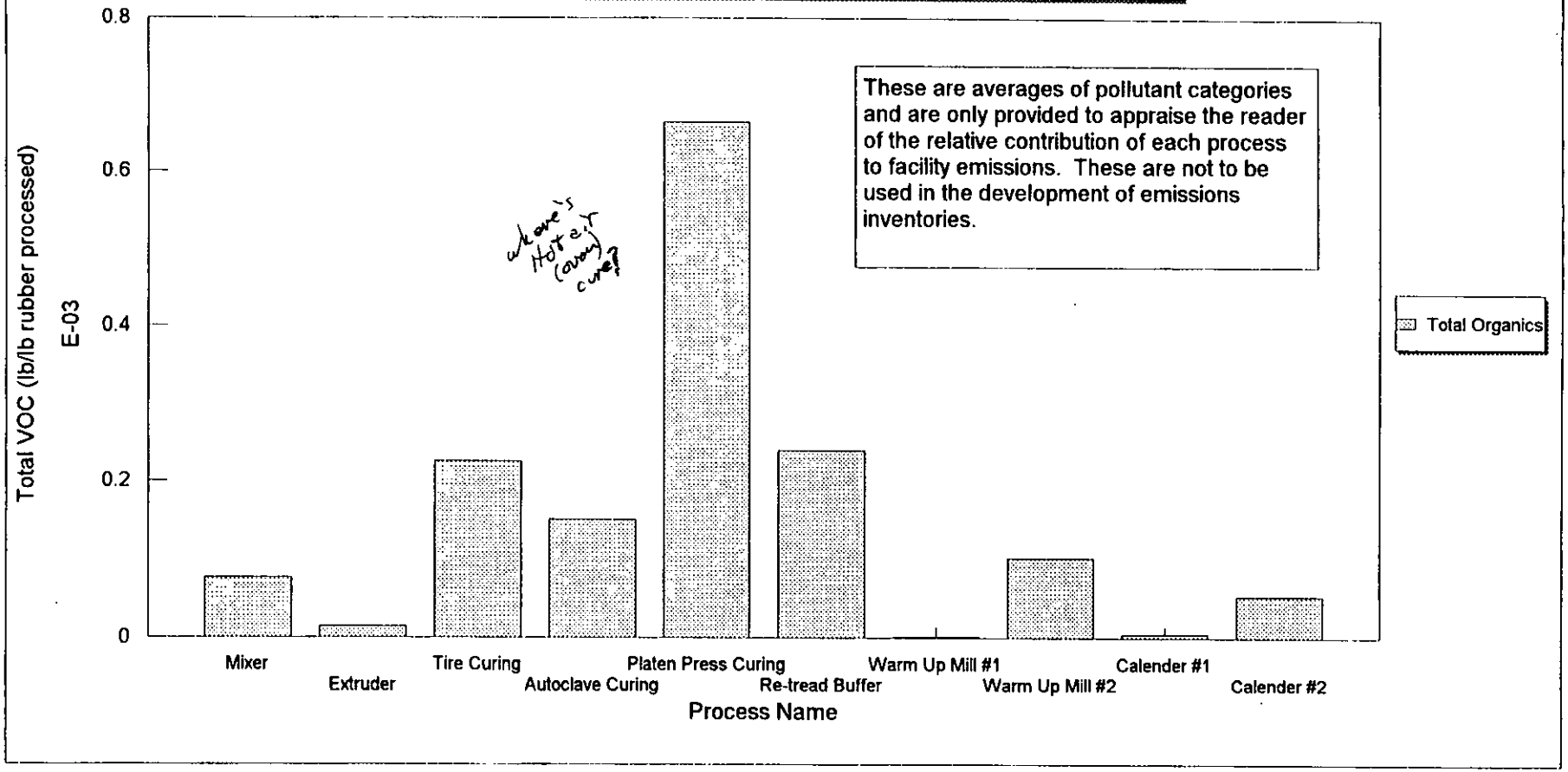
[3]Emission factors are for noncontact steam systems and include the water phase concentrations.

[4]*Process includes a control device(s). However, factors provided in this table are before control, indicating the process potential to emit.*

Large / 4 orders magnitude > Table 4.12-12

n/a =

Figure 1-1. - Relative Comparison of Emissions from Each Process



Average Temperature					
Warm Up Mill #1	175 °F	Mixing (Productive)	220 °F	Mixing (Non-Productive)	335 °F
Calender #1	190 °F	Extruder	260 °F	Autoclave/Platen Press/Tire Press	340 °F
Warm Up Mill #2	200 °F	Calender #2	265 °F		

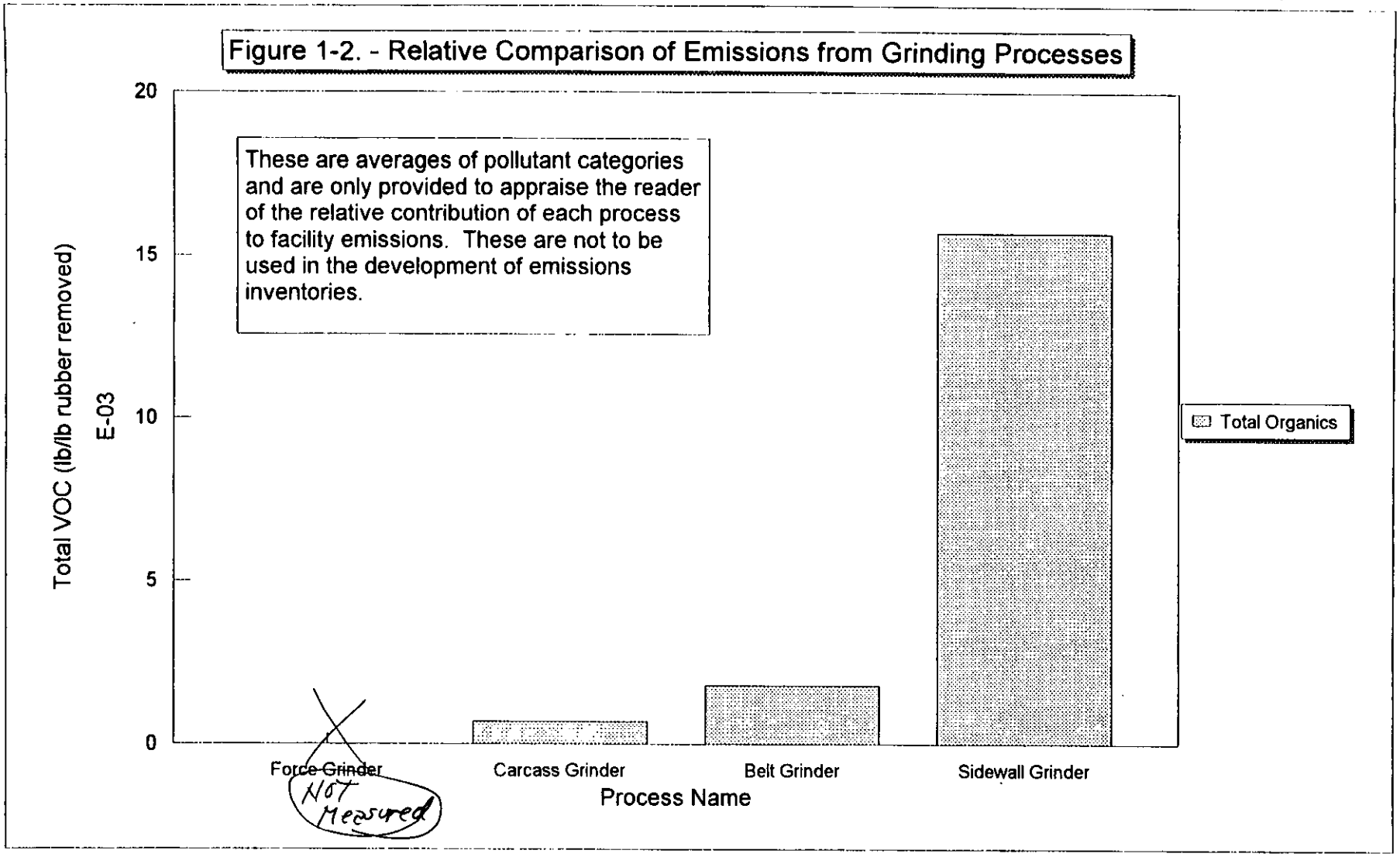


Figure 1-2. - Relative Comparison of Emissions from Grinding Processes
These are averages of pollutant categories and are only provided to appraise the reader of the relative contribution of each process to facility emissions. These are not to be used in the development of emissions inventories.
Total VOC (lb/lb rubber removed)
E-03
20
15
10
5
0
Force Grinder
NOT Measured
Carcass Grinder
Belt Grinder
Sidewall Grinder
Process Name
Total Organics

--Volume 2	Project Data
--Volume 3	Test Program Protocol

The results of this project are presented in the following sections of this volume (Volume 1). Section 2 presents the detailed approach employed to develop factors appropriate for use by the industry while Section 3 follows up with the details of the actual process equipment used to conduct the project. A discussion of the results are presented in Section 4 along with a discussion of the data analysis techniques employed.

Section 5 provides a detailed explanation recommending how to utilize the factors for facility specificity. Finally, this volume is summarized with Section 6 which presents conclusions and recommendations.

SECTION 2
~~EMISSIONS FACTOR DEVELOPMENT APPROACH~~ - ?

2.1 General Process Description

Many of the rubber manufacturing facilities in the United States produce pneumatic tires for automobile, trucks, airplanes and farm machinery. However, the majority of rubber manufacturing facilities produce other engineered rubber products. The processes involved in these industries are very similar. Differences basically consist of the raw rubber material (natural or synthetic) used, the chemical additives, and the type of curing employed. The following is a description of a generic rubber manufacturing facility applicable to both tire and other manufactured rubber products, except where noted. Figure 2-1 shows a process schematic of a typical tire manufacturing facility for reference.

The manufacturing of rubber products involves several processing steps. Initially, the raw rubber (natural or synthetic) is mixed with several additives which are chosen based upon the desired properties of the final product. The mixed rubber is often milled and transferred to an extruder where it can be combined with other rubbers. Many rubber products contain synthetic fabric or fibers for strengthening purposes. These fibers are typically coated with mixed rubber using a calendering machine. The extruded rubber and rubber coated materials are then assembled into its final shape and cured. It is during the curing process that the rubber vulcanizes (crosslinks), producing the characteristic properties of finished rubber. Once the final product is cured, it is often ground to remove rough surfaces and/or to achieve symmetry.

Mixing consists of taking the raw rubber and mixing it with several chemical additives. These additives consist of an accelerator (accelerates the vulcanization rate), zinc oxides (assists in accelerating vulcanization), retarders (prevents premature vulcanization), antioxidants (prevents aging), softeners (facilitates processing of the rubber), carbon black or other fillers (reinforcing/strengthening agents), and inorganic or organic sulfur compounds (vulcanizing agent).

Mixing is typically performed in an internal batch mixer. The internal mixer contains two rotors which shear the rubber mix against the wall of the vessel. Internal mixing is performed at elevated temperatures up to approximately 356°F.

The processing of the rubber mixes is performed in either a non-productive or productive mode, or both. In nonproductive mode, all of the materials are mixed with the exception of the accelerators and sulfur compounds. This mixed rubber is then stored until needed and then the accelerators and sulfur are added to the mix. During the productive mode, the accelerators and sulfur compounds are added to the mix for immediate processing through completion of the final product.

In addition to the operations described above, one other variable was examined to determine its effect upon the emissions. The addition of carbon black to a mix creates the potential for carbon black particulate to escape to the atmosphere. These airborne particles may provide] - ? why here

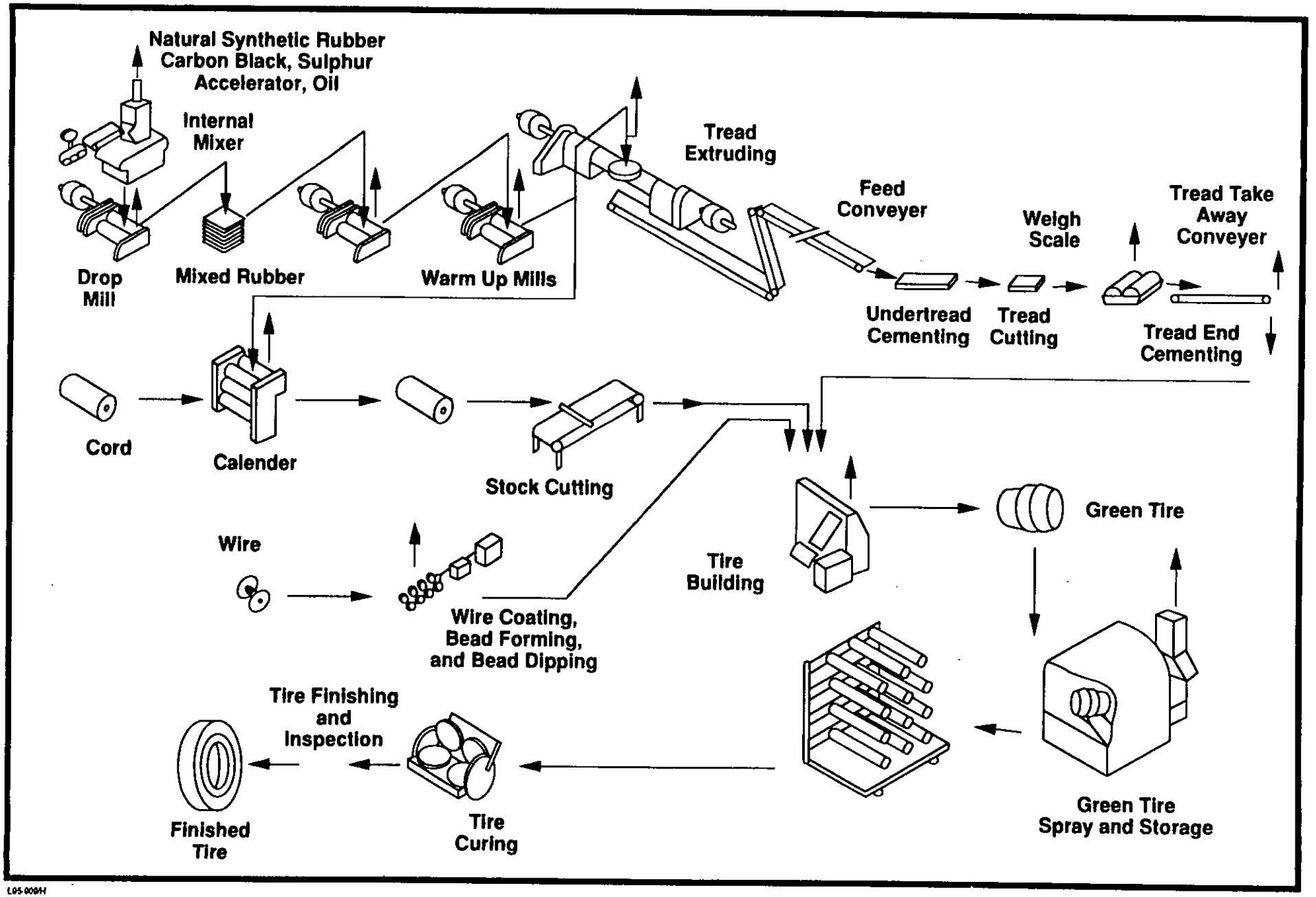


Figure 2-1. Example Tire Manufacturing Facility.

additional surface area for higher molecular weight compounds to adsorb or condense, thereby reducing the emissions from the process.

Once the rubber is properly mixed, it can be extruded. Extrusion is often performed to combine several types of previously mixed rubber compounds. The extruder consists of a power driven screw within a stationary cylinder. A die is attached to the head of the screw to produce the desired shape or cross section of the extruded rubber. Extrusion can be performed with both warm or cold rubber feed. The extruder is jacketed to maintain the desired operating temperature.

Calendering is often used in the rubber manufacturing industry to apply a rubber coat onto synthetic or steel fibers. These calenders employ either 3 or 4 rolls and are hollow to allow for heating or cooling. The openings between the rolls can be adjusted to control the coating thickness. An example of calendering is in the manufacturing of radial tires where synthetic fibers are rubber coated and subsequently combined with rubber stock to create a more durable product.

The final step in manufacturing of rubber products is vulcanizing (curing). There are three predominant vulcanizing processes: press mold curing, autoclave curing, and hot air curing. Press mold curing uses high temperature and pressure to cure the final product. The high pressure (600-10,000 psi) forces the rubber to conform to the shape of the mold. Press mold curing is used in tire and engineered products manufacturing.

Autoclave curing utilizes saturated steam at an elevated pressure to cure the rubber mix. Unlike press mold curing, the product is formed into its final shape prior to the curing process. Autoclave curing is the predominant curing method in non-tire rubber manufacturing facilities.

Hot air curing entails passing uncured, green engineered products through a chamber with a heated atmosphere. Temperature and residence times may vary, depending on the product type and formulation. As with the autoclave curing, these products have already been formed into their final shape prior to undergoing the curing process.

Grinding is often performed to remove rough edges and other blemishes from the final product or in some cases to actually form and shape the product. The ground rubber is occasionally recycled and utilized as filler in some rubber manufacturing processes. In the tire manufacturing industry, grinding is performed to balance the tire and also to expose the white sidewall or lettering. Relative to the engineered products industry, grinding may actually be used to obtain the correct shape of the final product such as the final shaping of drive belts.

2.2 Equipment Scale Considerations

Emissions testing was performed on several sizes of similar process equipment. These size differences are the most profound on the sizes of internal mixers tested. Emissions tests were performed on internal mixers ranging from a 2 pound laboratory mixer, to a 200 pound pilot

scale system up to a 500 pound production mixer. On a pound pollutant emitted per pound of rubber mixed basis, emissions were not observed to be dependent on mixer size. This is especially true for the volatiles and semivolatile emissions. There was greater variability of metals emissions which is most likely the result of greater particulate losses into the ventilation system on the larger mixers during charging than is experienced on smaller scale equipment.

how was it handled?

Since there were no direct correlation to process equipment size and emissions, no scaling factors were developed for equipment size.

2.3 Selection of Compounds and Target Pollutants

The initial step necessary in developing emission factors is to identify which pollutants are emitted to the atmosphere from the process. Previous investigations into the emissions from rubber manufacturing show that the predominant emissions are low molecular weight organic compounds (C_6-C_8). However, the potential for heavier, less volatile organic compound emissions also exists due to the chemistry and the elevated temperatures of many of the processes. Particulate matter emissions can also be significant, especially during the mixing process when carbon black is added to the mix.

Title III of 1990 CAAA lists 189 HAPs. Many of these are applicable to the rubber manufacturing industry. In addition, many states where rubber manufacturing facilities operate have developed their own HAP lists. Since the Title V operating program will be administered by the individual states, there exists the possibility that facilities will need to conduct emission inventories for all of the HAPs in Title III as well as on the state lists. A combined HAP list has been developed from Title III, state HAP lists, as well as the SARA 313 toxic chemical list. All compounds on this combined list (shown in Appendix A) which have the potential to be emitted from the selected processes, have been targeted by this program.

The emissions from each process change depending upon the type of rubber used (natural or synthetic) and the specific additives (metal oxides, accelerators, retardants, antioxidants, softeners, fillers, and vulcanizing agents) in the mix. The emissions vary due to the physical properties of the raw rubber, the physical characteristics of the processes, chemical additives, and the reaction chemistry of the processes. Some historical emissions data is available, although it is not comprehensive. These data have served as a starting point for developing the final target compound list.

The tire manufacturing industry principally uses natural rubber, styrene-butadiene (SBR) rubber, and polybutadiene rubber. Polybutadiene is often mixed with SBR to improve the abrasion and cracking resistance of the tire. For non-tire rubber goods where oil resistance is a priority, rubbers such as polyacrylates, nitrile, neoprene, polyurethanes, epichlorohydrins, chlorosulfonated polyethylene, chlorinated polyethylene, and fluoroelastomers are used. Potential emissions from these rubbers consist of breakdown compounds such as the monomers used to create the rubber.

Accelerators are added to the mix to speed up the vulcanization rate. Typical accelerators are metal oxides (zinc oxide, lead oxide, and magnesium oxide) and a large variety of organic accelerators. These organic accelerators are typically from the following classes of organic compounds: benzothiazoles, benzothiazolesulfonamides, dithiocarbamates, dithiophosphates, guanidines, thioureas, and thiurams.

Antioxidants help to prevent oxidation (aging) of the vulcanized product. Antioxidants are usually high molecular weight amine compounds such as dioctylated diphenylamine. The potential for amine emissions exists upon the degradation of this compound during processing.

Retarders are used to prevent the premature vulcanization (scorching) of the rubber during processing. Retarders currently in use mainly consist of organic acids (salicyclic and benzoic acids), phthalic anhydride, and N-(cyclohexylthio)phthalimide. Again, the potential emissions consist of the retarders themselves along with their thermal breakdown components.

Softeners are used to increase the workability of the mix for lubrication during extrusion and molding and, to aid in the dispersion of fillers. The predominant softener used in the rubber industry is petroleum oil. The potential emission compounds from petroleum oil are extensive. The majority of the compounds would most likely be aromatic hydrocarbons of various sizes and types.

Fillers are added to the rubber mix for several reasons. Fillers provide color but are mainly used to reinforce the final product. Fillers are fine particles which increase the abrasion resistance and tensile strength of the product. Carbon black is used as the primary filler in tire manufacturing. Rubber goods requiring a color other than black use numerous types of inorganic fillers. Due to the extremely fine particle size of fillers, they are easily emitted to the atmosphere during mixing.

Sulfur compounds comprise the vast majority of vulcanizing agents currently used. Sulfur can be added as elemental sulfur or within inorganic or organic sulfur compounds. The presence of sulfur and the high temperatures involved in the processes creates the possibility of sulfur compounds such as carbon disulfide to be emitted.

The available historical data for emissions from rubber manufacturing consists mainly of a doctoral thesis presented by Dr. Stephen Rappaport at the University of North Carolina in 1976 (**Reference 3**). Dr. Rappaport conducted a laboratory study of C_6-C_{25} organic compound emissions from the curing of one type of rubber stock used in tire manufacturing. The rubber stock was a mixture of SBR and polybutadiene rubbers along with the necessary chemical additives. The results of Dr. Rappaport's study showed that a large number of cyclic (aromatic) organic compounds were emitted. Although these results are informative, the study was conducted on only one type of rubber mix using a simulated press mold cure. The potential for hazardous compounds to be emitted, other than those discovered by Rappaport, is considerable.

Since the publishing of the Rappaport study, others have confirmed the presence of similar pollutants. Studies conducted by Trelleborg Industri AB confirmed the presence of nitrosamine compounds in laboratory scale curing tests of certain formulations (**Reference 4**).

Similarly, Willoughby et. al. of RAPRA through the development of the FUME data base corroborates the results of the aforementioned studies (**Reference 5**).

Twenty six rubber compounds/mixtures were studied in this program as summarized in Table 2-1. These include four specific tire-related mixtures: (1) tread mixture, (5) sidewall mixtures", (4) styrene-butadiene rubbers (SBR), and (3) ethylene-propylene-diene-mixture (EPDM) terpolymers. Thirteen other compounds/mixtures were also studied. =13 ≠13

Table 2-1. Summary of Generic Rubber Compounds Evaluated

Typical Tire Compounds	Typical Engineered Products Compounds
Tire Inner Liner	Hypalon
Tire Ply Coat	Fluoroelastomer
Tire Base / Sidewall	VAMAC
Tire Apex	Hydrogenated Nitrile
Tire Tread	Silicone
Tire Curing Bladder	Acrylate Rubber
(6)	Chlorinated Polyethylene
	Epichlorohydrin
	SBR
	EPDM
	Neoprene
	Nitrile (12)

there are 8 missing?

The formulations studied during this program and their recipes are provided in Volume 2 - Project Data, Section 1. The composition of these mixes were examined against the combined HAP list (Appendix A of Volume 3 - Test Program Protocol) generated from Title III, state air toxic lists, and SARA 313 toxic chemical list. The target compounds for the emission factor development program are the list of 189 HAPs, in addition to total VOCs and other pollutants prevalent in typical rubber manufacturing processes.

2.4 Description of Sampling / Analytical Regimes

The ten processes tested are summarized in Table 2-2 and the test methods employed are shown in Table 2-3: tire press, oven cure of tire cuts, autoclave, extruder, internal mixers, grinding, platen press, calender, warmup mill, and oven cure of engineered products. Nine of the processes were tested for: total volatile organic compounds, speciated volatiles, volatile ozone precursors, sulfur compounds, and semivolatile organic compounds. Two processes (tire press and autoclave) were tested for amines. Four processes (tire press, oven cure of tire cuts, extruder, and some grinding processes) were tested by Fourier transform infrared spectroscopy (FTIR). Three processes (extruder, internal mixers, and grinding) were tested for particulate matter and metals.

To accurately quantify the emissions from each process, the emissions tests were conducted using enclosure methodologies to ensure that all emissions were captured. The design of each enclosure was based upon the criteria in EPA Method 204 for a total enclosure. Figures 2-2 and 2-3 show typical enclosure designs used during the testing. The objective in using the enclosure approach was to collect and "concentrate" non-point source emissions from the individual process in a way that enclosure exhaust could be sampled.

A highly ventilated enclosure with rapid air turnover would not allow for adequate detection limits of the target parameters. EPA's criteria for enclosures have been followed, as guidance. However, air velocities have been varied to allow for optimal sampling conditions within the exhaust duct. Specific enclosure construction and exhaust details vary with the process, fugitive release rate, and target sampling parameters.

2.5 Data Analysis Approach - Volume 2

The comprehensive data set for this program is presented in Volume 2 of this report series. The data analysis which produced this data set included consideration of: operating parameters, analytical issues, time averaging for some methods, and data reporting.

During each test run for all processes, all pertinent operating parameters were recorded. These parameters consisted of the quantity and type of materials being processed, processing and/or production rate, process temperature, and process pressure. This data was recorded at the start of each test run and at fifteen minute intervals thereafter until the completion of the test run.

The emissions test data, process data, and laboratory data acquired from the sampling program as summarized in Table 2-2 was compiled and evaluated for each test run. Mass emission rates from each rubber type and each pollutant were calculated from the laboratory results and field test data. The mass emission rates were calculated utilizing the measured exhaust air flow rate and concentration of each target pollutant in the sample vent for each individual test run. All emission calculations were performed in accordance with the specific sampling methodologies utilized for this program.

Table 2-2. Test Matrix of Processes and Chemical Analyses

	Mixing (Internal)	Extruder	Warmup Mill	Calender	Tire Press	Autoclave	Platen Press	Oven Cure	Grinding
Total Volatile Organic Compounds	X	X	X	X	X	X	X	X	X
Speciated Volatiles	X	X	X	X	X	X	X	X	X
Volatile Ozone Precursors	X	X	X	X	X	X	X	X	X
Sulfur Compounds	X	X	X	X	X	X	X	X	X
Speciated Semivolatiles	X	X	X	X	X	X	X	X	X
Amines					X	X			
Total Speciated Volatiles by FTIR		X			X				(a)
Particulate Matter	X	X							X
Metals	X	X							X

(a) FTIR at one grinding facility.

Table 2-3. Sampling and Analytical Methods Summary			
	Parameters	**Sampling Method**	**Analytical Methods**
1	Total Volatile Organic Compounds	M25A	M25A/FID
2	Speciated Volatiles	TO-14 (a) Grab Sample	TO-14/GC-MS M 8240
3	Volatile Ozone Precursors	TO-14	TO-14/GC-FID
4	Sulfur Compounds	TO-14	GC/FPD
5	Speciated Semivolatiles	M 0010 Grab Sample (b)	M 8270 M 8270
6	Particulate Matter	M5	Gravimetric
7	Metals	M0012	M 6010, 7000
8	Amines	Midget Impinger Sampling Train	GC
9	Total Speciated Volatiles by FTIR	Extractive	FTIR

(a) Grab sample for autoclave water trap.
(b) Grab/composite sample for autoclave water trap.

In addition to the sampling conducted at each process emission vent, numerous sampling runs were conducted to quantify background concentrations of target pollutants present in the atmosphere where the sampling was conducted. These background tests were conducted since most of the emissions testing was performed in process areas containing several air pollutant emitting processes. The necessity of background emissions testing was determined by the team leader for each test program based upon field observations. These field observations included assessing the presence of visible emissions, odors, and plant activities which could bias the test data such as maintenance painting. Quantifiable background concentrations were subtracted from the sample concentrations for that day to provide more accurate emission results from the processes.

Laboratory and field blank samples were also collected for each sampling method to recognize and quantify contamination of any sampling media. The results of these blank sample runs were compared with the process sample runs to identify emission results which may be biased. If quantifiable pollutant concentrations were found in the sample blanks, these concentrations were subtracted from the specific test results associated the blank sample. Sample results which were found to have values less than or equal to background or blank sample concentrations were assumed to be equal to zero.

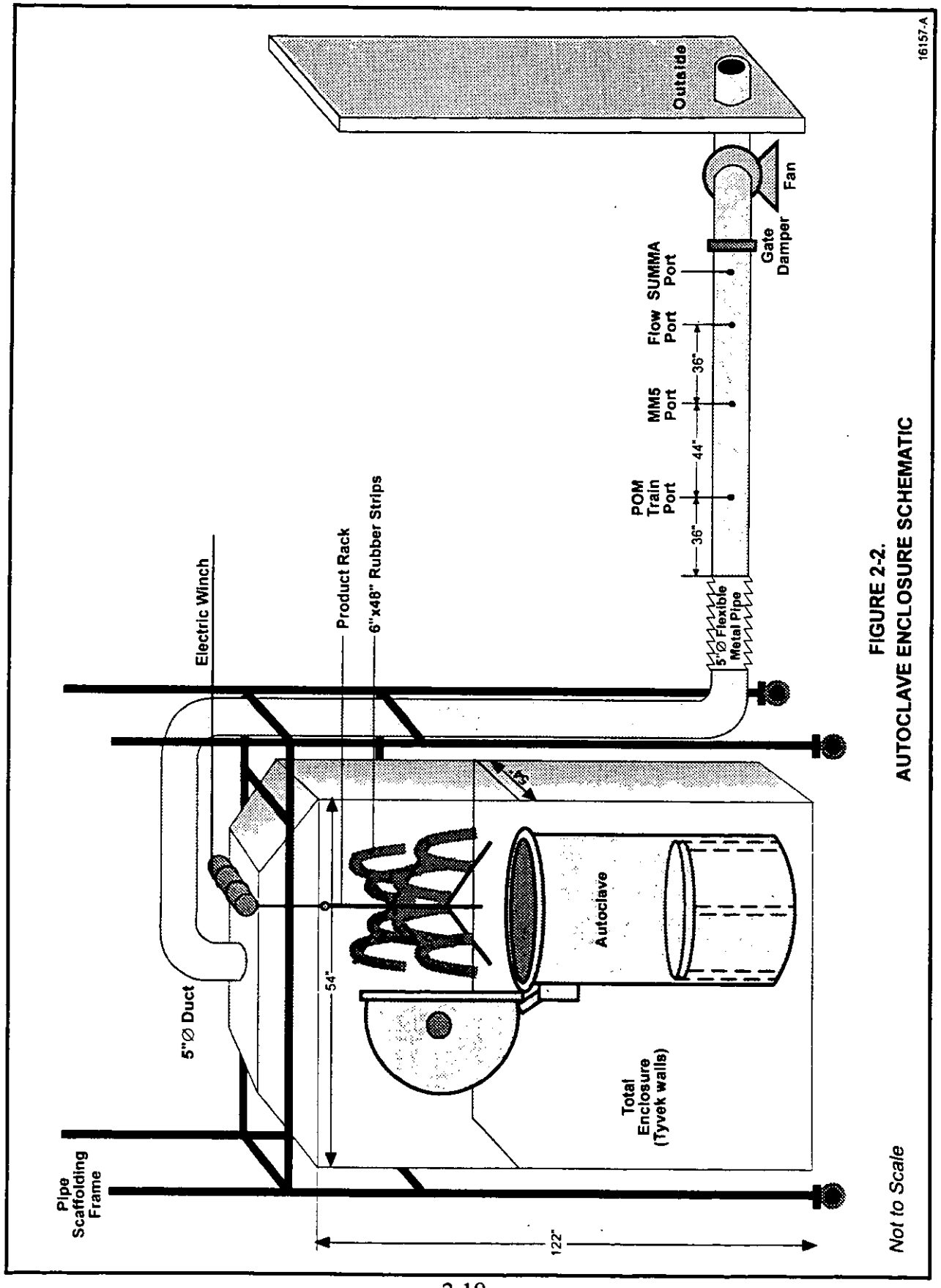
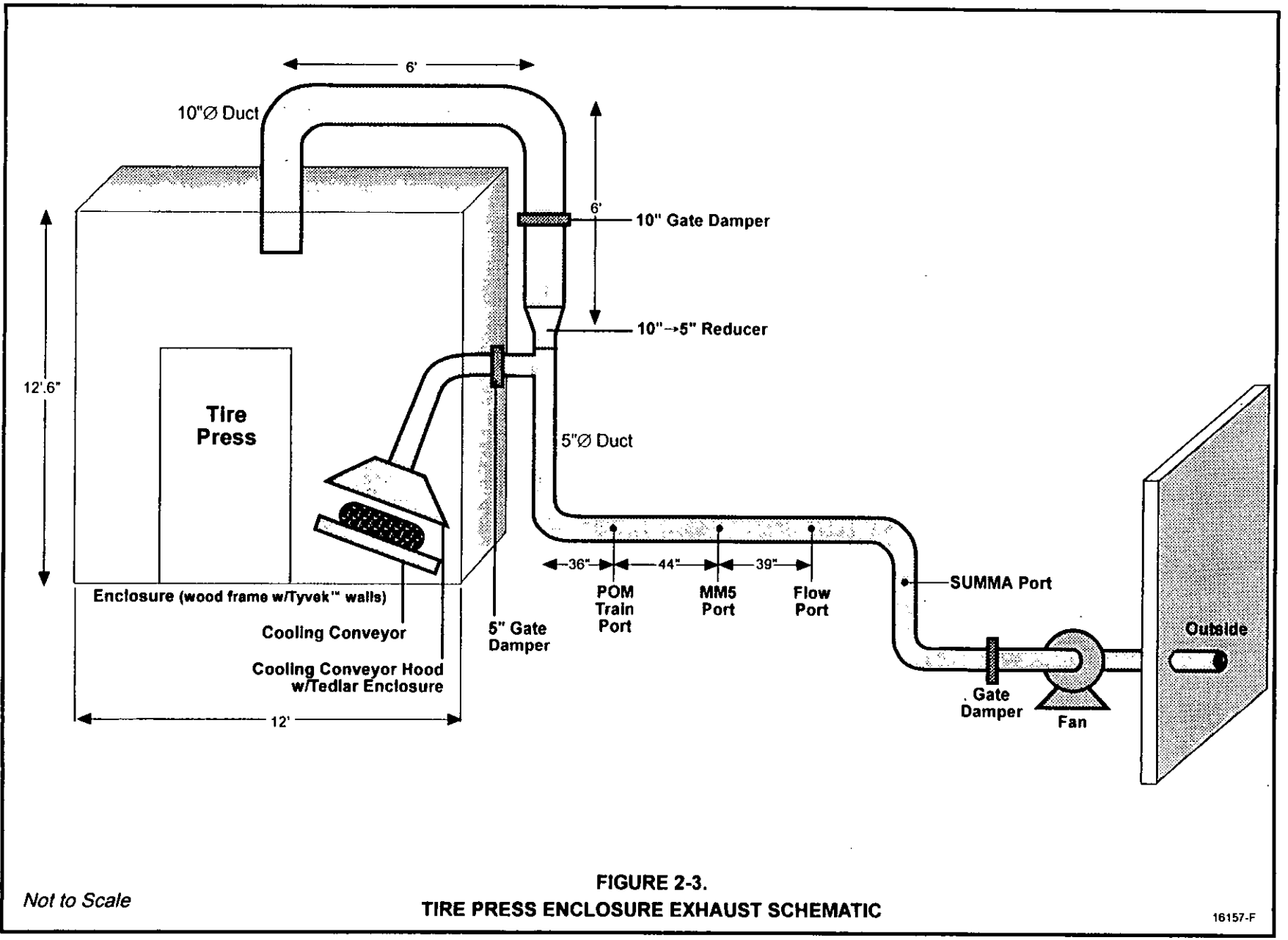


FIGURE 2-2.
AUTOCLAVE ENCLOSURE SCHEMATIC



Not to Scale

FIGURE 2-3.
TIRE PRESS ENCLOSURE EXHAUST SCHEMATIC

16157-F

The emission sampling results and the process data were then correlated to quantify emissions on a basis of pounds of pollutant emitted per pound of rubber processed. For 3 of the grinding operations (sidewall grinding, carcass grinding, and belt grinding), emissions were quantified on a pound of pollutant emitted per pound of rubber removed basis. For batch operations such as the internal mixer and autoclave, this was done by determining the total pounds of pollutant emitted and dividing by the total pounds of rubber processed. For continuous operations such as the extruder and calendering, this was performed by dividing the average hourly mass emission rate by the average hourly rubber processing rate. Results for the tire press were developed on both a lb/lb tire and lb/lb rubber basis due to the non-rubber components of the tires such as fabric and steel cords, wire beads, and belts.

In addition to the results of the compound specific sampling methods data, total organic compound emissions were determined using the data collected during the Method 25A continuous process monitoring. Average total organic concentrations were recorded for each one minute interval for each test run. An average value was then determined from the average of all the one minute data points collected over the duration of each test. Background concentrations were quantified at the beginning of each test run to correct the final result. Mass emissions of total organics were then quantified for each run.

In Volume 2, concentration data are provided for every target analyte and every tentatively identified compound. In each case where a particular compound was not detected, the detection limit is provided. These detection limits allow one to assess whether a compound could have been present at a lower concentration but not have been detectable in any particular sample.

For sampling methods having more than one target pollutant, the pollutant emissions were aggregated to provide total emissions by pollutant category. Total emissions were developed in this manner for metals, organics (including volatiles, ozone precursors, and semivolatiles), sulfur compounds, and in some cases, amines. Many of the target pollutants in these sampling methods were not present in the sample exhaust at quantifiable concentrations. Mass emission rates of these pollutants were calculated based upon their detection limit, as stated in the laboratory results, and their values were denoted with a "<" symbol prior to their stated emission value in the results tables. Aggregate emissions totals are presented for both detected compounds and "detected plus non-detected" compounds reported as lb/lb-rubber. Emissions totals for detected compounds include emissions of all compounds which were detected in the sample by the chemical analysis. The total for "detected plus non-detected" compounds allows for the possibility that a compound could have been present at undetectable levels and could have contributed to the total amount present. This is equal to the total of the detected concentrations plus the total of the detection limits for all other compounds. This "total with non-detects" provides an upper bound on the maximum total concentration for any class of compounds, e.g., volatile organic compounds and provides a conservative total.

2.6 Development of Final Factors - Volume 1

The results of the data analysis were assembled to develop pollutant and rubber type specific emission factors for each process. This effort involved collecting and collating the results of several emission tests performed on similar processes at different facilities. Emission factors, presented in Section 4, are reported as point estimates, means, and maxima. Section 5 provides a discussion on how the emission factors may be applied, including guidance on the selection of the mean versus maximum. The emission factors were developed based upon the aggregate emission totals in the data analysis discussed above.

For calculation of emission factors, emissions of all organic compounds were computed as the sum of ozone precursors, volatile organic compounds, and semivolatile organic compounds. For organic compounds which were detected by more than one method, the higher concentration value was used.

For calculation of emission factors and speciation tables, target analytes which were not detected in any runs for a particular process were deleted from the tables. The assumption is that if a target analyte went undetected in any runs, there is a high probability that if it was present, it was present at a concentration well below the detection limit and would not have contributed significantly to aggregate totals.

For some process conditions, multiple runs were conducted and data from Volume 2 were averaged for calculation of speciation factor tables in this volume. For chemical compounds which were not detected in each of the replicate samples for a particular condition, the average concentration was flagged as a "less than" value in the speciation factor tables. If all of the speciation table values for that compound were flagged as "less than" for a particular process (e.g., extrusion), the data for that chemical compound were deleted. Compounds deleted in this way constituted less than 0.5% of the total detected.

Speciation tables are included to show the contributions of specific pollutants and are provided as a percentage of the aggregate emission factor. For example, the concentration (or detection limit) of each organic compound was divided by the "total with non-detects" to yield the percent contribution for that compound. Analyzing the data in this manner highlights the major contributors and allows for identification of insignificant contributors to the overall emission factors.

To calculate speciated emissions, the user should first calculate an emission rate by multiplying the lb/lb rubber emission factor by the amount of rubber processed (or for some of the grinding operations, the amount of rubber removed). To then calculate speciated emissions, the emissions for a given pollutant (e.g., volatiles) would be multiplied by the speciation factor for the desired compound (e.g., butanol). In cases where emissions for the speciated component only are desired, the user can use the species specific emission factor (lb/lb rubber) from Volume 2 of the report series.

SECTION 3
DESCRIPTION OF TEST FACILITIES

3.1 Processes Employing Generic Rubber Compounds

3.1.1 Internal Mixer/Drop Mill

Emissions during mixing were evaluated from four internal mixers at three facilities during this program. For this report series, the mixers are designated as:

Large Banbury Mixer (F-80)	Large Mixer No. 1
Small Banbury Mixer (BR-1600)	Small Mixer No. 1
Small Banbury Mixer (BR-1600)	Small Mixer No. 2
Large Banbury Mixer/Torit Control Device	Mixer Control Device

comparison on 4 cmpds
- all 26 cmpds
- PM control eff.

Emissions from Large Mixer No. 1 occurred at 2 points in the process, during charging and mixing, and during drop milling. Batch sizes of 125 to 140 pounds per drop were mixed during the testing. Temperatures of the nonproductive runs were approximately 335° F. The productive run temperatures were typically 220° F (240° F for the EPDM 2). The configuration of the unit tested allowed for sampling of the fume collector and duct system. The charging/mixing zone is serviced by an 18-inch exhaust duct leading to a baghouse for control of emissions. Sampling was conducted in the round duct in an area with a suitable length of straight run. Emissions from the drop milling zone were handled similarly, being routed to a collector duct via a long rectangular duct.

The small internal mixers were similar in design and capacity. Emissions were sampled from a section of duct installed in a flexible exhaust hose. Sampling took place during charging and mixing. Batch sizes were typically 2 to 3 pounds for each drop with a fill of approximately 65 percent. Mixing temperatures were the same as with the larger units, and consistent with the recipes (335° F. for the non-productive and 220° F. for the productive drops). At the completion of the mixing, the rubber dropped into a tray drawer for transfer to the adjacent milling unit.

The milling units used with the small internal mixers were enclosed to contain pollutants released during operation. The enclosures were equipped with an outlet exhaust duct to facilitate sampling. Monitoring/sampling continued once the mixed rubber was placed inside the enclosures and continued throughout the milling process.

Control efficiencies of emissions from the large internal mixer were determined through the simultaneous sampling of inlet and outlet ducts of a Torit fabric filter control device. The sampling was conducted during 2 modes of operation, charging/mixing and drop milling. Batch sizes of approximately 465 pounds per drop were mixed during the testing. Temperatures of these master batch nonproductive runs ranged from 315° to 330° F. A summary of the rubber compositions tested is provided below:

on which mixers?

Compounds	Lbs. Carbon Black	Lbs. Zinc Oxide
34 Natural rubber and carbon black masterbatch	100	0
231 Natural rubber and carbon black masterbatch	100	0
320 Natural rubber and carbon black masterbatch	93	0
513 Natural rubber and carbon black masterbatch	93	0
550 Natural rubber and carbon black, 2nd pass, w/some additives & oil	73	13
802 Natural rubber and carbon black, 2nd pass, w/some additives & oil	52	30
887 Natural rubber and carbon black, 1st stage	93	0

3.1.2 Extrusion

Evaluation of emissions during the extrusion process was conducted on a 3.5-inch extruder. The compounds extruded were mixed and provided by the Goodyear Tire and Rubber Company's St. Mary's, OH facility. Two pallets each of wigwagged tread (Compound No. 6), sidewall (Compound No. 4), emulsion SBR (Compound No. 22), and peroxide-cure EPDM (Compound No. 9) were provided. Optimum target melt temperatures were provided for each compound. These were as follows:

Tread -	255 - 275° F.
Sidewall -	230 - 260° F.
SBR 1502 -	255 - 275° F.
EPDM 2 -	250 - 280° F.

The extruder consists of a power driven screw within a stationary cylinder. A die with a 1/8 x 3-inch extrusion slot was attached to the head of the screw to produce the desired cross section of the extruded rubber. During the testing, it became necessary to install additional screens behind the die plate to increase rubber back pressure and temperature. The rubber strips were fed manually into the hopper rollers.

There were two zones sampled during operation of the extruder process. The extruder outlet, or head, was enclosed to permit capture of emissions throughout operation. The small enclosure was equipped with an outlet exhaust duct from which sampling was conducted. This was designated as Location A. After extrusion, the product entered the cool-down zone, designated as Location B, which was also enclosed to allow for sampling of pollutant emissions. Rubber temperatures were measured at the die head and at two points of the cooldown zone.

3.1.3 Autoclave Curing

Autoclave curing utilizes saturated steam at an elevated pressure to cure the rubber mix and is the predominant curing method in nontire rubber manufacturing facilities. The 11 rubber compounds selected for testing included compounds used primarily for engineered products, but also included compounds used in tire manufacturing. These compounds were provided by

several manufacturers. The compounds selected and their designated compound numbers were as follows:

- Tire Base/Sidewall (#4)
- Tire Tread (#6)
- EPDM 2 (unextruded peroxide-cured) (#9)
- EPDM 2 (extruded peroxide-cured) (#9)
- HNBR Hydrogenated Nitrile (#18)
- CPE Chlorinated Polyethylene (#21)
- Tire Apex (#5)
- EPDM 1 (sulfur-cured) (#8)
- CRW Neoprene (#11)
- Hypalon (#15)
- Emulsion SBR (SBR 1502) (#22)

The curing tests were conducted using a steam-contact autoclave setup. Figure 3-1 illustrates a schematic of the autoclave structure. A rack loaded with the desired quantity of rubber strips was loaded by electric winch into the autoclave chamber. Three batches of approximately 50 pounds each were loaded and cured for each rubber type. The autoclave was operated at 340° F and approximately 110 psig during each curing run.

Sampling of the autoclave emissions was conducted throughout the three basic modes of operation. Sampling was initiated during the curing phase with sampling of the water trap effluent, conducted during the blowdown phase, and continued through the cool-down phase. TRC's approach was to set up a total capture method whereby all steam and pollutant releases were sampled. The autoclave curing entailed sampling of the water trap condensate (during curing), the blowdown steam, and cooldown air emissions. All steam releases were vented through the 1-inch water trap or blowdown pipe into a series of condensing impingers and sorbent tubes kept under negative pressure by a metering pump. During curing, the water trap condensate was directed into sample containers and large impingers for volume determination. The blowdown pipe was connected to the condensing coils and the first of a series of large impingers. Steam and entrained pollutants were directed into the impingers for condensing and gross pollutant scrubbing through impingement. Remaining gaseous or entrained pollutants then passed through the sorbent traps for the collection of organic species. TRC installed a controlling valve on the blowdown system to control the rate of steam release during the blowdown cycle.

Following completion of each autoclave run, the rack containing the cured rubber products was removed from the autoclave but kept within the temporary enclosure for sampling during the cooldown period.

3.1.4 Platen Press Curing

The platen press curing process is a general approach to pressure curing engineered rubber products in molds. Specific molds are used to form the desired engineered product at set pressures and curing temperatures. Emissions from platen presses can be controlled using an exhaust hood and duct. Most emissions occur during mold release, at the end of the curing cycle.

The platen press used in this program was manufactured by Pasadena Hydraulics, Inc. of Pasadena, CA and provided for the test program by Goodyear Tire and Rubber Company.

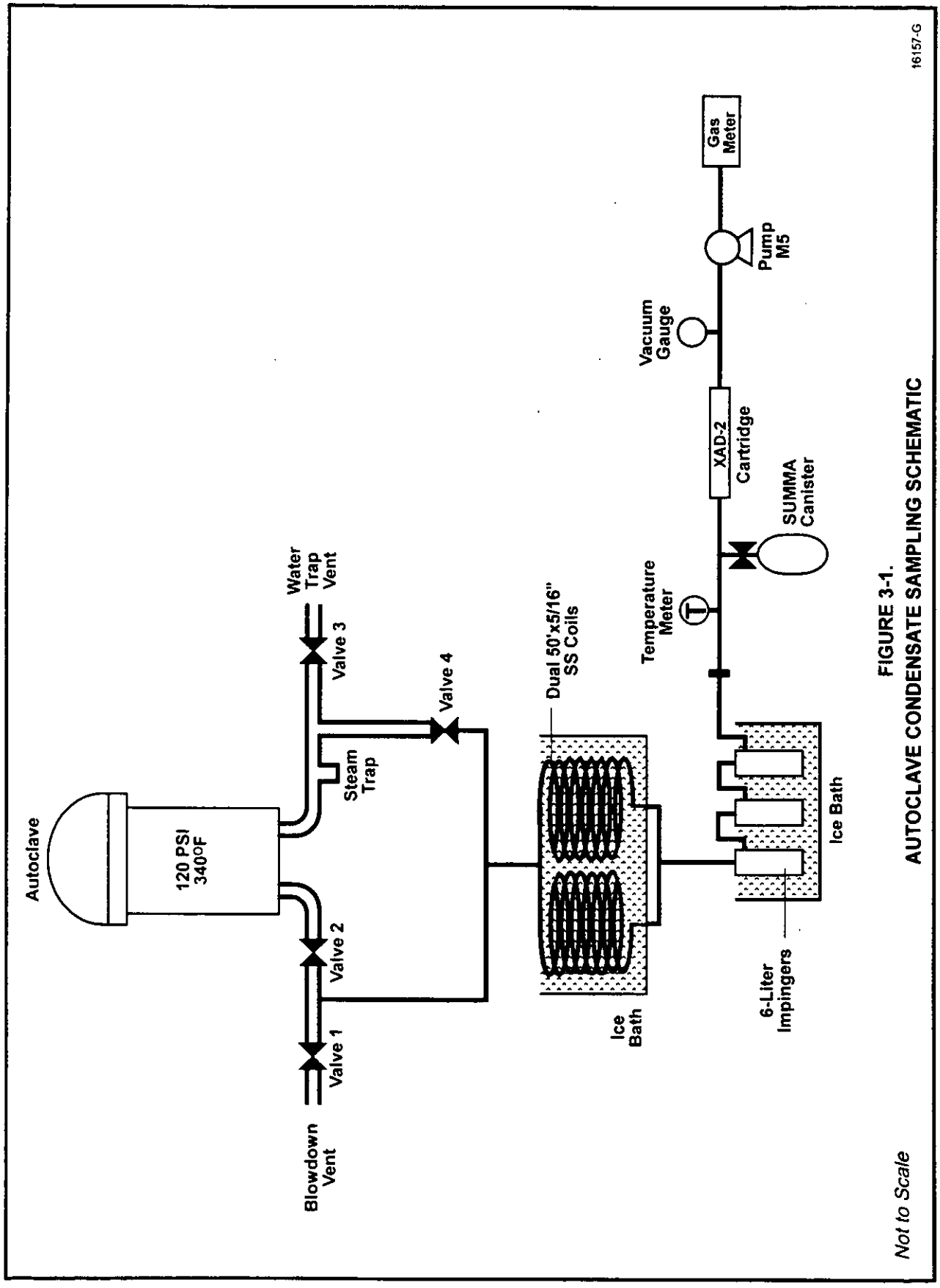


FIGURE 3-1.
AUTOCLAVE CONDENSATE SAMPLING SCHEMATIC

Testing was conducted at TRC's Lowell, MA facility. Emission rates were developed based on: pounds of pollutant emitted per hour (lbs/hr) and pounds emitted per pound of rubber (lbs/lb rubber) cured.

During this program, 17 rubber compounds were cured at temperatures between 340° and 350° F and pressures of 30 tons for the first 3 minutes and 20 tons for the second 3 minutes. The rubber compounds were from batches mixed during testing of small internal mixer No. 2. The compounds cured and their designated numbers were as follows:

- #1 Tire Inner Liner
- #2 Tire Ply Coat
- #3 Tire Belt Coat
- #5 Tire Apex
- #7 Tire Curing Bladder
- #11 CRW Neoprene
- #9 EPDM 2 (unextruded peroxide-cured)
- #12 CRG Neoprene
- #10 EPDM 3 (non-black sulfur-cured)
- #16 Fluoroelastomer
- #13 Paracryl OZO
- #17 AEM
- #14 Paracryl BLT
- #19 Silicone
- #20 Acrylate Rubber
- #22 Emulsion SBR (SBR 1502)
- #23 Epichlorohydrin

Nine samples of approximately 50 grams each were cured for each rubber type. Each 50-gram tab of rubber was placed directly onto the lower plate and pressed into a "pancake" approximately 185 mm diameter and 1 mm thickness. The cooldown period lasted for 6 minutes when the cured samples were removed from the press and left inside the enclosure. Emissions were contained by an exhaust hood and flexible Tyvek sheeting, and exhausted by a single 5-inch duct and blower.

3.1.5 Hot Air Oven Curing

Hot air oven curing of engineered rubber products is used to final cure preformed products. Three rubber compounds were evaluated. One compound used in tire manufacturing (Tire Apex, Compound #5) and two compounds typical of engineered rubber products manufacturing (sulfur-cured EPDM 1, Compound #8; and Emulsion SBR 1502, Compound #22) were selected. To simulate the process for this program, a lab scale system with enclosure was designed and set up to evaluate the emissions during curing and cooldown. The rubber compound samples were placed in the oven and allowed to reach the curing temperature of 400° F for a period of 5-8 minutes. Each sample weighed approximately 100 grams. After completion of curing, each rubber sample was removed and allowed to cool down in the enclosure and another sample of the same compound placed in the oven and brought up to temperature.

The oven was set up with a preheated sweep gas inlet and an exhaust gas outlet. A temporary enclosure was erected around the oven to contain emissions during the curing and cooldown and when the door was opened. An exhaust duct similar to that used for the platen press was constructed to vent the enclosure and to provide the sampling locations.

3.2 Tire Curing

3.2.1 Laboratory Scale Tire Curing

A lab scale evaluation of emissions from tire cuts (sections) was conducted using a hot nitrogen purge oven cure system with emissions being monitored by a Fourier transform infrared analyzer (FTIR). The lab scale evaluation was conducted to determine if there is a correlation between lab scale and field data for tire curing. A total of 28 tire cuts were oven-cured, representing 9 types of tires from 7 manufacturers. The tire cuts were received uncured and varied in size, weight, and type. The different types received were: original equipment, replacement, and high performance.

There were two zones sampled during the hot air curing of tire cut samples. An oven was set up with a nitrogen sweep gas inlet and a sample gas outlet leading to the FTIR analyzer. This system was used to analyze tire cut off-gases during the curing and cooldown phases. The oven temperature was raised to near 360° F to allow the tire cut core temperature to reach the desired cure temperature of 340° F. After completion of curing, the tire cut was removed and immediately placed in a cooldown chamber equipped similarly to the oven with a sweep gas inlet and a sample gas outlet.

3.2.2 Full-Scale Tire Curing

Evaluation of tire press emissions was conducted on a full-scale tire press equipped with a single mold set and an integral cooldown rack. A total of 9 tire types/brands were press-cured, representing 2 tire sizes from 7 manufacturers. The tires were received uncured and varied in size, weight, and type. Multiple tires for each type were press-cured during each test run to allow for adequate sampling times. The 2 sizes tested were 195/75 and 205/70. A generic, obsolete mold for each tire size was used for the press curing. The different types received were: original equipment (OEM), replacement, and high performance.

Mold temperatures ranged from 330° to 355° F and steam pressures ranged from 200 to 300 psig. Each tire was cured for a period of 10 to 15 minutes. There were two emission zones sampled on the tire press: the press itself and the tire cool-down zone. An enclosure was set up on the tire press to collect fugitive emissions during the press curing of green tires. The enclosure was equipped with an outlet exhaust duct in which sampling was conducted for the target parameters. A similar enclosure was erected around the integral cool-down rack where the tire cools after completion of the press curing.

3.3 Other Rubber Processing

3.3.1 Warmup Milling

Warmup mills are utilized by the industry as a preparation/warmup step for feeding calenders and extruders following each drop from a internal mixer or, to warm the rubber to prepare it for subsequent processing. A warmup mill is similar or identical to a drop mill in that it has

a series of rollers, some toothed, to increase the shearing of the compound. The mill can be batch or continuously fed, depending of the production need.

Evaluations of warmup mill emissions were conducted at two facilities during this program. Emissions from both were captured using a temporary enclosure and exhaust duct system. Emissions from a lab scale warmup mill were tested during the milling of the following three compounds:

- Tire Ply Coat (#2)
- Tire Belt Coat (#3)
- Tire Base/Sidewall (#4)

Multiple drops were made for each test run. One test run was conducted per compound. Each drop was approximately 2.5 pounds of rubber which represents a fill of approximately 65 percent.

A second warmup mill test was conducted at an engineered rubber products manufacturing facility. This was a production facility that operated its warmup mill in a batch mode for the test. The facility ran a neoprene compound in the warmup mill for the three test runs and collected the milled rubber on pigs for running through the calender. The mill roll temperature was approximately 90° F. The rubber was milled to a thickness of 0.3 inches and a temperature of approximately 175° F.

3.3.2 Calendering

The calendering process is used to bond a continuous textile or metal mesh web to one or two layers of rubber for use in building tires and other engineered rubber products. The latex-dipped textile passes through a series of rollers through which one or two rubber strips also passes. Under pressure and elevated temperatures induced by the rollers, the rubber is bonded to the web. The nip of the rollers can be adjusted to vary the thickness of the calendered product. The rubberized fabric is then cooled and cut to the proper dimensions.

During this program, emissions from the calendering process were tested at two facilities. The first was a continuous production process where the rubber was continuously fed from a warmup mill. A tire ply coat rubber compound was being run on the test days. Three test runs were conducted from an exhaust collector system outlet stack.

The second process tested involved a batch or "pig" fed calender during calendering of a neoprene compound at an engineered rubber products manufacturing facility. The calender itself had 54-inch wide rolls and ran approximately 1100 linear yards of a neoprene compound during each of the three test runs. The emissions from this system were measured using a temporary enclosure and exhaust duct configuration.

3.4 Tire Grinding Processes

The grinding processes used in tire manufacturing are specific to each application. Four types were identified for this program: retread buffing, carcass grinding, whitewall (sidewall), and truing (force). The grinding processes, in general, generate quantities of rubber dust and particles, and may generate HAP emissions, depending on the rubber formulation and the amount of heat generated during grinding. To control these emissions, cyclones, baghouses, and electrostatic precipitators (ESPs) are used either alone, or in combination.

Grinding operations are typically conducted in a collector hood with an exhaust duct leading to a primary and possibly secondary control device. Emissions sampling was conducted in the hood's exhaust duct (control device inlet) to determine the process' potential to emit. Simultaneous sampling was also conducted at the outlet duct of each downstream control device to determine control efficiency and the final pollutant emissions rate.

3.4.1 Force/Balance Grinding

A screening evaluation of emissions from a force grinder was conducted at a full scale tire manufacturing facility using FTIR and total hydrocarbon analyzers. The force grinder is used to buff areas of a tire that are out of specification when the tire is put under load. Observations of the force grinder showed that only a few tires per hour are actually buffed, and the quantity of rubber removed is very slight, resulting in insignificant or no emissions.

3.4.2 Sidewall/Whitewall Grinding

Another surface grinding process, sidewall/whitewall grinding, was also evaluated. The grinder consists of two stones set in a wheel which rotate at high rpms over the whitewall area of the tire, removing a thin coat of black rubber which overlays the whitewall section. The grinder is set into a frame equipped with four powered exhaust ducts. Emissions from the grinding operation are carried via flex hose to overhead ductwork. Emissions at this facility are ducted to a cyclone for removal of rubber dust and pieces ground from the tires. The exhaust air passes through the cyclone and is exhausted to the atmosphere. Approximate grinding time per tire is 20 seconds. Testing was conducted during normal operations, and emissions are based on pounds emitted per hour and pounds emitted per pound of rubber removed, as measured by the quantity of rubber dust and particles collected in the cyclone hopper.

3.4.3 Retread Buffing

Retread buffing was also studied as a surface grinding operation in this program. In this process, the surface of the back of the tread is buffed to prepare it to receive adhesive further down the line. The retread buffer consists of an edger and four inline buffing wheels with hasps around the circumference of each wheel. Each wheel is covered by a hood exhausted by an flexible duct. The four exhaust ducts enter a common header duct. At the facility tested, the header duct conveys the emissions to an American Air Filter cyclone/fabric filter control system. The fabric filter is Model Number 12-84-1347.

A tread section approximately 37 feet long is fed to the edger where the edge is squared. The tread is then fed to the first wheel of the inline buffer which catches and draws the tread into the line. As the tread passes each succeeding wheel, the wheel comes down onto the surface. A given pressure is applied to the buffing wheels to remove the required layer of rubber. As the hasps dull, a greater pressure on the surface is required to remove the same amount of material. The emissions are solid rubber particles and volatile and semivolatile organic compounds. It takes approximately 40 seconds to buff a tread with approximately 5 seconds between tread sections. Sampling was conducted in the 20-inch inlet duct to the cyclone, in the 20-inch baghouse outlet duct prior to the I.D. fan, and in the 22-inch stack after the I.D. fan. Emission are presented as pounds per hour and pounds emitted per pound of rubber processed, as no actual rubber removal rates were calculable.

3.4.4 Tire Carcass Grinding

Tire carcass grinding is used for gross rubber removal (tread section) and for preparation of the resulting tire carcass for retreading. This operation consists of two phases, a coarse grind module and a fine grind module. The tire is first ground to a predetermined depth with a coarse grind hasp to prepare it for the fine grind operation. The fine grind operation completely removes the old tread and prepares the carcass surface to receive the new tread. The tire carcass to be ground is placed on a shaft and rotated at predetermined revolutions per minute. The carcass is then placed against a rotating fine tooth hasp at a given pressure. The hasp moves across the surface of the carcass in a predetermined pattern.

The fine grind operation was selected for the study due to the fact that the grinding period is longer, the pressure of the hasp on the wheel is greater than the coarse grind, and the temperature of the carcass surface is higher than for the coarse grind operation. The grinding time for the coarse grind operation is 1-2 minutes, while the grinding time for the fine grind operation is 4 minutes. Approximately 10 to 12 tires are ground per hour.

The fine grind module consists of the rotating shaft on which the carcass is placed and a rotating fine tooth hasp which is covered by a hood. At the facility tested, a flexible exhaust duct connects the hood to an elevated horizontal duct which leads to a cyclone manufactured by Retread Equipment Corp. of Charlotte, NC. The exhaust from the cyclone passes through a horizontal centrifugal fan to an outlet stack on the roof. The entire module was enclosed with Tedlar sheeting to enhance the capture of volatiles, semivolatiles, and particulate matter by the hasp hood. Sampling was conducted in the 10-inch horizontal cyclone inlet duct and in the 16-inch outlet stack. Emissions are presented as pounds per hour and as pounds emitted per pound of rubber removed, measured by the quantity of rubber dust and rubber particles collected in the cyclone hopper.

3.5 Engineered Products Grinding - Drive Belts

The belt grinding operation selected for this study is located at an engineered rubber products manufacturing facility. The selected process line was deemed to be representative of surface grinding operations. This particular line was used for V-belt grinding and consists of eight grinders. Each grinder is enclosed within a close fitting hood. An exhaust duct exits from

each hood and enters an overhead exhaust manifold. The combined exhaust streams enter the 16-inch diameter central cyclone inlet duct which leads to a Fisher Kloster XQ-120-20 cyclone. An 18-inch duct exits from the top of the cyclone and enters a dual 3-stage electrostatic precipitator (ESP). The effluent streams exiting the ESP are combined into a single 14-inch duct which exits the roof through an I.D. fan. During the grinding operation the belts are cooled with a localized water spray located within each grinder hood. Sampling was conducted in the cyclone inlet duct, cyclone exit duct, and ESP exit duct. Emissions are presented as pounds per hour and as pounds emitted per pound of rubber removed, as measured by initial and final weights of the belt batches for each test run.

SECTION 4
DATA ANALYSIS AND DISCUSSION OF RESULTS

This section provides point estimates, means, and maxima of emission factors for individual compounds and elements:

- speciated organic compounds (including volatile compounds, volatile ozone precursors, and semivolatile compounds)
- sulfur compounds
- amines
- metals
- particulate matter

Process and rubber mix/formulation specific emission factors are provided in the following sections. When applicable, rubber formulations are grouped into categories for calculation of means and maxima. Standard deviations are also included for all processes. The speciation table percent values were calculated relative to the "total with non-detects". All data tables are provided at the end of this section.

4.1 Processes Employing Generic Materials

A series of 23 rubber formulations/products and three polymers were tested to determine emission factors for: mixing, extrusion, autoclave curing, and platen press curing. These mixtures tested are presented in Table 4-1. Emissions tests for the mixers were performed on three different size systems: two 2-pound laboratory mixers, a 200-pound pilot scale system, and a 500-pound production mixer. Emissions do not appear to be dependent on mixer size, based on the emission factors of pounds of pollutant emitted per pound of rubber mixed.

4.1.1 Internal Mixing / Drop Mill

All 23 formulations and three polymers were tested once on small internal Mixer No. 2. Five of the formulations were also tested on additional mixers (Table 4-2).

During the earlier stages of the project, data collected on Small Mixer No. 1 and Large Mixer No. 1 were compared for scale differences. Emission factors were calculated for Compounds 4, 6, 9, and 22. Results for these two mixers were found to be somewhat consistent based on emission rate categories. A summary of the emission factors for the mixers is presented in Table 4-3. Emissions for the large and the small mixers do not appear to be dependent on mixer size. Mixers did show variability for total metals. This is likely the result of greater losses into the ventilation system when charging the larger equipment versus what is experienced on smaller scale equipment.

Means, maxima, and standard deviations were determined for tire compounds (1-7), engineered product compounds (1-23) and polymers (SBRs 24-26) in Tables 4-4a, 4b, and 4c, respectively. Pollutant emission factors include organic compounds, metals, sulfur compounds, and particulate matter. Figure 4-1 presents total VOC (total hydrocarbons as methane) for all 23 compounds and 3 polymers (SBR Compounds 24-26).

Table 4-1. Generic Rubber Formulations/Products		
Compound	**Category**	**Description**
1	Tire Inner Liner	Brominated IIR/Natural Rubber
2	Tire Ply Coat	Natural Rubber/Synthetic Rubber
3	Tire Belt Coat	Natural Rubber
4	Tire Base/Sidewall	Natural Rubber/Polybutadiene Rubber
5	Tire Apex	Natural Rubber
6	Tire Tread	Styrene Butadiene Rubber/Polybutadiene Rubber
7	Tire Bladder	Butyl Rubber/Neoprene Rubber
8	EPDM 1	EPDM Sulfur Cure
9	EPDM 2	Peroxide Cure
10	EPDM 3	Non-black EPDM Sulfur Cure
11	CRW	Polychloroprene W Type
12	CRG	Polychloroprene G Type
13	Paracryl OZO	Nitrile Rubber/PVC
14	Paracryl BLT	Nitrile Rubber
15	Hypalon	CSM
16	Fluoroelastomer	FKM
17	AEM	Vamac
18	Hydrogenated Nitrile	HNBR
19	Silicone	VMQ
20	Acrylate Rubber	ACM
21	Chlorinated Polyethylene	CPE
22	Emulsion SBR	SBR 1502
23	Epichlorohydrin	ECO
24	Oil-Extended SBR*	SBR 1712
25	Emulsion SBR*	SBR 1500
26	Solution SBR*	Duradene 707

*Compounds 24, 25, and 26. Were mixes of polymer only, without fillers or cure system.

Table 4-2. Additional Internal Mixer Tests			
#	Formulation	Runs	Tested on
4	tire base/sidewall	1	Large Mixer No. 1 and Small Mixer No. 1
5	tire apex	3	Internal Mixer with a Torit control device
6	tire tread	1	Large Mixer No. 1
9	EPDM2	1	Large Mixer No. 1 and Small Mixer No. 1
22	emulsion SBR (1502)	1	Large Mixer No. 1 and Small Mixer No. 1

see pg. 8-4

Tables 4-4d through 4l provide speciation factors for organics, metals, and sulfur compounds for tire compounds, engineered products, and the three polymers as a weight percent value. Similar to Tables 4-4a, 4b, and 4c, means, maxima, and standard deviations were also determined for the speciation factors for the three general rubber categories.

Table 4-5 presents control efficiencies for a Torit fabric filter handling ventilation exhaust from a large production-scale internal mixer.

4.1.2 Extruder

Table 4-6a provides an emission factor summary for the four rubber formulations tested. Tables 4-6b and 6c provide speciation factors for organic compounds and metals for each of the four rubber compounds and all four combined. The only sulfur compound detected in the extruder test series was carbon disulfide (Location A, Run 2). Therefore, a speciated sulfur table was not developed. Carbon disulfide emissions are presented in Volume 2. Figure 4-2 provides a summary of total VOC (THC as methane), metals, and sulfur for the extruder.

4.1.3 Autoclave Curing

Autoclave curing is a process which can utilize either a steam contact or non-contact system. During this program, air emissions and water discharge were evaluated from a steam contact system. Emission factors were calculated using ten of the generic rubber mixtures tested in the small Mixer No. 2. One rubber compound, EPDM 2 (Compound No. 9) was also tested using extruded and unextruded rubber to determine what, if any, differences result in curing emissions if previously extruded. Based on the limited amount of data available, there were no substantial differences between the extruded and unextruded EPDM. A summary of the autoclave emission factors for the rubber mixes is presented in Table 4-7a. Tables 4-7b through 7d present the speciation factors for organic compounds, amines, and sulfur compounds. A summary of total VOCs (total hydrocarbons, as methane) from the autoclave is presented in Figure 4-3.

In this steam contact autoclave system, uncured rubber loaded into the pressurization chamber is in full contact with the steam, resulting in both water-borne and air-borne pollutants. The

Figure 4-1. - BANBURY MIXER / DROP MILL

Small #1 ?

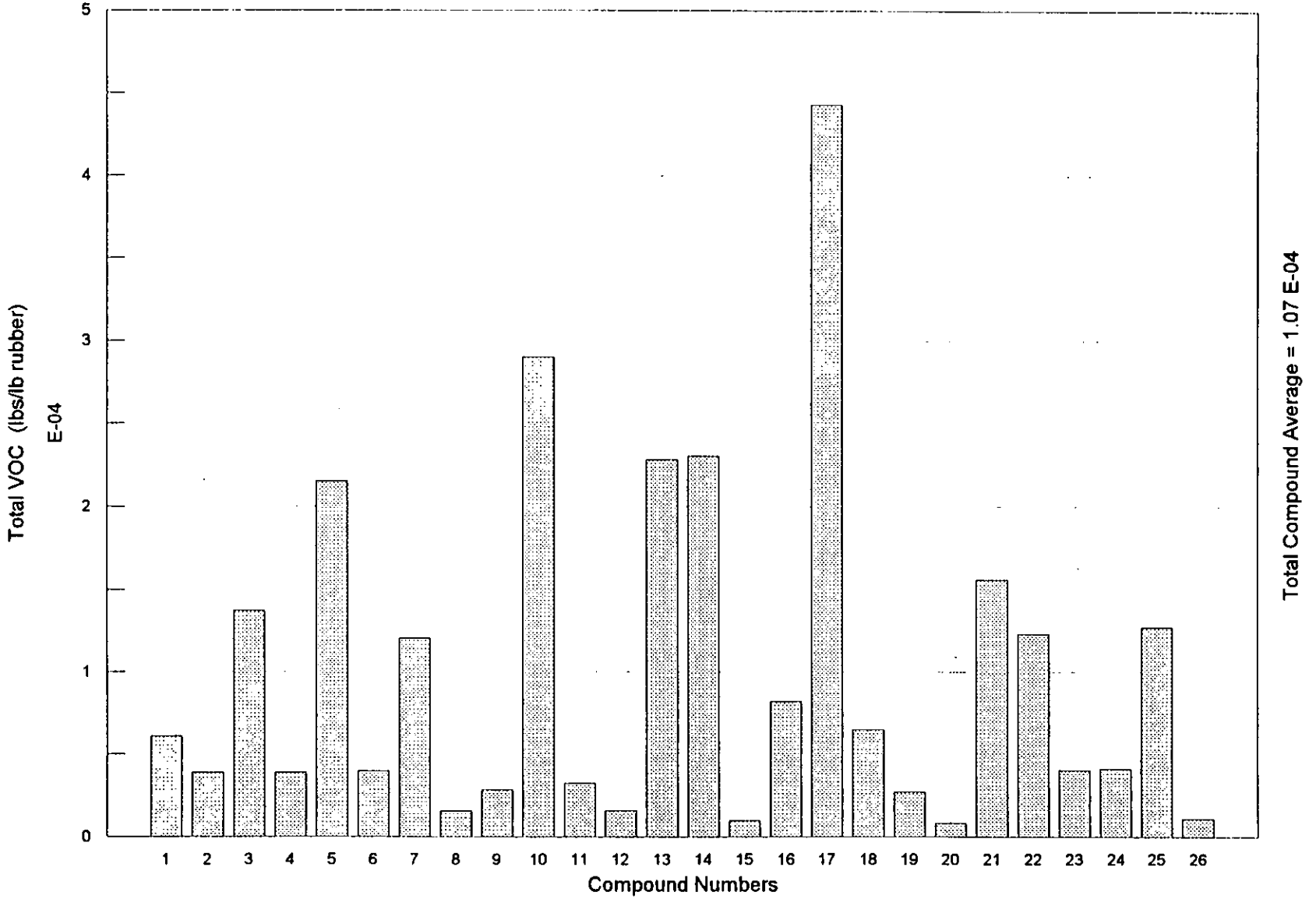


Figure 4-2 - Summary of VOC Emissions For The Extruder Test Series

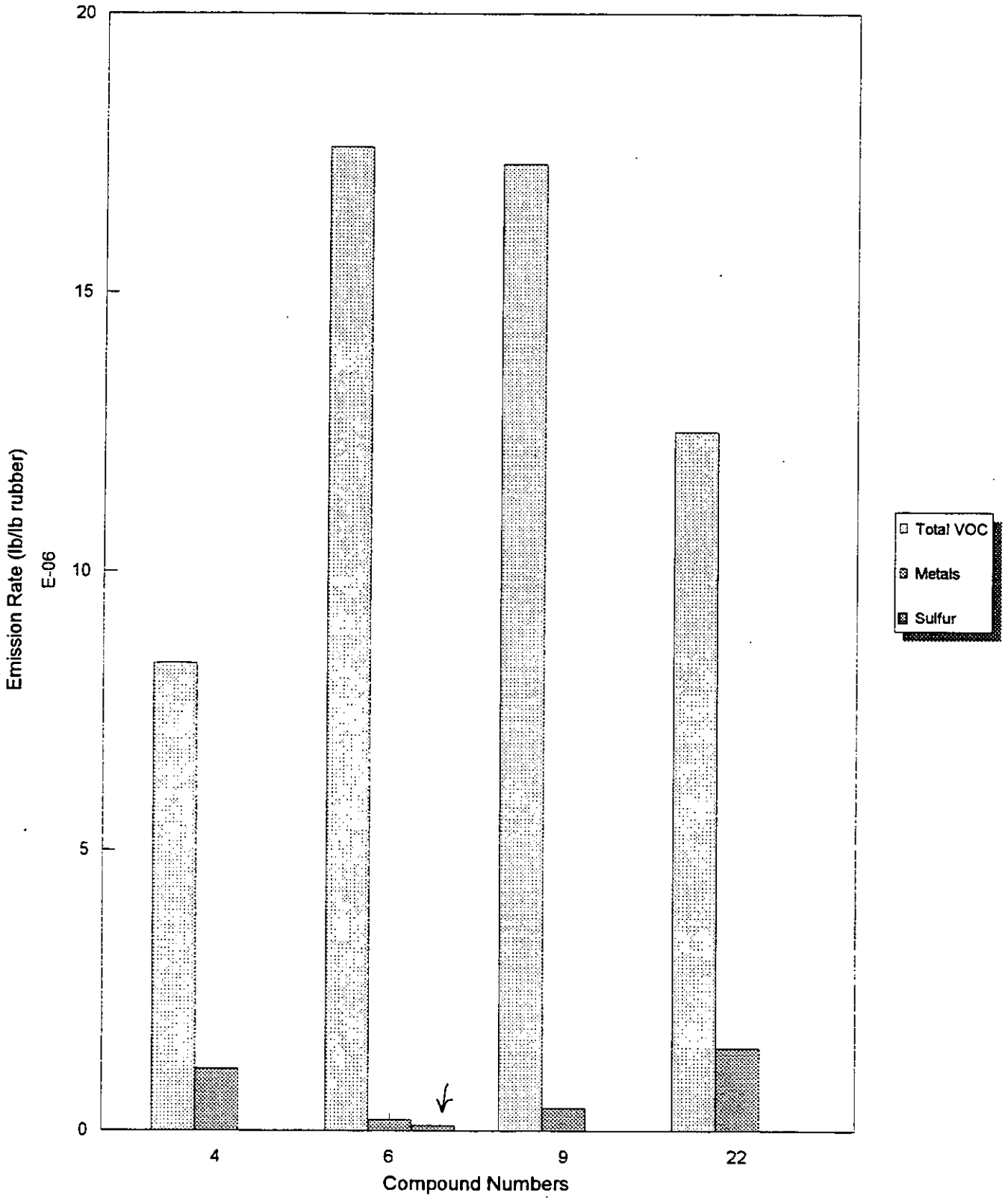
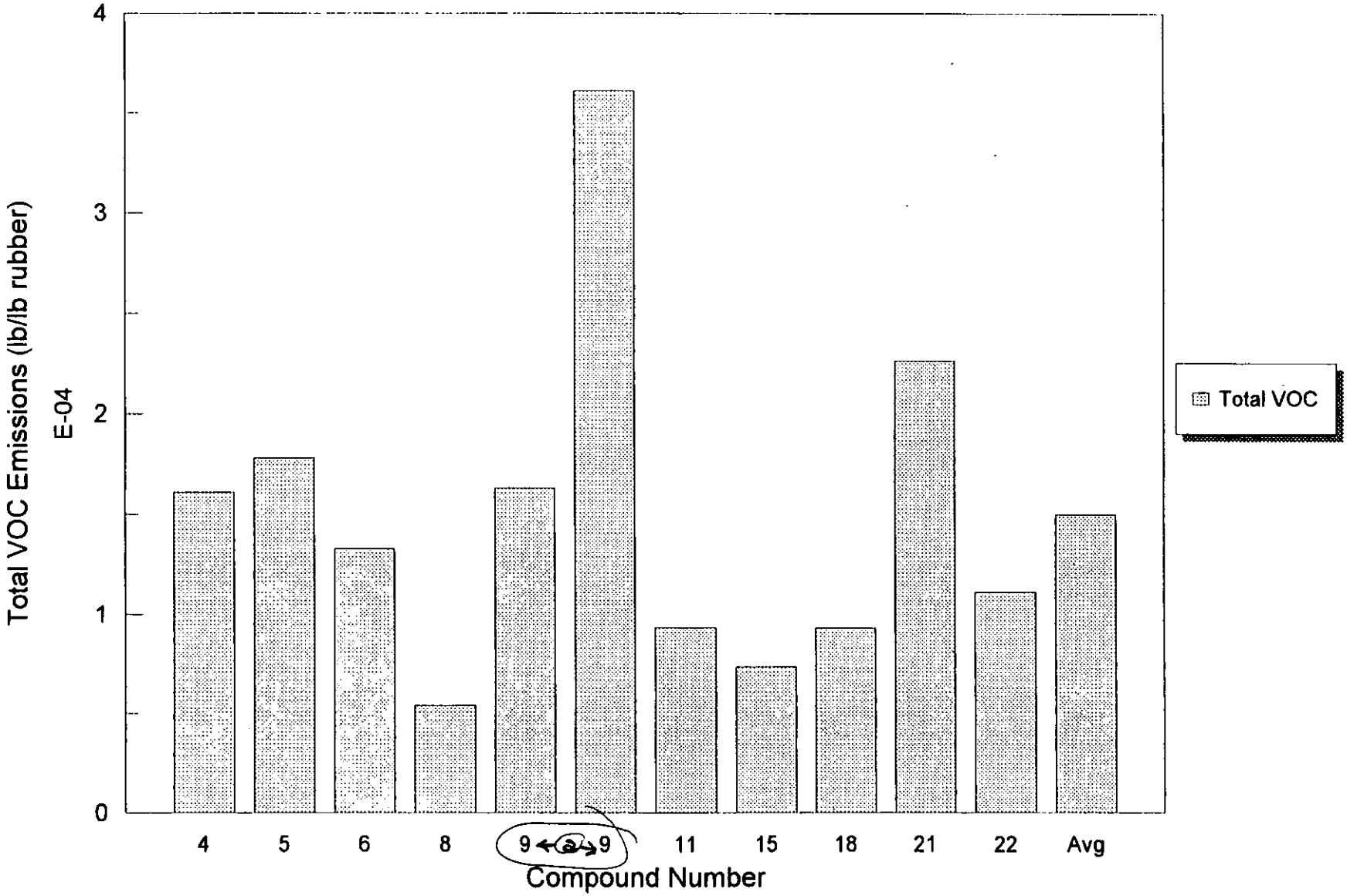


Figure 4-3. Summary of VOC Emissions from Autoclave Tests



steam condensate from this type of system is discharged during blowdown at the end of the curing cycle and, oftentimes, from the water trap during the curing cycle.

In the non-contact system, the uncured rubber is enclosed in a bladder within the pressurization chamber and does not come into contact with the steam. Therefore, pollutants are not discharged with the steam condensate as occurs with the steam contact system, but are emitted as air-borne pollutants upon opening of the autoclave chamber.

In evaluating pollutant discharges from the steam contact type of system, samples were collected and analyzed from two aqueous (water trap and blowdown condensate) and one gaseous (cooldown air) matrices. The total emissions for the autoclave system were obtained by combining the emission and discharge rates (lbs/hr and lbs/lb rubber) for volatiles, semivolatiles, and sulfur compounds. This total is most representative of a non-contact system where all pollutants are discharged as air contaminants and should be considered in an emissions inventory. To enable a comparison of a steam contact system with a non-contact system, the water-borne pollutants from a steam contact system could be considered separately, possibly as a discharge under a NPDES permit, and not as an air emission. However, there is a possibility of downstream fugitive emissions from this aqueous discharge.

As is shown in Table 4-7e, certain classes of pollutants exhibit higher condensibility or solubility properties and a higher percentage removal in the aqueous discharge streams. The table indicates that as much as 100 percent of sulfur emissions are removed in the aqueous streams, and could be discounted from inclusion in air emissions inventories when steam contact autoclaves are in use. Similarly, up to 95 percent of semivolatile organic emissions are removed in aqueous streams. Predictably, volatile organics exhibited a much lower removal rate with a maximum of 36 percent removal in the aqueous streams.

As the table indicates, the removal percentages vary by not only pollutant class, but also by rubber compound. It should be noted that the table presents only a comparison of the totals of the pollutant categories, and not the individual chemical species. This information could be determined through further detailed review of the speciated data.

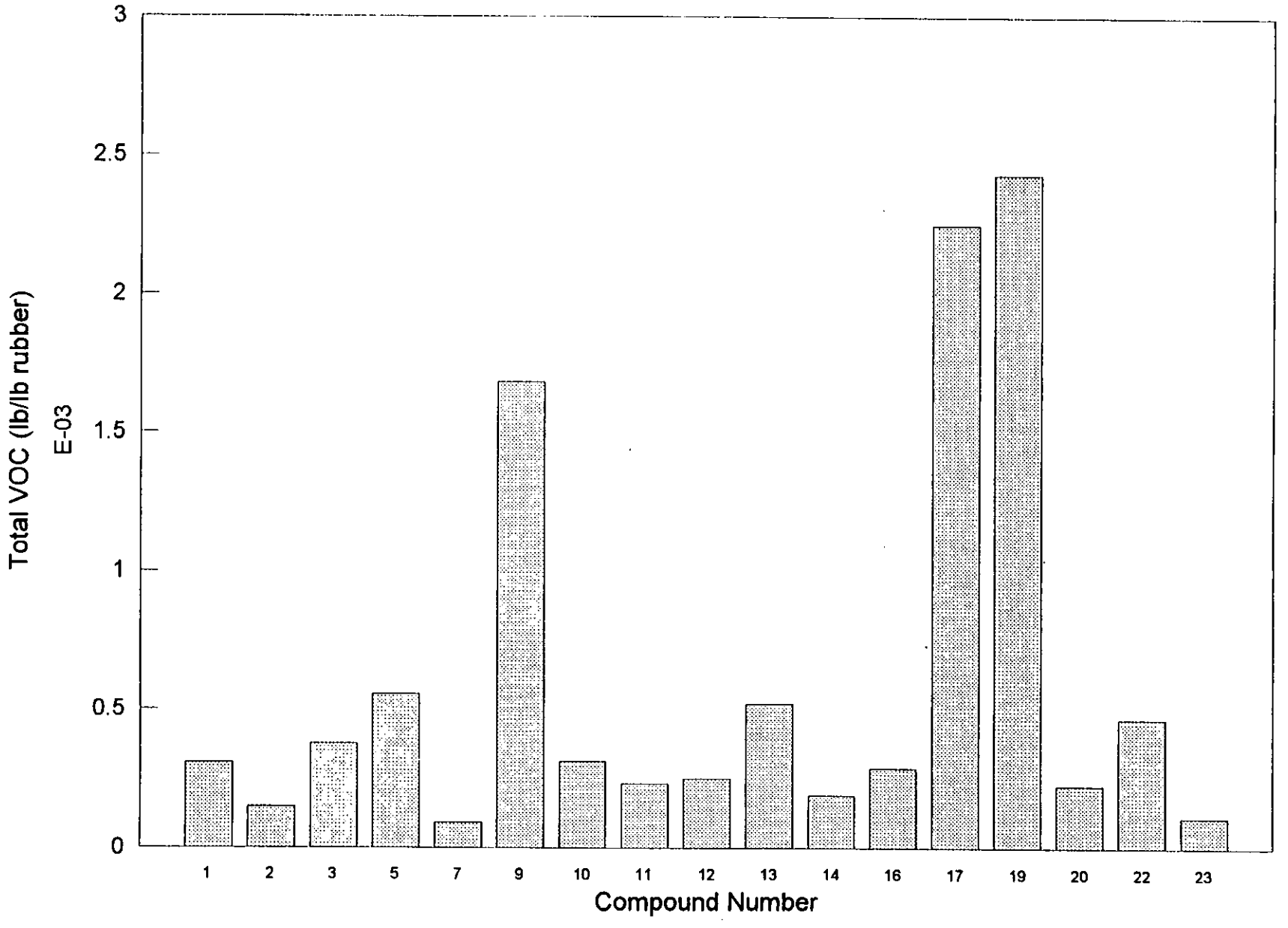
4.1.4 Platen Press Curing

A summary of VOC (THC as methane) from the platen press is presented in Figure 4-4. An emission factor summary for the platen press for 16 rubber formulations is presented in Table 4-8a. Organic and sulfur compound speciation factors are presented in Tables 4-8b and 8c.

4.1.5 Hot Air Oven Curing

An emission factor summary for hot air oven curing of 3 rubber formulations is presented in Table 4-9a. Organic and sulfur compound speciation factors are presented in Tables 4-9b and 9c.

Figure 4-4 - Summary of VOC Emissions From The Platen Press



4.2 Tire Curing

Tire press emission factors were determined for laboratory scale tire cuts and a full scale tire press. The tires tested represent a cross section of passenger tires and brands from the larger manufacturers.

Table 4-10a provides a summary of VOC emission factors for the laboratory scale tire cuts. Figure 4-5 shows a summary of VOC (THC as methane) emissions for passenger tires. Emission factor summaries for the tire press for OEM (original equipment manufacturer), high performance, replacement tires, and all tires combined are presented in Tables 4-10b,10c, 10d, and 10e. Tables 4-10f, 10g, 10h and 10i present organic compound speciation factors for the three tire types and all tires combined. Amine and sulfur speciation factors are presented in Tables 4-10j through 10q for each of the tire types and all tires combined.

4.2.1 Relationship of Laboratory Scale and Full-scale Data

Table 4-10r provides a comparison of the laboratory and full scale tire press data from FTIR analyses. A review of this table indicates that there is little correlation between the lab and full-scale tire cure data for inoganic compounds, organic sulfur compounds, and speciated organic compounds.

4.3 Warmup Mills and Calendering

4.3.1 Warmup Mills

An emission factor summary for organics and sulfur compounds for the four rubber mixes tested in the warmup mill are presented in Table 4-11a. Tables 4-11b and 11c present the speciation factors for organic and sulfur compounds.

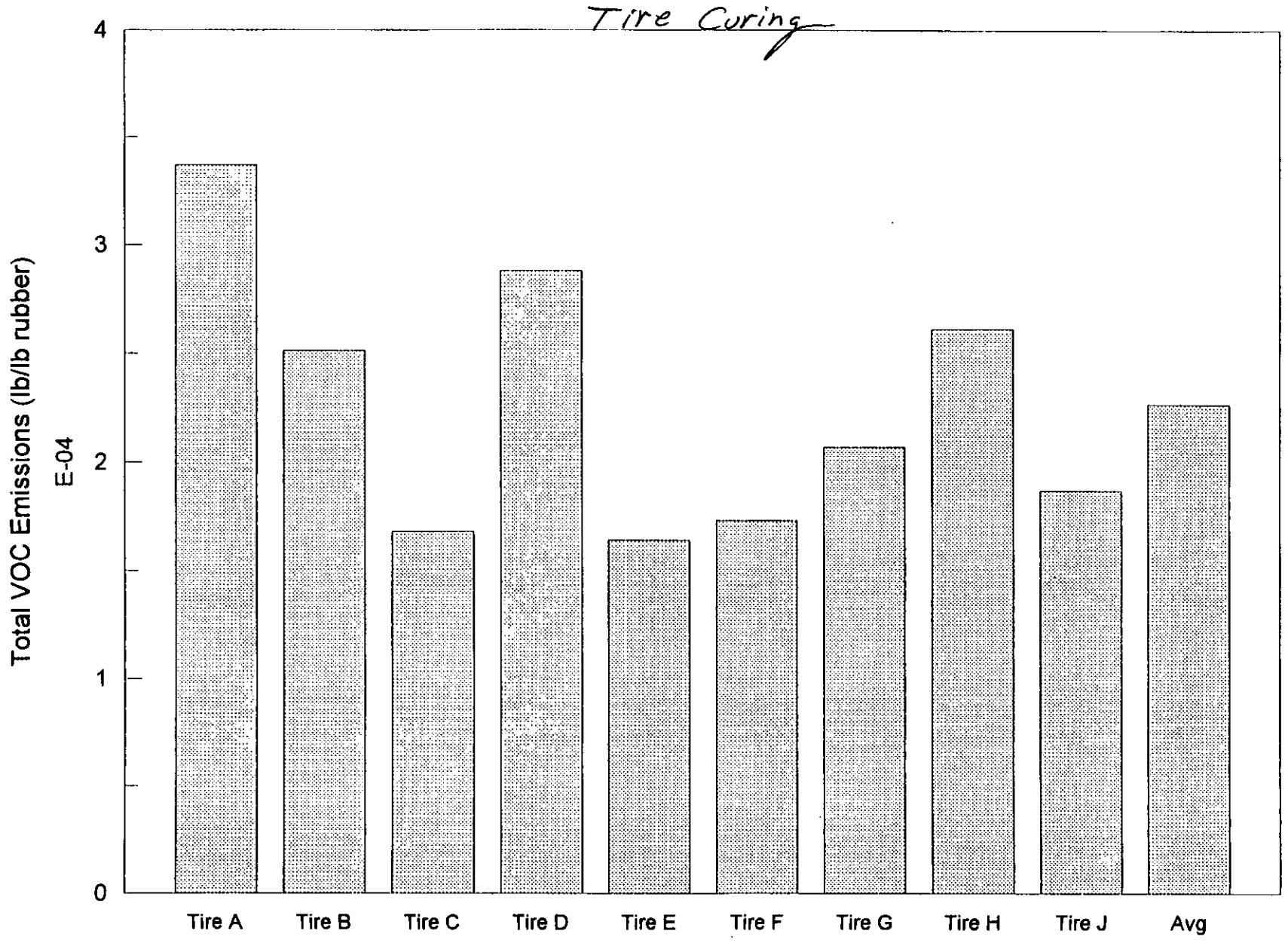
4.3.2 Calenders

An emission factor summary for calendering for total organics, total sulfur and amines for two rubber mixes is presented in Table 4-12a. Tables 4-12b and 12c contain speciation factors for organic and sulfur compounds.

4.4 Grinding

Emission factors were developed for four grinding operations: sidewall/whitewall grinding, retread carcass grinding, retread buffing, and belt grinding. Inlet and outlet concentrations were measured in order to determine control efficiencies. Force grinding was also evaluated but was found to have insignificant VOC emissions at the facility tested. Specifications of the grinding test series are summarized as follows:

Figure 4-5. Summary of VOC Emissions for Passenger Tires



Process	Control Device Sampling Locations	Rubber Removal Measurement
Retread Buffing	Cyclone Inlet, Baghouse Outlet	lbs Emitted/lb Rubber Processed (1)
Sidewall Grinding	Cyclone Inlet, Cyclone Outlet	lbs Emitted/lb Rubber Removed (2)
Carcass Grinding	Cyclone Inlet, Cyclone Outlet	lbs Emitted/lb Rubber Removed (2)
Belt Grinding	Cyclone Inlet, ESP Inlet, ESP Outlet	lbs Emitted/lb Rubber Removed (3)

[1]Initial weights of the retread sections were taken. The emission factors were based on the pounds of tread processed.
[2]Initial and final weights of the cyclone hopper were taken to obtain the quantity of the rubber removed from the tires per test run. The difference in hopper weights was the amount of rubber removed.
[3]Initial and final weights of the belt batches were taken for each test run.

A summary of inlet concentrations, outlet concentrations, and control efficiencies is provided below.

4.4.1 Inlet Concentrations

Summary inlet emission factors for sidewall grinding, tire carcass grinding, retread buffing, and belt grinding are presented in Tables 4-13a through 4-13d, respectively. Tables 4-13e, 13f, and 13g present speciation factors for each of the grinding operations for organic compounds, metals, and sulfur compounds.

4.4.2 Outlet Concentrations

Summary outlet emission factors for the four grinding operations are presented in Tables 4-13h, 13i, 13j, and 13k. Calculated control efficiencies are presented in Table 4-13l.

4.5 Effects of Temperature

Table 4-14 presents VOC data for compounds at various temperatures on different processes. While no direct correlations can be derived, empirically one can observe that between 220°F and 400°F. VOC emissions can increase up to two orders of magnitude for most of the compounds. At a minimum, it appears that VOC emissions will increase at least one order of magnitude.

Specific tests were not conducted to determine the effects of elevated temperatures in a given compound. However, several compounds were subjected to temperatures varying from 200°F to 400°F, as a result of the tests conducted for each process. No compounds were tested at multiple temperatures on a given process.

These data, while not conclusive, can be used as a guide for making decisions when applying data from this study to plant-specific situations.

TABLE 4-3

SMALL MIXER 1/LARGE MIXER 1 SUMMARY

SMALL MIXER 1 -

Compound	Total VOCs, as methane (lbs/lb rubber)		Total Speciated Semivolatiles (lbs/lb rubber) with non-detects		Total Speciated Volatiles (lbs/lb rubber) with non-detects	Total Speciated Organics[1]		Total Sulfur (lbs/lb rubber) with non-detects	Total Metals (lbs/lb rubber) with non-detects	Total PM (lbs/lb rubber)
TREAD	NA		NA		NA	NA		NA	NA	NA
EPDM	4.52E-05	<	1.68E-04	<	1.46E-04	1.47E-04	<	2.94E-06	1.21E-05	2.07E-04
SDW	2.88E-05	<	9.42E-05	<	3.79E-05	3.51E-05	<	2.27E-06	5.79E-06	1.37E-04
SBR	6.59E-05	<	1.09E-04	<	2.66E-04	2.62E-04	<	2.50E-06	1.35E-05	1.73E-04
Mean	4.66E-05	<	1.24E-04	<	1.50E-04	1.48E-04	<	2.57E-06	1.05E-05	1.72E-04
Max.	6.59E-05	<	1.68E-04	<	2.66E-04	2.62E-04	<	2.94E-06	1.35E-05	2.07E-04
Std. Dev.	1.52E-05	<	3.19E-05	<	9.32E-05	9.26E-05	<	2.78E-07	3.35E-06	2.86E-05

LARGE MIXER 1 -

Compound	Total VOCs, as methane (lbs/lb rubber)		Total Speciated Semivolatiles (lbs/lb rubber) with non-detects		Total Speciated Volatiles (lbs/lb rubber) with non-detects	Total Speciated Organics[1]		Total Sulfur (lbs/lb rubber) with non-detects	Total Metals (lbs/lb rubber) with non-detects	Total PM (lbs/lb rubber)
TREAD	4.86E-05	<	3.33E-04	<	6.69E-05	6.79E-05	<	2.86E-06	6.14E-06	5.36E-04
EPDM	7.72E-05	<	2.44E-04	<	1.48E-04	1.48E-04	<	3.35E-06	2.79E-06	1.31E-04
SDW	3.05E-05	<	3.27E-04	<	1.10E-04	9.91E-05	<	8.07E-06	3.30E-05	4.99E-04
SBR	6.41E-05	<	1.87E-04	<	1.34E-04	1.33E-04	<	2.25E-06	1.29E-04	4.27E-04
Mean	5.51E-05	<	2.73E-04	<	1.15E-04	1.12E-04	<	4.13E-06	4.27E-05	3.98E-04
Max.	7.72E-05	<	3.33E-04	<	1.48E-04	1.48E-04	<	8.07E-06	1.29E-04	5.36E-04
Std. Dev.	1.74E-05	<	6.07E-05	<	3.08E-05	3.10E-05	<	2.31E-06	5.12E-05	1.59E-04

1 - Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

TABLE 4-4a

SMALL MIXER 2 - TIRE PRODUCTS

TIRE COMPOUND SUMMARY

Compound	Total VOCs, as methane (lbs/lb rubber)		Total Speciated Semivolatiles (lbs/lb rubber) with non-detects		Total Speciated Volatiles (lbs/lb rubber) with non-detects		Total Speciated Organics[1] (lbs/lb rubber) with non-detects		Total Sulfur (lbs/lb rubber) with non-detects		Total Metals (lbs/lb rubber) with non-detects		Total PM (lbs/lb rubber)
1	6.11E-05	<	1.93E-06	<	7.88E-05	<	8.08E-05	<	5.53E-06		1.20E-05		1.75E-04
2	3.86E-05	<	2.56E-06	<	6.35E-05	<	6.61E-05	<	3.90E-06	<	4.25E-05		4.02E-04
3	1.37E-04	<	5.10E-06	<	1.04E-04	<	1.09E-04	<	7.65E-06		1.30E-04		8.99E-04
4	3.86E-05	<	2.09E-06	<	5.89E-05	<	6.09E-05	<	2.95E-06		2.44E-05		3.00E-04
5	2.15E-04	<	2.91E-05	<	4.45E-05	<	7.36E-05	<	3.04E-06		3.30E-05		9.25E-04
6	3.96E-05	<	3.56E-06	<	1.21E-04	<	1.25E-04	<	7.65E-06	<	8.28E-06		4.00E-04
7	1.20E-04	<	2.41E-06	<	1.16E-04	<	1.19E-04	<	5.64E-06	<	3.54E-05		5.66E-04
Mean	9.28E-05	<	6.68E-06	<	8.38E-05	<	9.06E-05	<	5.19E-06	<	4.08E-05		5.24E-04
Max.	2.15E-04	<	2.91E-05	<	1.21E-04	<	1.25E-04	<	7.65E-06	<	1.30E-04		9.25E-04
Std. Dev.	6.25E-05	<	9.21E-06	<	2.79E-05	<	2.45E-05	<	1.84E-06	<	3.82E-05		2.69E-04

[1] - Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

TABLE 4-4b

SMALL MIXER 2 - ENGINEERED PRODUCTS

~~TIRE COMPOUND~~ SUMMARY

Compound	Total VOCs, as methane (lbs/lb rubber)	Total Speciated Semivolatiles (lbs/lb rubber) with non-detects	Total Speciated Volatiles (lbs/lb rubber) with non-detects	Total Speciated Organics[1] (lbs/lb rubber) with non-detects	Total Sulfur (lbs/lb rubber) with non-detects	Total Metals (lbs/lb rubber) with non-detects	Total PM (lbs/lb rubber)
1	6.11E-05	< 1.93E-06	< 7.88E-05	< 8.08E-05	< 5.53E-06	1.20E-05	1.75E-04
2	3.86E-05	< 2.56E-06	< 6.35E-05	< 6.61E-05	< 3.90E-06	< 4.25E-05	4.02E-04
3	1.37E-04	< 5.10E-06	< 1.04E-04	< 1.09E-04	< 7.65E-06	1.30E-04	8.99E-04
4	3.86E-05	< 2.09E-06	< 5.89E-05	< 6.09E-05	< 2.95E-06	2.44E-05	3.00E-04
5	2.15E-04	< 2.91E-05	< 4.45E-05	< 7.36E-05	< 3.04E-06	3.30E-05	9.25E-04
6	3.96E-05	< 3.56E-06	< 1.21E-04	< 1.25E-04	< 7.65E-06	< 8.28E-06	4.00E-04
7	1.20E-04	< 2.41E-06	< 1.16E-04	< 1.19E-04	< 5.64E-06	< 3.54E-05	5.66E-04
8	1.55E-05	< 1.07E-06	< 5.93E-05	< 6.04E-05	< 7.64E-06	8.19E-06	2.22E-04
9	2.84E-05	< 2.51E-06	< 6.28E-05	< 6.53E-05	< 5.32E-06	< 2.42E-06	4.92E-05
10	2.90E-04	< 2.67E-06	< 3.10E-05	< 3.13E-04	< 2.81E-05	2.44E-05	3.58E-04
11	3.22E-05	< 1.09E-05	< 3.12E-05	< 4.21E-05	< 9.84E-06	< 1.72E-05	7.82E-05
12	1.59E-05	< 1.59E-06	< 6.54E-05	< 6.70E-05	< 5.74E-05	1.85E-05	1.83E-04
13	2.28E-04	< 2.99E-06	< 1.60E-04	< 1.63E-04	< 3.11E-06	< 8.06E-06	2.46E-04
14	2.30E-04	< 1.85E-06	< 1.45E-04	< 1.47E-04	< 1.70E-05	< 1.05E-05	1.30E-04
15	9.69E-06	< 2.12E-06	< 6.10E-05	< 6.32E-05	< 4.46E-06	4.54E-06	1.42E-04
16	8.18E-05	< 1.05E-06	< 3.48E-05	< 3.59E-05	< 2.50E-06	< 1.14E-05	3.17E-04
17	4.43E-04	< 3.81E-06	< 3.16E-04	< 3.20E-04	< 5.64E-06	1.69E-06	8.96E-05
18	6.48E-05	< 1.38E-06	< 1.34E-04	< 1.35E-04	< 7.56E-05	< 1.34E-05	1.92E-04
19	2.70E-05	< 9.06E-07	< 2.31E-05	< 2.40E-05	< 1.97E-06	< 1.04E-06	6.89E-05
20	8.22E-06	< 1.84E-06	< 1.78E-05	< 1.97E-05	< 4.89E-06	< 1.17E-06	7.84E-04
21	1.56E-04	< 2.13E-06	< 1.38E-04	< 1.40E-05	< 3.16E-06	< 9.28E-06	7.50E-05
22	1.23E-04	< 2.67E-06	< 9.00E-05	< 9.27E-05	< 3.24E-06	< 7.27E-05	4.49E-04
23	4.02E-05	< 2.85E-06	< 5.91E-05	< 6.19E-05	< 4.49E-06	4.38E-06	3.39E-04
Mean	1.06E-04	< 3.87E-06	< 8.76E-05	< 9.82E-05	< 1.18E-05	< 2.15E-05	3.21E-04
Max.	4.43E-04	< 2.91E-05	< 3.16E-04	< 3.20E-04	< 7.56E-05	< 1.30E-04	9.25E-04
Std. Dev.	1.08E-04	< 5.73E-06	< 6.34E-05	< 7.79E-05	< 1.80E-05	< 2.83E-05	2.52E-04

[1] - *Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions* results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

same in AO as table 4-42- this is for Tire products

TABLE 4-4c

SMALL MIXER 2 - SBR COPOLYMERS

TIRE COMPOUND SUMMARY

Compound	Total VOCs, as methane (lbs/lb rubber)	Total Speciated Semivolatiles (lbs/lb rubber) with non-detects	Total Speciated Volatiles (lbs/lb rubber) with non-detects	Total Speciated Organics[1] (lbs/lb rubber) with non-detects	Total Sulfur (lbs/lb rubber) with non-detects	Total Metals (lbs/lb rubber) with non-detects	Total PM (lbs/lb rubber)
24	4.10E-05	< 1.69E-06	< 4.06E-05	< 4.23E-05	< 2.91E-06	< 6.59E-07	1.56E-05
25	1.27E-04	< 2.25E-06	< 8.80E-05	< 9.03E-05	< 2.72E-06	< 3.16E-07	2.04E-05
26	1.10E-05	< 5.20E-07	< 2.28E-05	< 2.34E-05	< 2.85E-06	< 2.18E-07	7.37E-06
Mean	5.97E-05	< 1.49E-06	< 5.05E-05	< 5.20E-05	< 2.83E-06	< 3.98E-07	1.45E-05
Max.	1.27E-04	< 2.25E-06	< 8.80E-05	< 9.03E-05	< 2.91E-06	< 6.59E-07	2.04E-05
Std. Dev.	4.92E-05	< 7.21E-07	< 2.75E-05	< 2.82E-05	< 7.93E-08	< 1.89E-07	5.38E-06

[1] - Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

TABLE 4-4d
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - TIRE PRODUCTS

			CAS Numbers	Cmpd #1 % Of Tot	Cmpd #2 % Of Tot	Cmpd #3 % Of Tot	Cmpd #4 % Of Tot	Cmpd #5 % Of Tot	Cmpd #6 % Of Tot	Cmpd #7 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
1	2	1-Butanol	00071-36-3	T	T	T	T	T	1.07	T	< 0.15	1.07	< 0.38
1	2	1-Chloro-4-(1-chloroethenyl) cyclohexen		T	T	T	T	T	T	T	T	T	T
1	2	1-Chloro-5-(1-chloroethenyl) cyclohexen		T	T	T	T	T	T	T	T	T	T
1	2	1-Chloropropane		T	T	T	T	T	T	T	T	T	T
		1-Dodecene	112-41-4	< 0.05	< 0.04	< 0.07	< 0.03	0.01	< 0.04	< 0.05	< 0.04	0.07	< 0.02
		1-Heptene	00592-76-7	0.05	0.51	< 0.03	< 0.02	0.06	< 0.05	0.05	< 0.11	0.51	< 0.16
		1-Hexene	00592-41-6	< 0.03	< 0.03	< 0.03	0.07	< 0.02	< 0.05	0.07	< 0.04	0.07	< 0.02
1	2	1-Methoxybutane		T	T	T	T	T	T	T	T	T	T
		1-Octene	00111-60-0	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	< 0.02	< 0.03	< 0.05	< 0.01
		1-Pentene	00109-67-1	0.19	0.13	0.16	0.23	0.57	0.29	< 0.02	< 0.23	0.57	< 0.16
1	2	1-Propanol		T	T	T	T	T	T	T	T	T	T
1		1,1-Dichloroethane	00075-34-3	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
1		1,1-Dichloroethene	00075-35-4	< 0.57	< 0.20	< 0.24	0.90	< 0.28	< 0.37	< 0.40	< 0.42	0.90	< 0.23
1		1,1,1-Trichloroethane	00071-55-6	< 0.57	0.12	0.29	0.07	0.25	< 0.37	< 0.40	< 0.30	0.57	< 0.16
1		1,1,2-Trichloroethane	00079-00-5	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
1		1,1,2,2-Tetrachloroethane	00079-34-5	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
1		1,2-Dibromo-3-Chloropropane	00096-12-8	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.63	< 1.15	< 0.26
		1,2-Dibromo-3-chloropropane	96-12-8	< 0.02	< 0.01	< 0.03	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.03	< 0.00
1		1,2-Dibromoethane	00106-93-4	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
1		1,2-Dichlorobenzene	00095-50-1	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
		1,2-Dichlorobenzene	95-50-1	< 0.01	< 0.01	< 0.01	< 0.00	0.00	< 0.01	< 0.01	< 0.01	0.01	< 0.00
1		1,2-Dichloroethane	00107-06-2	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
1		1,2-Dichloropropane	00078-87-5	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
		1,2,4-Trichlorobenzene	120-82-1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
		1,2,4-Trimethylbenzene	00095-63-6	0.19	0.29	< 0.16	< 0.11	< 0.08	1.19	0.17	< 0.31	1.19	< 0.36
		1,2,4-Trimethylbenzene	95-63-6	0.05	0.03	0.05	0.03	0.03	0.04	< 0.00	< 0.03	0.05	< 0.02
		1,3-Butadiene	00106-99-0	0.12	< 0.03	< 0.03	0.36	< 0.02	< 0.05	0.39	< 0.14	0.39	< 0.15
		1,3-Cyclooctadiene	1700-10-3	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.00
1		1,3-Dichlorobenzene	00541-73-1	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
		1,3-Dichlorobenzene	541-73-1	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
		1,3,5-Trimethylbenzene	00108-67-8	< 0.16	< 0.14	< 0.16	< 0.11	< 0.08	< 0.26	0.19	< 0.16	0.26	< 0.05
1		1,4-Dichlorobenzene	00106-46-7	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
		1,4-Dichlorobenzene	106-46-7	< 0.01	< 0.01	0.00	0.00	0.00	0.00	0.00	< 0.00	0.01	< 0.00
		1,4-Diethylbenzene + n-Butylbenzene	00105-05-5/00104-51-8	< 0.16	< 0.14	< 0.16	< 0.11	< 0.08	< 0.26	< 0.11	< 0.15	< 0.26	< 0.05
1		1,4-Dioxane	00123-91-1	< 2.30	< 0.79	< 0.94	< 0.65	< 1.11	< 1.47	< 1.60	< 1.27	< 2.30	< 0.53
		1,4-Phenylenediamine	106-50-3	< 0.02	< 0.01	< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.03	< 0.01
		1,5-Cyclooctadiene	111-78-4	< 0.02	< 0.02	< 0.04	< 0.02	< 0.02	< 0.02	< 0.03	< 0.02	< 0.04	< 0.01
1	2	2-Butanol		T	T	T	T	T	T	T	T	T	T
1		2-Butanone	00078-93-3	7.32	2.41	0.83	4.49	2.08	0.35	1.18	2.66	7.32	2.28
1	2	2-Butene	00126-99-8	T	T	T	T	T	T	1.00	< 0.14	1.00	< 0.35
		2-Chloroacetophenone	1341-24-8	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
		2-Chloronaphthalene	91-58-7	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
		2-Chlorophenol	95-57-8	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
		2-Furaldehyde	98-01-1	0.01	0.56	0.15	< 0.01	0.05	0.10	0.00	< 0.13	0.56	< 0.19
1		2-Hexanone	00591-78-6	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
		2-Methyl-1-butene	00563-46-2	0.06	0.28	< 0.03	< 0.02	< 0.02	< 0.05	< 0.02	< 0.07	0.28	< 0.09
		2-Methyl-2-butene	00513-35-9	0.20	< 0.03	< 0.03	< 0.02	< 0.02	0.36	< 0.02	< 0.10	0.36	< 0.12
		2-Methyl-2-pentene	00625-27-4	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	< 0.02	< 0.03	< 0.05	< 0.01
		2-Methylheptane	00592-27-8	0.68	0.59	< 0.04	0.18	0.25	0.15	0.18	< 0.29	0.68	< 0.23
		2-Methylhexane	00591-76-4	0.05	1.39	0.14	0.21	0.21	0.16	0.13	0.33	1.39	0.44
		2-Methylnaphthalene	91-57-6	0.02	0.04	0.07	0.01	0.01	0.01	0.01	0.02	0.07	0.02
		2-Methylpentane	00107-83-5	0.69	0.65	0.88	1.06	1.16	0.75	0.62	0.83	1.16	0.19
		2-Methylphenol	95-48-7	< 0.01	< 0.01	0.08	0.00	0.02	0.00	< 0.01	< 0.02	0.08	< 0.03
		2-Nitroaniline	88-74-4	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.00
		2-Nitrophenol	88-75-5	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.00
		2,2-Dimethylbutane	00075-83-2	< 0.03	< 0.03	< 0.04	0.13	0.13	< 0.05	< 0.02	< 0.06	0.13	< 0.04
		2,2-Dimethylpropane	00463-82-1	< 0.03	< 0.03	< 0.04	< 0.02	< 0.02	< 0.06	< 0.02	< 0.03	< 0.06	< 0.01
		2,2'-oxybis(1-Chloropropane)	108-60-1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
		2,3-Dimethylpentane	00565-59-3	< 0.03	0.49	< 0.04	0.06	0.07	0.07	0.06	< 0.12	0.49	< 0.15
		2,3,4-Trimethylpentane	00565-75-3	< 0.03	0.40	< 0.04	< 0.02	< 0.02	< 0.05	< 0.02	< 0.08	0.40	< 0.13
		2,4-Dichlorophenol	120-83-2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
		2,4-Dimethylhexane	00589-43-5	0.10	0.69	< 0.04	0.17	0.05	< 0.05	0.14	< 0.18	0.69	< 0.21
		2,4-Dimethylphenol	105-67-9	< 0.01	< 0.01	0.13	< 0.01	< 0.01	0.02	< 0.01	< 0.03	0.13	< 0.04
		2,4-Dinitrophenol	105-67-9	< 0.04	< 0.04	< 0.07	< 0.05	< 0.04	< 0.04	< 0.04	< 0.04	< 0.07	< 0.01
		2,4-Dinitrotoluene	121-14-2	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.00
		2,4,5-Trichlorophenol	95-95-4	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.00

TABLE 4-4d
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - TIRE PRODUCTS

		CAS Numbers	Cmpd #1 % Of Tot	Cmpd #2 % Of Tot	Cmpd #3 % Of Tot	Cmpd #4 % Of Tot	Cmpd #5 % Of Tot	Cmpd #6 % Of Tot	Cmpd #7 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
	2,4,6-Trichlorophenol	88-06-2	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.00
	2,6-Dinitrotoluene	606-20-2	< 0.01	< 0.01	< 0.03	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.03	< 0.00
	3-Furaldehyde	498-60-2	< 0.01	< 0.01	< 0.03	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.03	< 0.01
1	2 3-Methyl-2-Butanone		1.43	T	T	T	T	T	T	< 0.20	1.43	< 0.50
	3-Methylhexane	00589-34-4	0.13	1.92	0.23	0.23	0.28	0.21	0.15	0.45	1.92	0.60
	3-Methylpentane	00096-14-0	2.66	0.58	0.41	0.79	0.99	0.41	2.75	1.23	2.75	0.95
	3-Methylstyrene	100-80-1	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.00
	3-Nitroaniline	99-09-2	< 0.01	< 0.01	< 0.03	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.03	< 0.00
	3,3'-Dichlorobenzidine	91-94-1	< 0.03	< 0.01	< 0.07	< 0.02	< 0.03	< 0.00	< 0.03	< 0.03	< 0.07	< 0.02
	3,3'-Dimethoxybenzidine	119-90-4	< 0.03	< 0.01	< 0.08	< 0.03	< 0.03	< 0.01	< 0.03	< 0.03	< 0.08	< 0.02
	3,3'-Dimethylbenzidine	119-93-7	< 0.01	< 0.00	< 0.02	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.02	< 0.01
	3/4-Methylphenol	108-39-4/106-44-5	0.01	< 0.01	0.22	< 0.01	0.15	< 0.01	< 0.01	< 0.06	0.22	< 0.08
	4-Aminobiphenyl	92-67-1	< 0.01	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
	4-Bromophenyl-phenylether	101-55-3	< 0.02	< 0.01	0.00	< 0.01	< 0.02	< 0.01	< 0.02	< 0.01	0.02	< 0.00
	4-Chloro-3-methylphenol	59-50-7	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.00
	4-Chloroaniline	106-47-8	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.00
	4-Chlorophenyl-phenylether	70005-72-3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	4-Chlorostyrene	1073-67-2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	4-Methyl-1-pentene	00691-37-2	< 0.03	< 0.03	< 0.03	0.31	< 0.02	0.30	< 0.02	< 0.11	0.31	< 0.13
1	4-Methyl-2-Pentanone	00108-10-1	< 0.57	0.30	11.50	24.48	< 0.28	24.54	< 0.40	< 8.87	24.54	< 10.58
	4-Methylstyrene	622-97-9	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.00
	4-Nitroaniline	100-01-6	< 0.02	< 0.01	< 0.03	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.03	< 0.01
	4-Nitrobiphenyl	92-93-3	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.00
	4-Nitrophenol	100-02-7	< 0.03	< 0.03	< 0.05	< 0.02	< 0.03	< 0.03	< 0.03	< 0.03	< 0.05	< 0.01
1	2 4,4-Dimethyl-2-Pentanone		1.43	T	T	T	T	T	T	< 0.20	1.43	< 0.50
	4,4'-Methylenedianiline	101-77-9	< 0.02	< 0.01	< 0.04	< 0.02	< 0.02	< 0.00	< 0.03	< 0.02	< 0.04	< 0.01
	4,6-Dinitro-2-methylphenol	534-52-1	< 0.03	< 0.02	< 0.04	< 0.04	< 0.03	< 0.02	< 0.03	< 0.03	< 0.04	< 0.01
	Acenaphthene	83-32-9	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
	Acenaphthylene	208-96-8	< 0.00	0.01	0.06	0.01	0.06	0.00	0.00	< 0.02	0.06	< 0.02
1	2 Acetaldehyde	00075-07-0	0.86	T	T	T	T	T	T	< 0.12	0.86	< 0.30
1	2 Acetaldehyde+Isobutane		T	T	T	T	0.83	T	T	< 0.12	0.83	< 0.29
	Acetone	00067-64-1	1.87	20.10	3.83	15.91	3.74	2.61	2.60	7.24	20.10	6.93
1	Acetonitrile	01722-09-4	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.63	< 1.15	< 0.26
1	2 Acetophenone	00098-86-2	2.87	T	T	T	T	T	T	< 0.41	2.87	< 1.00
	Acetophenone	98-86-2	0.05	0.03	0.05	0.01	0.03	0.06	0.10	0.05	0.10	0.03
	Acetylene	00074-86-2	1.01	2.55	0.43	0.53	0.12	1.41	0.04	0.87	2.55	0.82
1	Acrolein	00107-02-8	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.63	< 1.15	< 0.26
1	Acrylonitrile	00107-13-1	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.63	< 1.15	< 0.26
1	Allyl Chloride	00107-05-1	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.63	< 1.15	< 0.26
	Aniline	62-53-3	< 0.01	0.73	< 0.01	0.71	< 0.01	0.08	< 0.01	< 0.22	0.73	< 0.31
	Anthracene	120-12-7	< 0.00	< 0.00	0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	0.01	< 0.00
	a-Pinene	07785-70-8	< 0.03	< 0.03	< 0.03	0.13	< 0.02	< 0.05	< 0.02	< 0.04	0.13	< 0.04
	a,a,a-Trichlorotoluene	98-07-7	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	Benzaldehyde	100-52-7	0.02	0.07	0.09	0.01	0.04	0.06	< 0.01	< 0.04	0.09	< 0.03
	Benzene	00071-43-2	0.07	0.07	0.10	0.19	0.41	< 0.05	0.08	< 0.14	0.41	< 0.12
	Benzidine	92-87-5	< 0.01	< 0.00	< 0.03	< 0.01	< 0.02	< 0.00	< 0.02	< 0.01	< 0.03	< 0.01
	Benzoic acid	65-85-0	0.51	< 0.02	< 0.03	0.06	0.53	0.25	0.16	< 0.22	0.53	< 0.20
	Benzonitrile	100-47-0	< 0.01	< 0.00	0.01	< 0.00	0.01	< 0.00	< 0.01	< 0.01	0.01	< 0.00
	Benzo(a)anthracene	56-55-3	< 0.01	< 0.00	0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	0.01	< 0.00
	Benzo(a)pyrene	50-32-8	< 0.01	< 0.00	< 0.03	< 0.01	< 0.01	< 0.00	< 0.02	< 0.01	< 0.03	< 0.01
	Benzo(b)fluoranthene	205-99-2	< 0.01	< 0.00	< 0.02	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.02	< 0.01
	Benzo(g,h,i)perylene	191-24-2	0.02	< 0.00	< 0.04	< 0.01	< 0.02	< 0.00	< 0.03	< 0.02	0.04	< 0.01
	Benzo(k)fluoranthene	207-08-9	< 0.01	< 0.00	< 0.02	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.02	< 0.01
	Benzyl alcohol	100-51-6	0.01	0.02	0.02	0.01	0.02	0.03	0.02	0.02	0.03	0.01
1	Benzyl Chloride	00100-44-7	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.63	< 1.15	< 0.26
	Benzyl Chloride	100-44-7	< 0.01	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
	Biphenyl	92-52-4	< 0.00	< 0.00	0.05	0.01	< 0.00	0.01	< 0.00	< 0.01	0.05	< 0.02
1	2 bis(1-Methylethyl)Benzene		T	T	T	T	T	T	T	T	T	T
1	2 bis(1,1-dimethylethyl)perroxide		T	T	T	T	T	T	T	T	T	T
	bis(2-Chloroethoxy)methane	111-91-1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	bis(2-Chloroethyl)ether	111-44-4	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.00
	bis(2-Ethylhexyl)phthalate	117-81-7	0.05	0.05	0.11	T	0.03	0.14	0.03	0.06	0.14	0.05
	b-Pinene	18172-67-3	< 0.16	0.28	0.28	0.49	0.16	< 0.26	< 0.11	< 0.25	0.49	< 0.12
1	Bromodichloromethane	00075-27-4	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
1	Bromoform	00075-25-2	0.34	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.28	0.40	< 0.08
1	Bromomethane	00074-83-9	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13

TABLE 4-4d
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - TIRE PRODUCTS

			CAS Numbers	Cmpd #1 % Of Tot	Cmpd #2 % Of Tot	Cmpd #3 % Of Tot	Cmpd #4 % Of Tot	Cmpd #5 % Of Tot	Cmpd #6 % Of Tot	Cmpd #7 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
	2	Butanal	00123-72-8	T	T	T	T	T	T	T	T	T	T
1	2	Butane		T	T	1.18	1.22	T	T	T	< 0.34	1.22	< 0.54
		Butylbenzylphthalate	85-68-7	0.01	0.01	0.03	< 0.01	< 0.01	T	< 0.01	< 0.01	0.03	< 0.01
1	2	C10-C11 Branched Alkane		T	T	T	T	T	T	T	T	T	T
1	2	C10H18 Polycyclic Hydrocarbon		T	T	T	T	T	T	T	T	T	T
1	2	C10H20 Alkyl Substituted Cyclohexane		T	T	T	T	T	7.67	T	< 1.10	7.67	< 2.68
1	2	C11-C12 Branched Alkane		T	T	T	T	T	T	T	T	T	T
1	2	C11H22 Alkene		T	T	T	T	T	T	T	T	T	T
1	2	C12H24 Alkene		T	T	T	T	T	T	T	T	T	T
1	2	C4 Aldehyde		T	T	0.88	T	T	T	T	< 0.13	0.88	< 0.31
1	2	C5 Aldehyde		T	T	0.88	T	T	T	T	< 0.13	0.88	< 0.31
1	2	C6H10 O2 Acid Ester		T	T	T	T	T	T	T	T	T	T
1	2	C8H12 Cyclic alkene		T	T	T	T	T	T	T	T	T	T
1	2	C8H16 Alkene		2.87	T	T	T	T	T	7.99	< 1.55	7.99	< 2.81
1	2	C9H10 Alkyl Substituted Benzene		T	1.24	T	T	T	T	T	< 0.18	1.24	< 0.43
1	2	C9H12 Alkyl Substituted Benzene		T	1.49	T	T	T	T	T	< 0.21	1.49	< 0.52
1	2	C9H12 Polycyclic Alkene		T	T	T	T	T	T	T	T	T	T
		Camphene	79-92-5	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	0.01	< 0.01	< 0.01	0.02	< 0.00
1		Carbon Disulfide	00075-15-0	< 0.57	< 0.20	< 0.24	0.33	0.25	3.07	< 0.40	< 0.72	3.07	< 0.96
1		Carbon Tetrachloride	00056-23-5	< 0.57	< 0.20	0.11	< 0.16	< 0.28	< 0.37	< 0.40	< 0.30	0.57	< 0.15
1	2	Carbonyl sulfide	00463-58-1	T	T	T	T	T	T	T	T	T	T
1		Chlorobenzene	00108-90-7	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
1	2	Chlorobutadiene+Methylpentane		T	T	T	T	T	T	T	T	T	T
1		Chlorodibromomethane	00124-48-1	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
1		Chloroethane	00075-00-3	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
1		Chloroform	00067-66-3	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
1		Chloromethane	00074-87-3	< 0.57	0.05	< 0.24	0.05	< 0.28	0.26	< 0.40	< 0.26	0.57	< 0.17
		Chrysene	218-01-9	< 0.01	< 0.00	0.01	< 0.01	< 0.01	T	< 0.01	< 0.01	0.01	< 0.00
1		cis-1,2-Dichloroethene	00156-59-2	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
1		cis-1,3-Dichloropropene	10061-01-5	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
		cis-2-Butene	00590-18-1	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	< 0.02	< 0.03	< 0.05	< 0.01
		cis-2-Hexene	07688-21-3	0.50	< 0.03	< 0.03	< 0.02	0.13	< 0.05	0.22	< 0.14	0.50	< 0.16
		cis-2-Pentene	00627-20-3	0.09	0.32	3.61	0.45	0.19	0.37	0.22	0.75	3.61	1.17
		Cumene	00098-82-8	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	0.07	< 0.04	0.07	< 0.02
		Cumene	98-82-8	0.00	< 0.00	0.00	0.00	0.00	0.01	0.02	< 0.01	0.02	< 0.01
1	2	Cyclobutane		T	T	T	T	T	T	T	T	T	T
		Cyclohexane	00110-82-7	0.56	1.88	0.10	0.40	0.27	0.14	6.53	1.41	6.53	2.16
		Cyclohexanone	108-94-1	< 0.02	0.04	0.09	0.05	0.15	0.07	0.18	< 0.09	0.18	< 0.05
		Cyclohexylamine	108-91-8	< 0.01	< 0.01	< 0.03	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.03	< 0.01
1	2	Cyclooctadiene		T	T	T	T	T	T	T	T	T	T
		Cyclopentane + 2,3-Dimethylbutane	00287-92-3/00079-29-8	0.17	0.16	0.09	0.19	0.23	0.26	0.12	0.17	0.26	0.05
		Cyclopentene	00142-29-0	< 0.03	0.27	0.57	0.09	0.30	< 0.05	< 0.02	< 0.19	0.57	< 0.19
1	2	Decane		T	T	1.18	T	T	T	T	< 0.17	1.18	< 0.41
		Dibenzofuran	132-64-9	< 0.00	0.00	0.03	0.00	< 0.00	0.00	< 0.00	< 0.01	0.03	< 0.01
		Dibenz(a,h)anthracene	53-90-3	< 0.02	< 0.00	< 0.05	< 0.01	< 0.02	< 0.00	< 0.03	< 0.02	< 0.05	< 0.01
1		Dichlorodifluoromethane	00075-71-8	< 0.57	< 0.20	0.10	< 0.16	< 0.28	0.12	< 0.40	< 0.26	0.57	< 0.16
		Diethylphthalate	84-66-2	0.01	0.02	0.02	T	0.00	0.01	T	0.01	0.02	0.01
		Dimethylaminoazobenzene	60-11-7	< 0.02	< 0.01	< 0.03	< 0.02	< 0.02	< 0.00	< 0.02	< 0.02	< 0.03	< 0.01
		Dimethylphthalate	131-11-3	< 0.00	< 0.00	0.01	0.00	< 0.00	< 0.00	< 0.00	< 0.00	0.01	< 0.00
		Di-n-butylphthalate	84-74-2	0.10	0.02	0.05	T	T	0.01	T	0.03	0.10	0.03
		Di-n-octylphthalate	117-84-0	0.01	< 0.00	< 0.01	< 0.00	0.00	< 0.00	< 0.01	< 0.00	0.01	< 0.00
		Diphenylamine	122-39-4	0.00	0.04	0.03	0.03	0.00	0.41	0.00	0.07	0.41	0.14
		d-Limonene	05989-27-5	< 0.16	< 0.14	< 0.17	< 0.12	0.21	< 0.26	< 0.11	< 0.17	0.26	< 0.05
1		Epichlorohydrin	00106-89-8	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.63	< 1.15	< 0.26
		Ethane	00074-84-0	1.97	0.42	0.66	0.84	0.29	0.44	0.21	0.69	1.97	0.56
1	2	Ethanol		1.29	1.24	T	1.43	1.11	9.20	T	< 2.04	9.20	< 2.98
1	2	Ethenylcyclohexene	25168-07-4	T	T	T	T	T	T	T	T	T	T
1	2	Ethyl Acetate		T	T	T	T	T	T	T	T	T	T
1	2	Ethyl Acrylate		T	T	T	T	T	T	T	T	T	T
		Ethylacetylene	00107-00-6	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	< 0.02	< 0.03	< 0.05	< 0.01
		Ethylbenzene	00100-41-4	< 0.03	0.22	0.20	0.19	0.16	0.19	3.64	< 0.66	3.64	< 1.22
		Ethylene	00074-85-1	< 0.03	0.10	0.22	0.25	0.18	0.11	< 0.02	< 0.13	0.25	< 0.08
		Fluoranthene	206-44-0	0.02	< 0.00	0.01	< 0.00	0.00	< 0.00	0.00	< 0.01	0.02	< 0.01
		Fluorene	86-73-7	0.00	0.00	0.01	0.00	0.00	0.00	< 0.00	< 0.00	0.01	< 0.00
1	2	Heptane		T	7.45	T	0.82	T	T	T	< 1.18	7.45	< 2.57
1	2	Heptanone		T	T	T	T	T	T	T	T	T	T

TABLE 4-4d
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - TIRE PRODUCTS

			CAS Numbers	Cmpd #1 % Of Tot	Cmpd #2 % Of Tot	Cmpd #3 % Of Tot	Cmpd #4 % Of Tot	Cmpd #5 % Of Tot	Cmpd #6 % Of Tot	Cmpd #7 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
		Hexachlorobenzene	118-74-1	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.00
1		Hexachlorobutadiene	00087-68-3	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.63	< 1.15	< 0.26
		Hexachlorobutadiene	87-68-3	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.02	< 0.00
		Hexachlorocyclopentadiene	77-47-4	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.02	< 0.00
1	2	Hexachloroethane		T	T	T	T	T	T	T	T	T	T
		Hexachloroethane	67-72-1	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.00
		Hydroquinone	123-31-9	< 0.01	< 0.01	< 0.02	1.33	35.65	< 0.01	< 0.01	< 5.29	35.65	< 12.40
		Indeno(1,2,3-cd)pyrene	193-39-5	< 0.02	< 0.00	< 0.03	< 0.01	< 0.02	< 0.00	< 0.02	< 0.01	< 0.03	< 0.01
1	2	Isobutanal	00078-84-2	T	T	T	T	1.25	T	T	< 0.18	1.25	< 0.44
		Isobutane	00075-28-5	0.44	< 0.03	0.30	0.31	0.70	< 0.06	0.12	< 0.28	0.70	< 0.22
		Isobutylene + 1-Butene	00115-11-7/00106-98-9	0.21	0.35	0.59	1.10	0.55	0.16	0.56	0.50	1.10	0.29
		Isooctane	00540-84-1	0.11	1.16	0.26	0.16	0.14	0.13	0.18	0.31	1.16	0.35
		Isooctanol	26952-21-6	< 0.13	0.22	< 0.22	< 0.09	< 0.13	0.48	< 0.13	< 0.20	0.48	< 0.12
		Isopentane	00078-78-4	1.03	< 0.03	2.83	8.69	2.99	2.95	1.32	< 2.84	8.69	< 2.61
		Isophorone	78-59-1	< 0.01	1.00	< 0.01	0.10	< 0.01	< 0.00	< 0.01	< 0.16	1.00	< 0.35
		Isoprene	00078-79-5	< 0.03	< 0.03	< 0.03	< 0.02	0.15	< 0.05	< 0.02	< 0.05	0.15	< 0.04
1	2	Isopropyl Alcohol		1.29	T	T	0.82	1.39	0.92	T	< 0.63	1.39	< 0.58
1	2	Methyl Acrylate		T	T	T	T	T	T	T	T	T	T
1	2	Methyl Isothiocyanate	00556-61-6	T	T	T	T	T	T	T	T	T	T
		Methylacetylene	00074-99-7	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	< 0.02	< 0.03	< 0.05	< 0.01
		Methylcyclohexane	00108-87-2	0.23	3.91	0.48	1.05	0.41	0.70	0.54	1.05	3.91	1.19
		Methylcyclopentane	00096-37-7	4.19	0.78	0.33	0.57	1.46	0.35	5.48	1.88	5.48	1.93
		Methylene bis-chloroaniline	101-14-4	< 0.04	< 0.01	< 0.09	< 0.03	< 0.04	< 0.01	< 0.05	< 0.04	< 0.09	< 0.03
1		Methylene Chloride	00075-09-2	1.36	1.44	35.39	3.06	0.57	1.99	0.96	6.40	35.39	11.86
1	2	Methylhexane		T	7.45	T	T	T	T	T	< 1.06	7.45	< 2.61
1	2	Methylpentane		T	1.24	0.88	2.45	T	2.76	T	< 1.05	2.76	< 1.09
		m-Ethyltoluene	00620-14-4	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	0.11	< 0.04	0.11	< 0.03
		m-Xylene + p-Xylene	00108-38-3/00106-42-3	0.32	0.88	0.65	0.84	0.56	0.50	12.13	2.27	12.13	4.03
		Naphthalene	91-20-3	0.03	0.05	0.28	0.03	0.34	0.04	0.04	0.12	0.34	0.13
		n-Butane	00106-97-8	0.95	0.35	0.94	1.17	1.93	0.16	0.53	0.86	1.93	0.55
		n-Decane	00124-18-5	0.49	0.41	0.44	0.85	0.28	< 0.27	0.73	< 0.50	0.85	< 0.20
		n-Heptane	00142-82-5	0.20	3.69	0.26	0.38	0.40	0.28	0.18	0.77	3.69	1.20
		n-Hexane	00110-54-3	10.21	1.63	1.45	2.56	8.03	1.19	9.08	4.88	10.21	3.73
		Nitrobenzene	98-95-3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
		N-Nitrosodiethylamine	55-18-5	< 0.02	< 0.02	< 0.03	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.03	< 0.01
		n-Nitrosodimethylamine	62-75-9	T	< 0.01	< 0.04	T	T	< 0.02	T	< 0.01	0.04	< 0.01
		N-Nitroso-di-n-propylamine	621-64-7	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.00
		N-Nitrosodiphenylamine	86-30-6	T	T	T	T	T	T	T	T	T	T
		n-Nitrosomorpholine	59-89-2	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.02	< 0.00
		n-Nonane	00111-84-2	0.33	0.25	0.13	< 0.02	0.15	0.47	0.51	< 0.27	0.51	< 0.17
		n-Octane	00111-65-9	0.19	< 0.03	< 0.04	0.15	0.17	0.08	0.12	< 0.11	0.19	< 0.06
1	2	Nonane		T	T	T	T	T	T	T	T	T	T
		n-Pentane	00109-66-0	0.66	< 0.03	0.62	0.83	1.25	0.24	0.41	< 0.58	1.25	< 0.37
1	2	n-Propane		1.43	T	T	T	T	T	T	< 0.20	1.43	< 0.50
		n-Propylbenzene	00103-65-1	0.15	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	0.15	< 0.04
1	2	n-Undecane	00112-21-4	1.43	T	T	T	0.97	T	1.00	< 0.49	1.43	< 0.58
		N,N-Diethylaniline	91-66-7	0.05	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	0.05	< 0.02
		N,N-Dimethylaniline	121-69-7	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
		o-Anisidine	90-04-0	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.00
		o-Ethyltoluene	00611-14-3	< 0.16	0.52	< 0.16	< 0.11	< 0.08	< 0.26	< 0.11	< 0.20	0.52	< 0.14
		o-Toluidine	95-53-4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.18	< 0.01	< 0.03	0.18	< 0.06
		o-Xylene	00095-47-6	0.12	0.59	0.29	0.62	0.21	0.76	6.51	1.30	6.51	2.14
		p-Cymene	00099-87-6	0.22	0.22	< 0.16	0.24	0.08	< 0.26	0.16	< 0.19	0.26	< 0.06
		Pentachloronitrobenzene	82-68-8	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.00
		Pentachlorophenol	87-86-5	< 0.02	< 0.01	< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.03	< 0.01
1	2	Pentane		T	T	1.18	1.43	T	T	T	< 0.37	1.43	< 0.59
1	2	Pentene		T	T	0.88	T	T	T	T	< 0.13	0.88	< 0.31
		p-Ethyltoluene	00622-96-8	< 0.03	< 0.03	< 0.03	0.57	< 0.02	< 0.05	0.39	< 0.16	0.57	< 0.21
		Phenanthrene	85-01-8	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.00
		Phenol	108-95-2	0.09	0.07	0.25	0.02	1.03	0.04	0.02	0.22	1.03	0.34
		Phthalimide	85-41-6	< 0.03	< 0.03	0.64	< 0.02	0.11	< 0.02	0.01	< 0.12	0.64	< 0.21
	2	Propanal		T	T	T	T	T	T	T	T	T	T
		Propane	00074-98-6	1.58	0.32	0.74	0.62	0.60	0.21	0.18	0.61	1.58	0.45
1	2	Propylcyclohexane		T	T	T	T	T	T	T	T	T	T
		Propylene	00115-07-1	< 0.03	0.33	< 0.03	0.06	0.06	< 0.05	< 0.02	< 0.08	0.33	< 0.10
1		Propylene Oxide	00075-56-9	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.63	< 1.15	< 0.26

TABLE 4-4d
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - TIRE PRODUCTS

		CAS Numbers	Cmpd #1 % Of Tot	Cmpd #2 % Of Tot	Cmpd #3 % Of Tot	Cmpd #4 % Of Tot	Cmpd #5 % Of Tot	Cmpd #6 % Of Tot	Cmpd #7 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
	Pyrene	129-00-0	0.04	0.01	0.03	0.01	0.04	0.01	0.02	0.02	0.04	0.02
	Pyridine	110-86-1	< 0.01	< 0.01	< 0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.03	< 0.01
	Styrene	00100-42-5	< 0.03	< 0.03	< 0.03	0.07	< 0.02	3.40	< 0.02	< 0.51	3.40	< 1.18
1	t-Butyl Methyl Ether	01634-04-4	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	0.26	< 0.80	< 0.57	1.15	< 0.29
1 2	tert-Butyl Alcohol	00075-65-0	T	T	T	T	T	0.92	T	< 0.13	0.92	< 0.32
1	Tetrachloroethene	00127-18-4	< 0.57	6.20	0.09	0.11	< 0.28	0.08	< 0.40	< 1.10	6.20	< 2.09
1 2	Tetrahydrofuran		1.43	T	T	T	T	T	1.00	< 0.35	1.43	< 0.56
	Toluene	00108-88-3	2.04	3.13	1.94	0.98	2.35	0.44	0.89	1.68	3.13	0.88
1	trans-1,2-Dichloroethene	00156-60-5	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
1	trans-1,2-Dichloropropene	10061-02-6	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
	trans-2-Butene	00624-64-6	< 0.03	< 0.03	0.33	< 0.02	< 0.02	< 0.05	< 0.02	< 0.07	0.33	< 0.10
	trans-2-Hexene	04050-45-7	< 0.03	< 0.03	0.10	< 0.02	0.11	< 0.05	< 0.02	< 0.05	0.11	< 0.04
	trans-2-Pentene	00646-04-8	< 0.03	< 0.03	< 0.03	0.19	< 0.02	< 0.05	< 0.02	< 0.05	0.19	< 0.06
1	Trichloroethene	00079-01-6	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
1	Trichlorofluoromethane	00075-69-4	< 0.57	1.02	0.23	< 0.16	< 0.28	0.86	0.56	< 0.53	1.02	< 0.30
1 2	Trichloroheptafluorobutane		T	T	T	T	T	T	T	T	T	T
1	Trichlortrifluoroethane	00076-13-1	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
	Trifluralin	1582-09-8	< 0.02	< 0.02	< 0.03	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.03	< 0.00
1 2	Undecane		T	T	0.88	T	T	T	T	< 0.13	0.88	< 0.31
1 2	Unknown		2.87	T	T	T	T	T	1.80	< 0.67	2.87	< 1.09
1	Vinyl Acetate	00108-05-4	< 0.57	< 0.20	< 0.24	< 0.16	3.19	< 0.37	< 0.40	< 0.73	3.19	< 1.01
1	Vinyl Chloride	00075-01-4	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.32	< 0.57	< 0.13
	Total Detected (lb/lb rubber)		5.20E-05	5.78E-05	9.14E-05	5.46E-05	6.10E-05	9.69E-05	8.89E-05			
	Total with non-detects (lb/lb rubber)		< 8.08E-05	< 6.61E-05	< 1.09E-04	< 6.09E-05	< 7.36E-05	< 1.25E-04	< 1.19E-04			

NOTES:

1 TO14 Compound

2 Tentatively Identified Compound(TIC)

T TIC Not Identified In Summarized Category

* % of Total Values Represent % of Total With Non-Detects

TABLE 4-4e

MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - ENGINEERED PRODUCTS

		CAS Numbers	Cmpd #1 % Of Tot	Cmpd #2 % Of Tot	Cmpd #3 % Of Tot	Cmpd #4 % Of Tot	Cmpd #5 % Of Tot	Cmpd #6 % Of Tot	Cmpd #7 % Of Tot	Cmpd #8 % Of Tot	Cmpd #9 % Of Tot	Cmpd #10 % Of Tot	Cmpd #11 % Of Tot	Cmpd #12 % Of Tot	Cmpd #13 % Of Tot	Cmpd #14 % Of Tot
1	2 1-Butanol	00071-36-3	T	T	T	T	T	1.07	T	1.33	T	0.47	T	T	13.57	6.13
1	2 1-Chloro-4-(1-chloroethenyl) cyclohexene		T	T	T	T	T	T	T	T	T	T	1.47	1.57	T	T
1	2 1-Chloro-5-(1-chloroethenyl) cyclohexene		T	T	T	T	T	T	T	T	T	T	1.47	1.57	T	T
1	2 1-Chloropropane		T	T	T	T	T	T	T	T	T	T	T	T	2.71	T
	1-Dodecene	112-41-4	< 0.05	< 0.04	< 0.07	< 0.03	0.01	< 0.04	< 0.05	< 0.05	< 0.04	0.02	0.02	< 0.03	< 0.02	< 0.05
	1-Heptene	00592-76-7	0.05	0.51	< 0.03	< 0.02	0.06	< 0.05	0.05	0.25	0.27	< 0.02	0.09	0.12	0.08	0.13
	1-Hexene	00592-41-6	< 0.03	< 0.03	< 0.03	0.07	< 0.02	< 0.05	0.07	0.03	< 0.03	< 0.02	< 0.03	< 0.02	0.10	< 0.01
1	2 1-Methoxybutane		T	T	T	T	T	T	T	T	T	T	T	T	T	1.75
	1-Octene	00111-66-0	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	< 0.02	< 0.03	< 0.03	< 0.02	< 0.03	< 0.02	< 0.01	< 0.01
	1-Pentene	00109-67-1	0.19	0.13	0.18	0.23	0.57	0.29	< 0.02	0.18	0.67	0.10	< 0.03	0.33	0.13	0.13
1	2 1-Propanol		T	T	T	T	T	T	T	T	T	T	T	T	1.36	T
1	1,1-Dichloroethane	00075-34-3	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
1	1,1-Dichloroethene	00075-35-4	< 0.57	< 0.20	< 0.24	0.90	< 0.28	< 0.37	< 0.40	0.17	0.29	< 0.16	< 0.23	< 0.13	< 0.11	0.15
1	1,1,1-Trichloroethane	00071-55-6	< 0.57	0.12	0.29	0.07	0.25	< 0.37	< 0.40	0.04	0.11	0.04	< 0.23	0.04	0.03	0.02
1	1,1,2-Trichloroethane	00079-00-5	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
1	1,1,2,2-Tetrachloroethane	00079-34-5	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
1	1,2-Dibromo-3-Chloropropane	00096-12-8	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.35	< 0.39	< 0.31	< 0.47	< 0.25	< 0.22	< 0.14
	1,2-Dibromo-3-chloropropane	96-12-8	< 0.02	< 0.01	< 0.03	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.01	< 0.00	< 0.02	< 0.01	< 0.01	< 0.01
1	1,2-Dibromoethane	00106-93-4	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
1	1,2-Dichlorobenzene	00095-50-1	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
	1,2-Dichlorobenzene	95-50-1	< 0.01	< 0.01	< 0.01	< 0.00	0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
1	1,2-Dichloroethane	00107-06-2	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
1	1,2-Dichloropropane	00078-87-5	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
	1,2,4-Trichlorobenzene	120-82-1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.01
	1,2,4-Trimethylbenzene	00095-63-6	0.19	0.29	< 0.16	< 0.11	< 0.08	1.19	0.17	2.70	0.23	< 0.11	< 0.16	0.17	< 0.04	< 0.05
	1,2,4-Trimethylbenzene	95-63-6	0.05	0.03	0.05	0.03	0.03	0.04	< 0.00	0.03	< 0.01	0.01	0.02	0.07	0.02	0.00
	1,3-Butadiene	00106-99-0	0.12	< 0.03	< 0.03	0.36	< 0.02	< 0.05	0.39	0.19	0.26	< 0.02	0.91	0.13	0.07	0.16
	1,3-Cyclooctadiene	1700-10-3	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.07	< 0.01	0.01	< 0.01	< 0.01	< 0.00	< 0.00
1	1,3-Dichlorobenzene	00541-73-1	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
	1,3-Dichlorobenzene	541-73-1	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
	1,3,5-Trimethylbenzene	00108-67-8	< 0.16	< 0.14	< 0.16	< 0.11	< 0.08	< 0.26	0.19	< 0.12	< 0.13	< 0.11	< 0.16	< 0.09	0.09	0.18
1	1,4-Dichlorobenzene	00106-46-7	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
	1,4-Dichlorobenzene	106-46-7	< 0.01	< 0.01	0.00	0.00	0.00	0.00	0.00	0.01	< 0.01	0.00	0.00	0.00	< 0.00	< 0.00
	1,4-Diethylbenzene + n-Butylbenzene	00105-05-5/00104-51-8	< 0.16	< 0.14	< 0.16	< 0.11	< 0.08	< 0.26	< 0.11	< 0.12	< 0.14	< 0.11	< 0.16	< 0.09	< 0.04	< 0.05
1	1,4-Dioxane	00123-91-1	< 2.30	< 0.79	< 0.94	< 0.65	< 1.11	< 1.47	< 1.60	< 0.71	< 0.78	< 0.62	< 0.94	< 0.50	< 0.43	< 0.28
	1,4-Phenylenediamine	106-50-3	< 0.02	< 0.01	< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.00	< 0.02	< 0.01	< 0.01	< 0.02
	1,5-Cyclooctadiene	111-78-4	< 0.02	< 0.02	< 0.04	< 0.02	< 0.02	< 0.02	< 0.03	< 0.03	< 0.02	0.00	< 0.03	< 0.02	< 0.01	< 0.01
1	2 2-Butanol		T	T	T	T	T	T	T	T	T	T	T	T	T	T
1	2-Butanone	00078-93-3	7.32	2.41	0.83	4.49	2.08	0.35	1.18	0.84	0.75	0.38	0.21	1.22	0.20	0.21
1	2 2-Butene	00126-99-8	T	T	T	T	T	T	1.00	T	T	T	T	T	T	T
	2-Chloroacetophenone	1341-24-8	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.00	< 0.00	< 0.01
	2-Chloronaphthalene	91-58-7	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
	2-Chlorophenol	95-57-8	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00
	2-Furaldehyde	98-01-1	0.01	0.56	0.15	< 0.01	0.05	0.10	0.00	0.01	0.00	< 0.00	< 0.02	0.49	< 0.00	0.01

TABLE 4-4e
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - ENGINEERED PRODUCTS

		CAS Numbers	Cmpd #1 % Of Tot	Cmpd #2 % Of Tot	Cmpd #3 % Of Tot	Cmpd #4 % Of Tot	Cmpd #5 % Of Tot	Cmpd #6 % Of Tot	Cmpd #7 % Of Tot	Cmpd #8 % Of Tot	Cmpd #9 % Of Tot	Cmpd #10 % Of Tot	Cmpd #11 % Of Tot	Cmpd #12 % Of Tot	Cmpd #13 % Of Tot	Cmpd #14 % Of Tot
1	2-Hexanone	00591-78-6	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
	2-Methyl-1-butene	00563-46-2	0.06	0.28	< 0.03	< 0.02	< 0.02	< 0.05	< 0.02	< 0.03	< 0.03	< 0.02	0.15	< 0.02	< 0.01	1.48
	2-Methyl-2-butene	00513-35-9	0.20	< 0.03	< 0.03	< 0.02	< 0.02	0.38	< 0.02	< 0.03	< 0.03	< 0.02	0.34	< 0.02	< 0.01	< 0.01
	2-Methyl-2-pentene	00625-27-4	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	< 0.02	< 0.03	< 0.03	< 0.02	< 0.03	< 0.02	< 0.01	< 0.01
	2-Methylheptane	00592-27-8	0.68	0.59	< 0.04	0.18	0.25	0.15	0.18	0.25	0.46	0.09	0.29	0.16	0.33	0.34
	2-Methylhexane	00591-76-4	0.05	1.39	0.14	0.21	0.21	0.18	0.13	0.58	0.59	0.15	0.24	0.24	0.31	0.26
	2-Methylnaphthalene	91-57-6	0.02	0.04	0.07	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.02	0.00	0.02
	2-Methylpentane	00107-83-5	0.69	0.65	0.68	1.06	1.16	0.75	0.62	0.67	0.94	0.24	0.13	0.29	17.03	0.08
	2-Methylphenol	95-48-7	< 0.01	< 0.01	0.08	0.00	0.02	0.00	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00
	2-Nitroaniline	88-74-4	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.00	< 0.02	< 0.01	< 0.01	< 0.01
	2-Nitrophenol	88-75-5	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.00	< 0.02	< 0.01	< 0.01	< 0.02
	2,2-Dimethylbutane	00075-83-2	< 0.03	< 0.03	< 0.04	0.13	0.13	< 0.05	< 0.02	0.13	0.10	0.06	< 0.04	< 0.02	1.50	< 0.01
	2,2-Dimethylpropane	00463-82-1	< 0.03	< 0.03	< 0.04	< 0.02	< 0.02	< 0.06	< 0.02	< 0.03	< 0.03	< 0.02	< 0.04	< 0.02	< 0.01	< 0.01
	2,2'-oxybis(1-Chloropropane)	108-60-1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00
	2,3-Dimethylpentane	00565-59-3	< 0.03	0.49	< 0.04	0.06	0.07	0.07	0.06	0.20	0.22	0.06	0.10	0.09	0.14	0.09
	2,3,4-Trimethylpentane	00565-75-3	< 0.03	0.40	< 0.04	< 0.02	< 0.02	< 0.05	< 0.02	0.13	0.25	< 0.02	< 0.03	0.11	0.08	< 0.01
	2,4-Dichlorophenol	120-83-2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.01
	2,4-Dimethylhexane	00589-43-5	0.10	0.69	< 0.04	0.17	0.05	< 0.05	0.14	0.26	0.39	< 0.02	0.20	0.14	0.12	0.08
	2,4-Dimethylphenol	105-67-9	< 0.01	< 0.01	0.13	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.01
	2,4-Dinitrophenol	105-67-9	< 0.04	< 0.04	< 0.07	< 0.05	< 0.04	< 0.04	< 0.04	< 0.05	< 0.05	< 0.01	< 0.06	< 0.03	< 0.02	< 0.02
	2,4-Dinitrotoluene	121-14-2	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00
	2,4,5-Trichlorophenol	95-95-4	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.02	< 0.01	< 0.00	< 0.00
	2,4,6-Trichlorophenol	88-06-2	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.02	< 0.01	< 0.00	< 0.00
	2,6-Dinitrotoluene	606-20-2	< 0.01	< 0.01	< 0.03	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.00	< 0.02	< 0.01	< 0.01	< 0.01
	3-Furaldehyde	498-60-2	< 0.01	< 0.01	< 0.03	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.01	< 0.00	< 0.02	< 0.01	< 0.01	< 0.01
1	2 3-Methyl-2-Butanone		1.43	T	T	T	T	T	T	T	T	T	T	T	T	T
	3-Methylhexane	00589-34-4	0.13	1.92	0.23	0.23	0.28	0.21	0.15	0.75	0.84	0.26	0.37	0.33	0.39	0.39
	3-Methylpentane	00096-14-0	2.66	0.58	0.41	0.79	0.99	0.41	2.75	0.78	1.89	0.28	0.46	0.45	0.49	0.15
	3-Methylstyrene	100-80-1	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
	3-Nitroaniline	99-09-2	< 0.01	< 0.01	< 0.03	< 0.01	< 0.02	< 0.01	< 0.02	< 0.01	< 0.01	< 0.00	< 0.02	< 0.01	< 0.01	< 0.01
	3,3'-Dichlorobenzidine	91-94-1	< 0.03	< 0.01	< 0.07	< 0.02	< 0.03	< 0.00	< 0.03	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
	3,3'-Dimethoxybenzidine	119-90-4	< 0.03	< 0.01	< 0.08	< 0.03	< 0.03	< 0.01	< 0.03	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
	3,3'-Dimethylbenzidine	119-93-7	< 0.01	< 0.00	< 0.02	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	3/4-Methylphenol	108-39-4/106-44-5	0.01	< 0.01	0.22	< 0.01	0.15	< 0.01	< 0.01	< 0.01	< 0.01	0.00	< 0.01	< 0.01	< 0.00	< 0.00
	4-Aminobiphenyl	92-67-1	< 0.01	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	4-Bromophenyl-phenylether	101-55-3	< 0.02	< 0.01	0.00	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.01	< 0.00	< 0.02	< 0.01	< 0.00	< 0.00
	4-Chloro-3-methylphenol	59-50-7	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.01
	4-Chloroaniline	106-47-8	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01
	4-Chlorophenyl-phenylether	70005-72-3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00
	4-Chlorostyrene	1073-67-2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	0.01	< 0.01	< 0.00	< 0.00
	4-Methyl-1-pentene	00691-37-2	< 0.03	< 0.03	< 0.03	0.31	< 0.02	0.30	< 0.02	< 0.03	< 0.03	< 0.02	< 0.03	< 0.02	< 0.01	< 0.01
1	4-Methyl-2-Pentanone	00108-10-1	< 0.57	0.30	11.50	24.48	< 0.28	24.54	< 0.40	0.21	0.19	0.13	0.16	< 0.13	0.06	0.56
	4-Methylstyrene	622-97-9	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
	4-Nitroaniline	100-01-6	< 0.02	< 0.01	< 0.03	< 0.01	< 0.02	< 0.01	< 0.02	< 0.01	< 0.01	< 0.00	< 0.02	< 0.01	< 0.00	< 0.01

TABLE 4-4e

MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - ENGINEERED PRODUCTS

		CAS Numbers	Cmpd #1 % Of Tot	Cmpd #2 % Of Tot	Cmpd #3 % Of Tot	Cmpd #4 % Of Tot	Cmpd #5 % Of Tot	Cmpd #6 % Of Tot	Cmpd #7 % Of Tot	Cmpd #8 % Of Tot	Cmpd #9 % Of Tot	Cmpd #10 % Of Tot	Cmpd #11 % Of Tot	Cmpd #12 % Of Tot	Cmpd #13 % Of Tot	Cmpd #14 % Of Tot
	4-Nitrobiphenyl	92-93-3	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
	4-Nitrophenol	100-02-7	< 0.03	< 0.03	< 0.05	< 0.02	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.01	< 0.04	< 0.02	< 0.01	< 0.01
1	2 4,4-Dimethyl-2-Pentanone		1.43	T	T	T	T	T	T	T	T	T	T	T	T	T
	4,4'-Methylenedianiline	101-77-9	< 0.02	< 0.01	< 0.04	< 0.02	< 0.02	< 0.00	< 0.03	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
	4,6-Dinitro-2-methylphenol	534-52-1	< 0.03	< 0.02	< 0.04	< 0.04	< 0.03	< 0.02	< 0.03	< 0.03	< 0.03	< 0.00	< 0.03	< 0.02	< 0.01	< 0.01
	Acenaphthene	83-32-9	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
	Acenaphthylene	208-96-8	< 0.00	0.01	0.06	0.01	0.06	0.00	0.00	0.00	0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
1	2 Acetaldehyde	00075-07-0	0.86	T	T	T	T	T	T	T	T	T	T	T	T	T
1	2 Acetaldehyde+Isobutane		T	T	T	T	0.83	T	T	T	T	T	T	T	T	T
1	Acetone	00067-64-1	1.87	20.10	3.83	15.91	3.74	2.61	2.60	2.86	1.63	2.18	9.07	1.57	< 0.22	4.12
1	Acetonitrile	01722-09-4	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.35	< 0.39	< 0.31	< 0.47	< 0.25	< 0.22	< 0.14
1	2 Acetophenone	00098-86-2	2.87	T	T	T	T	T	T	T	T	T	T	T	T	T
	Acetophenone	98-86-2	0.05	0.03	0.05	0.01	0.03	0.06	0.10	0.02	2.26	0.03	0.54	0.51	0.03	0.01
	Acetylene	00074-86-2	1.01	2.55	0.43	0.53	0.12	1.41	0.04	0.43	0.83	0.49	0.10	0.58	0.20	0.24
1	Acrolein	00107-02-8	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.35	< 0.39	< 0.31	< 0.47	< 0.25	0.43	0.56
1	Acrylonitrile	00107-13-1	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	0.11	< 0.39	< 0.31	< 0.47	< 0.25	0.58	7.97
1	Allyl Chloride	00107-05-1	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.35	< 0.39	< 0.31	< 0.47	< 0.25	< 0.22	< 0.14
	Aniline	62-53-3	< 0.01	0.73	< 0.01	0.71	< 0.01	0.08	< 0.01	0.01	0.01	0.00	0.06	< 0.00	< 0.00	< 0.00
	Anthracene	120-12-7	< 0.00	< 0.00	0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	a-Pinene	07785-70-8	< 0.03	< 0.03	< 0.03	0.13	< 0.02	< 0.05	< 0.02	0.18	0.14	0.14	< 0.03	< 0.02	0.09	< 0.01
	a,a,a-Trichlorotoluene	98-07-7	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01
	Benzaldehyde	100-52-7	0.02	0.07	0.09	0.01	0.04	0.06	< 0.01	0.02	0.03	0.00	0.02	0.03	0.01	0.01
	Benzene	00071-43-2	0.07	0.07	0.10	0.19	0.41	< 0.05	0.08	< 0.02	0.08	< 0.02	< 0.03	0.05	0.40	0.38
	Benzidine	92-87-5	< 0.01	< 0.00	< 0.03	< 0.01	< 0.02	< 0.00	< 0.02	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
	Benzoic acid	65-85-0	0.51	< 0.02	< 0.03	0.06	0.53	0.25	0.18	< 0.02	< 0.02	0.03	0.04	< 0.01	0.14	< 0.03
	Benzonitrile	100-47-0	< 0.01	< 0.00	0.01	< 0.00	0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
	Benzo(a)anthracene	56-55-3	< 0.01	< 0.00	0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	Benzo(a)pyrene	50-32-8	< 0.01	< 0.00	< 0.03	< 0.01	< 0.01	< 0.00	< 0.02	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	Benzo(b)fluoranthene	205-99-2	< 0.01	< 0.00	< 0.02	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	0.00	< 0.00
	Benzo(g,h,i)perylene	191-24-2	0.02	< 0.00	< 0.04	< 0.01	< 0.02	< 0.00	< 0.03	< 0.00	< 0.00	< 0.00	< 0.00	0.01	< 0.00	0.00
	Benzo(k)fluoranthene	207-08-9	< 0.01	< 0.00	< 0.02	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	0.00	< 0.00
	Benzyl alcohol	100-51-6	0.01	0.02	0.02	0.01	0.02	0.03	0.02	0.05	0.04	0.01	0.01	0.03	< 0.00	< 0.01
1	Benzyl Chloride	00100-44-7	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.35	< 0.39	< 0.31	< 0.47	< 0.25	< 0.22	< 0.14
	Benzyl Chloride	100-44-7	< 0.01	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
	Biphenyl	92-52-4	< 0.00	< 0.00	0.05	0.01	< 0.00	0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	0.00
1	2 bis(1-Methylethyl)Benzene		T	T	T	T	T	T	T	T	T	T	T	T	T	T
1	2 bis(1,1-dimethylethyl)perroxide		T	T	T	T	T	T	T	T	T	T	T	T	T	T
	bis(2-Chloroethoxy)methane	111-91-1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.01
	bis(2-Chloroethyl)ether	111-44-4	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00
	bis(2-Ethylhexyl)phthalate	117-81-7	0.05	0.05	0.11	T	0.03	0.14	0.03	T	0.01	< 0.00	0.64	0.01	0.45	T
	b-Pinene	18172-67-3	< 0.16	0.28	0.28	0.49	0.16	< 0.26	< 0.11	< 0.13	< 0.14	< 0.11	< 0.17	< 0.09	1.42	10.92
1	Bromodichloromethane	00075-27-4	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
1	Bromoform	00075-25-2	0.34	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
1	Bromomethane	00074-83-9	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07

TABLE 4-4e
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - ENGINEERED PRODUCTS

		CAS Numbers	Cmpd #1 % Of Tot	Cmpd #2 % Of Tot	Cmpd #3 % Of Tot	Cmpd #4 % Of Tot	Cmpd #5 % Of Tot	Cmpd #6 % Of Tot	Cmpd #7 % Of Tot	Cmpd #8 % Of Tot	Cmpd #9 % Of Tot	Cmpd #10 % Of Tot	Cmpd #11 % Of Tot	Cmpd #12 % Of Tot	Cmpd #13 % Of Tot	Cmpd #14 % Of Tot
1 2	Butanal	00123-72-8	T	T	T	T	T	T	T	T	T	T	0.73	T	13.57	8.13
1 2	Butane		T	T	1.18	1.22	T	T	T	T	T	T	T	T	T	T
	Butylbenzylphthalate	85-68-7	0.01	0.01	0.03	< 0.01	< 0.01	T	< 0.01	0.00	0.01	T	T	0.00	0.00	0.00
1 2	C10-C11 Branched Alkane		T	T	T	T	T	T	T	T	T	T	T	T	T	T
1 2	C10H18 Polycyclic Hydrocarbon		T	T	T	T	T	T	T	T	T	T	T	T	T	T
1 2	C10H20 Alkyl Substituted Cyclohexane		T	T	T	T	T	7.87	T	T	T	T	T	T	T	5.25
1 2	C11-C12 Branched Alkane		T	T	T	T	T	T	T	T	T	T	T	T	16.29	T
1 2	C11H22 Alkene		T	T	T	T	T	T	T	T	T	T	T	T	T	T
1 2	C12H24 Alkene		T	T	T	T	T	T	T	T	T	T	T	T	T	T
1 2	C4 Aldehyde		T	T	0.88	T	T	T	T	T	T	T	T	T	T	T
1 2	C5 Aldehyde		T	T	0.88	T	T	T	T	T	T	T	T	T	T	T
1 2	C6H10 O2 Acid Ester		T	T	T	T	T	T	T	T	T	T	T	T	T	T
1 2	C8H12 Cyclic alkene		T	T	T	T	T	T	T	T	T	T	T	T	T	T
1 2	C8H16 Alkene		2.87	T	T	T	T	T	7.99	T	T	T	T	T	T	T
1 2	C9H10 Alkyl Substituted Benzene		T	1.24	T	T	T	T	T	T	T	T	T	T	T	T
1 2	C9H12 Alkyl Substituted Benzene		T	1.49	T	T	T	T	T	T	T	T	T	T	T	T
1 2	C9H12 Polycyclic Alkene		T	T	T	T	T	T	T	T	34.02	T	T	T	T	T
	Camphene	79-92-5	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.00	0.03	0.07	< 0.00	< 0.00
1	Carbon Disulfide	00075-15-0	< 0.57	< 0.20	< 0.24	0.33	0.25	3.07	< 0.40	46.45	1.02	32.76	20.52	67.47	0.51	2.69
1	Carbon Tetrachloride	00056-23-5	< 0.57	< 0.20	0.11	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
1 2	Carbonyl sulfide	00463-58-1	T	T	T	T	T	T	T	2.21	T	T	T	T	T	T
1	Chlorobenzene	00108-90-7	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
1 2	Chlorobutadiene+Methylpentane		T	T	T	T	T	T	T	T	T	T	T	0.78	T	T
1	Chlorodibromomethane	00124-48-1	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
1	Chloroethane	00075-00-3	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
1	Chloroform	00067-66-3	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	0.02
1	Chloromethane	00074-87-3	< 0.57	0.05	< 0.24	0.05	< 0.28	0.26	< 0.40	0.06	0.05	0.03	< 0.23	0.03	0.04	0.02
	Chrysene	218-01-9	< 0.01	< 0.00	0.01	< 0.01	< 0.01	T	< 0.01	< 0.00	< 0.00	< 0.00	0.00	< 0.00	T	< 0.00
1	cis-1,2-Dichloroethene	00156-59-2	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	0.39	< 0.07
1	cis-1,3-Dichloropropene	10061-01-5	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
	cis-2-Butene	00590-18-1	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	< 0.02	< 0.03	< 0.03	< 0.02	< 0.03	< 0.02	< 0.01	< 0.01
	cis-2-Hexene	07688-21-3	0.50	< 0.03	< 0.03	< 0.02	0.13	< 0.05	0.22	< 0.03	0.11	< 0.02	< 0.03	0.20	< 0.01	< 0.01
	cis-2-Pentene	00627-20-3	0.09	0.32	3.61	0.45	0.19	0.37	0.22	0.05	0.09	1.46	T	0.17	0.32	0.19
	Cumene	00098-82-8	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	0.07	0.16	4.66	0.26	< 0.03	0.14	0.06	< 0.01
	Cumene	98-82-8	0.00	< 0.00	0.00	0.00	0.00	0.01	0.02	< 0.00	< 0.00	0.01	0.01	0.03	0.00	< 0.00
1 2	Cyclobutane		T	T	T	T	T	T	T	T	T	0.78	T	T	T	T
	Cyclohexane	00110-82-7	0.56	1.88	0.10	0.40	0.27	0.14	6.53	0.25	0.38	0.05	0.08	0.12	0.21	0.19
	Cyclohexanone	108-94-1	< 0.02	0.04	0.09	0.05	0.15	0.07	0.18	0.05	0.02	0.01	< 0.01	0.07	< 0.00	0.02
	Cyclohexylamine	108-91-8	< 0.01	< 0.01	< 0.03	< 0.01	< 0.01	0.00	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00
1 2	Cyclooctadiene		T	T	T	T	T	T	T	1.77	T	T	T	T	T	17.52
	Cyclopentane + 2,3-Dimethylbutane	00287-92-3/00079-29-8	0.17	0.16	0.09	0.19	0.23	0.26	0.12	0.16	0.21	0.05	0.01	0.11	0.11	0.03
	Cyclopentene	00142-29-0	< 0.03	0.27	0.57	0.09	0.30	< 0.05	< 0.02	< 0.03	< 0.03	< 0.02	< 0.03	< 0.02	0.30	< 0.01
1 2	Decane		T	T	1.18	T	T	T	T	1.11	T	0.78	1.03	0.63	T	T
	Dibenzofuran	132-64-9	< 0.00	0.00	0.03	0.00	< 0.00	0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	0.00

TABLE 4-4e
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - ENGINEERED PRODUCTS

		CAS Numbers	Cmpd #1 % Of Tot	Cmpd #2 % Of Tot	Cmpd #3 % Of Tot	Cmpd #4 % Of Tot	Cmpd #5 % Of Tot	Cmpd #6 % Of Tot	Cmpd #7 % Of Tot	Cmpd #8 % Of Tot	Cmpd #9 % Of Tot	Cmpd #10 % Of Tot	Cmpd #11 % Of Tot	Cmpd #12 % Of Tot	Cmpd #13 % Of Tot	Cmpd #14 % Of Tot
	Dibenz(a,h)anthracene	53-90-3	< 0.02	< 0.00	< 0.05	< 0.01	< 0.02	< 0.00	< 0.03	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
1	Dichlorodifluoromethane	00075-71-8	< 0.57	< 0.20	0.10	< 0.16	< 0.28	0.12	< 0.40	0.09	0.09	0.07	< 0.23	0.06	< 0.11	< 0.07
	Diethylphthalate	84-66-2	0.01	0.02	0.02	T	0.00	0.01	T	0.01	0.01	0.03	T	0.01	0.03	0.01
	Dimethylaminoazobenzene	60-11-7	< 0.02	< 0.01	< 0.03	< 0.02	< 0.02	< 0.00	< 0.02	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
	Dimethylphthalate	131-11-3	< 0.00	< 0.00	0.01	0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	0.00
	Di-n-butylphthalate	84-74-2	0.10	0.02	0.05	T	T	0.01	T	0.01	0.00	0.00	T	0.01	0.20	0.01
	Di-n-octylphthalate	117-84-0	0.01	< 0.00	< 0.01	< 0.00	0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	Diphenylamine	122-39-4	0.00	0.04	0.03	0.03	0.00	0.41	0.00	0.17	0.20	0.01	0.21	0.07	0.01	0.55
	d-Limonene	05989-27-5	< 0.16	< 0.14	< 0.17	< 0.12	0.21	< 0.26	< 0.11	< 0.13	< 0.14	< 0.11	< 0.17	< 0.09	0.18	< 0.05
1	Epichlorohydrin	00106-89-8	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.35	< 0.39	< 0.31	< 0.47	< 0.25	< 0.22	< 0.14
	Ethane	00074-84-0	1.97	0.42	0.66	0.64	0.29	0.44	0.21	0.29	0.30	0.10	0.08	0.19	0.05	0.12
1	2 Ethanol		1.29	1.24	T	1.43	1.11	9.20	T	T	T	35.09	T	T	T	T
1	2 Ethenylcyclohexene	25168-07-4	T	T	T	T	T	T	T	T	T	T	T	T	1.36	8.76
1	2 Ethyl Acetate		T	T	T	T	T	T	T	T	T	T	T	T	T	T
1	2 Ethyl Acrylate		T	T	T	T	T	T	T	T	T	T	T	T	T	T
	Ethylacetylene	00107-00-6	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	< 0.02	< 0.02	< 0.03	< 0.02	< 0.03	< 0.02	< 0.01	< 0.01
	Ethylbenzene	00100-41-4	< 0.03	0.22	0.20	0.19	0.16	0.19	3.64	0.18	0.11	< 0.02	0.16	0.09	0.13	0.04
	Ethylene	00074-85-1	< 0.03	0.10	0.22	0.25	0.18	0.11	< 0.02	0.25	0.28	0.05	< 0.03	0.06	< 0.01	0.09
	Fluoranthene	206-44-0	0.02	< 0.00	0.01	< 0.00	0.00	< 0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00
	Fluorene	86-73-7	0.00	0.00	0.01	0.00	0.00	0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	0.00	< 0.00
1	2 Heptane		T	7.45	T	0.82	T	T	T	2.21	2.43	0.39	1.03	1.26	2.04	0.88
1	2 Heptanone		T	T	T	T	T	T	T	T	T	T	4.40	T	T	T
	Hexachlorobenzene	118-74-1	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00
1	Hexachlorobutadiene	00087-68-3	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.35	< 0.39	< 0.31	< 0.47	< 0.25	< 0.22	< 0.14
	Hexachlorobutadiene	87-68-3	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.02	< 0.01	< 0.00	< 0.02	< 0.01	< 0.00	< 0.02
	Hexachlorocyclopentadiene	77-47-4	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.00	< 0.03	< 0.02	< 0.01	< 0.01
1	2 Hexachloroethane		T	T	T	T	T	T	T	T	T	T	T	T	T	T
	Hexachloroethane	67-72-1	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.01	< 0.00	< 0.02	< 0.01	< 0.01	< 0.01
	Hydroquinone	123-31-9	< 0.01	< 0.01	< 0.02	1.33	35.65	< 0.01	< 0.01	< 0.02	< 0.01	< 0.00	< 0.02	< 0.01	< 0.00	< 0.02
	Indeno(1,2,3-cd)pyrene	193-39-5	< 0.02	< 0.00	< 0.03	< 0.01	< 0.02	< 0.00	< 0.02	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
1	2 Isobutanal	00078-84-2	T	T	T	T	1.25	T	T	T	T	T	T	T	T	T
	Isobutane	00075-28-5	0.44	< 0.03	0.30	0.31	0.70	< 0.06	0.12	0.43	0.25	< 0.02	< 0.04	< 0.02	< 0.01	< 0.01
	Isobutylene + 1-Butene	00115-11-7/00106-98-9	0.21	0.35	0.59	1.10	0.55	0.16	0.56	0.14	0.23	0.25	< 0.03	0.06	0.32	0.16
	Isooctane	00540-84-1	0.11	1.16	0.26	0.16	0.14	0.13	0.18	0.41	0.59	0.10	0.17	0.37	0.15	0.18
	Isooctanol	26952-21-6	< 0.13	0.22	< 0.22	< 0.09	< 0.13	0.48	< 0.13	< 0.12	< 0.10	0.53	23.15	< 0.07	0.59	< 0.04
	Isopentane	00078-78-4	1.03	< 0.03	2.83	8.69	2.99	2.95	1.32	3.72	1.88	1.36	6.89	0.98	3.21	2.00
	Isophorone	78-59-1	< 0.01	1.00	< 0.01	0.10	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01
	Isoprene	00078-79-5	< 0.03	< 0.03	< 0.03	< 0.02	0.15	< 0.05	< 0.02	0.04	0.04	< 0.02	< 0.03	0.03	0.03	0.03
1	2 Isopropyl Alcohol		1.29	T	T	0.82	1.39	0.92	T	T	0.97	T	T	T	T	T
1	2 Methyl Acrylate		T	T	T	T	T	T	T	T	T	T	T	T	T	T
1	2 Methyl Isothiocyanate	00556-61-6	T	T	T	T	T	T	T	0.88	T	T	T	T	T	T
	Methylacetylene	00074-99-7	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	< 0.02	< 0.02	< 0.03	< 0.02	< 0.03	< 0.02	< 0.01	< 0.01
	Methylcyclohexane	00108-87-2	0.23	3.91	0.48	1.05	0.41	0.70	0.54	1.55	1.70	0.28	0.52	0.71	0.75	0.56
	Methylcyclopentane	00096-37-7	4.19	0.78	0.33	0.57	1.46	0.35	5.48	0.57	4.96	0.17	0.31	0.22	0.38	0.09

TABLE 4-4e

MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - ENGINEERED PRODUCTS

		CAS Numbers	Cmpd #1 % Of Tot	Cmpd #2 % Of Tot	Cmpd #3 % Of Tot	Cmpd #4 % Of Tot	Cmpd #5 % Of Tot	Cmpd #6 % Of Tot	Cmpd #7 % Of Tot	Cmpd #8 % Of Tot	Cmpd #9 % Of Tot	Cmpd #10 % Of Tot	Cmpd #11 % Of Tot	Cmpd #12 % Of Tot	Cmpd #13 % Of Tot	Cmpd #14 % Of Tot
	Methylene bis-chloroaniline	101-14-4	< 0.04	< 0.01	< 0.09	< 0.03	< 0.04	< 0.01	< 0.05	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00
1	Methylene Chloride	00075-09-2	1.36	1.44	35.39	3.06	0.57	1.99	0.96	0.80	1.07	2.89	1.19	0.97	0.14	1.14
1 2	Methylhexane		T	7.45	T	T	T	T	T	1.11	1.46	T	T	0.63	T	0.53
1 2	Methylpentane		T	1.24	0.88	2.45	T	2.76	T	1.33	3.89	1.56	2.05	0.78	T	T
	m-Ethyltoluene	00620-14-4	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	0.11	< 0.02	< 0.03	< 0.02	< 0.03	< 0.02	0.07	0.09
	m-Xylene + p-Xylene	00108-38-3/00106-42-3	0.32	0.88	0.65	0.84	0.56	0.50	12.13	0.72	0.74	0.34	0.36	0.55	0.49	0.23
	Naphthalene	91-20-3	0.03	0.05	0.28	0.03	0.34	0.04	0.04	0.05	0.04	0.00	0.02	0.05	0.01	< 0.00
	n-Butane	00106-97-8	0.95	0.35	0.94	1.17	1.93	0.16	0.53	0.17	0.29	0.07	T	0.19	0.07	0.28
	n-Decane	00124-18-5	0.49	0.41	0.44	0.85	0.28	< 0.27	0.73	0.52	0.32	0.32	< 0.17	0.23	0.60	0.18
	n-Heptane	00142-82-5	0.20	3.69	0.26	0.36	0.40	0.26	0.18	1.45	1.59	0.39	0.59	0.61	0.65	0.44
	n-Hexane	00110-54-3	10.21	1.63	1.45	2.56	8.03	1.19	9.08	2.11	4.92	0.53	0.67	0.70	1.25	0.48
	Nitrobenzene	98-95-3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	0.05	< 0.01	< 0.00	< 0.01
	N-Nitrosodiethylamine	55-18-5	< 0.02	< 0.02	< 0.03	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.00	< 0.02	< 0.01	< 0.01	< 0.01
	n-Nitrosodimethylamine	62-75-9	T	< 0.01	< 0.04	T	T	< 0.02	T	< 0.02	< 0.01	< 0.00	< 0.02	< 0.01	< 0.01	< 0.01
	N-Nitroso-di-n-propylamine	621-64-7	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.01	< 0.00	< 0.02	< 0.01	< 0.01	< 0.01
	N-Nitrosodiphenylamine	86-30-6	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	n-Nitrosomorpholine	59-89-2	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.02	< 0.01	< 0.00	< 0.02	< 0.01	< 0.01	< 0.01
	n-Nonane	00111-84-2	0.33	0.25	0.13	< 0.02	0.15	0.47	0.51	0.13	0.16	0.18	0.31	0.17	0.28	0.12
	n-Octane	00111-65-9	0.19	< 0.03	< 0.04	0.15	0.17	0.08	0.12	< 0.03	< 0.03	0.06	0.15	< 0.02	0.22	0.05
1 2	Nonane		T	T	T	T	T	T	T	T	T	T	T	T	T	T
	n-Pentane	00109-66-0	0.66	< 0.03	0.62	0.83	1.25	0.24	0.41	0.29	0.28	0.11	0.22	0.17	0.15	< 0.01
1 2	n-Propane		1.43	T	T	T	T	T	T	T	T	T	T	T	T	T
	n-Propylbenzene	00103-65-1	0.15	< 0.03	< 0.03	< 0.02	< 0.02	< 0.05	< 0.02	< 0.02	< 0.03	< 0.02	< 0.03	< 0.02	< 0.01	< 0.01
1 2	n-Undecane	00112-21-4	1.43	T	T	T	0.97	T	1.00	T	T	T	T	T	T	T
	N,N-Diethylaniline	91-66-7	0.05	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00
	N,N-Dimethylaniline	121-69-7	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01
	o-Anisidine	90-04-0	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.01
	o-Ethyltoluene	00611-14-3	< 0.16	0.52	< 0.16	< 0.11	< 0.08	< 0.26	< 0.11	< 0.12	< 0.13	0.30	0.36	< 0.09	< 0.04	< 0.05
	o-Toluidine	95-53-4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.18	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	0.12	< 0.00	< 0.00
	o-Xylene	00095-47-6	0.12	0.59	0.29	0.82	0.21	0.76	6.51	0.26	0.25	0.12	0.32	0.25	0.22	0.12
	p-Cymene	00099-87-6	0.22	0.22	< 0.16	0.24	0.08	< 0.26	0.16	0.42	< 0.14	< 0.11	< 0.16	< 0.09	0.21	0.09
	Pentachloronitrobenzene	82-68-8	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.01	< 0.04	< 0.02	< 0.01	< 0.01
	Pentachlorophenol	87-86-5	< 0.02	< 0.01	< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.00	< 0.02	< 0.01	0.00	< 0.00
1 2	Pentane		T	T	1.18	1.43	T	T	T	T	T	T	T	T	T	T
1 2	Pentene		T	T	0.88	T	T	T	T	T	T	T	T	T	T	T
	p-Ethyltoluene	00622-96-8	< 0.03	< 0.03	< 0.03	0.57	< 0.02	< 0.05	0.39	< 0.02	< 0.03	< 0.02	< 0.03	< 0.02	0.08	< 0.01
	Phenanthrene	85-01-8	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.00	0.00	0.01	0.00	0.01
	Phenol	108-95-2	0.09	0.07	0.25	0.02	1.03	0.04	0.02	0.05	0.09	0.00	0.02	0.04	0.03	0.04
	Phthalimide	85-41-6	< 0.03	< 0.03	0.84	< 0.02	0.11	< 0.02	0.01	< 0.03	< 0.03	T	< 0.03	< 0.02	0.00	< 0.01
1 2	Propanal		T	T	T	T	T	T	T	T	T	T	T	T	2.04	T
	Propane	00074-98-6	1.58	0.32	0.74	0.62	0.60	0.21	0.18	0.31	0.25	0.08	0.10	0.15	1.29	3.80
1 2	Propylcyclohexane		T	T	T	T	T	T	T	T	T	T	T	T	T	T
	Propylene	00115-07-1	< 0.03	0.33	< 0.03	0.06	0.06	< 0.05	< 0.02	0.11	0.09	< 0.02	0.15	< 0.02	0.55	0.07
1	Propylene Oxide	00075-56-9	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	< 0.74	< 0.80	< 0.35	< 0.39	< 0.31	< 0.47	< 0.25	< 0.22	4.73

TABLE 4-4e

MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - ENGINEERED PRODUCTS

		CAS Numbers	Cmpd #1 % Of Tot	Cmpd #2 % Of Tot	Cmpd #3 % Of Tot	Cmpd #4 % Of Tot	Cmpd #5 % Of Tot	Cmpd #6 % Of Tot	Cmpd #7 % Of Tot	Cmpd #8 % Of Tot	Cmpd #9 % Of Tot	Cmpd #10 % Of Tot	Cmpd #11 % Of Tot	Cmpd #12 % Of Tot	Cmpd #13 % Of Tot	Cmpd #14 % Of Tot
	Pyrene	129-00-0	0.04	0.01	0.03	0.01	0.04	0.01	0.02	0.02	0.03	T	0.01	0.02	0.00	0.01
	Pyridine	110-86-1	< 0.01	< 0.01	< 0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00
	Styrene	00100-42-5	< 0.03	< 0.03	< 0.03	0.07	< 0.02	3.40	< 0.02	0.07	0.25	0.07	0.12	< 0.02	0.03	0.04
1	t-Butyl Methyl Ether	01634-04-4	< 1.15	< 0.40	< 0.47	< 0.33	< 0.55	0.26	< 0.80	< 0.35	< 0.39	< 0.31	< 0.47	< 0.25	< 0.22	< 0.14
1	2 tert-Butyl Alcohol	00075-65-0	T	T	T	T	T	0.92	T	T	T	2.73	T	T	T	T
1	Tetrachloroethene	00127-18-4	< 0.57	6.20	0.09	0.11	< 0.28	0.08	< 0.40	0.13	0.17	0.04	0.06	0.12	0.08	0.10
1	2 Tetrahydrofuran		1.43	T	T	T	T	T	1.00	T	T	T	T	0.78	T	T
	Toluene	00108-88-3	2.04	3.13	1.94	0.98	2.35	0.44	0.89	2.18	3.46	0.59	0.93	0.85	1.71	1.05
1	trans-1,2-Dichloroethene	00156-60-5	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
1	trans-1,2-Dichloropropene	10061-02-6	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
	trans-2-Butene	00624-64-6	< 0.03	< 0.03	0.33	< 0.02	< 0.02	< 0.05	< 0.02	< 0.03	< 0.03	< 0.02	< 0.03	< 0.02	0.04	< 0.01
	trans-2-Hexene	04050-45-7	< 0.03	< 0.03	0.10	< 0.02	0.11	< 0.05	< 0.02	< 0.03	< 0.03	< 0.02	< 0.03	< 0.02	< 0.01	< 0.01
	trans-2-Pentene	00646-04-8	< 0.03	< 0.03	< 0.03	0.19	< 0.02	< 0.05	< 0.02	< 0.03	0.05	< 0.02	< 0.03	< 0.02	< 0.01	0.06
1	Trichloroethene	00079-01-6	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	0.14	< 0.07
1	Trichlorofluoromethane	00075-69-4	< 0.57	1.02	0.23	< 0.16	< 0.28	0.88	0.56	0.27	< 0.19	0.45	0.26	< 0.13	0.12	0.06
1	2 Trichloroheptafluorobutane		T	T	T	T	T	T	T	T	T	T	T	T	T	T
1	Trichlortrifluoroethane	00076-13-1	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
	Trifluralin	1582-09-8	< 0.02	< 0.02	< 0.03	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.00	< 0.02	< 0.01	< 0.01	< 0.01
1	2 Undecane		T	T	0.88	T	T	T	T	T	T	T	T	T	T	T
1	2 Unknown		2.87	T	T	T	T	T	1.80	T	T	T	T	T	T	T
1	Vinyl Acetate	00108-05-4	< 0.57	< 0.20	< 0.24	< 0.16	3.19	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
1	Vinyl Chloride	00075-01-4	< 0.57	< 0.20	< 0.24	< 0.16	< 0.28	< 0.37	< 0.40	< 0.18	< 0.19	< 0.16	< 0.23	< 0.13	< 0.11	< 0.07
	Total Detected (lb/lb rubber)		5.20E-05	5.78E-05	9.14E-05	5.46E-05	6.10E-05	9.69E-05	8.89E-05	5.39E-05	5.73E-05	2.84E-04	3.54E-05	6.14E-05	1.54E-04	1.41E-04
	Total with non-detects (lb/lb rubber)		8.08E-05	< 6.61E-05	< 1.09E-04	< 6.09E-05	< 7.36E-05	< 1.25E-04	< 1.19E-04	< 6.04E-05	< 6.53E-05	< 3.13E-04	< 4.21E-05	< 6.70E-05	< 1.63E-04	< 1.47E-04

NOTES:

1 TO14 Compound

2 Tentatively Identified Compound(TIC)

T TIC Not Identified In Summarized Category

* % of Total Values Represent % of Total With Non-Detects

TABLE 4-4e
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - ENGINEERED PRODUCTS

		CAS Numbers	Cmpd #15 % Of Tot	Cmpd #16 % Of Tot	Cmpd #17 % Of Tot	Cmpd #18 % Of Tot	Cmpd #19 % Of Tot	Cmpd 20 % Of Tot	Cmpd #21 % Of Tot	Cmpd #22 % Of Tot	Cmpd #23 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
1	2 1-Butanol	00071-36-3	T	T	T	T	T	T	8.77	T	T	< 1.36	13.57	< 3.36
1	2 1-Chloro-4-(1-chloroethenyl) cyclohexene		T	T	T	T	T	T	T	T	T	< 0.13	1.57	< 0.43
1	2 1-Chloro-5-(1-chloroethenyl) cyclohexene		T	T	T	T	T	T	T	T	T	< 0.13	1.57	< 0.43
1	2 1-Chloropropane		T	T	T	T	T	T	T	T	T	< 0.12	2.71	< 0.55
	1-Dodecene	112-41-4	< 0.02	< 0.05	< 0.02	0.02	< 0.10	< 0.16	< 0.02	< 0.02	< 0.03	< 0.04	0.16	< 0.03
	1-Heptene	00592-76-7	< 0.01	< 0.03	< 0.04	0.05	0.16	< 0.08	< 0.01	0.46	< 0.03	< 0.11	0.51	< 0.13
	1-Hexene	00592-41-6	< 0.01	0.32	0.14	0.02	< 0.04	< 0.08	< 0.01	0.05	< 0.03	< 0.05	0.32	< 0.07
1	2 1-Methoxybutane		T	T	T	T	T	T	T	T	T	< 0.08	1.75	< 0.36
	1-Octene	00111-60-0	0.15	< 0.03	1.06	0.02	< 0.04	< 0.08	< 0.01	< 0.02	< 0.03	< 0.08	1.06	< 0.21
	1-Pentene	00109-67-1	0.04	0.52	0.43	13.82	< 0.04	0.53	0.13	0.17	< 0.03	< 0.82	13.82	< 2.78
1	2 1-Propanol		T	T	T	T	T	T	T	T	T	< 0.06	1.36	< 0.28
1	1,1-Dichloroethane	00075-34-3	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
1	1,1-Dichloroethene	00075-35-4	0.02	< 0.23	< 0.06	0.07	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.27	0.90	< 0.22
1	1,1,1-Trichloroethane	00071-55-6	0.03	0.05	0.02	0.14	0.48	3.72	0.01	0.07	< 0.74	< 0.34	3.72	< 0.75
1	1,1,2-Trichloroethane	00079-00-5	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
1	1,1,2,2-Tetrachloroethane	00079-34-5	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
1	1,2-Dibromo-3-Chloropropane	00096-12-8	< 0.19	< 0.47	< 0.12	0.27	< 0.53	< 1.11	< 0.14	< 0.24	< 1.49	< 0.48	< 1.49	< 0.35
	1,2-Dibromo-3-chloropropane	96-12-8	< 0.01	< 0.02	< 0.00	0.01	< 0.03	< 0.07	< 0.01	< 0.01	< 0.01	< 0.02	< 0.07	< 0.01
1	1,2-Dibromoethane	00106-93-4	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
1	1,2-Dichlorobenzene	00095-50-1	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
	1,2-Dichlorobenzene	95-50-1	< 0.00	< 0.01	< 0.00	0.00	< 0.02	< 0.03	< 0.00	< 0.00	< 0.01	< 0.01	0.03	< 0.01
1	1,2-Dichloroethane	00107-06-2	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
1	1,2-Dichloropropane	00078-87-5	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
	1,2,4-Trichlorobenzene	120-82-1	< 0.00	< 0.01	< 0.00	0.00	< 0.02	< 0.03	< 0.00	< 0.00	< 0.01	< 0.01	< 0.03	< 0.01
	1,2,4-Trimethylbenzene	00095-63-6	< 0.06	4.86	< 0.21	0.20	0.44	< 0.39	0.18	0.58	< 0.13	< 0.55	4.86	< 1.07
	1,2,4-Trimethylbenzene	95-63-6	< 0.00	< 0.01	0.01	0.03	0.06	0.04	0.01	< 0.00	0.02	< 0.02	0.07	< 0.02
	1,3-Butadiene	00106-99-0	0.10	< 0.03	< 0.04	0.13	0.24	< 0.08	< 0.01	0.14	0.23	< 0.16	0.91	< 0.19
	1,3-Cyclooctadiene	1700-10-3	< 0.01	< 0.01	< 0.00	0.01	< 0.02	< 0.04	< 0.00	< 0.00	< 0.01	< 0.01	0.07	< 0.01
1	1,3-Dichlorobenzene	00541-73-1	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
	1,3-Dichlorobenzene	541-73-1	< 0.00	< 0.01	< 0.00	0.00	< 0.01	< 0.03	< 0.00	< 0.00	< 0.01	< 0.01	< 0.03	< 0.00
	1,3,5-Trimethylbenzene	00108-67-8	< 0.06	< 0.16	0.60	0.34	< 0.18	0.41	0.06	0.34	< 0.13	< 0.19	0.60	< 0.12
1	1,4-Dichlorobenzene	00106-46-7	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
	1,4-Dichlorobenzene	106-46-7	< 0.00	< 0.01	< 0.00	0.00	< 0.01	< 0.02	< 0.00	< 0.00	< 0.01	< 0.01	0.02	< 0.01
	1,4-Diethylbenzene + n-Butylbenzene	00105-05-5/00104-51-8	< 0.06	< 0.16	< 0.21	0.09	0.46	0.38	< 0.05	< 0.08	< 0.13	< 0.15	0.46	< 0.10
1	1,4-Dioxane	00123-91-1	< 0.37	< 0.93	< 0.24	0.54	< 1.06	< 2.22	< 0.28	< 0.47	< 2.98	< 0.97	< 2.98	< 0.70
	1,4-Phenylenediamine	106-50-3	< 0.01	< 0.02	< 0.01	0.01	< 0.04	< 0.08	< 0.01	< 0.01	< 0.01	< 0.02	< 0.08	< 0.02
	1,5-Cyclooctadiene	111-78-4	< 0.01	< 0.03	< 0.01	0.01	< 0.05	< 0.09	< 0.01	< 0.01	< 0.02	< 0.02	0.09	< 0.02
1	2 2-Butanol		T	T	0.74	T	T	T	T	T	T	< 0.03	0.74	< 0.15
1	2-Butanone	00078-93-3	0.14	0.11	0.33	0.93	0.26	0.66	0.34	4.71	< 1.49	< 1.37	7.32	< 1.77
1	2 2-Butene	00128-99-6	T	T	T	T	T	T	T	T	T	< 0.04	1.00	< 0.20
	2-Chloroacetophenone	1341-24-6	< 0.00	< 0.01	< 0.00	0.00	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	0.01	< 0.00
	2-Chloronaphthalene	91-58-7	< 0.00	< 0.00	< 0.00	0.00	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
	2-Chlorophenol	95-57-8	< 0.00	< 0.01	< 0.00	0.00	< 0.02	< 0.03	< 0.00	< 0.00	< 0.01	< 0.01	< 0.03	< 0.01
	2-Furaldehyde	98-01-1	< 0.01	< 0.02	< 0.00	0.00	< 0.03	< 0.07	< 0.01	0.04	0.00	< 0.07	0.56	< 0.15

TABLE 4-4e

MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - ENGINEERED PRODUCTS

		CAS Numbers	Cmpd #15 % Of Tot	Cmpd #16 % Of Tot	Cmpd #17 % Of Tot	Cmpd #18 % Of Tot	Cmpd #19 % Of Tot	Cmpd 20 % Of Tot	Cmpd #21 % Of Tot	Cmpd #22 % Of Tot	Cmpd #23 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
1	2-Hexanone	00591-78-6	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
	2-Methyl-1-butene	00563-46-2	0.04	0.22	< 0.04	0.02	< 0.04	0.29	< 0.01	< 0.02	< 0.03	< 0.13	1.48	< 0.30
	2-Methyl-2-butene	00513-35-9	< 0.01	< 0.03	< 0.04	0.02	< 0.04	< 0.08	< 0.01	0.12	0.17	< 0.07	0.38	< 0.10
	2-Methyl-2-pentene	00625-27-4	< 0.01	0.08	< 0.04	0.02	< 0.04	< 0.08	0.06	< 0.02	< 0.03	< 0.03	0.08	< 0.02
	2-Methylheptane	00592-27-8	0.03	0.07	< 0.04	0.02	0.16	0.22	< 0.01	0.45	< 0.03	< 0.22	0.68	< 0.16
	2-Methylhexane	00591-76-4	0.21	1.13	< 0.04	0.06	0.19	< 0.08	0.13	1.14	< 0.03	< 0.33	1.39	< 0.37
	2-Methylnaphthalene	91-57-6	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.01	0.07	0.02
	2-Methylpentane	00107-83-5	0.15	< 0.03	0.15	0.13	0.22	< 0.08	1.36	0.48	0.41	< 1.23	17.03	< 3.39
	2-Methylphenol	95-48-7	< 0.01	< 0.01	< 0.00	0.01	< 0.02	0.01	< 0.00	< 0.01	< 0.01	< 0.01	0.08	< 0.02
	2-Nitroaniline	88-74-4	< 0.01	< 0.02	< 0.01	0.01	< 0.04	< 0.05	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01
	2-Nitrophenol	88-75-5	< 0.01	< 0.02	< 0.01	0.01	< 0.04	< 0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.04	< 0.01
	2,2-Dimethylbutane	00075-83-2	< 0.01	< 0.03	< 0.04	0.02	< 0.04	< 0.08	0.07	0.05	< 0.03	< 0.12	1.50	< 0.30
	2,2-Dimethylpropane	00463-82-1	< 0.01	< 0.04	< 0.04	0.02	< 0.04	< 0.08	< 0.01	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
	2,2'-oxybis(1-Chloropropane)	108-60-1	< 0.01	< 0.01	< 0.01	0.00	< 0.02	< 0.03	< 0.00	< 0.00	< 0.01	< 0.01	< 0.03	< 0.01
	2,3-Dimethylpentane	00565-59-3	< 0.01	< 0.03	< 0.04	0.02	0.08	< 0.08	0.08	0.41	< 0.03	< 0.11	0.49	< 0.12
	2,3,4-Trimethylpentane	00565-75-3	< 0.01	< 0.03	< 0.04	0.02	< 0.04	< 0.08	< 0.01	0.32	< 0.03	< 0.08	0.40	< 0.10
	2,4-Dichlorophenol	120-83-2	< 0.00	< 0.01	< 0.00	0.00	< 0.02	< 0.03	< 0.00	< 0.01	< 0.01	< 0.01	< 0.03	< 0.01
	2,4-Dimethylhexane	00589-43-5	< 0.01	< 0.03	< 0.04	0.02	< 0.04	< 0.08	< 0.01	0.63	< 0.03	< 0.15	0.69	< 0.18
	2,4-Dimethylphenol	105-67-9	< 0.00	< 0.01	0.01	0.01	< 0.02	< 0.03	< 0.00	< 0.00	< 0.01	< 0.02	0.13	< 0.02
	2,4-Dinitrophenol	105-67-9	< 0.03	< 0.05	< 0.03	0.02	0.07	< 0.16	< 0.01	< 0.03	< 0.04	< 0.04	0.16	< 0.03
	2,4-Dinitrotoluene	121-14-2	< 0.01	< 0.01	< 0.01	0.00	< 0.03	< 0.04	< 0.00	< 0.01	< 0.01	< 0.01	< 0.04	< 0.01
	2,4,5-Trichlorophenol	95-95-4	< 0.01	< 0.01	< 0.01	0.01	< 0.03	< 0.04	< 0.00	< 0.01	< 0.01	< 0.01	< 0.04	< 0.01
	2,4,6-Trichlorophenol	88-06-2	< 0.01	< 0.01	< 0.01	0.01	< 0.03	< 0.04	< 0.00	< 0.01	< 0.01	< 0.01	< 0.04	< 0.01
	2,6-Dinitrotoluene	606-20-2	< 0.01	< 0.02	< 0.01	0.01	< 0.04	< 0.06	< 0.01	< 0.01	< 0.01	< 0.02	< 0.06	< 0.01
	3-Furaldehyde	498-60-2	< 0.01	< 0.02	< 0.00	0.01	< 0.03	< 0.08	< 0.01	< 0.01	< 0.01	< 0.02	< 0.08	< 0.02
1	2 3-Methyl-2-Butanone		T	T	T	T	T	T	T	T	T	< 0.06	1.43	< 0.29
	3-Methylhexane	00589-34-4	0.07	0.09	< 0.04	0.09	0.29	0.34	0.10	1.58	1.05	< 0.44	1.92	< 0.48
	3-Methylpentane	00096-14-0	0.20	0.26	0.15	0.12	0.20	0.52	0.07	0.40	0.32	0.67	2.75	0.73
	3-Methylstyrene	100-80-1	< 0.00	< 0.01	< 0.00	0.00	< 0.02	< 0.03	< 0.00	< 0.00	< 0.01	< 0.01	0.03	< 0.01
	3-Nitroaniline	99-09-2	< 0.01	< 0.01	< 0.01	0.01	< 0.04	< 0.06	< 0.00	< 0.01	< 0.01	< 0.01	< 0.06	< 0.01
	3,3'-Dichlorobenzidine	91-94-1	< 0.01	< 0.01	< 0.01	0.00	< 0.01	< 0.17	< 0.00	< 0.00	< 0.00	< 0.02	< 0.17	< 0.04
	3,3'-Dimethoxybenzidine	119-90-4	< 0.02	< 0.01	< 0.01	0.00	< 0.02	< 0.22	< 0.00	< 0.01	< 0.01	< 0.02	< 0.22	< 0.04
	3,3'-Dimethylbenzidine	119-93-7	< 0.01	< 0.00	< 0.00	0.00	< 0.01	< 0.07	< 0.00	< 0.00	< 0.00	< 0.01	< 0.07	< 0.01
	3/4-Methylphenol	108-39-4/106-44-5	< 0.00	< 0.01	< 0.00	0.01	< 0.02	< 0.03	< 0.00	< 0.00	< 0.01	< 0.02	0.22	< 0.05
	4-Aminobiphenyl	92-67-1	< 0.00	< 0.00	< 0.00	0.00	< 0.01	< 0.02	< 0.00	< 0.00	< 0.00	< 0.00	< 0.02	< 0.00
	4-Bromophenyl-phenylether	101-55-3	< 0.01	< 0.02	< 0.01	0.01	< 0.04	< 0.05	< 0.00	< 0.01	< 0.01	< 0.01	0.05	< 0.01
	4-Chloro-3-methylphenol	59-50-7	< 0.01	< 0.01	< 0.00	0.01	< 0.02	< 0.04	< 0.00	< 0.01	< 0.01	< 0.01	< 0.04	< 0.01
	4-Chloroaniline	106-47-8	< 0.00	< 0.01	< 0.00	0.00	0.02	< 0.03	< 0.00	< 0.00	< 0.01	< 0.01	0.03	< 0.01
	4-Chlorophenyl-phenylether	70005-72-3	< 0.00	< 0.01	< 0.00	0.00	< 0.02	< 0.02	< 0.00	< 0.00	< 0.01	< 0.01	< 0.02	< 0.01
	4-Chlorostyrene	1073-67-2	< 0.00	< 0.01	< 0.00	0.00	< 0.02	< 0.03	< 0.00	< 0.00	< 0.01	< 0.01	0.03	< 0.01
	4-Methyl-1-pentene	00691-37-2	< 0.01	< 0.03	< 0.04	0.02	< 0.04	< 0.08	< 0.01	0.12	< 0.03	< 0.06	0.31	< 0.08
1	4-Methyl-2-Pentanone	00108-10-1	0.08	0.24	0.05	3.36	< 0.26	0.97	0.02	14.73	< 0.74	< 3.65	24.54	< 7.40
	4-Methylstyrene	622-97-9	< 0.00	< 0.01	< 0.00	0.00	< 0.02	< 0.03	< 0.00	< 0.00	< 0.01	< 0.01	0.03	< 0.01
	4-Nitroaniline	100-01-6	< 0.01	< 0.01	< 0.01	0.01	< 0.03	< 0.06	< 0.00	< 0.01	< 0.01	< 0.01	< 0.06	< 0.01

TABLE 4-4e

MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - ENGINEERED PRODUCTS

		CAS Numbers	Cmpd #15 % Of Tot	Cmpd #16 % Of Tot	Cmpd #17 % Of Tot	Cmpd #18 % Of Tot	Cmpd #19 % Of Tot	Cmpd 20 % Of Tot	Cmpd #21 % Of Tot	Cmpd #22 % Of Tot	Cmpd #23 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
	4-Nitrobiphenyl	92-93-3	< 0.01	< 0.01	< 0.00	0.00	< 0.02	< 0.04	< 0.00	< 0.00	< 0.01	< 0.01	< 0.04	< 0.01
	4-Nitrophenol	100-02-7	< 0.02	< 0.03	< 0.01	0.01	0.04	< 0.12	< 0.01	< 0.02	< 0.03	< 0.03	0.12	< 0.02
1	2 4,4-Dimethyl-2-Pentanone		T	T	T	T	T	T	T	T	T	< 0.06	1.43	< 0.29
	4,4'-Methylenedianiline	101-77-9	< 0.01	< 0.01	< 0.01	0.00	< 0.02	< 0.12	< 0.00	< 0.00	< 0.01	< 0.02	< 0.12	< 0.02
	4,6-Dinitro-2-methylphenol	534-52-1	< 0.02	< 0.03	< 0.02	0.01	< 0.06	< 0.11	< 0.01	< 0.01	< 0.02	< 0.03	< 0.11	< 0.02
	Acenaphthene	83-32-9	< 0.00	< 0.01	0.00	0.00	< 0.01	< 0.02	< 0.00	< 0.00	< 0.00	< 0.00	0.02	< 0.00
	Acenaphthylene	208-96-8	0.00	0.00	< 0.00	0.00	< 0.01	0.00	< 0.00	0.01	< 0.00	< 0.01	0.08	< 0.02
1	2 Acetaldehyde	00075-07-0	0.81	T	T	T	T	T	T	T	T	< 0.07	0.88	< 0.24
1	2 Acetaldehyde+Isobutane		T	T	T	T	T	T	T	T	T	< 0.04	0.83	< 0.17
1	Acetone	00067-64-1	0.82	0.80	0.33	3.81	20.15	4.52	11.40	12.82	< 1.49	< 5.58	20.15	< 8.05
1	Acetonitrile	01722-09-4	< 0.19	< 0.47	< 0.12	0.27	1.93	< 1.11	< 0.14	< 0.24	< 1.49	< 0.54	1.93	< 0.46
1	2 Acetophenone	00098-86-2	T	T	T	T	T	T	T	T	T	< 0.12	2.87	< 0.59
	Acetophenone	98-86-2	0.02	0.03	0.00	0.04	0.10	0.82	0.01	0.03	0.01	0.21	2.26	0.48
	Acetylene	00074-86-2	0.34	0.34	< 0.04	0.15	0.52	1.94	0.17	0.42	< 0.03	< 0.56	2.55	< 0.62
1	Acrolein	00107-02-8	< 0.19	< 0.47	< 0.12	0.27	< 0.53	< 1.11	0.16	0.32	< 1.49	< 0.52	1.49	< 0.33
1	Acrylonitrile	00107-13-1	< 0.19	< 0.47	< 0.12	0.59	< 0.53	< 1.11	< 0.14	< 0.24	< 1.49	< 0.84	7.87	< 1.56
1	Allyl Chloride	00107-05-1	< 0.19	< 0.47	< 0.12	0.27	< 0.53	< 1.11	< 0.14	< 0.24	< 1.49	< 0.48	< 1.49	< 0.35
	Aniline	62-53-3	< 0.00	< 0.01	0.16	0.12	< 0.01	0.04	< 0.00	0.51	0.36	< 0.12	0.73	< 0.22
	Anthracene	120-12-7	< 0.00	< 0.00	0.00	0.00	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	0.01	< 0.00
	a-Pinene	07785-70-8	< 0.01	< 0.03	< 0.04	0.09	< 0.04	< 0.08	0.04	0.45	< 0.03	< 0.07	0.45	< 0.09
	a,a,a-Trichlorotoluene	98-07-7	< 0.00	< 0.01	< 0.00	0.00	< 0.02	< 0.02	< 0.00	< 0.00	< 0.01	< 0.01	< 0.02	< 0.00
	Benzaldehyde	100-52-7	0.14	1.26	< 0.00	0.01	0.06	0.00	0.01	0.13	0.03	< 0.09	1.26	< 0.25
	Benzene	00071-43-2	0.03	0.07	< 0.04	0.03	0.59	0.30	< 0.01	0.10	< 0.03	< 0.14	0.59	< 0.16
	Benzidine	92-87-5	0.03	< 0.01	< 0.01	0.00	< 0.01	< 0.07	< 0.00	< 0.00	< 0.00	< 0.01	0.07	< 0.01
	Benzoic acid	65-85-0	0.23	< 0.03	< 0.01	0.01	0.85	< 0.06	T	0.01	0.83	< 0.18	0.85	< 0.23
	Benzonitrile	100-47-0	< 0.00	0.03	< 0.00	0.00	< 0.01	< 0.02	< 0.00	< 0.00	< 0.00	< 0.01	0.03	< 0.01
	Benzo(a)anthracene	56-55-3	< 0.00	< 0.00	< 0.00	0.00	< 0.01	< 0.04	< 0.00	< 0.00	< 0.00	< 0.00	0.04	< 0.01
	Benzo(a)pyrene	50-32-8	< 0.01	< 0.00	< 0.00	0.00	< 0.01	< 0.08	< 0.00	< 0.00	< 0.00	< 0.01	< 0.08	< 0.02
	Benzo(b)fluoranthene	205-99-2	< 0.01	< 0.00	< 0.00	0.00	< 0.01	< 0.06	< 0.00	< 0.00	< 0.00	< 0.01	0.06	< 0.01
	Benzo(g,h,i)perylene	191-24-2	< 0.01	0.01	< 0.01	0.00	< 0.01	< 0.13	< 0.00	< 0.00	0.00	< 0.01	0.13	< 0.03
	Benzo(k)fluoranthene	207-08-9	< 0.01	< 0.00	< 0.00	0.00	< 0.01	< 0.06	< 0.00	< 0.00	< 0.00	< 0.01	0.06	< 0.01
	Benzyl alcohol	100-51-6	0.05	0.02	< 0.01	0.02	0.04	0.05	0.01	0.02	< 0.01	< 0.02	0.05	< 0.01
1	Benzyl Chloride	00100-44-7	< 0.19	< 0.47	< 0.12	0.27	< 0.53	< 1.11	< 0.14	< 0.24	< 1.49	< 0.48	< 1.49	< 0.35
	Benzyl Chloride	100-44-7	< 0.00	< 0.01	< 0.00	0.00	< 0.01	< 0.02	< 0.00	< 0.00	< 0.00	< 0.01	< 0.02	< 0.00
	Biphenyl	92-52-4	< 0.00	< 0.00	< 0.00	0.00	< 0.01	< 0.01	< 0.00	0.01	< 0.00	< 0.01	0.05	< 0.01
1	2 bis(1-Methylethyl)Benzene		T	T	T	T	T	T	T	T	T	T	T	T
1	2 bis(1,1-dimethylethyl)perroxide		T	T	T	T	5.78	T	T	T	T	< 0.25	5.78	< 1.18
	bis(2-Chloroethoxy)methane	111-91-1	< 0.00	< 0.01	< 0.00	0.00	< 0.02	< 0.03	< 0.00	< 0.00	< 0.01	< 0.01	< 0.03	< 0.01
	bis(2-Chloroethyl)ether	111-44-4	< 0.01	< 0.01	< 0.00	0.01	< 0.02	< 0.04	< 0.00	< 0.00	< 0.01	< 0.01	< 0.04	< 0.01
	bis(2-Ethylhexyl)phthalate	117-81-7	0.07	0.10	0.00	0.02	0.05	0.23	0.09	0.01	1.09	< 0.14	1.09	< 0.25
	b-Pinene	18172-67-3	0.10	< 0.17	< 0.21	0.10	29.93	< 0.39	0.05	1.75	< 0.13	< 2.07	29.93	< 6.33
1	Bromodichloromethane	00075-27-4	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
1	Bromoform	00075-25-2	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.23	0.74	< 0.16
1	Bromomethane	00074-83-9	< 0.09	< 0.23	< 0.06	0.14	0.23	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	0.74	< 0.17

TABLE 4-4e

MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - ENGINEERED PRODUCTS

	CAS Numbers	Cmpd #15 % Of Tot	Cmpd #16 % Of Tot	Cmpd #17 % Of Tot	Cmpd #18 % Of Tot	Cmpd #19 % Of Tot	Cmpd 20 % Of Tot	Cmpd #21 % Of Tot	Cmpd #22 % Of Tot	Cmpd #23 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
1 2 Butanal	00123-72-8	T	T	T	T	T	T	1.75	T	T	< 0.96	13.57	< 2.98
1 2 Butane		T	T	T	T	T	T	T	T	T	< 0.10	1.22	< 0.34
Butylbenzylphthalate	85-68-7	< 0.01	0.01	< 0.00	0.00	0.01	0.03	T	0.00	0.00	< 0.01	0.03	< 0.01
1 2 C10-C11 Branched Alkane		T	T	1.48	1.02	T	T	T	T	T	< 0.11	1.48	< 0.36
1 2 C10H18 Polycyclic Hydrocarbon		T	T	T	T	T	T	T	T	T	T	T	T
1 2 C10H20 Alkyl Substituted Cyclohexane		T	T	T	T	T	T	T	T	T	< 0.56	7.87	< 1.85
1 2 C11-C12 Branched Alkane		0.46	T	9.61	0.51	T	T	0.39	T	T	< 1.19	16.29	< 3.76
1 2 C11H22 Alkene		T	T	T	T	T	T	T	2.95	T	< 0.13	2.95	< 0.60
1 2 C12H24 Alkene		T	T	T	T	T	T	T	4.42	T	< 0.19	4.42	< 0.90
1 2 C4 Aldehyde		T	T	T	T	T	T	T	T	T	< 0.04	0.66	< 0.18
1 2 C5 Aldehyde		T	T	T	T	T	T	T	T	T	< 0.04	0.66	< 0.18
1 2 C8H10 O2 Acid Ester		T	T	3.70	T	T	T	T	T	T	< 0.16	3.70	< 0.75
1 2 C8H12 Cyclic alkene		T	T	T	T	T	T	T	T	T	T	T	T
1 2 C8H16 Alkene		T	T	T	T	T	T	T	T	T	< 0.47	7.99	< 1.71
1 2 C9H10 Alkyl Substituted Benzene		T	T	T	0.68	T	T	T	T	T	< 0.08	1.24	< 0.28
1 2 C9H12 Alkyl Substituted Benzene		T	T	T	0.68	T	T	T	T	T	< 0.09	1.49	< 0.33
1 2 C9H12 Polycyclic Alkene		T	T	T	T	T	T	T	T	T	< 1.48	34.02	< 6.94
Camphene	79-92-5	< 0.01	< 0.01	< 0.00	0.02	< 0.02	< 0.04	< 0.00	< 0.01	< 0.01	< 0.01	0.07	< 0.01
1 Carbon Disulfide	00075-15-0	0.24	0.13	< 0.06	26.23	< 0.26	1.32	0.03	0.10	0.82	< 8.95	67.47	< 17.53
1 Carbon Tetrachloride	00056-23-5	74.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	0.38	< 3.44	74.09	< 15.06
1 2 Carbonyl sulfide	00463-58-1	0.46	T	T	T	T	T	T	T	T	< 0.12	2.21	< 0.46
1 Chlorobenzene	00108-90-7	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
1 2 Chlorobutadiene+Methylpentane		T	T	T	T	T	T	T	T	T	< 0.03	0.78	< 0.16
1 Chlorodibromomethane	00124-48-1	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
1 Chloroethane	00075-00-3	< 0.09	4.74	0.06	0.14	< 0.26	2.15	< 0.07	< 0.12	< 0.74	< 0.51	4.74	< 1.00
1 Chloroform	00067-66-3	1.03	0.03	< 0.06	0.14	< 0.26	< 0.56	0.01	< 0.12	< 0.74	< 0.27	1.03	< 0.24
1 Chloromethane	00074-87-3	0.16	0.04	0.28	0.14	0.62	1.70	0.28	0.04	< 0.74	< 0.27	1.70	< 0.36
Chrysene	218-01-9	< 0.00	< 0.00	< 0.00	0.00	0.00	< 0.04	< 0.00	< 0.00	< 0.00	< 0.00	0.04	< 0.01
1 cis-1,2-Dichloroethene	00156-59-2	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.25	0.74	< 0.17
1 cis-1,3-Dichloropropene	10061-01-5	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
cis-2-Butene	00590-18-1	< 0.01	< 0.03	< 0.04	0.02	< 0.04	< 0.08	< 0.01	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
cis-2-Hexene	07688-21-3	< 0.01	< 0.03	0.24	0.02	0.35	< 0.08	0.06	0.18	< 0.03	< 0.10	0.50	< 0.12
cis-2-Pentene	00627-20-3	0.18	0.17	0.78	0.18	0.37	0.75	30.69	0.17	0.17	1.78	30.69	6.21
Cumene	00098-82-8	< 0.01	< 0.03	< 0.04	0.09	4.40	< 0.08	0.02	0.06	< 0.03	< 0.46	4.86	< 1.29
Cumene	98-82-8	0.00	< 0.00	0.00	0.02	0.01	0.03	0.00	< 0.00	0.00	< 0.01	0.03	< 0.01
1 2 Cyclobutane		T	T	T	0.76	T	T	1.31	1.47	T	< 0.19	1.47	< 0.43
Cyclohexane	00110-82-7	0.05	0.05	< 0.04	0.03	0.07	< 0.08	0.19	0.48	0.09	< 0.53	6.53	< 1.33
Cyclohexanone	108-94-1	< 0.01	< 0.01	< 0.00	0.03	< 0.02	0.05	< 0.00	0.03	0.09	< 0.04	0.18	< 0.05
Cyclohexylamine	108-91-8	< 0.00	< 0.01	0.05	0.00	< 0.02	1.97	< 0.00	< 0.00	< 0.01	< 0.09	1.97	< 0.40
1 2 Cyclooctadiene		T	T	T	T	T	T	T	T	T	< 0.84	17.52	< 3.57
Cyclopentane + 2,3-Dimethylbutane	00287-92-3/00079-29-8	0.03	0.24	< 0.05	0.03	0.84	0.56	4.27	0.11	0.10	< 0.35	4.27	< 0.86
Cyclopentene	00142-29-0	< 0.01	< 0.03	< 0.04	0.02	< 0.04	< 0.08	< 0.01	< 0.02	< 0.03	< 0.09	0.57	< 0.13
1 2 Decane		0.58	T	T	2.54	0.44	T	0.88	T	T	< 0.40	2.54	< 0.62
Dibenzofuran	132-64-9	0.00	< 0.00	< 0.00	0.00	< 0.01	0.00	0.00	< 0.00	0.00	< 0.00	0.03	< 0.01

TABLE 4-4e

MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - ENGINEERED PRODUCTS

		CAS Numbers	Cmpd #15 % Of Tot	Cmpd #16 % Of Tot	Cmpd #17 % Of Tot	Cmpd #18 % Of Tot	Cmpd #19 % Of Tot	Cmpd 20 % Of Tot	Cmpd #21 % Of Tot	Cmpd #22 % Of Tot	Cmpd #23 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
	Dibenz(a,h)anthracene	53-90-3	< 0.01	< 0.00	< 0.01	0.00	< 0.01	< 0.14	< 0.00	< 0.00	< 0.00	< 0.01	< 0.14	< 0.03
1	Dichlorodifluoromethane	00075-71-8	0.04	< 0.23	< 0.08	0.14	< 0.26	0.25	< 0.07	0.05	< 0.74	< 0.19	0.74	< 0.17
	Diethylphthalate	84-66-2	0.01	0.01	0.00	0.01	0.02	0.04	0.00	0.01	0.01	0.01	0.04	0.01
	Dimethylaminoazobenzene	60-11-7	0.03	< 0.01	< 0.01	0.00	< 0.01	< 0.07	< 0.00	< 0.00	< 0.00	< 0.01	0.07	< 0.01
	Dimethylphthalate	131-11-3	0.00	0.01	< 0.00	0.00	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	0.01	< 0.00
	Di-n-butylphthalate	84-74-2	T	0.01	T	0.08	0.12	0.11	0.20	0.04	0.14	0.05	0.20	0.08
	Di-n-octylphthalate	117-84-0	< 0.00	< 0.00	< 0.00	0.00	< 0.00	< 0.03	< 0.00	< 0.00	< 0.00	< 0.00	0.03	< 0.01
	Diphenylamine	122-39-4	0.00	0.01	0.00	0.02	0.01	0.02	< 0.00	0.02	0.00	< 0.08	0.55	< 0.14
	d-Limonene	05989-27-5	< 0.07	< 0.17	< 0.21	0.07	< 0.19	< 0.39	< 0.05	0.72	< 0.13	< 0.17	0.72	< 0.14
1	Epichlorohydrin	00106-89-8	< 0.19	< 0.47	< 0.12	0.27	< 0.53	< 1.11	< 0.14	< 0.24	< 1.49	< 0.48	< 1.49	< 0.35
	Ethane	00074-84-0	0.18	0.16	0.60	0.19	0.47	0.85	0.09	0.28	< 0.03	< 0.38	1.97	< 0.41
1	2 Ethanol		T	43.77	7.40	T	T	6.95	T	1.47	T	< 4.74	43.77	< 11.09
1	2 Ethenylcyclohexene	25168-07-4	T	T	T	T	T	T	T	T	T	< 0.44	8.76	< 1.79
1	2 Ethyl Acetate		T	14.59	T	T	T	T	T	T	T	< 0.63	14.59	< 2.98
1	2 Ethyl Acrylate		T	T	1.48	T	T	T	T	T	T	< 0.06	1.48	< 0.30
	Ethylacetylene	00107-00-6	< 0.01	0.29	< 0.04	0.02	< 0.04	< 0.08	< 0.01	< 0.02	< 0.03	< 0.04	0.29	< 0.06
	Ethylbenzene	00100-41-4	0.08	< 0.03	< 0.04	0.21	0.13	0.40	< 0.01	0.14	< 0.03	< 0.28	3.64	< 0.72
	Ethylene	00074-85-1	0.05	< 0.03	6.04	0.08	0.13	1.12	< 0.01	0.07	< 0.03	< 0.40	6.04	< 1.22
	Fluoranthene	206-44-0	< 0.00	0.00	0.00	0.00	0.00	< 0.01	0.00	< 0.00	< 0.00	< 0.00	0.02	< 0.00
	Fluorene	86-73-7	< 0.00	< 0.00	< 0.00	0.00	< 0.01	0.00	< 0.00	0.00	0.00	< 0.00	0.01	< 0.00
1	2 Heptane		T	T	T	T	0.44	T	T	5.89	T	< 1.08	7.45	< 1.90
1	2 Heptanone		0.58	T	T	T	T	T	0.22	T	T	< 0.23	4.40	< 0.90
	Hexachlorobenzene	118-74-1	< 0.01	< 0.01	< 0.00	0.01	< 0.03	< 0.04	< 0.00	< 0.01	< 0.01	< 0.01	0.04	< 0.01
1	Hexachlorobutadiene	00087-68-3	< 0.19	< 0.47	< 0.12	0.27	< 0.53	< 1.11	< 0.14	< 0.24	< 1.49	< 0.48	< 1.49	< 0.35
	Hexachlorobutadiene	87-68-3	< 0.01	< 0.02	< 0.01	0.01	< 0.03	< 0.04	< 0.00	< 0.01	< 0.01	< 0.01	< 0.04	< 0.01
	Hexachlorocyclopentadiene	77-47-4	< 0.01	< 0.02	< 0.01	0.01	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01
1	2 Hexachloroethane		1.04	T	T	T	T	T	T	T	T	< 0.05	1.04	< 0.21
	Hexachloroethane	67-72-1	1.95	< 0.02	< 0.01	0.01	< 0.03	< 0.05	< 0.01	< 0.01	0.01	< 0.10	1.95	< 0.39
	Hydroquinone	123-31-9	< 0.01	< 0.02	< 0.00	0.01	< 0.03	< 0.05	< 0.00	< 0.01	< 0.01	< 1.62	35.65	< 7.26
	Indeno(1,2,3-cd)pyrene	193-39-5	< 0.01	< 0.00	< 0.01	0.00	< 0.01	< 0.11	< 0.00	< 0.00	< 0.00	< 0.01	< 0.11	< 0.02
1	2 Isobutanal	00078-84-2	T	T	T	T	T	T	T	T	T	< 0.05	1.25	< 0.25
	Isobutane	00075-28-5	0.03	< 0.04	< 0.04	0.02	< 0.04	< 0.08	< 0.01	0.12	0.14	< 0.14	0.70	< 0.16
	Isobutylene + 1-Butene	00115-11-7/00106-98-9	0.28	0.25	< 0.04	0.37	0.18	1.40	1.23	1.29	< 0.03	< 0.42	1.40	< 0.41
	Isooctane	00540-84-1	0.08	< 0.03	< 0.04	0.06	0.19	0.35	0.15	0.86	< 0.03	< 0.26	1.16	< 0.27
	Isooctanol	26952-21-6	< 0.06	< 0.12	< 0.04	0.05	< 0.22	< 0.53	0.82	0.25	< 0.08	< 1.22	23.15	< 4.66
	Isopentane	00078-78-4	0.63	< 0.04	1.66	1.77	0.85	2.67	8.13	< 0.02	1.29	< 2.47	8.69	< 2.33
	Isophorone	78-59-1	< 0.00	< 0.01	< 0.00	0.00	< 0.01	< 0.02	0.00	0.36	< 0.00	< 0.07	1.00	< 0.21
	Isoprene	00078-79-5	< 0.01	0.05	< 0.04	0.02	< 0.04	< 0.08	< 0.01	< 0.02	< 0.03	< 0.04	0.15	< 0.03
1	2 Isopropyl Alcohol		T	T	0.74	25.39	T	2.43	0.22	T	T	< 1.49	25.39	< 5.13
1	2 Methyl Acrylate		T	T	11.09	T	T	T	T	T	T	< 0.48	11.09	< 2.26
1	2 Methyl Isothiocyanate	00556-61-6	T	T	T	T	T	T	T	T	T	< 0.04	0.88	< 0.18
	Methylacetylene	00074-99-7	< 0.01	< 0.03	< 0.04	0.02	< 0.04	< 0.08	< 0.01	< 0.02	< 0.03	< 0.03	< 0.08	< 0.01
	Methylcyclohexane	00108-87-2	0.14	0.14	< 0.04	0.26	0.92	0.65	0.10	3.35	0.27	< 0.84	3.91	< 0.96
	Methylcyclopentane	00096-37-7	0.20	0.13	0.14	0.08	0.19	0.47	0.04	0.27	0.25	0.94	5.48	1.56

TABLE 4-4e

MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - ENGINEERED PRODUCTS

		CAS Numbers	Cmpd #15 % Of Tot	Cmpd #16 % Of Tot	Cmpd #17 % Of Tot	Cmpd #18 % Of Tot	Cmpd #19 % Of Tot	Cmpd 20 % Of Tot	Cmpd #21 % Of Tot	Cmpd #22 % Of Tot	Cmpd #23 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
	Methylene bis-chloroaniline	101-14-4	< 0.02	< 0.01	< 0.02	0.00	< 0.03	< 0.24	< 0.00	< 0.01	< 0.01	< 0.03	< 0.24	< 0.05
1	Methylene Chloride	00075-09-2	1.11	1.39	5.18	0.64	1.56	5.21	0.20	1.09	1.77	3.09	35.39	7.01
1 2	Methylhexane		T	T	T	T	T	T	T	5.89	T	< 0.74	7.45	< 1.88
1 2	Methylpentane		0.89	T	T	T	T	T	T	0.88	T	< 0.81	3.89	< 1.07
	m-Ethyltoluene	00620-14-4	< 0.01	0.17	< 0.04	0.09	< 0.04	0.23	0.04	< 0.02	< 0.03	< 0.05	0.23	< 0.05
	m-Xylene + p-Xylene	00108-38-3/00106-42-3	0.49	0.30	0.15	0.65	0.42	1.71	0.10	0.46	0.18	1.03	12.13	2.39
	Naphthalene	91-20-3	0.04	0.03	0.01	0.02	0.05	0.09	0.01	0.06	0.05	< 0.06	0.34	< 0.08
	n-Butane	00106-97-8	0.11	0.20	1.30	0.07	0.20	0.83	0.06	0.41	0.73	0.47	1.93	0.48
	n-Decane	00124-18-5	0.11	< 0.17	0.24	0.85	< 0.20	0.62	0.39	1.40	0.21	< 0.43	1.40	< 0.30
	n-Heptane	00142-82-5	0.10	0.10	< 0.04	0.15	0.57	0.50	0.10	2.98	0.15	< 0.69	3.69	< 0.91
	n-Hexane	00110-54-3	1.25	5.06	35.33	0.30	0.99	2.47	0.18	0.84	1.00	4.01	35.33	7.25
	Nitrobenzene	98-95-3	< 0.00	< 0.01	< 0.00	0.00	< 0.02	< 0.03	< 0.00	< 0.00	< 0.01	< 0.01	0.05	< 0.01
	N-Nitrosodiethylamine	55-18-5	< 0.01	< 0.02	< 0.01	0.01	< 0.04	< 0.08	< 0.01	< 0.01	< 0.01	< 0.02	< 0.08	< 0.02
	n-Nitrosodimethylamine	62-75-9	T	< 0.02	T	0.01	< 0.03	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	0.10	< 0.02
	N-Nitroso-di-n-propylamine	621-64-7	< 0.01	< 0.02	< 0.01	0.01	< 0.03	< 0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.06	< 0.01
	N-Nitrosodiphenylamine	86-30-6	0.00	T	T	T	T	T	T	T	T	0.00	0.00	0.00
	n-Nitrosomorpholine	59-89-2	< 0.01	< 0.02	< 0.00	0.01	< 0.03	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01
	n-Nonane	00111-84-2	< 0.01	< 0.03	< 0.04	0.36	0.37	< 0.08	0.21	0.06	< 0.03	< 0.19	0.51	< 0.14
	n-Octane	00111-65-9	0.06	< 0.03	< 0.04	0.02	< 0.04	< 0.08	< 0.01	0.11	< 0.03	< 0.08	0.22	< 0.06
1 2	Nonane		T	T	T	T	T	T	0.44	T	T	< 0.02	0.44	< 0.09
	n-Pentane	00109-66-0	0.07	< 0.04	0.19	0.12	0.12	< 0.08	0.03	0.30	0.56	< 0.29	1.25	< 0.30
1 2	n-Propane		T	T	T	T	T	T	T	T	T	< 0.06	1.43	< 0.29
	n-Propylbenzene	00103-65-1	< 0.01	0.14	< 0.04	0.02	< 0.04	< 0.08	< 0.01	< 0.02	< 0.03	< 0.04	0.15	< 0.04
1 2	n-Undecane	00112-21-4	T	T	T	T	T	T	T	T	T	< 0.15	1.43	< 0.39
	N,N-Diethylaniline	91-66-7	< 0.00	< 0.01	< 0.00	0.00	< 0.01	< 0.02	< 0.00	< 0.00	< 0.00	< 0.01	0.05	< 0.01
	N,N-Dimethylaniline	121-69-7	< 0.00	< 0.01	< 0.00	0.00	< 0.01	< 0.02	< 0.00	< 0.00	< 0.00	< 0.01	< 0.02	< 0.00
	o-Anisidine	90-04-0	< 0.01	< 0.01	< 0.00	0.01	< 0.03	< 0.04	< 0.00	< 0.01	< 0.01	< 0.01	< 0.04	< 0.01
	o-Ethyltoluene	00611-14-3	< 0.06	< 0.16	< 0.21	0.09	< 0.18	< 0.39	< 0.05	0.16	< 0.13	< 0.17	0.52	< 0.12
	o-Toluidine	95-53-4	< 0.00	< 0.01	< 0.00	0.00	< 0.01	< 0.02	< 0.00	< 0.00	< 0.01	< 0.02	0.18	< 0.04
	o-Xylene	00095-47-6	0.13	0.15	0.16	0.27	0.20	0.63	0.11	0.39	< 0.03	< 0.55	6.51	< 1.28
	p-Cymene	00099-87-6	< 0.06	< 0.16	0.29	0.17	< 0.18	< 0.39	0.10	1.23	< 0.13	< 0.23	1.23	< 0.23
	Pentachloronitrobenzene	82-68-8	< 0.02	< 0.04	< 0.01	0.02	< 0.08	< 0.10	< 0.01	< 0.02	< 0.03	< 0.03	< 0.10	< 0.02
	Pentachlorophenol	87-86-5	< 0.02	< 0.02	< 0.01	0.01	0.05	< 0.08	< 0.00	< 0.01	< 0.01	< 0.02	0.08	< 0.02
1 2	Pentane		T	T	T	T	T	T	T	T	T	< 0.11	1.43	< 0.37
1 2	Pentene		T	T	T	T	T	T	T	T	T	< 0.04	0.68	< 0.18
	p-Ethyltoluene	00622-96-8	< 0.01	< 0.03	< 0.04	0.02	< 0.04	< 0.08	0.07	0.20	< 0.03	< 0.08	0.57	< 0.13
	Phenanthrene	85-01-8	< 0.00	0.01	0.00	0.01	0.01	0.02	0.00	0.01	0.00	< 0.01	0.02	< 0.01
	Phenol	108-95-2	0.04	0.13	0.40	0.04	< 0.02	0.09	0.01	0.74	0.02	< 0.14	1.03	< 0.25
	Phthalimide	85-41-6	< 0.02	< 0.03	< 0.01	0.01	0.03	0.26	< 0.01	0.07	1.33	< 0.12	1.33	< 0.29
1 2	Propanal		T	T	T	T	T	T	T	T	T	< 0.09	2.04	< 0.42
	Propane	00074-98-6	0.07	0.12	0.38	0.08	0.24	1.15	0.08	0.23	< 0.03	< 0.55	3.80	< 0.81
1 2	Propylcyclohexane		T	T	T	0.59	T	T	T	T	T	< 0.03	0.59	< 0.12
	Propylene	00115-07-1	< 0.01	< 0.03	< 0.04	0.03	< 0.04	< 0.08	< 0.01	< 0.02	< 0.03	< 0.08	0.55	< 0.12
1	Propylene Oxide	00075-56-9	< 0.19	< 0.47	< 0.12	0.27	< 0.53	< 1.11	< 0.14	< 0.24	< 1.49	< 0.66	4.73	< 0.93

TABLE 4-4e
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - ENGINEERED PRODUCTS

		CAS Numbers	Cmpd #15 % Of Tot	Cmpd #16 % Of Tot	Cmpd #17 % Of Tot	Cmpd #18 % Of Tot	Cmpd #19 % Of Tot	Cmpd 20 % Of Tot	Cmpd #21 % Of Tot	Cmpd #22 % Of Tot	Cmpd #23 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
	Pyrene	129-00-0	0.01	0.01	0.00	0.00	0.01	0.11	0.00	0.01	0.02	0.02	0.11	0.02
	Pyridine	110-86-1	< 0.01	< 0.01	< 0.01	0.01	< 0.02	< 0.06	< 0.00	< 0.01	< 0.01	< 0.01	< 0.06	< 0.01
	Styrene	00100-42-5	< 0.01	< 0.03	< 0.04	0.04	< 0.04	< 0.08	0.05	1.60	< 0.03	< 0.27	3.40	< 0.74
1	t-Butyl Methyl Ether	01634-04-4	< 0.19	< 0.47	< 0.12	0.27	< 0.53	< 1.11	5.70	< 0.24	< 1.49	< 0.70	5.70	< 1.12
1 2	tert-Butyl Alcohol	00075-65-0	T	T	T	T	T	T	13.15	T	T	< 0.73	13.15	< 2.71
1	Tetrachloroethene	00127-18-4	1.10	< 0.23	< 0.06	0.06	0.12	0.39	< 0.07	2.06	< 0.74	< 0.58	6.20	< 1.28
1 2	Tetrahydrofuran		T	T	T	T	0.61	T	T	T	T	< 0.17	1.43	< 0.38
	Toluene	00108-88-3	0.50	0.49	0.32	0.51	1.81	2.42	0.10	2.66	37.21	2.98	37.21	7.36
1	trans-1,2-Dichloroethene	00156-60-5	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
1	trans-1,2-Dichloropropene	10061-02-6	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
	trans-2-Butene	00624-64-6	0.61	< 0.03	< 0.04	0.02	< 0.04	0.95	< 0.01	< 0.02	1.20	< 0.17	1.20	< 0.33
	trans-2-Hexene	04050-45-7	< 0.01	< 0.03	< 0.04	0.02	< 0.04	< 0.08	< 0.01	< 0.02	< 0.03	< 0.04	0.11	< 0.03
	trans-2-Pentene	00646-04-8	< 0.01	< 0.03	< 0.04	0.04	< 0.04	< 0.08	< 0.01	< 0.02	< 0.03	< 0.04	0.19	< 0.04
1	Trichloroethene	00079-01-6	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	0.74	< 0.17
1	Trichlorofluoromethane	00075-69-4	0.27	0.90	< 0.06	0.26	0.69	2.54	0.05	0.72	< 0.74	< 0.50	2.54	< 0.52
1 2	Trichloroheptafluorobutane		0.69	T	T	T	T	T	T	T	T	< 0.03	0.69	< 0.14
1	*Trichlortrifluoroethane*	00076-13-1	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	< 0.74	< 0.17
	Trifluralin	1582-09-8	< 0.01	< 0.02	< 0.01	0.01	< 0.04	< 0.07	< 0.01	< 0.01	< 0.02	< 0.02	< 0.07	< 0.01
1 2	Undecane		T	T	T	0.85	T	T	0.31	T	T	< 0.09	0.88	< 0.25
1 2	Unknown		T	T	T	T	T	T	T	T	T	< 0.20	2.87	< 0.68
1	Vinyl Acetate	00108-05-4	< 0.09	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.37	3.19	< 0.63
1	Vinyl Chloride	00075-01-4	0.02	< 0.23	< 0.06	0.14	< 0.26	< 0.56	< 0.07	< 0.12	< 0.74	< 0.24	0.74	< 0.18
	Total Detected (lb/lb rubber)		5.95E-05	3.04E-05	2.99E-04	1.24E-04	1.98E-05	1.22E-05	1.34E-04	8.65E-05	3.25E-05			
	Total with non-detects (lb/lb rubber)		< 6.32E-05	< 3.59E-05	< 3.20E-04	< 1.35E-04	< 2.40E-05	< 1.97E-05	< 1.40E-04	< 9.27E-05	< 6.19E-05			

NOTES:

1 TO14 Compound

2 *Tentatively Identified* Compound(TIC)

T TIC Not Identified In Summarized Category

* % of Total Values Represent % of Total With Non-Detects

TABLE 4-4f
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - POLYMERS

			CAS Numbers	Cmpd #24 % Of Tot	Cmpd #25 % Of Tot	Cmpd #26 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
1	2	1-Butanol	00071-36-3	T	T	T	T	T	T
1	2	1-Chloro-4-(1-chloroethenyl) cyclohexene		T	T	T	T	T	T
1	2	1-Chloro-5-(1-chloroethenyl) cyclohexene		T	T	T	T	T	T
1	2	1-Chloropropane		T	T	T	T	T	T
		1-Dodecene	112-41-4	< 0.02	< 0.03	< 0.02	< 0.02	< 0.03	< 0.00
		1-Heptene	00592-76-7	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
		1-Hexene	00592-41-6	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
1	2	1-Methoxybutane		T	T	T	T	T	T
		1-Octene	00111-60-0	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
		1-Pentene	00109-67-1	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
1	2	1-Propanol		T	T	T	T	T	T
1		1,1-Dichloroethane	00075-34-3	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1		1,1-Dichloroethene	00075-35-4	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1		1,1,1-Trichloroethane	00071-55-6	1.81	0.13	0.40	0.78	1.81	0.74
1		1,1,2-Trichloroethane	00079-00-5	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1		1,1,2,2-Tetrachloroethane	00079-34-5	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1		1,2-Dibromo-3-Chloropropane	00096-12-8	< 0.43	< 0.40	< 0.45	< 0.43	< 0.45	< 0.02
		1,2-Dibromo-3-chloropropane	96-12-8	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
1		1,2-Dibromoethane	00106-93-4	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1		1,2-Dichlorobenzene	00095-50-1	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
		1,2-Dichlorobenzene	95-50-1	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
1		1,2-Dichloroethane	00107-06-2	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1		1,2-Dichloropropane	00078-87-5	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
		1,2,4-Trichlorobenzene	120-82-1	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
		1,2,4-Trimethylbenzene	00095-63-6	< 0.15	< 0.14	< 0.16	< 0.15	< 0.16	< 0.01
		1,2,4-Trimethylbenzene	95-63-6	0.10	0.26	0.04	0.14	0.26	0.09
		1,3-Butadiene	00106-99-0	0.18	0.56	< 0.03	< 0.26	0.56	< 0.22
		1,3-Cyclooctadiene	1700-10-3	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
1		1,3-Dichlorobenzene	00541-73-1	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
		1,3-Dichlorobenzene	541-73-1	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		1,3,5-Trimethylbenzene	00108-67-8	< 0.15	< 0.14	< 0.16	< 0.15	< 0.16	< 0.01
1		1,4-Dichlorobenzene	00106-46-7	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
		1,4-Dichlorobenzene	106-46-7	0.01	0.01	< 0.00	< 0.01	0.01	< 0.00
		1,4-Diethylbenzene + n-Butylbenzene	00105-05-5/00104-51-8	< 0.15	0.87	< 0.16	< 0.39	0.87	< 0.34
1		1,4-Dioxane	00123-91-1	< 0.86	< 0.79	< 0.91	< 0.85	< 0.91	< 0.05
		1,4-Phenylenediamine	106-50-3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
		1,5-Cyclooctadiene	111-78-4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
1	2	2-Butanol		T	T	T	T	T	T
1		2-Butanone	00078-93-3	0.43	0.79	0.14	0.45	0.79	0.27
1	2	2-Butene	00126-99-8	T	T	T	T	T	T
		2-Chloroacetophenone	1341-24-8	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		2-Chloronaphthalene	91-58-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		2-Chlorophenol	95-57-8	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		2-Furaldehyde	98-01-1	0.01	0.02	0.00	0.01	0.02	0.01
1		2-Hexanone	00591-78-6	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
		2-Methyl-1-butene	00563-46-2	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
		2-Methyl-2-butene	00513-35-9	0.88	1.15	1.18	1.07	1.18	0.13
		2-Methyl-2-pentene	00625-27-4	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
		2-Methylheptane	00592-27-8	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00

TABLE 4-4f
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - POLYMERS

		CAS Numbers	Cmpd #24 % Of Tot	Cmpd #25 % Of Tot	Cmpd #26 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
	2-Methylhexane	00591-76-4	0.18	0.18	< 0.03	< 0.13	0.18	< 0.07
	2-Methylnaphthalene	91-57-6	0.07	0.16	0.01	0.08	0.16	0.06
	2-Methylpentane	00107-83-5	0.50	0.43	0.47	0.47	0.50	0.03
	2-Methylphenol	95-48-7	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
	2-Nitroaniline	88-74-4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	2-Nitrophenol	88-75-5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	2,2-Dimethylbutane	00075-83-2	< 0.03	0.24	0.13	< 0.13	0.24	< 0.08
	2,2-Dimethylpropane	00463-82-1	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
	2,2'-oxybis(1-Chloropropane)	108-60-1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	2,3-Dimethylpentane	00565-59-3	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
	2,3,4-Trimethylpentane	00565-75-3	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
	2,4-Dichlorophenol	120-83-2	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
	2,4-Dimethylhexane	00589-43-5	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
	2,4-Dimethylphenol	105-67-9	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
	2,4-Dinitrophenol	105-67-9	< 0.02	< 0.03	< 0.02	< 0.02	< 0.03	< 0.00
	2,4-Dinitrotoluene	121-14-2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	2,4,5-Trichlorophenol	95-95-4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	2,4,6-Trichlorophenol	88-06-2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	2,6-Dinitrotoluene	606-20-2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	3-Furaldehyde	498-60-2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
1 2	3-Methyl-2-Butanone		T	T	T	T	T	T
	3-Methylhexane	00589-34-4	0.15	0.14	0.14	0.14	0.15	0.00
	3-Methylpentane	00096-14-0	0.45	0.59	0.59	0.55	0.59	0.07
	3-Methylstyrene	100-80-1	0.12	0.31	0.01	0.14	0.31	0.12
	3-Nitroaniline	99-09-2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	3,3'-Dichlorobenzidine	91-94-1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	3,3'-Dimethoxybenzidine	119-90-4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	3,3'-Dimethylbenzidine	119-93-7	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
	3/4-Methylphenol	108-39-4/106-44-5	< 0.00	< 0.01	0.01	< 0.00	0.01	< 0.00
	4-Aminobiphenyl	92-67-1	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	4-Bromophenyl-phenylether	101-55-3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	4-Chloro-3-methylphenol	59-50-7	< 0.00	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00
	4-Chloroaniline	106-47-8	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	4-Chlorophenyl-phenylether	70005-72-3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	4-Chlorostyrene	1073-67-2	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
	4-Methyl-1-pentene	00691-37-2	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
1	4-Methyl-2-Pentanone	00108-10-1	0.16	0.24	0.14	0.18	0.24	0.04
	4-Methylstyrene	622-97-9	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	4-Nitroaniline	100-01-6	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	4-Nitrobiphenyl	92-93-3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	4-Nitrophenol	100-02-7	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.00
1 2	4,4-Dimethyl-2-Pentanone		T	T	T	T	T	T
	4,4'-Methylenedianiline	101-77-9	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	4,6-Dinitro-2-methylphenol	534-52-1	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.00
	Acenaphthene	83-32-9	0.00	< 0.00	< 0.00	< 0.00	0.00	< 0.00
	Acenaphthylene	208-96-8	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
1 2	Acetaldehyde	00075-07-0	T	T	T	T	T	T
1 2	Acetaldehyde+Isobutane		T	T	T	T	T	T
1	Acetone	00067-64-1	< 0.43	2.42	< 0.45	< 1.10	2.42	< 0.93
1	Acetonitrile	01722-09-4	< 0.43	< 0.40	< 0.45	< 0.43	< 0.45	< 0.02

TABLE 4-4f
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - POLYMERS

			CAS Numbers	Cmpd #24 % Of Tot	Cmpd #25 % Of Tot	Cmpd #26 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
1	2	Acetophenone	00098-86-2	T	T	T	T	T	T
		Acetophenone	98-86-2	0.09	0.23	0.04	0.12	0.23	0.08
		Acetylene	00074-86-2	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
1		Acrolein	00107-02-8	0.84	2.96	3.41	2.40	3.41	1.12
1		Acrylonitrile	00107-13-1	< 0.43	< 0.40	< 0.45	< 0.43	< 0.45	< 0.02
1		Allyl Chloride	00107-05-1	< 0.43	< 0.40	< 0.45	< 0.43	< 0.45	< 0.02
		Aniline	62-53-3	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		Anthracene	120-12-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		a-Pinene	07785-70-8	0.13	1.33	< 0.03	< 0.50	1.33	< 0.59
		a,a,a-Trichlorotoluene	98-07-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		Benzaldehyde	100-52-7	0.35	1.05	0.12	0.51	1.05	0.40
		Benzene	00071-43-2	0.08	0.19	< 0.03	< 0.10	0.19	< 0.07
		Benzidine	92-87-5	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
		Benzoic acid	65-85-0	< 0.01	< 0.01	0.03	< 0.02	0.03	< 0.01
		Benzonitrile	100-47-0	< 0.00	0.06	< 0.00	< 0.02	0.06	< 0.03
		Benzo(a)anthracene	56-55-3	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		Benzo(a)pyrene	50-32-8	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		Benzo(b)fluoranthene	205-99-2	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		Benzo(g,h,i)perylene	191-24-2	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		Benzo(k)fluoranthene	207-08-9	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		Benzyl alcohol	100-51-6	0.04	0.08	0.03	0.05	0.08	0.02
1		Benzyl Chloride	00100-44-7	< 0.43	< 0.40	< 0.45	< 0.43	< 0.45	< 0.02
		Benzyl Chloride	100-44-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		Biphenyl	92-52-4	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
1	2	bis(1-Methylethyl)Benzene		2.43	4.94	T	< 2.46	4.94	< 2.02
1	2	bis(1,1-dimethylethyl)perroxide		T	T	T	T	T	T
		bis(2-Chloroethoxy)methane	111-91-1	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		bis(2-Chloroethyl)ether	111-44-4	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
		bis(2-Ethylhexyl)phthalate	117-81-7	0.11	0.16	0.08	0.12	0.16	0.03
		b-Pinene	18172-67-3	< 0.15	< 0.14	< 0.16	< 0.15	< 0.16	< 0.01
1		Bromodichloromethane	00075-27-4	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1		Bromoform	00075-25-2	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1		Bromomethane	00074-83-9	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1	2	Butanal	00123-72-8	T	T	T	T	T	T
1	2	Butane		1.62	T	0.57	< 0.73	1.62	< 0.67
		Butylbenzylphthalate	85-68-7	0.06	0.02	0.01	0.03	0.06	0.02
1	2	C10-C11 Branched Alkane		T	T	1.42	< 0.47	1.42	< 0.67
1	2	C10H18 Polycyclic Hydrocarbon		43.24	121.07	T	< 54.77	121.07	< 50.09
1	2	C10H20 Alkyl Substituted Cyclohexane		T	T	T	T	T	T
1	2	C11-C12 Branched Alkane		2.16	9.88	T	< 4.02	9.88	< 4.24
1	2	C11H22 Alkene		T	T	T	T	T	T
1	2	C12H24 Alkene		T	4.94	T	< 1.65	4.94	< 2.33
1	2	C4 Aldehyde		T	T	T	T	T	T
1	2	C5 Aldehyde		T	T	T	T	T	T
1	2	C6H10 O2 Acid Ester		T	T	T	T	T	T
1	2	C8H12 Cyclic alkene		2.43	7.41	T	< 3.28	7.41	< 3.09
1	2	C8H16 Alkene		T	T	T	T	T	T
1	2	C9H10 Alkyl Substituted Benzene		T	T	T	T	T	T
1	2	C9H12 Alkyl Substituted Benzene		T	T	T	T	T	T
1	2	C9H12 Polycyclic Alkene		T	T	T	T	T	T

TABLE 4-4f
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - POLYMERS

			CAS Numbers	Cmpd #24 % Of Tot	Cmpd #25 % Of Tot	Cmpd #26 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
		Camphene	79-92-5	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
1		Carbon Disulfide	00075-15-0	0.62	0.82	0.22	0.55	0.82	0.25
1		Carbon Tetrachloride	00056-23-5	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1	2	Carbonyl sulfide	00463-58-1	T	T	T	T	T	T
1		Chlorobenzene	00108-90-7	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1	2	Chlorobutadiene+Methylpentane		T	T	T	T	T	T
1		Chlorodibromomethane	00124-48-1	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1		Chloroethane	00075-00-3	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1		Chloroform	00067-66-3	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1		Chloromethane	00074-87-3	0.14	0.18	0.07	0.13	0.18	0.04
		Chrysene	218-01-9	0.00	< 0.00	< 0.00	< 0.00	0.00	< 0.00
1		cis-1,2-Dichloroethene	00156-59-2	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1		cis-1,3-Dichloropropene	10061-01-5	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
		cis-2-Butene	00590-18-1	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
		cis-2-Hexene	07688-21-3	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
		cis-2-Pentene	00627-20-3	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
		Cumene	00098-82-8	0.26	0.70	< 0.03	< 0.33	0.70	< 0.28
		Cumene	98-82-8	< 0.00	< 0.00	0.01	< 0.00	0.01	< 0.00
1	2	Cyclobutane		T	T	T	T	T	T
		Cyclohexane	00110-82-7	0.24	0.30	3.31	1.28	3.31	1.44
		Cyclohexanone	108-94-1	< 0.01	< 0.01	0.01	< 0.01	0.01	< 0.00
		Cyclohexylamine	108-91-8	< 0.00	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00
1	2	Cyclooctadiene		T	T	T	T	T	T
		Cyclopentane + 2,3-Dimethylbutane	00287-92-3/00079-29-8	0.14	0.11	0.13	0.13	0.14	0.01
		Cyclopentene	00142-29-0	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
1	2	Decane		T	T	0.85	< 0.28	0.85	< 0.40
		Dibenzofuran	132-64-9	0.00	0.00	< 0.00	< 0.00	0.00	< 0.00
		Dibenz(a,h)anthracene	53-90-3	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
1		Dichlorodifluoromethane	00075-71-8	< 0.22	0.09	T	< 0.10	0.22	< 0.09
		Diethylphthalate	84-66-2	0.32	0.05	0.05	0.14	0.32	0.13
		Dimethylaminoazobenzene	60-11-7	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
		Dimethylphthalate	131-11-3	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		Di-n-butylphthalate	84-74-2	1.01	0.11	0.05	0.39	1.01	0.44
		Di-n-octylphthalate	117-84-0	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		Diphenylamine	122-39-4	0.28	1.15	0.04	0.49	1.15	0.48
		d-Limonene	05989-27-5	< 0.15	0.28	< 0.16	< 0.20	0.28	< 0.06
1		Epichlorohydrin	00106-89-8	< 0.43	< 0.40	< 0.45	< 0.43	< 0.45	< 0.02
		Ethane	00074-84-0	0.46	0.65	1.26	0.79	1.26	0.34
1	2	Ethanol		T	T	T	T	T	T
1	2	Ethenylcyclohexene	25168-07-4	T	T	T	T	T	T
1	2	Ethyl Acetate		T	T	T	T	T	T
1	2	Ethyl Acrylate		T	T	T	T	T	T
		Ethylacetylene	00107-00-6	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
		Ethylbenzene	00100-41-4	0.11	0.22	< 0.03	< 0.12	0.22	< 0.08
		Ethylene	00074-85-1	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
		Fluoranthene	206-44-0	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
		Fluorene	86-73-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
1	2	Heptane		T	T	T	T	T	T
1	2	Heptanone		T	T	0.57	< 0.19	0.57	< 0.27
		Hexachlorobenzene	118-74-1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00

TABLE 4-4f
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - POLYMERS

		CAS Numbers	Cmpd #24 % Of Tot	Cmpd #25 % Of Tot	Cmpd #26 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
1	Hexachlorobutadiene	00087-68-3	< 0.43	< 0.40	< 0.45	< 0.43	< 0.45	< 0.02
	Hexachlorobutadiene	87-68-3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	Hexachlorocyclopentadiene	77-47-4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
1 2	Hexachloroethane		T	T	T	T	T	T
	Hexachloroethane	67-72-1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	Hydroquinone	123-31-9	< 0.00	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00
	Indeno(1,2,3-cd)pyrene	193-39-5	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
1 2	Isobutanal	00078-84-2	T	T	T	T	T	T
	Isobutane	00075-28-5	0.15	0.19	0.38	0.24	0.38	0.10
	Isobutylene + 1-Butene	00115-11-7/00106-98-9	< 0.03	0.22	0.10	< 0.12	0.22	< 0.08
	Isooctane	00540-84-1	0.22	0.23	0.16	0.21	0.23	0.03
	Isooctanol	26952-21-6	< 0.05	< 0.07	< 0.05	< 0.06	< 0.07	< 0.01
	Isopentane	00078-78-4	1.04	1.48	1.62	1.38	1.62	0.25
	Isophorone	78-59-1	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	Isoprene	00078-79-5	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
1 2	Isopropyl Alcohol		T	T	T	T	T	T
1 2	Methyl Acrylate		T	T	T	T	T	T
1 2	Methyl Isothiocyanate	00556-61-6	T	T	T	T	T	T
	Methylacetylene	00074-99-7	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
	Methylcyclohexane	00108-87-2	0.25	0.26	0.22	0.24	0.26	0.02
	Methylcyclopentane	00096-37-7	0.35	0.27	1.11	0.58	1.11	0.38
	Methylene bis-chloroaniline	101-14-4	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.00
1	Methylene Chloride	00075-09-2	3.24	5.44	12.69	7.12	12.69	4.04
1 2	Methylhexane		T	T	T	T	T	T
1 2	Methylpentane		1.89	T	3.41	< 1.77	3.41	< 1.39
	m-Ethyltoluene	00620-14-4	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
	m-Xylene • p-Xylene	00108-38-3/00106-42-3	0.28	0.48	< 0.03	< 0.26	0.48	< 0.18
	Naphthalene	91-20-3	0.05	0.17	0.02	0.08	0.17	0.07
	n-Butane	00106-97-8	0.82	0.76	1.00	0.86	1.00	0.10
	n-Decane	00124-18-5	< 0.16	< 0.15	< 0.17	< 0.16	< 0.17	< 0.01
	n-Heptane	00142-82-5	0.21	0.22	0.17	0.20	0.22	0.02
	n-Hexane	00110-54-3	0.88	0.64	1.09	0.87	1.09	0.18
	Nitrobenzene	98-95-3	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
	N-Nitrosodiethylamine	55-18-5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	n-Nitrosodimethylamine	62-75-9	< 0.01	< 0.02	< 0.01	< 0.01	< 0.02	< 0.00
	N-Nitroso-di-n-propylamine	621-64-7	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	N-Nitrosodiphenylamine	86-30-6	T	T	T	T	T	T
	n-Nitrosomorpholine	59-89-2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	n-Nonane	00111-84-2	< 0.03	0.15	< 0.03	< 0.07	0.15	< 0.05
	n-Octane	00111-65-9	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
1 2	Nonane		T	T	T	T	T	T
	n-Pentane	00109-66-0	0.21	0.22	0.37	0.27	0.37	0.07
1 2	n-Propane		T	T	T	T	T	T
	n-Propylbenzene	00103-65-1	0.20	1.15	0.15	0.50	1.15	0.46
1 2	n-Undecane	00112-21-4	T	T	T	T	T	T
	N,N-Diethylaniline	91-66-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	N,N-Dimethylaniline	121-69-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	o-Anisidine	90-04-0	< 0.00	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00
	o-Ethyltoluene	00611-14-3	< 0.15	< 0.14	< 0.16	< 0.15	< 0.16	< 0.01
	o-Toluidine	95-53-4	0.80	0.66	< 0.00	< 0.49	0.80	< 0.35

TABLE 4-4f
MIXER 2 ORGANIC COMPOUND SPECIATION FACTORS - POLYMERS

		CAS Numbers	Cmpd #24 % Of Tot	Cmpd #25 % Of Tot	Cmpd #26 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
	o-Xylene	00095-47-6	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
	p-Cymene	00099-87-6	0.23	1.06	< 0.16	< 0.48	1.06	< 0.41
	Pentachloronitrobenzene	82-68-8	< 0.02	< 0.03	< 0.02	< 0.02	< 0.03	< 0.00
	Pentachlorophenol	87-86-5	< 0.01	< 0.02	< 0.01	< 0.01	< 0.02	< 0.00
1 2	Pentane		T	T	1.42	< 0.47	1.42	< 0.67
1 2	Pentene		T	T	T	T	T	T
	p-Ethyltoluene	00622-96-8	0.93	4.67	< 0.03	< 1.88	4.67	< 2.01
	Phenanthrene	85-01-8	0.01	0.02	0.01	0.01	0.02	0.00
	Phenol	108-95-2	0.03	< 0.00	0.06	< 0.03	0.06	< 0.02
	Phthalimide	85-41-6	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.00
1 2	Propanal		T	T	T	T	T	T
	Propane	00074-98-6	0.78	0.36	0.59	0.58	0.78	0.17
1 2	Propylcyclohexane		T	T	T	T	T	T
	Propylene	00115-07-1	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
1	Propylene Oxide	00075-56-9	< 0.43	< 0.40	< 0.45	< 0.43	< 0.45	< 0.02
	Pyrene	129-00-0	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	Pyridine	110-86-1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	Styrene	00100-42-5	10.39	14.72	< 0.03	< 8.38	14.72	< 6.16
1	t-Butyl Methyl Ether	01634-04-4	< 0.43	< 0.40	< 0.45	< 0.43	< 0.45	< 0.02
1 2	tert-Butyl Alcohol	00075-65-0	T	T	T	T	T	T
1	Tetrachloroethene	00127-18-4	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1 2	Tetrahydrofuran		T	T	T	T	T	T
	Toluene	00108-88-3	0.50	0.38	0.25	0.38	0.50	0.10
1	trans-1,2-Dichloroethene	00156-60-5	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1	trans-1,2-Dichloropropene	10061-02-6	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
	trans-2-Butene	00624-64-6	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
	trans-2-Hexene	04050-45-7	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
	trans-2-Pentene	00646-04-8	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.00
1	Trichloroethene	00079-01-6	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1	Trichlorofluoromethane	00075-69-4	0.30	< 0.20	T	< 0.16	0.30	< 0.12
1 2	Trichloroheptafluorobutane		T	T	T	T	T	T
1	Trichlortrifluoroethane	00076-13-1	0.21	< 0.20	< 0.23	< 0.21	0.23	< 0.01
	Trifluralin	1582-09-8	< 0.01	< 0.02	< 0.01	< 0.01	< 0.02	< 0.00
1 2	Undecane		T	T	T	T	T	T
1 2	Unknown		T	T	T	T	T	T
1	Vinyl Acetate	00108-05-4	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
1	Vinyl Chloride	00075-01-4	< 0.22	< 0.20	< 0.23	< 0.21	< 0.23	< 0.01
	Total Detected (lb/lb rubber)		3.64E-05	8.50E-05	1.70E-05			
	Total with non-detects (lb/lb rubber)		< 4.23E-05	< 9.03E-05	< 2.34E-05			

NOTES:

1 TO14 Compound

2 Tentatively Identified Compound(TIC)

T TIC Not Identified In Summarized Category

* % of Total Values Represent % of Total With Non-Detects

TABLE 4-4g
MIXER 2 METALS SPECIATION FACTORS - TIRE PRODUCTS

	#1 % of Tot		#2 % of Tot	#3 % of Tot	#4 % of Tot	#5 % of Tot		#6 % of Tot		#7 % of Tot	MEAN % of TOT		MAX % of TOT	STD % of TOT	
Cr	0.265		0.016	0.046	0.097	0.082		0.051		0.347	0.129		0.347	0.116	
Cu	0.157		0.016	0.058	0.059	0.049	<	0.128		0.132	0.086		0.157	0.049	
Mg	1.543		2.795	0.617	0.902	1.638		23.286		1.089	4.553		23.286	7.676	
Ni	0.410	<	0.066	0.073	0.167	0.075	<	0.513	<	0.139	< 0.206		0.513	< 0.168	
Zn	97.494		97.100	99.190	98.750	98.079		75.969		98.254	94.977		99.190	7.787	
Cd	0.078		0.006	0.005	0.010	0.015		0.026		0.011	0.022		0.078	0.024	
Pb	0.053		0.001	0.010	0.014	0.061	<	0.026		0.029	0.028		0.061	0.021	
Total Detected (lb/lb rubber)	1.20E-05		4.25E-05	1.30E-04	2.44E-05	3.30E-05		8.23E-06		3.53E-05					
Total with non-detects (lb/lb rubber)	1.20E-05	<	4.25E-05	1.30E-04	2.44E-05	3.30E-05	<	8.29E-06	<	3.54E-05					

NOTE: % of Total Values Represent % of Total With Non-Detects

TABLE 4-4h
MIXER 2 METALS SPECIATION FACTORS - ENGINEERED PRODUCTS

	#1 % of Tot	#2 % of Tot	#3 % of Tot	#4 % of Tot	#5 % of Tot	#6 % of Tot	#7 % of Tot	#8 % of Tot	#9 % of Tot	#10 % of Tot	#11 % of Tot	#12 % of Tot	#13 % of Tot
Cr	0.265	0.016	0.046	0.097	0.082	0.051	0.347	0.054	0.063	0.064	< 0.068	0.035	0.082
Cu	0.157	0.016	0.058	0.059	0.049	< 0.128	0.132	0.108	0.314	0.079	0.027	< 0.029	0.065
Mg	1.543	2.795	0.617	0.902	1.638	23.286	1.089	8.878	3.750	92.135	51.605	67.045	3.216
Ni	0.410	< 0.066	0.073	0.167	0.075	< 0.513	< 0.139	0.413	< 1.254	0.099	< 0.136	0.116	0.425
Zn	97.494	97.100	99.190	98.750	98.079	75.969	98.254	90.519	94.510	7.573	48.153	32.765	96.117
Cd	0.078	0.006	0.005	0.010	0.015	0.026	0.011	0.011	0.046	0.017	0.007	0.004	0.007
Pb	0.053	0.001	0.010	0.014	0.061	< 0.026	0.029	0.018	< 0.063	0.034	0.003	< 0.006	0.088
Total Detected (lb/lb rubber)	1.20E-05	4.25E-05	1.30E-04	2.44E-05	3.30E-05	8.23E-06	3.53E-05	8.19E-06	2.39E-06	2.44E-05	1.71E-05	1.85E-05	8.06E-06
Total with non-detects (lb/lb rubber)	1.20E-05	< 4.25E-05	1.30E-04	2.44E-05	3.30E-05	< 8.29E-06	< 3.54E-05	8.19E-06	< 2.43E-06	2.44E-05	< 1.72E-05	< 1.85E-05	8.06E-06

NOTE: % of Total Values Represent % of Total With Non-Detects

TABLE 4-4h

MIXER 2 METALS SPECIATION FACTORS - ENGINEERED PRODUCTS

	#14 % of Tot	#15 % of Tot	#16 % of Tot	#17 % of Tot	#18 % of Tot	#19 % of Tot	#20 % of Tot	#21 % of Tot	#22 % of Tot	#23 % of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
Cr	0.038	0.043	0.007	2.484	< 0.121	< 1.017	0.797	0.012	0.005	0.481	< 0.273	2.484	< 0.536
Cu	0.218	0.431	< 0.036	0.690	0.121	20.949	0.797	0.070	0.040	0.458	< 1.088	20.949	4.240
Mg	3.482	91.352	98.699	4.398	0.833	50.746	10.584	97.725	7.682	83.377	30.756	98.699	37.253
Ni	< 0.256	0.475	< 0.146	1.897	0.290	2.542	< 1.993	< 0.232	< 0.035	0.664	< 0.540	2.542	< 0.682
Zn	95.922	7.658	1.099	90.288	98.613	24.509	85.613	1.944	92.227	14.991	67.276	99.190	37.928
Cd	0.032	0.037	0.005	0.157	0.011	0.058	0.115	0.007	0.004	0.024	0.030	0.157	0.038
Pb	0.051	0.005	< 0.007	< 0.086	< 0.012	0.178	< 0.100	< 0.012	0.007	0.006	< 0.038	0.178	0.042
Total Detected (lb/lb rubber)	1.05E-05	4.54E-06	1.14E-05	1.69E-06	1.34E-05	1.03E-06	1.15E-06	9.26E-06	7.26E-05	4.38E-06			
Total with non-detects (lb/lb rubber)	< 1.05E-05	4.54E-06	< 1.14E-05	< 1.69E-06	< 1.34E-05	< 1.04E-06	< 1.18E-06	< 9.28E-06	< 7.27E-05	4.38E-06			

NOTE: % of Total Values Represent % of Total With Non-Detects

TABLE 4-4i
MIXER 2 METALS SPECIATION FACTORS - POLYMERS

	#24 % of Tot	#25 % of Tot	#26 % of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
Cr	< 2.422	9.736	12.949	< 8.369	12.949	< 4.405
Cu	3.390	7.174	9.712	6.759	9.712	2.597
Mg	24.410	26.646	19.424	23.493	26.646	3.019
Ni	< 4.843	< 10.249	< 12.949	< 9.347	< 12.949	< 3.370
Zn	61.800	42.019	40.143	47.987	61.800	9.797
Cd	0.966	1.265	1.404	1.211	1.404	0.183
Pb	2.170	2.911	3.419	2.833	3.419	0.513
Total Detected (lb/lb rubber)	6.11E-07	2.84E-07	1.90E-07			
Total with non-detects (lb/lb rubber)	< 6.59E-07	< 3.16E-07	< 2.18E-07			

NOTE: % of Total Values Represent % of Total With Non-Detects

TABLE 4-4j
MIXER 2 SULFUR SPECIATION FACTORS - TIRE PRODUCTS

	CAS Numbers	Cmpd #1 % Of Tot	Cmpd #2 % Of Tot	Cmpd #3 % Of Tot	Cmpd #4 % Of Tot	Cmpd #5 % Of Tot	Cmpd #6 % Of Tot	Cmpd #7 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
Carbonyl Sulfide	463-58-1	< 4.19	< 4.12	< 4.12	< 4.12	17.61	20.82	< 4.12	< 8.45	20.82	< 6.86
Methyl Mercaptan	74-93-1	< 3.35	< 3.32	< 3.32	< 3.32	< 2.65	< 1.98	< 3.32	< 3.04	< 3.35	< 0.49
Ethyl Mercaptan	75-08-1	< 4.19	< 4.21	< 4.21	< 4.21	< 3.36	< 2.50	< 4.21	< 3.84	< 4.21	< 0.62
Dimethyl Sulfide	75-18-3	< 4.19	< 4.21	< 4.21	< 4.21	< 3.36	< 2.50	< 4.21	< 3.84	< 4.21	< 0.62
Carbon Disulfide	75-15-0	< 2.52	< 2.61	< 2.61	< 2.61	< 2.08	23.72	< 2.61	< 5.54	23.72	< 7.43
Isopropyl Mercaptan	75-33-2	< 5.24	< 5.05	< 5.05	< 5.05	< 4.03	< 3.00	< 5.05	< 4.64	< 5.24	< 0.76
tert-Butyl Mercaptan	75-66-1	< 6.08	< 6.31	< 6.31	< 6.31	< 5.04	< 3.75	< 6.31	< 5.73	< 6.31	< 0.92
n-Propyl Mercaptan	107-03-9	< 5.24	< 5.05	< 5.05	< 5.05	< 4.03	< 3.00	< 5.05	< 4.64	< 5.24	< 0.76
Ethyl Methyl Sulfide	624-89-5	< 5.24	< 5.05	< 5.05	< 5.05	< 4.03	< 3.00	< 5.05	< 4.64	< 5.24	< 0.76
Thiophene	110-02-1	< 5.87	< 5.89	< 5.89	< 5.89	< 4.70	< 3.50	< 5.89	< 5.38	< 5.89	< 0.87
Isobutyl Mercaptan	513-44-0	< 6.08	< 6.31	< 6.31	< 6.31	< 5.04	< 3.75	< 6.31	< 5.73	< 6.31	< 0.92
Diethyl Sulfide	352-93-2	< 6.08	< 6.31	< 6.31	< 6.31	< 5.04	< 3.75	< 6.31	< 5.73	< 6.31	< 0.92
n-Butyl Mercaptan	109-79-5	< 6.08	< 6.31	< 6.31	< 6.31	< 5.04	< 3.75	< 6.31	< 5.73	< 6.31	< 0.92
Dimethyl Disulfide	624-92-0	< 3.14	< 3.24	< 3.24	< 3.24	8.43	< 1.93	< 3.24	< 3.78	8.43	< 1.95
3-Methylthiophene	616-44-4	< 6.71	< 6.73	< 6.73	< 6.73	< 5.38	< 4.00	< 6.73	< 6.15	< 6.73	< 0.99
Tetrahydrothiophene	110-01-0	< 6.08	< 5.89	< 5.89	< 5.89	< 4.70	< 3.50	< 5.89	< 5.41	< 6.08	< 0.89
2-Ethylthiophene	872-55-9	< 7.76	< 7.58	< 7.58	< 7.58	< 6.05	< 4.50	< 7.58	< 6.94	< 7.76	< 1.13
2,5-Dimethylthiophene	638-02-8	< 7.76	< 7.58	< 7.58	< 7.58	< 6.05	< 4.50	< 7.58	< 6.94	< 7.76	< 1.13
Diethyl Disulfide	110-81-6	< 4.19	< 4.21	< 4.21	< 4.21	< 3.36	< 2.50	< 4.21	< 3.84	< 4.21	< 0.62
Total Detected (lb/lb rubber)		0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.90E-07	3.41E-06	0.00E+00			
Total with non-detects (lb/lb rubber)		< 5.53E-06	< 3.90E-06	< 7.65E-06	< 2.95E-06	< 3.04E-06	< 7.65E-06	< 5.64E-06			

NOTE: % of Total Values Represent % of Total With Non-Detects

TABLE 4-4k
MIXER 2 SULFUR SPECIATION FACTORS - ENGINEERED PRODUCTS

	CAS Numbers	Cmpd #1 % Of Tot	Cmpd #2 % Of Tot	Cmpd #3 % Of Tot	Cmpd #4 % Of Tot	Cmpd #5 % Of Tot	Cmpd #6 % Of Tot	Cmpd #7 % Of Tot	Cmpd #8 % Of Tot	Cmpd #9 % Of Tot	Cmpd #10 % Of Tot	Cmpd #11 % Of Tot	Cmpd #12 % Of Tot	Cmpd #13 % Of Tot
Carbonyl Sulfide	463-58-1	4.19	4.12	4.12	4.12	17.61	20.82	< 4.12	29.39	21.56	< 0.87	< 1.25	10.70	18.82
Methyl Mercaptan	74-93-1	3.35	3.32	3.32	3.32	2.65	< 1.98	< 3.32	< 1.38	< 2.36	< 0.69	< 1.00	< 1.45	< 2.82
Ethyl Mercaptan	75-08-1	4.19	4.21	4.21	4.21	3.36	< 2.50	< 4.21	< 1.75	< 2.98	< 0.87	< 1.25	< 1.83	< 3.56
Dimethyl Sulfide	75-18-3	4.19	4.21	4.21	4.21	3.36	< 2.50	< 4.21	< 1.75	< 2.98	< 0.87	< 1.25	< 1.83	< 3.56
Carbon Disulfide	75-15-0	2.52	2.61	2.61	2.61	2.08	23.72	< 2.61	31.84	12.37	79.83	70.85	48.72	< 2.21
Isopropyl Mercaptan	75-33-2	5.24	5.05	5.05	5.05	4.03	< 3.00	< 5.05	< 2.10	< 3.58	< 1.08	< 1.57	< 2.20	< 4.28
tert-Butyl Mercaptan	75-66-1	6.08	6.31	6.31	6.31	5.04	< 3.75	< 6.31	< 2.62	< 4.47	< 1.26	< 1.82	< 2.75	< 5.35
n-Propyl Mercaptan	107-03-9	5.24	5.05	5.05	5.05	4.03	< 3.00	< 5.05	< 2.10	< 3.58	< 1.08	< 1.57	< 2.20	< 4.28
Ethyl Methyl Sulfide	624-89-5	5.24	5.05	5.05	5.05	4.03	< 3.00	< 5.05	< 2.10	< 3.58	< 1.08	< 1.57	< 2.20	< 4.28
Thiophene	110-02-1	5.87	5.89	5.89	5.89	4.70	< 3.50	< 5.89	< 2.45	< 4.17	< 1.21	< 1.76	< 2.56	< 4.99
Isobutyl Mercaptan	513-44-0	6.08	6.31	6.31	6.31	5.04	< 3.75	< 6.31	< 2.62	< 4.47	< 1.26	< 1.82	< 2.75	< 5.35
Diethyl Sulfide	352-93-2	6.08	6.31	6.31	6.31	5.04	< 3.75	< 6.31	< 2.62	< 4.47	< 1.26	< 1.82	< 2.75	< 5.35
n-Butyl Mercaptan	109-79-5	6.08	6.31	6.31	6.31	5.04	< 3.75	< 6.31	< 2.62	< 4.47	< 1.26	< 1.82	< 2.75	< 5.35
Dimethyl Disulfide	624-92-0	3.14	3.24	3.24	3.24	8.43	< 1.93	< 3.24	< 1.35	< 2.30	< 0.65	< 0.94	< 1.41	< 2.74
3-Methylthiophene	616-44-4	6.71	6.73	6.73	6.73	5.38	< 4.00	< 6.73	< 2.80	< 4.77	< 1.39	< 2.01	< 2.93	< 5.70
Tetrahydrothiophene	110-01-0	6.08	5.89	5.89	5.89	4.70	< 3.50	< 5.89	< 2.45	< 4.17	< 1.26	< 1.82	< 2.56	< 4.99
2-Ethylthiophene	872-55-9	7.76	7.58	7.58	7.58	6.05	< 4.50	< 7.58	< 3.15	< 5.37	< 1.61	< 2.32	< 3.30	< 6.41
2,5-Dimethylthiophene	638-02-8	7.76	7.58	7.58	7.58	6.05	< 4.50	< 7.58	< 3.15	< 5.37	< 1.61	< 2.32	< 3.30	< 6.41
Diethyl Disulfide	110-81-6	4.19	4.21	4.21	4.21	3.36	< 2.50	< 4.21	< 1.75	< 2.98	< 0.87	< 1.25	< 1.83	< 3.56
Total Detected (lb/lb rubber)		0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.90E-07	3.41E-06	0.00E+00	4.68E-05	1.81E-06	2.25E-05	6.97E-06	3.41E-05	5.85E-07
Total with non-detects (lb/lb rubber)		< 5.53E-06	< 3.90E-06	< 7.65E-06	< 2.95E-06	< 3.04E-06	< 7.65E-06	< 5.64E-06	< 7.64E-05	< 5.32E-06	< 2.81E-05	< 9.84E-06	< 5.74E-05	< 3.11E-06

NOTE: % of Total Values Represent % of Total With Non-Detects

TABLE 4-4k
MIXER 2 SULFUR SPECIATION FACTORS - ENGINEERED PRODUCTS

	CAS Numbers	Cmpd #14 % Of Tot	Cmpd #15 % Of Tot	Cmpd #16 % Of Tot	Cmpd #17 % Of Tot	Cmpd #18 % Of Tot	Cmpd #19 % Of Tot	Cmpd 20 % Of Tot	Cmpd #21 % Of Tot	Cmpd #22 % Of Tot	Cmpd #23 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
Carbonyl Sulfide	463-58-1	66.71	61.20	4.19	4.19	3.02	8.55	32.50	11.14	< 4.12	64.06	< 17.45	66.71	< 20.04
Methyl Mercaptan	74-93-1	0.60	1.30	3.35	3.35	2.42	3.17	< 2.22	< 3.11	< 3.32	< 1.01	< 2.38	< 3.35	< 0.97
Ethyl Mercaptan	75-08-1	0.76	1.64	4.19	4.19	3.02	4.01	< 2.81	< 3.89	< 4.21	< 1.28	< 3.01	< 4.21	< 1.22
Dimethyl Sulfide	75-18-3	0.76	1.64	4.19	4.19	3.02	4.01	< 2.81	< 3.89	< 4.21	< 1.28	< 3.01	< 4.21	< 1.22
Carbon Disulfide	75-15-0	16.43	2.44	2.52	2.52	29.71	2.49	5.14	< 2.33	< 2.61	7.48	< 15.58	79.83	< 22.10
Isopropyl Mercaptan	75-33-2	0.91	1.97	5.24	5.24	3.78	4.82	< 3.38	< 4.86	< 5.05	< 1.54	< 3.66	< 5.24	< 1.50
tert-Butyl Mercaptan	75-66-1	1.14	2.46	6.08	6.08	4.38	6.02	< 4.22	< 5.64	< 6.31	< 1.93	< 4.46	< 6.31	< 1.81
n-Propyl Mercaptan	107-03-9	0.91	1.97	5.24	5.24	3.78	4.82	< 3.38	< 4.86	< 5.05	< 1.54	< 3.66	< 5.24	< 1.50
Ethyl Methyl Sulfide	624-89-5	0.91	1.97	5.24	5.24	3.78	4.82	< 3.38	< 4.86	< 5.05	< 1.54	< 3.66	< 5.24	< 1.50
Thiophene	110-02-1	1.06	2.30	5.87	5.87	4.23	5.62	< 3.94	< 5.44	< 5.89	< 1.80	< 4.21	< 5.89	< 1.71
Isobutyl Mercaptan	513-44-0	1.14	2.46	6.08	6.08	4.38	6.02	< 4.22	< 5.64	< 6.31	< 1.93	< 4.46	< 6.31	< 1.81
Diethyl Sulfide	352-93-2	1.14	2.46	6.08	6.08	4.38	6.02	< 4.22	< 5.64	< 6.31	< 1.93	< 4.46	< 6.31	< 1.81
n-Butyl Mercaptan	109-79-5	1.14	2.46	6.08	6.08	4.38	6.02	< 4.22	< 5.64	< 6.31	< 1.93	< 4.46	< 6.31	< 1.81
Dimethyl Disulfide	624-92-0	0.59	1.26	3.14	3.14	2.27	3.09	< 2.17	< 2.92	< 3.24	< 0.99	< 2.55	8.43	< 1.56
3-Methylthiophene	616-44-4	1.22	2.63	6.71	6.71	4.84	6.42	< 4.50	< 6.22	< 6.73	< 2.05	< 4.81	< 6.73	< 1.96
Tetrahydrothiophene	110-01-0	1.06	2.30	6.08	6.08	4.38	5.62	< 3.94	< 5.64	< 5.89	< 1.80	< 4.26	< 6.08	< 1.74
2-Ethylthiophene	872-55-9	1.37	2.95	7.76	7.76	5.59	7.23	< 5.07	< 7.19	< 7.58	< 2.31	< 5.46	< 7.76	< 2.23
2,5-Dimethylthiophene	638-02-8	1.37	2.95	7.76	7.76	5.59	7.23	< 5.07	< 7.19	< 7.58	< 2.31	< 5.46	< 7.76	< 2.23
Diethyl Disulfide	110-81-6	0.76	1.64	4.19	4.19	3.02	4.01	< 2.81	< 3.89	< 4.21	< 1.28	< 3.01	< 4.21	< 1.22
Total Detected (lb/lb rubber)		1.41E-05	2.84E-06	0.00E+00	0.00E+00	2.25E-05	1.69E-07	1.83E-06	3.52E-07	0.00E+00	3.21E-06			
Total with non-detects (lb/lb rubber)		< 1.70E-05	< 4.46E-06	< 2.50E-06	< 5.64E-06	< 7.56E-05	< 1.97E-06	< 4.86E-06	< 3.16E-06	< 3.24E-06	< 4.49E-06			

NOTE: % of Total Values Represent % of Total With Non-Detects

TABLE 4-4I
MIXER 2 SULFUR SPECIATION FACTORS - POLYMERS

	CAS Numbers	Cmpd #24 % Of Tot	Cmpd #25 % Of Tot	Cmpd #26 % Of Tot	MEAN % of TOT	MAX % of TOT	STD % of TOT
Carbonyl Sulfide	463-58-1	3.85	3.76	< 4.12	< 3.91	< 4.12	< 0.16
Methyl Mercaptan	74-93-1	3.10	3.03	< 3.32	< 3.15	< 3.32	< 0.13
Ethyl Mercaptan	75-08-1	3.93	3.83	< 4.21	< 3.99	< 4.21	< 0.16
Dimethyl Sulfide	75-18-3	3.93	3.83	< 4.21	< 3.99	< 4.21	< 0.16
Carbon Disulfide	75-15-0	9.08	11.31	< 2.61	< 7.66	11.31	< 3.69
Isopropyl Mercaptan	75-33-2	4.72	4.60	< 5.05	< 4.79	< 5.05	< 0.19
tert-Butyl Mercaptan	75-66-1	5.89	5.75	< 6.31	< 5.99	< 6.31	< 0.24
n-Propyl Mercaptan	107-03-9	4.72	4.60	< 5.05	< 4.79	< 5.05	< 0.19
Ethyl Methyl Sulfide	624-89-5	4.72	4.60	< 5.05	< 4.79	< 5.05	< 0.19
Thiophene	110-02-1	5.50	5.37	< 5.89	< 5.59	< 5.89	< 0.22
Isobutyl Mercaptan	513-44-0	5.89	5.75	< 6.31	< 5.99	< 6.31	< 0.24
Diethyl Sulfide	352-93-2	5.89	5.75	< 6.31	< 5.99	< 6.31	< 0.24
n-Butyl Mercaptan	109-79-5	5.89	5.75	< 6.31	< 5.99	< 6.31	< 0.24
Dimethyl Disulfide	624-92-0	3.03	2.95	< 3.24	< 3.07	< 3.24	< 0.12
3-Methylthiophene	616-44-4	6.29	6.13	< 6.73	< 6.38	< 6.73	< 0.26
Tetrahydrothiophene	110-01-0	5.50	5.37	< 5.89	< 5.59	< 5.89	< 0.22
2-Ethylthiophene	872-55-9	7.07	6.90	< 7.58	< 7.18	< 7.58	< 0.29
2,5-Dimethylthiophene	638-02-8	7.07	6.90	< 7.58	< 7.18	< 7.58	< 0.29
Diethyl Disulfide	110-81-6	3.93	3.83	< 4.21	< 3.99	< 4.21	< 0.16
Total Detected (lb/lb rubber)		2.64E-07	3.08E-07	0.00E+00			
Total with non-detects (lb/lb rubber)		< 2.91E-06	< 2.72E-06	< 2.85E-06			

NOTE: % of Total Values Represent % of Total With Non-Detects

TABLE 4-5

INTERNAL MIXER CONTROL DEVICE EFFICIENCY SUMMARY

Pollutant Categories	Internal Mixer Control Device (1)								Control Efficiency
	Inlet				Outlet				
	1	2	3	Average	1	2	3	Average	%
Total Metals (lbs/hr) (2)	2.23E+00	4.03E+00	2.08E-01	2.15E+00	1.15E-02	1.49E-02	1.07E-02	1.23E-02	99.4%
Total Particulate Matter (lbs/hr)	35.152	17.405	17.794	23.450	0.149	0.117	0.212	0.159	99.3%

(1) - Torit fabric filter.
(2) - Inlet and outlet values shown are detected analytes only.

TABLE 4-6a

EXTRUSION SUMMARY

Compound	Total VOCs, as methane (lbs/lb rubber)		Total Speciated Semivolatiles (lbs/lb rubber) with non-detects		Total Speciated Volatiles (lbs/lb rubber) with non-detects		Total Speciated Organics[1] (lbs/lb rubber) with non-detects	Total Particulate (lbs/lb rubber)	Total Metals (lbs/lb rubber)
Tire Base/Sidewall, Compound 4	8.35E-06	<	6.41E-06	<	2.06E-05	<	1.50E-05	2.38E-05	1.10E-06
Tire TREAD, Compound 6	1.76E-05	<	2.21E-05	<	6.40E-05	<	5.87E-05	1.28E-06	1.94E-07
EPDM 2 (Peroxide Cure), Compound 9	1.73E-05	<	1.28E-05	<	2.36E-05	<	2.77E-05	5.75E-06	3.97E-07
Emulsion SBR 1502, Compound 22	1.24E-05	<	2.29E-06	<	1.84E-05	<	1.25E-05	2.66E-05	1.47E-06
Mean	1.39E-05	<	1.09E-05	<	3.17E-05	<	2.85E-05	1.44E-05	7.90E-07
Max.	1.76E-05	<	2.21E-05	<	6.40E-05	<	5.87E-05	2.66E-05	1.47E-06
Std. Dev.	3.82E-06	<	7.47E-06	<	1.88E-05	<	1.84E-05	1.10E-05	5.17E-07

[1] - Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

TABLE 4 - 6.B. Extruder Organic Speciation Factors

Compound	CAS #	Cmpd #9	Cmpd. #22	Cmpd.#4	Cmpd. #6	TOTAL		
		% of Total	% of Total	% of Total	% of Total	Mean % of Total	MAX % of Total	STD % of Total
1-Butanol	00071-36-3	0.39	T	T	1.42	0.45	1.42	0.58
1-Hexene	00592-41-6	< 0.01	1.40	< 0.02	< 0.00	< 0.36	< 1.40	< 0.60
1-Pentene	00109-67-1	< 0.20	< 0.05	< 0.02	1.16	< 0.36	< 1.16	< 0.47
1,2,4-Trichlorobenzene	120-83-2	< 0.06	< 0.07	< 0.17	< 0.01	< 0.08	< 0.17	< 0.06
1,2,4-Trimethylbenzene	00095-63-6	0.75	0.42	1.86	4.56	1.90	4.56	1.63
1,3-Butadiene	00106-99-0	< 0.22	< 0.62	< 0.60	0.86	< 0.58	< 0.86	< 0.23
1,3,5-Trimethylbenzene	00108-67-8	0.15	< 0.82	1.09	1.07	< 0.78	< 1.09	< 0.38
1,4-Dichlorobenzene	106-46-7	< 0.05	0.02	< 0.08	< 0.01	< 0.04	< 0.08	< 0.03
1,4-Diethylbenzene + n-Butylbenzene	00105-05-5, 00104-51-8	< 1.53	< 0.04	< 0.21	0.36	< 0.53	< 1.53	< 0.59
2-Butanone	78-93-3	0.42	0.74	0.90	0.20	0.57	0.90	0.27
2-Chloroacetophenone	532-27-4	< 0.02	0.03	< 0.08	< 0.01	< 0.03	< 0.08	< 0.03
2-Chloronaphthalene	1335-88-2	< 0.02	0.01	< 0.09	< 0.01	< 0.03	< 0.09	< 0.03
2-Furaldehyde		< 0.11	0.03	< 0.33	< 0.02	< 0.12	< 0.33	< 0.12
2-Methylnaphthalene		0.03	0.39	0.07	0.17	0.17	0.39	0.14
2-Methylpentane	00107-83-5	0.82	0.29	0.42	0.38	0.48	0.82	0.20
2,2-Dimethylbutane	00075-83-2	0.09	< 0.04	< 0.02	< 0.08	< 0.06	< 0.09	< 0.03
3-Methylhexane	00589-34-4	< 0.07	< 0.04	0.23	0.14	< 0.12	< 0.23	< 0.07
3-Methylpentane	00096-14-0	1.00	< 0.31	0.29	< 0.07	< 0.42	< 1.00	< 0.35
3/4-Methylphenol		< 0.07	0.02	< 0.15	< 0.02	< 0.06	< 0.15	< 0.05
4-Methyl-1-pentene	00691-37-2	< 0.03	< 0.01	0.22	< 0.06	< 0.08	< 0.22	< 0.08
4-Methyl-2-Pentanone	108-10-1	1.03	12.83	37.01	4.54	13.85	37.01	14.04
Acenaphthene		< 0.02	0.03	< 0.05	< 0.00	< 0.02	< 0.05	< 0.02
Acenaphthylene		0.01	0.07	0.04	0.03	0.04	0.07	0.02
Acetone	67-64-1	1.31	4.82	2.20	3.06	2.85	4.82	1.30
Acetophenone	98-86-2	29.53	0.13	0.14	5.19	8.75	29.53	12.18
Acetylene	00074-86-2	< 0.06	< 0.30	< 0.27	0.27	< 0.23	< 0.30	< 0.10
Aniline	62-53-3	< 0.03	1.76	3.12	0.32	< 1.31	< 3.12	< 1.23
Benzaldehyde	100-52-7	0.14	0.28	0.14	0.03	0.15	0.28	0.09
Benzene	00071-43-2	0.27	0.98	< 0.30	0.46	< 0.50	< 0.98	< 0.28
Benzoic acid	65-85-0	1.56	0.73	0.58	< 0.03	< 0.73	< 1.56	< 0.55
Benzonitrile	100-47-0	< 0.04	0.07	< 0.09	< 0.00	< 0.05	< 0.09	< 0.03
Benzyl alcohol	100-51-6	< 0.12	0.14	0.16	0.20	< 0.16	< 0.20	< 0.03
Biphenyl	92-52-4	0.01	0.04	0.03	0.02	0.03	0.04	0.01
bis-Methylethylbenzene		T	0.40	T	T	0.10	0.40	0.17
bis(2-Ethylhexyl)phthalate		0.24	1.18	0.62	0.17	0.55	1.18	0.40
Butanal	123-72-8	0.65	T	T	T	0.16	0.65	0.28
Butane	106-97-8	T	0.34	0.42	0.25	0.25	0.42	0.16
Butanol	71-36-3	T	0.34	T	1.06	0.35	1.06	0.43
Butylbenzylphthalate		< 0.05	< 0.09	< 0.11	0.02	< 0.07	< 0.11	< 0.04

TABLE 4 - 6.B. Extruder Organic Speciation Factors

Compound	CAS #	Cmpd #9	Cmpd. #22	Cmpd.#4	Cmpd. #6	TOTAL		
		% of Total	% of Total	% of Total	% of Total	Mean % of Total	MAX % of Total	STD % of Total
C10H14 Alkyl Substituted Benzene		T	T	0.69	T	0.17	0.69	0.30
C10H18 Cyclic Hydrocarbon		T	7.15	T	0.68	1.96	7.15	3.01
C11 + C12 Alkenes		T	0.61	T	T	0.15	0.61	0.27
C11-C12 Branched Alkane		3.24	T	T	0.71	0.99	3.24	1.33
C13H18 Substituted Benzene		T	0.93	T	T	0.23	0.93	0.40
C9H10 Alkyl Substituted Benzene		3.01	0.32	T	T	0.83	3.01	1.27
C9H12 Alkyl Substituted Benzene		T	0.91	7.71	2.99	2.90	7.71	2.98
C9H12 Cyclic Hydrocarbon		1.55	T	T	T	0.39	1.55	0.67
Carbon Disulfide	75-15-0	0.35	0.92	0.73	< 0.45	< 0.61	< 0.92	< 0.23
Chloromethane	74-87-3	< 0.22	1.46	< 0.47	0.11	< 0.57	< 1.46	< 0.53
cis-2-Pentene	000627-20-3	1.97	< 0.15	< 0.10	< 4.88	< 1.78	< 4.88	< 1.94
Cumene	98-82-8	5.35	0.29	0.04	0.19	1.47	5.35	2.24
Cyclobutane	287-23-0	T	1.85	1.71	T	0.89	1.85	0.89
Cyclohexanone	108-94-1	< 0.08	< 0.10	0.76	0.21	< 0.29	< 0.76	< 0.28
Cyclopentane	00287-92-3,	T	0.56	T	T	0.14	0.56	0.24
Cyclopentane + 2,3-Dimethylbutane	00287-92-3, 00079-29-8	0.32	< 0.17	< 0.29	< 0.09	< 0.22	< 0.32	< 0.09
Cyclopentene	00142-29-0	< 0.02	< 0.03	< 0.02	0.09	< 0.04	< 0.09	< 0.03
Decane	124-18-5	0.21	T	T	0.04	0.06	0.21	0.09
Dibenzofuran	38178-38-0	< 0.02	0.02	< 0.04	0.00	< 0.02	< 0.04	< 0.01
Diethylphthalate	84-66-2	0.07	0.10	0.04	0.46	0.17	0.46	0.17
Dimethylphthalate	131-11-13	< 0.02	< 0.03	< 0.08	0.01	< 0.04	< 0.08	< 0.03
Di-n-butylphthalate		1.32	< 0.60	0.55	0.33	< 0.70	< 1.32	< 0.37
Diphenylamine		1.32	0.07	0.10	0.69	0.54	1.32	0.51
Dodecane	112-40-3	0.14	2.06	T	0.50	0.67	2.06	0.82
Ethane	00074-84-0	0.12	< 0.28	< 0.06	0.14	< 0.15	< 0.28	< 0.08
Ethylbenzene	00100-41-4	0.11	< 2.85	< 0.22	0.14	< 0.83	< 2.85	< 1.17
Ethylhexanol		T	T	4.63	T	1.16	4.63	2.01
Ethylhexenal		0.39	6.74	0.46	T	1.90	6.74	2.80
Fluoranthene	206-44-0	0.02	< 0.02	< 0.05	< 0.01	< 0.02	< 0.05	< 0.02
Fluorene	86-73-7	< 0.03	0.02	0.02	< 0.00	< 0.02	< 0.03	< 0.01
Heptanone		0.73	T	T	0.28	0.25	0.73	0.30
Hexachlorobutadiene	87-68-3	0.26	< 0.12	< 0.28	< 0.02	< 0.17	< 0.28	< 0.11
Isobutane	00075-28-5	< 0.51	< 0.10	< 0.15	0.51	< 0.32	< 0.51	< 0.19
Isobutanol	78-83-1	0.26	T	1.54	0.71	0.63	1.54	0.59
Isobutylene + 1-Butene	00115-11-7, 00106-98-9	0.59	< 0.70	< 0.09	< 0.06	< 0.36	< 0.70	< 0.29
Isobutyraldehyde	78-84-2	0.26	T	T	0.35	0.15	0.35	0.16
Isopentane	00078-78-4	9.01	< 3.72	1.82	2.15	< 4.17	< 9.01	< 2.88
Isophorone	78-59-1	< 0.03	0.51	0.19	< 0.01	< 0.18	< 0.51	< 0.20

TABLE 4 - 6.B. Extruder Organic Speciation Factors

Compound	CAS #	Cmpd #9	Cmpd. #22	Cmpd.#4	Cmpd. #6	TOTAL		
		% of Total	% of Total	% of Total	% of Total	Mean % of Total	MAX % of Total	STD % of Total
Isoprene	00078-79-5	0.09	< 0.09	< 0.14	0.27	< 0.15	< 0.27	< 0.07
Isopropyl Alcohol	67-63-0	0.99	T	0.35	2.60	0.99	2.60	1.00
Methylcyclopentane	00096-37-7	1.47	< 0.68	< 0.31	0.12	< 0.65	< 1.47	< 0.52
Methylene Chloride	79-09-2	8.81	< 0.65	10.66	22.47	< 10.65	< 22.47	< 7.79
Methylpentane		0.97	0.65	T	T	0.40	0.97	0.42
m-Ethyltoluene	00620-14-4	0.25	< 0.34	1.02	2.02	< 0.91	< 2.02	< 0.71
m-Xylene + p-Xylene	00108-38-3, 00106-42-3	0.55	0.48	< 0.51	0.57	< 0.53	< 0.57	< 0.03
Naphthalene	91-20-3	2.82	0.48	0.44	0.30	1.01	2.82	1.05
n-Butane	00106-97-8	0.50	< 0.53	< 0.55	< 0.27	< 0.46	< 0.55	< 0.11
n-Decane	00124-18-5	< 0.12	< 0.14	< 0.24	0.57	< 0.27	< 0.57	< 0.18
n-Hexane	00110-54-3	3.02	19.52	0.68	0.67	5.97	19.52	7.88
Nitromethane	75-52-5	T	T	T	0.25	0.06	0.25	0.11
n-Nonane	00111-84-2	0.07	< 0.01	< 0.08	< 0.03	< 0.05	< 0.08	< 0.03
n-Octane	00111-65-9	< 0.04	< 0.05	< 0.19	0.09	< 0.09	< 0.19	< 0.06
n-Pentane	00109-66-0	0.48	< 0.42	< 0.34	0.08	< 0.33	< 0.48	< 0.15
n-Propylbenzene	00103-65-1	< 0.02	< 0.04	0.25	0.54	< 0.21	< 0.54	< 0.21
o-Ethyltoluene	00611-14-3	< 1.14	0.25	0.44	1.24	< 0.77	< 1.24	< 0.43
o-Xylene	00095-47-6	0.27	3.81	0.28	0.44	1.20	3.81	1.51
p-Cymene	00099-87-6	< 0.20	< 0.51	1.30	0.74	< 0.69	< 1.30	< 0.40
Pentane	109-66-0	0.38	T	T	T	0.10	0.38	0.17
p-Ethyltoluene	00622-96-8	0.18	< 0.40	0.60	0.78	< 0.49	< 0.78	< 0.22
Phenanthrene	85-01-8	0.02	0.07	0.04	0.02	0.04	0.07	0.02
Phenol	108-95-2	0.62	0.09	0.80	0.24	0.44	0.80	0.28
Propane	00074-98-6	< 0.04	< 0.34	2.59	4.81	< 1.94	< 4.81	< 1.93
Propene	115-07-1	T	2.25	T	0.17	0.61	2.25	0.95
Propylbenzene		T	T	T	0.21	0.05	0.21	0.09
Propylene	00115-07-1	0.20	< 0.34	< 0.53	0.15	< 0.31	< 0.53	< 0.15
Pyrene	129-00-0	0.06	0.02	0.03	< 0.01	< 0.03	< 0.06	< 0.02
Pyridine	110-86-1	0.52	< 0.11	< 0.25	< 0.02	< 0.23	< 0.52	< 0.19
Styrene	00100-42-5	< 0.09	< 0.31	< 0.07	1.24	< 0.43	< 1.24	< 0.48
Tetrahydrofuran	109-99-9	T	T	1.54	T	0.39	1.54	0.67
Toluene	00108-88-3	3.23	< 2.74	< 0.78	15.78	< 5.63	< 15.78	< 5.93
Undecane	1120-21-4	0.21	1.43	T	0.18	0.46	1.43	0.57
TOTAL Detected (lb/lb rubber)		2.62E-05	1.02E-05	1.37E-05	5.50E-05			
TOTAL with non-detects (lb/lb rubber)		< 2.77E-05	< 1.25E-05	< 1.50E-05	< 5.87E-05			

TABLE 4 - 6.C Extruder Metal Speciation Factors

	Cmpd. #9	Cmpd. #22	Cmpd. #4	Cmpd. #6	TOTAL		
					Mean	MAX	STD
	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total
Chromium	19.66	17.29	22.26	11.62	17.71	22.26	3.93
Cobalt	3.79	0.71	1.72	5.12	2.83	5.12	1.72
Magnesium	18.15	19.15	21.38	14.03	18.18	21.38	2.66
Nickel	25.54	33.63	18.05	37.33	28.64	37.33	7.45
Zinc	32.86	29.23	36.59	31.91	32.65	36.59	2.64
Total Detected (lb/lb rubber)	3.97E-07	1.47E-06	1.10E-06	1.94E-07			
Total with non-detects (lb/lb rubber)	3.97E-07	1.47E-06	1.10E-06	1.94E-07			

TABLE 4-7a

AUTOCLAVE SUMMARY[1]

Compound	Total VOCs, as methane (lbs/lb rubber)		Total Speciated *Semivolatiles* (lbs/lb rubber) with non-detects		Total Speciated *Volatiles* (lbs/lb rubber) with non-detects		Total Speciated Organics[2] (lbs/lb rubber) with non-detects		*Total Sulfur* (lbs/lb rubber) with non-detects		*Amines* (lbs/lb rubber) with non-detects
4	1.61E-04	<	1.79E-04	<	4.07E-04	<	5.62E-04	<	3.04E-06	<	4.29E-08
5	1.78E-04	<	9.32E-05	<	4.79E-04	<	5.54E-04	<	3.11E-06	<	2.86E-08
6	1.33E-04	<	6.08E-04	<	2.46E-04	<	8.27E-04	<	2.79E-06	<	4.73E-08
8	5.42E-05	<	1.82E-05	<	6.67E-04	<	6.68E-04	<	2.85E-03	<	9.42E-08
9a	1.63E-04	<	8.21E-04	<	4.12E-04	<	1.22E-03	<	6.54E-06	<	7.10E-08
9	3.61E-04	<	4.98E-04	<	3.33E-04	<	8.17E-04	<	3.13E-06	<	4.69E-08
11	9.32E-05	<	1.04E-04	<	2.54E-04	<	3.55E-04	<	1.46E-04	<	3.61E-08
15	7.34E-05	<	8.73E-05	<	4.36E-04	<	5.08E-04	<	1.99E-04	<	5.11E-08
18	9.27E-05	<	2.02E-04	<	1.89E-03	<	2.09E-03	<	7.07E-05	<	1.80E-07
21	2.26E-04	<	1.28E-04	<	1.84E-03	<	1.96E-03	<	1.94E-06	<	3.19E-08
22	1.11E-04	<	2.36E-05	<	2.18E-04	<	2.37E-04	<	3.33E-06	<	5.18E-08
Mean	1.50E-04	<	2.51E-04	<	6.53E-04	<	8.91E-04	<	2.99E-04	<	6.20E-08
Max.	3.61E-04	<	8.21E-04	<	1.89E-03	<	2.09E-03	<	2.85E-03	<	1.80E-07
Std. Dev.	8.24E-05	<	2.55E-04	<	5.84E-04	<	5.90E-04	<	8.09E-04	<	4.13E-08

a - Extruded EPDM

1 - Inclusive of both gaseous and aqueous matrices representing the blowdown and water trap effluent, and cooldown air stream.

2 - *Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions* results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

TABLE 4-7b
AUTOCLAVE ORGANIC SPECIATION FACTORS

Compound	CAS #	Cmpd. #4 % of TOT	Cmpd. #5 % of TOT	Cmpd. #6 % of TOT	Cmpd. #8 % of TOT	Cmpd. #9* % of TOT	Cmpd. #9 % of TOT	Cmpd. #11 % of TOT	Cmpd. #15 % of TOT	Cmpd. #18 % of TOT	Cmpd. #21 % of TOT	Cmpd. #22 % of TOT	MEAN % of TOT	MAX % of TOT	STD % of TOT
1-Butanol	00071-36-3	T	< T	< T	< T	T	T	0.26	< T	< T	1.23	< T	< 0.14	1.23	< 0.35
1-Dodecene	112-41-4	< 0.01	< 0.01	< 0.01	< 0.03	< 0.04	< 0.06	< 0.03	0.11	< 0.00	< 0.01	< 0.04	< 0.03	0.11	< 0.03
1-Heptene	00592-76-7	0.09	< 0.11	0.05	< 0.17	0.02	< 0.05	< 0.09	0.11	< 0.00	< 0.07	0.06	< 0.07	0.17	< 0.04
1-Hexene	00592-41-6	< 0.00	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.03	< 0.02	< 0.01	< 0.03	< 0.01
1-Octene	00111-60-0	< 0.00	< 0.03	< 0.01	< 0.00	< 0.01	< 0.00	< 0.10	< 0.17	< 0.00	< 0.64	< 0.01	< 0.09	< 0.64	< 0.18
1-Pentene	00109-67-1	< 0.01	0.06	< 0.03	< 0.00	< 0.02	< 0.00	< 0.01	< 0.02	0.09	0.04	0.13	< 0.04	0.13	< 0.04
1,1-Dichloroethane	75-34-3	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.05	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
1,1-Dichloroethene	75-35-4	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
1,1,1-Trichloroethane	71-55-6	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
1,1,2-Trichloroethane	79-00-5	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
1,1,2,2-Tetrachloroethane	79-34-5	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
1,2-Dibromo-3-Chloropropane	00096-12-8	< 0.05	< 0.07	< 0.03	< 0.16	< 0.02	< 0.02	< 0.11	< 0.11	< 0.05	< 0.04	< 0.05	< 0.07	< 0.16	< 0.04
1,2-Dibromo-3-chloropropane	96-12-8	< 0.01	< 0.01	< 0.00	< 0.01	< 0.02	< 0.02	< 0.01	< 0.00	< 0.00	< 0.00	< 0.02	< 0.01	< 0.02	< 0.01
1,2-Dibromoethane	00106-93-4	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.05	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
1,2-Dichlorobenzene	00095-50-1	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.05	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
1,2-Dichlorobenzene	95-50-1	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
1,2-Dichloroethane	107-06-2	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
1,2-Dichloropropane	78-87-5	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
1,2-Epoxybutane	106-88-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
1,2,4-Trichlorobenzene	120-82-1	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
1,2,4-Trimethylbenzene	95-63-6	0.78	0.40	0.58	0.25	0.06	0.30	0.11	0.19	0.06	0.03	0.36	0.28	0.78	0.22
1,3-Butadiene	106-99-0	0.31	< 0.38	0.09	< 0.01	< 0.00	< 0.11	< 0.04	< 0.00	< 0.00	< 0.00	< 0.14	< 0.10	0.38	< 0.13
1,3-Cyclooctadiene	1700-10-3	< 0.00	< 0.00	< 0.00	0.04	0.01	0.02	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	0.04	< 0.01
1,3-Dichlorobenzene	00541-73-1	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.05	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
1,3-Dichlorobenzene	541-73-1	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
1,3,5-Trimethylbenzene	00108-67-8	0.28	0.23	0.12	0.26	0.04	< 0.03	0.03	0.17	0.01	0.02	0.20	< 0.13	0.28	< 0.10
1,4-Dichloro-1,3-Butadiene	02984-42-1	< T	< T	< T	< T	< T	< T	< 0.24	< T	< T	< T	< T	< 0.02	< 0.24	< 0.07
1,4-Dichlorobenzene	00106-46-7	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.05	< 0.05	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
1,4-Dichlorobenzene	106-46-7	0.00	0.00	< 0.00	0.01	0.01	< 0.01	< 0.00	0.01	< 0.00	< 0.00	< 0.00	< 0.00	0.01	< 0.00
1,4-Diethylbenzene + n-Butylbenzene	0105-05-5/00104-51-	0.09	0.48	< 0.21	< 0.19	< 0.01	< 0.06	< 0.02	0.07	0.13	< 0.01	< 0.01	< 0.12	0.48	< 0.13
1,4-Dioxane	00123-91-1	< 0.10	< 0.14	< 0.05	< 0.33	< 0.03	< 0.05	< 0.22	< 0.22	< 0.11	< 0.09	< 0.10	< 0.13	< 0.33	< 0.09
1,4-Phenylenediamine	106-50-3	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
1,5-Cyclooctadiene	111-78-4	< 0.01	< 0.01	< 0.01	< 0.02	< 0.02	< 0.03	< 0.01	0.00	< 0.00	< 0.00	< 0.02	< 0.01	0.03	< 0.01
2-Butanone	78-93-3	0.32	0.38	0.06	0.51	0.20	0.17	0.39	< 0.21	0.08	0.99	0.37	< 0.33	0.99	< 0.25
2-Butene	00126-99-8	< T	< 0.10	< T	< 0.20	< T	< T	< 0.10	< T	< T	< 0.60	< T	< 0.09	< 0.60	< 0.17
2-Chloro-1,3-Butadiene	00126-99-8	< T	< T	< T	< T	< T	< T	1.22	T	< T	T	< T	< 0.11	1.22	< 0.35
2-Chloro-1,3-Butadiene dimer		< T	< T	< T	< T	< T	< T	< 1.76	< T	< T	< T	< T	< 0.16	< 1.76	< 0.51
2-Chloroacetophenone	1341-24-8	< 0.00	0.04	< 0.00	< 0.00	< 0.00	0.00	0.24	< 0.00	< 0.00	< 0.00	< 0.00	< 0.03	0.24	< 0.07
2-Chloronaphthalene	91-58-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
2-Chlorophenol	95-57-8	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
2-Ethylhexanal	00123-05-7	< T	< T	< T	< T	< T	< T	< 0.26	< T	< T	< T	< T	< 0.02	< 0.26	< 0.08
2-Furaldehyde	98-01-1	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.02	< 0.01	< 0.00	< 0.00	0.00	0.01	< 0.01	0.02	< 0.00
2-Heptene	14686-13-6	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.05	< T	< 0.00	< 0.05	< 0.01
2-Hexanone	591-78-6	< 0.03	< 0.04	< 0.02	< 0.08	< 0.02	< 0.02	< 0.06	< 0.06	< 0.03	< 0.35	< 0.03	< 0.07	< 0.35	< 0.09
2-Methyl-1-butene	00563-46-2	< 0.04	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.02	< 0.01	< 0.01	< 0.04	< 0.01

TABLE 4-7b
AUTOCLAVE ORGANIC SPECIATION FACTORS

Compound	CAS #	Cmpd. #4 % of TOT	Cmpd. #5 % of TOT	Cmpd. #6 % of TOT	Cmpd. #8 % of TOT	Cmpd. #9* % of TOT	Cmpd. #9 % of TOT	Cmpd. #11 % of TOT	Cmpd. #15 % of TOT	Cmpd. #18 % of TOT	Cmpd. #21 % of TOT	Cmpd. #22 % of TOT	MEAN % of TOT	MAX % of TOT	STD % of TOT
2-Methyl-2-butene	00513-35-9	< 0.34	< 6.38	0.15	< 0.00	< 0.00	< 0.35	< 0.06	< 0.94	< 0.00	< 1.15	2.59	< 1.09	6.38	< 1.83
2-Methyl-2-pentene	00625-27-4	< 0.02	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.02	< 0.01
2-Methyl-2-Propanol	00075-65-0	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 1.92	< T	< 0.17	< 1.92	< 0.55
2-Methylbutanal	00096-17-3	< T	< 0.05	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.00	< 0.05	< 0.01
2-Methylfuran	00534-22-5	< 0.27	< 0.52	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.07	< 0.52	< 0.16
2-Methylheptane	00592-27-8	0.57	0.56	0.15	< 0.77	0.08	< 0.15	0.42	1.04	< 0.00	0.25	0.20	< 0.38	1.04	< 0.31
2-Methylhexane	00591-76-4	< 0.21	< 0.29	0.09	0.54	0.02	< 0.09	0.25	0.48	< 0.00	0.15	< 0.12	< 0.20	0.54	< 0.17
2-Methylnaphthalene	91-57-6	0.02	0.19	0.02	0.01	0.01	0.01	< 0.00	0.00	0.00	0.00	0.16	< 0.04	0.19	< 0.06
2-Methylpentane	00107-83-5	< 0.09	0.23	0.15	1.28	0.12	< 0.02	< 0.11	< 0.09	< 0.02	< 0.08	0.48	< 0.24	1.28	< 0.35
2-Methylphenol	95-48-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	0.01	< 0.00	0.00	< 0.00	< 0.01	< 0.00	0.01	< 0.00
2-Methylpropanal	00078-84-2	< T	< 0.10	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.01	< 0.10	< 0.03
2-Nitroaniline	88-74-4	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
2-Nitrophenol	88-75-5	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.02	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.02	< 0.00
2-Phenyl-2-Propanol		< T	< T	< T	< T	< 0.73	< 0.32	< T	< T	< T	< T	< T	< 0.10	< 0.73	< 0.22
2,2-Dimethylbutane	00075-83-2	< 0.10	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.02	< 0.02	0.01	< 0.01	< 0.01	< 0.02	0.10	< 0.03
2,2-Dimethylpropane	00463-82-1	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
2,2'-oxybis(1-Chloropropane)	108-60-1	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
2,3-Dimethylpentane	00565-59-3	< 0.06	< 0.08	0.03	0.19	< 0.00	< 0.03	0.09	< 0.12	< 0.00	0.08	0.05	< 0.07	0.19	< 0.05
2,3,4-Trimethylpentane	00565-75-3	0.13	0.14	< 0.01	< 0.07	< 0.00	< 0.00	< 0.04	< 0.12	< 0.01	0.02	< 0.02	< 0.05	0.14	< 0.05
2,4-Dichlorophenol	120-83-2	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
2,4-Dimethylhexane	00589-43-5	0.32	0.24	0.05	< 0.20	< 0.00	< 0.04	0.50	0.27	0.01	0.06	< 0.08	< 0.16	0.50	< 0.15
2,4-Dimethylphenol	105-67-9	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
2,4-Dinitrophenol	105-67-9	< 0.01	< 0.01	< 0.01	< 0.02	< 0.03	< 0.03	< 0.03	< 0.01	< 0.00	< 0.01	< 0.03	< 0.02	< 0.03	< 0.01
2,4-Dinitrotoluene	121-14-2	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
2,4,5-Trichlorophenol	95-95-4	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
2,4,6-Trichlorophenol	88-06-2	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
2,6-Dinitrotoluene	606-20-2	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.02	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.02	< 0.00
3-Furaldehyde	498-60-2	< 0.01	< 0.01	< 0.00	< 0.02	< 0.02	< 0.02	< 0.01	< 0.01	< 0.00	< 0.00	< 0.02	< 0.01	< 0.02	< 0.01
3-Heptanone	00106-35-4	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.03	< T	< 0.00	< 0.03	< 0.01
3-Heptene	14686-14-7	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.05	< T	< 0.00	< 0.05	< 0.01
3-Methyl styrene	100-80-1	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
3-Methylbutanal	00590-86-3	< T	< 0.10	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.01	< 0.10	< 0.03
3-Methylheptane	00589-81-1	< 0.16	< 0.15	< T	< T	< T	< T	0.10	< T	< T	0.95	< T	< 0.12	0.95	< 0.27
3-Methylhexane	00589-34-4	< 1.07	< 1.15	< 0.80	< 0.15	< 0.02	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.30	< 1.15	< 0.44
3-Methylpentane	00096-14-0	0.05	0.21	0.02	0.18	0.02	0.05	2.81	0.12	< 0.00	0.03	0.04	< 0.32	2.81	< 0.79
3-Methylstyrene	100-80-1	0.10	0.05	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.00	0.00	< 0.01	< 0.02	0.10	< 0.03
3-Nitroaniline	99-09-2	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
3,3'-Dichlorobenzidine	91-94-1	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
3,3'-Dimethoxybenzidine	119-90-4	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
3,3'-Dimethylbenzidine	119-93-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
3/4-Methylphenol	108-39-4/106-44-5	0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	0.01	< 0.00
4-Aminobiphenyl	92-67-1	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
4-Bromophenyl-phenylether	101-55-3	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.02	< 0.01	< 0.02	< 0.01
4-Chloro-3-methylphenol	59-50-7	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
4-Chloroaniline	106-47-8	0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	0.01	< 0.00

TABLE 4-7b
AUTOCLAVE ORGANIC SPECIATION FACTORS

Compound	CAS #	Cmpd. #4 % of TOT	Cmpd. #5 % of TOT	Cmpd. #6 % of TOT	Cmpd. #8 % of TOT	Cmpd. #9* % of TOT	Cmpd. #9 % of TOT	Cmpd. #11 % of TOT	Cmpd. #15 % of TOT	Cmpd. #18 % of TOT	Cmpd. #21 % of TOT	Cmpd. #22 % of TOT	MEAN % of TOT	MAX % of TOT	STD % of TOT
4-Chlorophenyl-phenylether	70005-72-3	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
4-Chlorostyrene	1073-67-2	< 0.00	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	0.05	< 0.10	< 0.00	< 0.00	< 0.01	< 0.02	0.10	< 0.03
4-Methyl styrene	622-97-9	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
4-Methyl-1-pentene	00691-37-2	< 0.02	< 0.00	< 0.04	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	0.16	< 0.02	0.16	< 0.05
4-Methyl-2-pentanone	108-10-1	28.55	< 0.12	8.80	< 0.08	1.01	< 0.10	< 0.06	< 0.06	2.73	< 0.02	27.22	< 6.25	28.55	< 10.50
4-Methylstyrene	622-97-9	0.00	0.00	0.00	< 0.01	< 0.01	< 0.01	< 0.00	0.00	< 0.00	0.00	< 0.01	< 0.00	0.01	< 0.00
4-Nitroaniline	100-01-6	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
4-Nitrobiphenyl	92-93-3	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
4-Nitrophenol	100-02-7	< 0.01	< 0.01	< 0.00	< 0.01	< 0.02	< 0.02	< 0.01	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.02	< 0.01
4,4'-Methylenedianiline	101-77-9	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
4,6-Dinitro-2-methylphenol	534-52-1	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.02	< 0.02	< 0.01	< 0.00	< 0.00	< 0.03	< 0.01	< 0.03	< 0.01
Acenaphthene	83-32-9	< 0.00	0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	0.00	< 0.00	< 0.00	< 0.01	< 0.00	0.01	< 0.00
Acenaphthylene	208-96-8	0.01	0.00	0.04	0.01	0.00	< 0.00	0.00	0.00	< 0.00	< 0.00	0.04	< 0.01	0.04	< 0.02
Acetaldehyde	00075-07-0	< T	0.33	< T	0.04	T	T	0.03	T	< T	0.06	< T	< 0.04	0.33	< 0.09
Acetone	67-64-1	3.74	16.09	< 0.40	1.61	1.18	1.66	6.53	1.51	0.15	28.38	1.46	< 5.70	28.38	< 8.39
Acetonitrile	01722-09-4	< 0.05	0.29	< 0.03	< 0.16	< 0.02	< 0.02	< 0.11	< 0.11	< 0.05	< 0.04	< 0.05	< 0.09	0.29	< 0.08
Acetophenone	00098-86-2	0.87	T	< 1.10	T	10.91	10.77	T	T	< T	T	< 3.10	< 2.43	10.91	< 4.06
Acetophenone	98-86-2	0.08	0.06	0.17	0.02	64.06	56.89	0.04	0.05	0.02	0.01	0.86	11.11	64.06	23.32
Acetylene	00074-86-2	< 0.00	< 0.04	< 0.00	< 0.05	< 0.00	< 0.00	0.08	< 0.00	< 0.00	< 0.03	< 0.00	< 0.02	0.08	< 0.03
Acrolein	00107-02-8	< 0.05	< 0.05	< 0.03	< 0.16	< 0.03	< 0.02	< 0.11	< 0.11	< 0.05	< 0.23	< 0.05	< 0.08	< 0.23	< 0.06
Acrylonitrile	107-13-1	< 0.06	< 0.08	< 0.03	< 0.17	< 0.02	< 0.03	< 0.11	< 0.11	< 0.05	< 0.04	< 0.06	< 0.07	< 0.17	< 0.05
Allyl chloride	107-05-1	< 0.05	< 0.07	< 0.03	< 0.17	< 0.02	< 0.03	< 0.11	< 0.11	< 0.05	< 0.04	< 0.05	< 0.07	< 0.17	< 0.04
Alpha-Methoxy Cumene		< T	< T	< 0.28	T	1.15	1.15	< T	T	< T	T	< T	< 0.23	1.15	< 0.44
Alpha-Methyl Styrene		1.06	< T	0.98	T	4.48	7.52	< T	T	4.17	T	3.30	< 1.95	7.52	< 2.43
Alpha-Pinene	07785-70-8	< T	< T	< 0.03	< T	< T	< T	< T	< T	< T	< T	< 0.13	< 0.01	< 0.13	< 0.04
Aniline	62-53-3	1.86	1.62	3.12	0.13	0.22	0.02	0.62	0.01	0.08	0.00	3.48	1.01	3.48	1.25
Anthracene	120-12-7	< 0.00	0.00	< 0.00	< 0.00	< 0.00	< 0.00	0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	0.00	< 0.00
a-Pinene	07785-70-8	< 0.01	0.10	< 0.06	< 0.08	< 0.02	< 0.00	< 0.00	0.07	< 0.03	< 0.02	0.28	< 0.06	0.28	< 0.08
a,a,a-Trichlorotoluene	98-07-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
Benzaldehyde	00100-52-7	< T	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.16	< 0.01	< 0.16	< 0.04
Benzaldehyde	100-52-7	< 0.00	0.05	< 0.00	< 0.01	< 0.01	< 0.02	0.01	0.03	0.00	0.01	0.02	< 0.02	0.05	< 0.01
Benzene	71-43-2	2.07	0.97	1.10	3.34	0.36	0.18	0.47	1.04	0.02	0.27	4.82	1.33	4.82	1.44
Benzidine	92-87-5	< 0.00	< 0.07	< 0.00	0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	0.07	< 0.02
Benzoic acid	65-85-0	0.03	0.01	< 0.00	< 0.02	0.13	0.20	0.03	< 0.04	0.00	< 0.00	0.64	< 0.10	0.64	< 0.18
Benzonitrile	100-47-0	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
Benzo(a)anthracene	56-55-3	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Benzo(a)pyrene	50-32-8	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
Benzo(b)fluoranthene	205-99-2	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Benzo(g,h,i)perylene	191-24-2	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
Benzo(k)fluoranthene	207-08-9	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
Benzyl alcohol	100-51-6	0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.02	< 0.01	< 0.00	< 0.00	< 0.00	0.02	< 0.01	0.02	< 0.01
Benzyl Chloride	00100-44-7	< 0.05	< 0.07	< 0.03	< 0.16	< 0.02	< 0.02	< 0.11	< 0.11	< 0.05	< 0.04	< 0.05	< 0.07	< 0.16	< 0.04
Benzyl Chloride	100-44-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
Biphenyl	92-52-4	0.01	0.05	0.05	0.01	0.01	< 0.01	0.00	0.00	0.00	0.00	0.17	< 0.03	0.17	< 0.05
bis(2-Chloroethoxy)methane	111-91-1	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00

TABLE 4-7b
AUTOCLAVE ORGANIC SPECIATION FACTORS

Compound	CAS #	Cmpd. #4 % of TOT	Cmpd. #5 % of TOT	Cmpd. #6 % of TOT	Cmpd. #8 % of TOT	Cmpd. #9* % of TOT	Cmpd. #9 % of TOT	Cmpd. #11 % of TOT	Cmpd. #15 % of TOT	Cmpd. #18 % of TOT	Cmpd. #21 % of TOT	Cmpd. #22 % of TOT	MEAN % of TOT	MAX % of TOT	STD % of TOT
bis(2-Chloroethyl)ether	111-44-4	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
bis(2-Ethylhexyl)phthalate	117-81-7	0.08	0.06	0.29	0.06	0.01	0.02	0.21	0.20	0.00	0.11	0.07	0.10	0.29	0.09
b-Pinene	18172-67-3	< 0.07	0.07	< 0.04	< 0.02	< 0.01	< 0.01	< 0.02	0.06	< 0.01	0.02	< 0.15	< 0.05	0.15	< 0.04
Bromodichloromethane	75-27-4	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
Bromoform	75-25-2	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
Bromomethane	74-83-9	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
Butanal	00123-72-8	< T	< T	< T	< 0.68	< T	< T	< T	< 0.16	< T	< 0.05	< T	< 0.08	< 0.68	< 0.20
Butene Isomer	25167-67-3	0.16	< T	< T	T	0.06	< T	< T	T	1.34	T	2.84	< 0.40	2.84	< 0.86
Butyl Acrylate	00141-32-2	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.11	< T	< 0.01	< 0.11	< 0.03
Butyl Propionate	00590-01-2	< T	< T	< T	0.68	< T	< T	1.44	0.04	< T	2.83	< T	< 0.45	2.83	< 0.87
Butyl Thiocyanate		< T	< T	< T	< 0.55	< T	< T	< T	< T	< T	< T	< T	< 0.05	< 0.55	< 0.16
Butylbenzylphthalate	85-68-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Butyraldehyde	00123-72-8	< T	< T	< T	< T	< 0.03	< 0.01	< T	< T	< T	< T	< T	< 0.00	< 0.03	< 0.01
C10H14 Alkyl Benzene		< T	< 0.75	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.07	< 0.75	< 0.22
C10H18 Cyclic Alkene		< T	< T	0.55	T	< T	< T	< T	T	< T	T	2.70	< 0.30	2.70	< 0.78
C10H20 Alkene		< T	< T	< 0.04	< T	< T	< T	< T	< T	< 2.08	< T	< 0.25	< 0.22	< 2.08	< 0.60
C10H22 Alkane		< T	< T	< T	< T	< T	< T	< T	< 0.23	< T	< T	< T	< 0.02	< 0.23	< 0.07
C11H22 Alkene		< T	< T	< 0.19	< T	< 0.03	< T	< T	< T	< 8.86	< T	< 0.89	< 0.91	< 8.86	< 2.53
C11H22 Cyclic Alkene		< T	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.31	< 0.03	< 0.31	< 0.09
C11H24 Alkane		< T	< T	< T	< 0.06	< 0.06	< 0.03	< T	< T	< T	< T	< T	< 0.01	< 0.06	< 0.02
C12H24 Alkene		< T	< T	0.58	T	< T	T	< T	T	9.44	T	3.77	< 1.25	9.44	< 2.80
C12H26 Alkane		< T	< T	< T	< T	< T	< 0.04	< T	< T	< T	< T	< T	< 0.00	< 0.04	< 0.01
C6H12 Alkene		< 0.05	< T	< 0.04	< T	< T	< T	< T	< T	< T	< T	< 0.13	< 0.02	< 0.13	< 0.04
C7H16 Alkane		< T	< T	< T	< T	< T	< T	< T	< 0.69	< T	< T	< T	< 0.06	< 0.69	< 0.20
C9H12 Cyclic Alkene		< T	< T	< T	< T	< 0.11	< 0.35	< T	< T	< T	< T	< T	< 0.04	< 0.35	< 0.10
Camphene	79-92-5	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.03	< 0.01	< 0.03	< 0.01
Carbon disulfide	75-15-0	< 0.08	0.39	< 0.07	57.47	0.48	0.17	25.18	28.88	50.83	0.05	0.78	< 14.94	57.47	< 21.10
Carbon tetrachloride	56-23-5	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.05	11.15	< 0.03	0.03	< 0.03	< 1.04	11.15	< 3.20
Carbonyl Sulfide	00463-58-1	< T	< T	< T	< 0.68	< 0.06	< T	< 0.19	< 0.28	< 7.45	< T	< T	< 0.79	< 7.45	< 2.12
Chlorobenzene	108-90-7	0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.05	< 0.06	0.03	< 0.02	< 0.03	< 0.03	0.08	< 0.02
Chlorodibromomethane	00124-48-1	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.05	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
Chloroethane	75-003	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
Chloroform	67-66-3	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.05	3.23	< 0.03	0.03	< 0.03	< 0.32	3.23	< 0.92
Chloromethane	74-87-3	< 0.03	< 0.04	< 0.02	< 0.08	< 0.03	< 0.02	< 0.06	< 0.06	< 0.03	< 0.23	< 0.07	< 0.06	< 0.23	< 0.06
Chloroprene	126-99-8	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	0.09	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	0.09	< 0.03
Chrysene	218-01-9	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
cis-1,2-Dichloroethene	156-59-2	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
cis-1,3-Dichloropropene	10061-01-5	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.05	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
cis-2-Butene	00590-18-1	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
cis-2-Hexene	07688-21-3	< 0.00	< 0.02	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.02	< 0.01
cis-2-Pentene	00627-20-3	0.49	< 0.57	0.10	0.45	0.12	0.31	1.47	< 0.14	0.00	11.79	< 0.43	< 1.44	11.79	< 3.29
Cumene	98-82-8	0.01	0.01	0.01	0.01	0.11	0.10	0.00	0.01	0.00	0.01	0.03	0.03	0.11	0.04
Cyclohexane	110-82-7	0.21	0.42	0.13	0.41	0.03	0.07	0.19	< 0.22	< 0.00	0.16	0.14	< 0.18	0.42	< 0.13
Cyclohexanone	108-94-1	6.63	1.99	10.48	0.18	0.05	0.03	0.24	0.08	0.09	0.44	0.15	1.85	10.48	3.31
Cyclohexene	110-83-8	0.48	0.58	0.24	< 0.00	< 0.00	< 0.00	0.00	0.00	< 0.00	0.00	< 0.00	< 0.12	0.58	< 0.21

TABLE 4-7b
AUTOCLAVE ORGANIC SPECIATION FACTORS

Compound	CAS #	Cmpd. #4 % of TOT	Cmpd. #5 % of TOT	Cmpd. #6 % of TOT	Cmpd. #8 % of TOT	Cmpd. #9* % of TOT	Cmpd. #9 % of TOT	Cmpd. #11 % of TOT	Cmpd. #15 % of TOT	Cmpd. #18 % of TOT	Cmpd. #21 % of TOT	Cmpd. #22 % of TOT	MEAN % of TOT	MAX % of TOT	STD % of TOT
Cyclohexylamine	108-91-8	21.75	11.95	51.35	1.44	0.06	0.03	0.11	0.14	0.00	0.02	< 0.01	< 7.90	51.35	< 15.28
Cyclooctadiene		< T	< T	< T	< 0.05	< T	< T	< T	< T	< T	< T	< T	< 0.00	< 0.05	< 0.01
Cyclopentane + 2,3-Dimethylbutane	0287-92-3/00079-29-	0.26	0.16	0.04	< 0.08	0.04	< 0.09	0.58	0.04	0.01	11.01	< 0.11	< 1.13	11.01	< 3.13
Cyclopentene	00142-29-0	0.17	0.31	< 0.01	0.11	< 0.01	< 0.00	< 0.01	0.14	< 0.01	0.02	0.04	< 0.08	0.31	< 0.09
Dibenzofuran	132-64-9	0.00	0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	0.00	< 0.00	< 0.00	< 0.00	< 0.00	0.01	< 0.00
Dibenz(a,h)anthracene	53-90-3	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
Dibromochloromethane	124-48-1	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Dichlorodifluoromethane	00075-71-8	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.05	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
Diethylphthalate	84-66-2	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	0.00	< 0.00	< 0.00	< 0.00	< 0.00	0.00	< 0.00
Diisopropylbenzene Isomer		< T	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.31	< 0.03	< 0.31	< 0.09
Dimethyl Cyclohexane	27195-67-1	< T	< T	< T	< T	< T	< T	< T	< 0.23	< T	< T	< T	< 0.02	< 0.23	< 0.07
Dimethyl Cyclohexane Isomer		< 0.16	< 0.15	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.03	< 0.16	< 0.06
Dimethylaminoazobenzene	60-11-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
Dimethylphthalate	131-11-3	< 0.00	< 0.00	< 0.00	0.00	< 0.00	< 0.00	0.00	0.00	< 0.00	0.00	< 0.00	< 0.00	0.00	< 0.00
Di-n-butylphthalate	84-74-2	< 0.00	0.00	0.00	< 0.00	0.01	0.01	0.00	0.09	0.00	0.01	0.14	< 0.02	0.14	< 0.05
Di-n-octylphthalate	117-84-0	< 0.00	< 0.00	< 0.00	0.00	< 0.00	< 0.00	0.00	0.00	< 0.00	0.00	< 0.00	< 0.00	0.00	< 0.00
Diphenylamine	122-39-4	0.11	0.06	0.94	0.01	0.60	0.99	0.32	0.01	0.01	0.00	0.22	0.30	0.99	0.36
d-Limonene	05989-27-5	< 0.03	0.91	0.08	< 0.27	< 0.04	< 0.65	3.88	0.12	< 0.08	0.02	< 0.39	< 0.59	3.88	< 1.08
Epichlorohydrin	00106-89-8	< 0.05	< 0.07	< 0.03	< 0.53	< 0.02	< 0.02	< 0.11	< 0.11	< 0.05	< 0.04	< 0.05	< 0.10	< 0.53	< 0.14
Ethane	00074-84-0	< 0.01	0.03	< 0.00	< 0.00	< 0.04	< 0.06	< 0.00	< 0.00	< 0.00	0.07	< 0.00	< 0.02	0.07	< 0.02
Ethenyl Cyclohexene	25168-07-4	< T	< T	< T	< T	< T	< T	< T	< 0.12	< T	< T	< T	< 0.01	< 0.12	< 0.03
Ethyl acrylate	140-88-5	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Ethylacetylene	00107-00-6	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
Ethylbenzene	100-41-4	0.85	0.32	0.35	0.58	0.27	0.37	< 0.02	1.75	0.01	0.17	0.55	< 0.48	1.75	< 0.47
Ethylene	00074-85-1	< 0.03	0.06	< 0.01	< 0.00	< 0.01	< 0.00	< 0.08	< 0.01	< 0.00	< 0.01	< 0.02	< 0.02	0.08	< 0.02
Ethylene dibromide	106-93-4	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Fluoranthene	206-44-0	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.14	0.02	0.14	0.04
Fluorene	86-73-7	0.01	0.01	< 0.02	0.00	< 0.00	< 0.00	< 0.00	0.00	< 0.00	< 0.00	0.01	< 0.01	0.02	< 0.01
Heptane	142-82-5	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Hexachlorobenzene	118-74-1	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.02	< 0.01	< 0.02	< 0.00
Hexachlorobutadiene	00087-68-3	< 0.05	< 0.07	< 0.03	< 0.16	< 0.03	< 0.06	< 0.04	< 0.11	< 0.05	< 0.04	< 0.05	< 0.06	< 0.16	< 0.04
Hexachlorobutadiene	87-68-3	< 0.00	< 0.00	< 0.00	< 0.01	0.03	0.05	< 0.01	< 0.00	< 0.00	< 0.00	0.01	< 0.01	0.05	< 0.02
Hexachlorocyclopentadiene	77-47-4	< 0.00	< 0.01	< 0.00	< 0.01	< 0.01	< 0.02	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.02	< 0.01
Hexachloroethane	67-72-1	< 0.00	< 0.01	< 0.00	< 0.01	< 0.01	< 0.02	< 0.02	0.10	< 0.00	0.00	< 0.01	< 0.02	0.10	< 0.03
Hydroquinone	123-31-9	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
Indeno(1,2,3-cd)pyrene	193-39-5	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
Iodomethane	74-88-4	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Isobutanal	00078-84-2	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.03	< T	< 0.00	< 0.03	< 0.01
Isobutane	00075-28-5	< 0.11	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	0.00	< 0.00	< 0.00	< 0.03	< 0.03	< 0.02	0.11	< 0.03
Isobutyl Butyrate	00539-90-2	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.12	< T	< 0.01	< 0.12	< 0.03
Isobutyl Thiocyanate		< T	T	< T	2.19	T	T	0.38	T	< T	T	< T	< 0.23	2.19	< 0.63
Isobutylene + 1-Butene	0115-11-7/00106-98-	< 0.06	0.77	0.05	1.15	0.31	0.03	0.28	1.89	< 0.09	2.17	5.16	< 1.09	5.16	< 1.48
Isobutylisocyanate		< T	< T	< T	< T	< 0.02	< T	< T	< T	< T	< T	< T	< 0.00	< 0.02	< 0.00
Isooctane	540-84-1	0.09	0.13	0.03	0.15	0.00	0.03	2.08	0.21	< 0.00	0.20	0.07	< 0.27	2.08	< 0.58
Isooctanol	26952-21-6	0.48	< 0.04	4.56	< 0.11	0.89	1.35	< 26.71	15.83	9.38	5.79	2.23	< 6.12	26.71	< 7.99

TABLE 4-7b
AUTOCLAVE ORGANIC SPECIATION FACTORS

Compound	CAS #	Cmpd. #4 % of TOT	Cmpd. #5 % of TOT	Cmpd. #6 % of TOT	Cmpd. #8 % of TOT	Cmpd. #9* % of TOT	Cmpd. #9 % of TOT	Cmpd. #11 % of TOT	Cmpd. #15 % of TOT	Cmpd. #18 % of TOT	Cmpd. #21 % of TOT	Cmpd. #22 % of TOT	MEAN % of TOT	MAX % of TOT	STD % of TOT
Isopentane	00078-78-4	< 1.50	6.11	0.55	1.75	0.43	< 0.81	< 0.29	1.56	< 0.21	< 0.00	1.24	< 1.31	6.11	< 1.62
Isophorone	78-59-1	0.04	0.04	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	0.00	< 0.00	0.15	< 0.02	0.15	< 0.04
Isoprene	00078-79-5	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
m- & p-Ethyl Toluene	0620-14-4/00622-96-	0.39	T	0.10	T	< T	0.03	0.35	T	< T	T	< T	< 0.08	0.39	< 0.14
Methacrolein	00078-85-3	< T	< 0.10	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.01	< 0.10	< 0.03
Methyl Cyclohexane	00108-87-2	< 0.31	< 0.45	< 0.11	0.74	< T	0.11	< 0.00	0.58	< T	0.17	< T	< 0.22	0.74	< 0.25
Methyl Isothiocyanate	00556-61-6	< T	< T	< T	< 0.14	< T	< T	< T	< T	< T	< T	< T	< 0.01	< 0.14	< 0.04
Methyl methacrylate	80-62-6	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Methylacetylene	00074-99-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.72	< 0.00	< 0.00	< 0.00	< 0.00	< 0.07	< 0.72	< 0.21
Methylcyclohexane	00108-87-2	< 0.11	< 0.04	< 0.03	< 0.10	< 0.01	< 0.00	< 0.02	< 0.01	< 0.02	< 0.00	< 0.07	< 0.04	< 0.11	< 0.04
Methylcyclopentane	00096-37-7	< 0.06	< 0.17	< 0.03	0.14	< 0.02	0.08	0.12	0.19	< T	0.03	< 0.03	< 0.08	0.19	< 0.06
Methylene bis-chloroaniline	101-14-4	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.02	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.02	< 0.00
Methylene chloride	75-09-2	1.73	13.24	0.27	0.46	0.18	0.54	0.15	2.32	0.02	2.49	5.10	2.41	13.24	3.72
Methylheptene Isomer		< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.03	< T	< 0.00	< 0.03	< 0.01
m-Ethyltoluene	00620-14-4	0.30	0.26	0.20	< 0.14	0.08	< 0.06	1.22	0.10	0.04	0.02	0.31	< 0.25	1.22	< 0.32
m-/p-Xylene	108-38-3/106-42-3	7.96	11.16	1.17	2.91	1.05	1.20	0.08	6.37	0.07	0.63	2.00	3.15	11.16	3.52
Naphthalene	00091-20-3	< T	< T	< 0.11	< T	< T	< T	< 0.13	< T	< T	< T	< 0.16	< 0.04	< 0.16	< 0.06
Naphthalene	91-20-3	0.05	0.05	0.12	0.04	0.01	0.02	0.02	0.06	0.00	0.00	0.14	0.05	0.14	0.04
n-Butane	00106-97-8	< 0.17	0.12	0.10	< 0.13	< 0.01	< 0.06	0.14	< 0.05	< 0.04	0.20	0.18	< 0.11	0.20	< 0.06
N-Butyl acetate	123-86-4	< 0.00	< 0.00	< 0.00	< 0.00	0.12	0.12	0.48	< 0.00	< 0.00	0.63	0.17	< 0.14	0.63	< 0.21
n-Decane	00124-18-5	0.17	0.72	0.09	< 0.22	0.05	< 0.05	0.01	0.20	0.05	0.03	0.30	< 0.17	0.72	< 0.20
n-Dodecane	00112-40-3	< T	< 0.75	< T	< T	< T	< T	< 0.63	< T	< T	< T	< T	< 0.13	< 0.75	< 0.27
n-Heptane	00142-82-5	0.72	0.88	0.26	1.25	0.13	< 0.24	0.39	1.40	T	0.61	0.34	< 0.57	1.40	< 0.44
n-Hexane	110-54-3	0.33	0.55	0.13	0.59	0.10	0.23	0.27	< 0.36	0.00	0.10	0.17	< 0.26	0.59	< 0.18
Nitrobenzene	98-95-3	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
N-Nitrosodiethylamine	55-18-5	< 0.01	< 0.01	< 0.01	< 0.02	< 0.02	< 0.03	< 0.01	< 0.01	< 0.00	< 0.00	< 0.02	< 0.01	< 0.03	< 0.01
n-Nitrosodimethylamine	62-75-9	< 0.01	< 0.01	< 0.01	< 0.02	< 0.02	< 0.02	< 0.01	< 0.01	< 0.00	< 0.00	< 0.02	< 0.01	< 0.02	< 0.01
N-Nitroso-di-n-propylamine	621-64-7	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.02	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.02	< 0.00
n-Nitrosomorpholine	59-89-2	< 0.00	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
Nonane	111-84-2	0.34	0.57	0.10	< 0.46	0.06	< 0.08	0.38	0.43	0.00	0.18	0.17	< 0.25	0.57	< 0.18
n-Pentane	00109-66-0	0.03	0.05	< 0.02	< 0.04	< 0.01	< 0.00	< 0.01	0.09	< 0.02	0.05	0.05	< 0.03	0.09	< 0.02
n-Propylbenzene	00103-65-1	0.08	0.11	< 0.07	0.13	< 0.01	< 0.00	0.01	0.05	< 0.03	0.02	0.14	< 0.06	0.14	< 0.05
n-Undecane	00112-21-4	< T	2.55	< T	T	T	T	< 0.01	T	< T	T	< T	< 0.23	2.55	< 0.73
N,N-Diethylaniline	91-66-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
N,N-Dimethylaniline	121-69-7	< 0.00	< 0.00	< 0.00	0.00	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	0.01	< 0.00
o-Anisidine	90-04-0	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
Octane	111-65-9	0.63	0.57	0.18	< 0.87	0.08	< 0.15	0.06	1.08	0.00	< 0.21	0.24	< 0.37	1.08	< 0.34
o-Ethyltoluene	00611-14-3	1.50	0.08	2.27	0.16	6.09	< 7.79	0.51	0.05	0.07	0.07	9.37	< 2.54	9.37	< 3.33
o-Toluidine	95-53-4	0.04	< 0.00	1.84	< 0.01	< 0.01	< 0.01	< 0.00	< 0.00	0.00	< 0.00	0.07	< 0.18	1.84	< 0.53
o-Xylene	95-47-6	0.88	0.76	0.40	0.72	1.02	0.36	5.67	1.44	0.00	4.68	1.23	1.56	5.67	1.76
p-Cymene	00099-87-6	0.11	1.69	0.19	0.82	< 0.05	< 0.01	< 0.04	0.08	0.24	0.04	0.83	< 0.37	1.69	< 0.51
Pentachloronitrobenzene	82-68-8	< 0.01	< 0.01	< 0.00	< 0.01	< 0.02	< 0.02	< 0.01	< 0.01	< 0.00	< 0.00	< 0.04	< 0.01	< 0.04	< 0.01
Pentachlorophenol	87-86-5	< 0.01	0.08	< 0.00	< 0.01	< 0.01	< 0.02	0.11	< 0.01	< 0.00	< 0.00	< 0.03	< 0.02	0.11	< 0.03
p-Ethyltoluene	00622-96-8	0.18	0.10	0.11	< 0.05	< 0.01	< 0.00	0.23	0.08	< 0.02	0.01	0.21	< 0.09	0.23	< 0.08
Phenanthrene	85-01-8	0.01	0.01	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.14	0.02	0.14	0.04

TABLE 4-7b
AUTOCLAVE ORGANIC SPECIATION FACTORS

Compound	CAS #	Cmpd. #4 % of TOT	Cmpd. #5 % of TOT	Cmpd. #6 % of TOT	Cmpd. #8 % of TOT	Cmpd. #9* % of TOT	Cmpd. #9 % of TOT	Cmpd. #11 % of TOT	Cmpd. #15 % of TOT	Cmpd. #18 % of TOT	Cmpd. #21 % of TOT	Cmpd. #22 % of TOT	MEAN % of TOT	MAX % of TOT	STD % of TOT
Phenol	108-95-2	< 0.00	< 0.02	< 0.00	< 0.01	0.12	0.11	< 0.01	< 0.02	< 0.00	0.00	< 0.01	< 0.03	0.12	< 0.04
Phthalimide	85-41-6	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.02	< 0.01	0.00	< 0.00	< 0.00	< 0.01	< 0.01	0.02	< 0.00
Propane	00074-98-6	0.07	0.43	0.10	< 0.24	< 0.01	< 0.03	< 0.01	0.11	0.00	0.10	0.02	< 0.10	0.43	< 0.12
Propyl Butyrate	00105-66-8	< T	< T	< T	< T	< 0.03	< T	< T	< T	< T.	< T	< T	< 0.00	< 0.03	< 0.01
Propylene	00115-07-1	< 0.01	0.03	< 0.01	< 0.00	< 0.01	< 0.00	< 0.14	< 0.01	0.01	0.02	< 0.01	< 0.02	0.14	< 0.04
Propylene Oxide	00075-56-9	< 0.05	< 0.07	< 0.03	< 0.16	< 0.02	< 0.02	< 0.06	< 0.11	< 0.05	< 0.04	< 0.05	< 0.06	< 0.16	< 0.04
Pyrene	129-00-0	0.03	0.00	0.03	0.02	0.02	0.05	0.01	0.01	0.00	0.00	0.10	0.02	0.10	0.03
Pyridine	110-86-1	< 0.01	0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.00	0.00	< 0.01	< 0.01	0.01	< 0.00
S-Butyl acetate	105-46-4	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Styrene	100-42-5	0.23	0.13	0.40	< 0.05	0.10	0.05	0.01	0.13	0.01	0.00	0.41	< 0.14	0.41	< 0.14
t-Butanol	00075-65-0	< T	< T	< T	< T	< T	< T	< 0.05	< T	< T	< 0.15	< T	< 0.02	< 0.15	< 0.04
T-Butyl acetate	540-88-5	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	1.06	< 0.00	< 0.00	1.45	< 0.00	< 0.23	1.45	< 0.49
tert-Butyl methyl ether	1634-04-4	0.05	0.05	0.03	0.17	< 0.02	< 0.04	0.32	0.11	0.05	11.75	0.06	< 1.15	11.75	< 3.35
Tetrachloroethene	127-18-4	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	0.33	< 0.03	0.02	< 0.03	< 0.06	0.33	< 0.09
Tetrahydrofuran	109-99-9	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
Tetrahydromethylnaphthalene Isomer		< T	< 0.30	< T	< T	< T	< T	< T	< T	< T	< T	< T	< 0.03	< 0.30	< 0.09
Toluene	108-88-3	3.69	2.81	0.86	4.18	0.41	0.85	2.10	5.53	0.19	1.29	1.20	2.10	5.53	1.66
trans-1,2-Dichloroethene	156-60-5	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
trans-1,2-Dichloropropene	10061-02-6	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
trans-2-Butene	00624-64-6	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
trans-2-Hexene	04050-45-7	< 0.02	< 0.12	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.59	< 0.00	< 0.01	< 0.01	< 0.07	< 0.59	< 0.17
trans-2-Pentene	00646-04-8	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.02	< 0.01	< 0.02	< 0.00
Trichloroethene	79-01-6	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
Trichlorofluoromethane	75-69-4	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.05	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
Trichlortrifluoroethane	00076-13-1	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.05	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
Trifluralin	1582-09-8	< 0.00	< 0.01	< 0.00	< 0.01	< 0.02	< 0.02	< 0.01	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.02	< 0.01
Trimethyl Cyclopentane Isomer		< T	< T	< T	< T	< T	< T	< T	< 0.08	< T	< T	< T	< 0.01	< 0.08	< 0.02
Trimethylcyclohexane Isomer		< T	< T	< T	< T	< T	< T	< 0.05	< T	< T	< 0.33	< T	< 0.03	< 0.33	< 0.10
Unknown		0.34	< 0.38	0.04	0.07	0.03	< T	0.05	0.16	< T	0.08	< T	< 0.10	0.38	< 0.13
Vinyl acetate	108-05-4	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
Vinyl bromide	593-60-2	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Vinyl Chloride	75-01-4	< 0.03	< 0.04	< 0.01	< 0.08	< 0.01	< 0.01	< 0.06	< 0.06	< 0.03	< 0.02	< 0.03	< 0.03	< 0.08	< 0.02
Total Detected (lb/lb rubber)		5.6E-04	5.5E-04	8.1E-04	6.5E-04	1.1E-03	7.3E-04	3.4E-04	5.0E-04	2.0E-03	1.9E-03	2.3E-04			
Total with non-detects (lb/lb rubber)		5.62E-04	< 5.54E-04	< 8.27E-04	< 6.68E-04	< 1.22E-03	< 8.17E-04	< 3.55E-04	< 5.08E-04	< 2.09E-03	< 1.96E-03	< 2.37E-04			

NOTES T Tentatively Identified Compound (TIC) Not Identified In Summarized Category
% of Total Values Represent % of Total With Non-Detects

TABLE 4-7c
AUTOCLAVE AMINE SPECIATION FACTORS

	Cmpd.#4 % of TOT	Cmpd.#5 % of TOT	Cmpd.#6 % of TOT	Cmpd.#8 % of TOT	Cmpd.#9* % of TOT	Cmpd.#9 % of TOT	Cmpd.#11 % of TOT	Cmpd.#15 % of TOT	Cmpd.#18 % of TOT	Cmpd.#21 % of TOT	Cmpd.#22 % of TOT	MEAN % of TOT	MAX % of TOT	STD % of TOT
Trimethylamine	< 16.67	6.88	< 16.67	5.13	< 16.67	< 16.67	< 16.67	< 16.67	12.09	< 16.67	< 13.19	< 14.00	16.67	< 4.09
Dimethylamine	< 16.67	< 18.62	< 16.67	57.43	< 16.67	< 16.67	< 16.67	< 16.67	5.97	< 16.67	34.06	< 21.16	57.43	< 13.01
Diethylamine	< 16.67	< 18.62	< 16.67	< 9.36	< 16.67	< 16.67	< 16.67	< 16.67	< 20.49	< 16.67	< 13.19	< 16.21	< 20.49	< 2.72
Butylamine	< 16.67	< 18.62	< 16.67	< 9.36	< 16.67	< 16.67	< 16.67	< 16.67	< 20.49	< 16.67	< 13.19	< 16.21	< 20.49	< 2.72
Cyclohexylamine	< 16.67	< 18.62	< 16.67	< 9.36	< 16.67	< 16.67	< 16.67	< 16.67	< 20.49	< 16.67	< 13.19	< 16.21	< 20.49	< 2.72
Diphenylamine	< 16.67	< 18.62	< 16.67	< 9.36	< 16.67	< 16.67	< 16.67	< 16.67	< 20.49	< 16.67	< 13.19	< 16.21	< 20.49	< 2.72
Total Detected (lb/lb rubber)	0.00E+00	1.96E-09	0.00E+00	5.89E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.25E-08	0.00E+00	1.76E-08			
Total with non-detects (lb/lb rubber)	< 4.29E-08	< 2.86E-08	< 4.73E-08	< 9.42E-08	< 7.10E-08	< 4.69E-08	< 3.61E-08	< 5.11E-08	< 1.80E-07	< 3.19E-08	< 5.18E-08			

NOTE: % of Total Values Represent % of Total With Non-Detects

TABLE 4-7d
AUTOCLAVE SPECIATED SULFUR FACTORS

	CAS #	Cmpd.#4 % of TOT	Cmpd.#5 % of TOT	Cmpd.#6 % of TOT	Cmpd.#8 % of TOT	Cmpd.#9* % of TOT	Cmpd.#9 % of TOT	Cmpd.#11 % of TOT	Cmpd.#15 % of TOT	Cmpd.#18 % of TOT	Cmpd.#21 % of TOT	Cmpd.#22 % of TOT	MEAN % of TOT	MAX % of TOT	STD % of TOT
Carbonyl Sulfide	463-58-1	15.06	14.97	19.63	0.69	12.46	16.54	1.39	0.44	12.97	7.34	13.04	10.41	19.63	6.52
Methyl Mercaptan	74-93-1	2.71	1.35	2.41	0.00	0.70	1.84	0.04	0.02	0.11	1.78	1.58	1.14	2.71	0.96
Ethyl Mercaptan	75-08-1	3.41	1.72	3.05	0.00	0.89	2.33	0.04	0.03	0.14	2.25	2.00	1.44	3.41	1.22
Dimethyl Sulfide	75-18-3	3.41	1.72	3.05	0.00	1.61	2.33	0.04	0.03	0.14	5.28	2.00	1.78	5.28	1.62
Carbon Disulfide	75-15-0	9.28	44.87	12.69	99.24	65.86	31.85	97.61	98.82	83.84	37.07	42.61	56.70	99.24	32.48
Isopropyl Mercaptan	75-33-2	4.19	2.08	3.67	0.00	1.08	2.79	0.06	0.04	0.18	2.72	2.40	1.74	4.19	1.48
tert-Butyl Mercaptan	75-66-1	5.01	2.56	4.58	0.00	1.33	3.49	0.07	0.04	0.21	3.37	3.00	2.15	5.01	1.81
n-Propyl Mercaptan	107-03-9	4.19	2.08	3.67	0.00	1.08	2.79	0.06	0.04	0.18	2.72	2.40	1.74	4.19	1.48
Ethyl Methyl Sulfide	624-89-5	4.19	2.08	3.67	0.00	1.08	2.79	0.06	0.04	0.18	2.72	2.40	1.74	4.19	1.48
Thiophene	110-02-1	4.77	2.39	4.28	0.00	1.24	3.26	0.06	0.09	0.20	3.16	2.80	2.02	4.77	1.70
Isobutyl Mercaptan	513-44-0	5.01	2.56	4.58	0.00	1.33	3.49	0.07	0.04	0.21	3.37	3.00	2.15	5.01	1.81
Diethyl Sulfide	352-93-2	5.01	2.56	4.58	0.00	1.33	3.49	0.07	0.04	0.21	3.37	3.00	2.15	5.01	1.81
n-Butyl Mercaptan	109-79-5	5.01	2.56	4.58	0.00	1.33	3.49	0.07	0.04	0.21	3.37	3.00	2.15	5.01	1.81
Dimethyl Disulfide	624-92-0	2.58	3.41	2.35	0.00	1.92	1.79	0.03	0.05	0.11	4.32	1.54	1.65	4.32	1.41
3-Methylthiophene	616-44-4	5.45	2.74	4.89	0.01	1.42	3.73	0.07	0.06	0.23	3.61	3.20	2.31	5.45	1.95
Tetrahydrothiophene	110-01-0	4.87	2.42	4.28	0.00	1.26	3.26	0.06	0.04	0.21	3.17	2.80	2.03	4.87	1.72
2-Ethylthiophene	872-55-9	6.23	3.10	5.50	0.01	1.61	4.19	0.08	0.05	0.26	4.07	3.60	2.61	6.23	2.21
2,5-Dimethylthiophene	638-02-8	6.23	3.10	5.50	0.01	1.61	4.19	0.08	0.05	0.26	4.07	3.60	2.61	6.23	2.21
Diethyl Disulfide	110-81-6	3.41	1.72	3.05	0.00	0.89	2.33	0.04	0.03	0.14	2.25	2.00	1.44	3.41	1.22
Total Detected (lb/lb rubber)		6.69E-07	1.89E-06	8.29E-07	2.85E-03	5.23E-06	1.47E-06	1.44E-04	1.98E-04	6.85E-05	8.94E-07	1.82E-06			
Total with non-detects (lb/lb rubber)		< 3.04E-06	< 3.11E-06	< 2.79E-06	< 2.85E-03	< 6.54E-06	< 3.13E-06	< 1.45E-04	< 2.00E-04	< 7.07E-05	< 1.93E-06	< 3.34E-06			

NOTE: % of Total Values Represent % of Total With Non-Detects

Table 4-7e. Comparison of Autoclave Water-Borne Pollutants with Total Pollutant Emission Rates

Compound No.:	4	5	6	8	9 (a)	9	11	15	18	21	22
Water-Borne Pollutants (Aqueous matrix) (b) (Typical of Steam-Contact Systems)											
Semivolatiles (lbs/lb rubber)	1.55E-04	8.30E-05	5.29E-04	1.28E-05	6.30E-04	3.28E-04	6.01E-06	2.51E-05	1.74E-04	6.72E-05	1.74E-05
Volatiles (lbs/lb rubber)	1.37E-04	7.32E-05	6.00E-05	4.88E-06	2.48E-05	1.13E-05	3.28E-05	1.87E-05	4.15E-05	6.60E-04	5.58E-05
Sulfur Compounds (lbs/lb rubber)	6.69E-07	1.87E-06	8.29E-07	2.77E-03	4.90E-06	1.35E-06	1.36E-04	1.76E-04	1.11E-05	8.94E-07	1.70E-06
Total Emissions (Combined gaseous and aqueous matrices) (Typical of Non-Contact Systems)											
Semivolatiles (lbs/lb rubber)	1.78E-04	9.15E-05	6.06E-04	1.34E-05	8.11E-04	4.90E-04	1.02E-04	8.54E-05	2.01E-04	1.25E-04	2.17E-05
Volatiles (lbs/lb rubber)	3.99E-04	4.68E-04	2.39E-04	6.35E-04	4.05E-04	3.25E-04	2.42E-04	4.20E-04	1.85E-03	1.82E-03	2.14E-04
Sulfur Compounds (lbs/lb rubber)	6.69E-07	1.90E-06	8.29E-07	2.85E-03	5.23E-06	1.47E-06	1.44E-04	1.98E-04	6.85E-05	8.94E-07	1.82E-06
Percent of Pollutants Discharged in Aqueous Streams (c)											
Semivolatiles	87.2%	90.7%	87.3%	95.7%	77.7%	66.9%	5.9%	29.3%	86.5%	53.7%	80.2%
Volatiles	34.4%	15.6%	25.1%	0.8%	6.1%	3.5%	13.6%	4.5%	2.2%	36.3%	26.1%
Sulfur Compounds	100.0%	98.4%	100.0%	97.2%	93.7%	91.8%	94.4%	88.9%	16.2%	100.0%	93.4%

(a) Compound for this run had been previously extruded at a temperature of approximately 260 degrees F. All other rubber compounds cured in these autoclave test runs were unextruded rubber, processed by internal mixer and drop mill only.

(b) Water-borne organics from water trap and blowdown discharge.

(c) This percentage could possibly be omitted from use in an emissions inventory involving a steam contact autoclave. Discharges may actually be relevant to NPDES. Note that there is a potential for downstream fugitive emissions from these aqueous discharge streams.

TABLE 4-8a
PLATEN PRESS SUMMARY

Compound	Total VOCs, as methane (lbs/lb rubber)		Total Speciated Semivolatiles (lbs/lb rubber) with non-detects		Total Speciated Volatiles (lbs/lb rubber) with non-detects		Total Speciated Organics[1] (lbs/lb rubber) with non-detects		Total Sulfur (lbs/lb rubber) with non-detects	
1	3.10E-04	<	5.02E-05	<	1.76E-03	<	1.59E-03	<	7.66E-05	
2	1.51E-04	<	3.32E-05	<	1.73E-03	<	1.39E-03	<	5.95E-04	
3	3.77E-04	<	3.56E-05	<	3.02E-03	<	2.85E-03	<	7.48E-05	
5	5.56E-04	<	1.14E-04	<	6.59E-04	<	5.27E-04	<	1.08E-04	
7	9.34E-05	<	6.06E-05	<	1.65E-03	<	9.54E-04	<	1.52E-04	
9	1.68E-03	<	4.92E-04	<	5.57E-03	<	5.70E-03	<	9.08E-05	
10	3.15E-04	<	2.70E-05	<	3.04E-03	<	2.87E-03	<	1.04E-03	
11	2.35E-04	<	1.02E-04	<	2.52E-03	<	2.50E-03	<	3.42E-04	
12	2.53E-04	<	3.46E-05	<	2.77E-03	<	2.61E-03	<	5.74E-04	
13	5.21E-04	<	4.09E-05	<	3.11E-03	<	2.80E-03	<	7.88E-04	
14	1.93E-04	<	3.42E-05	<	4.09E-03	<	3.93E-03	<	7.60E-04	
16	2.91E-04	<	3.91E-05	<	2.15E-03	<	1.99E-03	<	7.48E-05	
17	2.25E-03	<	1.05E-03	<	3.10E-03	<	3.95E-03	<	7.48E-05	
19	2.43E-03	<	7.23E-05	<	3.86E-03	<	3.60E-03	<	6.98E-05	
20	2.26E-04	<	1.76E-05	<	3.04E-03	<	2.87E-03	<	7.22E-05	
22	4.68E-04	<	3.73E-05	<	3.16E-03	<	2.89E-03	<	9.58E-05	
23	1.12E-04	<	4.90E-05	<	1.56E-03	<	1.41E-03	<	1.01E-04	
Mean	6.15E-04	<	1.35E-04	<	2.75E-03	<	2.61E-03	<	2.99E-04	
Max.	2.43E-03	<	1.05E-03	<	5.57E-03	<	5.70E-03	<	1.04E-03	
Std. Dev.	7.21E-04	<	2.52E-04	<	1.11E-03	<	1.23E-03	<	3.12E-04	

[1] - Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

TABLE 4 - 8.B PLATEN PRESS ORGANIC SPECIATION FACTORS

		CAS #	Cmpd. #1 % of Total	Cmpd. #2 % of Total	Cmpd. #3 % of Total	Cmpd. #5 % of Total	Cmpd. #7 % of Total	Cmpd. #9 % of Total	Cmpd. #10 % of Total	Cmpd. #11 % of Total	Cmpd. #12 % of Total	Cmpd. #13 % of Total
*	1-Butanol	00071-36-3	T	T	0.33	T	T	T	0.33	T	T	0.85
1 *	1-Chloro-4-)1-Chloroethenyl)-Cyclohexen		T	T	T	T	T	T	T	0.19	T	T
1 *	1-Chloro-5-)1-Chloroethenyl)-Cyclohexen		T	T	T	T	T	T	T	0.12	T	T
	1-Pentene	109-67-1	< 0.06	1.02	0.28	< 0.31	< 0.20	< 0.02	< 0.03	< 0.03	< 0.03	< 0.03
1 *	1,1-Difluoroethane	00075-34-3	T	T	T	T	T	T	T	0.63	T	T
1	1,1,1-Trichloroethane	00071-55-6	0.22	0.18	0.11	0.72	0.44	0.07	0.09	< 0.11	1.16	12.72
	1,2,4-Trichlorobenzene	120-82-1	< 0.02	< 0.01	< 0.01	< 0.04	< 0.04	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01
	1,2,4-Trimethylbenzene	95-63-6	0.05	0.06	0.02	0.11	0.06	0.01	0.01	0.01	0.01	< 0.00
	1,3-Butadiene	106-99-0	< 0.05	0.66	< 0.02	1.11	0.99	0.13	0.26	< 0.04	< 0.03	< 0.02
1 *	1,3-Dioxolane		T	T	T	0.21	T	T	T	T	T	T
1 *	1,4-Dichloro-1,3-Butadiene	02984-42-1	T	T	T	T	T	T	T	0.03	T	T
	1,4-Dichlorobenzene	106-46-7	0.01	0.01	0.00	< 0.03	0.01	< 0.00	0.00	< 0.00	0.00	< 0.00
	1,4-Diethylbenzene + n-Butylbenzene	105-05-5/104-51-8	< 0.57	< 0.63	< 0.31	< 2.19	< 1.88	1.46	< 0.31	< 0.28	< 0.32	< 0.30
1	2-Butanone	00078-93-3	0.12	0.20	0.10	0.39	< 2.70	0.05	< 0.18	< 0.07	0.05	< 0.42
1 *	2-Butene	00126-99-8	T	T	T	0.17	T	T	T	T	T	T
1 *	2-Chloro-1,3-Butadiene	00126-99-8	T	T	T	T	T	T	T	0.36	T	T
	2-Chloronaphthalene	91-58-7	< 0.01	< 0.00	< 0.00	< 0.02	< 0.02	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	2-Furaldehyde	98-01-1	0.01	0.03	0.01	0.04	0.04	0.00	0.01	0.01	0.03	0.00
	2-Methyl-1-butene	563-46-2	< 0.06	< 0.07	0.08	< 0.23	< 0.20	< 0.02	< 0.03	< 0.03	< 0.03	< 0.03
	2-Methyl-2-butene	513-35-9	< 0.06	< 0.07	< 0.03	< 0.23	< 0.20	4.69	< 0.03	< 0.03	< 0.03	< 0.03
	2-Methylnaphthalene	91-57-6	0.01	0.02	0.01	0.38	0.02	0.00	0.00	0.01	0.01	0.00
	2-Methylpentane	107-83-5	0.07	0.10	< 0.04	< 0.22	< 0.24	< 0.02	< 0.04	< 0.04	< 0.04	< 0.04
	2-Methylphenol	95-48-7	< 0.02	< 0.01	0.00	< 0.04	< 0.03	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01
	2,2-Dimethylbutane	75-83-2	< 0.07	< 0.08	< 0.04	< 0.28	< 0.24	< 0.02	< 0.04	< 0.04	< 0.04	< 0.04
1 *	3-Heptanone	00106-35-4	T	T	T	T	T	T	T	0.03	T	T
	3-Methylhexane	589-34-4	< 0.08	< 0.09	< 0.05	0.50	< 0.28	< 0.03	< 0.05	< 0.04	< 0.05	< 0.04
	3-Methylpentane	96-14-0	0.08	0.18	0.04	< 0.35	< 0.24	< 0.02	< 0.04	0.20	0.04	< 0.04
	3-Methylstyrene	100-80-1	< 0.02	0.00	0.00	< 0.03	< 0.03	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	3/4-Methylphenol	108-39-4/106-44-5	< 0.02	< 0.01	0.00	< 0.04	< 0.03	< 0.00	0.00	< 0.01	< 0.00	< 0.00
	4-Chloroaniline	106-47-8	< 0.01	< 0.01	< 0.00	< 0.03	< 0.02	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	4-Chlorostyrene	1073-67-2	< 0.02	0.02	< 0.00	< 0.03	< 0.03	< 0.00	< 0.00	0.01	0.01	< 0.00
	4-Methyl-2-pentanone	00108-10-1	< 0.16	< 0.45	4.09	< 0.30	< 1.35	< 0.05	< 0.09	< 0.04	< 0.09	< 0.21
	Acenaphthene	83-32-9	< 0.01	< 0.01	0.00	0.01	< 0.02	0.00	0.00	< 0.00	0.00	< 0.00
	Acenaphthylene	208-96-8	< 0.01	< 0.00	0.01	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
1 *	Acetaldehyde	00075-07-0	T	T	T	1.27	T	0.13	T	0.07	T	T
1	Acetone	00067-64-1	0.77	1.58	0.56	9.94	1.79	1.21	0.35	1.10	0.44	0.49
1	Acetonitrile	01722-09-4	< 0.32	< 0.90	< 0.18	1.04	< 2.70	< 0.11	< 0.18	< 0.08	< 0.19	< 0.42
	Acetophenone	98-86-2	0.03	0.10	0.01	T	0.09	7.71	0.02	T	0.08	0.02
	Acetylene	74-86-2	0.05	0.10	0.03	< 0.13	< 0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1	Acrylonitrile	00107-13-1	< 0.32	< 0.90	< 0.18	< 0.51	< 2.70	< 0.11	< 0.18	< 0.08	< 0.19	< 0.42
1 *	Alpha-Methyl Sytrene		T	T	T	0.21	T	0.54	T	T	T	T
	Aniline	62-53-3	< 0.01	0.03	0.02	0.38	< 0.02	< 0.00	< 0.00	0.01	< 0.00	< 0.00
	Benzaldehyde	100-52-7	0.06	0.08	0.04	0.13	0.12	0.02	0.03	0.02	0.05	0.03
	Benzene	71-43-2	0.07	0.10	0.04	< 0.22	< 0.22	< 0.02	< 0.04	< 0.03	< 0.04	< 0.03
	Benzidine	92-87-5	< 0.01	< 0.01	< 0.00	0.86	< 0.02	< 0.00	< 0.00	< 0.01	< 0.00	< 0.00
	Benzoic acid	65-85-0	< 0.03	0.29	0.07	< 0.18	0.05	< 0.01	0.04	< 0.03	< 0.01	< 0.01
	Benzonitrile	100-47-0	< 0.01	< 0.00	< 0.00	< 0.02	< 0.02	0.06	< 0.00	< 0.00	< 0.00	< 0.00
	Benzyl alcohol	100-51-6	< 0.03	0.01	0.01	< 0.05	0.01	< 0.01	0.01	< 0.00	0.02	0.01
	Biphenyl	92-52-4	< 0.01	< 0.00	0.00	0.06	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	bis(2-Ethylhexyl)phthalate	117-81-7	0.26	0.18	0.07	0.73	1.21	0.05	0.10	0.07	0.14	0.64
1 *	Butane		0.61	T	0.33	T	T	T	T	T	T	T
	Butylbenzylphthalate	85-68-7	0.03	0.02	0.01	0.12	0.06	0.01	0.01	0.01	0.03	0.02
1 *	C12H24 Branched Alkene		T	T	T	T	T	T	T	T	T	4.24
1 *	C9-C10 Branched Alkane		T	T	T	T	T	T	T	T	T	T
	Camphene	79-92-5	0.05	0.05	0.02	< 0.13	0.11	0.02	0.03	0.02	0.03	< 0.00
1	Carbon Disulfide	00075-15-0	0.14	38.43	0.11	0.66	< 1.35	0.07	46.06	13.87	21.99	33.91
1 *	Carbonyl Sulfide	00463-58-1	T	T	T	T	T	T	T	0.03	0.35	T
1 *	Chlorodifluoromethane		T	T	T	0.21	T	T	T	T	T	T
1	Chloroethane	00075-00-3	< 0.16	< 0.45	< 0.09	< 0.25	< 1.35	< 0.05	< 0.09	< 0.04	< 0.09	< 0.21
1	Chloromethane	00074-87-3	0.07	< 0.45	0.03	< 0.25	< 1.35	< 0.05	< 0.09	< 0.04	0.03	< 0.21
	cis-2-Pentene	627-20-3	7.21	3.17	6.06	8.96	5.12	< 0.02	3.78	4.61	5.60	< 0.03
	Cumene	98-82-8	0.00	0.00	0.00	0.02	0.01	0.05	0.00	0.00	0.00	0.00
1 *	Cyclobutane		T	T	0.55	T	T	T	T	T	T	T
	Cyclohexanone	108-94-1	0.03	< 0.01	0.02	2.54	< 0.05	0.01	< 0.01	0.01	0.01	< 0.01
*	Cyclohexene	00110-82-7	T	T	T	0.59	T	T	T	T	T	T
1 *	Cyclooctadiene		T	T	T	T	T	T	T	T	T	T
	Cyclopentane + 2,3-Dimethylbutane	287-92-3/79-29-8	0.05	0.12	0.05	< 0.31	< 0.22	< 0.02	< 0.04	< 0.03	< 0.04	< 0.03

TABLE 4 - 8.B PLATEN PRESS ORGANIC SPECIATION FACTORS

		CAS #	Cmpd. #1 % of Total	Cmpd. #2 % of Total	Cmpd. #3 % of Total	Cmpd. #5 % of Total	Cmpd. #7 % of Total	Cmpd. #9 % of Total	Cmpd. #10 % of Total	Cmpd. #11 % of Total	Cmpd. #12 % of Total	Cmpd. #13 % of Total
	Dibenzofuran	132-64-9	0.00	0.00	0.01	< 0.01	< 0.01	< 0.00	0.00	< 0.00	0.00	0.00
1	Dichlorodifluoromethane	00075-71-8	0.10	< 0.45	0.08	< 0.25	< 1.35	< 0.05	0.06	< 0.04	0.07	< 0.21
	Diethylphthalate	84-66-2	0.06	0.04	0.02	0.09	0.08	0.01	0.02	0.01	0.04	0.01
	Dimethylphthalate	131-11-3	< 0.01	0.01	< 0.00	0.03	< 0.02	0.00	< 0.00	< 0.00	< 0.00	< 0.00
	Di-n-butylphthalate	84-74-2	0.00	0.15	0.01	0.03	0.08	0.13	0.00	T	0.01	T
	Di-n-octylphthalate	117-84-0	0.01	0.01	< 0.00	< 0.04	< 0.01	0.00	0.01	< 0.00	0.01	< 0.00
	Diphenylamine	122-39-4	< 0.01	0.03	0.00	0.11	< 0.02	0.08	0.00	0.04	0.04	0.01
	Ethane	74-84-0	0.24	0.27	0.09	1.14	0.49	0.12	0.12	0.15	0.14	0.10
1 *	Ethanol		T	T	T	0.42	T	T	3.29	T	T	0.64
	Ethylbenzene	100-41-4	< 0.09	< 0.10	< 0.05	0.25	< 0.30	< 0.03	< 0.05	< 0.04	< 0.05	< 0.05
	Ethylene	74-85-1	0.13	0.15	0.06	< 0.29	< 0.08	< 0.01	< 0.01	< 0.03	< 0.01	< 0.01
	Fluoranthene	206-44-0	0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	Fluorene	86-73-7	0.00	0.00	0.00	0.02	< 0.02	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	Hexachlorobutadiene	87-68-3	< 0.04	< 0.02	< 0.01	< 0.06	< 0.07	0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Isobutane	75-28-5	0.15	0.15	0.07	< 0.19	0.31	< 0.02	< 0.03	< 0.03	< 0.03	< 0.03
	Isobutylene + 1-Butene	115-11-7/106-98-9	2.13	< 0.05	1.23	0.30	< 0.16	< 0.02	< 0.03	0.38	2.97	< 0.02
	Isooctanol	26952-21-6	< 0.25	< 0.10	0.11	< 0.43	< 0.42	< 0.05	0.14	3.00	< 0.06	< 0.06
	Isopentane	78-78-4	0.72	0.99	0.45	6.60	0.97	0.44	0.22	0.99	0.22	< 0.03
	Isoprene	78-79-5	< 0.06	0.03	< 0.03	< 0.22	< 0.19	< 0.02	< 0.03	< 0.03	< 0.03	< 0.03
1 *	Isopropanol	00067-63-0	0.61	4.52	1.11	1.06	T	T	T	0.03	0.69	T
	Methylcyclopentane	96-37-7	0.10	0.16	0.09	0.39	< 0.24	0.04	< 0.04	0.05	< 0.04	< 0.04
1	Methylene Chloride	00075-09-2	78.99	29.38	79.59	33.30	54.01	80.46	40.58	66.70	61.34	40.27
	m-Xylene + p-Xylene	108-38-3/106-42-3	0.06	0.14	0.32	1.75	0.34	< 0.03	< 0.05	< 0.04	< 0.05	< 0.05
	Naphthalene	91-20-3	0.02	0.03	0.02	0.30	0.25	0.07	0.01	0.07	0.01	0.01
	n-Butane	106-97-8	0.83	0.53	0.43	0.58	0.71	0.04	0.09	0.06	< 0.03	< 0.03
	n-Decane	124-18-5	< 0.60	< 0.67	< 0.33	0.50	< 2.00	< 0.20	< 0.32	< 0.29	< 0.34	< 0.31
	n-Hexane	110-54-3	0.47	0.74	0.24	3.15	0.97	0.29	0.14	1.25	0.10	< 0.04
	n-Pentane	109-66-0	0.08	0.24	< 0.03	< 0.23	< 0.20	< 0.02	< 0.03	< 0.03	< 0.03	< 0.03
	n-Propylbenzene	103-65-1	< 0.10	< 0.11	< 0.06	< 0.39	< 0.34	< 0.03	< 0.05	< 0.05	< 0.06	< 0.05
1 *	n-Undecane	00112-21-4	T	T	T	2.54	T	T	T	0.03	T	T
	o-Ethyltoluene	611-14-3	< 0.51	< 0.57	< 0.28	< 1.96	< 1.69	0.26	< 0.27	< 0.25	< 0.29	< 0.26
	o-Toluidine	95-53-4	< 0.01	0.11	< 0.00	< 0.03	< 0.02	< 0.00	< 0.00	< 0.00	0.08	< 0.00
	o-Xylene	95-47-6	< 0.09	< 0.10	< 0.05	0.38	0.19	< 0.03	< 0.05	< 0.04	< 0.05	< 0.05
	Phenanthrene	85-01-8	0.01	0.02	0.01	0.05	0.02	0.00	0.00	0.00	0.01	0.00
	Phenol	108-95-2	0.04	0.04	0.02	0.18	0.04	0.02	0.01	0.02	0.02	0.03
	Phthalimide	85-41-6	< 0.05	< 0.03	0.12	< 0.08	< 0.09	< 0.01	0.06	< 0.01	0.03	< 0.02
	Propane	74-98-6	0.20	< 0.04	0.07	0.83	0.31	0.04	0.07	0.06	< 0.02	< 0.02
	Propylene	115-07-1	0.05	0.07	< 0.02	0.23	< 0.12	< 0.01	< 0.02	< 0.04	< 0.02	0.10
1	Propylene Oxide	00075-56-9	< 0.32	7.46	< 0.18	< 0.51	< 2.70	< 0.11	< 0.18	1.45	< 0.19	< 0.42
	Pyrene	129-00-0	0.01	0.01	0.00	< 0.02	< 0.01	0.00	0.00	< 0.00	0.01	0.00
1 *	tert-Butyl Alcohol		T	T	0.33	T	T	T	1.10	T	1.16	0.95
1	Tetrachloroethene	00127-18-4	< 0.16	< 0.45	0.02	< 0.25	< 1.35	< 0.05	< 0.09	< 0.04	< 0.09	< 0.21
	Toluene	108-88-3	0.27	0.45	0.21	2.24	0.31	0.05	0.10	0.09	0.11	< 0.04
	trans-2-Pentene	646-04-8	< 0.06	0.03	< 0.03	< 0.23	< 0.20	< 0.02	< 0.03	< 0.03	< 0.03	< 0.03
1	Trichlorofluoromethane	00075-69-4	0.19	< 0.45	0.10	0.56	< 1.35	< 0.05	0.08	< 0.06	0.12	< 0.21
1 *	(1-Methoxy-1-Methylethyl)-Benzene		T	T	T	T	T	0.27	T	T	T	T
	Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	TOTAL Detected (lb/lb rubber)		1.52E-03	1.29E-03	2.79E-03	4.66E-04	6.60E-04	5.62E-03	2.79E-03	2.44E-03	2.54E-03	2.66E-03
	TOTAL with non-detects (lb/lb rubber)		< 1.59E-03	< 1.39E-03	< 2.85E-03	< 5.27E-04	< 9.54E-04	< 5.70E-03	< 2.87E-03	< 2.50E-03	< 2.61E-03	< 2.80E-03

1 - Results from Method TO-14 * - Tentatively Identified ompound

TABLE 4 - 8.B PLATEN PRESS ORGANIC SPECIATION FACTORS

		CAS #	Cmpd. #14 % of Total	Cmpd. #16 % of Total	Cmpd. #17 % of Total	Cmpd. #19 % of Total	Cmpd. #20 % of Total	Cmpd. #22 % of Total	Cmpd. #23 % of Total	TOTAL Mean % of Total	TOTAL MAX % of Total	TOTAL STD % of Total
*	1-Butanol	00071-36-3	0.33	0.47	0.24	T	T	T	T	< 0.15	< 0.85	< 0.24
1 *	1-Chloro-4-)1-Chloroethenyl)-Cyclohexen		T	T	T	T	T	T	T	< 0.01	< 0.19	< 0.04
1 *	1-Chloro-5-)1-Chloroethenyl)-Cyclohexen		T	T	T	T	T	T	T	< 0.01	< 0.12	< 0.03
	1-Pentene	109-67-1	< 0.02	0.08	5.11	< 0.02	< 0.03	< 0.03	< 0.06	< 0.43	< 5.11	< 1.19
1 *	1,1-Difluoroethane	00075-34-3	T	T	T	T	T	0.31	T	< 0.06	< 0.63	< 0.18
1	1,1,1-Trichloroethane	00071-55-6	0.05	0.12	0.38	0.06	0.12	0.16	0.14	< 0.99	< 12.72	< 2.94
	1,2,4-Trichlorobenzene	120-82-1	< 0.00	< 0.01	0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.04	< 0.01
	1,2,4-Trimethylbenzene	95-63-6	0.02	0.02	0.01	15.39	0.02	0.01	0.02	< 0.93	< 15.39	< 3.61
	1,3-Butadiene	106-99-0	0.55	< 0.04	< 0.02	0.28	0.89	< 0.02	0.48	< 0.34	< 1.11	< 0.38
1 *	1,3-Dioxolane		T	T	T	T	T	T	T	< 0.01	< 0.21	< 0.05
1 *	1,4-Dichloro-1,3-Butadiene	02984-42-1	T	T	T	T	T	T	T	< 0.00	< 0.03	< 0.01
	1,4-Dichlorobenzene	106-46-7	0.00	0.00	0.00	0.00	0.00	< 0.01	0.01	< 0.01	< 0.03	< 0.01
	1,4-Diethylbenzene + n-Butylbenzene	105-05-5/104-51-8	< 0.23	< 0.44	< 0.22	< 0.22	< 0.30	< 0.29	< 0.61	< 0.62	< 2.19	< 0.59
1	2-Butanone	00078-93-3	< 0.13	0.06	< 0.13	0.36	0.06	< 0.33	0.09	< 0.32	< 2.70	< 0.61
1 *	2-Butene	00126-99-8	T	T	T	T	T	0.17	T	< 0.02	< 0.17	< 0.08
1 *	2-Chloro-1,3-Butadiene	00126-99-8	T	T	T	T	T	0.14	T	< 0.03	< 0.36	< 0.09
	2-Chloronaphthalene	91-58-7	0.00	< 0.00	< 0.00	< 0.00	0.00	< 0.00	< 0.00	< 0.00	< 0.02	< 0.01
	2-Furaldehyde	98-01-1	0.01	0.01	< 0.00	< 0.01	0.01	0.00	0.01	< 0.01	< 0.04	< 0.01
	2-Methyl-1-butene	563-46-2	< 0.02	< 0.05	< 0.02	< 0.02	< 0.03	< 0.03	< 0.06	< 0.06	< 0.23	< 0.06
	2-Methyl-2-butene	513-35-9	< 0.02	< 0.05	< 0.02	< 0.02	< 0.03	< 3.26	< 0.06	< 0.52	< 4.69	< 1.29
	2-Methylnaphthalene	91-57-6	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.03	0.38	0.09
	2-Methylpentane	107-83-5	< 0.03	< 0.06	< 0.03	0.10	0.04	< 0.04	< 0.08	< 0.07	< 0.24	< 0.06
	2-Methylphenol	95-48-7	< 0.00	< 0.01	< 0.00	< 0.01	0.00	< 0.01	< 0.01	< 0.01	< 0.04	< 0.01
	2,2-Dimethylbutane	75-83-2	< 0.03	< 0.06	< 0.03	< 0.03	0.03	< 0.04	< 0.08	< 0.07	< 0.28	< 0.07
1 *	3-Heptanone	00106-35-4	T	T	T	T	T	0.10	T	< 0.01	< 0.10	< 0.02
	3-Methylhexane	589-34-4	< 0.03	< 0.07	< 0.03	< 0.03	< 0.04	< 0.04	< 0.09	< 0.09	< 0.50	< 0.12
	3-Methylpentane	96-14-0	< 0.03	< 0.06	< 0.03	0.32	0.05	< 0.04	< 0.08	< 0.11	< 0.35	< 0.10
	3-Methylstyrene	100-80-1	0.00	< 0.01	0.00	< 0.00	0.00	< 0.01	< 0.01	< 0.01	< 0.03	< 0.01
	3/4-Methylphenol	108-39-4/106-44-5	< 0.00	0.00	< 0.00	< 0.01	0.00	< 0.01	0.00	< 0.01	< 0.04	< 0.01
	4-Chloroaniline	106-47-8	< 0.00	< 0.00	0.02	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.03	< 0.01
	4-Chlorostyrene	1073-67-2	< 0.00	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.03	< 0.01
	4-Methyl-2-pentanone	00108-10-1	< 0.07	< 0.13	< 0.06	< 0.16	< 0.08	< 0.77	< 0.17	< 0.49	< 4.09	< 0.96
	Acenaphthene	83-32-9	< 0.00	< 0.00	< 0.00	< 0.00	0.00	0.00	0.00	< 0.00	< 0.02	< 0.01
	Acenaphthylene	208-96-8	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	0.00	< 0.00	< 0.00	< 0.01	< 0.00
1 *	Acetaldehyde	00075-07-0	T	T	T	T	T	0.14	T	< 0.09	< 1.27	< 0.30
1	Acetone	00067-64-1	0.27	0.60	0.30	24.79	0.39	0.88	0.68	2.71	24.79	5.94
1	Acetonitrile	01722-09-4	< 0.13	< 0.25	< 0.13	< 0.32	< 0.17	< 0.33	< 0.35	< 0.46	< 2.70	< 0.62
	Acetophenone	98-86-2	0.05	0.03	0.02	0.01	0.03	0.14	0.02	< 0.49	< 7.71	< 1.80
	Acetylene	74-86-2	0.02	< 0.02	0.04	0.05	0.03	< 0.02	< 0.02	< 0.04	< 0.13	< 0.03
1	Acrylonitrile	00107-13-1	0.77	< 0.25	< 0.13	< 0.32	< 0.17	< 0.33	< 0.35	< 0.46	< 2.70	< 0.60
1 *	Alpha-Methyl Sytrene		T	T	T	T	T	0.07	T	< 0.05	< 0.54	< 0.13
	Aniline	62-53-3	< 0.00	< 0.00	25.68	< 0.00	< 0.00	0.15	0.20	< 1.56	< 25.68	< 6.03
	Benzaldehyde	100-52-7	0.03	0.18	< 0.00	0.51	0.04	0.02	0.04	< 0.08	< 0.51	< 0.12
	Benzene	71-43-2	0.03	0.05	0.03	0.16	0.03	< 0.04	< 0.07	< 0.07	< 0.22	< 0.06
	Benzidine	92-87-5	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	0.01	< 0.01	< 0.06	< 0.86	< 0.20
	Benzoic acid	65-85-0	0.07	0.19	0.09	0.77	0.08	< 0.01	0.04	< 0.12	< 0.77	< 0.18
	Benzonitrile	100-47-0	< 0.00	0.01	< 0.00	< 0.00	< 0.00	0.01	< 0.00	< 0.01	< 0.06	< 0.01
	Benzyl alcohol	100-51-6	0.01	0.02	< 0.00	0.01	0.01	< 0.01	0.02	< 0.01	< 0.05	< 0.01
	Biphenyl	92-52-4	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.06	< 0.01
	bis(2-Ethylhexyl)phthalate	117-81-7	0.06	0.15	0.10	0.12	0.09	0.09	0.46	0.27	1.21	0.31
1 *	Butane		T	T	T	T	T	T	T	< 0.06	< 0.61	< 0.16
	Butylbenzylphthalate	85-68-7	0.01	0.03	0.01	0.01	0.01	0.02	0.04	0.03	0.12	0.03
1 *	C12H24 Branched Alkene		0.33	T	T	T	T	T	T	< 0.27	< 4.24	< 1.00
1 *	C9-C10 Branched Alkane		T	T	T	1.60	T	T	T	< 0.09	< 1.60	< 0.38
	Camphene	79-92-5	0.02	0.04	< 0.00	< 0.00	0.02	0.02	0.03	< 0.04	< 0.13	< 0.03
1	Carbon Disulfide	00075-15-0	22.06	0.28	0.16	< 0.16	0.15	5.65	0.61	< 10.92	< 46.06	< 15.18
1 *	Carbonyl Sulfide	00463-58-1	0.41	T	T	T	T	T	T	< 0.05	< 0.41	< 0.12
1 *	Chlorodifluoromethane		T	T	T	T	T	T	T	< 0.01	< 0.21	< 0.05
1	Chloroethane	00075-00-3	< 0.07	0.07	< 0.06	< 0.16	< 0.08	< 0.17	< 0.17	< 0.21	< 1.35	< 0.30
1	Chloromethane	00074-87-3	< 0.07	0.03	0.03	< 0.16	0.03	< 0.17	0.07	< 0.18	< 1.35	< 0.31
	cis-2-Pentene	627-20-3	4.77	6.65	2.37	8.28	6.79	< 1.68	7.00	< 4.83	< 8.96	< 2.60
	Cumene	98-82-8	0.00	< 0.00	0.00	< 0.00	0.00	0.00	0.00	< 0.01	< 0.05	< 0.01
1 *	Cyclobutane		T	T	T	T	T	T	T	< 0.03	< 0.55	< 0.13
	Cyclohexanone	108-94-1	0.01	0.02	< 0.00	< 0.01	0.00	0.01	0.05	< 0.16	< 2.54	< 0.59
*	Cyclohexene	00110-82-7	T	T	T	T	T	T	T	< 0.03	< 0.59	< 0.14
1 *	Cyclooctadiene		0.57	T	T	T	T	T	T	< 0.03	< 0.57	< 0.13
	Cyclopentane + 2,3-Dimethylbutane	287-92-3/79-29-8	< 0.03	< 0.05	< 0.03	0.13	0.02	< 0.03	< 0.07	< 0.07	< 0.31	< 0.08

TABLE 4 - 8.B PLATEN PRESS ORGANIC SPECIATION FACTORS

		CAS #	Cmpd. #14 % of Total	Cmpd. #16 % of Total	Cmpd. #17 % of Total	Cmpd. #19 % of Total	Cmpd. #20 % of Total	Cmpd. #22 % of Total	Cmpd. #23 % of Total	TOTAL Mean % of Total	TOTAL MAX % of Total	TOTAL STD % of Total
	Dibenzofuran	132-64-9	0.00	0.00	0.00	< 0.00	0.00	< 0.00	0.00	< 0.00	< 0.01	< 0.00
1	Dichlorodifluoromethane	00075-71-8	0.05	0.15	0.04	< 0.16	0.05	< 0.17	0.08	< 0.20	< 1.35	< 0.31
	Diethylphthalate	84-66-2	0.02	0.03	0.01	0.00	0.01	0.01	0.04	0.03	0.09	0.03
	Dimethylphthalate	131-11-3	0.00	0.00	0.00	< 0.00	< 0.00	0.00	< 0.00	< 0.01	< 0.03	< 0.01
	Di-n-butylphthalate	84-74-2	0.01	0.00	0.24	0.01	0.02	0.00	0.25	< 0.06	< 0.25	< 0.08
	Di-n-octylphthalate	117-84-0	0.00	0.01	< 0.00	0.00	0.01	< 0.00	0.02	< 0.01	< 0.04	< 0.01
	Diphenylamine	122-39-4	0.22	0.02	0.00	< 0.00	0.00	0.01	0.00	< 0.04	< 0.22	< 0.05
	Ethane	74-84-0	0.10	0.20	< 0.01	< 0.01	0.08	0.16	0.26	< 0.21	< 1.14	< 0.26
1 *	Ethanol		T	1.58	15.92	T	T	T	T	< 1.29	< 15.92	< 3.75
	Ethylbenzene	100-41-4	< 0.04	< 0.07	< 0.04	< 0.04	< 0.05	< 0.05	< 0.10	< 0.06	< 0.30	< 0.07
	Ethylene	74-85-1	0.03	< 0.02	< 0.01	< 0.01	0.05	< 0.04	< 0.03	< 0.06	< 0.29	< 0.07
	Fluoranthene	206-44-0	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
	Fluorene	86-73-7	< 0.00	< 0.00	0.00	< 0.00	0.00	< 0.00	< 0.00	< 0.00	< 0.02	< 0.01
	Hexachlorobutadiene	87-68-3	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00	< 0.01	< 0.02	< 0.02	< 0.07	< 0.02
	Isobutane	75-28-5	0.05	< 0.04	< 0.02	0.20	< 0.03	< 0.03	0.14	< 0.09	< 0.31	< 0.08
	Isobutylene + 1-Butene	115-11-7/106-98-9	< 0.02	2.40	2.04	0.30	< 0.02	0.72	< 0.05	< 0.76	< 2.97	< 0.97
	Isooctanol	26952-21-6	< 0.02	0.15	< 0.02	< 0.06	< 0.02	< 0.07	< 0.09	< 0.30	< 3.00	< 0.69
	Isopentane	78-78-4	0.20	0.36	0.43	25.20	0.29	0.39	0.38	< 2.29	< 25.20	< 5.91
	Isoprene	78-79-5	< 0.02	< 0.04	< 0.02	< 0.02	< 0.03	< 0.03	< 0.06	< 0.05	< 0.22	< 0.06
1 *	Isopropanol	00067-63-0	T	0.63	15.92	T	T	T	0.65	< 1.48	< 15.92	< 3.76
	Methylcyclopentane	96-37-7	< 0.03	< 0.06	< 0.03	0.48	0.10	< 0.04	< 0.08	< 0.12	< 0.48	< 0.13
1	Methylene Chloride	00075-09-2	66.18	79.09	27.86	5.44	86.69	79.64	80.68	58.36	86.69	23.75
	m-Xylene + p-Xylene	108-38-3/106-42-3	< 0.04	< 0.07	< 0.04	< 0.04	< 0.05	< 0.05	< 0.10	< 0.19	< 1.75	< 0.40
	Naphthalene	91-20-3	0.02	0.02	0.01	T	0.01	0.10	0.03	< 0.06	< 0.30	< 0.08
	n-Butane	106-97-8	0.17	< 0.04	0.23	0.21	0.27	0.12	0.20	< 0.27	< 0.83	< 0.25
	n-Decane	124-18-5	< 0.24	< 0.47	< 0.24	< 0.24	< 0.31	< 0.31	< 0.65	< 0.47	< 2.00	< 0.41
	n-Hexane	110-54-3	0.17	0.26	0.13	8.31	0.92	0.29	0.35	< 1.05	< 8.31	< 1.95
	n-Pentane	109-66-0	0.11	< 0.05	< 0.02	0.07	0.10	< 0.03	< 0.07	< 0.08	< 0.24	< 0.07
	n-Propylbenzene	103-65-1	< 0.04	< 0.08	< 0.04	0.16	< 0.05	< 0.05	< 0.11	< 0.10	< 0.39	< 0.10
1 *	n-Undecane	00112-21-4	T	T	T	T	T	T	T	< 0.15	< 2.54	< 0.60
	o-Ethyltoluene	611-14-3	< 0.20	< 0.40	< 0.20	< 0.20	< 0.26	< 0.20	< 0.55	< 0.49	< 1.96	< 0.50
	o-Toluidine	95-53-4	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.02	< 0.11	< 0.03
	o-Xylene	95-47-6	< 0.04	< 0.07	< 0.04	< 0.04	< 0.05	< 0.05	< 0.10	< 0.08	< 0.38	< 0.08
	Phenanthrene	85-01-8	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.05	0.01
	Phenol	108-95-2	0.07	0.03	< 0.00	< 0.00	0.02	0.02	0.03	< 0.03	< 0.18	< 0.04
	Phthalimide	85-41-6	0.05	0.29	0.22	< 0.01	0.00	< 0.01	1.15	< 0.13	< 1.15	< 0.27
	Propane	74-98-6	0.07	< 0.03	< 0.01	< 0.01	< 0.02	< 0.06	0.13	< 0.12	< 0.83	< 0.19
	Propylene	115-07-1	< 0.01	< 0.03	< 0.01	< 0.01	< 0.02	< 0.02	< 0.04	< 0.05	< 0.23	< 0.06
1	Propylene Oxide	00075-56-9	< 0.13	< 0.25	< 0.13	< 0.32	0.17	< 0.92	< 0.35	< 0.93	< 7.46	< 1.75
	Pyrene	129-00-0	0.00	0.00	0.00	< 0.00	0.00	0.00	0.00	< 0.01	< 0.02	< 0.01
1 *	tert-Butyl Alcohol		T	T	0.32	3.20	T	T	T	< 0.42	< 3.20	< 0.80
1	Tetrachloroethene	00127-18-4	< 0.07	< 0.13	< 0.06	< 0.16	< 0.08	< 0.17	< 0.17	< 0.21	< 1.35	< 0.30
	Toluene	108-88-3	0.10	1.99	0.08	0.28	0.16	0.15	0.39	< 0.41	< 2.24	< 0.63
	trans-2-Pentene	646-04-8	< 0.02	< 0.05	< 0.02	< 0.02	< 0.03	< 0.03	< 0.06	< 0.05	< 0.23	< 0.06
1	Trichlorofluoromethane	00075-69-4	0.07	0.16	0.05	< 0.16	0.12	< 0.17	0.16	< 0.24	< 1.35	< 0.31
1 *	(1-Methoxy-1-Methylethyl)-Benzene		T	T	T	T	T	T	T	< 0.02	< 0.27	< 0.06
	Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00			
	TOTAL Detected (lb/lb rubber)		3.86E-03	1.92E-03	3.88E-03	3.49E-03	2.81E-03	2.60E-03	1.34E-03			
	TOTAL with non-detects (lb/lb rubber)		< 3.93E-03	< 1.99E-03	< 3.95E-03	< 3.60E-03	< 2.87E-03	< 2.89E-03	< 1.41E-03			

1 - Results from Method TO-14 * - Tentatively Identified

TABLE 4 - 8.C PLATEN PRESS SULFUR SPECIATION FACTORS

	CAS #	Cmpd.#1 % of Total	Cmpd.#2 % of Total	Cmpd.#3 % of Total	Cmpd.#5 % of Total	Cmpd.#7 % of Total	Cmpd.#9 % of Total	Cmpd.#10 % of Total	Cmpd.#11 % of Total	Cmpd.#12 % of Total	Cmpd.#13 % of Total
Carbonyl Sulfide	463-58-1	< 61.24	8.02	< 61.25	< 68.62	< 76.30	< 61.27	< 0.32	< 1.21	8.66	4.61
Carbon Disulfide	75-15-0	< 38.76	91.98	< 38.75	< 31.38	< 23.70	< 38.73	99.68	98.79	91.34	95.39
Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total detected (lb/lb rubber)		0.00E+00	4.55E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.69E-04	2.65E-04	5.07E-04	7.22E-04
Total w/ non detects (lb/lb rubber)		< 5.16E-06	< 4.55E-04	< 5.03E-06	< 6.56E-06	< 8.44E-06	< 6.12E-06	< 9.72E-04	< 2.69E-04	< 5.07E-04	< 7.22E-04

	CAS #	Cmpd.#14 % of Total	Cmpd.#16 % of Total	Cmpd.#17 % of Total	Cmpd.#19 % of Total	Cmpd.#20 % of Total	Cmpd.#22 % of Total	Cmpd.#23 % of Total	TOTAL Mean % of Total	TOTAL MAX % of Total	TOTAL STD % of Total
Carbonyl Sulfide	463-58-1	12.78	< 61.25	< 61.25	< 61.25	< 61.25	< 68.22	81.87	44.67	81.87	29.26
Carbon Disulfide	75-15-0	87.22	< 38.75	< 38.75	< 38.75	< 38.75	< 31.78	18.13	55.33	99.68	29.26
Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00			
Total detected (lb/lb rubber)		6.88E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.23E-05			
Total w/ non detects (lb/lb rubber)		< 6.88E-04	< 5.03E-06	< 5.03E-06	< 4.70E-06	< 4.86E-06	< 5.87E-06	< 3.23E-05			

TABLE 4-9A

HOT AIR OVEN CURE SUMMARY

Compound	Total VOCs, as methane (lbs/lb rubber)	Total Speciated Semivolatiles (lbs/lb rubber) with non-detects	Total Speciated Volatiles (lbs/lb rubber) with non-detects	Total Speciated Organics[1] (lbs/lb rubber) with non-detects	Total Sulfur (lbs/lb rubber) with non-detects
5	3.10E-04	< 6.36E-04	< 2.46E-04	< 8.77E-04	< 7.71E-05
8	2.26E-04	< 1.19E-04	< 1.94E-03	< 2.06E-03	< 1.14E-03
22	1.12E-04	< 1.24E-03	< 2.20E-03	< 3.36E-03	< 2.21E-03
Mean	2.16E-04	< 6.65E-04	< 1.46E-03	< 2.10E-03	< 1.14E-03
Max.	3.10E-04	< 1.24E-03	< 2.20E-03	< 3.36E-03	< 2.21E-03
Std. Dev.	8.11E-05	< 4.58E-04	< 8.66E-04	< 1.01E-03	< 8.71E-04

1 - *Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.*

Table 4-9.B HOT AIR OVEN CURE ORGANIC SPECIATION FACTORS

	Chemical Compound	CAS Numbers	Cmpd. #5 % of Total	Cmpd. #8 % of Total	Cmpd. #22 % of Total	MEAN % of Total	MAX % of Total	STD. DEV. % of Total
	1,1,1-Trichloroethane	00071-55-6	0.13	< 0.21	< 0.17	< 0.17	< 0.21	< 0.03
	1,1,2,2-Tetrachloroethane	00079-34-5	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	1,1,2-Trichloroethane	00079-00-5	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	1,1-Dichloroethane	00075-34-3	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	1,1-Dichloroethene	00075-35-4	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	1,2,4-Trichlorobenzene	120-82-1	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
O	1,2,4-Trimethylbenzene	00095-63-6	< 0.20	0.10	< 0.05	< 0.12	< 0.20	< 0.06
	1,2-Dibromoethane	00106-93-4	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	1,2-Dibromo-3-Chloropropane	00096-12-8	< 0.29	< 0.41	< 0.35	< 0.35	< 0.41	< 0.05
	1,2-Dichlorobenzene	00095-50-1	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	1,2-Dichloroethane	00107-06-2	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	1,2-Dichloropropane	00078-87-5	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
O	1,3,5-Trimethylbenzene	00108-67-8	< 0.20	0.57	< 0.06	< 0.27	0.57	< 0.21
O	1,3-Butadiene	00106-99-0	< 0.04	0.06	< 0.01	< 0.04	0.06	< 0.02
	1,3-Cyclooctadiene	1700-10-3	< 0.02	0.00	< 0.01	< 0.01	< 0.02	< 0.00
	1,3-Dichlorobenzene	00541-73-1	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	1,4-Dichlorobenzene	00106-46-7	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
O	1,4-Diethylbenzene	00105-05-5	< 0.20	< 0.06	< 0.01	< 0.09	< 0.20	< 0.08
	1,4-Dioxane	00123-91-1	< 0.59	< 0.83	< 0.69	< 0.70	< 0.83	< 0.10
	1,4-Phenylenediamine	106-50-3	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
	1,5-Cyclooctadiene	111-78-4	< 0.03	< 0.01	< 0.02	< 0.02	< 0.03	< 0.01
T	1-Butanol	00071-36-3	T	2.59	T	< 0.86	2.59	< 1.22
O	1-Butene	00106-98-9	0.96	< 0.01	< 0.01	< 0.33	0.96	< 0.45
	1-Dodecene	112-41-4	< 0.05	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02
O	1-Heptene	00592-76-7	0.10	< 0.04	< 0.01	< 0.05	0.10	< 0.04
O	1-Hexene	00592-41-6	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
T	1-Methoxy-Cumene		T	1.55	T	0.52	1.55	0.73
O	1-Octene	111-66-0	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
O	1-Pentene	00109-67-1	< 0.04	< 0.01	0.03	0.03	< 0.04	0.01
	2,2'-oxybis(1-Chloropropane)	108-60-1	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
O	2,2-Dimethylbutane	00075-83-2	0.10	0.03	< 0.01	< 0.05	0.10	< 0.04
O	2,2-Dimethylpropane	00463-82-1	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.02
O	2,3,4-Trimethylpentane	00565-75-3	< 0.04	0.03	0.17	0.08	0.17	0.07
O	2,3-Dimethylbutane	00079-29-8	< 0.04	0.02	0.01	0.03	< 0.04	0.01
O	2,3-Dimethylpentane	00565-59-3	0.16	< 0.01	< 0.01	< 0.06	0.16	< 0.07
	2,4,5-Trichlorophenol	95-95-4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	2,4,6-Trichlorophenol	88-06-2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	2,4-Dichlorophenol	120-83-2	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
O	2,4-Dimethylhexane	00589-43-5	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.02
	2,4-Dimethylphenol	105-67-9	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00
	2,4-Dinitrophenol	51-28-5	< 0.07	< 0.03	< 0.04	< 0.04	< 0.07	< 0.02
	2,4-Dinitrotoluene	121-14-2	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.00
	2,6-Dinitrotoluene	606-20-2	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01
	2-Butanone	00078-93-3	0.18	< 0.41	< 0.35	< 0.32	< 0.41	< 0.10
	2-Chloroacetophenone	1341-24-8	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
	2-Chloronaphthalene	91-58-7	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
	2-Chlorophenol	95-57-8	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
T	2-Ethyl Hexanal	00123-05-7	T	1.55	T	< 0.52	1.55	< 0.73
T	2-Ethyl-1-Hexanol	00104-76-7	T	15.52	0.69	5.40	15.52	7.16
	2-Furaldehyde	98-01-1	0.01	0.00	0.01	0.01	0.01	0.01
	2-Hexanone	00591-78-6	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
O	2-Methylheptane	00592-27-8	0.07	0.05	< 0.01	< 0.04	0.07	< 0.02
O	2-Methylhexane	00591-76-4	< 0.04	0.02	0.02	0.03	< 0.04	0.01
	2-Methylnaphthalene	91-57-6	0.05	0.02	0.05	0.04	0.05	0.01
O	2-Methylpentane	00107-83-5	0.50	0.04	0.71	0.42	0.71	0.28

Table 4-9.B HOT AIR OVEN CURE ORGANIC SPECIATION FACTORS

	Chemical Compound	CAS Numbers	Cmpd. #5 % of Total	Cmpd. #8 % of Total	Cmpd. #22 % of Total	MEAN % of Total	MAX % of Total	STD. DEV. % of Total
	2-Methylphenol	95-48-7	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
O	2-Methyl-1-Butene	00563-46-2	< 0.04	0.04	0.05	0.04	0.05	0.00
O	2-Methyl-2-Butene	00513-35-9	0.40	0.86	0.12	0.46	0.86	0.31
O	2-Methyl-2-Pentene	00625-27-4	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
T	2-Methyl-2-Propenal		1.11	T	T	< 0.37	1.11	< 0.52
	2-Nitroaniline	88-74-4	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01
	2-Nitrophenol	88-75-5	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01
	3,3'-Dichlorobenzidine	91-94-1	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00
	3,3'-Dimethoxybenzidine	119-90-4	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
	3,3'-Dimethylbenzidine	119-93-7	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
	3-Furaldehyde	498-60-2	0.01	< 0.00	< 0.01	< 0.01	0.01	< 0.00
O	3-Methylhexane	00589-34-4	0.36	0.01	< 0.01	< 0.13	0.36	< 0.16
O	3-Methylpentane	00096-14-0	0.06	0.02	0.01	0.03	0.06	0.02
	3-Methylstyrene	100-80-1	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
	3-Nitroaniline	99-09-2	< 0.02	< 0.01	< 0.01	< 0.02	< 0.02	< 0.01
	3/4-Methylphenol	108-39-4/106-44-5	0.04	< 0.00	0.01	0.02	0.04	0.01
	4,4'-Methylenedianiline	101-77-9	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
	4,6-Dinitro-2-methylphenol	88-85-7	< 0.03	< 0.01	< 0.01	< 0.02	< 0.03	< 0.01
	4-Aminobiphenyl	92-67-1	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
	4-Bromophenyl-phenylether	101-55-3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
	4-Chloroaniline	106-47-8	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00
	4-Chlorophenyl-phenylether	7005-72-3	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
	4-Chlorostyrene	1073-67-2	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01
	4-Chloro-3-methylphenol	59-50-7	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
	4-Methylstyrene		< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
O	4-Methyl-1-Pentene	00691-37-2	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
	4-Methyl-2-pentanone	00108-10-1	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	4-Nitroaniline	100-01-6	< 0.02	< 0.01	< 0.01	< 0.02	< 0.02	< 0.01
	4-Nitrobiphenyl	92-93-3	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
	4-Nitrophenol	100-02-7	< 0.03	< 0.01	< 0.02	< 0.02	< 0.03	< 0.01
	a,a,a-Trichlorotoluene	98-07-7	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
	Acenaphthene	83-32-9	< 0.01	< 0.00	0.00	0.00	< 0.01	0.00
	Acenaphthylene	208-96-8	< 0.07	0.00	< 0.02	< 0.03	< 0.07	< 0.03
	Acetone	00067-64-1	1.46	0.72	0.64	0.94	1.46	0.37
	Acetonitrile	75-05-8	0.07	< 0.41	< 0.35	< 0.28	< 0.41	< 0.15
T	Acetophenone	00098-86-2	T	10.35	0.43	3.59	10.35	4.78
O	Acetylene	00074-86-2	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
	Acrolein	00107-02-8	0.09	< 0.41	0.28	0.26	< 0.41	0.13
	Acrylonitrile	00107-13-1	< 0.29	< 0.41	< 0.35	< 0.35	< 0.41	< 0.05
T	Alkane		0.29	0.53	4.73	1.85	4.73	2.04
T	Alkyl acid		13.24	1.57	13.73	9.52	13.73	5.62
	Allyl Chloride	00107-05-1	< 0.29	< 0.41	< 0.35	< 0.35	< 0.41	< 0.05
T	Alpha-Methylstyrene	00098-83-9	T	3.10	T	< 1.03	3.10	< 1.46
	Aniline	62-53-3	< 0.01	0.01	0.03	0.01	0.03	0.01
	Anthracene	120-12-7	0.04	0.01	< 0.01	< 0.02	0.04	< 0.01
O	a-Pinene	1330-16-1	< 0.04	0.01	< 0.01	< 0.02	< 0.04	< 0.01
	Benzaldehyde	100-52-7	0.06	0.03	0.49	0.19	0.49	0.21
O	Benzene	00071-43-2	0.17	2.37	0.12	0.89	2.37	1.05
	Benzidine	92-87-5	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
	Benzoic acid	65-85-0	0.88	0.36	0.57	0.60	0.88	0.21
	Benzonitrile	100-47-0	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
T	Benzophenone	119-61-9	T	0.05	T	0.02	0.05	0.02
T	Benzothiazole	95-16-9	3.47	0.21	0.55	1.41	3.47	1.46
	Benzo(a)anthracene	56-55-3	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	Benzo(a)pyrene	50-32-8	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	Benzo(b)fluoranthene	205-99-2	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	Benzo(g,h,i)perylene	191-24-2	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	Benzo(k)fluoranthene	207-08-9	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00

Table 4-9.B HOT AIR OVEN CURE ORGANIC SPECIATION FACTORS

	Chemical Compound	CAS Numbers	Cmpd. #5 % of Total	Cmpd. #8 % of Total	Cmpd. #22 % of Total	MEAN % of Total	MAX % of Total	STD. DEV. % of Total
	Benzyl alcohol	100-51-6	< 0.01	< 0.01	0.01	0.01	0.01	0.00
	Benzyl Chloride	00100-44-7	< 0.29	< 0.41	< 0.35	< 0.35	< 0.41	< 0.05
	Biphenyl	92-52-4	0.04	0.02	< 0.12	< 0.06	< 0.12	< 0.04
	bis(2-Chloroethoxy)methane	111-91-1	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00
	bis(2-Chloroethyl)ether	111-44-4	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
	bis(2-Ethylhexyl)phthalate	117-81-7	< 0.00	0.01	0.03	0.02	0.03	0.01
	Bromodichloromethane	00075-27-4	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	Bromoform	00075-25-2	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	Bromomethane	00074-83-9	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
T	Butanal	00123-72-8	T	T	0.87	0.29	0.87	0.41
T	Butyl Propionate	00590-01-2	T	5.17	T	< 1.72	5.17	< 2.44
T	Butylatedhydroxytoluene	128-37-0	T	0.05	T	0.02	0.05	0.02
	Butylbenzylphthalate	85-68-7	0.01	0.00	0.00	0.00	0.01	0.00
T	Butylbutanamine		T	T	1.66	0.55	1.66	0.78
O	b-Pinene	127-91-3	< 0.21	0.07	< 0.01	< 0.10	< 0.21	< 0.08
	Camphene	79-92-5	< 0.02	< 0.01	0.01	0.01	< 0.02	0.01
	Carbon Disulfide	00075-15-0	0.18	22.76	35.57	19.50	35.57	14.63
	Carbon Tetrachloride	00056-23-5	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	Chlorobenzene	00108-90-7	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	Chloroethane	00075-00-3	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	Chloroform	00067-66-3	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	Chloromethane	00074-87-3	0.05	< 0.21	< 0.17	< 0.14	< 0.21	< 0.07
	Chrysene	218-01-9	< 0.00	0.00	< 0.00	< 0.00	0.00	< 0.00
	cis-1,2-Dichloroethene	00156-59-2	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	cis-1,3-Dichloropropene	10061-01-5	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
O	cis-2-Butene	00590-18-1	< 0.04	0.02	< 0.01	< 0.02	< 0.04	< 0.01
O	cis-2-Hexene	00592-43-8	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
O	cis-2-Pentene	00627-20-3	< 0.04	< 0.01	1.19	0.42	1.19	0.55
O	Cumene	00098-82-8	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
O	Cyclohexane	00110-82-7	0.29	< 0.01	0.02	0.11	0.29	0.13
	Cyclohexanone	108-94-1	0.12	0.01	2.37	0.84	2.37	1.09
T	Cyclohexyl Isothiocyanate	01122-82-3	T	4.14	T	1.38	4.14	1.95
	Cyclohexylamine	108-91-8	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
O	Cyclopentane	00287-92-3	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
O	Cyclopentene	00142-29-0	0.64	0.03	< 0.01	< 0.23	0.64	< 0.29
T	$C_{11}H_{24}$ Branched Alkene		1.11	T	T	< 0.37	1.11	< 0.52
	Dibenzofuran	132-64-9	0.22	0.10	0.10	0.14	0.22	0.06
	Dibenz(a,h)anthracene	53-70-3	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
	Dibromochloromethane	00124-48-1	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	Dichlorodifluoromethane	00075-71-8	0.06	< 0.21	< 0.17	< 0.15	< 0.21	< 0.06
T	Dicyclohexyldisulphide	2550-40-5	1.77	T	T	0.59	1.77	0.84
	Diethylphthalate	84-66-2	0.01	0.00	0.01	0.01	0.01	0.00
T	Dimethyl Cyclopentane Isomer		0.18	T	T	< 0.06	0.18	< 0.09
	Dimethylaminoazobenzene	60-11-7	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
	Dimethylphthalate	131-11-3	0.01	0.00	< 0.00	< 0.00	0.01	< 0.00
	Diphenylamine	122-39-4	T	< 0.00	0.04	0.01	0.04	0.02
	Di-n-butylphthalate	84-74-2	0.87	T	0.03	0.30	0.87	0.40
	Di-n-octylphthalate	117-84-0	< 0.00	< 0.00	0.00	0.00	0.00	0.00
O	d-Limonene	05989-27-5	< 0.21	< 0.06	< 0.01	< 0.09	< 0.21	< 0.08
	Epichlorohydrin	00106-89-8	< 0.29	< 0.41	< 0.35	< 0.35	< 0.41	< 0.05
O	Ethane	00074-84-0	0.37	0.06	0.18	0.21	0.37	0.13
O	Ethylacetylene	00107-00-6	< 0.04	0.16	< 0.01	< 0.07	0.16	< 0.07
O	Ethylbenzene	00100-41-4	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
O	Ethylene	00074-85-1	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
	Fluoranthene	206-44-0	0.02	0.01	< 0.01	< 0.01	0.02	< 0.00
	Fluorene	86-73-7	< 0.00	0.01	< 0.01	< 0.01	0.01	< 0.00
	Hexachlorobenzene	118-74-1	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00

Table 4-9.B HOT AIR OVEN CURE ORGANIC SPECIATION FACTORS

	Chemical Compound	CAS Numbers	Cmpd. #5 % of Total	Cmpd. #8 % of Total	Cmpd. #22 % of Total	MEAN % of Total	MAX % of Total	STD. DEV. % of Total
	Hexachlorobutadiene	87-68-3	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01
	Hexachlorocyclopentadiene	77-47-4	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.00
	Hexachloroethane	67-72-1	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01
	Hexachloro-1,3-butadiene	00087-68-3	< 0.29	< 0.41	< 0.35	< 0.35	< 0.41	< 0.05
	Hydroquinone	123-31-9	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00
	Indeno(1,2,3-cd)pyrene	193-39-5	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
O	Isobutane	00075-28-5	0.06	< 0.01	0.07	0.05	0.07	0.03
T	Isobutene	00115-11-7	0.55	T	T	< 0.18	0.55	< 0.26
O	Isobutylene	00115-11-7	< 0.04	< 0.01	0.07	0.04	0.07	0.02
O	Isooctane	00540-84-1	0.20	< 0.01	< 0.01	< 0.08	0.20	< 0.09
	Isooctanol	26952-21-6	< 0.18	< 0.05	< 0.08	< 0.11	< 0.18	< 0.06
O	Isopentane	00078-78-4	0.60	0.03	0.56	0.40	0.60	0.26
	Isophorone	78-59-1	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
O	Isoprene	00078-79-5	< 0.04	0.03	< 0.01	< 0.03	< 0.04	< 0.01
T	Isothiocyanatobutane		T	T	0.35	0.12	0.35	0.16
T	Mercaptobenzothiazole	149-30-4	1.04	T	0.20	0.41	1.04	0.45
T	Methenamine	100-97-0	34.05	0.09	0.25	11.46	34.05	15.97
T	Methyl Cyclohexane	00108-87-2	0.18	T	T	< 0.06	0.18	< 0.09
T	Methyl Cyclopentane	00096-37-7	0.18	T	T	< 0.06	0.18	< 0.09
T	Methyl Ester Benzoic Acid		T	0.13	0.25	0.13	0.25	0.10
T	Methyl Vinyl Ketone	00078-94-4	0.74	T	T	< 0.25	0.74	< 0.35
O	Methylacetylene	00074-99-7	0.23	< 0.01	0.03	0.09	0.23	0.10
O	Methylcyclohexane	00108-87-2	0.22	0.06	< 0.01	< 0.10	0.22	< 0.09
O	Methylcyclopentane	00096-37-7	0.22	0.04	< 0.01	< 0.09	0.22	< 0.09
	Methylene bis-chloroaniline	101-14-4	< 0.02	< 0.01	< 0.01	< 0.01	0.02	< 0.01
	Methylene Chloride	00075-09-2	2.95	2.85	9.54	5.11	9.54	3.13
T	Methylthiobenzothiazole		T	0.05	0.16	0.07	0.16	0.07
O	m-Ethyltoluene	00620-14-4	< 0.04	0.03	< 0.01	< 0.03	< 0.04	< 0.01
O	m-Xylene	00108-38-3	< 0.04	0.06	< 0.01	< 0.04	0.06	< 0.02
	N,N-Diethylaniline	91-66-7	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00
	N,N-Dimethylaniline	121-69-7	< 0.01	< 0.00	< 0.04	< 0.02	< 0.04	< 0.02
	Naphthalene	91-20-3	0.15	0.05	0.07	0.09	0.15	0.04
	Nitrobenzene	98-95-3	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00
O	n-Butane	00106-97-8	0.54	3.07	0.07	1.23	3.07	1.32
O	n-Butylbenzene	00104-51-8	< 0.20	< 0.06	< 0.01	< 0.09	< 0.20	< 0.08
O	n-Decane	00124-18-5	< 0.21	< 0.06	< 0.01	< 0.09	< 0.21	< 0.09
O	n-Heptane	00142-82-5	0.18	0.03	< 0.01	< 0.08	0.18	< 0.08
O	n-Hexane	00110-54-3	0.44	0.15	0.20	0.27	0.44	0.13
	n-Nitrosodiethylamine	55-18-5	< 0.03	< 0.01	< 0.01	< 0.02	< 0.03	< 0.01
	n-Nitrosodimethylamine	62-75-9	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01
	n-Nitrosomorpholine	59-89-2	< 0.03	< 0.01	< 0.01	< 0.02	< 0.03	< 0.01
	n-Nitroso-di-n-propylamine	621-64-7	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01
O	n-Nonane	00111-84-2	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.02
O	n-Octane	00111-65-9	0.08	0.03	< 0.01	< 0.04	0.08	< 0.03
O	n-Pentane	00109-66-0	0.11	< 0.01	0.07	0.06	0.11	0.04
O	n-Propylbenzene	00103-65-1	< 0.04	0.01	< 0.01	< 0.02	< 0.04	< 0.01
	o-Anisidine	90-04-0	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
O	o-Ethyltoluene	00611-14-3	< 0.20	0.08	< 0.01	< 0.10	< 0.20	< 0.08
	o-Toluidine	95-53-4	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00
O	o-Xylene	00095-47-6	0.06	2.39	< 0.01	< 0.82	2.39	< 1.11
	Pentachloronitrobenzene	82-68-8	< 0.04	< 0.01	< 0.02	< 0.02	< 0.04	< 0.01
	Pentachlorophenol	87-86-5	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01
	Phenanthrene	85-01-8	0.28	0.09	0.07	0.14	0.28	0.10
	Phenol	108-95-2	0.14	0.02	0.06	0.07	0.14	0.05
	Phthalimide	85-41-6	0.81	< 0.01	0.76	0.53	0.81	0.37
O	Propane	00074-98-6	0.13	0.10	0.07	0.10	0.13	0.03
O	Propylene	00115-07-1	0.07	0.02	0.02	0.04	0.07	0.02
	Propylene Oxide	00075-56-9	< 0.29	< 0.41	< 0.35	< 0.35	< 0.41	< 0.05
	Pyrene	129-00-0	0.07	0.01	0.02	0.04	0.07	0.03

Table 4-9.B HOT AIR OVEN CURE ORGANIC SPECIATION FACTORS

	Chemical Compound	CAS Numbers	Cmpd. #5 % of Total	Cmpd. #8 % of Total	Cmpd. #22 % of Total	MEAN % of Total	MAX % of Total	STD. DEV. % of Total
	Pyridine	110-86-1	< 0.01	0.03	< 0.01	< 0.02	0.03	< 0.01
O	p-Cymene	00099-87-6	< 0.20	< 0.06	< 0.01	< 0.09	< 0.20	< 0.08
O	p-Ethyltoluene	00622-96-8	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
O	p-Xylene	00106-42-3	0.22	0.14	0.75	0.37	0.75	0.27
O	Styrene	00100-42-5	0.10	0.02	0.01	0.04	0.10	0.04
T	Substituted Aromatic Hydrocarbon	70693-06-0	T	0.07	3.05	1.04	3.05	1.42
T	Substituted Benzene	71-43-2	T	0.10	T	0.03	0.10	0.05
T	Substituted Cyclic Hydrocarbon		1.85	T	0.16	0.67	1.85	0.83
T	Substituted Hydrocarbon		9.23	1.63	2.22	4.36	9.23	3.45
T	Substituted Indole	120-72-9	T	T	0.28	0.09	0.28	0.13
T	Substituted Naphthalene	91-20-3	2.16	T	T	0.72	2.16	1.02
T	Substituted Quinoline	91-22-5	T	T	3.67	1.22	3.67	1.73
	Tetrachloroethene	00127-18-4	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	Toluene	00108-88-3	0.31	0.21	0.16	0.23	0.31	0.07
	trans-1,2-Dichloroethene	00156-60-5	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	trans-1,3-Dichloropropene	10061-02-6	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
O	trans-2-Butene	00624-64-6	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
O	trans-2-Hexene	00592-43-8	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
O	trans-2-Pentene	00646-04-8	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
	Trichloroethene	00079-01-6	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	Trichlorofluoromethane	00075-69-4	0.08	< 0.21	< 0.17	< 0.16	< 0.21	< 0.05
	Trichlorotrifluoroethane	00076-13-1	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	Trifluralin	1582-09-8	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01
	t-Butyl Methyl Ether	01634-04-4	< 0.29	< 0.41	< 0.35	< 0.35	< 0.41	< 0.05
	Vinyl Acetate	00108-05-4	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	Vinyl Chloride	00075-01-4	< 0.15	< 0.21	< 0.17	< 0.18	< 0.21	< 0.02
	Total Percent		100.00	100.00	100.00			
	Total Detected		7.74E-04	1.79E-03	2.99E-03	1.85E-03	2.99E-03	9.04E-04
	Total with Non-detects		< 8.77E-04	< 2.06E-03	< 3.36E-03	< 2.10E-03	< 3.36E-03	< 1.02E-03

A "0" signifies a value representing less than 0.005% of the total with non-detects.

A "T" signifies a Tentatively Identified Compound (TIC). A "T" is given if the compound was not detected in that sample.

An "O" signifies an Ozone Precursor compound.

Table 4 - 9C. Hot Air Oven Cure

Sulfur Summary

Sulfur Compound	CAS Numbers	Cmpd.#5 % of Total	Cmpd.#8 % of Total	Cmpd.#22 % of Total	MEAN % of Total	MAX % of Total	STD. DEV. % of Total
2,5-Dimethylthiophene	638-02-8	< 7.76	< 3.46	< 2.38	< 4.53	< 7.76	< 2.32
2-Ethylthiophene	872-55-9	< 7.76	< 3.46	< 2.38	< 4.53	< 7.76	< 2.32
3-Methylthiophene	616-44-4	< 6.71	< 2.99	< 2.11	< 3.94	< 6.71	< 1.99
Carbon Disulfide	75-15-0	< 2.52	56.50	69.45	< 42.82	69.45	< 28.99
Carbonyl Sulfide	463-58-1	< 4.19	< 1.87	< 1.29	< 2.45	< 4.19	< 1.25
Diethyl Disulfide	110-81-6	< 4.19	< 1.87	< 1.32	< 2.46	< 4.19	< 1.24
Diethyl Sulfide	352-93-2	< 6.08	< 2.71	< 1.98	< 3.59	< 6.08	< 1.78
Dimethyl Disulfide	624-92-0	< 3.14	< 1.40	< 1.02	< 1.85	< 3.14	< 0.93
Dimethyl Sulfide	75-18-3	< 4.19	< 1.87	< 1.32	< 2.46	< 4.19	< 1.24
Ethyl Mercaptan	75-08-1	< 4.19	< 1.87	< 1.32	< 2.46	< 4.19	< 1.24
Ethyl Methyl Sulfide		< 5.24	< 2.34	< 1.58	< 3.05	< 5.24	< 1.58
Isobutyl Mercaptan	513-44-0	< 6.08	< 2.71	< 1.98	< 3.59	< 6.08	< 1.78
Isopropyl Mercaptan	75-33-2	< 5.24	< 2.34	< 1.58	< 3.05	< 5.24	< 1.58
Methyl Mercaptan	74-93-1	< 3.35	< 1.50	< 1.04	< 1.96	< 3.35	< 1.00
n-Butyl Mercaptan	109-79-5	< 6.08	< 2.71	< 1.98	< 3.59	< 6.08	< 1.78
n-Propyl Mercaptan	107-03-9	< 5.24	< 2.34	< 1.58	< 3.05	< 5.24	< 1.58
tert-Butyl Mercaptan	75-66-1	< 6.08	< 2.71	< 1.98	< 3.59	< 6.08	< 1.78
Tetrahydrothiophene	110-01-0	< 6.08	< 2.71	< 1.85	< 3.55	< 6.08	< 1.83
Thiophene	110-02-1	< 5.87	< 2.62	< 1.85	< 3.45	< 5.87	< 1.74
Total Percent		100.00	100.00	100.00			
Total Detected (lb/lb of rubber)		0.0	6.43E-04	1.53E-03			
Total w/ Non Detects (lb/lb of rubber)		< 7.71E-05	< 1.14E-03	< 2.21E-03			

TABLE 4 - 10a
LAB CUT FTIR DATA
lb/lb Rubber

	Inorganic Compounds			Organic Sulfur Compounds		Organic Compounds						TOTAL
	Carbon Monoxide	Sulfur Dioxide	Ammonia	Carbonyl Sulfide	Carbon Disulfide	Methanol	t-Butyl Amine	Methane	Ethylene	Ethanol	Other	VOC as CH4
Lab Cut No. 1A	2.30E-06	3.20E-06	4.38E-07	1.67E-05	1.64E-04	3.20E-05	1.69E-05	1.61E-07	3.46E-07	2.52E-05	1.40E-04	2.15E-04
Lab Cut No. 2A	1.21E-06	6.30E-07	3.27E-07	8.03E-06	5.28E-05	2.64E-05	1.13E-05	4.67E-08	3.27E-07	1.88E-05	5.72E-05	1.14E-04
Lab Cut No. 3A	2.51E-06	ND	3.88E-07	6.74E-06	2.92E-05	6.54E-05	5.77E-05	4.77E-07	2.98E-08	1.46E-05	1.00E-04	2.38E-04
Lab Cut No. 3B	5.05E-06	ND	6.51E-07	8.20E-06	2.10E-05	7.89E-05	7.70E-05	3.53E-07	1.36E-07	1.26E-05	8.74E-05	2.56E-04
Lab Cut No. 3C	8.07E-06	1.74E-07	4.27E-06	2.16E-05	1.09E-04	5.89E-05	8.91E-05	6.98E-07	1.18E-07	ND	1.45E-04	2.94E-04
Lab Cut No. 3D	6.69E-06	ND	4.50E-06	1.88E-05	7.72E-05	4.80E-05	1.27E-04	7.96E-07	9.95E-07	ND	2.41E-04	4.19E-04
Lab Cut No. 3E	5.53E-06	ND	3.67E-06	1.66E-05	7.48E-05	4.04E-05	5.83E-05	4.86E-07	2.43E-07	ND	9.36E-05	1.93E-04
Lab Cut No. 3F	3.65E-06	2.77E-06	7.66E-07	7.72E-06	1.95E-05	6.74E-05	6.81E-05	6.78E-07	8.84E-08	1.98E-05	8.54E-05	2.41E-04
Lab Cut No. 4A	1.67E-06	3.25E-07	6.09E-08	8.33E-06	2.20E-05	3.47E-06	3.26E-05	2.23E-06	1.52E-07	2.62E-05	6.56E-05	1.30E-04
Lab Cut No. 5A	6.52E-07	1.42E-06	3.97E-07	3.85E-06	3.00E-05	1.82E-05	2.64E-05	1.13E-07	4.53E-08	1.67E-06	4.14E-05	8.78E-05
Lab Cut No. 5B	2.43E-06	7.94E-08	5.03E-07	6.70E-06	4.58E-05	2.61E-05	3.77E-05	ND	9.26E-08	2.41E-06	5.40E-05	1.20E-04
Lab Cut No. 6A	7.14E-07	3.52E-06	4.33E-07	1.78E-06	4.15E-05	1.58E-05	3.86E-05	1.27E-07	1.40E-06	1.33E-06	3.21E-05	8.93E-05
Lab Cut No. 6B	7.09E-07	ND	ND	ND	ND	8.18E-06	ND	ND	ND	ND	7.09E-06	1.53E-05
Lab Cut No. 6C	7.18E-07	6.95E-08	6.95E-08	3.24E-07	1.20E-05	4.75E-06	6.46E-06	4.63E-08	2.43E-07	4.40E-07	1.20E-05	2.40E-05
Lab Cut No. 6D	2.20E-06	2.33E-07	6.21E-07	2.20E-06	5.93E-05	1.59E-05	4.32E-05	1.03E-07	7.76E-08	ND	4.09E-05	1.00E-04
Lab Cut No. 7A	3.52E-07	1.35E-07	5.15E-07	8.13E-08	5.55E-06	ND	1.57E-06	ND	2.17E-07	6.26E-06	4.15E-05	4.95E-05
Lab Cut No. 7B	9.95E-07	1.94E-07	7.04E-07	1.70E-07	4.78E-06	ND	3.33E-06	2.43E-08	7.28E-08	1.03E-05	5.61E-05	6.98E-05
Lab Cut No. 7C	1.52E-06	4.15E-06	3.82E-06	1.45E-06	2.26E-05	ND	3.01E-05	1.63E-07	1.64E-04	3.24E-05	5.38E-05	2.80E-04
Lab Cut No. 8A	2.90E-06	5.47E-06	1.74E-06	1.29E-05	1.02E-04	5.41E-05	5.78E-05	8.30E-07	1.82E-07	2.69E-05	8.95E-05	2.29E-04
Lab Cut No. 8B	1.88E-06	4.69E-07	1.63E-06	6.57E-06	4.15E-05	2.98E-05	4.27E-05	1.73E-07	1.23E-08	ND	4.22E-05	1.15E-04
Lab Cut No. 8C	1.11E-06	ND	1.82E-06	9.00E-06	6.82E-05	4.19E-05	6.71E-05	1.47E-07	2.93E-07	3.78E-06	3.46E-05	1.48E-04
Lab Cut No. 8D	2.36E-06	ND	2.96E-06	1.70E-05	1.47E-04	9.52E-05	1.13E-04	6.86E-07	2.74E-07	1.39E-05	9.99E-05	3.23E-04
Lab Cut No. 9A	3.03E-06	2.70E-07	2.37E-06	1.71E-06	1.45E-05	3.77E-05	5.66E-05	1.50E-07	1.65E-07	ND	1.92E-04	2.87E-04
Lab Cut No. 9B	1.53E-06	ND	9.74E-07	3.90E-07	7.17E-06	1.84E-05	2.05E-05	3.25E-08	2.27E-07	ND	6.75E-05	1.07E-04
Lab Cut No. 9C	2.96E-06	3.02E-07	1.81E-06	8.77E-07	1.22E-05	3.22E-05	4.33E-05	1.51E-07	6.05E-08	ND	1.38E-04	2.13E-04
Lab Cut No. 10A	2.82E-06	6.35E-06	4.46E-07	7.94E-06	3.03E-05	2.19E-05	2.49E-05	4.25E-08	2.23E-06	1.89E-06	2.85E-05	7.94E-05
Lab Cut No. 10B	2.69E-06	2.28E-07	6.01E-07	1.16E-05	5.62E-05	4.67E-05	4.36E-05	1.04E-07	7.25E-08	8.87E-06	6.63E-05	1.66E-04
Lab Cut No. 10C	3.12E-05	ND	6.02E-07	1.20E-05	6.66E-05	5.65E-05	4.78E-05	1.04E-07	9.34E-08	8.63E-06	4.94E-05	1.63E-04

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TABLE 4 - 10b
TIRE PRESS SUMMARY - ORIGINAL EQUIPMENT (OEM)

Tire	Total VOCs, as methane (lbs/lb rubber)		Total Speciated Semivolatiles (lbs/lb rubber) with non-detects		Total Speciated Volatiles (lbs/lb rubber) with non-detects		Total Speciated Organics[1] (lbs/lb rubber) with non-detects		Total Sulfur (lbs/lb rubber) with non-detects		Total Amines (lbs/lb rubber) with non-detects
A	3.37E-04	<	5.50E-06	<	1.43E-04	<	1.48E-04	<	2.98E-06	<	6.50E-07
D	2.88E-04	<	2.00E-05	<	1.50E-04	<	1.66E-04	<	6.76E-06	<	1.01E-07
F	1.73E-04	<	3.26E-05	<	2.48E-04	<	2.76E-04	<	1.09E-05	<	8.77E-08
Mean	2.66E-04	<	1.94E-05	<	1.80E-04	<	1.97E-04	<	6.88E-06	<	2.80E-07
Max.	3.37E-04	<	3.26E-05	<	2.48E-04	<	2.76E-04	<	1.09E-05	<	6.50E-07
Std. Dev.	6.87E-05	<	1.11E-05	<	4.79E-05	<	5.66E-05	<	3.23E-06	<	2.62E-07

[1] - Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

TABLE 4 - 10c

TIRE PRESS SUMMARY - HIGH PERFORMANCE

Tire	Total VOCs, as methane (lbs/lb rubber)		Total Speciated Semivolatiles (lbs/lb rubber) with non-detects		Total Speciated Volatiles (lbs/lb rubber) with non-detects		Total Speciated Organics[1] (lbs/lb rubber) with non-detects		Total Sulfur (lbs/lb rubber) with non-detects		Total Amines (lbs/lb rubber) with non-detects
E	1.64E-04	<	3.58E-06	<	1.69E-04	<	1.71E-04	<	1.21E-05	<	1.63E-07
G	2.07E-04	<	1.49E-05	<	1.97E-04	<	2.11E-04	<	1.03E-05	<	1.44E-07
H	2.61E-04	<	7.75E-06	<	3.08E-04	<	3.15E-04	<	1.73E-05	<	1.00E-07
Mean	2.11E-04	<	8.74E-06	<	2.25E-04	<	2.32E-04	<	1.32E-05	<	1.36E-07
Max.	2.61E-04	<	1.49E-05	<	3.08E-04	<	3.15E-04	<	1.73E-05	<	1.63E-07
Std. Dev.	3.97E-05	<	4.67E-06	<	6.00E-05	<	6.07E-05	<	2.97E-06	<	2.64E-08

1 - Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

TABLE 4-10d

TIRE PRESS SUMMARY - REPLACEMENT TIRES

Tire	Total VOCs, as methane (lbs/lb rubber)		Total Speciated Semivolatiles (lbs/lb rubber) with non-detects		Total Speciated Volatiles (lbs/lb rubber) with non-detects		Total Speciated Organics[1] (lbs/lb rubber) with non-detects		Total Sulfur (lbs/lb rubber) with non-detects		Total Amines (lbs/lb rubber) with non-detects
B	2.51E-04	<	1.38E-05	<	1.49E-04	<	1.57E-04	<	1.78E-05	<	1.25E-07
C	1.68E-04	<	5.64E-06	<	1.07E-04	<	1.12E-04	<	1.41E-05	<	2.18E-07
I	1.87E-04	<	1.70E-05	<	1.74E-04	<	1.91E-04	<	7.19E-06	<	7.89E-08
Mean	2.02E-04	<	1.21E-05	<	1.43E-04	<	1.53E-04	<	1.30E-05	<	1.41E-07
Max.	2.51E-04	<	1.70E-05	<	1.74E-04	<	1.91E-04	<	1.78E-05	<	2.18E-07
Std. Dev.	3.55E-05	<	4.78E-06	<	2.76E-05	<	3.24E-05	<	4.40E-06	<	5.79E-08

1 - Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

TABLE 4-10e

TIRE PRESS SUMMARY - ALL TIRES

Tire	Total VOCs, as methane (lbs/lb rubber)		Total Speciated Semivolatiles (lbs/lb rubber) with non-detects		Total Speciated Volatiles (lbs/lb rubber) with non-detects		Total Speciated Organics[1] (lbs/lb rubber) with non-detects		Total Sulfur (lbs/lb rubber) with non-detects		Total Amines (lbs/lb rubber) with non-detects
A	3.37E-04	<	5.50E-06	<	1.43E-04	<	1.48E-04	<	2.98E-06	<	6.50E-07
B	2.51E-04	<	1.38E-05	<	1.49E-04	<	1.57E-04	<	1.78E-05	<	1.25E-07
C	1.68E-04	<	5.64E-06	<	1.07E-04	<	1.12E-04	<	1.41E-05	<	2.18E-07
D	2.88E-04	<	2.00E-05	<	1.50E-04	<	1.66E-04	<	6.76E-06	<	1.01E-07
E	1.64E-04	<	3.58E-06	<	1.69E-04	<	1.71E-04	<	1.21E-05	<	1.63E-07
F	1.73E-04	<	3.26E-05	<	2.48E-04	<	2.76E-04	<	1.09E-05	<	8.77E-08
G	2.07E-04	<	1.49E-05	<	1.97E-04	<	2.11E-04	<	1.03E-05	<	1.44E-07
H	2.61E-04	<	7.75E-06	<	3.08E-04	<	3.15E-04	<	1.73E-05	<	1.00E-07
I	1.87E-04	<	1.70E-05	<	1.74E-04	<	1.91E-04	<	7.19E-06	<	7.89E-08
Mean	2.26E-04	<	1.34E-05	<	1.83E-04	<	1.94E-04	<	1.10E-05	<	1.85E-07
Max.	3.37E-04	<	3.26E-05	<	3.08E-04	<	3.15E-04	<	1.78E-05	<	6.50E-07
Std. Dev.	5.77E-05	<	8.68E-06	<	5.77E-05	<	6.07E-05	<	4.64E-06	<	1.69E-07

1 - Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

TABLE 4 - 10F. TIRE PRESS ORGANIC COMPOUND SPECIATION FACTORS - OEM

Compounds	CAS Numbers	Type A	Type D	Type F	OEM		
					Mean	MAX	STD
		% of Total	% of Total	% of Total	% of Total	% of Total	% of Total
* 1-Butanol	71-36-3	1.07	T	T	0.36	1.07	0.50
1-Dodecene	00112-41-4	< 0.04	< 0.03	0.02	< 0.03	< 0.04	< 0.01
1,1-Dichloroethane	75-34-3	< 0.14	< 0.13	0.03	< 0.10	< 0.14	< 0.05
1,1-Dichloroethene	75-35-4	< 0.14	< 0.13	0.20	< 0.16	< 0.20	< 0.03
* 1,1,1-Trichloroethane	71-55-6	0.05	< 0.13	14.64	< 4.94	< 14.64	< 6.86
1,1,2-Trichloroethane	79-00-5	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
1,1,2,2-Tetrachloroethane	79-34-5	< 0.14	0.13	< 0.07	< 0.11	< 0.14	< 0.03
1,2-Dibromo-3-Chloropropane	96-12-8	< 0.29	0.25	< 0.13	< 0.22	< 0.29	< 0.07
1,2-Dibromoethane	106-93-4	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
1,2-Dichlorobenzene	95-50-1	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00
1,2-dichloroethane	107-06-3	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
1,2-Dichloropropane	78-87-5	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
1,2,4-Trichlorobenzene	00120-82-1	< 0.01	< 0.01	< 0.00	< 0.00	< 0.01	< 0.00
1,2,4-Trimethylbenzene	00095-63-6	0.07	0.18	< 0.17	< 0.14	< 0.18	< 0.05
1,3-Butadiene	106-99-0	< 0.29	< 0.25	< 0.13	< 0.22	< 0.29	< 0.07
1,3-Dichlorobenzene	541-34-5	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
1,4-Dichlorobenzene	00106-46-7	0.00	< 0.01	0.24	< 0.08	< 0.24	< 0.11
1,4-Dioxane	123-91-1	< 0.57	< 0.50	< 0.26	< 0.45	< 0.57	< 0.13
2-Butanone	78-93-3	0.27	0.54	0.54	0.45	0.54	0.13
2-Chloroacetophenone	01341-24-8	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
2-Furaldehyde	00098-01-1	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.00
2-Hexanone	591-78-6	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
2-Methylnaphthalene	00091-57-6	0.02	0.10	0.02	0.05	0.10	0.04
2-Methylphenol	00095-48-7	0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00
3-Methylstyrene	00100-80-1	0.00	0.01	0.01	0.01	0.01	0.00
3/4-Methylphenol	00108-39-4/00106-44-5	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00
4-Chlorophenyl-phenylether	70005-72-3	< 0.01	< 0.01	0.00	< 0.00	< 0.01	< 0.00
4-Methyl-2-Pentanone	108-10-1	9.45	7.57	3.33	6.78	9.45	2.56
4-Methylstyrene	00622-97-9	< 0.00	0.01	0.00	< 0.00	< 0.01	< 0.00
Acenaphthene	00083-32-9	< 0.00	< 0.00	0.00	< 0.00	< 0.00	< 0.00
Acenaphthylene	00208-96-8	0.02	0.03	< 0.02	< 0.02	< 0.03	< 0.00
Acetone	67-64-1	3.39	5.36	4.07	4.27	5.36	0.82
Acetonitrile	1722-09-4	< 0.29	< 0.25	< 0.13	< 0.22	< 0.29	< 0.07
Acetophenone	00098-86-2	0.05	0.08	0.04	0.06	0.08	0.02
Acrolein	107-02-8	< 0.29	< 0.25	< 0.13	< 0.22	< 0.29	< 0.07
Acrylonitrile	107-13-1	< 0.29	< 0.25	< 0.13	< 0.22	< 0.29	< 0.07
Allyl Chloride	107-05-1	< 0.29	< 0.25	< 0.13	< 0.22	< 0.29	< 0.07
Aniline	00062-53-3	1.19	3.45	1.58	2.07	3.45	0.99
* a-Pinene	7785-70-8	3.57	1.58	T	1.71	3.57	1.46
Benzaldehyde	00100-52-7	0.05	< 0.01	< 0.00	< 0.02	< 0.05	< 0.02
Benzene	71-43-2	0.13	0.12	0.12	0.13	0.13	0.01
Benzoic acid	00065-85-0	< 0.06	< 0.01	< 0.01	< 0.03	< 0.06	< 0.02
Benzonitrile	00100-47-0	0.02	< 0.00	< 0.00	< 0.01	< 0.02	< 0.01
Benzyl alcohol	00100-51-6	0.01	0.00	< 0.00	< 0.00	< 0.01	< 0.00
Benzyl Chloride	100-44-7	< 0.00	< 0.00	0.02	< 0.01	< 0.02	< 0.01
Biphenyl	00092-52-4	0.06	0.02	< 0.01	< 0.03	< 0.06	< 0.02
bis(2-Ethylhexyl)phthalate	00117-81-7	0.08	0.01	< 0.02	< 0.04	< 0.08	< 0.03
Bromodichloromethane	75-27-4	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
Bromoform	75-25-2	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
Bromomethane	74-83-9	0.08	0.04	< 0.07	< 0.06	< 0.08	< 0.01
* Butane	106-97-8	T	T	T	T	T	T
Butylbenzylphthalate	00085-68-7	0.00	< 0.01	0.00	< 0.01	< 0.01	< 0.00
* C13-C14 Branched Alkane		T	T	T	T	T	T
Camphene	00079-92-5	< 0.01	< 0.01	0.00	< 0.01	< 0.01	< 0.00
Carbon Disulfide	75-15-0	17.29	0.44	0.17	5.97	17.29	8.01
Carbon Tetrachloride	56-23-5	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
Chlorobenzene	108-90-7	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
Chlorodibromoethene	124-48-1	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
Chloroethane	75-00-3	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
Chloroform	67-66-3	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
Chloromethane	74-87-3	0.07	0.05	0.02	0.05	0.07	0.02
cis-1,2-Dichloroehtene	156-59-2	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
cis-1,3-Dichloropropene	10061-01-5	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
Cumene	98-82-8	0.08	0.21	0.15	0.14	0.21	0.05
* Cyclobutane		1.43	1.10	T	0.84	1.43	0.61

TABLE 4 - 10F. TIRE PRESS ORGANIC COMPOUND SPECIATION FACTORS - OEM

Compounds	CAS Numbers	Type A	Type D	Type F	OEM		
		% of Total	% of Total	% of Total	Mean % of Total	MAX % of Total	STD % of Total
Cyclohexanone	00108-94-1	0.69	3.15	2.44	2.09	3.15	1.04
Cyclohexylamine	00108-91-8	< 0.01	4.70	< 7.82	< 4.18	< 7.82	< 3.21
* Decane		T	T	T	T	T	T
Dibenzofuran	00132-64-9	0.01	0.00	< 0.00	< 0.00	< 0.01	< 0.00
Dichlorodifluoromethane	75-71-8	< 0.14	< 0.13	0.09	< 0.12	< 0.14	< 0.02
Diethylphthalate	00084-66-2	0.02	0.00	0.00	0.01	0.02	0.01
* Dimethylcyclohexane		T	1.58	T	0.53	1.58	0.74
Dimethylphthalate	00131-11-3	0.00	0.01	0.00	0.00	0.01	0.00
Di-n-butylphthalate	00084-74-2	0.14	0.11	0.34	0.20	0.34	0.10
Diphenylamine	00122-39-4	0.71	0.06	0.04	0.27	0.71	0.31
* Dodecane		3.57	T	T	1.19	3.57	1.68
Epichlorohydrin	106-89-8	< 0.29	< 0.25	< 0.13	< 0.22	< 0.29	< 0.07
* Ethanol		17.83	T	4.88	7.57	17.83	7.52
Ethylbenzene	100-41-4	3.57	7.25	3.58	4.80	7.25	1.74
Fluoranthene	00206-44-0	0.00	< 0.00	0.01	< 0.00	< 0.01	< 0.00
Fluorene	00086-73-7	0.02	< 0.00	0.00	< 0.01	< 0.02	< 0.01
* Heptane		1.78	4.73	7.32	4.61	7.32	2.26
Hexachlorobutadiene	*87-68-3*	< 0.29	0.25	< 0.13	< 0.22	< 0.29	< 0.07
* Isobutanol		T	T	3.25	1.08	3.25	1.53
* Isopentane		T	T	1.63	0.54	1.63	0.77
Isophorone	00078-59-1	< 0.00	0.01	0.00	< 0.00	< 0.01	< 0.00
* Isopropyl Alcohol		1.07	T	T	0.36	1.07	0.50
m & p-Xylenes	1330-20-7	11.59	17.35	8.13	12.36	17.35	3.80
* Methylcyclohexane		1.78	3.15	5.69	3.54	5.69	1.62
Methylene Chloride	79-09-2	0.66	4.57	1.95	2.39	4.57	1.63
* Methylheptane		T	3.15	3.25	2.14	3.25	1.51
* Methylhexane		0.89	1.58	7.32	3.26	7.32	2.88
* Methylhexanone		T	T	T	T	T	T
* Methylpentane	96-14-0	T	T	T	T	T	T
Naphthalene	00091-20-3	0.05	0.17	< 0.11	< 0.11	< 0.17	< 0.05
n-Hexane	110-54-3	0.32	0.52	1.06	0.63	1.06	0.31
* Octane		T	4.73	4.07	2.93	4.73	2.09
o-Toluidine	00095-53-4	0.12	< 0.01	0.00	< 0.04	< 0.12	< 0.06
o-Xylene	95-47-6	2.85	4.89	2.68	3.47	4.89	1.00
Phenanthrene	00085-01-8	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.00
Phenol	00108-95-2	0.05	< 0.01	0.05	< 0.03	< 0.05	< 0.02
Phthalimide	00085-41-6	0.11	1.30	< 0.00	< 0.47	< 1.30	< 0.59
* Propane	74-98-6	T	T	T	T	T	T
Propylene Oxide	75-56-9	< 0.29	< 0.25	< 0.13	< 0.22	< 0.29	< 0.07
Pyrene	00129-00-0	0.02	0.02	0.03	0.03	0.03	0.00
Styrene	100-42-5	0.27	0.17	1.38	0.61	1.38	0.55
t-Butyl Methyl Ether	1634-04-4	< 0.29	< 0.25	0.11	< 0.21	< 0.29	< 0.08
Tetrachloroethene	127-18-4	0.05	< 0.13	0.07	< 0.08	< 0.13	< 0.03
Toluene	108-88-3	4.46	7.57	4.23	5.42	7.57	1.52
trans-1,2-Dichloroethene	156-60-5	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
trans-1,2-Dichloropropene	10061-02-6	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
Trichloroethene	79-01-6	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
Trichlorofluoromethane	75-69-4	< 0.14	< 0.13	0.07	< 0.11	< 0.14	< 0.03
Trichlorotrifluoroethane	76-13-1	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
* Undecane	1120-21-4	1.60	1.58	T	1.06	1.60	0.75
Vinyl Chloride	75-1-4	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
Vinyl Acetate	108-05-4	< 0.14	< 0.13	< 0.07	< 0.11	< 0.14	< 0.03
Total		100	100	100			
Total Detected (lb/lb rubber)		1.37E-04	1.56E-04	2.46E-04			
Total with non-detects (lb/lb rubber)		< 1.48E-04	< 1.66E-04	< 2.76E-04			

TABLE 4 - 10G. TIRE PRESS ORGANIC COMPOUND SPECIATION FACTORS - HIGH PERFORMANCE

Compounds	CAS Numbers	Type E	Type G	Type H	High Performance		
		% of Total	% of Total	% of Total	Mean % of Total	MAX % of Total	STD % of Total
1-Butanol	71-36-3	T	T	T	T	T	T
1-Dodecene	00112-41-4	< 0.03	< 0.03	< 0.02	< 0.02	< 0.03	< 0.01
1,1-Dichloroethane	75-34-3	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
1,1-Dichloroethene	75-35-4	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
1,1,1-Trichloroethane	71-55-6	0.25	0.06	0.05	0.12	0.25	0.09
1,1,2-Trichloroethane	79-00-5	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
1,1,2,2-Tetrachloroethane	79-34-5	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
1,2-Dibromo-3-Chloropropane	96-12-8	< 0.25	< 0.17	< 0.12	< 0.18	< 0.25	< 0.05
1,2-Dibromoethane	106-93-4	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
1,2-Dichlorobenzene	95-50-1	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
1,2-dichloroethane	107-06-3	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
1,2-Dichloropropane	78-87-5	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
1,2,4-Trichlorobenzene	00120-82-1	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
1,2,4-Trimethylbenzene	00095-63-6	0.24	0.27	0.30	0.27	0.30	0.03
1,3-Butadiene	106-99-0	< 0.25	< 0.17	< 0.12	< 0.18	< 0.25	< 0.05
1,3-Dichlorobenzene	541-34-5	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
1,4-Dichlorobenzene	00106-46-7	< 0.00	0.03	0.00	< 0.01	< 0.03	< 0.01
1,4-Dioxane	123-91-1	< 0.50	< 0.34	< 0.24	< 0.36	< 0.50	< 0.10
2-Butanone	78-93-3	0.60	0.29	0.53	0.47	0.60	0.13
2-Chloroacetophenone	01341-24-8	0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
2-Furaldehyde	00098-01-1	< 0.01	0.02	0.01	< 0.01	< 0.02	< 0.01
2-Hexanone	591-78-6	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
2-Methylnaphthalene	00091-57-6	0.07	0.02	0.05	0.05	0.07	0.02
2-Methylphenol	00095-48-7	< 0.01	0.00	0.01	< 0.01	< 0.01	< 0.00
3-Methylstyrene	00100-80-1	0.01	0.01	0.02	0.01	0.02	0.00
3/4-Methylphenol	00108-39-4/00106-44-5	< 0.01	0.00	0.00	< 0.00	< 0.01	< 0.00
4-Chlorophenyl-phenylether	70005-72-3	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
4-Methyl-2-Pentanone	108-10-1	5.73	6.06	5.19	5.66	6.06	0.36
4-Methylstyrene	00622-97-9	0.01	< 0.00	0.00	< 0.00	< 0.01	< 0.00
Acenaphthene	00083-32-9	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Acenaphthylene	00208-96-8	0.04	0.03	0.01	0.02	0.04	0.02
Acetone	67-64-1	5.11	7.76	9.03	7.30	9.03	1.63
Acetonitrile	1722-09-4	< 0.25	< 0.17	< 0.12	< 0.18	< 0.25	< 0.05
Acetophenone	00098-86-2	0.04	0.06	0.04	0.05	0.06	0.01
Acrolein	107-02-8	< 0.25	< 0.17	< 0.12	< 0.18	< 0.25	< 0.05
Acrylonitrile	107-13-1	< 0.25	< 0.17	< 0.12	< 0.18	< 0.25	< 0.05
Allyl Chloride	107-05-1	< 0.25	< 0.17	< 0.12	< 0.18	< 0.25	< 0.05
Aniline	00062-53-3	0.43	0.33	0.11	0.29	0.43	0.14
a-Pinene	7785-70-8	1.55	T	T	0.52	1.55	0.73
Benzaldehyde	00100-52-7	< 0.01	0.07	< 0.00	< 0.03	< 0.07	< 0.03
Benzene	71-43-2	0.25	0.26	0.15	0.22	0.26	0.05
Benzoic acid	00065-85-0	< 0.01	0.04	< 0.01	< 0.02	< 0.04	< 0.01
Benzonitrile	00100-47-0	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Benzyl alcohol	00100-51-6	< 0.01	< 0.01	0.00	< 0.01	< 0.01	< 0.00
Benzyl Chloride	100-44-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Biphenyl	00092-52-4	0.03	0.03	0.02	0.02	0.03	0.01
bis(2-Ethylhexyl)phthalate	00117-81-7	< 0.06	< 0.03	0.01	< 0.03	< 0.06	< 0.02
Bromodichloromethane	75-27-4	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
Bromoform	75-25-2	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
Bromomethane	74-83-9	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
Butane		T	T	T	T	T	T
Butylbenzylphthalate	00085-68-7	< 0.01	0.00	0.00	< 0.00	< 0.01	< 0.00
C13-C14 Branched Alkane		T	T	T	T	T	T
Camphene	00079-92-5	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	< 0.00
Carbon Disulfide	75-15-0	4.49	2.87	2.18	3.18	4.49	0.97
Carbon Tetrachloride	56-23-5	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
Chlorobenzene	108-90-7	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
Chlorodibromoethene	124-48-1	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
Chloroethane	75-00-3	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
Chloroform	67-66-3	< 0.12	0.03	< 0.06	< 0.07	< 0.12	< 0.04
Chloromethane	74-87-3	< 0.12	0.05	0.03	< 0.07	< 0.12	< 0.04
cis-1,2-Dichloroehtene	156-59-2	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
cis-1,3-Dichloropropene	10061-01-5	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
Cumene	98-82-8	0.26	0.14	0.22	0.21	0.26	0.05
Cyclobutane		1.08	T	T	0.36	1.08	0.51

TABLE 4 - 10G. TIRE PRESS ORGANIC COMPOUND SPECIATION FACTORS - HIGH PERFORMANCE

Compounds	CAS Numbers	Type E % of Total	Type G % of Total	Type H % of Total	High Performance Mean % of Total	High Performance MAX % of Total	High Performance STD % of Total
Cyclohexanone	00108-94-1	0.11	0.23	0.31	0.21	0.31	0.08
Cyclohexylamin	00108-91-8	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00
* Decane		1.55	2.13	3.01	2.23	3.01	0.60
Dibenzofuran	00132-64-9	0.00	0.00	0.00	0.00	0.00	0.00
Dichlorodifluoromethane	75-71-8	0.08	0.09	0.07	0.08	0.09	0.01
Diethylphthalate	00084-66-2	0.00	0.01	0.01	0.00	0.01	0.00
* Dimethylcyclohexane		T	3.19	3.01	2.07	3.19	1.46
Dimethylphthalate	00131-11-3	0.03	0.10	0.00	0.05	0.10	0.04
Di-n-butylphthalate	00084-74-2	0.18	0.08	0.12	0.13	0.18	0.04
Diphenylamine	00122-39-4	0.09	3.49	0.27	1.28	3.49	1.56
* Dodecane		T	T	T	T	T	T
Epichlorohydrin	106-89-8	< 0.25	< 0.17	< 0.12	< 0.18	< 0.25	< 0.05
* Ethanol		T	T	T	T	T	T
Ethylbenzene	100-41-4	7.43	3.19	6.77	5.80	7.43	1.86
Fluoranthene	00206-44-0	0.01	0.01	0.00	0.01	0.01	0.00
Fluorene	00086-73-7	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
* Heptane		6.19	9.57	6.77	7.51	9.57	1.48
Hexachlorobutadiene	87-68-3	< 0.25	< 0.17	< 0.12	< 0.18	< 0.25	< 0.05
* Isobutanol		T	T	T	T	T	T
* Isopentane		T	T	T	T	T	T
Isophorone	00078-59-1	0.04	< 0.02	< 0.02	< 0.03	< 0.04	< 0.01
* Isopropyl Alcohol		T	T	T	T	T	T
m & p-Xylenes	1330-20-7	17.02	9.47	16.55	14.35	17.02	3.46
* Methylcyclohexane		4.64	7.45	6.02	6.04	7.45	1.14
Methylene Chloride	79-09-2	2.79	0.48	0.90	1.39	2.79	1.00
* Methylheptane		3.09	4.25	3.01	3.45	4.25	0.57
* Methylhexane		6.19	8.51	7.52	7.41	8.51	0.95
* Methylhexanone		T	T	T	T	T	T
* Methylpentane		T	2.13	1.50	1.21	2.13	0.89
Naphthalene	00091-20-3	0.13	0.06	0.08	0.09	0.13	0.03
n-Hexane	110-54-3	1.86	3.19	2.56	2.54	3.19	0.54
* Octane		6.19	7.45	5.27	6.30	7.45	0.89
o-Toluidine	00095-53-4	0.01	0.06	0.01	0.03	0.06	0.03
o-Xylene	95-47-6	5.57	2.55	3.61	3.91	5.57	1.25
Phenanthrene	00085-01-8	0.01	0.02	0.01	0.01	0.02	0.01
Phenol	00108-95-2	0.13	0.28	0.19	0.20	0.28	0.06
Phthalimide	00085-41-6	0.21	1.59	0.72	0.84	1.59	0.57
* Propane	74-98-6	T	T	T	T	T	T
Propylene Oxide	75-56-9	< 0.25	< 0.17	< 0.12	< 0.18	< 0.25	< 0.05
Pyrene	00129-00-0	0.03	0.04	0.03	0.03	0.04	0.01
Styrene	100-42-5	0.56	0.37	0.10	0.34	0.56	0.19
t-Butyl Methyl Ether	1634-04-4	< 0.25	< 0.17	< 0.12	< 0.18	< 0.25	< 0.05
Tetrachloroethene	127-18-4	0.05	0.04	0.04	0.04	0.05	0.00
Toluene	108-88-3	7.58	5.11	8.27	6.99	8.27	1.36
trans-1,2-Dichloroethene	156-60-5	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
trans-1,2-Dichloropropene	10061-02-6	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
Trichloroethene	79-01-6	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
Trichlorofluoromethane	75-69-4	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
Trichlorotrifluoroethane	76-13-1	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
* Undecane		1.55	2.13	2.26	1.98	2.26	0.31
Vinyl Chloride	75-1-4	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
Vinyl Acetate	108-05-4	< 0.12	< 0.09	< 0.06	< 0.09	< 0.12	< 0.03
Total		100	100	100			
Total Detected (lb/lb rubber)		1.60E-04	2.02E-04	3.05E-04			
Total with non-detects (lb/lb rubber)		< 1.71E-04	< 2.11E-04	< 3.15E-04			

TABLE 4 - 10H. TIRE PRESS ORGANIC COMPOUND SPECIATION FACTORS - REPLACEMENT

Compounds	CAS Numbers	Type B	Type C	Type I	Replacement		
					Mean	MAX	STD
		% of Total	% of Total	% of Total	% of Total	% of Total	% of Total
* 1-Butanol	71-36-3	T	1.67	T	0.56	1.67	0.79
1-Dodecene	00112-41-4	< 0.13	< 0.02	< 0.04	< 0.06	< 0.13	< 0.05
1,1-Dichloroethane	75-34-3	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
1,1-Dichloroethene	75-35-4	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
1,1,1-Trichloroethane	71-55-6	< 0.16	0.16	0.07	< 0.13	< 0.16	< 0.04
1,1,2-Trichloroethane	79-00-5	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
1,1,2,2-Tetrachloroethane	79-34-5	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
1,2-Dibromo-3-Chloropropane	96-12-8	< 0.32	0.44	< 0.21	< 0.33	< 0.44	< 0.10
1,2-Dibromoethane	106-93-4	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
1,2-Dichlorobenzene	95-50-1	0.00	0.22	< 0.01	< 0.08	< 0.22	< 0.10
1,2-dichloroethane	107-06-3	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
1,2-Dichloropropane	78-87-5	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
1,2,4-Trichlorobenzene	00120-82-1	0.00	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
1,2,4-Trimethylbenzene	00095-63-6	0.11	0.07	0.09	0.09	0.11	0.01
1,3-Butadiene	106-99-0	< 0.32	0.44	< 0.21	< 0.33	< 0.44	< 0.10
1,3-Dichlorobenzene	541-34-5	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
1,4-Dichlorobenzene	00106-46-7	0.00	0.22	0.00	0.08	0.22	0.10
1,4-Dioxane	123-91-1	< 0.65	0.89	< 0.42	< 0.65	< 0.89	< 0.19
2-Butanone	78-93-3	0.28	0.43	0.40	0.37	0.43	0.07
2-Chloroacetophenone	01341-24-8	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.01
2-Furaldehyde	00098-01-1	< 0.04	0.02	0.04	< 0.03	< 0.04	< 0.01
2-Hexanone	591-78-6	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
2-Methylnaphthalene	00091-57-6	0.03	0.15	0.04	0.07	0.15	0.05
2-Methylphenol	00095-48-7	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.00
3-Methylstyrene	00100-80-1	0.01	0.00	0.01	0.01	0.01	0.00
3/4-Methylphenol	00108-39-4/00106-44-5	0.03	< 0.01	< 0.01	< 0.01	< 0.03	< 0.01
4-Chlorophenyl-phenylether	70005-72-3	T	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
4-Methyl-2-Pentanone	108-10-1	12.48	9.28	4.69	8.81	12.48	3.20
4-Methylstyrene	00622-97-9	0.00	0.00	0.00	0.00	0.00	0.00
Acenaphthene	00083-32-9	0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
Acenaphthylene	00208-96-8	0.01	0.06	0.05	0.04	0.06	0.02
Acetone	67-64-1	4.12	3.40	4.04	3.85	4.12	0.32
Acetonitrile	1722-09-4	< 0.32	0.44	< 0.21	< 0.33	< 0.44	< 0.10
Acetophenone	00098-86-2	0.10	0.08	0.06	0.08	0.10	0.01
Acrolein	107-02-8	< 0.28	0.43	< 0.21	< 0.31	< 0.43	< 0.09
Acrylonitrile	107-13-1	< 0.32	0.44	< 0.21	< 0.33	< 0.44	< 0.10
Allyl Chloride	107-05-1	< 0.32	0.44	< 0.21	< 0.33	< 0.44	< 0.10
Aniline	00062-53-3	1.63	0.51	3.97	2.04	3.97	1.44
* a-Pinene	7785-70-8	4.05	6.57	T	3.54	6.57	2.70
Benzaldehyde	00100-52-7	0.05	0.09	< 0.01	< 0.05	< 0.09	< 0.03
Benzene	71-43-2	< 0.15	0.24	0.26	< 0.22	< 0.26	< 0.05
Benzoic acid	00065-85-0	< 0.01	< 0.02	0.12	< 0.05	< 0.12	< 0.05
Benzonitrile	00100-47-0	< 0.01	< 0.00	< 0.00	< 0.01	< 0.01	< 0.00
Benzyl alcohol	00100-51-6	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.00
Benzyl Chloride	100-44-7	< 0.01	0.44	< 0.00	< 0.15	< 0.44	< 0.21
Biphenyl	00092-52-4	0.04	0.04	< 0.00	< 0.03	< 0.04	< 0.02
bis(2-Ethylhexyl)phthalate	00117-81-7	1.02	0.12	0.02	0.39	1.02	0.45
Bromodichloromethane	75-27-4	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
Bromoform	75-25-2	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
Bromomethane	74-83-9	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
* Butane		1.10	T	T	0.37	1.10	0.52
Butylbenzylphthalate	00085-68-7	T	0.01	< 0.01	< 0.00	< 0.01	< 0.00
* C13-C14 Branched Alkane		1.80	2.06	T	1.29	2.06	0.92
Camphene	00079-92-5	< 0.03	< 0.01	0.69	< 0.24	< 0.69	< 0.31
Carbon Disulfide	75-15-0	5.74	3.10	1.09	3.31	5.74	1.90
Carbon Tetrachloride	56-23-5	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
Chlorobenzene	108-90-7	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
Chlorodibromoethene	124-48-1	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
Chloroethane	75-00-3	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
Chloroform	67-66-3	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
Chloromethane	74-87-3	< 0.16	0.07	0.04	< 0.09	< 0.16	< 0.05
cis-1,2-Dichloroehtene	156-59-2	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
cis-1,3-Dichloropropene	10061-01-5	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
Cumene	98-82-8	0.21	0.44	0.11	0.26	0.44	0.14
* Cyclobutane		1.51	3.59	T	1.70	3.59	1.47

TABLE 4 - 10H. TIRE PRESS ORGANIC COMPOUND SPECIATION FACTORS - REPLACEMENT

Compounds	CAS Numbers	Type B % of Total	Type C % of Total	Type I % of Total	Replacement Mean % of Total	Replacement MAX % of Total	Replacement STD % of Total
Cyclohexanone	00108-94-1	5.15	0.62	1.49	2.42	5.15	1.96
Cyclohexylamine	00108-91-8	< 0.04	< 0.01	< 0.01	< 0.02	< 0.04	< 0.01
* Decane		T	T	2.60	0.87	2.60	1.23
Dibenzofuran	00132-64-9	0.01	0.01	0.00	0.01	0.01	0.00
Dichlorodifluoromethane	75-71-8	< 0.16	0.19	< 0.10	< 0.15	< 0.19	< 0.04
Diethylphthalate	00084-66-2	0.02	0.01	0.00	0.01	0.02	0.01
* Dimethylcyclohexane		T	T	2.60	0.87	2.60	1.23
Dimethylphthalate	00131-11-3	0.02	0.02	0.01	0.01	0.02	0.01
Di-n-butylphthalate	00084-74-2	0.41	0.56	0.05	0.34	0.56	0.21
Diphenylamine	00122-39-4	1.15	0.15	0.06	0.45	1.15	0.49
* Dodecane		4.05	5.56	T	3.20	5.56	2.35
Epichlorohydrin	106-89-8	< 0.32	0.44	< 0.21	< 0.33	< 0.44	< 0.10
* Ethanol		20.24	T	T	6.75	20.24	9.54
Ethylbenzene	100-41-4	1.87	0.91	3.78	2.19	3.78	1.19
Fluoranthene	00206-44-0	0.00	0.01	0.01	0.01	0.01	0.00
Fluorene	00086-73-7	0.02	< 0.00	0.01	< 0.01	< 0.02	< 0.01
* Heptane		2.95	1.68	7.81	4.15	7.81	2.64
Hexachlorobutadiene	87-68-3	< 0.32	0.44	< 0.21	< 0.33	< 0.44	< 0.10
* Isobutanol		T	T	T	T	T	T
* Isopentane		T	T	T	T	T	T
Isophorone	00078-59-1	< 0.00	0.02	< 0.00	< 0.01	< 0.02	< 0.01
* Isopropyl Alcohol		T	T	T	T	T	T
m & p-Xylenes	1330-20-7	6.77	5.02	11.46	7.75	11.46	2.72
* Methylcyclohexane		2.02	1.29	6.51	3.27	6.51	2.31
Methylene Chloride	79-09-2	0.60	1.79	1.95	1.45	1.95	0.61
* Methylheptane		T	T	3.91	1.30	3.91	1.84
* Methylhexane		1.30	1.14	6.51	2.98	6.51	2.50
* Methylhexanone		T	23.24	9.12	10.79	23.24	9.56
* Methylpentane		T	T	T	T	T	T
Naphthalene	00091-20-3	0.05	0.13	0.08	0.09	0.13	0.03
n-Hexane	110-54-3	0.70	0.24	1.82	0.92	1.82	0.66
* Octane		T	1.37	6.51	2.63	6.51	2.80
o-Toluidine	00095-53-4	0.18	0.01	< 0.01	< 0.07	< 0.18	< 0.08
o-Xylene	95-47-6	1.37	1.08	3.13	1.86	3.13	0.90
Phenanthrene	00085-01-8	0.01	0.04	0.02	0.03	0.04	0.01
Phenol	00108-95-2	0.32	0.20	0.23	0.25	0.32	0.05
Phthalimide	00085-41-6	0.38	1.89	1.67	1.31	1.89	0.67
* Propane	74-98-6	T	0.98	T	0.33	0.98	0.46
Propylene Oxide	75-56-9	< 0.32	1.99	< 0.21	< 0.84	< 1.99	< 0.81
Pyrene	00129-00-0	0.03	0.08	0.03	0.05	0.08	0.02
Styrene	100-42-5	0.20	0.33	0.43	0.32	0.43	0.10
t-Butyl Methyl Ether	1634-04-4	< 0.32	0.44	< 0.21	< 0.33	< 0.44	< 0.10
Tetrachloroethene	127-18-4	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
Toluene	108-88-3	4.68	2.60	5.60	4.29	5.60	1.26
trans-1,2-Dichloroethene	156-60-5	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
trans-1,2-Dichloropropene	10061-02-6	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
Trichloroethene	79-01-6	< 0.16	0.22	0.06	< 0.15	< 0.22	< 0.07
Trichlorofluoromethane	75-69-4	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
Trichlorotrifluoroethane	76-13-1	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
* Undecane		2.02	2.78	1.30	2.04	2.78	0.60
Vinyl Chloride	75-1-4	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
Vinyl Acetate	108-05-4	< 0.16	0.22	< 0.10	< 0.16	< 0.22	< 0.05
Total		100	100	100			
Total Detected (lb/lb rubber)		1.43E-04	1.12E-04	1.80E-04			
Total with non-detects (lb/lb rubber)		< 1.57E-04	< 1.12E-04	< 1.91E-04			

TABLE 4 - 10I. TIRE PRESS ORGANIC COMPOUND SPECIATION FACTORS - ALL TIRES

Compounds	CAS Numbers	Type A % of Total	Type B % of Total	Type C % of Total	Type D % of Total	Type E % of Total	Type F % of Total	Type G % of Total	Type H % of Total	Type I % of Total	ALL TIRES Mean % of Total	ALL TIRES MAX % of Total	ALL TIRES STD % of Total
* 1-Butanol	71-36-3	1.07	T	1.67	T	T	T	T	T	T	< 0.30	< 1.67	< 0.59
1-Dodecene	00112-41-4	< 0.04	< 0.13	< 0.02	< 0.03	< 0.03	0.02	< 0.03	< 0.02	< 0.04	< 0.04	< 0.13	< 0.03
1,1-Dichloroethane	75-34-3	< 0.14	< 0.16	0.22	< 0.13	< 0.12	0.03	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
1,1-Dichloroethene	75-35-4	< 0.14	< 0.16	0.22	< 0.13	< 0.12	0.20	< 0.09	< 0.06	< 0.10	< 0.14	< 0.22	< 0.05
1,1,1-Trichloroethane	71-55-6	0.05	< 0.16	0.16	< 0.13	0.25	14.64	0.06	0.05	0.07	< 1.73	< 14.64	< 4.56
1,1,2-Trichloroethane	79-00-5	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
1,1,2,2-Tetrachloroethane	79-34-5	< 0.14	< 0.16	0.22	0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
1,2-Dibromo-3-Chloropropane	96-12-8	< 0.29	< 0.32	0.44	0.25	< 0.25	< 0.13	< 0.17	< 0.12	< 0.21	< 0.24	< 0.44	< 0.10
1,2-Dibromoethane	106-93-4	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
1,2-Dichlorobenzene	95-50-1	< 0.01	0.00	0.22	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.03	< 0.22	< 0.07
1,2-dichloroethane	107-06-3	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
1,2-Dichloropropane	78-87-5	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
1,2,4-Trichlorobenzene	00120-82-1	< 0.01	0.00	< 0.00	< 0.01	< 0.01	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
1,2,4-Trimethylbenzene	00095-63-6	0.07	0.11	0.07	0.18	0.24	< 0.17	0.27	0.30	0.09	< 0.17	< 0.30	< 0.08
1,3-Butadiene	106-99-0	< 0.29	< 0.32	0.44	< 0.25	< 0.25	< 0.13	< 0.17	< 0.12	< 0.21	< 0.24	< 0.44	< 0.10
1,3-Dichlorobenzene	541-34-5	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
1,4-Dichlorobenzene	00106-46-7	0.00	0.00	0.22	< 0.01	< 0.00	0.24	0.03	0.00	0.00	< 0.06	< 0.24	< 0.09
1,4-Dioxane	123-91-1	< 0.57	< 0.65	0.89	< 0.50	< 0.50	< 0.26	< 0.34	< 0.24	< 0.42	< 0.49	< 0.89	< 0.19
2-Butanone	78-93-3	0.27	0.28	0.43	0.54	0.60	0.54	0.29	0.53	0.40	0.43	0.60	0.12
2-Chloroacetophenone	01341-24-8	< 0.00	< 0.01	< 0.00	< 0.00	0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
2-Furaldehyde	00098-01-1	< 0.01	< 0.04	0.02	< 0.01	< 0.01	0.01	0.02	0.01	0.04	< 0.02	< 0.04	< 0.01
2-Hexanone	591-78-6	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
2-Methylnaphthalene	00091-57-6	0.02	0.03	0.15	0.10	0.07	0.02	0.02	0.05	0.04	0.06	0.15	0.04
2-Methylphenol	00095-48-7	0.01	0.01	0.01	< 0.01	< 0.01	< 0.00	0.00	0.01	< 0.01	< 0.01	< 0.01	< 0.00
3-Methylstyrene	00100-80-1	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.00
3/4-Methylphenol	00108-39-4/00106-44-5	< 0.01	0.03	< 0.01	< 0.01	< 0.01	< 0.00	0.00	0.00	< 0.01	< 0.01	< 0.03	< 0.01
4-Chlorophenyl-phenylether	70005-72-3	< 0.01	T	< 0.00	< 0.01	< 0.00	0.00	< 0.00	< 0.00	< 0.01	< 0.00	< 0.01	< 0.00
4-Methyl-2-Pentanone	108-10-1	9.45	12.48	9.28	7.57	5.73	3.33	6.06	5.19	4.69	7.09	12.48	2.71
4-Methylstyrene	00622-97-9	< 0.00	0.00	0.00	0.01	0.01	0.00	< 0.00	0.00	0.00	< 0.00	< 0.01	< 0.00
Acenaphthene	00083-32-9	< 0.00	0.01	< 0.00	< 0.00	< 0.00	0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.00
Acenaphthylene	00208-96-8	0.02	0.01	0.06	0.03	0.04	< 0.02	0.03	0.01	0.05	< 0.03	< 0.06	< 0.02
Acetone	67-64-1	3.39	4.12	3.40	5.36	5.11	4.07	7.76	9.03	4.04	5.14	9.03	1.87
Acetonitrile	1722-09-4	< 0.29	< 0.32	0.44	< 0.25	< 0.25	< 0.13	< 0.17	< 0.12	< 0.21	< 0.24	< 0.44	< 0.10
Acetophenone	00098-86-2	0.05	0.10	0.08	0.08	0.04	0.04	0.06	0.04	0.06	0.06	0.10	0.02
Acrolein	107-02-8	< 0.29	< 0.28	0.43	< 0.25	< 0.25	< 0.13	< 0.17	< 0.12	< 0.21	< 0.24	< 0.43	< 0.09
Acrylonitrile	107-13-1	< 0.29	< 0.32	0.44	< 0.25	< 0.25	< 0.13	< 0.17	< 0.12	< 0.21	< 0.24	< 0.44	< 0.10
Allyl Chloride	107-05-1	< 0.29	< 0.32	0.44	< 0.25	< 0.25	< 0.13	< 0.17	< 0.12	< 0.21	< 0.24	< 0.44	< 0.10
Aniline	00062-53-3	1.19	1.63	0.51	3.45	0.43	1.58	0.33	0.11	3.97	1.47	3.97	1.31
* a-Pinene	7785-70-8	3.57	4.05	6.57	1.58	1.55	T	T	T	T	1.92	6.57	2.21
Benzaldehyde	00100-52-7	0.05	0.05	0.09	< 0.01	< 0.01	< 0.00	0.07	< 0.00	< 0.01	< 0.03	< 0.09	< 0.03
Benzene	71-43-2	0.13	< 0.15	0.24	0.12	0.25	0.12	0.26	0.15	0.26	< 0.19	< 0.26	< 0.06
Benzoic acid	00065-85-0	< 0.06	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	0.04	< 0.01	0.12	< 0.03	< 0.12	< 0.04
Benzonitrile	00100-47-0	0.02	< 0.01	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.01	< 0.02	< 0.01
Benzyl alcohol	00100-51-6	0.01	0.01	0.01	0.00	< 0.01	< 0.00	< 0.01	0.00	< 0.01	< 0.01	< 0.01	< 0.00
Benzyl Chloride	100-44-7	< 0.00	< 0.01	0.44	< 0.00	< 0.00	0.02	< 0.00	< 0.00	< 0.00	< 0.05	< 0.44	< 0.14
Biphenyl	00092-52-4	0.06	0.04	0.04	0.02	0.03	< 0.01	0.03	0.02	< 0.00	< 0.03	< 0.06	< 0.02

TABLE 4 - 10I. TIRE PRESS ORGANIC COMPOUND SPECIATION FACTORS - ALL TIRES

Compounds	CAS Numbers	Type A	Type B	Type C	Type D	Type E	Type F	Type G	Type H	Type I	ALL TIRES Mean	ALL TIRES MAX	ALL TIRES STD
		% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total
bis(2-Ethylhexyl)phthalate	00117-81-7	0.08	1.02	0.12	0.01	< 0.06	< 0.02	< 0.03	0.01	0.02	< 0.15	< 1.02	< 0.31
Bromodichloromethane	75-27-4	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
Bromoform	75-25-2	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
Bromomethane	74-83-9	0.08	< 0.16	0.22	0.04	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.10	< 0.22	< 0.05
* Butane		T	1.10	T	T	T	T	T	T	T	< 0.12	< 1.10	< 0.35
Butylbenzylphthalate	00085-68-7	0.00	T	0.01	< 0.01	< 0.01	0.00	0.00	0.00	< 0.01	< 0.00	< 0.01	< 0.00
* C13-C14 Branched Alkane		T	1.80	2.06	T	T	T	T	T	T	< 0.43	< 2.06	< 0.81
Camphene	00079-92-5	< 0.01	< 0.03	< 0.01	< 0.01	< 0.01	0.00	< 0.01	< 0.00	0.69	< 0.08	< 0.69	< 0.21
Carbon Disulfide	75-15-0	17.29	5.74	3.10	0.44	4.49	0.17	2.87	2.18	1.09	4.15	17.29	4.95
Carbon Tetrachloride	56-23-5	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
Chlorobenzene	108-90-7	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
Chlorodibromoethene	124-48-1	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
Chloroethane	75-00-3	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
Chloroform	67-66-3	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	0.03	< 0.06	< 0.10	< 0.12	< 0.22	< 0.06
Chloromethane	74-87-3	0.07	< 0.16	0.07	0.05	< 0.12	0.02	0.05	0.03	0.04	< 0.07	< 0.16	< 0.04
cis-1,2-Dichloroethene	156-59-2	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
cis-1,3-Dichloropropene	10061-01-5	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
Cumene	98-82-8	0.08	0.21	0.44	0.21	0.26	0.15	0.14	0.22	0.11	0.20	0.44	0.10
* Cyclobutane		1.43	1.51	3.59	1.10	1.08	T	T	T	T	< 0.97	< 3.59	< 1.11
Cyclohexanone	00108-94-1	0.69	5.15	0.62	3.15	0.11	2.44	0.23	0.31	1.49	1.58	5.15	1.61
Cyclohexylamine	00108-91-8	< 0.01	< 0.04	< 0.01	4.70	< 0.01	< 7.82	< 0.01	< 0.01	< 0.01	< 1.40	< 7.82	< 2.70
* Decane		T	T	T	T	1.55	T	2.13	3.01	2.60	< 1.03	< 3.01	< 1.21
Dibenzofuran	00132-64-9	0.01	0.01	0.01	0.00	0.00	< 0.00	0.00	0.00	0.00	< 0.00	< 0.01	< 0.00
Dichlorodifluoromethane	75-71-8	< 0.14	< 0.16	0.19	< 0.13	0.08	0.09	0.09	0.07	< 0.10	< 0.12	< 0.19	< 0.04
Diethylphthalate	00084-66-2	0.02	0.02	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.02	0.01
* Dimethylcyclohexane		T	T	T	1.58	T	T	3.19	3.01	2.60	< 1.15	< 3.19	< 1.36
Dimethylphthalate	00131-11-3	0.00	0.02	0.02	0.01	0.03	0.00	0.10	0.00	0.01	0.02	0.10	0.03
Di-n-butylphthalate	00084-74-2	0.14	0.41	0.56	0.11	0.18	0.34	0.08	0.12	0.05	0.22	0.56	0.16
Diphenylamine	00122-39-4	0.71	1.15	0.15	0.06	0.09	0.04	3.49	0.27	0.06	0.67	3.49	1.06
* Dodecane		3.57	4.05	5.56	T	T	T	T	T	T	< 1.46	< 5.56	< 2.13
Epichlorohydrin	106-89-8	< 0.29	< 0.32	0.44	< 0.25	< 0.25	< 0.13	< 0.17	< 0.12	< 0.21	< 0.24	< 0.44	< 0.10
* Ethanol		17.83	20.24	T	T	T	4.88	T	T	T	< 4.77	< 20.24	< 7.79
Ethylbenzene	100-41-4	3.57	1.87	0.91	7.25	7.43	3.58	3.19	6.77	3.78	4.26	7.43	2.22
Fluoranthene	00206-44-0	0.00	0.00	0.01	< 0.00	0.01	0.01	0.01	0.00	0.01	< 0.01	< 0.01	< 0.00
Fluorene	00086-73-7	0.02	0.02	< 0.00	< 0.00	< 0.00	0.00	< 0.00	< 0.00	0.01	< 0.01	< 0.02	< 0.01
* Heptane		1.78	2.95	1.68	4.73	6.19	7.32	9.57	6.77	7.81	5.42	9.57	2.64
Hexachlorobutadiene	87-68-3	< 0.29	< 0.32	0.44	0.25	< 0.25	< 0.13	< 0.17	< 0.12	< 0.21	< 0.24	< 0.44	< 0.10
* Isobutanol		T	T	T	T	T	3.25	T	T	T	< 0.36	< 3.25	< 1.02
* Isopentane		T	T	T	T	T	1.63	T	T	T	< 0.18	< 1.63	< 0.51
Isophorone	00078-59-1	< 0.00	< 0.00	0.02	0.01	0.04	0.00	< 0.02	< 0.02	< 0.00	< 0.01	< 0.04	< 0.01
* Isopropyl Alcohol		1.07	T	T	T	T	T	T	T	T	< 0.12	< 1.07	< 0.34
m & p-Xylenes	1330-20-7	11.59	6.77	5.02	17.35	17.02	8.13	9.47	16.55	11.46	11.48	17.35	4.35
* Methylcyclohexane		1.78	2.02	1.29	3.15	4.64	5.69	7.45	6.02	6.51	4.28	7.45	2.15
Methylene Chloride	79-09-2	0.66	0.60	1.79	4.57	2.79	1.95	0.48	0.90	1.95	1.74	4.57	1.25
* Methylheptane		T	T	T	3.15	3.09	3.25	4.25	3.01	3.91	< 2.30	< 4.25	< 1.67
* Methylhexane		0.89	1.30	1.14	1.58	6.19	7.32	8.51	7.52	6.51	< 4.55	< 8.51	< 3.04

TABLE 4 - 10I. TIRE PRESS ORGANIC COMPOUND SPECIATION FACTORS - ALL TIRES

Compounds	CAS Numbers	Type A	Type B	Type C	Type D	Type E	Type F	Type G	Type H	Type I	ALL TIRES Mean	ALL TIRES MAX	ALL TIRES STD
		% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total
* Methylhexanone		T	T	23.24	T	T	T	T	T	9.12	< 3.60	< 23.24	< 7.51
* Methylpentane		T	T	T	T	T	T	2.13	1.50	T	< 0.40	< 2.13	< 0.77
Naphthalene	00091-20-3	0.05	0.05	0.13	0.17	0.13	< 0.11	0.06	0.08	0.08	< 0.10	< 0.17	< 0.04
n-Hexane	110-54-3	0.32	0.70	0.24	0.52	1.86	1.06	3.19	2.56	1.82	1.36	3.19	0.99
* Octane		T	T	1.37	4.73	6.19	4.07	7.45	5.27	6.51	< 3.95	< 7.45	< 2.67
o-Toluidine	00095-53-4	0.12	0.18	0.01	< 0.01	0.01	0.00	0.06	0.01	< 0.01	< 0.05	< 0.18	< 0.06
o-Xylene	95-47-6	2.85	1.37	1.08	4.89	5.57	2.68	2.55	3.61	3.13	3.08	5.57	1.38
Phenanthrene	00085-01-8	0.01	0.01	0.04	0.01	0.01	< 0.01	0.02	0.01	0.02	< 0.02	< 0.04	< 0.01
Phenol	00108-95-2	0.05	0.32	0.20	< 0.01	0.13	0.05	0.28	0.19	0.23	< 0.16	< 0.32	< 0.10
Phthalimide	00085-41-6	0.11	0.38	1.89	1.30	0.21	< 0.00	1.59	0.72	1.67	< 0.87	< 1.89	< 0.70
* Propane	74-98-6	T	T	0.98	T	T	T	T	T	T	< 0.11	< 0.98	< 0.31
Propylene Oxide	75-56-9	< 0.29	< 0.32	1.99	< 0.25	< 0.25	< 0.13	< 0.17	< 0.12	< 0.21	< 0.41	< 1.99	< 0.56
Pyrene	00129-00-0	0.02	0.03	0.08	0.02	0.03	0.03	0.04	0.03	0.03	0.04	0.08	0.02
Styrene	100-42-5	0.27	0.20	0.33	0.17	0.56	1.38	0.37	0.10	0.43	0.42	1.38	0.36
t-Butyl Methyl Ether	1634-04-4	< 0.29	< 0.32	0.44	< 0.25	< 0.25	0.11	< 0.17	< 0.12	< 0.21	< 0.24	< 0.44	< 0.10
Tetrachloroethene	127-18-4	0.05	< 0.16	0.22	< 0.13	0.05	0.07	0.04	0.04	< 0.10	< 0.10	< 0.22	< 0.06
Toluene	108-88-3	4.46	4.68	2.60	7.57	7.58	4.23	5.11	8.27	5.60	5.57	8.27	1.77
trans-1,2-Dichloroethene	156-60-5	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
trans-1,2-Dichloropropene	10061-02-6	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
Trichloroethene	79-01-6	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	0.06	< 0.12	< 0.22	< 0.05
Trichlorofluoromethane	75-69-4	< 0.14	< 0.16	0.22	< 0.13	< 0.12	0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
Trichlortrifluoroethane	76-13-1	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
* Undecane		1.60	2.02	2.78	1.58	1.55	T	2.13	2.26	1.30	< 1.69	< 2.78	< 0.73
Vinyl Chloride	75-1-4	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
Vinyl Acetate	108-05-4	< 0.14	< 0.16	0.22	< 0.13	< 0.12	< 0.07	< 0.09	< 0.06	< 0.10	< 0.12	< 0.22	< 0.05
Total		100	100	100	100	100	100	100	100	100			
Total Detected (lb/lb rubber)		1.37E-04	1.43E-04	1.12E-04	1.56E-04	1.60E-04	2.46E-04	2.02E-04	3.05E-04	1.80E-04			
Total with non-detects (lb/lb rubber)		< 1.48E-04	< 1.57E-04	< 1.12E-04	< 1.66E-04	< 1.71E-04	< 2.76E-04	< 2.11E-04	< 3.15E-04	< 1.91E-04			

TABLE 4 - 10J. TIRE PRESS AMINE SPECIATION FACTORS - OEM

	Type A % of Total	Type D % of Total	Type F % of Total	OEM Mean % of Total	OEM MAX % of Total	OEM STD % of Total
Trimethylamine	2.20	< 66.67	< 88.98	52.62	88.98	36.80
Dimethylamine	97.80	33.33	11.02	47.38	97.80	36.80
Total	100.00	100.00	100.00			
Total Detected (lb/lb rubber)	3.56E-07	9.21E-09	2.12E-09			
Total with non-detects(lb/lb rubber)	< 6.50E-07	< 1.01E-07	< 8.77E-08			

TABLE 4 - 10K. TIRE PRESS AMINE SPECIATION FACTORS - HIGH PERFORMANCE

	Type E	Type G	Type H	High Performance		
	% of Total	% of Total	% of Total	Mean % of Total	MAX % of Total	STD % of Total
Trimethylamine	< 86.96	< 50.00	< 69.93	68.96	86.96	15.10
Dimethylamine	13.04	< 50.00	30.07	31.04	50.00	15.10
Total	100.00	100.00	100.00			
Total Detected (lb/lb rubber)	4.74E-09	0.00E+00	7.93E-09			
Total with non-detects(lb/lb rubber)	< 1.63E-07	< 1.44E-07	< 1.00E-07			

TABLE 4 - 10L. TIRE PRESS AMINE SPECIATION FACTORS - REPLACEMENT

	Type B % of Total	Type C % of Total	Type I % of Total	Replacement Mean % of Total	Replacement MAX % of Total	Replacement STD % of Total
Trimethylamine	< 50.00	< 50.00	< 79.28	59.76	79.28	13.80
Dimethylamine	< 50.00	< 50.00	20.72	40.24	50.00	13.80
Total	100.00	100.00	100.00			
Total Detected (lb/lb rubber)	0.00E+00	0.00E+00	3.92E-09			
Total with non-detects(lb/lb rubber)	< 1.25E-07	< 2.18E-07	< 7.89E-08			

TABLE 4 - 10M. TIRE PRESS AMINE SPECIATION FACTORS - ALL TIRES

	Type A % of Total	Type B % of Total	Type C % of Total	Type D % of Total	Type E % of Total	Type F % of Total	Type G % of Total	Type H % of Total	Type I % of Total	ALL TIRES Mean % of Total	ALL TIRES MAX % of Total
Trimethylamine	2.20	< 50.00	< 50.00	< 66.67	< 86.96	< 88.98	< 50.00	< 69.93	< 79.28	60.45	88.98
Dimethylamine	97.80	< 50.00	< 50.00	33.33	13.04	11.02	< 50.00	30.07	20.72	39.55	97.80
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00		
Total Detected (lb/lb rubber)	3.56E-07	0.00E+00	0.00E+00	9.21E-09	4.74E-09	2.12E-09	0.00E+00	7.93E-09	3.92E-09		
Total with non-detects(lb/lb rubber)	< 6.50E-07	< 1.25E-07	< 2.18E-07	< 1.01E-07	< 1.63E-07	< 8.77E-08	< 1.44E-07	< 1.00E-07	< 7.89E-08		

TABLE 4- 10N. TIRE PRESS SULFUR SPECIATION FACTORS - OEM

	CAS Numbers	Type A % of Total	Type D % of Total	Type F % of Total	OEM Mean % of Total	OEM MAX % of Total	OEM STD % of Total
Carbonyl Sulfide	463-58-1	3.65	< 3.80	< 4.14	< 3.86	< 4.14	< 0.20
Methyl Mercaptan	74-93-1	< 0.70	< 3.06	< 3.31	< 2.36	< 3.31	< 1.18
Ethyl Mercaptan	75-08-1	< 0.89	< 3.88	< 4.14	< 2.97	< 4.14	< 1.48
Dimethyl Sulfide	75-18-3	< 0.89	< 3.88	< 4.14	< 2.97	< 4.14	< 1.48
Carbon Disulfide	75-15-0	76.70	10.28	3.77	30.25	76.70	32.95
Isopropyl Mercaptan	75-33-2	< 1.06	< 4.65	< 5.17	< 3.63	< 5.17	< 1.83
tert-Butyl Mercaptan	75-66-1	< 1.33	< 5.82	< 6.00	< 4.38	< 6.00	< 2.16
n-Propyl Mercaptan	107-03-9	< 1.06	< 4.65	< 5.17	< 3.63	< 5.17	< 1.83
Ethyl Methyl Sulfide	624-89-5	< 1.06	< 4.65	< 5.17	< 3.63	< 5.17	< 1.83
Thiophene	110-02-1	< 1.24	< 5.43	< 5.79	< 4.15	< 5.79	< 2.07
Isobutyl Mercaptan	513-44-0	< 1.33	< 5.82	< 6.00	< 4.38	< 6.00	< 2.16
Diethyl Sulfide	352-93-2	< 1.33	< 5.82	< 6.00	< 4.38	< 6.00	< 2.16
n-Butyl Mercaptan	109-79-5	< 1.33	< 5.82	< 6.00	< 4.38	< 6.00	< 2.16
Dimethyl Disulfide	624-92-0	< 0.68	< 2.99	< 3.10	< 2.26	< 3.10	< 1.11
3-Methylthiophene	616-44-4	< 1.42	< 6.20	< 6.62	< 4.75	< 6.62	< 2.36
Tetrahydrothiophene	110-01-0	< 1.24	< 5.43	< 6.00	< 4.22	< 6.00	< 2.12
2-Ethylthiophene	872-55-9	< 1.60	< 6.98	< 7.66	< 5.41	< 7.66	< 2.71
2,5-Dimethylthiophene	638-02-8	< 1.60	< 6.98	< 7.66	< 5.41	< 7.66	< 2.71
Diethyl Disulfide	110-81-6	< 0.89	< 3.88	< 4.14	< 2.97	< 4.14	< 1.48
Total		100.00	100.00	100.00			
Total Detected (lb/lb rubber)		2.39E-05	6.95E-07	4.09E-07			
Total with non-detects (lb/lb rubber)		< 2.98E-05	< 6.76E-06	< 1.09E-05			

TABLE 4 -10O. TIRE PRESS SULFUR SPECIATION FACTORS - HIGH PERFORMANCE

	CAS Numbers	Type E % of Total	Type G % of Total	Type H % of Total	HIGH PERFORMANCE Mean % of Total	HIGH PERFORMANCE MAX % of Total	HIGH PERFORMANCE STD % of Total
Carbonyl Sulfide	463-58-1	< 2.15	< 2.15	< 2.73	< 2.34	< 2.73	< 0.28
Methyl Mercaptan	74-93-1	< 1.73	< 1.73	< 2.19	< 1.88	< 2.19	< 0.21
Ethyl Mercaptan	75-08-1	< 2.19	< 2.19	< 2.73	< 2.37	< 2.73	< 0.26
Dimethyl Sulfide	75-18-3	< 2.19	< 2.19	< 2.73	< 2.37	< 2.73	< 0.26
Carbon Disulfide	75-15-0	49.30	49.30	36.48	45.02	49.30	6.05
Isopropyl Mercaptan	75-33-2	< 2.63	< 2.63	< 3.42	< 2.89	< 3.42	< 0.37
tert-Butyl Mercaptan	75-66-1	< 3.29	< 3.29	< 3.96	< 3.51	< 3.96	< 0.32
n-Propyl Mercaptan	107-03-9	< 2.63	< 2.63	< 3.42	< 2.89	< 3.42	< 0.37
Ethyl Methyl Sulfide	624-89-5	< 2.63	< 2.63	< 3.42	< 2.89	< 3.42	< 0.37
Thiophene	110-02-1	< 3.07	< 3.07	< 3.83	< 3.32	< 3.83	< 0.36
Isobutyl Mercaptan	513-44-0	< 3.29	< 3.29	< 3.96	< 3.51	< 3.96	< 0.32
Diethyl Sulfide	352-93-2	< 3.29	< 3.29	< 3.96	< 3.51	< 3.96	< 0.32
n-Butyl Mercaptan	109-79-5	< 3.29	< 3.29	< 3.96	< 3.51	< 3.96	< 0.32
Dimethyl Disulfide	624-92-0	< 1.69	< 1.69	< 2.05	< 1.81	< 2.05	< 0.17
3-Methylthiophene	616-44-4	< 3.51	< 3.51	< 4.37	< 3.79	< 4.37	< 0.41
Tetrahydrothiophene	110-01-0	< 3.07	< 3.07	< 3.96	< 3.37	< 3.96	< 0.42
2-Ethylthiophene	872-55-9	< 3.94	< 3.94	< 5.05	< 4.31	< 5.05	< 0.52
2,5-Dimethylthiophene	638-02-8	< 3.94	< 3.94	< 5.05	< 4.31	< 5.05	< 0.52
Diethyl Disulfide	110-81-6	< 2.19	< 2.19	< 2.73	< 2.37	< 2.73	< 0.26
Total		100.00	100.00	100.00			
Total Detected (lb/lb rubber)		5.97E-06	5.06E-06	6.32E-06			
Total with non-detects (lb/lb rubber)		< 1.21E-05	< 1.03E-05	< 1.73E-05			

TABLE 4 -10P. TIRE PRESS SULFUR SPECIATION FACTORS - REPLACEMENT

	CAS Numbers	Type B % of Total	Type C % of Total	Type I % of Total	REPLACEMENT Mean % of Total	REPLACEMENT MAX % of Total	REPLACEMENT STD % of Total
Carbonyl Sulfide	463-58-1	< 2.57	< 3.49	< 3.38	< 3.15	< 3.49	< 0.41
Methyl Mercaptan	74-93-1	< 2.07	< 2.80	< 2.72	< 2.53	< 2.80	< 0.33
Ethyl Mercaptan	75-08-1	< 2.59	< 3.51	< 3.45	< 3.18	< 3.51	< 0.42
Dimethyl Sulfide	75-18-3	< 2.59	< 3.51	< 3.45	< 3.18	< 3.51	< 0.42
Carbon Disulfide	75-15-0	39.80	18.46	20.21	26.15	39.80	9.67
Isopropyl Mercaptan	75-33-2	< 3.19	< 4.34	< 4.14	< 3.89	< 4.34	< 0.50
tert-Butyl Mercaptan	75-66-1	< 3.81	< 5.14	< 5.17	< 4.71	< 5.17	< 0.63
n-Propyl Mercaptan	107-03-9	< 3.19	< 4.34	< 4.14	< 3.89	< 4.34	< 0.50
Ethyl Methyl Sulfide	624-89-5	< 3.19	< 4.34	< 4.14	< 3.89	< 4.34	< 0.50
Thiophene	110-02-1	< 3.63	< 4.92	< 4.83	< 4.46	< 4.92	< 0.59
Isobutyl Mercaptan	513-44-0	< 3.81	< 5.14	< 5.17	< 4.71	< 5.17	< 0.63
Diethyl Sulfide	352-93-2	< 3.81	< 5.14	< 5.17	< 4.71	< 5.17	< 0.63
n-Butyl Mercaptan	109-79-5	< 3.81	< 5.14	< 5.17	< 4.71	< 5.17	< 0.63
Dimethyl Disulfide	624-92-0	< 1.96	< 2.65	< 2.66	< 2.42	< 2.66	< 0.32
3-Methylthiophene	616-44-4	< 4.15	< 5.62	< 5.52	< 5.10	< 5.62	< 0.67
Tetrahydrothiophene	110-01-0	< 3.71	< 5.05	< 4.83	< 4.53	< 5.05	< 0.58
2-Ethylthiophene	872-55-9	< 4.75	< 6.45	< 6.21	< 5.80	< 6.45	< 0.75
2,5-Dimethylthiophene	638-02-8	< 4.75	< 6.45	< 6.21	< 5.80	< 6.45	< 0.75
Diethyl Disulfide	110-81-6	< 2.59	< 3.51	< 3.45	< 3.18	< 3.51	< 0.42
Total		100.00	100.00	100.00			
Total Detected (lb/lb rubber)		7.10E-06	2.61E-06	1.45E-06			
Total with non-detects (lb/lb rubber)		< 1.78E-05	< 1.41E-05	< 7.19E-06			

TABLE 4 -10Q. TIRE PRESS SULFUR SPECIATION FACTORS - ALL TIRES

	CAS Numbers	Type A % of Total	Type B % of Total	Type C % of Total	Type D % of Total	Type E % of Total	Type F % of Total	Type G % of Total	Type H % of Total	Type I % of Total	ALL TIRES Mean % of Total	ALL TIRES MAX % of Total	ALL TIRES STD % of Total
Carbonyl Sulfide	463-58-1	3.65	< 2.57	< 3.49	< 3.80	< 2.15	< 4.14	< 2.15	< 2.73	< 3.38	< 3.12	< 4.14	< 0.69
Methyl Mercaptan	74-93-1	< 0.70	< 2.07	< 2.80	< 3.06	< 1.73	< 3.31	< 1.73	< 2.19	< 2.72	< 2.26	< 3.31	< 0.77
Ethyl Mercaptan	75-08-1	< 0.89	< 2.59	< 3.51	< 3.88	< 2.19	< 4.14	< 2.19	< 2.73	< 3.45	< 2.84	< 4.14	< 0.96
Dimethyl Sulfide	75-18-3	< 0.89	< 2.59	< 3.51	< 3.88	< 2.19	< 4.14	< 2.19	< 2.73	< 3.45	< 2.84	< 4.14	< 0.96
Carbon Disulfide	75-15-0	76.70	39.80	18.46	10.28	49.30	3.77	49.30	36.48	20.21	33.81	76.70	21.70
Isopropyl Mercaptan	75-33-2	< 1.06	< 3.19	< 4.34	< 4.65	< 2.63	< 5.17	< 2.63	< 3.42	< 4.14	< 3.47	< 5.17	< 1.19
tert-Butyl Mercaptan	75-66-1	< 1.33	< 3.81	< 5.14	< 5.82	< 3.29	< 6.00	< 3.29	< 3.96	< 5.17	< 4.20	< 6.00	< 1.41
n-Propyl Mercaptan	107-03-9	< 1.06	< 3.19	< 4.34	< 4.65	< 2.63	< 5.17	< 2.63	< 3.42	< 4.14	< 3.47	< 5.17	< 1.19
Ethyl Methyl Sulfide	624-89-5	< 1.06	< 3.19	< 4.34	< 4.65	< 2.63	< 5.17	< 2.63	< 3.42	< 4.14	< 3.47	< 5.17	< 1.19
Thiophene	110-02-1	< 1.24	< 3.63	< 4.92	< 5.43	< 3.07	< 5.79	< 3.07	< 3.83	< 4.83	< 3.98	< 5.79	< 1.35
Isobutyl Mercaptan	513-44-0	< 1.33	< 3.81	< 5.14	< 5.82	< 3.29	< 6.00	< 3.29	< 3.96	< 5.17	< 4.20	< 6.00	< 1.41
Diethyl Sulfide	352-93-2	< 1.33	< 3.81	< 5.14	< 5.82	< 3.29	< 6.00	< 3.29	< 3.96	< 5.17	< 4.20	< 6.00	< 1.41
n-Butyl Mercaptan	109-79-5	< 1.33	< 3.81	< 5.14	< 5.82	< 3.29	< 6.00	< 3.29	< 3.96	< 5.17	< 4.20	< 6.00	< 1.41
Dimethyl Disulfide	624-92-0	< 0.68	< 1.96	< 2.65	< 2.99	< 1.69	< 3.10	< 1.69	< 2.05	< 2.66	< 2.16	< 3.10	< 0.73
3-Methylthiophene	616-44-4	< 1.42	< 4.15	< 5.62	< 6.20	< 3.51	< 6.62	< 3.51	< 4.37	< 5.52	< 4.55	< 6.62	< 1.54
Tetrahydrothiophene	110-01-0	< 1.24	< 3.71	< 5.05	< 5.43	< 3.07	< 6.00	< 3.07	< 3.96	< 4.83	< 4.04	< 6.00	< 1.38
2-Ethylthiophene	872-55-9	< 1.60	< 4.75	< 6.45	< 6.98	< 3.94	< 7.66	< 3.94	< 5.05	< 6.21	< 5.18	< 7.66	< 1.77
2,5-Dimethylthiophene	638-02-8	< 1.60	< 4.75	< 6.45	< 6.98	< 3.94	< 7.66	< 3.94	< 5.05	< 6.21	< 5.18	< 7.66	< 1.77
Diethyl Disulfide	110-81-6	< 0.89	< 2.59	< 3.51	< 3.88	< 2.19	< 4.14	< 2.19	< 2.73	< 3.45	< 2.84	< 4.14	< 0.96
Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00			
Total Detected (lb/lb rubber)		2.39E-05	7.10E-06	2.61E-06	6.95E-07	5.97E-06	4.09E-07	5.06E-06	6.32E-06	1.45E-06			
Total with non-detects (lb/lb rubber)		< 2.98E-05	< 1.78E-05	< 1.41E-05	< 6.76E-06	< 1.21E-05	< 1.09E-05	< 1.03E-05	< 1.73E-05	< 7.19E-06			

TABLE 4-10r

EMISSIONS COMPARISON - TIRE PRESS FIELD vs LAB CUT DATA

lb/lb rubber

DATA SOURCE	Organic Sulfur Compounds		Organic Compounds		Total Organics
	Carbonyl Sulfide	Carbon Disulfide	Methanol	Ethanol	
Tire Press No. 1	6.69E-07	8.56E-05	2.03E-05	2.75E-05	1.34E-04
Lab Cut No. 1A	3.00E-05	3.00E-05	2.64E-05	4.14E-05	1.28E-04
Tire Press No. 2	5.17E-07	1.16E-04	3.79E-05	2.66E-05	1.81E-04
Lab Cut No. 2A	2.20E-05	2.20E-05	3.26E-05	6.56E-05	1.42E-04
Tire Press No. 3	4.62E-07	4.53E-05	3.94E-05	2.75E-05	1.13E-04
Lab Cut No. 3A	6.66E-05	6.66E-05	4.78E-05	4.94E-05	2.30E-04
Lab Cut No. 3B	2.92E-05	2.92E-05	5.77E-05	1.00E-04	2.16E-04
Lab Cut No. 3C	2.10E-05	2.10E-05	7.70E-05	8.74E-05	2.06E-04
Lab Cut No. 3D	1.09E-04	1.09E-04	8.91E-05	1.45E-04	4.53E-04
Lab Cut No. 3E	7.72E-05	7.72E-05	1.27E-04	2.41E-04	5.23E-04
Lab Cut No. 3F	7.48E-05	7.48E-05	5.83E-05	9.36E-05	3.02E-04
Tire Press No. 5	1.38E-07	2.25E-05	1.45E-05	ND	3.71E-05
Lab Cut No. 5A	5.93E-05	5.93E-05	4.32E-05	4.09E-05	2.03E-04
Lab Cut No. 5B	5.28E-05	5.28E-05	1.13E-05	5.72E-05	1.74E-04
Tire Press No. 6	2.36E-07	3.87E-05	8.01E-06	ND	4.69E-05
Lab Cut No. 6A	2.26E-05	2.26E-05	3.01E-05	5.38E-05	1.29E-04
Lab Cut No. 6B	4.15E-05	4.15E-05	3.86E-05	3.21E-05	1.54E-04
Lab Cut No. 6C	ND	ND	ND	7.09E-06	7.09E-06
Lab Cut No. 6D	1.20E-05	1.20E-05	6.46E-06	1.20E-05	4.25E-05
Tire Press No. 7	1.02E-07	3.29E-05	1.64E-06	3.29E-05	6.76E-05
Lab Cut No. 7A	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lab Cut No. 7B	5.55E-06	5.55E-06	1.57E-06	4.15E-05	5.41E-05
Lab Cut No. 7C	4.78E-06	4.78E-06	3.33E-06	5.61E-05	6.90E-05
Tire Press No. 8	1.89E-07	6.02E-05	1.15E-05	ND	7.19E-05
Lab Cut No. 8A	1.22E-05	1.22E-05	4.33E-05	1.38E-04	2.05E-04
Lab Cut No. 8B	1.02E-04	1.02E-04	5.78E-05	8.95E-05	3.51E-04
Lab Cut No. 8C	4.15E-05	4.15E-05	4.27E-05	4.22E-05	1.68E-04
Lab Cut No. 8D	6.82E-05	6.82E-05	6.71E-05	3.46E-05	2.38E-04
Tire Press No. 9	1.23E-07	6.97E-05	1.09E-05	ND	8.08E-05
Lab Cut No. 9A	4.58E-05	4.58E-05	3.77E-05	5.40E-05	1.83E-04
Lab Cut No. 9B	1.45E-05	1.45E-05	5.66E-05	1.92E-04	2.78E-04
Lab Cut No. 9C	7.17E-06	7.17E-06	2.05E-05	6.75E-05	1.02E-04
Tire Press No. 10	2.21E-07	2.81E-05	9.12E-06	ND	3.74E-05
Lab Cut No. 10A	1.47E-04	1.47E-04	1.13E-04	9.99E-05	5.06E-04
Lab Cut No. 10B	3.03E-05	3.03E-05	2.49E-05	2.85E-05	1.14E-04
Lab Cut No. 10C	5.62E-05	5.62E-05	4.36E-05	6.63E-05	2.22E-04

ND = Not detected. Detection limits cannot be determined with the FTIR analyzer as it is calibrated to zero.

TABLE 4-11a
WARMUP MILL SUMMARY

Compound	Total VOCs, as methane (lbs/lb rubber)		Total Speciated Semivolatiles (lbs/lb rubber) with non-detects		Total Speciated Volatiles (lbs/lb rubber) with non-detects		Total Speciated Organics[1] (lbs/lb rubber) with non-detects		Total Sulfur (lbs/lb rubber) with non-detects
2[2]	1.10E-04	<	1.75E-06	<	4.17E-05	<	3.47E-05	<	6.84E-06
3[2]	1.12E-04	<	4.06E-05	<	8.64E-06	<	4.39E-05	<	1.05E-05
4[2]	8.40E-05	<	2.99E-05	<	2.51E-05	<	5.08E-05	<	6.52E-06
12[3]	1.71E-06	<	1.24E-08	<	1.14E-06	<	9.61E-07	<	1.62E-06
Mean	7.69E-05	<	1.81E-05	<	1.91E-05	<	3.26E-05	<	6.37E-06
Max.	1.12E-04	<	4.06E-05	<	4.17E-05	<	5.08E-05	<	1.05E-05
Std. Dev.	4.48E-05	<	1.76E-05	<	1.56E-05	<	1.91E-05	<	3.16E-06

1 - Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

2 - One run conducted on each tire compound: Warmup Mill 2 - (#2) tire ply coat, (#3) belt coat, and (#4) base/sidewall

3 - Three runs conducted on Engineered Product #12 (neoprene) (Warmup Mill 1), the total average being presented.

disagrees w/ pg. 4-123

Table 4-11b. Warmup Mill Organic Compound Speciation Factors

Compound	CAS Number	Warmup Mill 2 Cmpd. 2 % of Total	Warmup Mill 2 Cmpd. 3 % of Total	Warmup Mill 2 Cmpd. 4 % of Total	Warmup Mill 1 Cmpd 12 % of Total	Warmup Mill 1&2 Average % of Total	Warmup Mill 1&2 Maximum % of Total	Warmup Mill 1&2 Std. Dev. % of Total
1-Heptene	592-76-7	0.22	< 0.02	0.06	0.50	< 0.30	0.50	0.20
1-Pentene	109-67-1	< 0.06	< 0.02	0.38	0.14	< 0.15	0.16	0.01
1,2,4-Trimethylbenzene	95-63-6	0.03	0.62	0.04	< 0.08	< 0.15	0.23	0.08
1,3,5-Trimethylbenzene	108-67-8	0.77	< 0.11	0.27	< 0.08	< 0.23	0.38	0.15
1,4-Diethylbenzene + n-Butylbenzene	105-05-5/104-51-8	< 0.30	< 0.11	< 0.09	< 0.86	< 0.51	0.86	0.35
2-Butanone	00078-93-3	2.34	0.17	0.80	< 0.79	< 0.94	1.10	0.16
2-Furaldehyde	98-01-1	0.05	0.10	< 0.02	0.00	< 0.03	0.06	0.03
2-Methyl-2-butene	513-35-9	< 0.06	< 0.02	0.26	< 0.01	< 0.06	0.11	0.05
2-Methylheptane	592-27-8	0.16	0.06	0.04	< 0.01	< 0.05	0.09	0.04
2-Methylhexane	591-76-4	0.08	< 0.02	0.06	1.87	< 0.96	1.87	0.91
2-Methylnaphthalene	91-57-6	0.12	1.03	0.13	0.02	0.22	0.42	0.20
2-Methylpentane	107-83-5	0.94	0.16	0.25	< 0.01	< 0.23	0.45	0.22
2-Methylphenol	95-48-7	0.06	< 0.04	< 0.01	0.00	< 0.02	0.04	0.02
2,2-Dimethylbutane	75-83-2	0.22	< 0.02	< 0.02	< 0.01	< 0.05	0.09	0.04
2,3-Dimethylpentane	565-59-3	< 0.06	< 0.02	< 0.02	0.56	< 0.30	0.56	0.26
2,4-Dimethylhexane	589-43-5	< 0.06	< 0.02	0.07	0.30	< 0.18	0.30	0.12
2,4-Dimethylphenol	105-67-9	0.11	< 0.04	0.35	< 0.01	< 0.09	0.17	0.08
3-Methylhexane	589-34-4	0.17	< 0.02	0.06	2.68	< 1.38	2.68	1.30
3-Methylpentane	96-14-0	0.86	0.10	0.19	0.07	0.23	0.38	0.15
3/4-Methylphenol	108-39-4/106-44-5	0.16	< 0.04	0.02	< 0.00	< 0.04	0.07	0.04
4-Aminobiphenyl	92-67-1	< 0.01	< 0.01	< 0.00	< 0.01	< 0.01	0.01	0.00
4-Chloroaniline	106-47-8	< 0.01	0.67	0.11	< 0.00	< 0.13	0.26	0.13
4-Chlorostyrene	1073-67-2	< 0.01	< 0.03	< 0.01	0.00	< 0.01	0.02	0.01
4-Methyl-1-pentene	691-37-2	< 0.06	0.07	0.10	< 0.01	< 0.04	0.08	0.03
4-Methyl-2-Pentanone	00108-10-1	0.45	2.60	17.94	< 0.39	< 3.69	7.00	3.30
Acenaphthylene	208-96-8	0.12	0.12	0.10	< 0.00	< 0.06	0.11	0.06
Acetone	00067-64-1	39.87	0.80	3.10	0.42	7.51	14.59	7.08
Acetophenone	98-86-2	< 0.01	0.64	0.06	0.03	< 0.13	0.24	0.10
Acetylene	74-86-2	0.92	0.10	0.31	0.08	0.26	0.44	0.18
Acrylonitrile	00107-13-1	0.37	< 0.32	< 0.26	< 0.79	< 0.55	0.79	0.23
Aniline	62-53-3	0.22	12.12	6.84	< 0.03	< 3.21	6.39	3.18
Benzaldehyde	100-52-7	0.07	< 0.05	< 0.01	0.01	< 0.03	0.04	0.02
Benzene	71-43-2	0.17	0.04	0.11	0.05	0.08	0.11	0.03
Benzoic acid	65-85-0	1.36	1.41	1.42	0.26	0.83	1.40	0.57
Benzonitrile	100-47-0	< 0.01	0.03	< 0.01	< 0.00	< 0.01	0.01	0.01
Benzyl alcohol	100-51-6	< 0.02	< 0.06	0.02	< 0.01	< 0.02	0.04	0.01
Biphenyl	92-52-4	0.10	0.08	0.08	0.01	0.05	0.09	0.04
bis(2-Ethylhexyl)phthalate	117-81-7	0.09	1.97	0.21	0.16	0.46	0.76	0.30
b-Pinene	18172-67-3	0.32	< 0.11	< 0.09	< 0.15	< 0.16	0.17	0.01
Butylbenzylphthalate	85-68-7	0.00	0.00	0.00	0.01	0.00	0.01	0.00
C11-C12 Branched Alkane		13.29	0.70	4.24	8.74	7.41	8.74	1.33
C9H12 Alkyl Substituted Benzene		0.00	0.00	0.82	0.75	0.51	0.75	0.24
Camphene	79-92-5	< 0.02	< 0.05	< 0.01	< 0.01	< 0.02	0.03	0.01
Carbon Disulfide	00075-15-0	1.70	0.22	0.49	21.13	10.97	21.13	10.16
Chloro-4-(1-Chloroethenyl)Cyclohexene		0.00	0.00	0.00	3.78	3.78	3.78	NA
Chloro-5-(1-Chloroethenyl)Cyclohexene		0.00	0.00	0.00	3.33	3.33	3.33	NA
cis-2-Pentene	627-20-3	0.39	0.15	0.07	0.47	0.33	0.47	0.13
Cumene	98-82-8	< 0.01	0.03	0.00	0.00	< 0.01	0.01	0.01
Cyclobutane		0.00	0.00	0.65	0.00	0.22	0.22	NA
Cyclohexane	110-82-7	1.30	< 0.02	0.07	< 0.02	< 0.24	0.47	0.22
Cyclohexanone	108-94-1	0.09	2.11	0.07	0.03	0.39	0.75	0.36
Cyclohexylamine	108-91-8	< 0.01	40.11	46.80	< 0.01	< 14.49	28.98	14.48
Cyclopentane + 2,3-Dimethylbutane	287-92-3/79-29-8	0.21	0.06	0.09	< 0.01	< 0.07	0.12	0.05
Cyclopentene	142-29-0	0.42	< 0.02	< 0.02	< 0.01	< 0.08	0.15	0.07
Decane		5.32	0.00	0.49	0.00	1.93	1.93	NA
Dibenzofuran	132-64-9	0.05	< 0.01	0.02	< 0.00	< 0.02	0.03	0.01

Table 4-11b. Warmup Mill Organic Compound Speciation Factors

Compound	CAS Number	Warmup Mill 2 Cmpd. 2 % of Total	Warmup Mill 2 Cmpd. 3 % of Total	Warmup Mill 2 Cmpd. 4 % of Total	Warmup Mill 1 Cmpd 12 % of Total	Warmup Mill 1&2 Average % of Total	Warmup Mill 1&2 Maximum % of Total	Warmup Mill 1&2 Std. Dev. % of Total
Diethylphthalate	84-66-2	0.00	0.02	0.00	0.01	< 0.01	0.01	0.00
Dimethylpentane		0.00	0.00	0.00	0.55	0.55	0.55	NA
Dimethylphthalate	131-11-3	< 0.01	0.16	< 0.00	< 0.00	< 0.03	0.06	0.03
Di-n-butylphthalate	84-74-2	0.01	0.31	0.33	0.03	0.12	0.22	0.10
Di-n-octylphthalate	117-84-0	< 0.00	< 0.00	< 0.00	0.00	< 0.00	0.00	0.00
Diphenylamine	122-39-4	0.03	0.70	0.17	0.07	0.19	0.30	0.11
d-Limonene	5989-27-5	< 0.30	< 0.11	< 0.09	0.59	< 0.38	0.59	0.21
Ethane	74-84-0	0.22	0.06	0.11	0.73	0.43	0.73	0.30
Ethyl Acetate		0.00	0.00	0.00	14.21	14.21	14.21	NA
Ethylbenzene	100-41-4	0.32	< 0.02	0.15	0.03	< 0.10	0.17	0.07
Ethylene	74-85-1	< 0.06	< 0.02	0.04	0.19	< 0.12	0.19	0.07
Fluoranthene	206-44-0	< 0.00	0.01	0.00	< 0.00	< 0.00	0.01	0.00
Fluorene	86-73-7	0.01	0.08	0.03	0.01	0.02	0.04	0.02
Heptane		0.00	0.00	0.00	5.17	5.17	5.17	NA
Isobutane	75-28-5	< 0.06	0.06	0.10	0.06	< 0.07	0.07	0.01
Isobutylene + 1-Butene	115-11-7/106-98-9	1.16	0.20	0.72	0.40	0.55	0.69	0.15
Isooctane	540-84-1	< 0.06	0.07	0.07	0.16	< 0.11	0.16	0.04
Isopentane	78-78-4	< 0.06	0.42	1.57	0.35	< 0.52	0.68	0.17
Isophorone	78-59-1	0.02	25.53	0.60	< 0.00	< 4.36	8.72	4.36
Isopropyl Alcohol		0.00	0.00	1.63	0.00	0.54	0.54	NA
Methylcyclohexane	108-87-2	0.68	0.12	0.48	0.00	0.42	0.42	NA
Methylcyclopentane	96-37-7	0.71	0.10	0.14	0.05	0.18	0.32	0.13
Methylene Chloride	00075-09-2	2.92	0.94	1.34	5.29	3.51	5.29	1.78
Methylhexane		0.00	0.00	0.00	9.09	9.09	9.09	NA
Methylpentane		4.25	0.00	0.65	0.00	1.63	1.63	NA
m-Ethyltoluene	620-14-4	0.47	< 0.02	< 0.02	< 0.01	< 0.09	0.17	0.08
m-Xylene + p-Xylene	108-38-3/106-42-3	1.76	0.08	0.50	0.14	0.46	0.78	0.32
Naphthalene	91-20-3	0.37	0.85	0.33	0.03	0.27	0.52	0.24
n-Butane	106-97-8	0.26	0.21	0.18	0.13	0.17	0.21	0.04
n-Decane	124-18-5	1.46	0.12	0.14	0.16	0.37	0.58	0.21
n-Heptane	142-82-5	0.41	0.06	0.11	2.45	1.32	2.45	1.13
n-Hexane	110-54-3	2.06	0.28	0.49	2.45	1.70	2.45	0.76
n-Nonane	111-84-2	0.72	< 0.02	0.04	< 0.01	< 0.14	0.26	0.13
n-Pentane	109-66-0	0.30	0.06	0.09	0.03	0.09	0.15	0.06
o-Ethyltoluene	611-14-3	0.44	< 0.11	< 0.09	< 0.37	< 0.29	0.37	0.08
o-Xylene	95-47-6	1.00	< 0.02	0.27	< 0.02	< 0.23	0.43	0.20
p-Cymene	99-87-6	< 0.30	< 0.11	0.09	< 0.06	< 0.11	0.17	0.05
p-Ethyltoluene	622-96-8	< 0.06	< 0.02	< 0.02	< 0.05	< 0.04	0.05	0.01
Phenanthrene	85-01-8	0.01	0.09	0.02	0.02	0.03	0.04	0.01
Phenol	108-95-2	0.13	< 0.03	< 0.01	0.08	< 0.07	0.08	0.01
Propane	74-98-6	0.31	0.27	0.13	2.21	1.22	2.21	0.99
Propylene	115-07-1	< 0.06	< 0.02	< 0.02	0.04	< 0.04	0.04	0.00
Pyrene	129-00-0	0.00	0.03	0.01	0.01	0.01	0.01	0.00
Styrene	100-42-5	0.45	< 0.02	< 0.02	< 0.01	< 0.09	0.16	0.08
Tetrachloroethene	00127-18-4	0.24	< 0.16	< 0.13	< 0.39	< 0.29	0.39	0.11
Toluene	108-88-3	0.95	0.84	0.38	5.20	2.96	5.20	2.24
trans-2-Hexene	4050-45-7	0.16	< 0.02	< 0.02	< 0.01	< 0.04	0.07	0.03
Trichlorofluoromethane	00075-69-4	0.66	0.11	0.26	< 0.39	< 0.37	0.39	0.02
Undecane		2.66	0.00	0.65	0.00	1.10	1.10	NA
Total		100.00	100.00	100.00	100.00			
Total lb/lb rubber detected		3.41E-05	4.31E-05	5.03E-05	9.34E-07			
Total lb/lb rubber with non-detects		< 3.47E-05	< 4.39E-05	< 5.08E-05	< 9.61E-07			

* Percent Values in this table are expressed as % of lb/lb-rubber including detection limits for undetected compounds.

Table 4-11c. Warmup Mill Sulfur Speciation Factors

Compounds	CAS Numbers	Warmup Mill 1 Cmpnd. 12 % of Total	Warmup Mill 2 Cmpnd. 2 % of Total	Warmup Mill 2 Cmpnd. 3 % of Total	Warmup Mill 2 Cmpnd. 4 % of Total	Warmup Mill 1&2 Average % of Total	Warmup Mill 1&2 Maximum % of Total	Warmup Mill 1&2 Std. Dev. % of Total
Carbonyl Sulfide	463-58-1	< 0.52	15.30	< 4.09	< 3.92	< 4.14	7.77	3.63
Methyl Mercaptan	74-93-1	< 0.42	< 2.70	< 3.26	< 3.24	< 1.74	3.07	1.32
Ethyl Mercaptan	75-08-1	< 0.53	< 3.37	< 4.26	< 4.05	< 2.21	3.89	1.68
Dimethyl Sulfide	75-18-3	< 0.53	< 3.37	< 4.26	< 4.05	< 2.21	3.89	1.68
Carbon Disulfide	75-15-0	87.82	9.69	< 2.59	6.13	< 46.98	87.82	40.84
Isopropyl Mercaptan	75-33-2	< 0.63	< 4.21	< 5.18	< 5.00	< 2.71	4.80	2.08
tert-Butyl Mercaptan	75-66-1	< 0.79	< 4.89	< 6.18	< 5.94	< 3.23	5.67	2.44
n-Propyl Mercaptan	107-03-9	< 0.63	< 4.21	< 5.18	< 5.00	< 2.71	4.80	2.08
Ethyl Methyl Sulfide	624-89-5	< 0.63	< 4.21	< 5.18	< 5.00	< 2.71	4.80	2.08
Thiophene	110-02-1	< 0.74	< 4.72	< 5.76	< 5.54	< 3.04	5.34	2.30
Isobutyl Mercaptan	513-44-0	< 0.79	< 4.89	< 6.18	< 5.94	< 3.23	5.67	2.44
Diethyl Sulfide	352-93-2	< 0.79	< 4.89	< 6.18	< 5.94	< 3.23	5.67	2.44
n-Butyl Mercaptan	109-79-5	< 0.79	< 4.89	< 6.18	< 5.94	< 3.23	5.67	2.44
Dimethyl Disulfide	624-92-0	< 0.41	< 2.53	< 3.26	< 3.11	< 1.68	2.96	1.28
3-Methylthiophene	616-44-4	< 0.84	< 5.39	< 6.68	< 6.48	< 3.51	6.19	2.67
Tetrahydrothiophene	110-01-0	< 0.74	< 4.89	< 6.02	< 5.81	< 3.15	5.57	2.42
2-Ethylthiophene	872-55-9	< 0.95	< 6.24	< 7.69	< 7.43	< 4.03	7.12	3.08
2,5-Dimethylthiophene	638-02-8	< 0.95	< 6.24	< 7.69	< 7.43	< 4.03	7.12	3.08
Diethyl Disulfide	110-81-6	< 0.53	< 3.37	< 4.18	< 4.05	< 2.20	3.87	1.67
Total		100.00	100.00	100.00	100.00			
Total Detected		1.42E-07	1.37E-06	0.00E+00	3.76E-07			
Total with non-detects		< 1.62E-07	< 5.47E-06	< 1.05E-05	< 6.14E-06			

* Percent Values in this table are expressed as % of lb/lb rubber including detection limits for undetected compounds.

TABLE 4-12a
CALENDERING SUMMARY

Compound	Total VOCs, as methane (lbs/lb rubber)		Total Speciated Semivolatiles (lbs/lb rubber) with non-detects		Total Speciated Volatiles (lbs/lb rubber) with non-detects		Total Speciated Organics[1] (lbs/lb rubber) with non-detects		Total Sulfur (lbs/lb rubber) with non-detects	
2[2]	5.31E-05	<	3.94E-06	<	7.38E-05	<	7.34E-05	<	3.79E-05	
12[3]	4.67E-06	<	3.57E-08	<	5.48E-06	<	4.49E-06	<	2.06E-06	
Mean	2.89E-05	<	1.99E-06	<	3.96E-05	<	3.89E-05	<	2.00E-05	
Max.	5.31E-05	<	3.94E-06	<	7.38E-05	<	7.34E-05	<	3.79E-05	
Std. Dev.	2.42E-05	<	1.95E-06	<	3.42E-05	<	3.45E-05	<	1.79E-05	

1 - Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

2 - Three runs conducted on Tire Compound #2 (tire ply coat) (Calendering 2), the total average being presented.

3 - Three runs conducted on Engineered Product #12 (neoprene) (Calendering 1), the total average being presented.

TABLE 4-12b
Calender Organic Compound Speciation Factors

Organic Compound	CAS Number	Calender 1 %of TOT	Calender 2 %of TOT	Pollutant Mean % of TOT	Pollutant Maximum % of TOT	Standard Deviation % of TOT
[illegible]Heptene	592-76-7	0.122	1.020	0.571	1.197	0.442
1-Hexene	592-41-6	< 0.004	< 0.015	< 0.010	< 0.016	< 0.006
1-Pentene	109-67-1	< 0.115	< 0.015	< 0.065	< 0.206	< 0.063
1,1,1-Trichloroethane	71-55-6	< 0.513	< 0.066	< 0.290	< 0.642	< 0.227
1,2-Dichloroethane	107-06-2	< 0.513	< 0.162	< 0.337	< 0.642	< 0.222
1,2,4-Trimethylbenzene	95-63-6	0.078	0.572	0.325	0.701	0.249
1,3,5-Trimethylbenzene	108-67-8	< 0.014	< 0.302	< 0.158	< 0.361	< 0.136
1,4-Dichlorobenzene	106-46-7	< 0.513	< 0.082	< 0.298	< 0.642	< 0.225
1,4-Diethylbenzene + n-Butylbenzene	105-05-5/104-51-8	< 0.514	< 0.123	< 0.318	< 1.510	< 0.426
1,5-Cyclooctadiene	111-78-4	< 0.003	< 0.340	< 0.171	< 0.379	< 0.153
2-Butanone	78-93-3	< 1.026	< 0.349	< 0.688	< 1.283	< 0.438
2-Furaldehyde	98-01-1	0.000	0.057	0.028	0.071	0.026
2-Methyl-1-butene	563-46-2	< 0.029	< 0.015	< 0.022	< 0.054	< 0.016
2-Methyl-2-butene	513-35-9	< 0.003	< 0.045	< 0.024	< 0.070	< 0.023
2-Methylheptane	592-27-8	< 0.016	< 0.429	< 0.223	< 0.787	< 0.230
2-Methylhexane	591-76-4	0.434	2.289	1.361	2.687	0.977
2-Methylnaphthalene	91-57-6	0.004	0.341	0.172	0.426	0.157
2-Methylpentane	107-83-5	0.014	0.421	0.218	0.629	0.201
2-Methylphenol	95-48-7	< 0.001	< 0.003	< 0.002	< 0.003	< 0.001
2,2-Dimethylbutane	75-83-2	< 0.003	< 0.031	< 0.017	< 0.059	< 0.017
2,3-Dimethylpentane	565-59-3	0.144	0.834	0.489	0.977	0.357
2,3,4-Trimethylpentane	565-75-3	< 0.003	< 0.083	< 0.043	< 0.218	< 0.062
2,4-Dimethylhexane	589-43-5	0.080	0.611	0.346	0.707	0.264
3-Methylhexane	589-34-4	0.637	5.126	2.882	6.025	2.220
3-Methylpentane	96-14-0	0.089	0.357	0.223	0.557	0.166
3/4-Methylphenol	108-39-4/106-44-5	< 0.001	< 0.002	< 0.002	< 0.003	< 0.001
4-Aminobiphenyl	92-67-1	< 0.002	< 0.003	< 0.002	< 0.005	< 0.002
4-Chlorostyrene	1073-67-2	< 0.000	< 0.006	< 0.003	< 0.008	< 0.003
4-Methyl-2-pentanone	108-10-1	< 0.513	< 0.851	< 0.682	< 0.957	< 0.368
[illegible]Nitrobiphenyl	92-93-3	< 0.001	< 0.005	< 0.003	< 0.006	< 0.002
[illegible]naphthene	83-32-9	< 0.001	< 0.007	< 0.004	< 0.008	< 0.003
[illegible]etone	67-64-1	0.406	1.663	1.034	2.051	0.709
Acetophenone	98-86-2	0.007	0.696	0.352	0.828	0.315
Acetylene	74-86-2	0.016	0.172	0.094	0.193	0.076
Acrolein	107-02-8	< 1.026	< 0.173	< 0.600	< 1.283	< 0.448
Aniline	62-53-3	< 0.007	< 0.127	< 0.067	< 0.158	< 0.057
Benzaldehyde	100-52-7	0.002	0.072	0.037	0.082	0.032
Benzene	71-43-2	0.031	0.061	0.046	0.065	0.026
Benzoic acid	65-85-0	0.051	0.111	0.081	0.144	0.055
Benzonitriile	100-47-0	< 0.000	< 0.482	< 0.241	< 0.553	< 0.218
Benzo(b)fluoranthene	205-99-2	< 0.000	< 0.001	< 0.000	< 0.001	< 0.000
Benzo(k)fluoranthene	207-08-9	< 0.000	< 0.001	< 0.000	< 0.001	< 0.000
Benzyl alcohol	100-51-6	< 0.001	< 0.004	< 0.003	< 0.004	< 0.002
Biphenyl	92-52-4	0.002	0.026	0.014	0.033	0.012
bis(1-Methylethyl) Benzene		< 0.000	< 1.714	< 0.857	< 2.735	< 0.994
bis(2-Ethylhexyl)phthalate	117-81-7	0.033	1.213	0.623	2.232	0.655
b-Pinene	18172-67-3	< 0.128	< 0.115	< 0.122	< 0.194	< 0.067
Butylbenzylphthalate	85-68-7	0.002	0.002	0.002	0.002	0.001
C11-C12 Branched Alkane		17.068	2.735	9.901	18.287	7.541
Camphene	79-92-5	< 0.001	< 0.010	< 0.006	< 0.012	< 0.004
Carbon Disulfide	75-15-0	58.616	3.153	30.885	64.166	25.710
Chloro-4-(1-Chloroethenyl)Cyclohexene		< 1.368	< 0.000	< 0.684	< 2.559	< 0.820
Chloro-5-(1-Chloroethenyl)Cyclohexene		< 1.368	< 0.000	< 0.684	< 2.559	< 0.820
Chloromethane	74-87-3	< 0.513	< 0.029	< 0.271	< 0.642	< 0.231
Cumene	98-82-8	0.016	0.086	0.051	0.090	0.036
Cumene	98-82-8	0.001	0.016	0.008	0.019	0.007
Cyclohexane	110-82-7	0.045	0.124	0.085	0.160	0.056
Cyclohexanone	108-94-1	0.007	0.096	0.051	0.115	0.042
Cyclopentane + 2,3-Dimethylbutane	287-92-3/79-29-8	< 0.007	< 0.111	< 0.059	< 0.141	< 0.052
Cyclopentene	142-29-0	< 0.003	< 0.094	< 0.048	< 0.100	< 0.041
Dibenzofuran	132-64-9	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001
[illegible]orodifluoromethane	75-71-8	< 0.513	< 0.038	< 0.276	< 0.642	< 0.229

TABLE 4-12b
Calender Organic Compound Speciation Factors

Organic Compound	CAS Number	Calender 1 %of TOT	Calender 2 %of TOT	Pollutant Mean % of TOT	Pollutant Maximum % of TOT	Standard Deviation % of TOT
[illegible]hylphthalate	84-66-2	0.002	0.001	0.001	0.003	0.001
[illegible]methylpentane		< 0.000	< 1.309	< 0.655	< 1.367	< 0.584
Di-n-butylphthalate	84-74-2	0.006	0.000	0.003	0.007	0.003
Di-n-octylphthalate	117-84-0	< 0.000	< 0.000	< 0.000	< 0.001	< 0.000
Diphenylamine	122-39-4	0.019	0.013	0.016	0.051	0.014
d-Limonene	5989-27-5	< 0.789	< 0.097	< 0.443	< 0.855	< 0.340
Ethane	74-84-0	0.157	0.201	0.179	0.341	0.114
Ethyl Acetate		< 3.637	< 0.000	< 1.819	< 5.795	< 2.109
Ethenylcyclohexene		< 0.000	< 7.844	< 3.922	< 12.207	< 3.904
Ethylacetylene	107-00-6	< 0.003	< 0.069	< 0.036	< 0.094	< 0.032
Ethylbenzene	100-41-4	0.044	0.225	0.134	0.270	0.098
Ethylene	74-85-1	0.039	0.298	0.169	0.362	0.131
Ethylpentane		< 0.000	< 0.863	< 0.431	< 1.367	< 0.500
Fluoranthene	206-44-0	< 0.000	< 0.001	< 0.000	< 0.001	< 0.000
Fluorene	86-73-7	< 0.002	< 0.005	< 0.004	< 0.012	< 0.003
Heptane		1.197	11.331	6.264	12.307	4.906
Hydroquinone	123-31-9	< 0.002	< 0.089	< 0.046	< 0.254	< 0.073
Isobutane	75-28-5	0.018	0.075	0.047	0.083	0.032
Isobutylene + 1-Butene	115-11-7/106-98-9	< 0.141	< 0.015	< 0.078	< 0.150	< 0.061
Isooctane	540-84-1	0.049	0.355	0.202	0.414	0.153
Isopentane	78-78-4	0.198	0.852	0.525	1.149	0.374
Isophorone	78-59-1	< 0.001	< 0.192	< 0.096	< 0.235	< 0.089
Methylcyclohexane	108-87-2	0.160	1.333	0.746	1.932	0.616
Methylcyclopentane	96-37-7	0.031	0.241	0.136	0.341	0.110
Methylene Chloride	75-09-2	< 0.899	< 0.108	< 0.504	< 1.612	< 0.468
Methylethenylbenzene		< 0.000	< 4.668	< 2.334	< 7.223	< 2.702
Methylhexane		1.112	12.239	6.675	13.674	5.336
Methylhexanone		< 0.000	< 2.618	< 1.309	< 2.735	< 1.169
m-Ethyltoluene	620-14-4	< 0.049	< 0.204	< 0.127	< 0.227	< 0.088
m-Xylene + p-Xylene	108-38-3/106-42-3	0.140	0.402	0.271	0.492	0.171
Naphthalene	91-20-3	0.007	0.173	0.090	0.196	0.078
[illegible]tane	106-97-8	0.036	0.029	0.032	0.058	0.019
[illegible]ecane	124-18-5	< 0.145	< 0.630	< 0.387	< 0.688	< 0.269
n-Heptane	142-82-5	0.581	6.704	3.642	7.817	2.929
n-Hexane	110-54-3	0.658	0.813	0.736	1.265	0.456
n-Nonane	111-84-2	0.050	0.490	0.270	0.685	0.224
n-Octane	111-65-9	0.009	0.405	0.207	0.787	0.229
n-Pentane	109-66-0	< 0.018	< 0.045	< 0.032	< 0.067	< 0.022
n-Propylbenzene	103-65-1	< 0.004	< 0.047	< 0.025	< 0.061	< 0.022
Octane		< 0.000	< 0.803	< 0.401	< 2.408	< 0.692
o-Ethyltoluene	611-14-3	0.038	3.450	1.744	3.874	1.539
o-Toluidine	95-53-4	< 0.001	< 0.004	< 0.002	< 0.005	< 0.002
o-Xylene	95-47-6	0.051	0.405	0.228	0.492	0.176
p-Cymene	99-87-6	< 0.038	< 0.075	< 0.057	< 0.076	< 0.033
p-Ethyltoluene	622-96-8	< 0.030	< 0.073	< 0.051	< 0.105	< 0.042
Phenanthrene	85-01-8	0.006	0.008	0.007	0.015	0.005
Phenol	108-95-2	0.018	0.244	0.131	0.421	0.125
Phthalimide	85-41-6	< 0.004	< 0.752	< 0.378	< 0.842	< 0.336
Propane	74-98-6	0.437	3.993	2.215	4.564	1.742
Propylene	115-07-1	0.011	0.100	0.055	0.128	0.046
Pyrene	129-00-0	0.002	0.003	0.002	0.004	0.002
Styrene	100-42-5	0.017	0.616	0.317	0.963	0.306
Toluene	108-88-3	1.482	5.647	3.565	8.169	2.650
trans-2-Hexene	4050-45-7	< 0.003	< 0.043	< 0.023	< 0.047	< 0.019
Trichlorofluoromethane	75-69-4	< 0.513	< 0.116	< 0.315	< 0.642	< 0.222
Trichlortrifluoroethane	76-13-1	< 0.513	< 0.097	< 0.305	< 0.642	< 0.223
Undecane		< 0.000	< 0.904	< 0.452	< 2.713	< 0.780
Total Detected (lb/lb rubber)		3.76E-06	5.43E-05			
Total with non-detects (lb/lb rubber)		< 4.49E-06	< 7.34E-05			

[illegible]ercent values in this table are expressed as percent of lb/lb-rubber including detection limits for undetected compounds.

TABLE 4-12c
Calender Sulfur Speciation Factors

Organic Compound	CAS Number	Calender 1 %of TOT	Calender 2 %of TOT	Pollutant Mean %of TOT	Pollutant Maximum %of TOT	Standard Deviation %of TOT
Carbonyl Sulfide	463-58-1	2.07		2.07	2.17	0.07
Carbon Disulfide	75-15-0	97.93	100.00	98.96	100.00	1.04
Total Detected (lb/lb rubber)		2.04E-06	1.53E-06			
Total with non-detects (lb/lb rubber)		2.04E-06	1.53E-06			

TABLE 4-13a

SIDEWALL/WHITEWALL GRINDING - UNCONTROLLED SUMMARY

Control Device Inlet	Total VOCs, as methane (lbs/lb rubber removed)	Total Speciated Semivolatiles (lbs/lb rubber removed) with non-detects	Total Speciated Volatiles (lbs/lb rubber removed) with non-detects	Total Speciated Organics[1] (lbs/lb rubber removed) with non-detects	Total Sulfur (lbs/lb rubber removed) with non-detects	Total Metals (lbs/lb rubber removed) with non-detects	Total PM (lbs/lb rubber removed)[2]
Run 1	9.94E-03	< 9.97E-04	< 1.14E-02	NA	< 2.93E-04	< 2.39E-02	1.42E+00
Run 2	5.65E-03	< 1.24E-03	< 1.30E-02	NA	< 3.14E-04	< 2.18E-02	1.29E+00
Run 3	3.16E-02	< 1.13E-03	< 1.07E-02	NA	< 4.36E-04	< 1.64E-02	9.62E-01
Table 4.12-12 1.57E-2 Mean	1.57E-02	< 1.12E-03	< 1.17E-02	< 1.02E-02	< 3.47E-04	< 2.07E-02	1.96E-4 1.23E+00
Max.	3.16E-02	< 1.24E-03	< 1.30E-02	< 2.12E-03	< 4.36E-04	< 2.39E-02	1.42E+00
Std. Dev.	1.14E-02	< 9.94E-05	< 9.63E-04	< 3.02E-04	< 6.29E-05	< 3.16E-03	1.94E-01

1 - Run specific Speciated Organics were not evaluated.

Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

2 - For uncontrolled PM emissions, use a factor of 1.0 lbs emitted per pound of rubber removed.

why?

TABLE 4-13b CYCLONE INLET

CARCASS GRINDING - UNCONTROLLED SUMMARY

Control Device Inlet	Total VOCs, as methane (lbs/lb rubber removed)	Total Speciated Semivolatiles (lbs/lb rubber removed) with non-detects	Total Speciated Volatiles (lbs/lb rubber removed) with non-detects	Total Speciated Organics[1] (lbs/lb rubber removed) with non-detects	Total Sulfur (lbs/lb rubber removed) with non-detects	Total Metals (lbs/lb rubber removed) with non-detects	Total PM (lbs/lb rubber removed)[2]
Run 1	3.79E-04	< 4.07E-04	< 1.05E-02	NA	< 2.21E-05	1.93E-02	5.67E-01
Run 2	7.93E-04	< 9.91E-04	< 1.83E-02	NA	< 2.73E-05	1.18E-02	5.68E-01
Run 3	3.82E-04	< 8.72E-04	< 1.87E-02	NA	< 2.87E-05	1.04E-02	5.02E-01
Mean	5.18E-04	< 7.57E-04	< 1.58E-02	< 1.64E-02	< 2.60E-05	1.38E-02	5.45E-01
Max.	7.93E-04	< 9.91E-04	< 1.87E-02	< 9.59E-03	< 2.87E-05	1.93E-02	5.68E-01
Std. Dev.	1.94E-04	< 2.52E-04	< 3.77E-03	< 1.11E-03	< 2.84E-06	3.91E-03	3.09E-02

IN Table 4.12-12: 5.21E-4

1.63E-2 - see Table 4.13E

6.35E-6

Used in Table 4.12-12

1 - Run specific Speciated Organics were not evaluated.

Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

2 - For uncontrolled PM emissions, use a factor of 1.0 lbs emitted per lb of rubber removed. ← why?

Total Metals = 1.38E-2

Table 4-13F shows speciation

Cd ~.01%	1.38E-6
Cr .01%	1.38E-6
Co ~0%	
Pb ~.01%	1.38E-6
Ni .01%	1.38E-6

TABLE 4-13c

RETREAD BUFFING - UNCONTROLLED SUMMARY

Control Device Inlet	Total VOCs, as methane (lbs/lb rubber processed)	Total Speciated Semivolatiles (lbs/lb rubber processed) with non-detects	Total Speciated Volatiles (lbs/lb rubber processed) with non-detects	Total Speciated Organics[1] (lbs/lb rubber processed) with non-detects	Total Sulfur (lbs/lb rubber processed) with non-detects	Total Metals (lbs/lb rubber processed) with non-detects	Total PM (lbs/lb rubber processed)
Run 1	1.98E-04	< 2.74E-06	< 1.10E-05	NA	< 1.78E-06	1.03E-04	9.96E-03
Run 2	3.70E-04	< 2.71E-06	< 1.45E-05	NA	< 3.03E-06	1.10E-04	1.02E-02
Run 3	1.52E-04	< 2.31E-06	< 4.44E-06	NA	< 2.87E-06	7.26E-05	8.23E-03
table 4.2-12 Mean	2.43E-4 2.40E-04	< 2.59E-06	< 9.98E-06	< 1.13E-05	< 2.56E-06	9.51E-05	9.09E-7 9.48E-03
Max.	3.70E-04	< 2.74E-06	< 1.45E-05	< 2.71E-06	< 3.03E-06	1.10E-04	1.02E-02
Std. Dev.	9.38E-05	< 1.96E-07	< 4.17E-06	< 4.25E-07	< 5.55E-07	1.62E-05	8.78E-04

1 - Run specific Speciated Organics were not evaluated.

Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

TABLE 4-13d CYCLONE INLET

BELT GRINDING - UNCONTROLLED SUMMARY

Cyclone Inlet	Total Speciated Semivolatiles (lbs/lb rubber removed) with non-detects	Total Speciated Volatiles (lbs/lb rubber removed) with non-detects	Total Speciated Organics[1] (lbs/lb rubber removed) with non-detects	Total Sulfur (lbs/lb rubber removed) with non-detects	Total Metals (lbs/lb rubber removed) with non-detects	Total PM (lbs/lb rubber removed)[2]
Run 1	< 2.47E-04	< 2.94E-03	NA	< 3.12E-04	5.13E-02	1.28E+00
Run 2	< 2.57E-04	< 3.25E-03	NA	< 3.09E-04	4.52E-02	1.12E+00
Run 3	< 2.27E-04	< 2.43E-03	NA	< 2.36E-04	4.72E-02	1.17E+00
table 4.12-12	1.78E-3					2.26E-4
Mean	< 2.44E-04	< 2.87E-03	< 2.63E-03	< 2.86E-04	4.79E-02	1.19E+00
Max.	< 2.57E-04	< 3.25E-03	< 1.35E-03	< 3.12E-04	5.13E-02	1.28E+00
Std. Dev.	< 1.25E-05	< 3.38E-04	< 1.47E-04	< 3.51E-05	2.54E-03	6.68E-02

ESP Inlet	Total VOCs, as methane (lbs/lb rubber removed)	Total Metals (lbs/lb rubber removed) with non-detects	Total PM (lbs/lb rubber removed)
Run 1	2.39E-03	9.24E-05	1.51E-02
Run 2	2.30E-03	1.02E-04	1.20E-02
Run 3	6.78E-04	7.35E-05	8.51E-03
Mean	1.79E-03	8.94E-05	1.19E-02
Max.	2.39E-03	1.02E-04	1.51E-02
Std. Dev.	7.87E-04	1.19E-05	2.69E-03

1 - Run specific Speciated Organics were not evaluated.

Organic compound total is taken from the speciated statistical summaries. The "total" represents the sum of the semivolatile and volatile emissions results for a given rubber compound. Where there is duplication of a chemical compound in the analyte list, between the two methods, the higher value was used to present a conservative emissions total. The other value was ignored and not included in the total.

2 - For uncontrolled PM emissions, use a factor of 1.0 pounds emitted per pound of rubber removed. why?

TABLE 4 - 13.E GRINDING UNCONTROLLED ORGANIC COMPOUND SPECIATION FACTORS

Compounds	CAS Numbers	Retread Buffing % of Total	Belt Grinding % of Total	Carcass Grinding % of Total	Sidewall Grinding % of Total	TOTAL * Mean Inlet %	TOTAL * MAX Inlet %	TOTAL * STD Inlet %
1-Chloro-4-(1-chloroethenyl) cyclohexene		T	0.41	T	T	0.14	0.41	0.19
1-Chloro-5-(1-chloroethenyl) cyclohexene		T	0.15	T	T	0.05	0.15	0.07
1-Heptene	592-76-7	1.73	< 0.04	0.17	3.40	< 1.20	< 3.40	< 1.56
1,2,4-Trimethylbenzene	95-63-6	0.02	0.21	< 0.00	< 0.02	< 0.08	< 0.21	< 0.09
1,3-Butadiene	106-99-0	< 0.01	0.92	0.16	< 0.24	< 0.44	< 0.92	< 0.34
1,3-Pentadiene		T	T	0.01	0.59	0.20	0.59	0.27
1,4-Dichlorobenzene	00106-46-7	0.02	< 0.02	< 0.00	< 0.05	< 0.02	< 0.05	< 0.02
1,4-Diethylbenzene + n-Butylbenzene	105-05-5/104-51-8	< 0.01	0.18	< 0.01	< 0.08	< 0.09	< 0.18	< 0.07
2-Butanone	00078-93-3	0.00	< 0.44	< 0.00	< 0.46	< 0.30	< 0.46	< 0.21
2-Butene		T	T	T	1.54	0.51	1.54	0.73
2-Chloro-1,3-Butadiene		T	3.10	T	T	1.03	3.10	1.46
2-Chlorothiophene		T	0.08	T	T	0.03	0.08	0.04
2-Furaldehyde	98-01-1	0.15	1.39	< 0.01	< 0.08	< 0.49	< 1.39	< 0.64
2-Methyl-2-butene	513-35-9	< 0.00	< 0.04	5.00	0.26	< 1.77	< 5.00	< 2.29
2-Methylheptane	592-27-8	< 0.04	< 0.04	< 0.00	2.52	< 0.85	< 2.52	< 1.18
2-Methylhexane	591-76-4	6.33	< 0.04	0.44	8.02	< 2.83	< 8.02	< 3.67
2-Methylnaphthalene	91-57-6	0.06	0.57	0.00	0.01	0.19	0.57	0.26
2-Methylpentane	107-83-5	< 0.00	0.81	< 0.01	< 0.56	< 0.46	< 0.81	< 0.33
2,2-Dimethylbutane	75-83-2	< 0.00	0.26	< 0.00	< 0.05	< 0.10	< 0.26	< 0.11
2,3-Dimethylpentane	565-59-3	< 0.00	< 0.04	< 0.11	2.98	< 1.04	< 2.98	< 1.37
2,4-Dimethylhexane	589-43-5	0.95	< 0.04	0.18	1.95	< 0.72	< 1.95	< 0.87
3-Ethylpentane		T	T	T	1.63	0.54	1.63	0.77
3-Heptanone		T	0.08	T	T	0.03	0.08	0.04
3-Methylheptane		T	T	T	0.82	0.27	0.82	0.39
3-Methylhexane	589-34-4	< 13.46	< 0.04	1.12	17.13	< 6.10	< 17.13	< 7.81
3-Methylpentane	96-14-0	< 0.00	5.70	< 0.02	0.69	< 2.14	< 5.70	< 2.53
4-Chlorostyrene	1073-67-2	< 0.07	0.07	< 0.01	< 0.05	< 0.04	< 0.07	< 0.03
4-Methyl-2-pentanone	00108-10-1	0.12	< 0.25	0.12	< 0.28	< 0.21	< 0.28	< 0.07
Acenaphthene	83-32-9	0.02	< 0.01	< 0.00	< 0.03	< 0.01	< 0.03	< 0.01
Acenaphthylene	208-96-8	0.25	< 0.01	< 0.00	< 0.02	< 0.01	< 0.02	< 0.01
Acetaldehyde		T	0.39	T	T	0.13	0.39	0.18
Acetone	00067-64-1	0.03	1.03	0.11	0.35	0.50	1.03	0.39
Acetophenone	98-86-2	0.17	0.22	< 0.01	0.03	< 0.09	< 0.22	< 0.10
Acrolein	00107-02-8	0.07	< 0.45	< 0.01	< 0.56	< 0.34	< 0.56	< 0.24
Aniline	62-53-3	0.59	< 0.03	0.12	3.98	< 1.37	< 3.98	< 1.84
a-Pinene	7785-70-8	< 0.00	0.20	< 0.00	< 0.02	< 0.07	< 0.20	< 0.09
Benzaldehyde	100-52-7	0.97	< 0.04	< 0.01	0.03	< 0.03	< 0.04	< 0.01
Benzene	71-43-2	1.47	< 0.03	< 0.03	0.13	< 0.06	< 0.13	< 0.05
Benzoic acid	65-85-0	1.96	< 0.05	0.02	0.63	< 0.23	< 0.63	< 0.28
Benzo(a)anthracene	56-55-3	0.20	< 0.01	< 0.00	< 0.01	< 0.01	< 0.01	< 0.00
Benzo(g,h,i)perylene	191-24-2	0.18	< 0.02	0.01	< 0.01	< 0.02	< 0.02	< 0.00
Biphenyl	92-52-4	0.06	< 0.01	< 0.00	< 0.03	< 0.01	< 0.03	< 0.01
bis(2-Ethylhexyl)phthalate	117-81-7	0.18	2.01	0.05	0.18	0.75	2.01	0.90
Butanal		T	0.15	0.01	T	0.05	0.15	0.07
C7H16 Branched Alkane		1.29	T	0.15	T	0.05	0.15	0.07
C8H16 Alkene		T	T	T	0.45	0.15	0.45	0.21
C8H16 Branched Alkene		T	T	0.02	T	0.01	0.02	0.01
C9H20 Alkane		T	T	T	4.25	1.42	4.25	2.00
Carbon Disulfide	00075-15-0	0.10	11.51	0.01	< 0.27	< 3.93	< 11.51	< 5.36
Chrysene	218-01-9	0.11	< 0.02	< 0.01	0.01	< 0.01	< 0.02	< 0.00
cis-2-Pentene	627-20-3	0.02	0.84	< 0.00	< 0.02	< 0.29	< 0.84	< 0.39
Cyclobutane		< 0.02	T	0.00	T	0.00	0.00	0.00
Cyclohexane	110-82-7	19.46	0.96	0.50	0.15	0.54	0.96	0.33
Cyclohexanone	108-94-1	< 0.14	< 0.05	0.10	< 0.05	< 0.06	< 0.10	< 0.02
Cyclohexylamine	108-91-8	< 0.67	< 0.09	2.89	< 0.06	< 1.01	< 2.89	< 1.33
Cyclopentane + 2,3-Dimethylbutane	287-92-3/79-29-8	< 0.02	0.35	< 0.00	0.20	< 0.18	< 0.35	< 0.14
Dibenzofuran	132-64-9	< 0.03	< 0.01	0.00	< 0.02	< 0.01	< 0.02	< 0.01
Dibromochloromethane	00124-48-1	< 0.01	< 0.25	0.00	< 0.28	< 0.18	< 0.28	< 0.13
Diethylphthalate	84-66-2	0.03	0.01	< 0.00	< 0.02	< 0.01	< 0.02	< 0.01
Dimethyl Cyclopentane Isomer		0.18	T	T	0.49	0.16	0.49	0.23
Dimethylcyclohexane		T	T	0.04	1.86	0.63	1.86	0.87
Di-n-butylphthalate	84-74-2	0.34	0.13	< 0.01	0.02	< 0.05	< 0.13	< 0.05
Diphenylamine	122-39-4	0.30	0.18	0.04	< 0.03	< 0.08	< 0.18	< 0.07
d-Limonene	5989-27-5	< 0.01	0.18	< 0.01	< 0.37	< 0.19	< 0.37	< 0.15
Ethanol		T	T	0.03	T	0.01	0.03	0.01
Ethyl Cyclopentane		< 0.31	T	T	0.57	0.19	0.57	0.27
Ethylbenzene	100-41-4	< 0.00	< 0.03	< 0.00	0.56	< 0.20	< 0.56	< 0.26
Ethylpentane	206-44-0	0.22	T	T	T	0.00	0.00	0.00
Fluoranthene	86-73-7	0.24	< 0.01	0.03	0.01	< 0.02	< 0.03	< 0.01
Fluorene		0.03	< 0.01	0.00	< 0.03	< 0.01	< 0.03	< 0.01
Heptane	75-28-5	0.43	T	0.44	< 0.56	< 0.33	< 0.56	< 0.24
Isobutane	115-11-7/106-98-9	< 0.00	0.24	< 0.00	< 0.20	< 0.15	< 0.24	< 0.10
Isobutylene + 1-Butene	540-84-1	< 0.01	< 0.04	< 0.00	1.69	< 0.58	< 1.69	< 0.79
Isooctane	78-78-4	< 0.00	< 0.04	< 0.07	1.13	< 0.41	< 1.13	< 0.51
Isopentane	78-59-1	< 0.03	< 1.02	< 0.07	0.85	< 0.64	< 1.02	< 0.41
Isophorone	108-87-2	0.06	< 0.02	< 0.00	< 0.03	< 0.02	< 0.03	< 0.01
Matrix of C7-C8 Cyclic & alphatic HC's	96-37-7	7.17	T	T	T	T	T	T
Methylcyclohexane	00075-09-2	9.14	< 0.04	0.88	3.99	< 1.64	< 3.99	< 1.70
Methylcyclopentane		0.62	0.33	0.07	0.65	0.35	0.65	0.24
Methylene Chloride		0.02	1.89	25.58	< 0.33	< 9.27	< 25.58	< 11.55
Methylheptane	108-38-3/106-42-3	T	T	0.10	T	0.03	0.10	0.05

TABLE 4 - 13.E GRINDING UNCONTROLLED ORGANIC COMPOUND SPECIATION FACTORS

Compounds	CAS Numbers	Retread Buffing % of Total	Belt Grinding % of Total	Carcass Grinding % of Total	Sidewall Grinding % of Total	TOTAL * Mean Inlet %	TOTAL * MAX Inlet %	TOTAL * STD Inlet %
Methylhexane	91-20-3	0.76	T	0.44	T	0.15	0.44	0.21
Methylhexanone	106-97-8	0.14	T	T	T	0.00	0.00	0.00
m-Xylene + p-Xylene	124-18-5	< 0.01	0.32	< 0.01	< 0.32	< 0.22	< 0.32	< 0.14
Naphthalene	142-82-5	0.19	0.15	0.00	0.04	0.06	0.15	0.06
n-Butane	110-54-3	< 0.00	< 0.04	< 0.00	0.95	< 0.33	< 0.95	< 0.44
n-Decane	111-84-2	< 0.01	0.64	< 0.01	< 0.08	< 0.25	< 0.64	< 0.28
n-Heptane	111-65-9	24.09	< 0.04	1.42	20.88	< 7.44	< 20.88	< 9.51
n-Hexane		< 0.00	1.59	< 0.10	1.21	< 0.97	< 1.59	< 0.63
n-Nonane		< 0.00	0.25	< 0.00	< 0.49	< 0.25	< 0.49	< 0.20
n-Octane	611-14-3	< 0.00	< 0.04	< 0.02	1.64	< 0.57	< 1.64	< 0.76
n-Undecane	95-53-4	T	0.72	T	T	0.24	0.72	0.34
Octane	95-47-6	T	T	0.04	T	0.01	0.04	0.02
o-Ethyltoluene	99-87-6	< 0.01	0.24	< 0.01	< 0.08	< 0.11	< 0.24	< 0.10
o-Toluidine	85-01-8	< 0.07	< 0.03	0.02	< 0.04	< 0.03	< 0.04	< 0.01
o-Xylene	108-95-2	< 0.01	0.21	< 0.00	< 0.19	< 0.13	< 0.21	< 0.09
p-Cymene	85-41-6	< 0.01	0.33	< 0.01	< 0.08	< 0.14	< 0.33	< 0.14
Phenanthrene	74-98-6	0.21	< 0.01	0.02	0.02	< 0.02	< 0.02	< 0.00
Phenol	129-00-0	2.70	0.34	< 0.01	0.15	< 0.17	< 0.34	< 0.13
Phthalimide	00127-18-4	< 0.26	< 0.06	0.37	0.04	< 0.15	< 0.37	< 0.15
Propane	108-88-3	0.03	0.35	< 0.00	< 0.76	< 0.37	< 0.76	< 0.31
Pyrene	00075-69-4	1.30	< 0.09	0.10	0.02	< 0.07	< 0.10	< 0.03
Tetrachloroethene		< 0.00	5.30	< 0.00	< 0.28	< 1.86	< 5.30	< 2.43
Toluene		< 0.06	51.22	58.52	1.83	37.19	58.52	25.18
Trichlorofluoromethane		< 0.00	< 0.25	0.03	< 0.28	< 0.19	< 0.28	< 0.11
Trimethyl Cyclohexane Isomer		T	T	T	0.59	0.20	0.59	0.28
Trimethyl Cyclopentane Isomer		T	T	T	0.12	0.04	0.12	0.06
Unknown		T	T	T	1.40	0.47	1.40	0.66
Total Detected (lb/lb rubber)		9.54E-06	2.53E-03	1.63E-02	9.43E-03			
Total with non-detects (lb/lb rubber)		< 1.13E-05	< 2.63E-03	< 1.64E-02	< 1.02E-02			

in Table 4.12-12

TABLE 4 - 13.F GRINDING UNCONTROLLED METAL SPECIATION FACTORS

	Retread Buffing % of Total	Belt Grinding % of Total	Carcass Grinding % of Total	Sidewall Grinding % of Total	Total* Mean Inlet %	Total* MAX Inlet %	Total* STD Inlet %
Co	0.01						
Cr	0.03	0.01	0.01	0.12	0.05	0.12	0.05
Cu		0.01	0.03	< 0.00	0.01	0.03	0.01
Mg	0.42	0.17	2.28	0.97	1.14	2.28	0.87
Ni	0.02	0.04	0.01	0.07	0.04	0.07	0.02
Zn	99.53	99.77	97.65	98.69	98.70	99.77	0.86
Cd		0.00	0.01	0.01	0.00	0.01	0.00
Pb		0.01	0.01	0.14	0.05	0.14	0.06
Total		100.00	100.00	100.00			
Total Detected (lb/lb rubber)		4.79E-02	4.79E-02	4.79E-02			
Total with non-detected (lb/lb rubber)		4.79E-02	4.79E-02	< 4.79E-02			

* - Retread Buffing not included.

TABLE 4 - 13.G Grinding Uncontrolled Sulfur Speciation Factors

Compounds	CAS Numbers	Retread Buffing % of Total	Belt Grinding % of Total	Carcass Grinding % of Total	Sidewall Grinding % of Total	Total* Mean Inlet %	Total* MAX Inlet %	Total* STD Inlet %
Carbonyl Sulfide	463-58-1	< 7.28	< 3.65	84.94	< 44.95	44.52	44.52	44.52
Carbon Disulfide	75-15-0	92.72	96.35	< 15.06	< 55.05	55.48	55.48	55.48
Total		100.00	100.00	100.00	100.00			
Total Detected (lb/lb rubber)			2.12E-04	9.99E-06	0.00			
Total with non-detects (lb/lb rubber)			< 2.86E-04	< 2.60E-05	< 3.47E-04			

* - Retread Buffing not included

TABLE 4-13h

SIDEWALL/WHITEWALL GRINDING - CONTROLLED SUMMARY

Control Device Outlet	Total Metals (lbs/lb rubber removed) with non-detects	Total PM (lbs/lb rubber removed) with non-detects
Run 1	6.00E-05	6.69E-03
Run 2	3.66E-04	1.59E-02
Run 3	1.48E-04	7.08E-03
Mean	1.92E-04	9.90E-03
Max.	3.66E-04	1.59E-02
Std. Dev.	1.29E-04	4.25E-03

TABLE 4-13i

CARCASS GRINDING - CONTROLLED SUMMARY

Control Device Outlet	Total VOCs, as methane (lbs/lb rubber removed)		Total Speciated Semivolatiles (lbs/lb rubber removed) with non-detects		Total Speciated Volatiles (lbs/lb rubber removed) with non-detects		Total Sulfur (lbs/lb rubber removed) with non-detects		Total Metals (lbs/lb rubber removed) with non-detects	Total PM (lbs/lb rubber removed)
Run 1	3.24E-04	<	3.59E-05	<	1.19E-03	<	1.96E-05	<	6.85E-06	1.16E-03
Run 2	4.76E-04	<	4.33E-05	<	1.34E-03	<	1.86E-05	<	7.19E-06	1.16E-03
Run 3	4.50E-04	<	5.34E-05	<	6.86E-04	<	2.10E-05	<	8.71E-06	1.38E-03
Mean	close to 4.17E-04	<	4.42E-05	<	1.07E-03	<	1.97E-05	<	7.58E-06	1.23E-03
Max.	4.76E-04	<	5.34E-05	<	1.34E-03	<	2.10E-05	<	8.71E-06	1.38E-03
Std. Dev.	6.64E-05	<	7.17E-06	<	2.80E-04	<	9.84E-07	<	8.09E-07	1.04E-04

TABLE 4-13j

RETREAD BUFFING - CONTROLLED SUMMARY

Control Device Outlet	Total Speciated Semivolatiles (lbs/lb rubber processed) with non-detects	Total Speciated Volatiles (lbs/lb rubber processed) with non-detects	Total Sulfur (lbs/lb rubber processed) with non-detects	Total Metals (lbs/lb rubber processed) with non-detects	Total PM (lbs/lb rubber processed)
Run 1	< 5.30E-07	< 3.63E-06	< 1.14E-06	< 1.83E-07	3.57E-05
Run 2	< 8.11E-07	< 5.17E-07	< 1.21E-06	< 1.30E-07	4.62E-05
Run 3	< 7.74E-07	< 5.64E-08	< 1.14E-06	< 6.11E-06	5.57E-04
Mean	< 7.05E-07	< 1.40E-06	< 1.16E-06	< 2.14E-06	2.13E-04
Max.	< 8.11E-07	< 3.63E-06	< 1.21E-06	< 6.11E-06	5.57E-04
Std. Dev.	< 1.25E-07	< 1.59E-06	< 3.30E-08	< 2.81E-06	2.43E-04

TABLE 4-13k ESP OUTLET

BELT GRINDING - CONTROLLED SUMMARY

ESP Outlet	Total Speciated Semivolatiles (lbs/lb rubber removed) with non-detects	Total Speciated Volatiles (lbs/lb rubber removed) with non-detects	Total Sulfur (lbs/lb rubber removed) with non-detects	Total Metals (lbs/lb rubber removed) with non-detects	Total PM (lbs/lb rubber removed)
Run 1	< 1.10E-04	< 3.27E-03	< 3.55E-04	5.40E-05	4.06E-04
Run 2	< 1.24E-04	< 4.36E-03	< 8.83E-04	2.96E-05	3.48E-04
Run 3	< 1.06E-04	< 3.03E-03	< 6.83E-04	3.03E-05	3.61E-04
Mean	< 1.13E-04	< 3.55E-03	< 6.40E-04	3.80E-05	3.72E-04
Max.	< 1.24E-04	< 4.36E-03	< 8.83E-04	5.40E-05	4.06E-04
Std. Dev.	< 7.72E-06	< 5.79E-04	< 2.18E-04	1.13E-05	2.49E-05

VOC?

TABLE 4-131

CONTROL DEVICE EFFICIENCY SUMMARY

Pollutant Categories (1)	Retread Buffing		Control	Carcass Grinding		Control
	Inlet	Outlet (BAGHOUSE)	Efficiency	Inlet	Outlet (CYCLONE)	Efficiency
Total Speciated Semivolatiles (lbs/hr)	8.62E-03	3.30E-03	61.7%	6.98E-02	1.33E-03	98.1%
Total Metals (lbs/hr)	6.85E-01	1.43E-02	97.9%	1.64E+00	8.34E-04	99.9%
Total Particulate Matter (lbs/hr)	6.80E+01	1.43E+00	97.9% ✓	6.33E+00	1.42E-01	97.8% ✓

Pollutant Categories (1)	Sidewall/Whitewall Grinding		Control	Belt Grinding			Control
	Inlet	Outlet (CYCLONE)	Efficiency	Cyclone-Inlet	ESP-Inlet (cyclone outlet)	ESP-Outlet	Efficiency
Total Speciated Semivolatiles (lbs/hr)	NA	NA	NA	9.76E-03		2.87E-03	70.6%
Total Metals (lbs/hr)	2.71E-01	2.49E-03	99.1%	2.96E+00	5.57E-03	2.37E-03	99.9%
Total Particulate Matter (lbs/hr)	1.61E+00	1.30E-01	91.9% ✓	7.33E+01	7.46E-01	2.30E-02	~~100.0%~~ 99.97

98.98% 96.91% 1%

(1) - Inlet and outlet values shown are for detected analytes only.

Table 4-14. Effects of Processing Temperature on Emissions							
Total VOC (lb/lb Rubber)							
Compound #	**Mixer (220-240°F)[1]**	**Extruder (250-275°F)**	**Autoclave (340°F)**	**Platen Press (340°F)**	**Hot Air Oven Cure (400°F)**	**Warmup Mill (200°F)**	**Calendering (265°F)**
2	3.86E-05	--	--	1.51E-04	--	1.1E-04	5.31E-05[3]
3	1.37E-04	--	--	3.77E-04	--	1.12E-04	--
4	3.86E-05	8.35E-06	1.61E-04	--	--	8.4E-05	--
5	2.15E-04	--	1.78E-04	5.56E-04[3]	3.10E-04	--	--
6	3.96E-05	1.76E-05	1.33E-04	--	--	--	--
8	--	--	--	--	2.26E-04	--	--
9	2.84E-05	1.73E-05	3.61E-04 1.63E-04[2]	1.68E-03	--	--	--
11	3.22E-05	--	9.32E-05	2.35E-04[3]	--	--	--
12	1.59E-05	--	--	2.53E-04	--	1.71E-06[3,4]	4.67E-06[3,4]
22	1.23E-04	1.24E-05	1.11E-04	4.68E-04	1.12E-04	--	--

[1]Also included mixer non-productive runs which averaged approximately 335°F
[2]Extruded EPDM
[3]Avg. of 3 runs
[4]Warmup Mill 2 (175°F) and Calender 2 (180-200°F)

~~text~~ says #1
tbl 4-11a / pg. 4-102

more platen press was done?

SECTION 5
EMISSION FACTOR APPLICATION

Application of the emissions and speciation factors presented in Section 4 will vary depending on several source specific factors. These include the number and types of products manufactured at the facility, the facility's status with respect to Title V, the operational flexibility required by the source, the recordkeeping and reporting systems in place at the facility, and whether or not the emission factor becomes critical in determining applicability to various regulations (E.G., Title V, Title III, RACT, or enhanced monitoring). The user should be cautioned however to consider all factors when choosing an emission factor as the facility will be required to demonstrate compliance based on the chosen emission factor.

The emission factors (lbs of pollutant emitted/lb rubber) for total organics (regulated as VOCs), total sulfur, total metals, total particulate, and amines are presented on a per rubber compound and per process basis. For the speciated components, weight percentages have been provided on a process and rubber compound specific basis. Additionally, emission and speciation factor means, maxima and standard deviations for each process have also been calculated for all rubber compounds and specialty groupings (e.g., engineered products and tire manufacturing).

Facilities which process several different rubber compounds may use the mean or the maximum for a particular process or grouping to simplify the emissions inventory process. The user is cautioned however, that if a mean emission factor is used and rubbers yielding higher emissions are the primary compounds processed, a situation of noncompliance may result. In that particular case, the maximum emission factor would be recommended. In general, use of the maximum emission factor value will result in the maximum operational flexibility of the facility.

For facilities which process only a few rubber compounds, the compound-specific factors could be used. For processes where not all compounds have been represented, the user will need to determine on a case by case basis whether the mean or the maximum value would be more representative of the compounds processed at the facility.

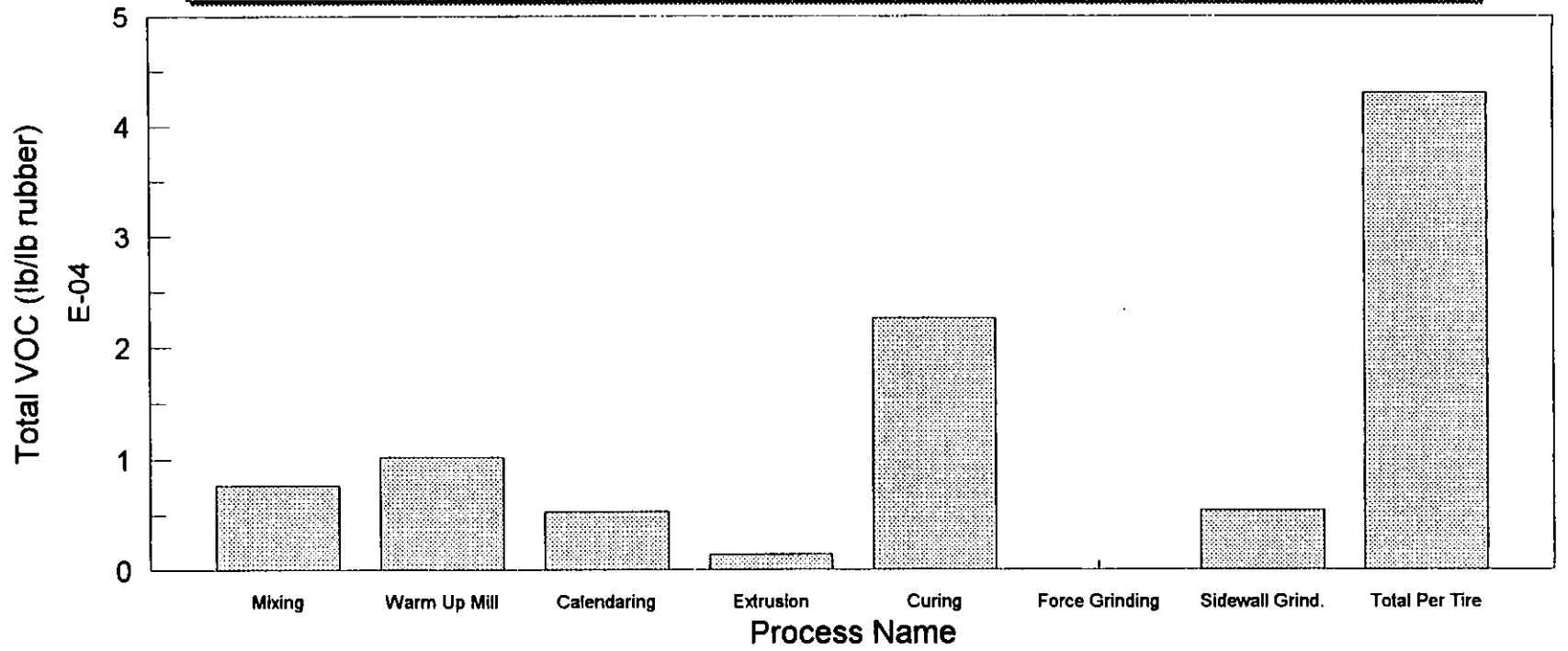
To calculate emissions using the emission factors presented, the user should simply select the most appropriate factor, based on the facility-specific characterization and needs. The emission factor (lb/lb rubber) would then be multiplied by the amount of rubber processed. To calculate species emissions, the emissions for a given pollutant category (e.g., volatiles) would be multiplied by the speciation factor for the desired compound (e.g., butanol). In cases where emissions for a specific chemical compound are required, the user may obtain a species-specific emission factor (lb/lb rubber) from Volume 2 of the report series.

When applying the factors generated in this project, it must be understood that the relative contribution of each process must be accounted for. For instance, the application of these factors to tire production must take into account the percentage of compound by weight in the tire and the ratio of calendered versus extruded components. Assuming the ratio of 30% calendered, 55% extruded and the remainder non-rubber components, greater than 70% of

VOC emissions (exclusive of adhesive application) are associated with the curing step and the remainder with the mixing, milling, calendering and grinding steps. An illustration of this is shown graphically in Figure 5-1.

For belt manufacturing an engineered rubber product, more than 75% of VOC emissions are attributable to the grinding process. Again, this illustration is exclusive of any adhesive application steps. Figure 5-2 provides a graphic presentation of this example.

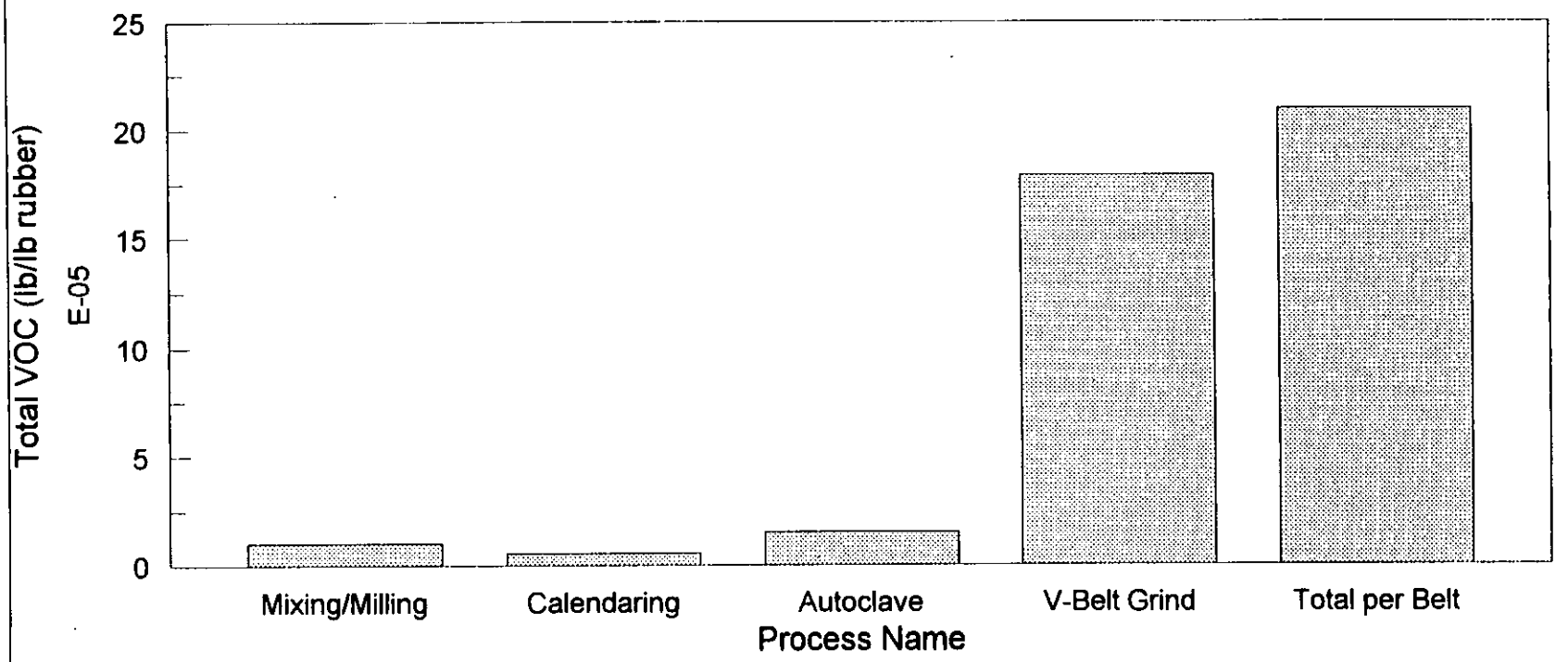
Figure 5-1. Application Approach - Tire Manufacturing



This is to demonstrate for an example plant how the emission factor data may be used to prepare an emissions inventory. This example does not include emissions from adhesive application and uncured tire spraying operations.

Assume average 20 pounds per tire at 85 percent rubber (17 pounds rubber per tire). Assume 25 percent of rubber is calendered and 60 percent of rubber is extruded. Total VOC per tire is 7.31E-03 pounds per tire. Sidewall Grinding emissions factor is pounds VOC per pound of rubber removed (average 0.067 pounds removed per tire).

Figure 5-2 - Application Approach - Belt Manufacturing



This is to demonstrate for an example plant how the emission factor data may be used to prepare an emissions inventory. This example does not include emissions from adhesive application and uncured tire spraying operations.

Total VOC per belt is 2.03E-03 pounds per pound. V-Belt Grinding emission factor is pounds VOC per pound of rubber removed.

SECTION 6
CONCLUSIONS AND RECOMMENDATIONS

The results of this study demonstrate the wide variety of HAPs emanating from the various processes used to manufacture rubber products. For tire manufacturing, the majority of organic pollutants are generated by the curing process. For belt manufacturing, the predominant emission source is the grinding operation. Figures 5-1 and 5-2 in the preceding section are illustrative examples for tire and engineered products manufacturing.

Several key conclusions can be drawn from the data. It should be noted that these conclusions are empirically based but nonetheless will aid the facility owner in applying the data.

- It appears that compounds with low accelerator contents inhibit the release of sulfur compounds during the various heating processes within the plant. This conclusion is based on the fact that Compound No. 2, which contains the highest amount of sulfur compound and one of the lowest accelerator content, exhibited minimal sulfur emissions during testing.

- Compounds containing carbon black had lower VOC emissions than compounds not containing carbon black. All compounds in the mixing tests contained carbon black with the exception of one compound. A comparison of Compounds 8 and 10 illustrates this conclusion. Both compounds are similar except for the carbon black component. VOC emissions are on the order of 8-10 times higher for the non-carbon black compound.

- Solution based polymers appear to release lower amounts of VOC during the mixing process when compared to emulsion and oil extended polymers. Data from Compounds 24, 25, and 26 illustrate this conclusion.

- Elevated temperatures result in the release of more VOC. When comparing compounds exposed to 220°F temperatures versus those at 340°F, VOC emissions are generally higher by about an order of magnitude. Compounds cured at the same temperatures in the autoclave and platen press exhibit VOC emissions one-half to an order of magnitude higher for the platen process.

SECTION 7
REFERENCES

1. *The Clean Air Act Amendments of 1990*

2. *The Title V Operating Permit Rule*, Federal Register, July 21, 1992

3. S. Rappaport, *The Identification of Effluents From Rubber Vulcanization*, Doctoral dissertation submitted to the Graduate School of the University of North Carolina, 1976

4. E. Waterson, *Assessment of the Dispersion and Effects of Emissions of Vulcanization Fumes From the Rubber Industry*, Project Report Conducted for Trelleborg Industri AB, 1991.

5. B.G. Willoughby, "The RAPRA Vulcanization Study--Ingredient/Emission Relationships through Computerized Analysis," *Kunstoffe, Vol 45*, 1992, pp. 120-123.

Development of Emission Factors for the Rubber Manufacturing Industry

Volume 3: Test Program Protocol

Presented to

Rubber Manufacturers Association

RMA

Presented by

TRC

TRC Environmental Corporation

January 1995

TRC Project No. 16157

January 1995

DEVELOPMENT OF EMISSION FACTORS FOR THE RUBBER MANUFACTURING INDUSTRY

Volume 3
Test Program Protocol

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TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

Section **Page**

Appendices

TABLES

Number **Page**

FIGURES

Number **Page**

TABLE OF CONTENTS (CONTINUED)

SECTION 1.0

INTRODUCTION

The 1990 Clean Air Act Amendments (CAAA) included a list of 189 regulated hazardous air pollutants (HAPs). Facilities emitting these compounds became subject to the 1990 CAAA Title V federal operating permit program. In order to meet the requirements of Title V, a plant wide emission inventory for all regulated pollutants, including HAPs, is necessary.

Accurate emission factors for HAPs are required for preparation of emission inventories in rubber manufacturing plants. The rubber manufacturing industry is one of these industries for which up-to-date emission factors are not available. The Rubber Manufacturers Association (RMA) has initiated an emissions sampling program, on behalf of its members, to develop HAP emission factors for processes with little available air pollutant emission data.

This report describes the results of a program conducted for the Rubber Manufacturers Association on behalf of its members. The technical approach are reported in sufficient detail to allow others to replicate the tests. Topics covered in this report include:

1.1 OBJECTIVE

The objective of this test program has been to quantify emissions of hazardous air pollutants (HAPs) from a representative selection of rubber formulations and manufacturing processes.

Emissions are expressed as emission factors which will be suitable for the purposes of Title V of the Clean Air Act Amendments.

1.2 OVERVIEW OF TEST PROGRAM

Six processes common to both the tire and general rubber products industries were the subject of this project. The processes were: mixing (including the drop mill or similar purpose equipment), milling (warmup), extruding, calendering, vulcanizing (curing), and grinding. Twenty six rubber compounds/mixtures, related to the tire and non-tire rubber products manufacturing facilities, were studied in this program.

Ten processes were tested: internal mixers, warmup mills, rubber extruder, calender, tire press, oven curing of tire cuts, platen press, surface grinding, and oven curing of general products. Nine of the processes were tested for: total volatile organic compounds, speciated volatiles, volatile ozone precursors, sulfur compounds, semivolatile organic compounds, particulate organic matter. Two processes (tire press and autoclave) were tested for amines. Four processes (tire press, oven cure of tire cuts, extruder, and some grinding processes) were tested by Fourier transform infrared spectroscopy (FTIR). Three processes (extruder, internal mixers, and grinding) were tested for particulate matter and metals. The test matrix of processes and chemical analyses is presented in Section 2.

The test program has been conducted at a total of eleven locations. These locations included manufacturing facilities as well as research and development facilities.

1.3 TECHNICAL APPROACH SUMMARY

1.3.1 Parameters

Target compounds for this study included the specific chemical compounds from:

- the Clean Air Act Amendments Title III hazardous air pollutant list (HAPs)
- the State Air Toxics lists
- the SARA 313 toxic chemical list (40 CFR 372.65)

any other compounds on the EPA Contract Laboratory Program

- volatile organic chemical (VOC) list
- semivolatile organic chemical list
- metals list

and sulfur compounds. Other parameters monitored for these tests included:

- organic compounds by Fourier transform infrared (FTIR) spectroscopy
- total volatile organic compounds (total VOC, or TVOC)
- polycyclic organic matter (POM)

1.3.2 Emission Calculations

For each test, emission rates were developed as pounds of pollutant emitted per pound of rubber (or product) processed. The amount of rubber or product involved in each test was directly measured or obtained from engineering data (such as rubber makeup of individual tires). The amount of pollutant emitted was determined from laboratory analytical data on a particular sample and by calculation of the fraction of the total emissions represented by the sample. A typical example can be used to illustrate the calculations involved in developing emission factors.

During the three-pass mixing of tread compound in the large Banbury mixer, the total mass of rubber processed was 1942.5 pounds over the 128-minute run time, for a rate of 910.5 pounds of rubber per hour. The mass of the semivolatile organic compound, diphenylamine, collected in the M0010 sampling train was determined through laboratory analysis to be 86.85 micrograms (ug). The volume of exhaust gas sampled by this train was 78.782 dry standard cubic feet (dscf). The resultant average concentration of diphenylamine in the exhaust gas from the Banbury mixer was 1.10 ug/dscf. The exhaust gas flow rate was 680 dscf/minute, yielding a pollutant emission rate for diphenylamine of 9.92×10^{-5} pounds per hour.

To calculate pollutant emission based on a production or processing rate, the hourly emission rate was divided by the hourly rubber processing rate:

$$\frac{9.92 \times 10^{-5} \textit{ lbs diphenylamine/hr}}{910.5 \textit{ lbs tread compound/hr}} = 1.09 \times 10^{-7} \textit{ lbs diphenylamine/lb-tread-mixed}$$

1.3.3 Sampling

All sampling for this program involved the collection of samples from air or air condensate (followed by chemical analysis) or the direct monitoring of concentrations in air. No solid samples of rubber were collected for direct chemical analysis.

Sampling locations for each type of process are outlined in Section 3. Samples were taken from enclosures or hoods which captured total air emissions from each process tested.

1.3.4 Monitoring and Chemical Analysis

One real-time monitor, Fourier transform infrared (FTIR) spectroscopy, was used to get an onsite quantitative indication of changes in the concentration of organic compounds during each test. The information was helpful in planning the lengths of sampling runs and flow rates for sampling trains.

Three parametric tests were used: total volatile organic compounds (TVOC), polycyclic organic matter (POM), and particulate matter (PM). Total volatile organic compound data provide close to real-time data on volatile organic compounds throughout each test. These data were later compared to compound-specific chemical analysis data. POM data provide an indication of the total mass of methylene-chloride soluble particulate matter emitted for each test. PM data quantify the particulate emissions from each process.

Three compound-specific chemical analysis tests were used: semivolatile organics, volatile organics, and metals. From these tests, it is possible to assess variation in the composition of emissions for each rubber mixture tested by process. These are the quantitative HAP data which are relevant to federal and state regulatory programs.

SECTION 2.0

TEST PROGRAM

2.1 OBJECTIVES

The objective of the test program has been to quantify the emissions of hazardous air pollutants (HAPs) and total organic compounds from the processes described in Section 3.0. These emissions have been correlated with the operating data obtained during the emissions testing to develop emission factors for each HAP for each process. These emission factors are expressed in units of mass of HAP emitted per mass of material processed or unit of product manufactured. These emission factors will then be employed by rubber manufacturing facilities to assist in completing application forms under Title V of the 1990 Clean Air Act Amendments (CAAA).

The primary focus of the test program has been upon rubber processing. Initially, four generic classes of rubber mix commonly used in the tire industry were studied. These are: tread, sidewall, styrene-butadiene rubber (SBR), and ethylene-propylene-diene copolymer (EPDM). Additional rubber mixes from both the tire and other rubber manufacturing industries have also been incorporated into the program.

Many operating variables exist in the manufacturing of rubber products. Some of these variables consist of the types of raw rubber and chemical additives used, the sequence of the processing steps, operating temperatures and pressures of each process for each product, and the manner in which the product is cured. The emissions sampling has been performed to address many of these variables. However, it is not feasible to address all of the variables involved in this industry. This program has attempted to provide sufficient information to allow facilities to determine the *potential to emit* for each selected process.

2.2 SELECTION OF TARGET COMPOUNDS

The initial step necessary in developing emission factors is to identify which pollutants are emitted to the atmosphere from the process. Previous investigations into the emissions from rubber manufacturing show that the predominant emissions are low molecular weight organic compounds (C_6-C_8). However, the potential for heavier, less volatile organic compound emissions also exists due to the chemistry and the elevated temperatures of many of the processes. Particulate matter emissions can also be significant, especially during the mixing process when carbon black is added to the mix.

Title III of 1990 CAAA lists 189 HAPs. Many of these are applicable to the rubber manufacturing industry. In addition, many states where rubber manufacturing facilities operate have developed their own HAP lists. Since the Title V operating program will be administered by the individual states, there exists the possibility that facilities will need to conduct emission inventories for all of the HAPs in Title III as well as on the state lists. A

combined HAP list has been developed from Title III, state HAP lists, as well as the SARA 313 toxic chemical list. All compounds on this combined list (shown in Appendix A) which have the potential to be emitted from the selected processes, have been targeted by this program.

The emissions from each process change depending upon the type of rubber used (natural or synthetic) and the specific additives (metal oxides, accelerators, retardants, antiozonants, softeners, fillers, and vulcanizing agents) in the mix. The emissions vary due to the physical properties of the raw rubber, the physical characteristics of the processes, chemical additives, and the reaction chemistry of the processes. Some historical emissions data is available, although it is not comprehensive. These data have served as a starting point for developing the final target compound list.

The tire manufacturing industry principally uses natural rubber, styrene-butadiene (SBR) rubber, and polybutadiene rubber. Polybutadiene is often mixed with SBR to improve the abrasion and cracking resistance of the tire. For non-tire rubber goods where oil resistance is a priority, rubbers such as polyacrylates, nitrile, neoprene, polyurethanes, epichlorohydrins, chlorosulfonated polyethylene, chlorinated polyethylene, and fluoroelastomers are used. Potential emissions from these rubbers consist of breakdown compounds such as the monomers used to create the rubber.

Accelerators are added to the mix to speed up the vulcanization rate. Typical accelerators are metal oxides (zinc oxide, lead oxide, and magnesium oxide) and a large variety of organic accelerators. These organic accelerators are typically from the following classes of organic compounds: benzothiazoles, benzothiazolesulfonamides, dithiocarbamates, dithiophosphates, guanidines, thioureas, and thiurams.

Antioxidants help to prevent oxidation (aging) of the vulcanized product. Antioxidants are usually high molecular weight amine compounds such as dioctylated diphenylamine. The potential for amine emissions exists upon the degradation of this compound during processing.

Retarders are used to prevent the premature vulcanization (scorching) of the rubber during processing. Retarders currently in use mainly consist of organic acids (salicyclic and benzoic acids), phthalic anhydride, and N-(cyclohexylthio)phthalimide. Again, the potential emissions consist of the retarders themselves along with their thermal breakdown components.

Softeners are used to increase the workability of the mix for lubrication during extrusion and molding and, to aid in the dispersion of fillers. The predominant softener used in the rubber industry is petroleum oil. The potential emission compounds from petroleum oil are extensive. The majority of the compounds would most likely be aromatic hydrocarbons of various sizes and types.

Fillers are added to the rubber mix for several reasons. Fillers provide color but are mainly used to reinforce the final product. Fillers are fine particles which increase the abrasion resistance and tensile strength of the product. Carbon black is used as the primary filler in tire manufacturing. Rubber goods requiring a color other than black use numerous types of inorganic fillers. Due to the extremely fine particle size of fillers, they are easily emitted to the atmosphere during mixing.

Sulfur compounds comprise the vast majority of vulcanizing agents currently used. Sulfur can be added as elemental sulfur or within inorganic or organic sulfur compounds. The presence of sulfur and the high temperatures involved in the processes creates the possibility of sulfur compounds such as carbon disulfide to be emitted.

The available historical data for emissions from rubber manufacturing consists mainly of a doctoral thesis presented by Dr. Stephen Rappaport at the University of North Carolina in 1976. Dr. Rappaport conducted a laboratory study of C_6-C_{25} organic compound emissions from the curing of one type of rubber stock used in tire manufacturing. The rubber stock was a mixture of SBR and polybutadiene rubbers along with the necessary chemical additives. The results of Dr. Rappaport's study showed that a large number of cyclic (aromatic) organic compounds were emitted. Although these results are informative, the study was conducted on only one type of rubber mix using a simulated press mold cure. The potential for hazardous compounds to be emitted, other than those discovered by Rappaport, is considerable.

The formulations studied during this program are shown in Appendix B. The composition of these mixes were examined against the combined HAP list (Appendix A) generated from Title III, state HAP lists, and SARA 313 toxic chemical list. The target compounds for the emission factor development program are the list of HAPs, in addition to total VOCs and other pollutants common to the rubber manufacturing industry.

2.3 TEST MATRIX

Table 2-1 summarizes parameters targeted for a given process. The sampling and analytical summary for each process classification is presented in Table 2-2.

Table 2-1. Test Matrix of Processes and Chemical Analyses										
	Tire Press	**Oven Cure**	**Autoclave**	**Extruder**	**Banbury Mixers**	**Surface Grinding**	**Platen Press**	**Calender**	**Warming Mill**	**Oven Cure-Engineered Products**
Total Volatile Organic Compounds	X		X	X	X	X	X	X	X	X
Speciated Volatiles	X		X	X	X	X	X	X	X	X
Volatile Ozone Precursors	X		X	X	X	X	X	X	X	X
Sulfur Compounds	X		X	X	X	X	X	X	X	X
Semivolatiles	X		X	X	X	X	X	X	X	X
Polycyclic Organic Matter	X		X	X	X	X	X	X	X	X
Amines	X		X							
FTIR	X	X		X		(a)				
Particulate Matter				X	X	X				
Metals				X	X	X				

(a) FTIR at one grinding facility.

Table 2-1 Test Matrix of Processes and Chemical Analyses

Table 2-2. Sampling and Analytical Methods Summary

	Parameters	Sampling Method	Analytical Methods
1	Total Volatile Organic Compounds	M25A	M25A/FID
2	Speciated Volatiles	TO-14 (a) Grab Sample	TO-14/GC-MS M 8240
3	Volatile Ozone Precursors	TO-14	TO-14/GC-FID
4	Sulfur Compounds	TO-14	GC/FPD
5	Speciated Semivolatiles	M 0010 Grab Sample (b)	M 8270 M 8270
6	Particulate Organic Matter	M202	Extr./Gravimetric
7	Particulate Matter	M5	Gravimetric
8	Metals	M0012	M 6010, 7000
9	Amines	Midget Impinger Sampling Train	GC
10	FTIR	Extractive	FTIR

(a) Grab sample for autoclave water trap.
(b) Grab/composite sample for autoclave blowdown.

Table 2-2 Sampling and Analytical Methods Summary

SECTION 3.0

SOURCE DESCRIPTION

The majority of rubber manufacturing facilities in the United States produce pneumatic tires for automobile, trucks, airplanes and farm machinery. However, the manufacturing of non-tire rubber products is also quite extensive. The processes involved in these industries are very similar. The differences basically consist of the raw rubber material (natural or synthetic) used, the chemical additives, and the type of curing employed. The following is a description of a generic rubber manufacturing facility applicable to both tire and other manufactured rubber products, except where noted.

3.1 PROCESS DESCRIPTION

The manufacturing of rubber products involves several processing steps. Initially, the raw rubber (natural or synthetic) is mixed with several additives which are chosen based upon the desired properties of the final product. The mixed rubber is often milled and transferred to an extruder where it can be laminated to other compounds. Many rubber products contain synthetic fabric or fibers for strengthening purposes. These fibers are typically coated with mixed rubber using a calendering machine. The extruded rubber and rubber coated materials are then assembled into its final shape and cured. It is during the curing process that the rubber vulcanizes (crosslinks) producing the characteristic properties of finished rubber. Some cured products undergo grinding as a final finishing step. A brief description of each of these processes is provided.

Mixing consists of taking the raw rubber and mixing it with several chemical additives. These additives consist of an accelerator (accelerates the vulcanization rate), zinc oxides (assists in accelerating vulcanization), retarders (prevent premature vulcanization), anti-degradents (prevent aging), softeners (facilitates processing of the rubber), carbon black or other fillers (reinforcing/strengthening agents), and inorganic or organic sulfur compounds (vulcanizing agent).

Mixing is typically performed in one of two types of mixers utilized in the rubber manufacturing industry, the internal intensive mixer and the mill mixer. The internal intensive mixer is a batch mixer while the mill is an external open batch mixer. The internal mixer contains two rotors which shear the rubber mix against the wall of the vessel. Internal mixing is performed at elevated temperatures which range from 120° to 180°C. Internal mixing is the primary mixing method within the tire manufacturing industry and in large volume, non-tire mixing applications.

Mill mixing incorporates parallel rolls rotating in opposing directions at slightly different speeds and are operated at modest temperatures of 40° to 100°C. The mixing occurs at the nip between the two rolls. Mill mixing is the dominant mixer used in many smaller manufacturing operations and is commonly utilized for certain practices in most production

operations. Mill mixing is also commonly performed downstream from internal mixers in rubber product manufacturing.

The homogenous rubber mass produced by the Banbury is discharged to a mill or other equipment which forms it into a long strip or sheet. The hot sticky strip or sheet is passed through a water based "anti-tack" solution applied to prevent it from sticking together as it cools to ambient temperature.

The processing of the rubber mixes is performed in either a non-productive or productive mode, or both. In nonproductive mode, all of the materials are mixed with the exception of the accelerators and sulfur compounds. This mixed rubber is then stored until needed and then the accelerators and sulfur are added to make the productive mix. After mixing the accelerators and sulfur compounds, the mix has a finite useful life and is normally processed through completion of the final product.

Once the rubber is properly mixed, it can be extruded. The extruder consists of a power driven screw within a stationary cylinder. A die is attached to the head of the screw to produce the desired shape or cross section of the extruded rubber. Extrusion can be performed with both warm or cold rubber feed. The extruder is temperature-controlled to maintain the desired operating temperature.

Calendering is often used in the rubber manufacturing industry to apply a rubber coat onto fabric. Calenders employ either 3 or 4 rolls which are hollow to allow for heating or cooling. The openings between the rolls can be adjusted to control the final thickness.

A common step in manufacturing of rubber products is curing. There are three predominant curing processes: compression mold curing, autoclave curing, and hot air curing. Compression mold curing uses high temperature and pressure to cure the final product. The high pressure (600-10,000 psi) forces the rubber to conform to the shape of the heated mold. Press mold curing is used in tire and non-tire manufacturing.

Autoclave curing utilizes steam to cure the rubber mix. Autoclave curing is curing method in non-tire rubber manufacturing facilities.

Hot air curing entails passing preshaped, a common uncured engineered products through a chamber with a heated atmosphere. Temperature and residence times vary, depending on the product type and formulation. Some of these processes use a heated oven, while others use continuous feed tunnels or chambers.

Grinding is used in the tire industry in producing white side wall tires and in balancing a finished tire. The 'V' shape of a fan belt is also produced in a grinding operation. The tire retreading process uses grinding to remove the old tread from a tire carcass.

In addition to the operations described above, one other variable may be examined to determine its effect upon the emissions. The addition of carbon black to a mix causes some fugitive carbon black to escape to the atmosphere. Therefore, testing has been performed with and without carbon black being added to the mix to determine its effect upon the overall emissions.

3.2 CONTROL EQUIPMENT DESCRIPTION

Emissions from the internal mixers are typically controlled by baghouses. Exhausts from the collection hoods are ducted to the baghouses for control of particulate and possibly particle-bound semivolatiles and metals. During this program, TRC conducted inlet and outlet sampling of a fabric filter for controlling mixer emissions. Additionally, the surface grinding processes generate dust and rubber particles which are typically controlled by a primary cyclone and a secondary baghouse or electrostatic precipitator. Again, inlet and outlet sampling have been conducted to determine collection efficiency and outlet emissions. Specific details on the control devices tested are presented in the test report.

3.3 DESIGN AND CONSTRUCTION OF ENCLOSURES

To accurately quantify the emissions from each process, the emissions were contained to permit sampling of the process offgases. To ensure that all emissions are captured, the design of each enclosure was based upon the criteria in EPA Method 204 for a total enclosure. The objective in using the enclosure approach was to collect and "concentrate" fugitives from the individual process in a way that enclosure exhaust could be sampled.

A highly ventilated enclosure with rapid air turnover would not allow for adequate detection limits of the target parameters. EPA's criteria for enclosures have been followed, as guidance. However, air velocities have been varied to allow for optimal sampling conditions within the exhaust duct. Specific enclosure construction and exhaust details vary with the process, fugitive release rate, and target sampling parameters.

Typical enclosures are illustrated in a Figures 3-1 through 3-16. The figures are presented essentially in the order in which processes were tested during the program.

Process	Figures
Tire press and laboratory oven testing of tire cuts	3-1 and 3-2
Autoclave	3-3 and 3-4
Extruder	3-5, 3-6, and 3-7
Mixers and Mills	3-8, 3-9, 3-10, and 3-11
Grinding	3-12
Platen Press	3-13
Calender	3-14
Warmup Mill	3-15
Hot Air Cure of Engineered Products	3-16

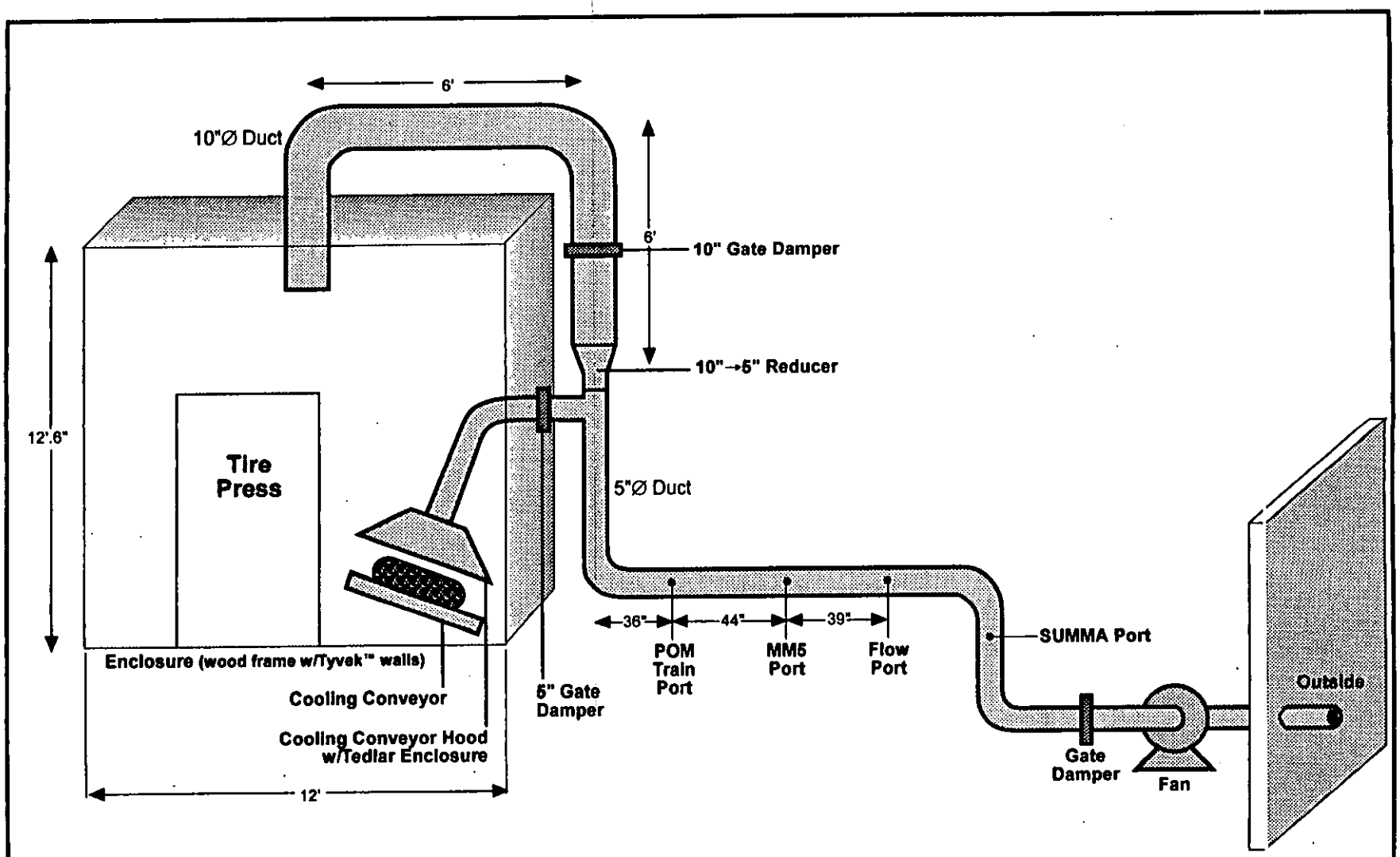


FIGURE 3-1.
TIRE PRESS ENCLOSURE EXHAUST SCHEMATIC

Not to Scale

16157-F

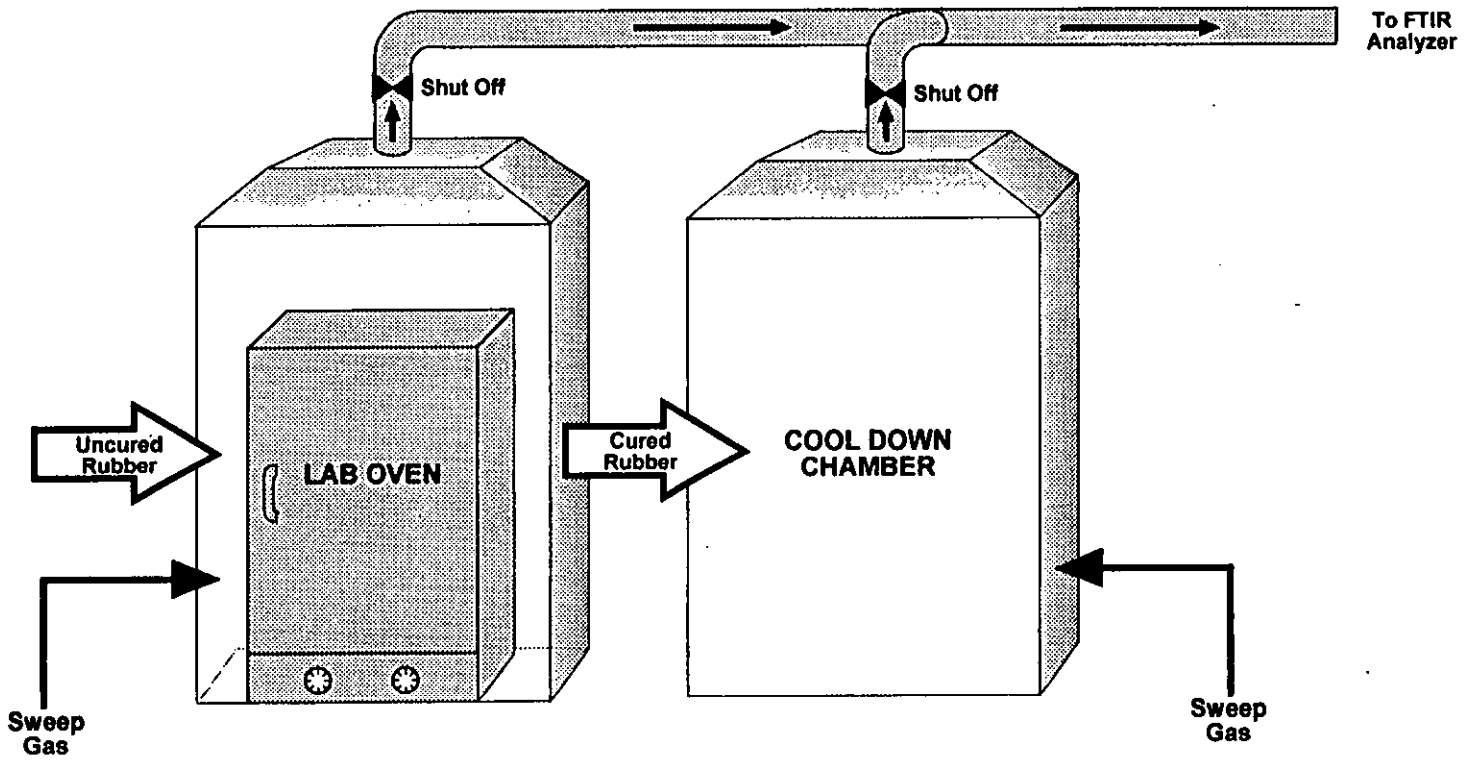
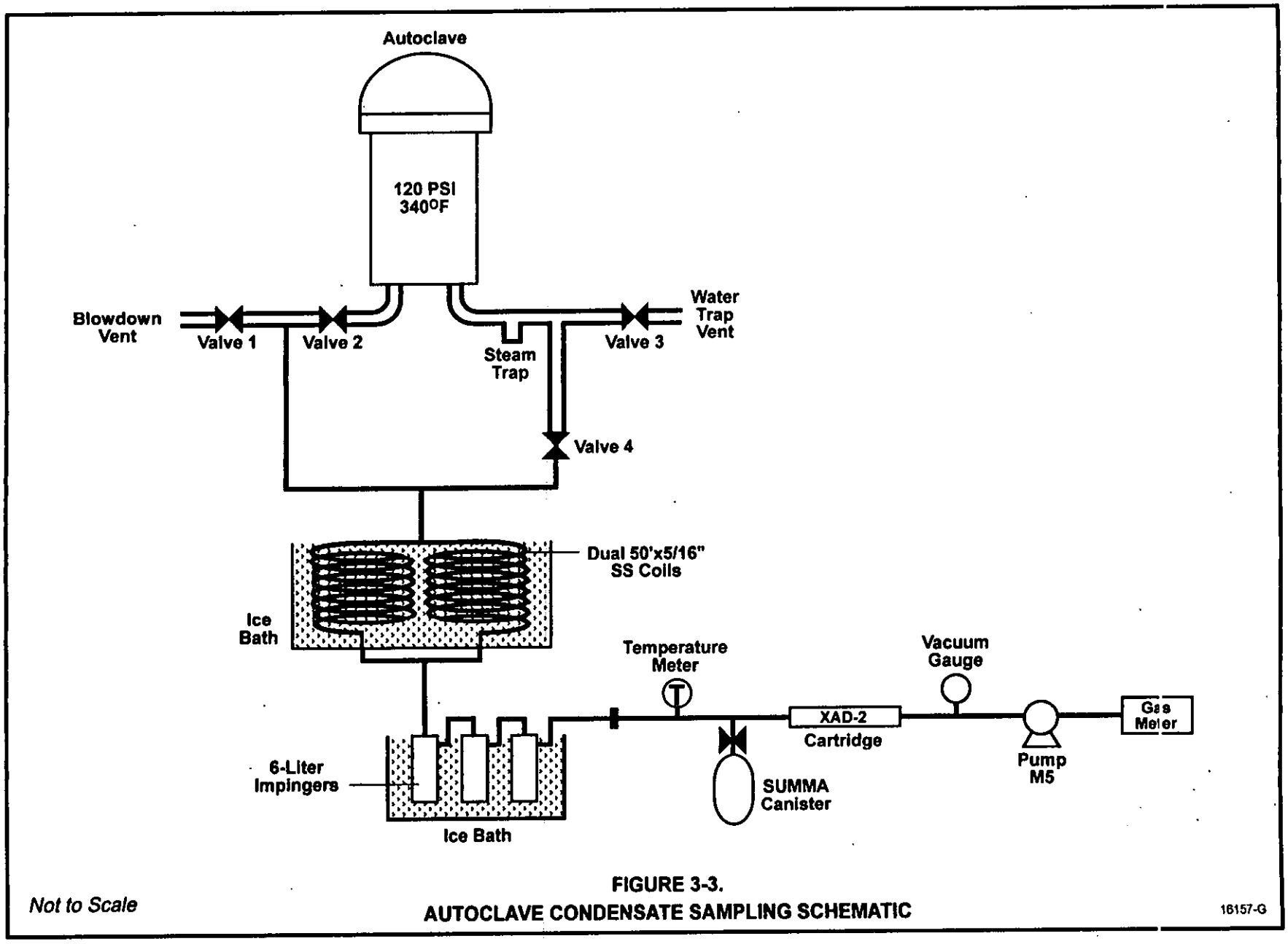


FIGURE 3-2.
LABORATORY OVEN TESTING AND COOL DOWN CHAMBER (TIRE CUTS)

Not to Scale

16157-M



Not to Scale

FIGURE 3-3.
AUTOCLAVE CONDENSATE SAMPLING SCHEMATIC

16157-G

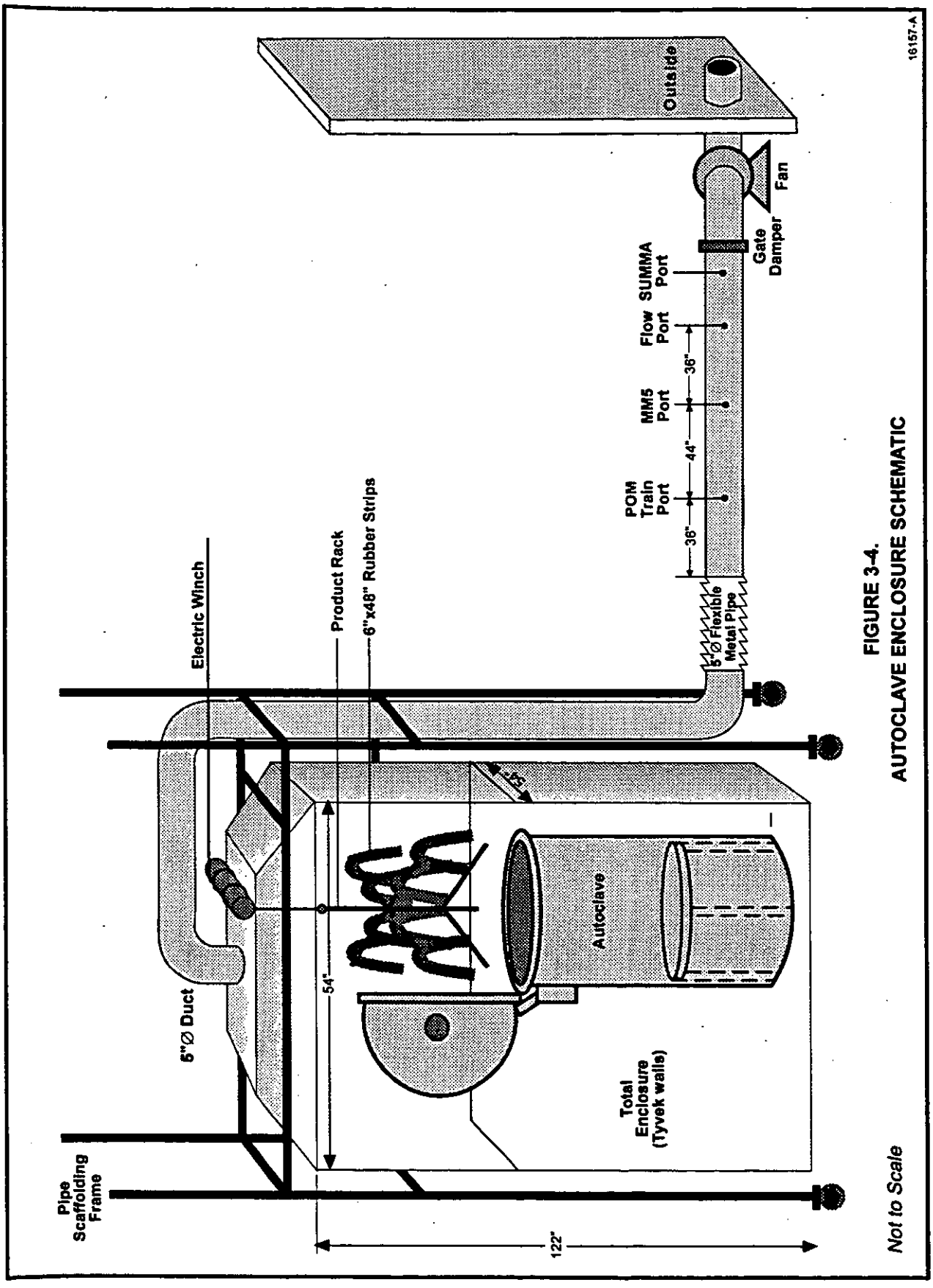


FIGURE 3-4.
AUTOCLAVE ENCLOSURE SCHEMATIC

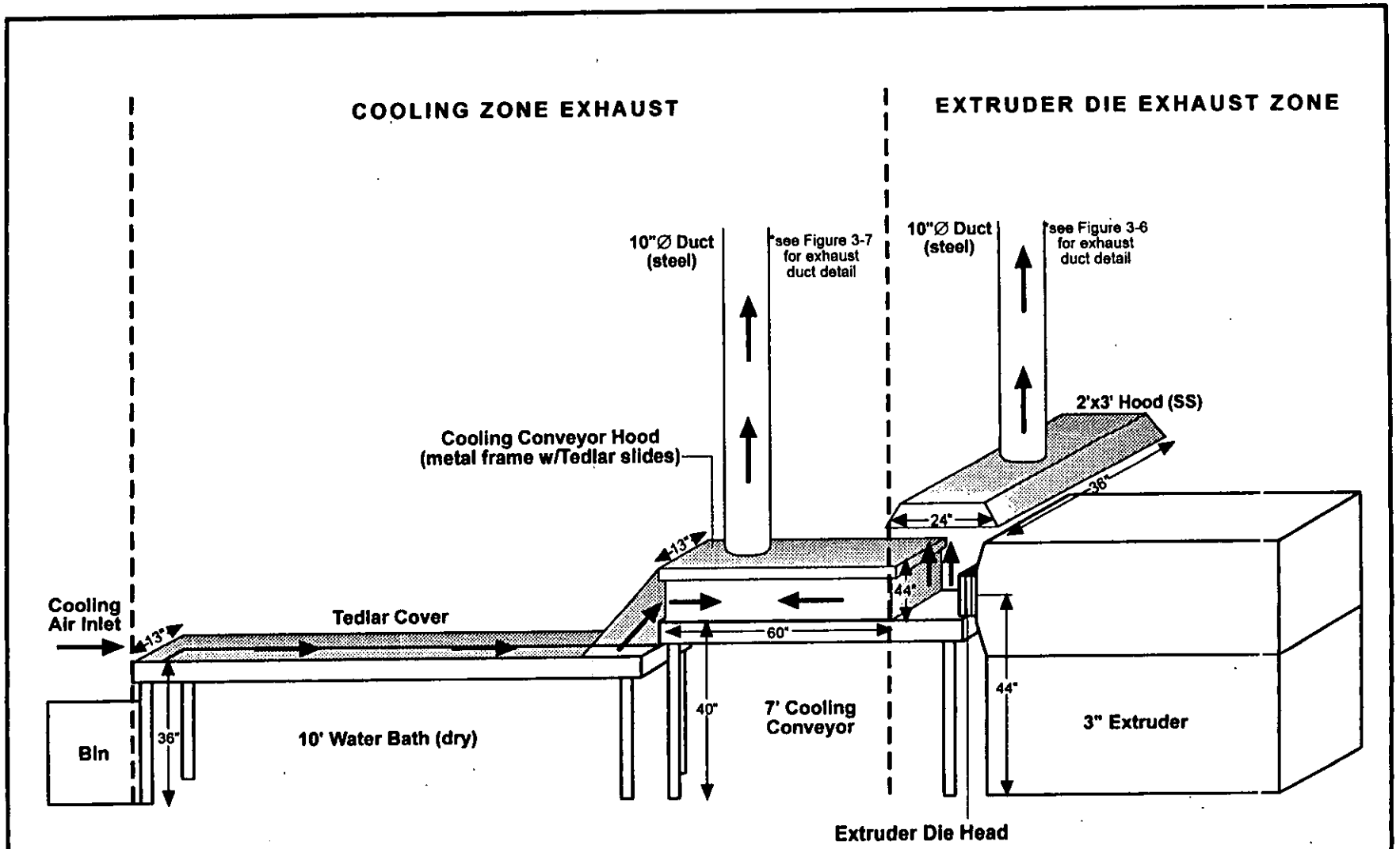


FIGURE 3-5.
THREE-INCH EXTRUDER TEMPORARY EXHAUST DUCT SCHEMATIC (OVERVIEW)

Not to Scale

16157-I

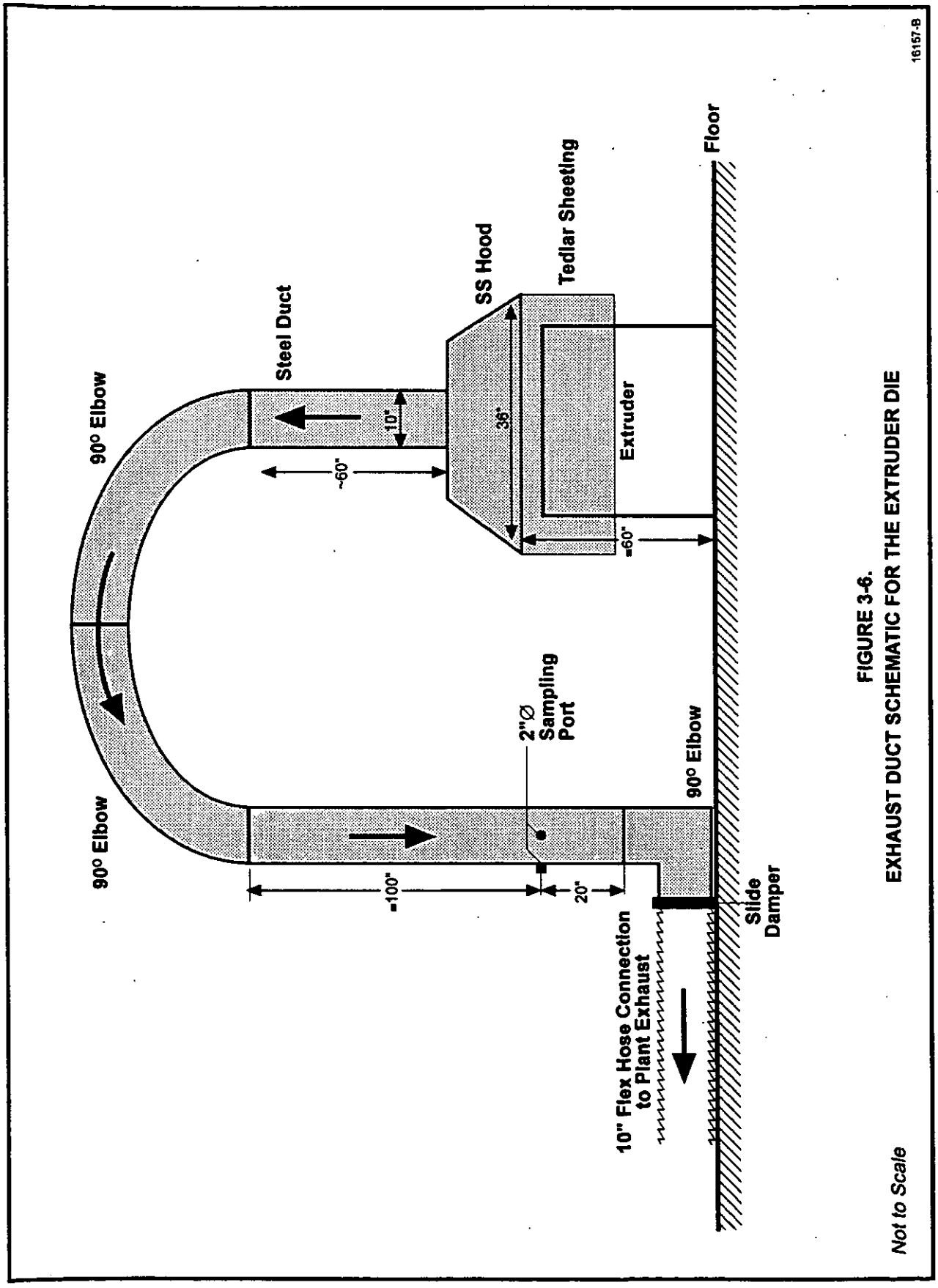


FIGURE 3-6.
EXHAUST DUCT SCHEMATIC FOR THE EXTRUDER DIE

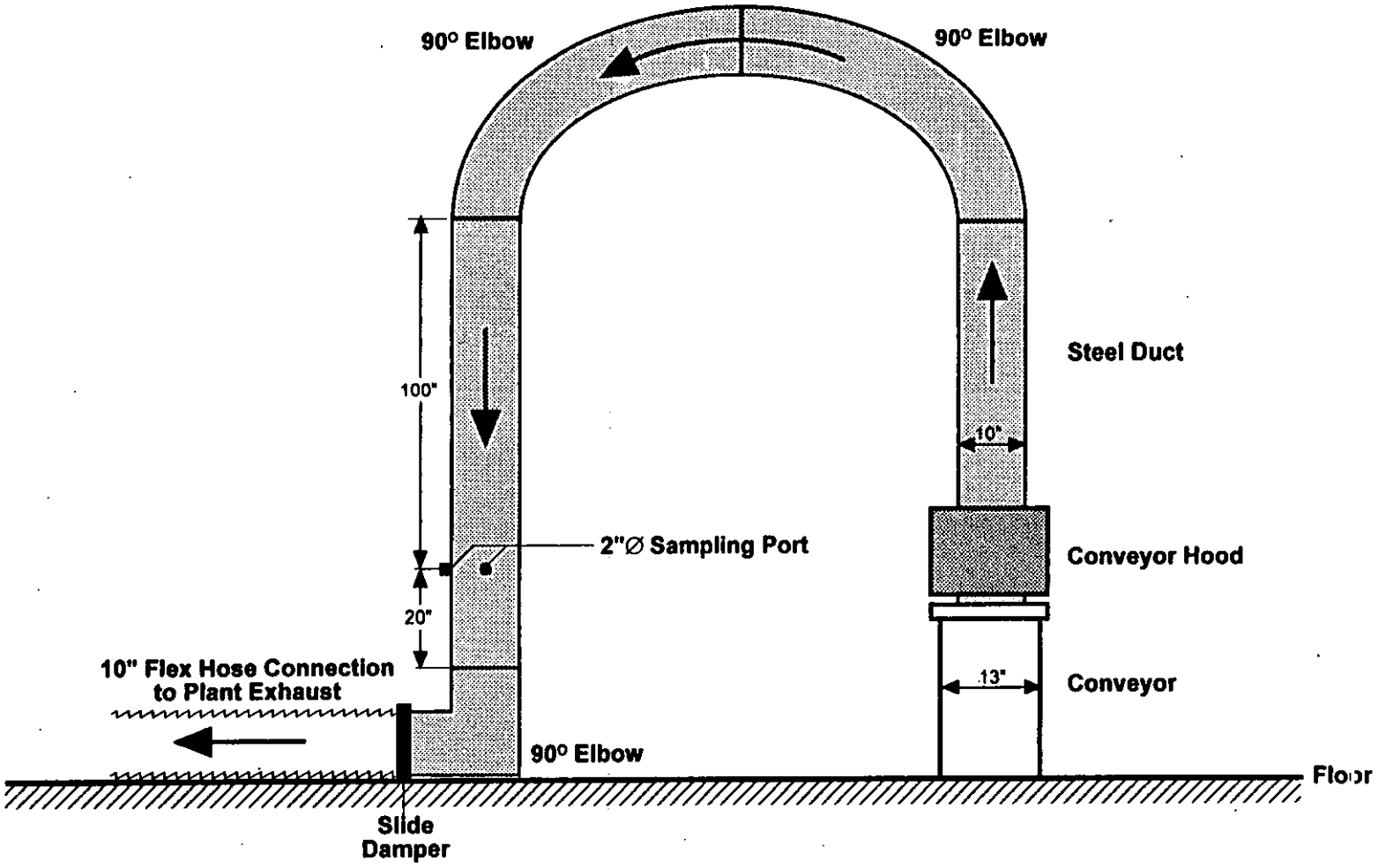


FIGURE 3-7.
EXHAUST DUCT SCHEMATIC FOR THE EXTRUDER COOLING ZONE

Not to Scale

16157-C

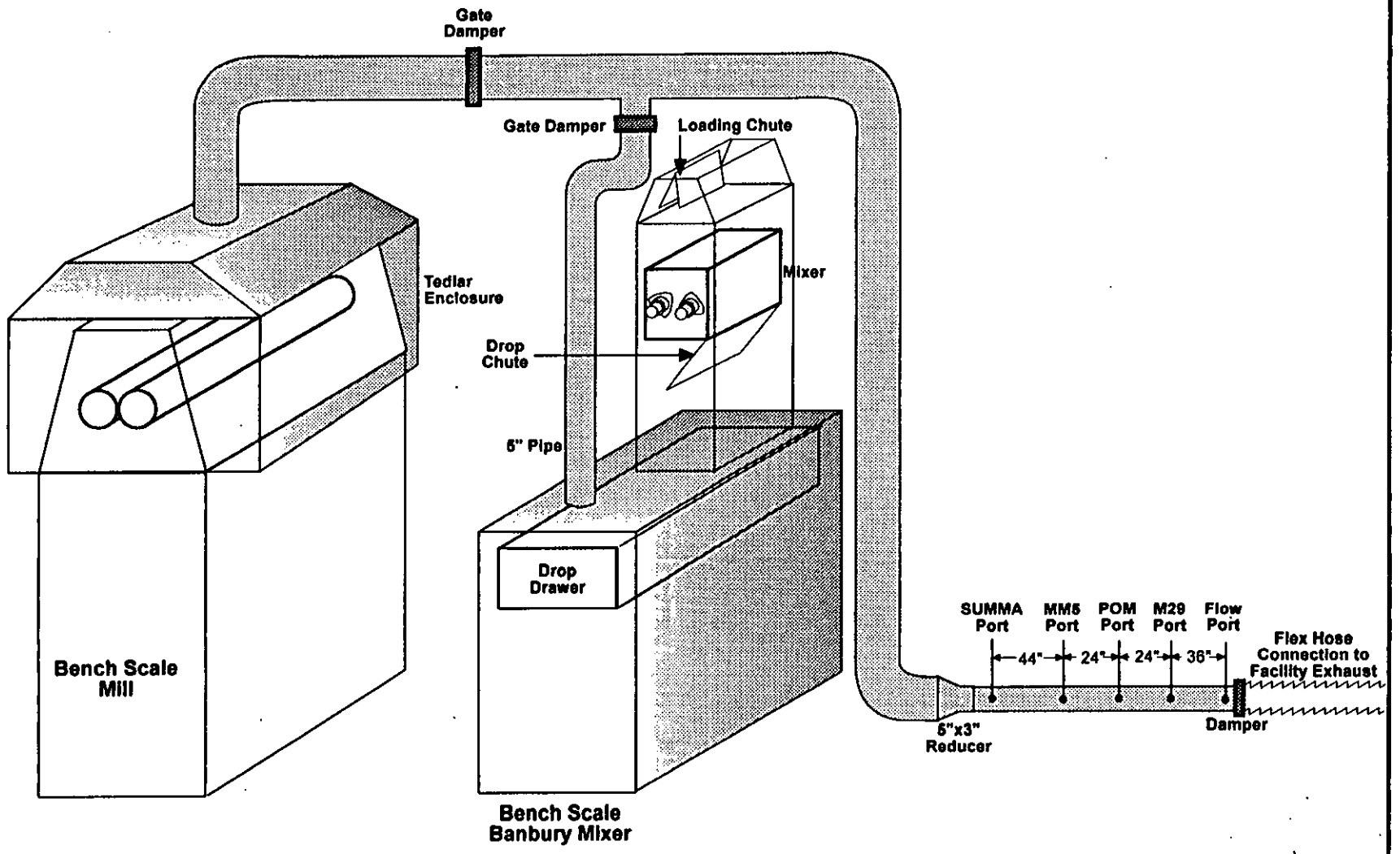


FIGURE 3-8.

Not to Scale

LABORATORY SCALE MIXER/MILL EXHAUST SCHEMATIC

16157-L

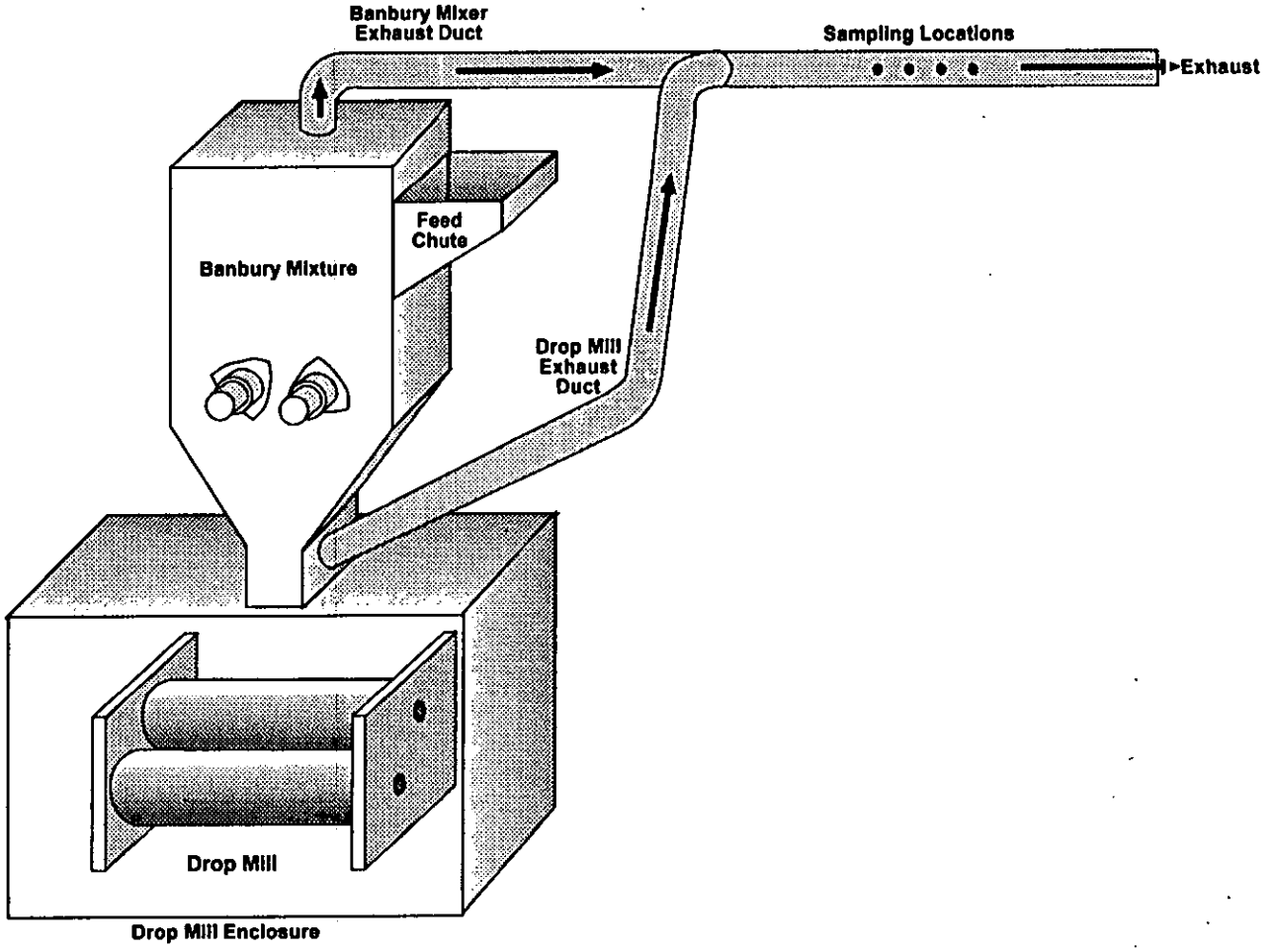
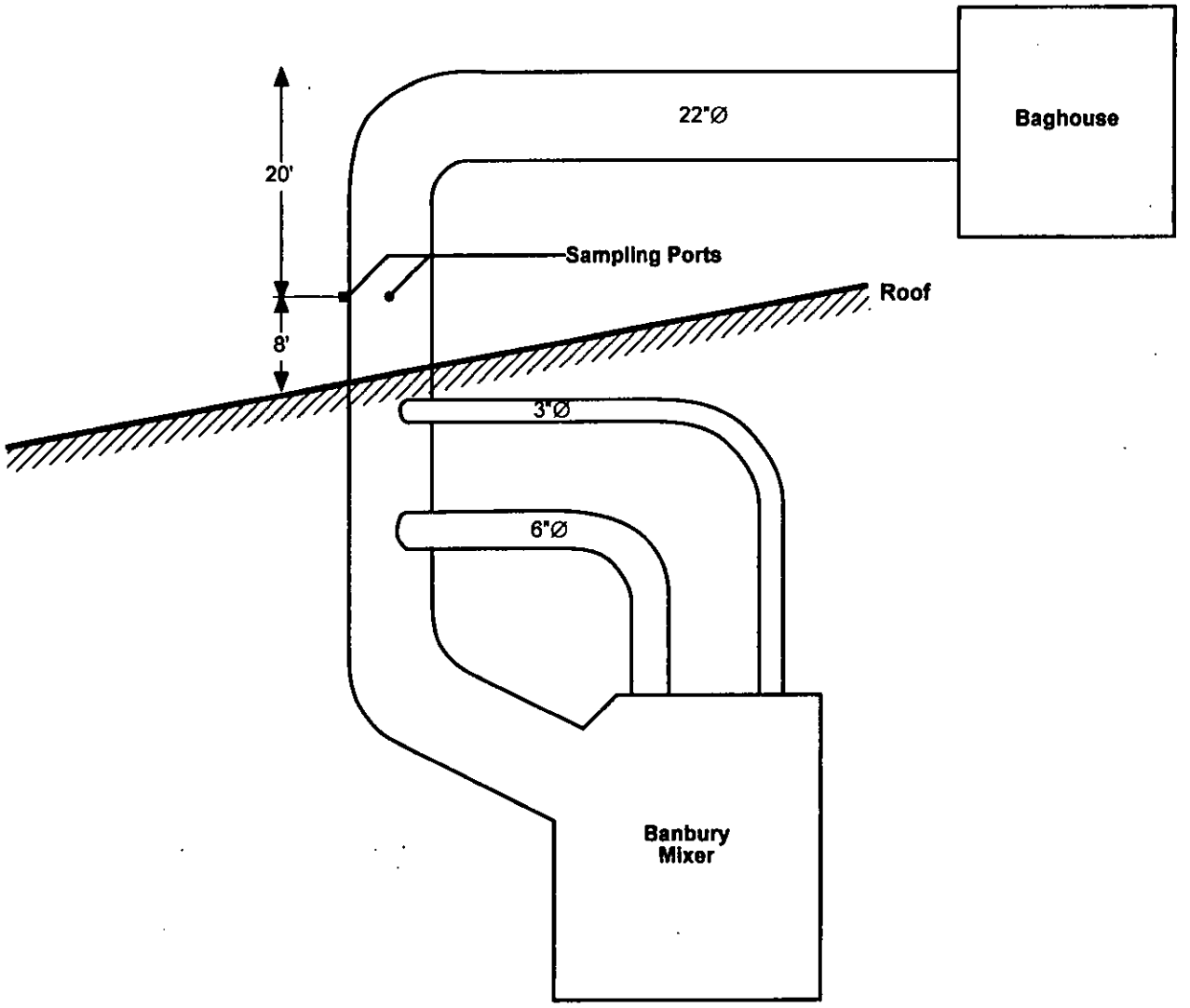


FIGURE 3-9.
LARGE BANBURY MIXER/DROP MILL SCHEMATIC

Not to Scale

16157-P



Not to Scale

FIGURE 3-10.
BANBURY BAGHOUSE INLET SCHEMATIC

16157-E

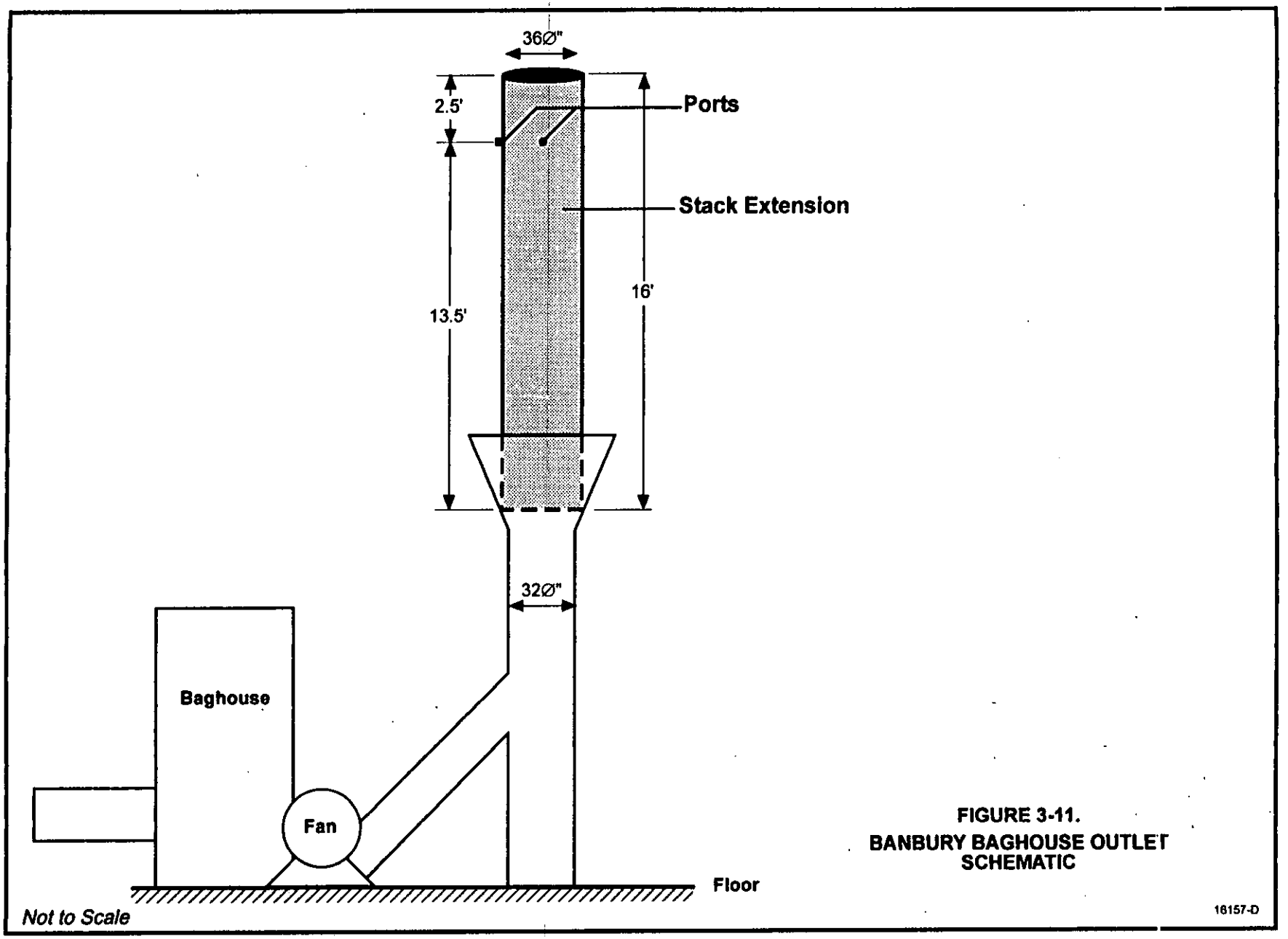


FIGURE 3-11.
BANBURY BAGHOUSE OUTLET SCHEMATIC

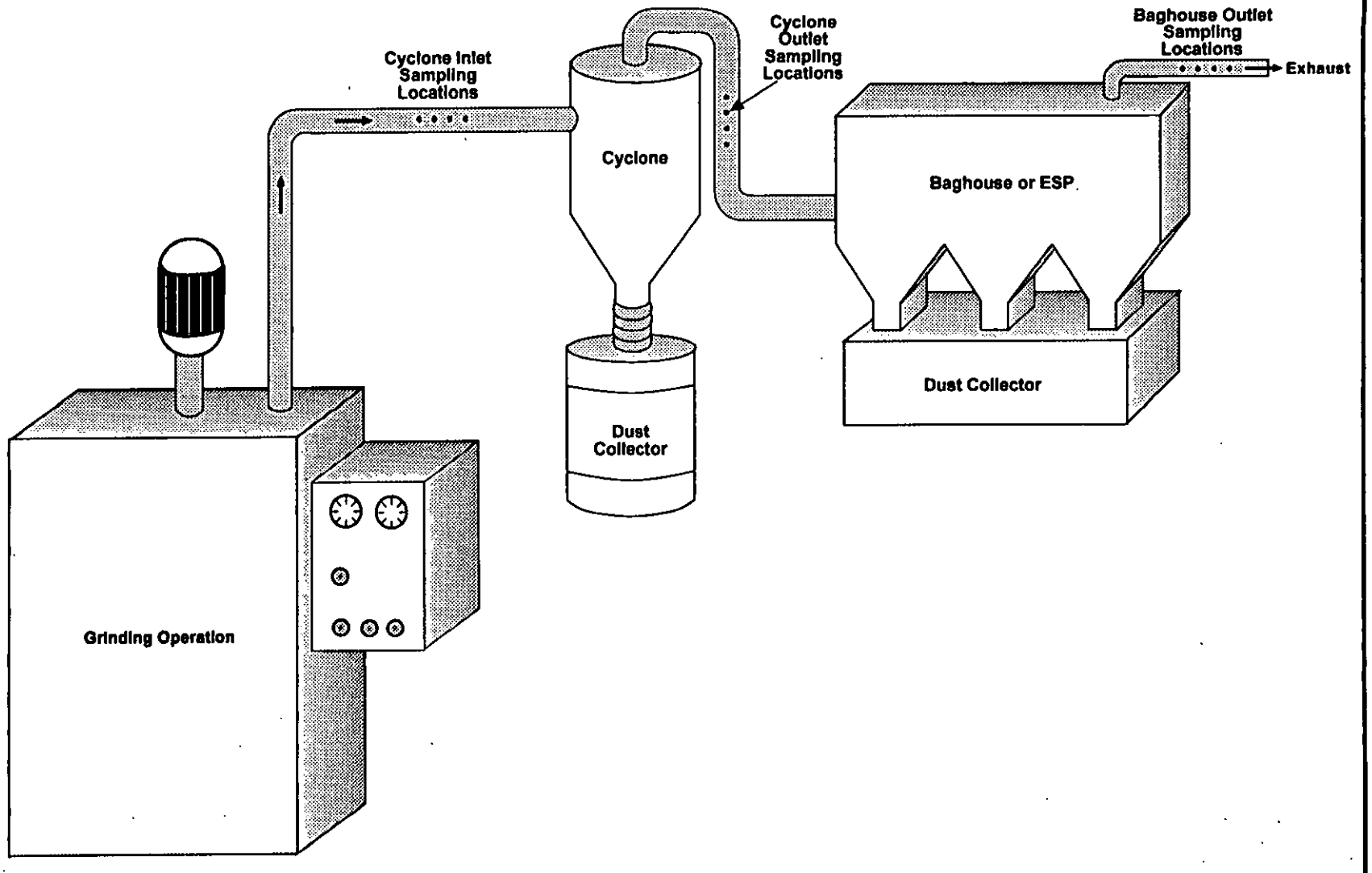


FIGURE 3-12.

Not to Scale

GRINDING AND CONTROL DEVICE SCHEMATIC (TYPICAL)

16157-Q

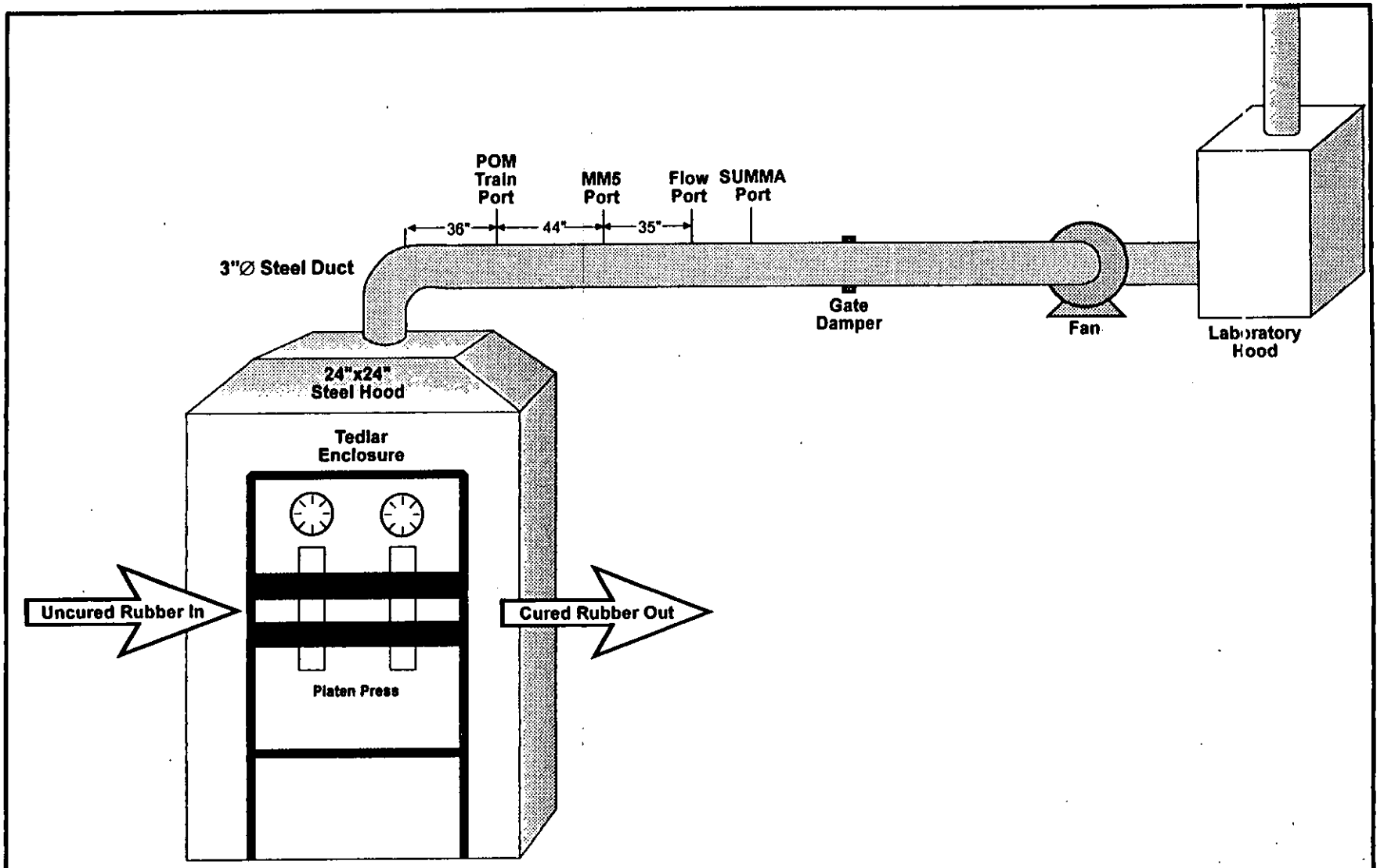


FIGURE 3-13.

PLATEN PRESS CURE SCHEMATIC

Not to Scale

16157-J

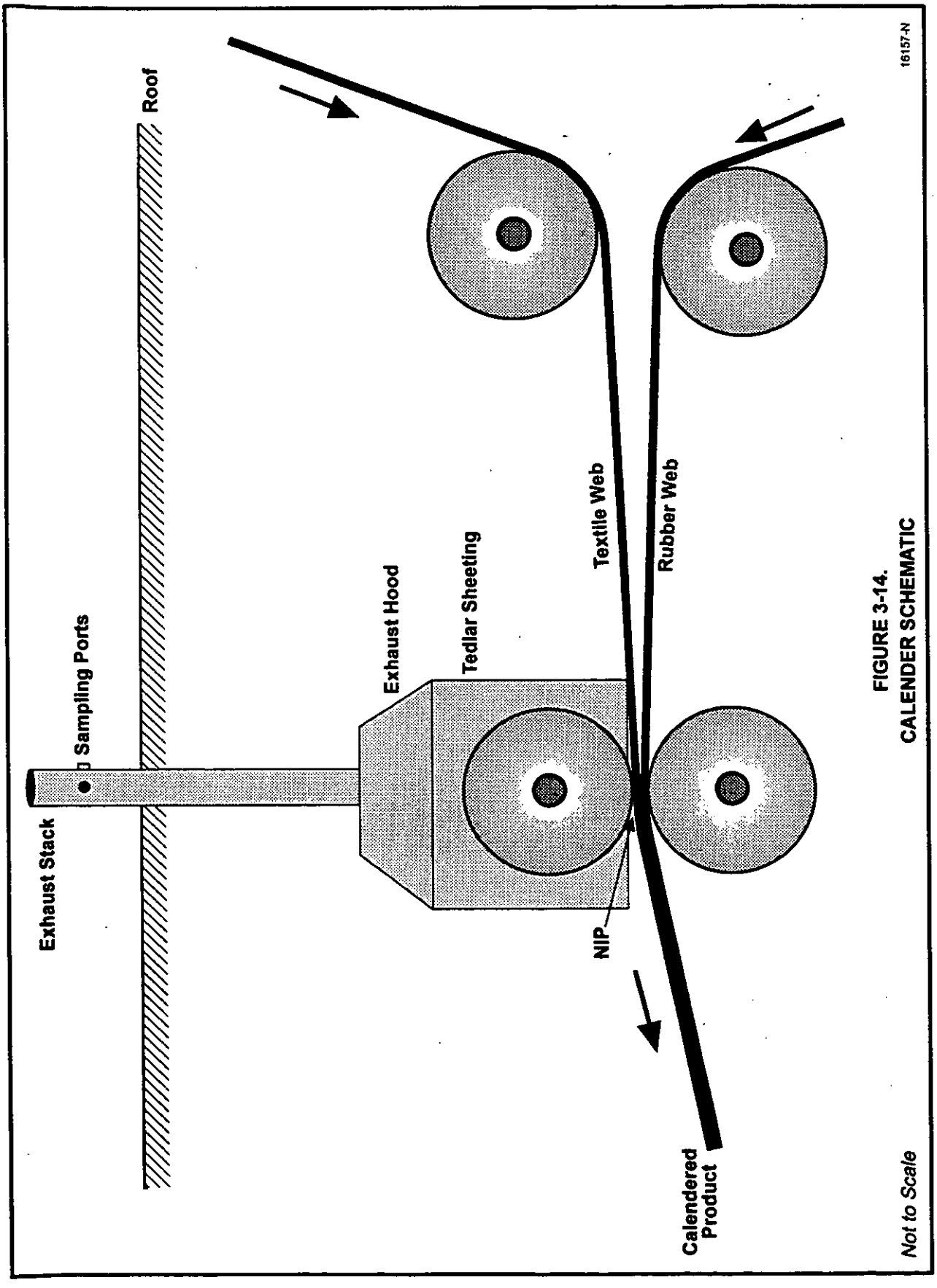
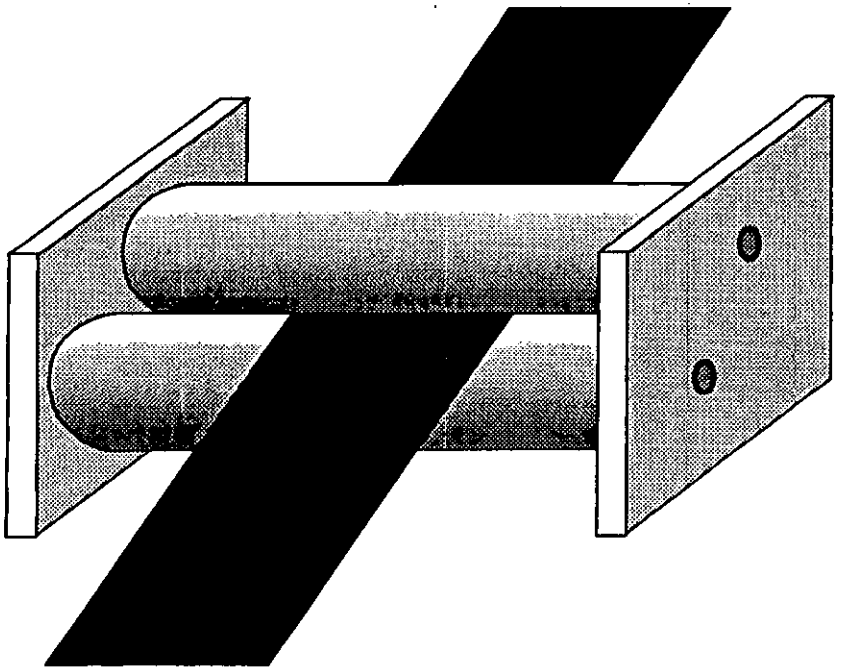
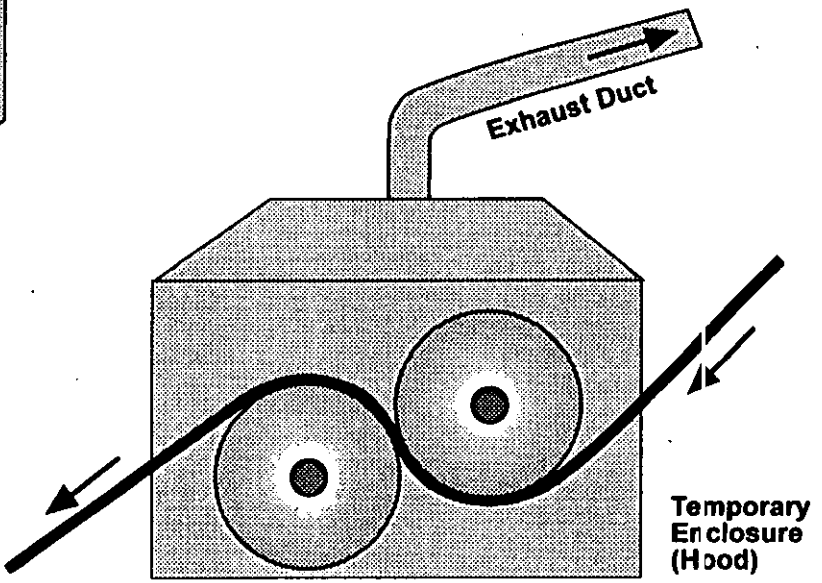


FIGURE 3-14.
CALENDER SCHEMATIC





Not to Scale

FIGURE 3-15.
WARMING MILL SCHEMATIC

16157-O

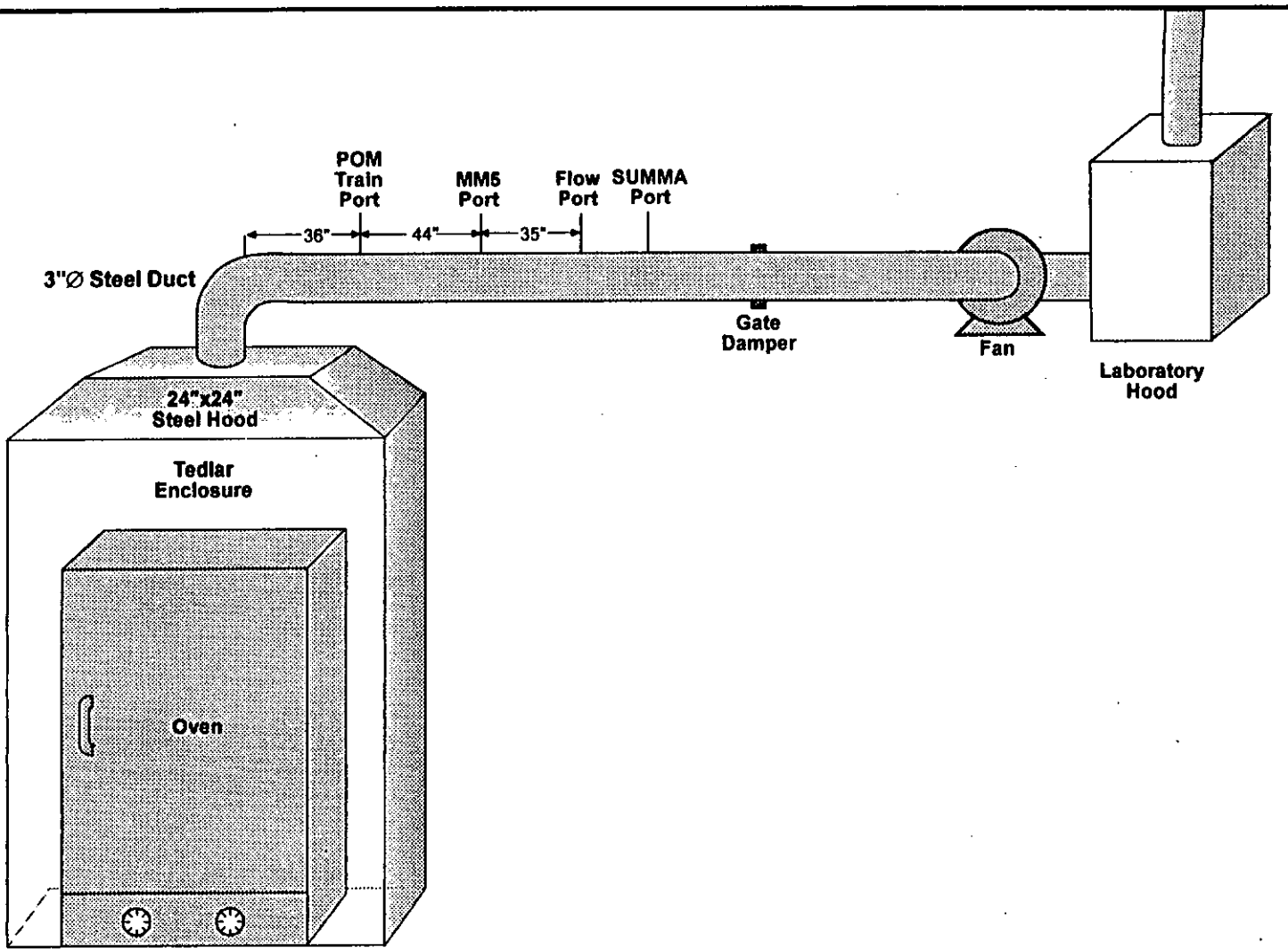


FIGURE 3-16.
HOT AIR CURE SCHEMATIC (ENGINEERING PRODUCTS)

Not to Scale

16157-K

SECTION 4.0

SAMPLING LOCATIONS

Each of the rubber manufacturing processes described in Section 3.1 have been sampled. Emissions from the processes occur at one or more zones. Samples have been taken at each emission zone.

The emissions zones of rubber manufacturing processes require essentially three types of sampling setups. The first type is a fixed hood or collector system already in place, such as with the large Banbury mixer. This type of system may or may not need a more complete enclosure to capture emissions, but has an existing duct and fan system for moving pollutants to the control device. Hood/duct configurations vary by process.

The second type of sampling setup is a temporary enclosure or hood set up on a process to collect emissions at the desired emission zone. The enclosure includes an exhaust duct with sampling ports, and a fan to keep the system under negative pressure. Enclosure configurations vary by process.

The last type is specific to the autoclave curing system and is described below.

The emissions from each sampling setup are delivered to a single exhaust vent. The vent for each sampling setup is typically 3, 5, or 8-inches in diameter. Sampling ports for flow rate measurements are located a minimum of four diameters downstream and two duct diameters upstream from the nearest bend or flow obstruction.

Due to the number of sampling methods necessary to quantify the emissions from each process, several sets of sampling ports are required in each sample duct to perform all sampling simultaneously. Each set of sampling ports is located a minimum of two duct diameters downstream from the nearest sample train.

Throughout this section, the reader is referred to process schematics contained in the previous section. These schematics include information regarding sampling locations, as well as process information.

4.1 TIRE PRESS

There were two emission zones sampled on the tire press: the press itself and the tire cool-down zone (Figure 3-1). An enclosure was set up on the tire press to collect fugitive emissions during the press curing of green tires. The enclosure was equipped with an outlet exhaust duct in which sampling was conducted for the target parameters.

A similar enclosure was erected around the cool-down rack where the tire cools after completion of the press curing.

4.2 OVEN CURE OF TIRE CUTS

There were two zones sampled during hot air curing of tire cut samples. An oven was set up with a sweep gas inlet and a sample gas outlet leading to the Fourier transform infrared (FTIR) analyzer as shown in Figure 3-2. This system was used to analyze tire cut off-gases during the curing phase. After completion of curing, the tire cut was removed and immediately placed in a cooldown chamber equipped similarly to the oven with a sweep gas inlet and a sample gas outlet.

4.3 AUTOCLAVE

Sampling of the autoclave process represents the most unique approach in this program. Sampling was initiated during the curing phase, conducted during the blow-down phase, and continued through the cool-down phase.

TRC's approach was to set up a total capture method whereby all steam and pollutant releases were sampled. The autoclave curing entailed sampling of the water trap condensate (during curing), the blowdown steam, and cooldown air emissions. All steam releases were vented through the 1-inch water trap or blow-down pipe into a series of condensing impingers and sorbent tubes kept under negative pressure by a metering pump (Figure 3-3). During curing, the water trap condensate was directed into sample containers and large impingers for volume determination. The blow-down pipe was connected to the condensing coils and the first of a series of large impingers. Steam and entrained pollutants were directed into the impingers for condensing and gross pollutant scrubbing through impingement. Remaining gaseous or entrained pollutants then passed through the sorbent traps for the collection of organic species. TRC installed a controlling valve on the blow-down system to control the rate of steam release during the blow-down cycle.

Following completion of each autoclave run, the rack containing the rubber products was removed from the autoclave but kept within the temporary enclosure as shown in Figure 3-4. Sampling continued during the cooldown period.

4.4 EXTRUDER

There were two zones sampled during operation of the extruder process (Figure 3-5). The extruder outlet, or head, was enclosed to permit capture of emissions throughout operation. The small enclosure was equipped with an outlet exhaust duct from which sampling was conducted (Figure 3-6). After extrusion, the product entered the cool-down zone which was also enclosed to allow for sampling of pollutant emissions (Figure 3-7).

4.5 INTERNAL INTENSIVE MIXERS

4.5.1 Small Internal Mixer

The small internal mixer was sampled from a section of duct installed in a flexible exhaust hose (Figure 3-8). Sampling took place during charging and mixing. At the completion of the mixing, the rubber dropped into a tray drawer for transfer to the adjacent milling unit.

The milling unit was enclosed to contain pollutants released during operation. The enclosure was equipped with an outlet exhaust duct to facilitate sampling. Monitoring/sampling continued once the mixed rubber was placed inside the enclosure and continued throughout the milling process.

4.5.2 Large Internal Mixer

Emissions from the large internal mixer occur at 2 points in the process, during charging and mixing, and during drop milling (Figure 3-9). The configuration of the unit tested allows for sampling of the present collector and duct system. The charging/mixing zone is serviced by an 18-inch exhaust duct leading to a baghouse for control of emissions. Sampling was conducted in the round duct in an area with a suitable length of straight run. Emissions from the drop milling zone were handled similarly, being routed to a collector duct via a long rectangular duct. It was necessary to more fully enclose the milling area prior to sampling. Sampling was conducted in the rectangular duct prior to its joining the collector duct.

Control efficiencies of emissions from internal mixers have been determined through the simultaneous sampling of inlet (Figure 3-10) and outlet (Figure 3-11) ducts of a typical baghouse. The necessary ports were located and installed in accordance with EPA Reference Method 1. The sampling was conducted during 2 modes of operation, charging/mixing and drop milling.

4.6 GRINDING

The grinding processes used in tire manufacturing are specific to each application. Four types were identified for this program: retread, belt, whitewall, and truing. The grinding processes, in general, generate quantities of rubber dust and particles, and may generate HAP emissions, depending on the rubber formulation and the amount of heat generated during grinding. To control these emissions, cyclones, baghouses, and electrostatic precipitators (ESPs) are used either alone, or in combination (Figure 3-12).

Grinding operations are typically conducted in a collector hood with an exhaust duct leading to a primary and possibly secondary control device. Emissions sampling was conducted in the hood's exhaust duct (control device inlet) to determine the process' potential to emit. Simultaneous sampling was also conducted at the outlet duct of each downstream control device to determine control efficiency and the final pollutant emissions rate.

4.7 PLATEN PRESS

The platen press curing process is a general approach to pressure curing engineered rubber products in molds. Specific molds are used to form the desired engineered product at set pressures and curing temperatures. Emissions from platen presses can be controlled using an exhaust hood and duct. Most emissions occur during mold release, at the end of the curing cycle.

During this program, 17 rubber compounds were cured at 345° F and pressures of 30 tons for the first 3 minutes and 20 tons for the second 3 minutes. Nine samples of approximately 50 grams each were cured for each rubber type. The cooldown period lasted for 6 minutes when the cured samples were removed from the press and left inside the enclosure. Emissions were contained by an exhaust hood and flexible Tyvek sheeting, and exhausted by a single 5-inch duct and blower. Figure 3-13 presents a schematic of the platen press and exhaust duct configuration.

4.8 CALENDER

The calendering process is used to bond a continuous textile or metal mesh web to one or two layers of rubber for use in building tires or other engineered rubber products. The latex-dipped textile passes through a series of rollers through which one or two rubber strips also passes. Under pressure and elevated temperatures induced by the rollers, the rubber is bonded to the web. The nip of the rollers can be adjusted to vary the thickness of the calendered product. The rubberized fabric is then cooled and cut to the proper dimensions. Figure 3-14 presents a schematic of the calendering process and associated exhaust system.

During this program, emissions from the calendering process were tested at two facilities. The first tested was a continuous production process where the rubber was continuously fed from a warming mill. A tire ply coat rubber compound was being run on the test days. Testing was conducted from an exhaust collector system outlet stack. The second process tested involved a batch or "pig" fed calender during calendering of a neoprene compound. The emissions from this system were measured using a temporary enclosure and exhaust duct configuration.

4.9 WARMUP MILL

Warmup mills are utilized by the industry for further mixing of rubber compounds following each drop from an internal mixer or, to warm the rubber to prepare it for subsequent processing (eg. calendering). A warmup mill is similar or identical to a drop mill in that it has a series of rollers, some toothed, to increase the shearing of the compound. The mill can be batch or continuously fed, depending of the production need. A schematic of a typical warmup mill is shown in Figure 3-15.

The emissions from two warming mills were tested during this program. One was a batch fed, production scale unit and the other was a lab scale warming mill. Emissions from both were captured using a temporary enclosure and exhaust duct system. On the first mill, three test runs were conducted while milling one rubber type (neoprene). On the lab scale unit, a single test run was conducted while milling three types of rubber (tire ply coat, tire belt coat, and tire base/sidewall).

4.10 OVEN CURE OF ENGINEERED PRODUCTS

Hot air oven curing of engineered rubber products is used to final cure preformed products. Three rubber compounds were evaluated. One compound used in tire manufacturing (Tire Apex, Compound #5) and two compounds typical of engineered rubber products manufacturing (EPDM 1, sulfur-cured, Compound #8; and Emulsion SBR 1502, Compound #22) were selected. To simulate the process for this program, a lab scale system with enclosure was designed and set up to evaluate the emissions during curing and cooldown. The rubber compound samples were placed in the oven and allowed to reach the curing temperature of 400° F for a period of 5-8 minutes. Each sample weighed 50 grams. After completion of curing, each rubber sample was removed and allowed to cool down in the enclosure and another sample of the same compound placed in the oven and brought up to temperature.

The oven was set up with a preheated sweep gas inlet and an exhaust gas outlet. A temporary enclosure was erected around the oven to contain emissions during the curing and cooldown and when the door was opened. An exhaust duct similar to that used for the platen press was constructed to vent the enclosure and to provide the sampling locations. Figure 3-16 presents a schematic of this setup.

SECTION 5.0

FIELD SAMPLING PROCEDURES

5.1 OVERVIEW

This section describes the procedures that TRC followed during the field sampling program. Throughout the program TRC followed EPA reference methods presented in 40 CFR Part 60 Appendix A, Part 266 Appendix IX, and SW-846. Any deviations from the specified test methods will be fully documented in the test report.

The remainder of this section is divided into several subsections: Field Program Description, Presampling Activities, and Onsite Sampling Activities.

5.2 FIELD PROGRAM DESCRIPTION

The objective of the test program was to accurately quantify the emissions of hazardous air pollutants (HAPs) from the processes described in Section 2.0. These emissions have been correlated with the operating data obtained during the emission testing to develop emission factors for each HAP. These emission factors are in units of mass of HAP emitted per mass of material processed or unit of product manufactured. These emission factors will then be employed by rubber manufacturing facilities to assist in completing application forms under Title V of the 1990 CAAA.

The test methods utilized are as follows:

- Method 1, and 2 - Velocity Profile
- Method 4 - Percent Moisture
- Method 5 - Particulate Matter Determination
- Method 25A - Total Hydrocarbons (Total Volatile Organic Compounds)
- Method 29 - Multiple Metals
- Method 202 - Condensibles (Polycyclic Organic Matter)
- Method 0010 - Semivolatile Organic Compounds
- Method TO14 - Volatile Organics
- FTIR - Fourier Transform Infrared Spectroscopy
- NIOSH P&CAM Method 221 - Amines

5.3 PRESAMPLING ACTIVITIES

Presampling activities include equipment calibration, precleaning of the sample train glassware, and other miscellaneous tasks. Each of these activities are described or referenced in the following subsections. Other presampling activities include team meetings, equipment packing, and finalization of all details leading up to the coordinated initiation of the sampling program.

5.3.1 Equipment Calibration

TRC follows an orderly program of positive actions to prevent the failure of equipment or instruments during use. This preventative maintenance and careful calibration helps to ensure accurate measurements from field and laboratory instruments.

Once the equipment has gone through the cleaning and repair process it is then calibrated. All equipment that is scheduled for field use is cleaned and checked prior to calibration. Once the equipment has been calibrated, it is packed and stored to ensure the integrity of the equipment. An adequate supply of spare parts is taken in the field to minimize downtime from equipment failure.

Inspection and calibration of the equipment is a crucial step in ensuring the successful completion of the field effort. All equipment is inspected for proper operation and durability prior to calibration. Calibration of the following equipment is conducted in accordance with the procedures outlined in EPA documents entitled "*Quality Assurance Handbook for Air Pollution Measurement Systems; Volume III - Stationary Source Specific Methods*" (EPA-600/4-77-027b) and 40 CFR Part 60 Appendix A.

- Probe nozzles (QA Handbook, Vol III, Section 3.4.2, pp. 19) - average three ID measurements of nozzle; difference between high and low ≤ 0.1 mm. Recalibrate, reshape and sharpen when nozzle becomes nicked, dented, or corroded.

- Pitot tubes (QA Handbook, Vol III, Section 3.1.2, pp. 1-13) - measured for appropriate spacing and dimensions or calibrated in a wind tunnel. Rejection criteria given on the calibration sheet. Post-test check - inspect for damage.

- Thermocouples (QA Handbook, Vol III, Section 3.4.2, pp. 12-18) - verified against a mercury-in-glass thermometer at three points including the anticipated measurement range. Acceptance limits - impinger ± 2°F; DGM ± 5.4°F; stack ± 1.5 percent of stack temperature.

- Dry gas meters (EPA 40 CFR Part 60, Method 5, Section 5.3) - calibrated against a wet test meter. Acceptance criteria - pretest $Y_i = Y = \pm 0.02$; post test $Y = \pm 0.05\ Y_i$.

- Field barometer (QA Handbook, Vol III, Section 3.4.2, pp. 18-19) - compared against a mercury-in-glass barometer or use Airport Station BP and corrected for elevation. Acceptance criteria - ± 0.02 in. Hg; post-test check - same.

- Analytical balances (QA Handbook, Vol III, Section 3.4.2, pp. 19) - Acceptance criteria -calibrate with Standard Class-S weights within ± 0.5 g of stated value. Rejection criteria: Have manufacturer recalibrate or adjust.

5.3.2 Glassware Preparation

Sample train glassware and sample containers require specialized precleaning to avoid contamination of the sample. The sample train glassware necessary for the Method 29 multiple metals sampling was precleaned using an Alconox soap and water wash. Deionized water was used for rinsing followed by soaking in 10% nitric acid for a minimum of 4 hours. The glassware was then rinsed with deionized water followed by an acetone rinse. The glassware was then sealed with Parafilm.

The Method 0010 semivolatile organics sampling train glassware was precleaned with an Alconox soap and water wash. Deionized water was used for rinsing followed by an acetone and hexane rinse. The glassware was then sealed with hexane-rinsed aluminum foil.

The sample train glassware necessary for the Method 5 Particulate Matter, Method 202 POM, and Method 221 Amines sampling trains was precleaned using an Alconox soap and water wash. The glassware was then rinsed with deionized water. The glassware was then sealed with Parafilm.

Note that all amber sample bottle caps were fitted with Teflon^{R} liners which were cleaned in the same manner as the bottles themselves.

5.3.3 Sample Media Preparation

All reagents and sorbents are checked in accordance with TRC's existing QC Program to minimize the probability of using contaminated sampling media. This includes the use of spectro-grade solvents from the same lot and the collection and analysis of appropriate blanks.

5.4 ONSITE SAMPLING ACTIVITIES

Onsite sampling activities include the emissions testing of the sources and collection of operational data.

5.4.1 EPA Methods 1 and 2 - Velocity Measurements and Cyclonic Flow

Velocity traverses were conducted at the sampling locations with either an S-type or standard pitot assembly in accordance with EPA Reference Methods 1, 2, and 2A. A pitot tube with an attached inclined manometer was used to measure the exhaust velocities of each source. An attached Type-K thermocouple with remote digital display was used to determine the flue gas temperature. During the test programs, velocity measurements were conducted during each test run. The required number of velocity measurements points for each sampling location was determined following EPA Method 1.

Cyclonic flow checks were conducted on each source prior to sampling in accordance with Section 2.4 of EPA Method 1 as described in the July 1, 1988 edition of the *Federal Register*.

This procedure is referred to as the nulling technique. A pitot tube connected to an inclined manometer was used for this method. The pitot tube was positioned at each traverse point so that the face openings of the pitot tube are perpendicular to the stack cross-sectional plane. This position is called the "0° reference". The velocity pressure (ΔP) measurement is noted. If the ΔP reading was zero, the cyclonic angle was recorded as 0°. If the ΔP reading was not zero, the pitot tube was rotated clockwise or counter clockwise until the ΔP reading became zero. This angle was then measured with a leveled protractor and reported to the nearest degree. After this null technique was applied at each traverse point, the average of the cyclonic angles was calculated. If this average was less than 20°, the flow condition in the source was acceptable to test. This check was performed on the emission sources before testing.

5.4.2 EPA Method 4 - Moisture Determination

Moisture is determined for each test run according to EPA Reference Method 4, "*Determination of Moisture Content in Stack Gases*". The principle of this method is to remove the moisture from the sample stream and measure it either volumetrically or gravimetrically. This reference method was conducted simultaneously with the Method 5 sampling train, Method 0010 sampling train, Method 29 sampling train, Method 202 sampling train, and the Method 221 sampling train.

5.4.3 EPA Method 5 - Particulate Matter

The Particulate Matter train was operated as described in "*Determination of Particulate Emissions from Stationary Sources*" (40 CFR Part 60 Appendix A). The Method 5 train was used to measure and determine the emission rate of particulate matter.

The sampling train consisted of a heated, glass-lined probe, with a glass button-hook nozzle. A thermocouple and S-type pitot tube were attached to the probe for the measurement of gas temperature and velocity. The sample gas passed through the probe assembly to a heated quartz fiber filter. The filter holder was maintained at 248°F ± 25°F throughout each test period. Downstream of the heated filter, the gas passed through a series of four ice-cooled impingers kept below 68°F to enable condensation of entrained moisture. The first two impingers each contained 100 mL of deionized water. The third impinger was empty and the fourth impinger contained a preweighed amount of silica gel. The impingers were followed by a Nutech Model 2010 dry gas meter, pump, and calibrated orifice meter. A schematic of the Method 5 sampling train is presented in Figure 5-1.

Sampling was isokinetic (± 10 percent) with readings of flue gas parameters recorded at every sampling point during the traverse.

Leak checks of the entire Method 5 sampling train were performed before and after each sampling run. In the event any portion of the train was disassembled and reassembled, leak checks were performed prior to disassembling the train. All leak checks and leakage rates are

documented on the relevant field test data sheet. The acceptance criteria for the Method 5 train is a leak rate of ≤ 0.02 cfm at the highest vacuum obtained during the run.

Following the completion of each test run, the Method 5 train was transported to a recovery area onsite. The sample recovery sequence was as follows:

- Removed the sampling train to the recovery area.
- Noted the condition of the train (i.e., filter condition, impinger contents color, silica gel color, etc.).
- Disassembled the filter housing and transferred the filter to its original glass petri dish. Sealed the container with Teflon® tape and labeled it with the appropriate sample information.
- The front half of the train, nozzle, probe, and front-half filter housing was then brush-rinsed with acetone into an amber glass container with a Teflon®-lined cap. The rinse procedure was performed three times after which the container was sealed and labeled.
- The contents of the first three impingers were measured for volume only and the contents were discarded.
- The silica gel was returned to its original container and weighed to obtain a final weight.
- All containers were checked to ensure proper sealing, proper labeling, and that all liquid levels were marked. All samples were then logged onto the chain-of-custody record.

The Method 5 train produced the following samples:

- Filter
- Front-Half Acetone Rinse

5.4.4 EPA Method 25A - Total Volatile Organic Compounds (TVOC)

Total volatile organic compounds were continuously monitored in accordance with EPA Method 25A, "*Determination of Total Gaseous Organic Concentration using a Flame Ionization Analyzer*". Flue gas samples were drawn through a heated sample probe, heated Teflon® sample line, and a Ratfisch Model RS55 flame ionization detection (FID) total hydrocarbon analyzer.

A Ratfisch Model RS 55 Total Hydrocarbon analyzer measured total volatile organic compounds C_1 through C_{18}. A small amount of sample containing total volatile organic

compounds was introduced to the system through a heated filter and sample line. The sample gas then entered the heated detector bench, which contained the flame ionization detector (FID). The resulting current was detected and amplified by an electrometer/amplifier circuit. The output of the amplifier provided a signal for direct readout on a meter and for output to a strip chart recorder. The FID was calibrated with certified methane gas standards.

The continuous emissions monitoring system consists of three subsystems: sample acquisition/conditioning, sample analysis, and a data acquisition system. The sample acquisition/conditioning unit is designed to deliver a representative sample of the stack gas stream to the sample analysis subsystem. Sample analysis was achieved using the following analyzer:

- Ratfisch Model RS 55 Total Hydrocarbon analyzer;

In each case, accurate interpretation of analyzer response required the systematic calibration of the instrument against gases of known concentrations. A calibration equation was determined from a linear regression of known gas concentrations versus instrument response. The equation used to convert instrument signal to concentration units follows:

$$\text{Concentration} = m * (\text{response}) + b$$

where:

m	=	slope of calibration curve
response	=	instrument signal (volts)
b	=	y-intercept of calibration curve

The data acquisition subsystem consisted of a Yokogawa Data Logger designed to receive and log instrument signals (raw voltages) at user defined intervals. In addition, the Yokogawa was programmed to perform the previously mentioned concentration calculation. The resulting values were instantaneously accessible (updated every 15 seconds) on a personal computer. A CEM Report program allowed the generation of an emissions summary upon user request. Once the system was set up, the THC analyzer was connected to a power source and brought online. Sample line and signal wires were strung between the sampling and the THC location, and the probe was placed in the duct at the sampling port.

Prior to insertion of the probe into the stack, the sample/acquisition system was leak checked by the following procedure:

a. plug probe;
b. observe that flow in rotameter reaches zero Lpm;
c. observe vacuum; and
d. confirm that sample vacuum during sampling does not exceed vacuum attained during leak check.

The initial phase of instrumental analysis methods requires calibration of all involved monitors. At the beginning of each day, direct instrument calibrations for zero and three upscale gases were performed prior to initiation of testing by direct calibration gas injection. Following these direct calibrations, system calibrations were performed both prior to and following each run using zero and one upscale gas concentration. This was accomplished by directing calibration gas through the sample line and conditioning system to assess system bias. Following completion of the required runs, final system and final direct calibrations was performed. These procedures allowed for determination of initial and final system bias, as well as system drift. Typical calibration gas values and instrument range settings are listed below:

Gas	Calibration Gas Value	Instrument Range
THC	25, 50, 100 ppm	0 - 100 ppm

5.4.5 EPA Method 29 - Multiple Metals

The Multiple Metals train was operated in accordance with EPA Method 29 to measure and determine the emission rates of multiple metals. Particulate matter was also determined from the front half of this train in accordance with EPA Method 5, described earlier.

The sampling train consisted of a heated, glass-lined probe, with a glass button-hook nozzle. A thermocouple and S-type pitot tube were attached to the probe for the measurement of gas temperature and velocity. The samples gas passed through the probe assembly to a heated glass fiber filter. The filter holder was maintained at 248°F ± 25°F throughout each test run. Downstream of the heated filter, the sample gas passed through a series of six ice-cooled impingers kept below 68°F to enable condensation of entrained moisture. The first and second impingers contained 100 mL 5% HNO_3/10% H_2O_2. The third impinger was empty. The fourth and fifth impingers contained 100 mL 4% $KMnO_4$/10% H_2SO_4. The sixth impinger contained a preweighed amount of silica gel. The impingers were followed by a Nutech Model 2010 dry gas meter, pump, and calibrated orifice meter. A schematic of the Method 29 sampling train is presented in Figure 5-3.

Sampling was isokinetic (± 10 percent) with readings of flue gas parameters recorded at every sampling point during the traverse.

Leak checks of the entire Method 29 sampling train were performed before and after each sampling run. In the event any portion of the train was disassembled and reassembled, leak checks were performed prior to disassembling the train. All leak checks and leakage rates are documented on the relevant field test data sheets. The acceptance criteria for the Method 29 train is a leak rate of ≤ 0.02 cfm at the highest vacuum obtained during the test run.

Following the completion of each test run, the Method 29 train was transported to a recovery area onsite. The sample recovery sequence was:

- Removed the sampling train to the recovery area.

- Noted the condition of the train (i.e., impinger contents color, silica gel color, etc.).

- Disassembled the filter housing and transferred the filter to its original petri dish. Sealed the petri dish with Teflon® tape and labeled it with the appropriate sample information.
- The front half of the train, nozzle, probe, and front-half filter housing was brush-rinsed with 100 mL of 0.1N HNO_3 into an amber glass container with a Teflon®-lined cap. The container was sealed and labeled.

- The contents of the first two impingers were measured for volume and transferred to a glass amber container with a Teflon®-lined cap. The impingers, back-half filter housing, right angle, and U-tubes were rinsed with 100 mL of 0.1N nitric acid into the sample container. The container was sealed and labeled.

- The contents of the third impinger was measured for volume and transferred to a glass amber container with a Teflon®-lined cap. The impinger and U-tubes were rinsed with 100 mL of 0.1N nitric acid into a sample container. The container was sealed and labeled.

- The contents of the fourth and fifth impingers were measured for volume and transferred to a glass amber container with a Teflon®-lined cap. The impingers and U-tubes were rinsed with 100 mL of 4% $KMnO_4$/10% H_2SO_4 into a sample container. The impingers and U-tubes were also rinsed with 100 mL of deionized water into the same container. The container was sealed and labeled.

- The fourth and fifth impingers and connecting U-tubes were rinsed with 25 mL of 8N HCl into a sample container containing 200 mL of deionized water. The container was sealed and labeled.

- The silica gel was returned to its original container and weighed to obtain a final weight.

- All containers were checked to ensure proper sealing, proper labeling, and that all liquid levels were marked. All samples were logged onto the chain-of-custody record.

The Method 29 train produced the following samples:

- Filter
- Front-half 0.1N nitric acid rinse
- Back-half 0.1N nitric acid impinger catch
- Impinger 3 - 0.1N nitric acid rinse

- Impinger 4 & 5 - $KMnO_4$ impinger catch
- HCl rinse

5.4.6 EPA Method 202 - Condensibles (Polycyclic Organic Matter - POM)

The EPA Method 202 sampling train was used to measure and determine the emission rates of Condensibles (Polycyclic Organic Matter - POM).

The sampling train consisted of a heated, glass-lined probe, with a glass button-hook nozzle. A thermocouple and S-type pitot tube were attached to the probe for the measurement of gas temperature and velocity. The sample gas passed through the probe assembly to a series of four ice-cooled impingers kept below 68°F to enable condensation of entrained moisture. The first two impingers contained 100 mL of deionized water. The third impinger was empty and the fourth impinger contained a preweighed amount of silica gel. All connections within the train were glass or Teflon^R, no sealant greases were used. The impingers were followed by a Nutech Model 2010 dry gas meter, pump, and calibrated orifice meter. A schematic of the Method 202 sampling train is presented in Figure 5-4.

Sampling was isokinetic (± 10 percent) with readings of flue gas parameters recorded at every sampling point during the traverse.

Leak checks of the entire Method 202 sampling train were performed before and after each sampling run. In the event any portion of the train was disassembled and reassembled, leak checks were performed prior to disassembling the train. All leak checks and leakage rates are documented on the relevant field test data sheets. The acceptance criteria for the Method 202 train is a leak rate of ≤ 0.02 cfm at the highest vacuum obtained during the run.

Following the completion of each test run, the Method 202 train was transported to a recovery area onsite. The sample recovery sequence was as follows:

- Removed the sampling train to the recovery area.
- Noted the condition of the train (i.e., impinger contents color, silica gel color, etc.).
- The contents of the first three impingers were measured for volume and transferred to a precleaned glass amber container.
- The probe, impingers, and U-tubes, were rinsed with methylene chloride into a sample amber glass container with a Teflon^R-lined cap. The rinse procedure was performed three times after which the container was sealed and labeled.
- The silica gel was returned to its original container and weighed to obtain a final weight.

- All containers were checked to ensure proper sealing, proper labeling, and that all liquid levels were marked. All samples were logged onto the chain-of-custody record.

The Method 202 train produced the following sample:

- Methylene Chloride Rinse

5.4.7 EPA Method 0010 - Semivolatile Organic Compounds

The Modified Method 5 (MM5) sampling train was operated in accordance with EPA Reference Method 0010, SW-846, 3rd Edition. The MM5 train was used to measure and determine the emission rates of semivolatile organic compounds.

The sampling train consisted of a heated, glass-lined probe, with a glass button-hook nozzle. A thermocouple and S-type pitot tube were attached to the probe for the measurement of gas temperature and velocity. The sample gas passed through the probe assembly to a heated glass fiber filter. The filter holder was maintained at 248°F ± 25°F throughout each test run. Downstream of the heated filter, the sample gas passed through a water-cooled condenser module, then through a sorbent module containing approximately 25g of XAD-2 resin. The XAD module was kept at a temperature below 68°F. The sample gas then passed through a series of four ice-cooled impingers kept below 68°F to enable condensation of entrained moisture. The first two impingers contained 100 mL of deionized water. The third impinger was empty and the fifth impinger contained a preweighed amount of silica gel. All connections within the train were glass or Teflon®, no sealant greases were used. The impingers were followed by a Nutech Model 2010 dry gas meter, pump, and calibrated orifice meter. A schematic of the Method 0010 sampling train is presented in Figure 5-5.

Sampling was isokinetic (± 10 percent) with readings of flue gas parameters recorded at every sampling point during the traverse.

Leak checks of the entire Method 0010 sampling train were performed before and after each sampling run. In the event any portion of the train was disassembled and reassembled, leak checks were performed prior to disassembling the train. All leak checks and leakage rates are documented on the relevant field test data sheets. The acceptance criteria for the Method 0010 train is a leak rate of ≤ 0.02 cfm at the highest vacuum obtained during the run.

Following the completion of each test run, the Method 0010 train was transported to a recovery area onsite. The sample recovery sequence was as follows:

- Removed the sampling train to the recovery area.

- Noted the condition of the train (i.e., filter condition, impinger contents color, silica gel color, etc.).

- Disassembled the filter housing and transferred the filter to its original glass petri dish with hexane rinsed forceps. Sealed the container with Teflon® tape and labeled it with the appropriate sample information.

- The XAD-2 resin sorbent module was capped tightly at both ends with glass dead ends and labeled. The module was covered with aluminum foil and stored on ice for transport to the laboratory.

- The front half of the train, nozzle, probe, and front-half filter housing were brush-rinsed with methylene chloride. This was followed by a methanol rinse into the same amber glass container with a Teflon®-lined cap. The rinse procedure was performed three times with each solvent after which the container was sealed and labeled.

- The contents of the three impingers were measured for volume and transferred to a precleaned glass amber container.

- The back half of the train, back-half filter housing, condenser, impingers, and U-tubes were brush-rinsed with methylene chloride. This was followed by a methanol rinse into the same amber glass container with a Teflon®-lined cap. The rinse procedure was performed three times with each solvent after which the container was sealed and labeled.

- The silica gel was returned to its original container and weighed to obtain a final weight.

- All containers were checked to ensure proper sealing, proper labeling, and that all liquid levels were marked. All samples were logged onto the chain-of-custody record.

The Method 0010 train produced the following samples:

- Filter
- XAD-2 Module
- Front-Half Methylene Chloride/Methanol Rinse
- Impinger Condensate
- Back-Half Methylene Chloride/Methanol Rinse

5.4.8 EPA Method TO14 - Speciated Volatile Organic Compounds, Ozone Precursors, and Sulfur Compounds

Air samples were collected for volatile organics utilizing EPA Method TO14 from *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air* (EPA 600/4-84-041). A sample of air was drawn through a sampling train comprised of components that regulate the rate and duration of sampling into a pre-evacuated SUMMA passivated canister. Air samples were collected over a 1-hour time frame, typically, using an

evacuated canister. After the air sample was collected, the canister valve was closed. Figure 5-6 presents a schematic of this sampling system.

5.4.9 Fourier Transform Infrared (FTIR)

Sampling System - For extractive FTIR measurements, the sample gas was sampled continuously or integrated, in accordance with EPA Method 18. The sample gas was transferred to a 5-meter effective pathlength FTIR gas cell through a PTFE (or 316 SS) transfer line. Gases could be sampled continuously from various points in the process. An 80486 personal computer (PC) controls solenoid valves to alternately switch between the sampling locations, and periodically switch to reference gas for measurement of a current background spectrum.

Field Measurements - The FTIR spectrometer and PC are transported to the test site and installed. After installation and alignment, proper instrument operation was confirmed via Bomem's "Valid" frequency calibration program. This program verifies that the frequency accuracy of the spectrometer is within 0.1 cm^{-1} and measures the true instrument resolution. If the frequency accuracy is not within 0.1 cm^{-1} or the resolution if less than 1.7 cm^{-1}, then the optics were realigned to improve system performance. Following the check of frequency accuracy, the system S/N was measured using the Bomem "SN" program. If the system S/N was not adequate (single-beam RMS S/N $\leq$ 2500 at 2100 cm^{-1}) further improvements in optical alignment, electrical isolation, and/or vibration isolation were employed to improve the S/N. If adjustments were made, verification of the frequency accuracy and resolution with the "Valid" program was then repeated.

Screening - The absorbance spectrum of a single sample of inlet gas was measured. The absorbance spectrum was compared to reference spectra for the compounds expected in the inlet. Any unexpected peaks were searched against a qualitative spectral library to identify unknown compounds. The sample analysis was performed for a sample of outlet gas with the addition of expected destruction products and products of incomplete destruction included in the initial analysis.

Based on the measured gases in the inlet and outlet, the most abundant 20 compounds were chosen for continuous analysis, and the most important 6 compounds for continuous display during the continuous monitoring phase of the test. If unidentified peaks remained in either spectrum, other spectra were obtained (after the initial testing) based on potential contaminants and process chemistry in an attempt to identify the unknown compounds.

Continuous Analysis - The continuous analysis software alternately directs reference gas, inlet gas, and outlet gas into the analyzer. At this time, it was expected that reference spectra would be collected once every two hours (1 minute cell purge, 1 minute spectrum collection). The rest of the measurement time was devoted to system sampling. The exact time required for reference, sample purging was determined by site-specific characteristics such as sample

flow rate and the expected time between process variance. Every measured interferogram was stored on hard disk with the associated sample time. Concentration vs. time was continuously displayed for 6 chosen compounds (inlet and outlet concentrations displayed on the same trace). These concentration vs. time traces were recorded along with the concentration vs. time of the other 14 most abundant species. The traces present the results of 119 one minute averages every 2 hours. The system was configured to run continuously for up to 6 hours with minimal attention.

Additional QA/QC - Randomly selected absorbance spectra were compared to reference spectra to insure reported concentrations were not the result of abnormal spectral interference. Also, the reported concentrations based on FTIR analysis were compared to concurrent analyses by standard methods.

Technical Approach - Sampled gases continuously flow through a multi-pass, heated gas cell with an effective optical pathlength of 20 m. Infrared (IR) radiation, modulated by a Michelson interferometer, pass through the gas cell prior to be detected by a photoelectric detector. The resulting, digitized signal corresponds to total infrared intensity vs. time. By applying a complex Fourier Transform (FT) on the digitized interferogram, a single beam ($I(\nu)$) spectrum is obtained corresponding to intensity vs. frequency (measured in wavenumbers, or cm^{-1}). The absorbance spectrum was calculated according to the formula:

$$Absorbance\ (\nu) = \quad - \log \frac{(I\ (\nu))}{(I_o\ (\nu))}$$

where $I_o\ (\nu)$ is the background, a single-beam spectrum measured with no sample gas (only non-absorbing gases in the cell). According to Beer's Law, the absorption intensity of a given spectral feature, at constant temperature and pressure, is directly proportional to product of the gas concentration (mols/liter) and the optical pathlength (m). When multiple absorption bands and/or multiple gas species are present, the measured absorbance is a linear superposition of the individual bands. Linear regression analysis can be used to solve for the individual species concentrations when absorbance vs. concentration data are available for the pure species.

5.4.10 NIOSH P&CAM Method 221 - Amines

The NIOSH P&CAM Method 221 sampling train was used to measure and determine the emission rate of amines.

The sampling train consisted of a heated, glass-lined probe, with a glass button-hook nozzle. A thermocouple and S-type pitot tube were attached to the probe for the measurement of gas temperature and velocity. The samples gas passed through the probe assembly to a series of four ice-cooled impingers kept below 68°F to enable condensation of entrained moisture. The first and second impingers contained 100 mL of 0.1N H_2SO_4. The fourth impinger was

empty. The fifth impinger contained a preweighed amount of silica gel. The impingers were followed by a Nutech Model 2010 dry gas meter, pump, and calibrated orifice meter. A schematic of the Method 221 sampling train is presented in Figure 5-7.

Sampling was isokinetic (± 10 percent) with readings of flue gas parameters recorded at every sampling point during the traverse.

Leak checks of the entire Method 221 sampling train were performed before and after each sampling run. In the event any portion of the train was disassembled and reassembled, leak checks were performed prior to disassembling the train. All leak checks and leakage rates are documented on the relevant field test data sheets. The acceptance criteria for the Method 221 train is a leak rate of ≤ 0.02 cfm at the highest vacuum obtained during the test run.

Following the completion of each test run, the Method 221 train was transported to a recovery area onsite. The sample recovery sequence was as follows:

- Removed the sampling train to the recovery area.
- Noted the condition of the train (i.e., impinger contents color, silica gel color, etc.).
- The contents of the first three impingers were measured for volume and transferred to a glass amber container with a Teflon^R-lined cap. The probe, impingers, right angle, and U-tubes were rinsed three times with distilled deionized water into the same sample container. The container was sealed and labeled.
- The silica gel was returned to its original container and weighed to obtain a final weight.
- All containers were checked to ensure proper sealing, proper labeling, and that all liquid levels were marked. All samples were logged onto the chain-of-custody record.

The Method 221 train produced the following samples:

- 0.1N H_2SO_4 Impinger Catches

5.4.11 Process Data

During each test run, all pertinent operating parameters are recorded. These parameters consist of the quantity and type of materials being processed, processing and/or production rate, process temperature, and process pressure. This data are recorded at the start of each test run and at fifteen minute intervals thereafter until the completion of the test run.

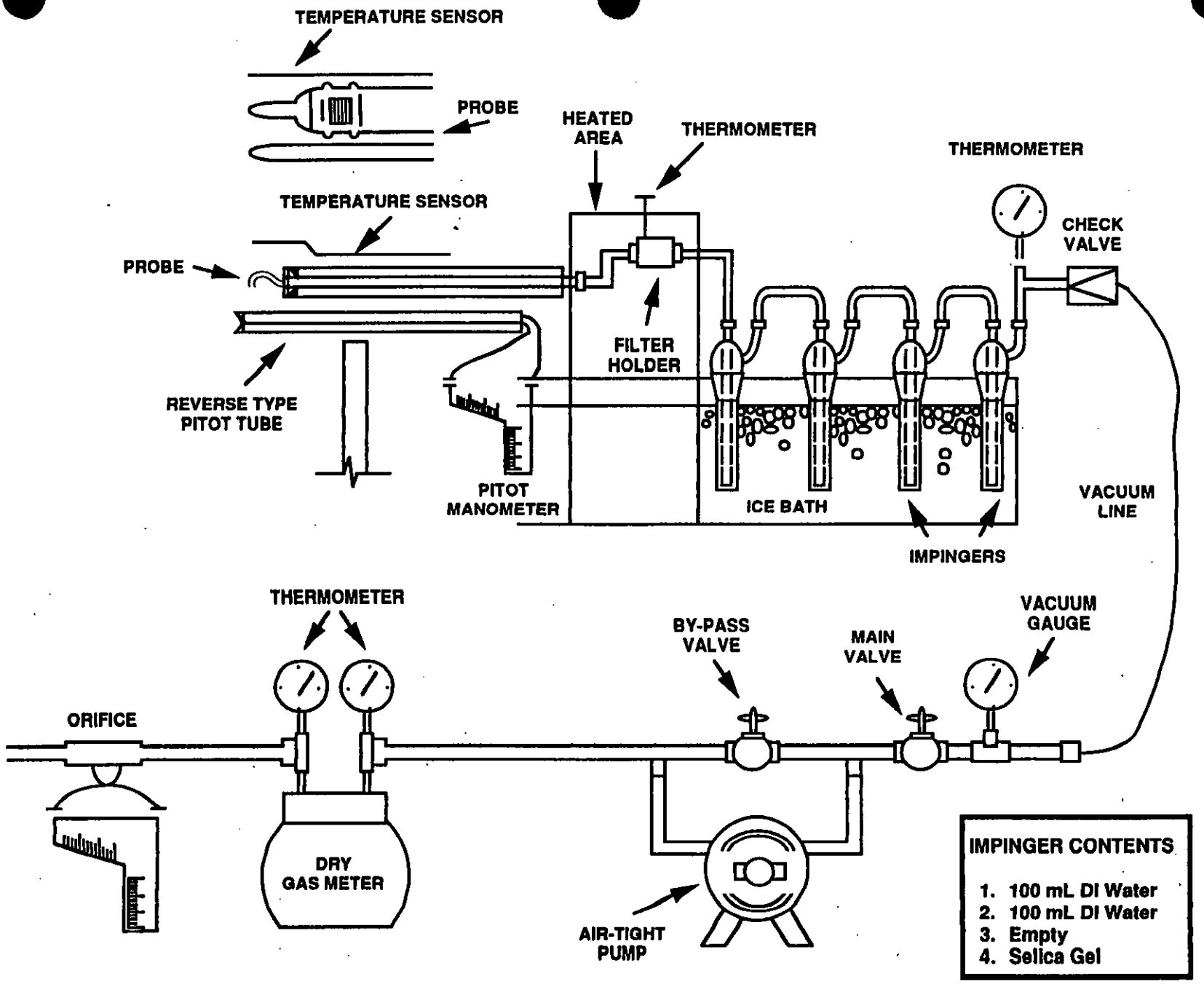


Figure 5-1. Method 5 - Particulate Matter Sampling Train.

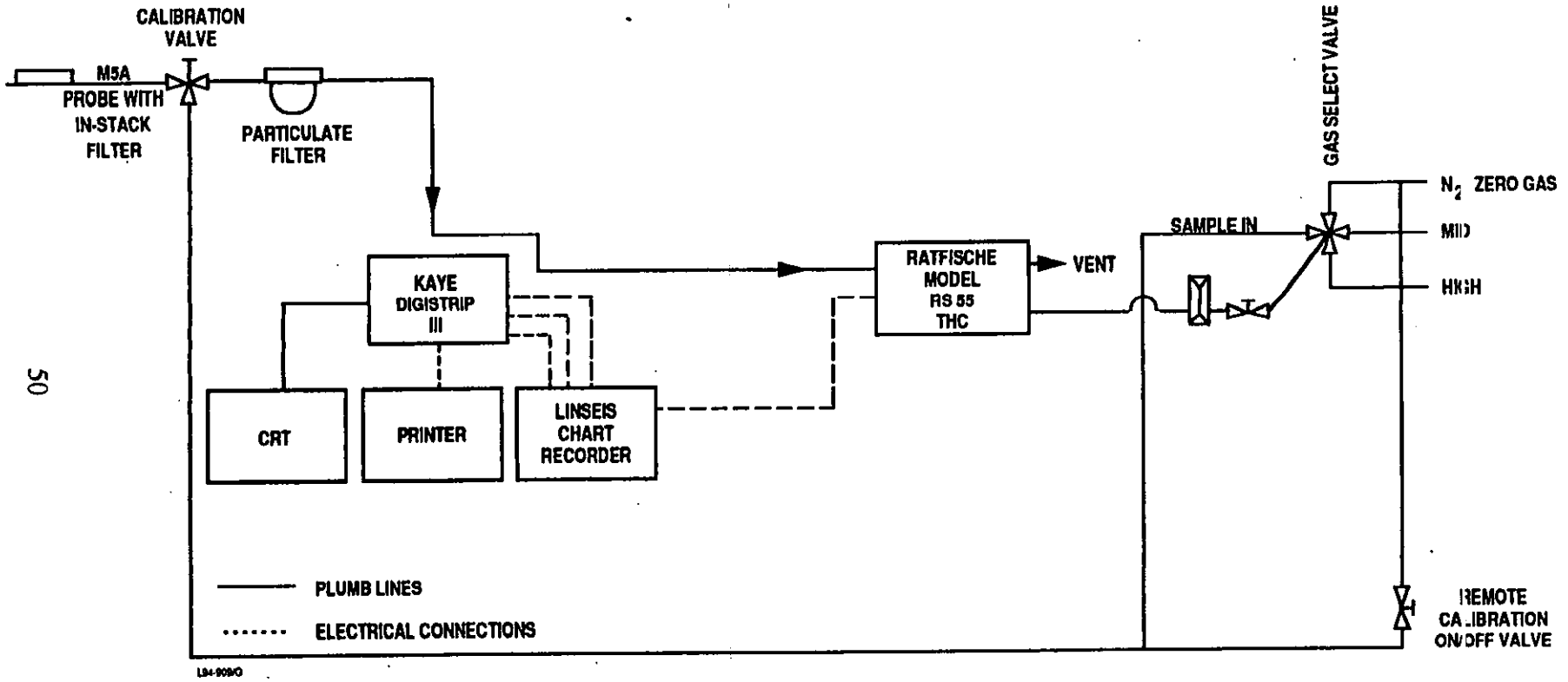


Figure 5-2. TCEM System Schematic.

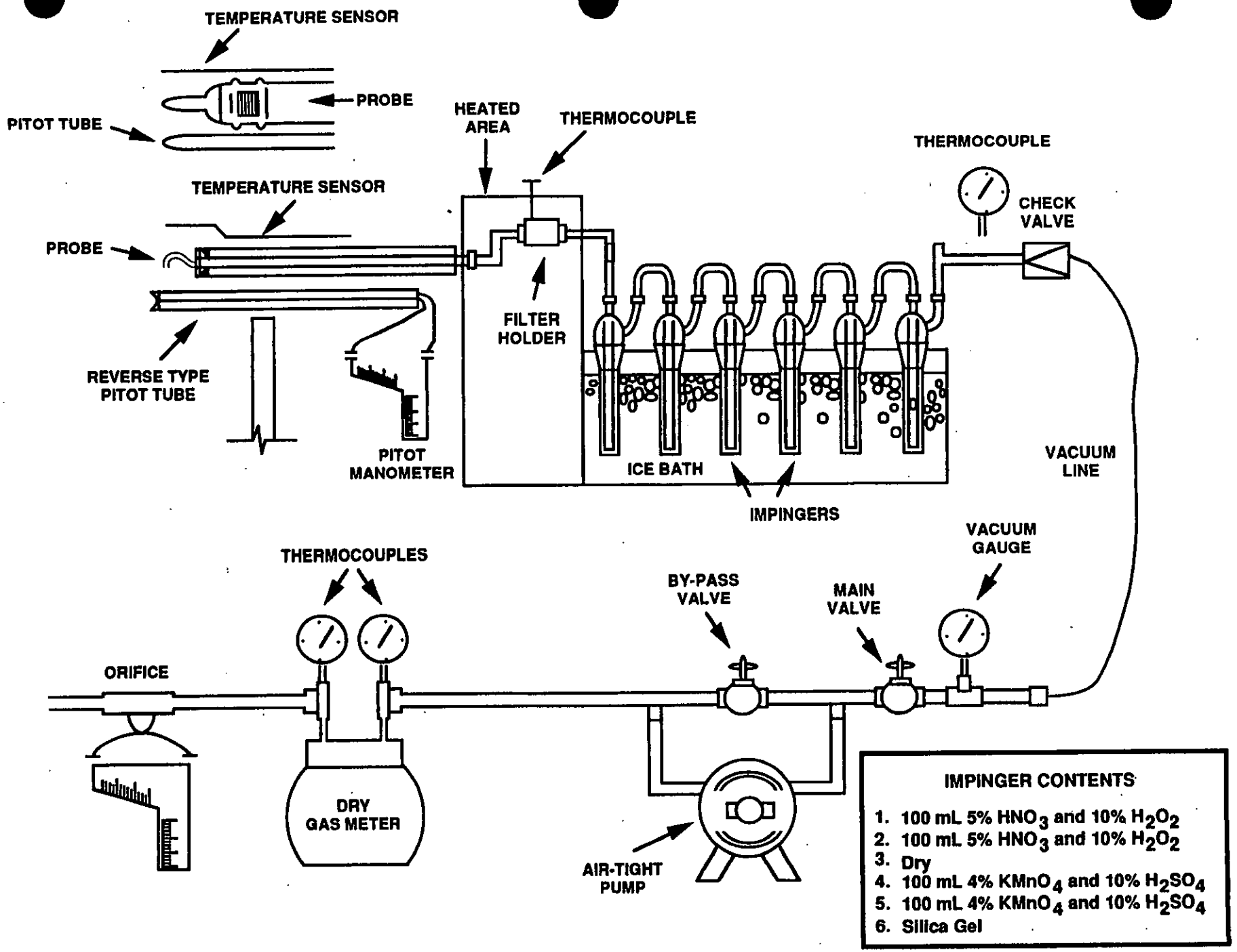


Figure 5-3. Method 29 - Multiple Metals Sampling Train.

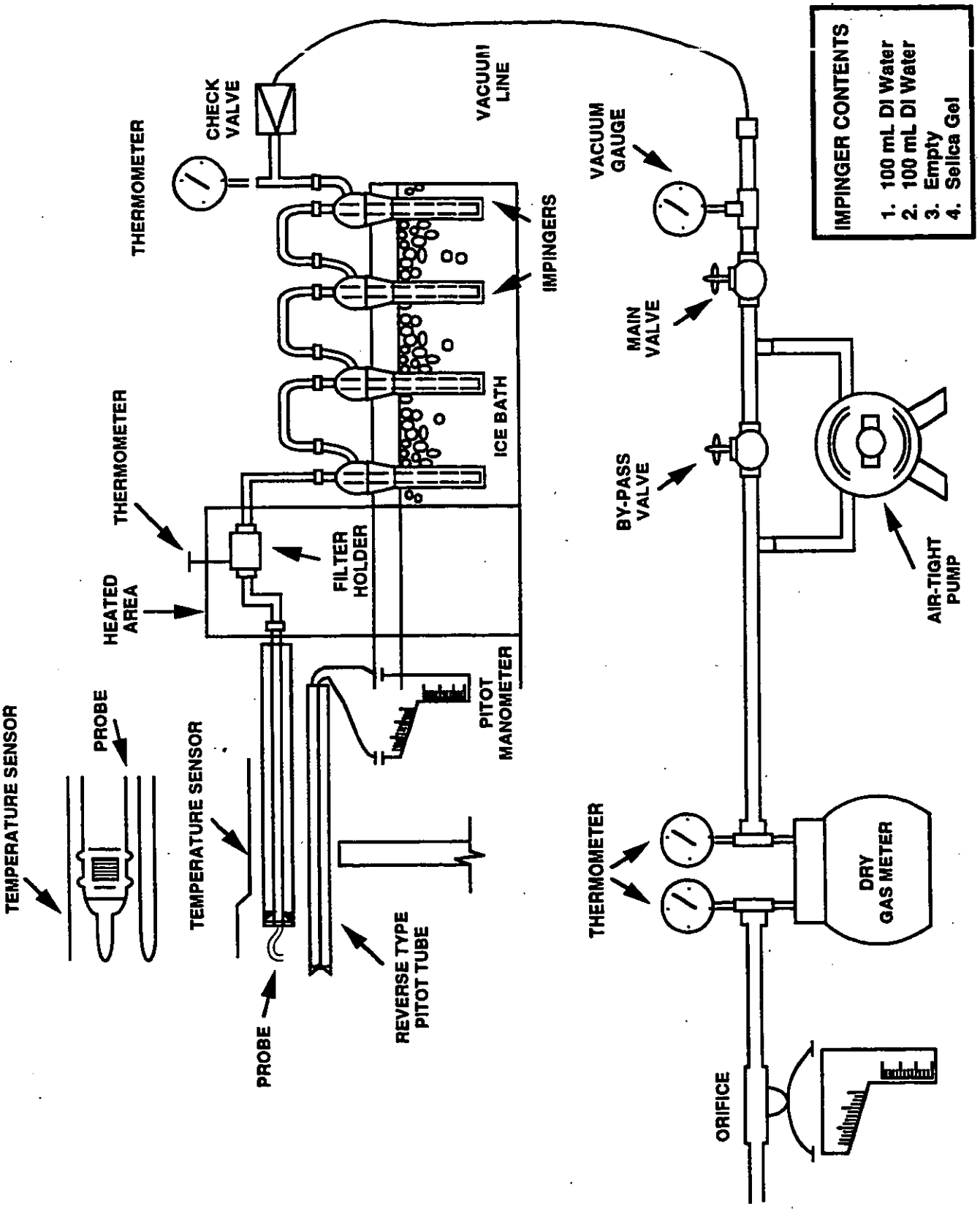


Figure 5-4. Method 202 - Condensibles (Polycyclic Organic Matter) Sampling Train.

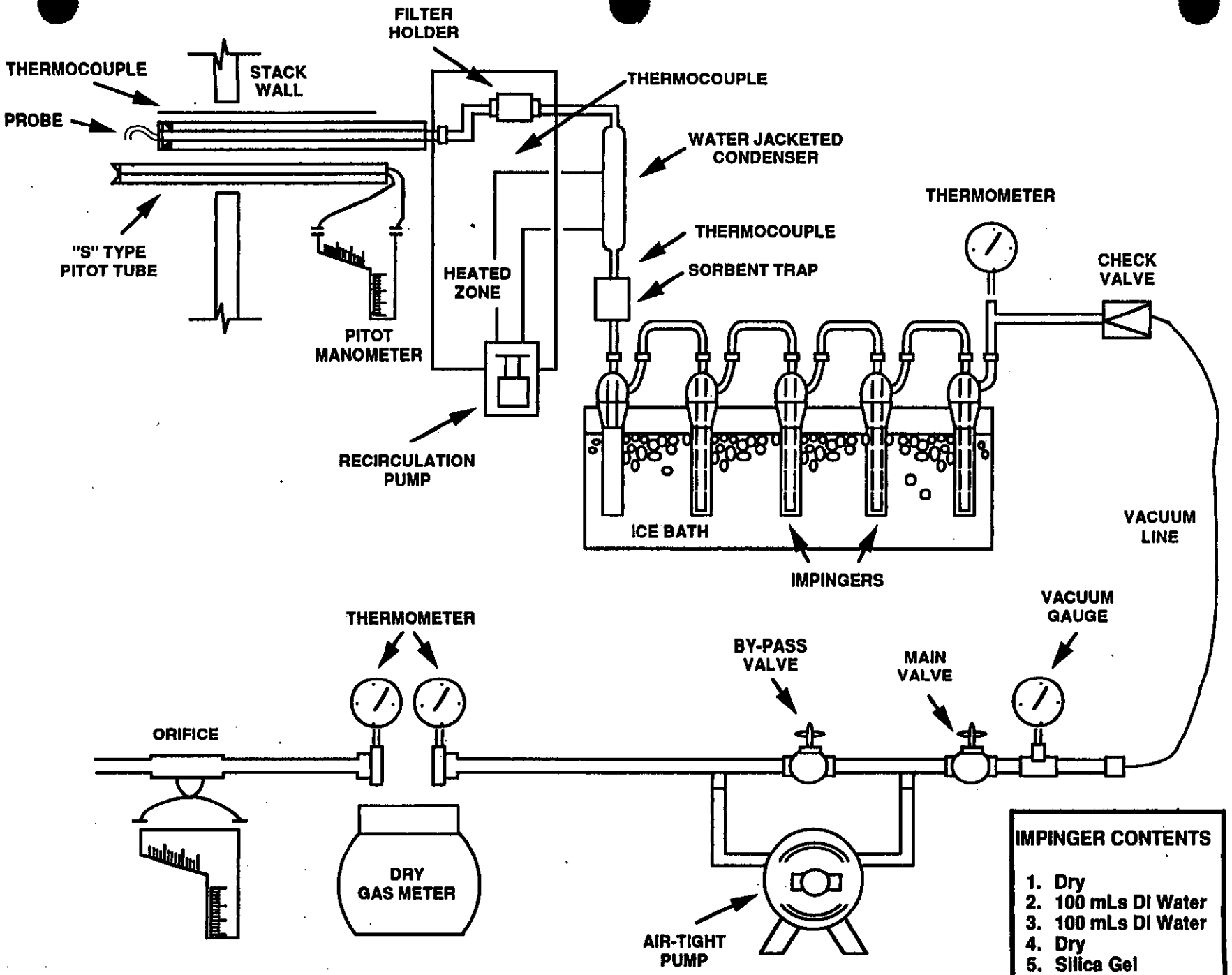


Figure 5-5. Method 0010 - Semivolatile Organic Compound Sampling Train.

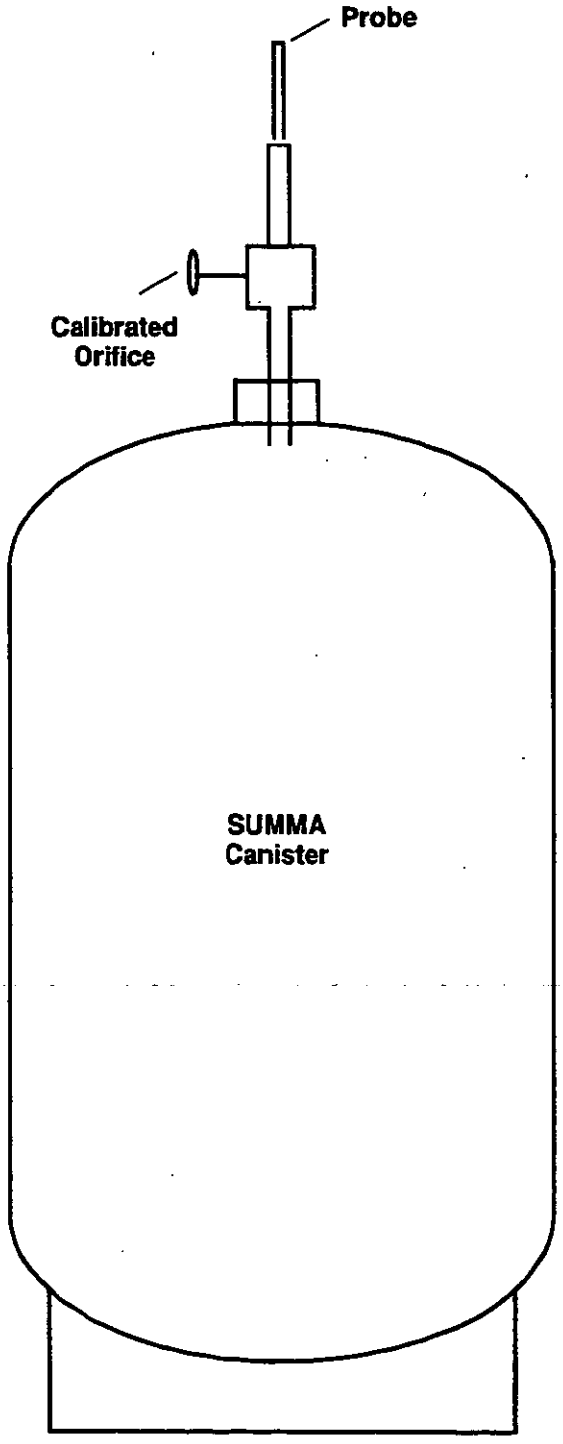


Figure 5-6. Method TO14 Sampling System.

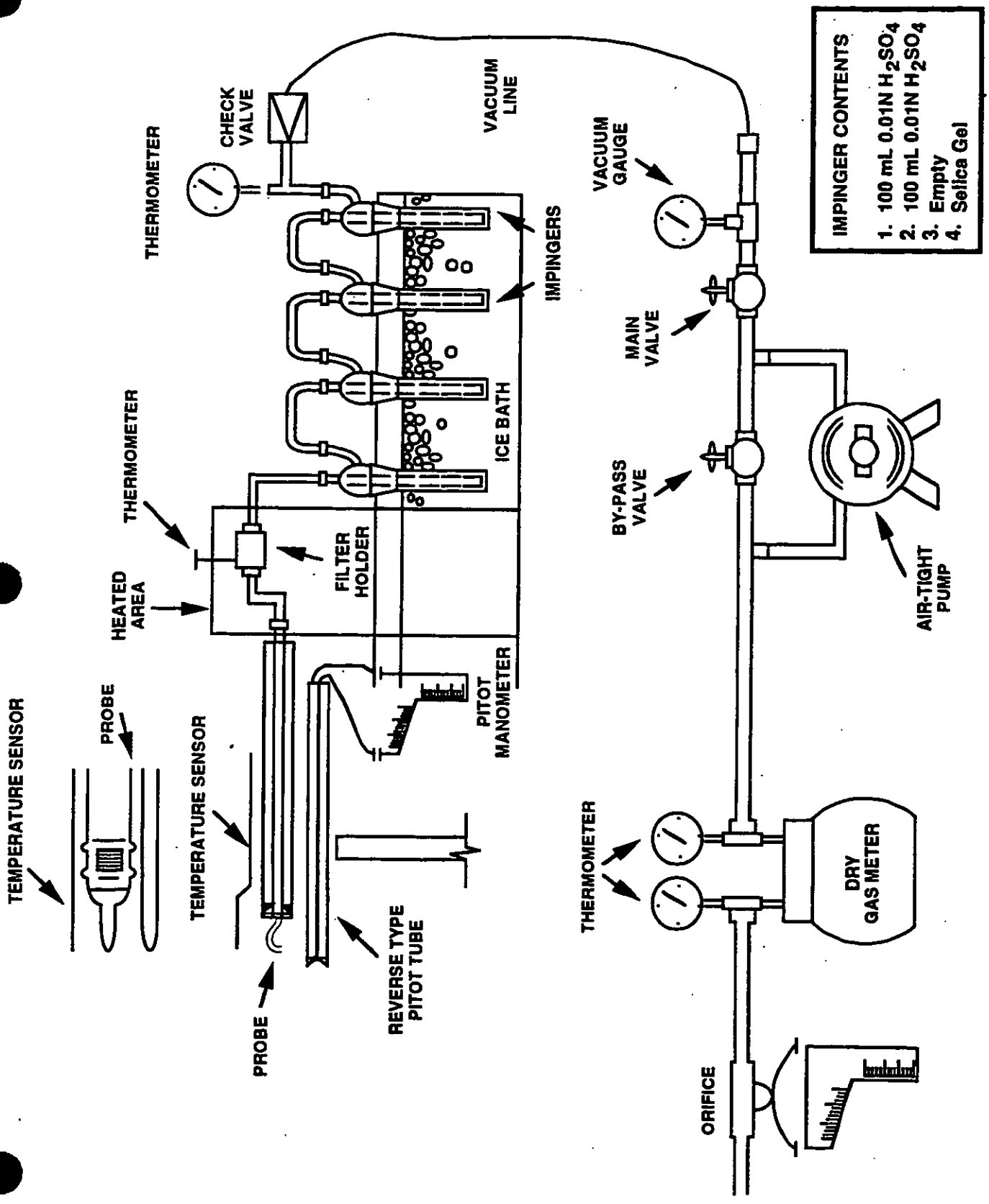


Figure 5-7. NIOSH P&CAM Method 221 - Amines Sampling Train

194-903/C

SECTION 6.0

ANALYTICAL PROCEDURES

This section delineates the analytical protocols used to analyze samples during the Rubber Manufacturers Association Test Program. The analysis and quality control protocols for each parameter are summarized below in Sections 6.1 through 6.2. The actual number of spikes and blanks required are a function of the number of actual samples collected, the analytical method requirements, and the method of sample recovery employed.

6.1 TOTAL VOLATILE ORGANIC COMPOUNDS

Total volatile organic compounds were determined continuously in the exhaust gases of the various processes using EPA Reference Method 25A as described earlier in Section 5.4.4.

6.2 SPECIATED VOLATILE ORGANICS

Volatile organic samples are collected in a 6-liter SUMMA canister according to EPA Method TO14. The samples are aliquoted using a vacuum pump, a mass flow controller, and a cryogenic trap. Internal standard/surrogate spike gas is added to the sample stream. The sample is cryogenically trapped using liquid nitrogen. The cryogenic trap is thermally desorbed by rapid heating. The sample is cryogenically refocussed, then injected onto a capillary column. The analysis is performed using a Finnigan 4500 GC/MS/DS interfaced to a Tekmar 5010GT Automatic Desorber. The estimated detection limit for these analyses is 1 $\mu g/m_3$.

6.3 VOLATILE OZONE PRECURSORS

Volatile organic samples are collected in a 6-liter SUMMA canister according to EPA Method TO14. The samples are aliquoted using a vacuum pump, a mass flow controller, and a cryogenic trap. Internal standard/surrogate spike gas is added to the sample stream. The sample is cryogenically trapped using liquid nitrogen. The cryogenic trap is thermally desorbed by rapid heating.

The speciation and measurement of gaseous ozone precursors is performed by gas chromatography/flame ionization detection (GC/FID). Analysis is performed utilizing the methodology outlined in the *Technical Assistance Document for Sampling and Analysis of Ozone Precursors*, EPA 600/8-91-215, U.S. EPA, Research Triangle Park, NC, October 1991. A subambient GC temperature program is utilized for the analysis. A standard of 54 target hydrocarbons is analyzed daily as a retention time marker. Results are calculated using individual peak responses and the average response factor for n-Propane. Results are reported in ppbC (parts per billion, Carbon).

6.4 SULFUR COMPOUNDS

Reduced sulfur gases are analyzed by gas chromatography/flame photometric detection (GC/FPD) using a direct injection technique according to modified EPA Method 16. The analysis is performed on a Hewlett-Packard 5890A gas chromatograph using a thick film (5micron) crossbonded 100% dimethylpolysiloxane megabore capitallary column (60 meter x 0.53 mm RT_x-1, Restek Corporation). A subambient GC temperature program is utilized for this analysis. An initial six-point calibration curve is prepared with hydrogen sulfide, methyl mercaptan, and carbonyl sulfide.

6.5 SEMIVOLATILE ORGANIC COMPOUNDS

The EPA Method 0010 sampling train is used to collect samples for the determination of emission levels of semivolatile organic compounds. The sample trains are extracted according to Method 0010 and analyzed for semivolatile organic compounds by SW-846 Method 8270. Quality control protocols include the spiking of the sampling train (XAD trap) with surrogate standards prior to sampling and the addition of more surrogate and internal standards in the laboratory prior to analysis. Laboratory analyses are conducted by Triangle Laboratories.

Surrogates are used to monitor efficiencies and are not used in the quantitation of unlabeled analytes. Low recoveries (< 70%, < 40%) would be indicative of possible breakthrough during the sampling session. A Laboratory Control Sample (LCS) is a laboratory blank spiked with the compounds of interest which are prepared and analyzed along with the field samples to further monitor the extraction efficiency of the method.

The Gas Chromatograph and Mass Spectrometer (GC/MS) to be used for the analysis of semivolatile organic compounds are calibrated according to Section 7.3 of SW-846 Method 8270.

6.6 POLYCYCLIC ORGANIC MATTER as Extractable Organic Matter

Polycyclic organic matter (POM) sampling is accomplished utilizing an EPA Method 5 sampling train. POM analysis is conducted by TRC Environmental Corporation.

The recovered POM train is extracted three times with methylene chloride in a separatory funnel. Following each extraction, the methylene chloride containing the extractable organic matter is decanted into a tared beaker. The methylene chloride is then allowed to evaporate and the beaker is desiccated and weighed to a constant weight. The beaker weight gain, following blank correction, is extractable organic matter.

6.7 PARTICULATE MATTER

Particulate sampling is accomplished by following the procedures in EPA Method 5. The sampling of particulate is done with the use of the EPA Method 5 sampling train. Particulate analysis is conducted by TRC Environmental Corporation.

The filters are desiccated to a constant weight. The filters are then placed in glass petri dishes and sealed with Teflon® tape. An identification label is placed on the dish. The beakers used for the dry down of the acetone rinse are cleaned and dried in an oven at 225°F. The beakers are desiccated to a constant weight.

The front-half acetone rinse is air dried in a tared beaker and then desiccated and weighed to a constant weight. The filter is desiccated and weighed to constant weight. The sum of the net weights for the probe wash and filter catch is used to calculate the concentration of particulate matter in gr/dscf. The emission rate in lbs/hr is also calculated.

6.8 METALS

The Multiple Metals train is operated in accordance with EPA Method 29 to measure and determine the emission rates of the cadmium (Cd), cobalt (Co), lead (Pb), and zinc (Zn). Laboratory analyses are conducted by Triangle Laboratories.

Method 29 sampling train components are recovered and digested in separate front- and back-half fractions. Materials collected in the sampling train are digested with acid solutions to dissolve organics and to remove organic constituents that may create analytical interferences. Acid digestion is performed using conventional Parr® Bomb or microwave digestion techniques.

The nitric acid and hydrogen peroxide solution, the probe rinse, and digested filter solutions of the train catches are analyzed for cadmium, cobalt, lead, and zinc by inductively coupled argon plasma emission spectroscopy (ICAP) or atomic absorption spectroscopy (AAS). Graphite furnace atomic absorption spectroscopy (GFAAS) is used for cadmium and lead, if these elements require greater analytical sensitivity than can be obtained by ICAP.

6.9 AMINES

The 0.01N sulfuric acid solution sample is analyzed by direct injection gas chromatography (GC) utilizing a nitrogen phosphorous detector. The sample pH is neutralized with sodium hydroxide (100ul in 3mL of sample) prior to injection.

Compounds in each sample are separated using a 30 meter 0.53mm Stabilwax-DB capillar column. Two four-point calibration curves are used to calibrate the gas chromatograph. The first solution contains trimethylamine, dimethylamine, diethylamine and butylamine at a

concentration range from 0.5 ug/mL to 2.0 ug/mL. The second curve consists of cyclohexylamine and diphenylamine at the same concentration range as the first curve.

Duplicate analysis and matrix spike analysis are used to determine the precision and accuracy of the method. Replicate analysis objectives are an RPD of less than or equal to 10%. Matrix spike objectives are 80 to 120% recover.

6.10 FOURIER TRANSFORM INFRARED SPECTROSCOPY (FTIR)

Spectrometer and Data Acquisition - An MB100 FT-IR spectrometer (Bomem Inc. Quebec, Canada) is used for IR modulation and detection. The MB100 can operate with a variable resolution from 1 to 128 cm^{-1}. The lower the spectral resolution (higher number) the faster the sampling time and the greater the signal-to-noise ratio (S/N); however, with low resolution absorbance non-linearities are more pronounced and it is difficult to separate absorbance features from multiple gas species. Therefore, more accurate quantitative results can be achieved with higher spectral resolution. 1 cm^{-1} resolution spectra are measured for quantitative analysis. The detector is liquid nitrogen - cooled Mercury-Cadmium-Telluride (MCT) detector with linearized preamp (Graseby Infrared, Orlando, FL). Digitized data are transferred to the PC via a Digital Signal Processor (DSP) board. Instrument control, data collection, and data reduction are performed by executable routines written in Array Basic™ for Grams™ (Galactic Industries Corp., Salem, NH). All measured interferograms are stored on an internal hard drive in the PC for quality control and potential secondary analysis. Concentrations of up to 20 gas species are calculated continuously while up to six are displayed. Concentration vs. time traces for the 20 measured species are stored periodically and at the conclusion of each run. When mass flow rates are determined, destruction efficiencies and total mass-based emissions are calculated from the measured inlet and outlet concentrations.

Standards Development - All spectra are obtained at 1 cm^{-1} spectral resolution, with the cell temperature and pressure maintained at 150° C and 1 atm, respectively. Therefore, pure component reference spectra need to be obtained at these same conditions. Gas phase spectra of CO_2 (from 424.1 to 50,000 ppm), CO (from 0.56 to 10,000 ppm), and NO (0.85 ppm) have been previously measured under these conditions and are available for use in this program. Theoretical, high resolution reference spectra ($\leq$ 0.0625 cm^{-1} data point spacing) were generated from the HITRAN Optical Spectroscopy Database using USF HITRAN-PC (University of South Florida Research Foundation, Tampa, FL) for CO_2 (from 12.5 ppm to 1,250 ppm), H_2O (from 100 to 10,000 ppm), and NO (From 1 to 100 ppm) and data is available for CO. The high resolution reference spectra were de-resolved to 1 cm^{-1} in the Fourier domain using triangular apodization to approximate the instrument line shape function of the spectrometer. Quantitative reference spectra for the other species have been obtained from the EPA FT-IR on-line database for 100 hazardous air pollutants (HAPs). The absorbance spectra of the standard gases are measured in the laboratory using the same sampling protocol described for the field analysis. This measurement is used to verify pre-installation instrument calibration and sampling accuracy. Pure component reference spectra

are used to calculate calibration curves and choose a suitable reference spectrum for use in a modified classical least squares algorithm. A pre-treatment procedure is applied to the spectra to remove the effects of baseline variations, and the optimal spectral region for quantitation is selected. The pre-treated sample spectra are then reconstructed from the pure component spectra, and previously computed calibration curves are applied to the results to determine the concentrations. Mixed gas standards can then be used to determine potential interference effects between the gas various gas species.

The sensitivity limits for the given species depend upon the absorbance coefficient of each gas as well as the S/N for the instrument and the degree to which other species absorbances interfere. The S/N can be increased by increasing the sampling time, but the ratio increases as the square root of the sampling time and time resolution sets practical limits on the time per measurement. It is expected that each measurement will be the result of 1 minute of scanning but this may be adjusted depending on the desired sensitivities, the absorbance coefficients of the species of interest, and the measured S/N.

Report Preparation and Support - The FT-IR system measures and records volume mixing concentrations (mol/mol) for each measured compound. When supplied with the volume and mass flow rates, mass-based emissions can be calculated for each device. Following each test, previously unidentified peaks are compared with potential compounds. If a match is found, quantitative reference spectra can be obtained or measured, and the recorded spectra can be re-analyzed to determine concentration vs. time information for the unknown. "Valid" and "S/N" reports are included for each test, as are the results of the pathlength calculation, zero and calibration error measurements, and sample bias measurements.

SECTION 7.0

QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

7.1 OVERVIEW

TRC's QA Program conforms with EPA recommendations and is directed by the Corporate QA Director, a full-time professional who reports directly to the Company President. This give the QA Director the necessary authority and independence to find and correct any existing quality problems. Division QC Coordinators are responsible for the QC Program within each technical division; they report both to their Division Manager and the Corporate QA Director.

This section highlights the specific QA/QC procedures to be followed on this Test Program. The QA Director has reviewed and approved this Test Plan and has attended project review meetings, as needed, to ensure that appropriate QA/QC procedures are followed.

7.2 FIELD QUALITY CONTROL SUMMARY

7.2.1 Calibration Procedures

Calibration of the field sampling equipment is performed prior to the field sampling effort. Copies of the calibration sheets are submitted to the field team leader to take onsite and for the project file. Calibrations are performed as described in the EPA publications "*Quality Assurance Handbook for Air Pollution Measurement Systems; Volume III - Stationary Source Specific Methods*" (EPA-600/4-77-027b) and EPA 40 CFR Part 60 Appendix A. Equipment to be calibrated includes the sample metering system, nozzles, barometers, thermocouples, and pitot tubes. All calibrations are available for review at the test program. Copies of the equipment calibration forms can be found in Appendix E.

7.2.2 Equipment Leak Checks

Prior to sampling, each sampling train is leak checked according to the procedures outlined in EPA Reference Method 5. During the course of a test run, a leak check is conducted before and after every test, or if replacement of a component becomes necessary. Final leak checks are performed to ensure that no leaks developed in the train during the course of the test run. All leakage rates, if any found, are recorded on the appropriate field data sheet.

7.2.3 Cyclonic Flow Check

The presence of cyclonic flow within each sampling location is checked during preliminary traverses prior to sampling, in accordance with Section 2.4 of EPA Method 1 as described in the July 1, 1988 edition of the Federal Register.

7.2.4 Method and Field Blanks

One Method blank for the Method 0010 and Method 29 sampling trains is taken during the field sampling program. One field blank for the Method 5, Method 25, and Method 0030 are taken during the field sampling program. This is to ensure sample quality and integrity.

7.3 SAMPLE CHAIN OF CUSTODY

The chain-of-custody of the samples is initiated and maintained as follows:

- Each sample is collected, labeled, sealed, and the liquid level marked on appropriate samples.
- The sample is then be recorded on the sample chain-of-custody form.
- Custody of the samples are retained by TRC until shipment by Federal Express. Upon receipt of the samples at the analytical laboratory, custody is reestablished by the labs' internal custody procedures.

An example of the TRC chain-of-custody form can be found in Appendix C.

7.4 DATA REDUCTION, VALIDATION, AND REPORTING

Specific QC measures are used to ensure the generation of reliable data from sampling and analysis activities. Proper collection and organization of accurate information followed by clear and concise reporting of the data is a primary goal in all projects.

7.4.1 Field Data Reduction

Appendix D of this Test Plan presents the standardized forms that are used to record field sampling data. The data collected are reviewed in the field by the Field Team Leader and at least one other field crew member. Errors or discrepancies are noted in the field book. Appendix D provides the calculation worksheets used in the field to check on isokinetic sampling conditions and a listing of formulas to be used to reduce the field data.

7.4.2 Laboratory Analysis Data Reduction

Analytical results are reduced to concentration units specified by the analytical procedures, using the equations provided in the analytical procedures. If units are not specified, data from the analysis of gas samples are reported as $\mu g/m^3$.

The emission test results and the calculated emission factors are subjected to a rigorous statistical analysis. This analysis determines the arithmetic mean, standard deviation, confidence limits, and testing for outlying data. If there is any outlying data which is not

representative of actual emissions, this data is discarded prior to final quantitation of the emission factors. An explicit explanation is provided for any data that is discarded.

The arithmetic mean (X) for a series of test data is determined from the summation of the results for each test run (U) by the number of test runs (N). This method is used for calculating average emission test results and the average emission factor for a specific test condition. Outlying data are not included in these calculations.

The standard deviation (S) is determined for each series of test data. The standard deviation is utilized to determine the confidence level for the results obtained for each test series. The standard deviation for a series of data is calculated using Equation 7-1.

(Equation 7-1)

$$S = \sqrt{\left(\frac{\Sigma(x-u)^2}{n}\right)}$$

The confidence level is calculated for the final results (F) for each test series. Due to the relatively small number of test runs that are conducted for each operating condition, the confidence level is determined using the Student *t* distribution. The confidence interval is calculated for a 95% confidence in the data. The *t* value for a 95% confidence interval is $t_{.025}$. The equation that is used is defined in Equation 7-2.

(Equation 7-2)

$$X - t_{.025}(S/\sqrt{N}) \leq F \leq X + t_{.025}(S/\sqrt{N})$$

Outlying data are eliminated to preserve the accuracy of the final results. Data are considered outlying if its value has a difference of > 20% from the arithmetic mean for the test series in which the data was acquired.

7.4.3 Data Validation

TRC supervisory and QC personnel use validation methods and criteria appropriate to the type of data and the purpose of the measurement. Records of all data are maintained, including that judged to be an "outlying" or spurious value. The persons validating the data have sufficient knowledge of the technical work to identify questionable values.

Field sampling data is validated by the Field Team Leader and/or the Field QC Coordinator based on their review of the adherence to an approved sampling protocol and written sample collection procedure.

Analytical data are validated by the subcontractor laboratory QC or supervisory personnel using criteria outlined below. TRC utilizes results from field and laboratory method blanks, replicate samples and internal QC samples to further validate analytical results. Furthermore, TRC QC personnel review all subcontractor laboratory raw analytical data to verify calculated results presented.

The following criteria are used to evaluate the field sampling data:

- Use of approved test procedures;
- Proper operation of the process being testing;
- Use of properly operating and calibrated equipment;
- Leak checks conducted before and after tests;
- Use of reagents conforming to QC specified criteria;
- Proper chain-of-custody maintained.

The criteria listed below are used to evaluate the analytical data:

- Use of approved analytical procedures;
- Use of properly operating and calibrated instrumentation;
- Acceptable results from analyses of QC samples (i.e., the reported values should fall within the 95 percent confidence interval for these samples).

7.4.4 Data Reporting

All data are reported in standard units depending on the measurement and the ultimate use of the data. The bulk of the data are computer processed. Data fore the exhaust gas streams will be reported as follows:

- Gas Properties
  - Moisture, percent by volume
  - Flow rate, dscfm and acfm
  - Pressure, mm of Hg
  - Temperature, °F

- Particulate Matter
  - gr/dscf
  - gr/ascf
  - lbs/hr
  - mass emitted per mass of product produced or processed

- Total Volatile Organic Compounds
  - ppm (v/v)
  - lbs/hr
  - mass emitted per mass of product produced or processed

- Speciated Semivolatile Organic Compounds
  - ng
  - lbs/hr
  - mass emitted per mass of product produced or processed

- Multiple Metals
  - µg/dscf
  - lbs/hr
  - mass emitted per mass of product produced or processed

- Speciated Volatile Organic Compounds
  - ng
  - lbs/hr
  - mass emitted per mass of product produced or processed

Results of the emission factor test program are being reported in sufficient detail to allow RMA to check all results and plan confirmatory measurements. The final report includes six sections:

- Introduction
- Summary and Discussion of Results
- Process Descriptions and Operation
- Sampling Locations
- Sampling and Analytical Procedures
- Data Reduction and Reporting

Report appendices include:

- Field Sampling Data Sheets
- Field Recovery Data Sheets
- Field Reduced Data
- Flue Gas Analytical Data Reports
- Process Data
- Calibration Sheets

APPENDIX A

COMBINED HAP, SARA 313, STATE AIR TOXICS LIST

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
0	Aluminum compounds	(CA,KY)
0	Antimony compounds	(EPA 189)
0	Arsenic compounds	(EPA 189)
0	Barium compounds	(CA,KY)
0	Beryllium compounds	(EPA 189)
0	Bromine compounds	(CA)
0	Cadmium compounds	(EPA 189)
0	Chromium compounds	(EPA 189)
0	Cobalt compounds	(EPA 189)
0	Coke oven emissions	(EPA 189)
0	Copper compounds	(CA)
0	Creosotes	(CA)
0	• Cyanide compounds	(EPA 189)
0	Dialkylnitrosamines	(CA)
0	Fine mineral fibers	(EPA 189)
0	Glycol ethers	(EPA 189)
0	Indium compounds	(KY)
0	Iron	(KY)
0	Iron salts	(KY)
0	Lead compounds	(EPA 189)
0	Manganese compounds	(EPA 189)
0	Mercury compounds	(EPA 189)
0	Molybdenum compounds	(KY)
0	Nickel compounds	(EPA 189)
0	Phosporous compounds	(CA)
0	Platinum compounds	(KY)
0	Polycyclic organic matter	(EPA 189)
0	Radionuclides	(EPA 189)
0	Rhodium compounds	(KY)
0	Selenium compounds	(EPA 189)
0	Silver compounds	(CA,KY)
0	Tellurium compounds	(KY)
0	Thallium compounds	(KY)
0	Thallium compounds	(CA)
0	Tin compounds	(KY)
0	Tungsten compounds	(KY)
0	Uranium compounds	(KY)
0	Vanadium	(CA)
0	• Zinc compounds	(CA)
76119	1,1,1,2-Tetrachloro-2,2-difluorethane	(NC)
71556	1,1,1-Trichloroethane	(EPA 189)
79345	1,1,2,2-Tetrachloride	(EPA 189)
76120	1,1,2,2-Tetrachloro-1,2-difluoroethane	(NC)
79005	1,1,2-Trichloroethane	(EPA 189)
76131	1,1,2-Trichloro-1,2,2-trifluoroethane	(CA,IL,NY,NC,TX)
	1,1-Butanediol dimethanesulphonate	(KY)
394729	1,1-Dichloro-1-nitroethane	(KY)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
57147	1,1–Dimethyl hydrazine	(EPA 189)
96184	1,2,3–Trichloropropane	(IL,KY,NY,TX)
120821	1,2,4–Trichlorobenzene	(EPA 189)
95636	1,2,4–Trimethylbenzene	(CA)
96128	1,2–Dibromo 3–chloropropane	(EPA 189)
540590	1,2–Dichloroethylene	(KY)
	1,2–Diethylhydrazine	(KY)
540738	1,2–Dimethylhydrzine	(KY)
122667	1,2–Diphenylhydrazine	(EPA 189)
106887	1,2–Epoxybutane	(EPA 189)
75558	1,2–Propylenimine	(EPA 189)
106990	• 1,3–Butadiene	(EPA 189)
107880	1,3–Butylene glycol	(NY,TX)
541731	1,3–Dichlorobenzene	(CA,IL,NY,TX)
542756	1,3–Dichloropropene	(EPA 189)
118525	1,3–Dichloro–5,5–dimethylhydantoin	(KY)
1120714	1,3–Propane sultone	(EPA 189)
106467	1,4–Dichlorobenzene(p)	(EPA 189)
123911	1,4–Diethyleneoxide	(EPA 189)
82280	1–Amino–2–Methylanthraquinone	(KY)
106989	1–Butene	(IL,NY,TX)
600259	1–Chloro–1–nitropropane	(KY)
108032	1–Nitropropane	(KY,SC)
109671	1–Pentene	(IL,NY,TX)
	1–(2–Chloroethyl)–3–cyclohexyl–1–nitrosurea	(KY)
	1–[(5–Nitrofurfurylidene)amino]–2–imidazolidinone	(KY)
540841	2,2,4–Trimethylpentane	(EPA 189)
75990	2,2–Dichloropropionoic acid	(KY)
1746016	2,3,7,8–Tetrachlorodibenzo–p–dioxin	(EPA 189)
78886	2,3–Dichloropropene	(SARA 313)
95954	2,4,5–Trichlorophenol	(EPA 189)
93765	2,4,5–Trichlorophenoxyacetic acid	(KY)
88062	2,4,6–Trichlorophenol	(EPA 189)
118967	2,4,6–Trinitrotoluene	(KY)
94757	2,4–D, salts & esters	(EPA 189)
615054	2,4–Diaminoanisole	(CA)
39156417	2,4–Diaminoanisole sulfate	(KY)
	2,4–Dichlorophenyl–p–nitrophenyl ether	(KY)
120832	2,4–Dichlorphenol	(CA)
105679	2,4–Dimethylphenol	(SARA 313)
51285	2,4–Dinitrophenol	(EPA 189)
121142	2,4–Dinitrotoluene	(EPA 189)
95807	2,4–Toluene diamine	(EPA 189)
584849	• 2,4–Toluene diisocyanate	(EPA 189)
606202	2,6–Dinitrotoluene	(CA)
128370	2,6–Ditertiary butyl–p–cresol	(KY)
91087	* 2,6–Toluene diisocyanate	(CA)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
53963	2-Acetylaminofluorene	(EPA 189)
117793	2-Aminoanthraquinone	(KY)
	2-Aminopyridine	(KY)
	2-Amino-5-(5-Nitro-2-furyl)-1,3,4-thiadiazole	(KY)
532274	2-Chloracetophenone	(EPA 189)
110805	2-Ethoxyethanol	(SARA 313)
104767	2-Ethylhexanol	(IL,NY,TX)
109864	2-Methoxyethanol	(SARA 313)
	2-Methylaziridine	(KY)
	2-Methyl-1-nitroanthraquinone	(KY)
88755	• 2-Nitrophenol	(IL,NY,TX)
79469	2-Nitropropane	(EPA 189)
102818	2-N-Dibutylaminoethanol	(KY)
90437	2-Phenylphenol	(SARA 313)
	2-(2-Formylhydrazine)-4-(5-nitro-2-furyl)thiazole	(KY)
91941	3,3-Dichlorobenzene	(EPA 189)
	3,3-Dichloro-4,4-diaminodiphenyl ether	(KY)
119904	3,3-Dimethoxybenzidine	(EPA 189)
119937	3,3-Dimethyl benzidine	(EPA 189)
99343	3,5-Dinitrobenzoic acid	(IL,NY,TX)
101804	4,4-Diaminodiphenyl ether	(SARA 313)
101611	4,4-Methylene bis benzenamine	(KY)
101144	4,4-Methylene bis(2-chloroaniline)	(EPA 189)
101779	4,4-Methylenedianaline	(EPA 189)
139651	4,4-Thiodianiline	(KY)
534521	4,6-Dinitro-o-cresol, & salts	(EPA 189)
60093	4-Aminoazobenzene	(SARA 313)
92671	4-Aminobiphenyl	(EPA 189)
95830	4-Chloro-o-phenylenediamine	(CA,KY)
150765	4-Methoxyphenol	(KY)
92933	4-Nitrobiphenyl	(EPA 189)
100027	4-Nitrophenol	(EPA 189)
99592	5-Nitroacenaphthene	(KY)
	5-Nitro-o-anisidine	(KY)
96695	6-tert-Butyl-m-cresol	(KY)
105575	Acetal	(IL,NY,TX)
75070	* Acetaldehyde	(EPA 189)
107891	Acetaldol	(IL,NY,TX)
60355	Acetamide	(EPA 189)
103844	Acetanilide	(IL,NY,TX)
64197	Acetic acid	(IL,KY,NY,NC,TX)
108247	Acetic anhydride	(IL,KY,NY,SC,TX)
67461	Acetone	(CA,IL,KY,NY,TX)
75865	Acetone cyanohydrin	(IL,NY,TX)
75058	Acetonitrile	(EPA 189)
98862	Acetophenone	(EPA 189)
75365	Acetyl chloride	(IL,NY,TX)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
74862	Acetylene	(IL,NY,TX)
79276	Acetylene tetrabromide	(KY)
50782	Acetylsalicyclic acid	(KY)
107028	Acrolein	(EPA 189)
79061	* Acrylamide	(EPA 189)
79107	* Acrylic Acid	(EPA 189)
107131	* Acrylonitrile	(EPA 189)
124049	Adipic acid	(IL,NY,TX)
111693	Adiponitrile	(IL,NY,TX)
	Adriamycin	(KY)
116063	Aldicarb	(SC)
309002	Aldrin	(KY)
	Alkyl napthalenes (linear)	(NY,TX)
	Alkyl sulfunate (linear)	(NY,TX)
123013	* Alkylbenzene (linear)	(IL,NY,TX)
107186	Allyl alcohol	(IL,KY,NY,TX)
107051	Allyl chloride	(EPA 189)
106923	Allyl glycidyl ether	(KY)
2179591	Allyl propyl disulfide	(KY)
97563	Aminoazotoluene(o)	(KY)
1321115	Aminobenzoic acid	(IL,NY,TX)
111411	Aminoethylethanolamine	(IL,NY,TX)
123308	* Aminophenol(p)	(IL,NY,TX)
61825	Amitrole	(CA,KY)
7664417	Ammonia	(CA,KY,NC)
12125029	Ammonium chloride	(KY,SC)
7788989	Ammonium chromate	(NC)
	Ammonium dichromate	(NC)
6484522	Ammonium nitrate	(CA)
7783202	Ammonium sulfate	(CA,KY)
628637	Amyl acetates	(IL,KY,NY,TX)
71410	Amyl alcohols	(IL,NY,TX)
110587	Amyl amine	(IL,NY,TX)
543599	Amyl chloride	(IL,NY,TX)
110687	Amyl mercaptans	(IL,NY,TX)
1322061	Amyl phenol	(IL,NY,TX)
62533	* Aniline	(EPA 189)
142041	Aniline hydrochloride	(IL,NY,TX)
29191524	Anisidine	(IL,NY,TX)
134292	Anisidine hydrochloride(o)	(SARA 313)
90040	Anisidine(o)	(EPA 189)
04949	Anisidine(p)	(SC)
100663	Anisole	(IL,NY,TX)
120127	Anthracene	(SARA 313)
118923	Anthranilic acid	(IL,NY,TX)
84651	Anthraquinone	(IL,NY,TX)
	Aramite	(KY)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
7784421	Arsine	(KY)
1332214	Asbestos	(EPA 189)
1912249	Atrazine	(KY)
492808	Auramine	(KY)
	Azaserine	(KY)
	Azathioprine	(KY)
86500	Azinphos–methyl	(KY)
17804352	Benomyl	(KY)
100527	• Benzaldehyde	(IL,NY,TX)
55210	• Benzamide	(IL,NY,TX)
71432	* Benzene	(EPA 189)
98486	Benzenedisulfonic acid	(IL,NY,TX)
98113	Benzenesulfonic acid	(IL,NY,TX)
92875	Benzidine	(EPA 189)
134816	Benzil	(IL,NY,TX)
76937	Benzilic acid	(IL,NY,TX)
271896	Benzofuran	(CA)
65850	• Benzoic acid	(IL,NY,TX)
119539	Benzoin	(IL,NY,TX)
100470	Benzonitrile	(IL,NY,TX)
119619	Benzophenone	(IL,NY,TX)
98077	Benzotrichloride	(EPA 189)
98884	Benzoyl chloride	(CA,IL,KY,NY,TX)
94360	Benzoyl peroxide	(CA,KY)
100516	Benzyl alcohol	(IL,NY,TX)
120514	Benzyl benzoate	(IL,NY,TX)
100447	Benzyl chloride	(EPA 189)
98873	Benzyl dichloride	(IL,KY,NY,TX)
100469	• Benzylamine	(IL,NY,TX)
92524	Biphenyl	(EPA 189)
	Bischloroethyl nitrosurea	(KY)
1304821	Bismuth telluride	(KY)
80057	Bisphenyl A	(IL,NY,TX)
11144	Bis(2–chloroethyl) ether	(CA,KY)
108601	Bis(2–chloro–1–methylethyl) ether	(SARA 313)
103231	Bis(2–ethylhexyl) adipate	(CA)
117817	Bis(2–ethylhexyl)phthalate	(EPA 189)
542881	Bis(chloromethyl)ether	(EPA 189)
	Borates	(KY)
1303862	Boron oxide	(KY)
10294334	Boron tribromide	(KY)
10294345	Boron trifluoride	(KY)
314409	Bromacil	(KY)
10861	Bromobenzene	(IL,NY,TX)
421012	Bromochlorodifluoromethane	(SARA 313)
75252	Bromoform	(EPA 189)
27497514	Bromonapthalene	(IL,NY,TX)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
75638	Bromotrifluoromethane	(SARA 313)
109795	Butanethiol	(SC)
123864	• Butyl acetate(n)	(IL,KY,NY,TX)
105464	* Butyl acetate(sec)	(KY)
540885	• Butyl acetate(tert)	(KY)
141322	Butyl acrylate	(CA,IL,KY,NY,TX)
71363	Butyl alcohol(n)	(CA,IL,KY,NY,TX)
78922	Butyl alcohol(sec)	(CA,IL,KY,NY,TX)
75650	Butyl alcohol(tert)	(IL,KY,NY,TX)
98737	Butyl benzoic acid(p-tert)	(IL,NY,TX)
85687	Butyl benzyl phthalate	(CA)
2426086	Butyl glycidyl ether(n)	(KY)
138227	Butyl lactate(n)	(KY)
	Butyl mercaptan	(KY)
109739	• Butylamine(n)	(IL,KY,NY,SC,TX)
13952846	• Butylamine(sec)	(IL,KY,NY,TX)
75649	• Butylamine(tert)	(IL,KY,NY,TX)
89725	Butylphenol(o-sec)	(KY)
98511	Butyltoluene(p-tert)	(KY)
123728	• Butyraldehyde(n)	(IL,NY,TX)
107926	Butyric acid	(IL,NY,TX)
106310	Butyric anhydride	(IL,NY,TX)
109740	Butyrnitrile	(IL,NY,TX)
96480	Butyrolactone(b)	(KY)
156627	Calcium cyanamide	(EPA 189)
1305620	Calcium hydroxide	(KY)
79925	Camphene	(KY)
76222	Camphor	(KY)
105602	Caprolactum	(EPA 189)
2425061	Captafol	(CA,KY)
133062	Captan	(EPA 189)
63252	Carbaryl	(EPA 189)
1563602	Carbofuran	(KY)
1333864	• Carbon black	(KY)
75150	• Carbon disulfide	(EPA 189)
558134	Carbon tetrabromide	(IL,KY,NY,TX)
56235	Carbon tetrachloride	(EPA 189)
353504	Carbonyl fluoride	(KY)
463581	• Carbonyl sulfide	(EPA 189)
120809	Catechol	(EPA 189)
9004357	Cellulose acetate	(IL,NY,TX)
21351791	Cesium hydroxide	(KY)
133904	Chloramben	(EPA 189)
	Chlorambicil	(KY)
56757	Chloramphenicol	(CA,KY)
57749	Chlordane	(EPA 189)
	Chlorinated diphenyl oxide	(KY)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
7782505	Chlorine	(EPA 189)
10049044	Chlorine dioxide	(KY)
7790912	Chlorine trifluoride	(KY)
79118	Chloroacetic acid	(EPA 189)
79049	Chloroacetyl chloride	(KY)
108429	Chloroaniline(m)	(IL,NY)
95512	Chloroaniline(o)	(IL,NY)
106478	Chloroaniline(p)	(IL,NY)
35913098	Chlorobenzaldehyde	(IL,NY)
108907	Chlorobenzene	(EPA 189)
510156	Chlorobenzilate	(EPA 189)
118912	Chlorobenzoic acid	(IL,NY)
2136814	Chlorobenzotrichloride	(IL,NY,TX)
1321035	Chlorobenzoyl chloride	(IL,NY,TX)
	Chlorobenzylidene malononitrile(o)	(KY)
74975	Chlorobromomethane	(KY)
75456	Chlorodifluoroethane	(IL,NY,TX)
25497294	Chlorodifluoromethane	(IL,NY,TX)
11097219	Chlorodiphenyl	(KY)
67663	Chloroform	(EPA 189)
107302	Chloromethyl methyl ether	(EPA 189)
25586430	Chloronapthalene	(IL,KY,NY,TX)
88733	Chloronitrobenzene(o)	(IL,NY,TX)
100005	Chloronitrobenzene(p)	(IL,KY,NY,SC,TX)
	Chlorophene	(NC)
25167800	Chlorophenols	(IL,KY,NY,TX)
76062	Chloropicrin	(CA,KY)
126998	Chloroprene	(EPA 189)
2039874	Chlorostyrene(o)	(KY)
779945	Chlorosulfonic acid	(IL,NY,TX)
1897456	Chlorothalonil	(SARA 313)
108418	Chlorotoluene(m)	(IL,NY,TX)
95498	Chlorotoluene(o)	(IL,KY,NY,TX)
106434	Chlorotoluene(p)	(IL,NY,TX)
75729	Chlorotrifluoromethane	(IL,NY,TX)
218019	Chrysene	(KY)
	Cisplatin	(KY)
2971906	Clopidol	(KY)
8001589	Creosote	(SARA 313)
120718	Cresidine(p)	(CA,KY)
1319773	Cresols/Cresylic acid	(EPA 189)
108394	• Cresol(m)	(EPA 189)
95487	• Cresol(o)	(EPA 189)
106445	• Cresol(p)	(EPA 189)
3724650	Crontonic acid	(IL,NY,TX)
4170300	Crotonaldehyde	(IL,KY,NY,TX)
299865	Cruformate	(KY)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
98828	Cumene	(EPA 189)
80159	Cumene hydroperoxide	(CA,IL,NY,TX)
135206	Cupferron	(CA,KY)
107915	Cyanoacetamide	(SC)
372098	Cyanoacetic acid	(IL,NY,TX)
506774	Cyanogen chloride	(IL,NY,TX)
108805	Cyanuric acid	(IL,NY,TX)
108770	Cyanuric chloride	(IL,NY,TX)
66819	Cyclohexamide	(CA)
110827	• Cyclohexane	(CA,IL,KY,NY,TX)
108930	Cyclohexanol	(IL,KY,NY,TX)
108941	• Cyclohexanone	(IL,KY,NY,TX)
110838	Cyclohexene	(IL,KY,NY,TX)
108918	Cyclohexylamine	(IL,KY,NY,TX)
121824	Cyclonite	(KY)
111784	• Cyclooctadiene	(IL,NY,TX)
542927	Cyclopentadiene	(KY)
287923	Cyclopentane	(KY)
50180	Cyclophosphamide	(KY)
1312705	Cyhexatin	(KY)
	Dacarbazine	(KY)
20830813	Daunomycin	(KY)
3547044	DDE	(EPA 189)
17702419	Decaborane	(KY)
1163195	Decabromodiphenyl oxide	(SARA 313)
112301	Decanol	(IL,NY,TX)
8065483	Demeton	(KY)
123422	Diacetone alcohol	(IL,KY,NY,TX)
2303164	Diallate	(SARA 313)
27576041	Diaminebenzoic acid	(IL,NY,TX)
33415	Diazinon	(KY)
334883	Diazomethane	(EPA 189)
132649	Dibenzofurans	(EPA 189)
124732	Dibromotetrafluoroethane	(SARA 313)
107664	Dibutyl phosphate	(KY)
84742	Dibutylphthalate	(EPA 189)
7572294	Dichloroacetylene	(KY)
95761	Dichloroaniline	(IL,NY,TX)
95501	Dichlorobenzene(o)	(CA,IL,NY,TX)
75274	Dichlorobromomethane	(SARA 313)
75718	Dichlorodifluourmethane	(IL,NY,NC,TX)
72559	Dichlorodiphenyldichloroethylene	(CA)
111444	Dichloroethyl ether	(EPA 189)
	Dichlorofluromethane	(KY,NC)
96231	Dichlorohydrin	(IL,NY,TX)
26952238	Dichloropropene	(IL,KY,NY,TX)
76142	Dichlorotetrafluoroethane	(SARA 313)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
62737	Dichlorvos	(EPA 189)
115322	Dicofol	(SARA 313)
141662	Dicrotophos	(KY)
77736	Dicyclopentadiene	(KY)
102595	Dicyclopentadienyl iron	(KY)
101837	Dicycohexylamine	(IL,NY,TX)
60571	Dieldrin	(KY)
	Dienoestrol	(KY)
1464535	Diepoxybutane	(KY)
111422	Diethanolamine	(EPA 189)
96220	Diethyl ketone	(KY)
84662	Diethyl phthalate	(SC)
64675	Diethyl sulfate	(EPA 189)
109897	* Diethylamine	(IL,KY,NY)
100378	Diethylaminoethanol	(KY)
111466	Diethylene glycol	(CA,IL,NY,TX)
56531	Diethylstilbestrol	(KY)
	Difluorobromomethane	(KY)
75376	Difluourethane	(IL,NY)
2238075	Diglycidyl ether	(KY)
	Dihydrosafrole	(KY)
	Dihydroxymethylfuratrizine	(KY)
108838	Diisobutyl ketone	(KY)
25167708	Diisobutylene	(IL,NY,TX)
26761400	Diisodecyl phthalate	(IL,NY,SC,TX)
27554263	Diisooctyl phthalate	(IL,NY,TX)
674828	Diketene	(IL,NY,TX)
127195	Dimethyl acetamide	(KY)
6011,7	Dimethyl aminoazobenzene	(EPA 189)
79447	Dimethyl carbamoyl chloride	(EPA 189)
115106	Dimethyl ether	(IL,KY,NY,TX)
68122	• Dimethyl formamide	(EPA 189)
131113	Dimethyl phthalate	(EPA 189)
77781	Dimethyl sulfate	(EPA 189)
75183	Dimethyl sulfide	(NY,TX)
67685	Dimethyl sulfoxide	(NY,TX)
120616	Dimethyl terephthalate	(IL,NY,TX)
124403	• Dimethylamine	(IL,KY,NY,TX)
121697	Dimethylaniline	(KY,NY,SC,TX)
528290	Dinitrobenzene(o)	(SARA 313)
100254	Dinitrobenzene(p)	(SARA 313)
	Dinitrolimide	(KY)
25321146	Dinitrotoluene	(IL,KY,NY,TX)
117840	Dioctyl phthalate	(SC)
78342	Dioxathion	(KY)
646060	Dioxolane	(IL,KY,NY,TX)
122394	• Diphenyl amine	(IL,KY,NY,TX)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
101844	Diphenyl oxide	(IL,NY,TX)
102089	Diphenyl thiourea	(IL,NY,TX)
	Diphenylhydrazine	(KY)
123193	Dipropyl ketone	(KY)
25265718	Dipropylene glycol	(CA,IL,NY,TX)
85007	Diquat	(KY)
97778	Disulfiram	(KY)
298044	Disulfoton	(KY)
330541	Diuron	(KY)
1321740	Divinyl benzene	(KY)
25378227	Dodecene	(IL,NY,TX)
28657174	Dodecylaniline	(IL,NY,TX)
27193868	Dodecylphenol	(IL,NY,TX)
115297	Endosulfan	(KY)
72208	Endrin	(KY)
106898	Epichlorhydrin	(EPA 189)
12510428	Erionite	(CA)
75081	Ethanethiol	(KY,NC,SC)
64175	Ethanol	(IL,NY,TX)
141435	Ethanolamines	(IL,KY,NY,SC,TX)
57636	Ethinyloestradiol	(KY)
563122	Ethion	(KY)
141786	* Ethyl acetate	(IL,KY,NY,NC,TX)
141979	Ethyl acetoacetate	(IL,NY,TX)
140885	* Ethyl acrylate	(EPA 189)
541855	Ethyl amyl ketone	(KY)
100414	• Ethyl benzene	(EPA 189)
74964	Ethyl bromide	(IL,KY,NY,TX)
51796	• Ethyl carbamate	(EPA 189)
75003	Ethyl chloride	(EPA 189)
105395	Ethyl chloroacetate	(IL,NY,TX)
60297	Ethyl ether	(IL,KY,NY,TX)
109940	Ethyl formate	(KY)
	Ethyl methanesulphonate	(KY)
122510	Ethyl orthoformate	(IL,NY,TX)
95921	Ethyl oxalate	(IL,NY,TX)
78104	Ethyl silicate	(KY)
41892711	Ethyl sodium oxaloacetate	(IL,NY,TX)
75047	• Ethylamine	(IL,KY,NY,TX)
9004573	Ethylcellulose	(IL,NY,TX)
541413	Ethylchloroformate	(SARA 313)
105566	Ethylcyanoacetate	(IL,NY)
74851	Ethylene	(CA,IL,NY,TX)
151564	• Ethylene amine	(EPA 189)
96491	Ethylene carbonate	(IL,NY,TX)
107073	Ethylene chlorohydrin	(IL,KY,NY,TX)
106934	Ethylene dibromide	(EPA 189)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
107062	Ethylene dichloride	(EPA 189)
107211	• Ethylene glycol	(EPA 189)
111557	Ethylene glycol diacetate	(IL,NY,TX)
628996	Ethylene glycol dinitrate	(KY)
75218	• Ethylene oxide	(EPA 189)
96457	* Ethylene thiorea	(EPA 189)
107153	• Ethylenediamine	(IL,KY,NY,NC,TX)
75343	Ethylidene dichloride	(EPA 189)
16219753	Ethylidene norborene	(KY)
100743	Ethylmorpholine(n)	(KY)
2224926	Fenamiphos	(KY)
115902	Fensulfothion	(KY)
55389	Fenthion	(KY)
14484641	Ferbam	(KY)
2164172	Fluometuron	(SARA 313)
944229	Fonofos	(KY)
50000	• Formaldehyde	(EPA 189)
75127	Formamide	(IL,KY,NY,SC,TX)
64186	Formic acid	(IL,KY,NY,SC,TX)
110178	Fumaric acid	(IL,NY,TX)
98011	Furfural	(IL,KY,NY,SC,TX)
98000	Furfuryl alcohol	(KY,SC)
778652	Germanium tetrahydride	(KY)
111308	Glutaraldehyde	(CA,KY)
56815	Glycerol	(IL,NY,TX)
26545737	Glycerol dichlorohydrin	(IL,NY,TX)
25791962	Glycerol triether	(IL,NY,TX)
7654344	Glycidaldehyde	(KY,SC)
556525	Glycidol	(KY)
56406	Glycine	(IL,NY,TX)
107222	Glyoxal	(IL,NY,TX)
126078	Griseofulvin	(CA)
7440586	Hafnium	(KY)
76448	Heptachlor	(EPA 189)
142825	Heptane	(NIOSH)
118741	Hexachlorobenzene	(EPA 189)
87683	Hexachlorobutadiene	(EPA 189)
608731	Hexachlorocyclohexane	(KY,SC)
77474	Hexachlorocyclopentadiene	(EPA 189)
67721	Hexachloroethane	(EPA 189)
1335871	Hexachloronapthalene	(KY,SC)
36653824	Hexadecyl alcohol	(IL,NY,TX)
648162	Hexafluoroacetone	(KY)
629118	Hexamethylene glycol	(IL,NY,TX)
124094	Hexamethylenediamine	(IL,NY,TX)
100970	• Hexamethylenetetramine	(IL,NY,TX)
822060	Hexamethylene–1,6–diisocyanate	(EPA 189)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
680319	Hexamethylphosphoramide	(EPA 189)
110543	* Hexane	(EPA 189)
108849	Hexyl acetate(sec)	(KY)
107415	Hexylene glycol	(KY)
302012	Hydrazine	(EPA 189)
10034932	Hydrazine sulfate	(KY)
7647010	Hydrochloric acid	(EPA 189)
10035106	Hydrogen bromide	(KY)
7664393	Hydrogen fluoride	(EPA 189)
7722841	Hydrogen peroxide	(KY)
7783064	* Hydrogen sulfide	(EPA 189)
61788327	Hydrogenated terphenyls	(KY)
123319	* Hydroquinone	(EPA 189)
99967	Hydroxybenzoic acid(p)	(IL,NY,TX)
95136	Indene	(KY)
7553562	Iodine	(KY)
75478	Iodoform	(KY)
123922	Isoamyl acetate	(KY)
123513	Isoamyl alchol	(KY)
26760645	Isoamylene	(IL,NY,TX)
78831	Isobutanol	(IL,KY,NY,TX)
110190	Isobutyl acetate	(IL,KY,NY,TX)
115117	Isobutylene	(IL,NY,TX)
78842	Isobutyraldehyde	(IL,NY,TX)
79312	Isobutyric acid	(IL,NY,TX)
25339177	Isodecanol	(IL,NY,TX)
26952216	Isooctyl alcohol	(IL,KY,NY,TX)
78784	Isopentane	(IL,NY,TX)
78591	Isophorene	(EPA 189)
4098719	Isophorone diisocyanate	(KY)
78795	Isophrene	(IL,NY,TX)
121915	Isophthalic acid	(IL,NY,TX)
109591	Isopropoxyethanol	(KY)
108214	Isopropyl acetate	(IL,KY,NY,TX)
67630	• Isopropyl alcohol	(CA,IL,NY,TX)
75296	Isopropyl chloride	(IL,NY,TX)
4016142	Isopropyl glycidyl ether	(KY)
75310	Isopropylamine	(IL,KY,NY,SC,TX)
768525	Isopropylaniline(n)	(KY)
25168063	Isopropylphenol	(IL,NY,TX)
120581	Isosafrole	(KY)
108203	Ispropyl ether	(KY)
143500	Kepone	(KY,SC)
463514	Ketene	(IL,KY,NY,SC,TX)
	Lasiocarpine	(KY)
58899	Lindane (all isomers)	(EPA 189)
7580678	Lithium hydride	(KY)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
121755	Malathion	(KY,SC)
110167	Maleic acid	(IL,NY,TX)
108316	Maleic anhydride	(EPA 189)
6915157	Malic acid	(IL,NY,TX)
55867	Mechlorethamine hydrochloride	(KY)
	Mechlorethamine hydrochloride oxide	(KY)
148823	Melphalan	(KY)
141797	Mesityl oxide	(IL,KY,NY,TX)
	Mestranol	(KY)
121471	Metanilic acid	(IL,NY,TX)
79414	Methacrylic acid	(IL,KY,NY,TX)
563473	Methallyl chloride	(IL,NY,TX)
67561	Methanol	(EPA 189)
	Methomyl	(KY)
72435	Methoxychlor	(EPA 189)
137053	Methyl 2-cyanocrylate	(KY)
79209	Methyl acetate	(IL,KY,NY,TX)
105453	Methyl acetoacetate	(IL,NY,TX)
74997	Methyl acetylene	(KY)
96333	Methyl acrylate	(KY)
74839	Methyl bromide	(EPA 189)
37365712	Methyl butynol	(IL,NY,TX)
74873	Methyl chloride	(EPA 189)
108872	Methyl cyclohexane	(IL,KY,NY,TX)
1331222	Methyl cyclohexanone	(IL,NY,TX)
8022002	Methyl demeton	(KY)
78933	• Methyl ethyl ketone	(EPA 189)
1338234	Methyl ethyl ketone peroxide	(KY)
107313	Methyl formate	(IL,KY,NY,TX)
60344	Methyl hydrazine	(EPA 189)
74884	Methyl iodide	(EPA 189)
108101	• Methyl iosbutyl ketone	(EPA 189)
110123	Methyl isoamyl ketone	(KY)
108112	Methyl isobutyl carbinol	(IL,KY,NY,TX)
624839	Methyl isocyanate	(EPA 189)
74931	• Methyl mercaptan	(NC,SC)
80626	Methyl methacrylate	(EPA 189)
110430	Methyl n-amyl ketone	(KY)
298000	Methyl parathion	(KY)
107879	Methyl propyl ketone	(KY)
681845	Methyl silicate	(KY)
1634044	Methyl tert butyl ether	(EPA 189)
	Methylacrylonitrile	(KY)
109875	Methylal	(KY)
74895	Methylamine	(IL,KY,NY,SC,TX)
100618	Methylaniline(n)	(IL,KY,NY,TX)
	Methylazoxymethanol	(KY)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
25639423	Methylcyclohexanol	(KY)
583608	Methylcyclohexanone(o)	(KY)
74953	Methylene bromide	(SARA 313)
75092	Methylene chloride	(EPA 189)
101688	Methylene diphenyl diisocyanate	(EPA 189)
77758	Methylpentynol	(IL,NY,TX)
98839	• Methylstyrene(a)	(IL,KY,NY,TX)
	Methylthiouricil	(KY)
21087649	Metribuzin	(KY)
443481	Metronidazole	(CA,KY)
7786347	Mevinphos	(KY)
2385855	Mirex	(KY,SC)
1313275	Molybdenum trioxide	(CA)
	Monocrotaline	(KY)
	Monocrotophos	(KY)
110918	* Morpholine	(IL,KY,NY,TX)
99650	m-Dinitrobenzene	(KY,SC)
	m-Xylene-a,a-diamine	(KY)
121697	N,N-Diethyl aniline	(EPA 189)
	Nafenopin	(KY)
300765	Naled	(KY)
91203	• Napthalene	(EPA 189)
85472	Napthalene sulfonic acid(a)	(IL,NY,TX)
120183	Napthalene sulfonic acid(b)	(IL,NY,TX)
90153	* Napthol(a)	(IL,TX)
135193	* Napthol(b)	(IL,NY,TX)
134327	• Napthylamine(a)	(SC)
91598	* Napthylamine(b)	(KY,SC)
86884	• Napthylthiorea(a)	(ACGIH)
75989	Neopentanoic acid	(IL,NY,TX)
61574	Nirodazole	(CA,KY)
1928824	Nitrapyrin	(KY)
7697372	Nitric acid	(CA,KY,NC,SC)
	Nitriloacetic acid	(KY)
139139	Nitrilotriacetic acid	(CA,KY)
88744	Nitroaniline(o)	(IL,NY,TX)
100016	Nitroaniline(p)	(IL,KY,NY,TX)
91236	Nitroanisole(o)	(IL,NY,TX)
100174	Nitroanisole(p)	(IL,NY,TX)
98953	Nitrobenzene	(EPA 189)
27178832	Nitrobenzoic acid (o,m, & p)	(IL,NY,TX)
79243	Nitroethane	(IL,KY,NY,TX)
1836755	Nitrofen	(SARA 313)
51752	Nitrogen mustard	(SC)
7783542	Nitrogen trifluoride	(KY)
55630	Nitroglycerin	(KY,SC)
75525	Nitromethane	(IL,KY,NY,TX)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
25322014	Nitropropane	(IL,NY,TX)
156105	Nitrosodiphenylamine(p)	(KY)
104916	Nitrosophenol(p)	(SC)
1321126	Nitrotoluene	(IL,KY,NY,SC,TX)
111842	* Nonane	(ACGIH)
11842	* Nonane	(KY)
27215958	Nonene	(IL,NY,TX)
25154523	Nonylphenol	(IL,NY,TX)
	Norethisterone	(KY)
	N-Methyl-N-nitro-n-nitrosoguanidine	(KY)
55185	* N-Nitrosodiethylamine	(KY)
62759	* N-Nitrosodimethylamine	(EPA 189)
86306	* N-Nitrosodiphenylamine	(SARA 313)
	N-Nitrosomethylethylamine	(KY)
4549400	N-Nitrosomethylvinylamine	(KY)
59892	N-Nitrosomorpholine	(EPA 189)
16543558	N-Nitrosonornicotine	(KY)
100754	N-Nitrosopiperidine	(CA,KY)
930552	N-Nitrosopyrollidine	(CA,KY)
	N-Nitrososarcosine	(KY)
924163	N-Nitroso-n-butylamine	(KY)
759739	N-Nitroso-n-ethylurea	(KY)
684935	N-Nitroso-N-methylurea	(EPA 189)
	N-Nitroso-n-methylurethane	(KY)
621647	N-Nitroso-n-propylamine	(KY)
135886	N-Phenyl-2-napthylamine	(KY)
2234131	Octachloronapthalene	(KY,SC)
57114	Octadecanoic acid(n)	(SC)
111659	* Octane	(ACGIH)
27193288	Octylphenol	(IL,NY,TX)
	Oestradiol-17 beta	(KY)
	Oestrone	(KY)
20816120	Osmium tetroxide	(KY)
144627	Oxalic acid	(KY,SC)
	Oxymetholone	(KY)
	Paraffin wax fume	(KY)
123637	Paraldehyde	(IL,NY,TX)
1910425	Paraquat	(KY,SC)
56382	Parathion	(EPA 189)
19624227	Pentaborane	(KY)
1321648	Pentachloronapthalene	(KY)
82688	Pentachloronitrobenzene	(EPA 189)
87865	Pentachlorophenol	(EPA 189)
115775	Pentaerythritol	(IL,NY,TX)
109660	* Pentane(n)	(IL,NY,TX)
79210	Peracetic acid	(CA)
	Perchloro fluoride	(KY)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
594423	Perchloromethyl mercaptan	(IL,KY,NY,TX)
	Phenazopyridine	(KY)
	Phenazopyridine hydrochloride	(KY)
	Phencatin	(KY)
94702	Phenetidine(o)	(IL,NY,TX)
156434	Phenetidine(p)	(IL,NY,TX)
50066	Phenobarbital	(CA)
108952	* Phenol	(EPA 189)
98679	Phenolsulfonic acids	(IL,NY,TX)
92842	Phenothiazine	(KY)
91407	Phenyl anthanilic acid	(IL,NY,TX)
101840	Phenyl ether	(KY)
122601	Phenyl glycidyl ether	(KY)
108985	Phenyl mercaptan	(KY)
106503	* Phenylenediamine(p)	(EPA 189)
100630	Phenylhydrazine	(KY,SC)
	Phenylphosphine	(KY)
	Phenytoin	(KY)
298022	Phorate	(KY)
75445	* Phosgene	(EPA 189)
7803512	Phosphine	(EPA 189)
7664382	Phosphoric acid	(SC)
7723140	Phosphorous	(EPA 189)
85416	Phthalamide	(IL,NY,TX)
85449	* Phthalic anhydride	(EPA 189)
	Picloram	(KY)
108996	Picoline(b)	(IL,NY,TX)
88891	Picric acid	(KY,SC)
83261	Pindone	(KY)
110850	Piperazine	(IL,NY,TX)
142643	Piperazine dihydrochloride	(KY)
	Polybrominated biphenyls (PBB's)	(KY)
9003296	Polybutylenes	(NY,TX)
1336363	Polychloinated byphenyls	(EPA 189)
9002884	Polyethylene	(IL,NY)
25322683	Polyethylene glycol	(IL,NY,TX)
9003070	Polypropylene	(NY)
25322694	Polypropylene glycol	(IL,NY,TX)
9009536	* Polystyrene	(IL,NY)
1310583	Potassium hydroxide	(KY)
	Procarbazine hydrochloride	(KY)
57830	Progesterone	(CA,KY)
107197	Propargyl alcohol	(KY)
57578	Propioactone(b)	(EPA 189)
123386	Propionaldehyde	(EPA 189)
79094	Propionoic acid	(IL,KY,TX)
114261	Propoxur	(EPA 189)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
109604	Propyl acetate(n)	(KY)
71238	Propyl alcohol(n)	(IL,NY,TX)
540545	Propyl chloride	(IL,KY,TX)
627134	Propyl nitrate(n)	(KY)
107108	Propylamine	(IL,KY,TX)
115071	Propylene	(CA,IL,NY,TX)
127004	Propylene chlorohydrin	(IL,KY,TX)
78875	Propylene dichloride	(EPA 189)
108656	Propylene glycol	(CA,NY,TX)
6423434	Propylene glycol dinitrate	(KY)
75569	Propylene oxide	(EPA 189)
51525	Propylthiouricil	(KY)
121211	Pyrethrin I	(SC)
121299	Pyrethrin II	(SC)
8003347	Pyrethrum	(KY,SC)
110861	• Pyridine	(CA,IL,KY,NY,TX)
95692	p-Chloro-o-toluidine	(CA)
91225	Quinoline	(EPA 189)
106514	• Quinone	(EPA 189)
50555	Reserpine	(KY)
108463	• Resorcinol	(IL,NY,TX)
27138574	Resorcylic acid	(IL,NY,TX)
299843	Ronnel	(KY)
83794	Rotenone	(KY,SC)
81072	Saccharin	(KY)
94597	Safrole	(KY)
69727	• Salicyclic acid	(IL,NY,TX)
136787	Sesone	(KY)
7803625	Silicon tetrahydride	(KY)
127093	Sodium acetate	(IL,NY)
7778430	Sodium arsenate	(KY)
7784465	Sodium arsenite	(KY)
26628228	Sodium azide	(KY)
532321	Sodium benzoate	(IL,NY,TX)
7681381	Sodium bisulfite	(KY)
9004324	Sodium carboxymethyl cellulose	(IL,NY,TX)
3926623	Sodium chloroacetate	(IL,NY,TX)
10588019	Sodium dichromate	(KY)
62748	Sodium fluoroacetate	(KY)
141537	Sodium formate	(IL,NY,TX)
1310732	Sodium hydroxide	(CA,KY,SC)
7681574	Sodium metabisulfite	(KY)
139026	Sodium phenate	(IL,NY,TX)
128449	Sodium saccharin	(KY)
110441	Sorbic acid	(IL,NY,TX)
52017	Spironolacetone	(KY)
	Sterigmatocystin	(KY)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
	Streptozotocin	(KY)
7789062	Strontium chromate	(KY)
57249	Strychnine	(KY)
100425	Styrene	(EPA 189)
96093	Styrene oxide	(EPA 189)
110156	Succinic acid	(IL,NY,TX)
110612	Succinitrile	(IL,NY,TX)
	Sulfallate	(KY)
121573	Sulfanic acid	(IL,NY,TX)
126330	Sulfolane	(IL,NY,TX)
3689245	Sulfotep	(KY)
10025679	Sulfur monochloride	(KY)
5714227	Sulfur pentachloride	(KY)
	Sulfur tetrachloride	(KY)
7664939	Sulfuric acid	(CA,KY,NC,SC)
2699798	Sulfuryl fluoride	(KY)
35400432	Sulprofos	(KY)
1401554	Tannic acid	(IL,NY,TX)
7440257	Tantalum	(KY)
3383968	Temephos	(KY)
100210	Terephthalic acid	(CA,IL,NY,TX)
92944	Terphenyls	(KY)
58220	Testosterone	(KY)
79345	Tetrachloroethanes	(NY,TX)
127184	Tetrachloroethylene	(EPA 189)
1335886	Tetrachloronapthalene	(KY)
117088	Tetrachlorophthalic anhydride	(IL,NY,TX)
961115	Tetrachlorvinphos	(SARA 313)
78002	Tetraethyl lead	(IL,KY,NY,TX)
109999	Tetrahydrofuran	(KY)
119642	Tetrahydronapthalene	(IL,NY,TX)
85438	Tetrahydrophthalic anhydride	(IL,NY,TX)
75741	Tetramethyl lead	(IL,NY,TX)
3333526	Tetramethyl succinonitrile	(KY)
90948	Tetramethyldiaminobenzophenone	(KY)
110601	Tetramethylenediamine	(IL,NY,TX)
110189	Tetramethylethylenediamine	(IL,NY,TX)
509148	Tetranitromethane	(KY)
7722885	Tetrasodium pyrophosphate	(KY)
479458	Tetryl	(KY)
62555	Thioacetamide	(CA,KY)
68111	Thioglycolic acid	(KY)
62566	Thiourea	(CA,KY)
137268	Thiram	(KY)
1314201	Thorium dioxide	(KY)
13463677	Titanium dioxide	(KY)
7550450	Titanium tetrachloride	(EPA 189)

RUBBER MANUFACTURERS ASSOCIATION (RMA)
EMISSION FACTOR DEVELOPMENT PROGRAM
COMBINED EPA 189, SARA 313, & STATE HAP LISTS

CAS NUMBER	CHEMICAL NAME	SOURCE
108883	• Toluene	(EPA 189)
1333079	Toluene sulfonamide	(IL,NY,TX)
98599	Toluene sulfonyl chloride	(IL,NY,TX)
104154	Toluenesulfonic acids	(IL,NY,TX)
636215	Toluidine hydrochloride(o)	(KY)
26915128	• Toluidines	(IL,KY,NY,SC,TX)
95534	• Toluidine(o)	(EPA 189)
8001352	Toxaphene	(EPA 189)
	Treosulphan	(KY)
68768	Triaziquone	(SARA 313)
126738	Tributyl phosphate	(KY)
52686	Trichlorfon	(SARA 313)
76039	Trichloroacetic acid	(KY)
87616	Trichlorobenzenes	(IL,NY,TX)
79016	Trichloroethylene	(EPA 189)
75694	Trichlorofluoromethane	(IL,NY,NC,TX)
121448	Triethylamine	(EPA 189)
112276	Triethylene glycol	(IL,NY,TX)
1582098	Trifluralin	(EPA 189)
7756947	Triisobutylene	(IL,NY,TX)
552307	Trimellitic anhydride	(KY)
25551137	• Trimethyl benzene	(KY)
121459	Trimethyl phosphite	(KY)
75503	Trimethylamine	(IL,KY,NY,TX)
	Triorthocresyl phosphate	(KY)
126727	Tris (2,3–dibromopropyl) phosphate	(KY)
	Tris (2,3–dibromopropyl) phosphite	(KY)
	Tris(1–aziridinyl)phosphine sulfide	(KY)
	Tris(aziridinyl)–p–benzoquinone	(KY)
	Uracil mustard	(KY)
57136	Urea	(IL,NY,TX)
110623	Valeraldehyde	(KY)
108054	Vinyl acetate	(EPA 189)
593602	Vinyl bromide	(EPA 189)
75014	Vinyl chloride	(EPA 189)
106876	Vinyl cyclohexene dioxide	(KY)
75025	Vinyl fluoride	(SC)
25013154	Vinyl toluene	(IL,KY,NY,TX)
75354	Vinylidene chloride	(EPA 189)
81812	Warfarin	(KY)
108383	• Xylene(m)	(EPA 189)
95476	• Xylene(o)	(EPA 189)
106423	* Xylene(p)	(EPA 189)
1300716	Xylenol	(NY,TX)
1300738	Xylidene	(NY,SC,TX)
76153	(Mono)chloropenatfluoroethane	(SARA 313)

• Theoretically emitted during rubber manufacturing.

APPENDIX B

COMPOSITION OF GENERIC RUBBER MIXES

INDEX OF RUBBER COMPOUNDS

[a] compounds 24, 25, 26 were mixes of polymer only, with no fillers or cure system

RUBBER COMPOUND RECIPES

Compound #1: Tire Inner Liner (BrIIR/NR)

Recipe:

Brominated IIR X−2	85.00
SMR 20 Natural Rubber	15.00
GPF Black	60.00
Stearic Acid	1.00
Paraffinic Medium Process Oil	15.00
Unreactive Phenol formaldehyde type resin (Arofene 8318, SP1068)	5.00
Zinc Oxide	3.00
Sulfur	.50
MBTS	1.50
	186.00

Number of Passes/Temperature:
1 (NP Temperature: 320°F; Chlorobutyl or 290°F Bromobutyl
2 (P) Temperature: 220°F

Compound #2: Tire Ply Coat (Natural Rubber/Synthetic Rubber)

Recipe:
50472 Natural Rubber

SMR−GP Natural Rubber	70.00
Duradene 707	30.00
N330	36.50
Sundex 790	20.00
Flectol H	1.50
Santoflex IP	2.30
Sunproof Super Wax	1.20
Zinc Oxide	5.00
Stearic Acid	1.00
Sulfur	2.30
CBS	.80
	170.60

Number of Passes/Temperature:
1 (NP) Temperature: 330°F
2 (P) Temperature: 220°F

Compound #3: Tire Belt Coat (Natural Rubber)

Recipe:

#1RSS Natural Rubber	100.00
HAF Black (N330)	55.00
Aromatic Oil	5.00
N−(1,3 dimethylbutyl) −N−phenyl−P−phenylene diamine (Santoflex 13)	1.00
Zinc Oxide	10.00
Stearic Acid	2.00
n−tertiary −butyl−2−benzothiazole disulfide (Vanax NS)	.80
Sulfur	4.00
Cobalt Neodecanate (20.5% cobalt)	2.50
	180.30

Number of Passes/Temperatures:
1 (NP) Temperature: 330°F; add 1/2 black, add 1/2 oil
2 (NP) Temperature: 330°F; add remainder of black and oil
3 (remill) Temperature 300°F
4 (P) Temperature: 220°F

RUBBER COMPOUND RECIPES

Compound #4: Tire Base/Sidewall (Natural Rubber/Polybutadiene Rubber)

Non–Productive Recipe:

NR–SMR–5 CV	50.00
Taktene 1220	50.00
N330 Carbon Black	50.00
Zinc Oxide	1.50
Stearic Acid	2.00
Agerite Resin D	2.00
Vulkanox 4020	3.00
Vanwax H Special	3.00
Flexon 580 Oil	10.00
	171.50

Productive Recipe:

Non Productive	171.50
Zinc Oxide	1.50
Rubber Maker Sulfur	1.75
DPG	0.10
CBS	0.60
	175.45

Number of Passes/Temperatures:
1 (NP) Temperature: 330°F
2 (P) Temperature: 220°F

Compound #5: Tire Apex (Natural Rubber)

Recipe:

TSR 20 Natural Rubber	100.00
HAF Black (N330)	80.00
Aromatic Oil	8.00
Stearic Acid	1.00
Resorcinol	3.00
Hexamethylenetetramine	3.00
Zinc Oxide	3.00
N–tertiary –butyl–2–benzothiazole disulfide (Vanax NS)	1.50
n–cyclohexylthiopthalimide (Santogard PVI)	.30
Sulfur	3.00
	202.80

1 (NP) Temperature: 330°F; add 60 parts black, add 6 parts oil
2 (NP) Temperature: 330°F; add Resorcinol, add 20 parts black, add 2 parts oil
3 (P) Temperature 200°F; add Hexam.

RUBBER COMPOUND RECIPES

Compound #6: Tire Tread (Styrene Butadiene Rubber/Polybutadiene Rubber)

Non-Productive Recipe #1:

SBR 1712C	110.00
N299 Carbon Black	60.00
Taktene 1220	20.00
Zinc Oxide	1.50
Stearic Acid	3.00
Vulkanox 4020	2.00
Wingstay 100	2.00
Vanox H Special	2.50
Sundex 8125 Oil	20.00
	221.00

Non-Productive Recipe #2:

Non-Productive #1:	221.00
N299 Carbon Black	20.00
Sundex 8125 Oil	5.00
	246.00

Productive Recipe:

Non Productive #2	246.00
Zinc Oxide	1.50
Rubber Maker Sulfur	1.60
TMTD	0.20
CBS	3.00
	252.30

Number of Passes/Temperatures:
1 (NP) Temperature: 330°F; add 60 parts black, add 20 parts oil
2 (NP) Temperature: 330°F; add 20 parts black; add 5 parts oil
3 (P) Temperature: 220°F

Compound #7: Tire Bladder

Recipe:

BUTYL 268	100.00
N330	55.00
Castor Oil	5.00
SP 1045 Resin	10.00
Zinc Oxide	5.00
Neoprene W	5.00
	180.00

Number of Passes/Temperatures:
NP 1 All Butyl, Castor Oil, Zinc Oxide, 45 phr N330, discharge approx 330°F/340°F
+Resin, 10 phr N330, discharge approx 270/280°F DO NOT EXCEED 290°F
PROD NP2 = neoprene, discharge approx 250F/260°F

RUBBER COMPOUND RECIPES

Compound #8: EPDM 1 (EPDM Sulfur Cure)

Non-Productive Recipe:

Vistalon 7000	50.00
Vistalon 3777	87.50
N650 GPF-HS Black	115.00
N762 SRF-LM Black	115.00
Process Oil Type 104B (Sunpar 2280)	100.00
Zinc Oxide	5.00
Stearic Acid	1.00
	473.50

Productive Recipe:

Non-Productive	473.50
Sulfur	0.50
TMTDS	3.00
ZDBDC	3.00
ZDMDC	3.00
DTDM	2.00
	485.00

Number of Passes/Temperatures
1 (NP) Temperature: 340°F; upside down mix, rubber then black and oil
2 (P) Temperature: 220°F

Compound #9: EPDM 2 (Peroxide Cure)

Non-Productive Recipe:

Royalene 502	100.00
N 762 Carbon Black	200.00
Sunpar 2280 Oil	85.00
Zinc Oxide	5.00
Stearic Acid	1.00
	391.00

Productive:

Non-Productive	391.00
DICUP 40C	6.00
SARET 500 (on carrier/2 parts active)	2.56
	399.56

NP Temperature: 330°F
P Temperature: 240°F

Compound #10: EPDM 3 (Non-black EPDM Sulfur Cure)

Recipe:

Vistalon 5600	50.00
Vistalon 3777	87.50
Hard Clay (Suprex)	180.00
Mistron Vapor Talc	100.00
Atomite Whiting	40.00
Process Oil Type 104B (Sunpar 2280)	60.00
Silane (A-1100)	1.50
Paraffin Wax	5.00
Zinc Oxide	5.00
Stearic Acid	1.00
Sulfur	1.50
Cupsac	0.50
TMTD	3.00
	535.00

Number of Passes/Temperatures:
1 (NP) Temperature: 330°F
2 (P) Temperature: 220°F, add Sulfur, Cupsac, and TMTDS

RUBBER COMPOUND RECIPES

Compound #11: CRW (Polychloroprene W Type)

Recipe:

Non Productive:	
Neoprene WRT	100.00
N 550	13.20
N 762	15.70
Agerite Staylite S	2.00
Sunproof Super Wax	2.00
Santoflex IP	1.00
Magnesium Oxide	4.00
Stearic Acid	0.50
PlastHall Doz	15.00
	153.40

Productive Recipe:

Non–Productive	153.40
Zinc Oxide	5.00
TMTD	0.50
Dispersed Ethylene Thiourea	1.00
	159.90

Number of Passes/Temperatures:
1 pass at 240°F; add accelerator package at 200°F

Compound #12: CRG (Polychloroprene G Type)

Non Productive Recipe:

Neoprene GN	100.00
SRF	50.00
Sundex 790	10.00
Octamine	2.00
Stearic Acid	1.00
Maglite D	4.00
	167.00

Productive Recipe:

Non–Productive	167.00
TMTM	0.50
Sulfur	1.00
DOTG	0.50
Zinc Oxide	5.00
	174.00

Number of Passes/Temperatures:
1 (NP) Temperatures: 240°F; add zinc oxide and cureatives late at 200°F
2 (P) Temperature: 200°F

RUBBER COMPOUND RECIPES

Compound #13: Paracryl OZO (NBR/PVC)

Recipe:

PARACRIL OZO	100.00
Zinc Oxide	5.00
OCTAMINE	2.00
Hard Clay	80.00
FEF (N–550) Black	20.00
Stearic Acid	1.00
MBTS	2.50
TUEX	1.50
ETHYL TUEX	1.50
DOP	15.00
KP–140	15.00
Spider Sulfur	0.20
	243.70

Number of Passes:
(NP) Temperature: 330°F
(P) Temperature: 220°F; add MBTS, TUEX, ETHYL TUEX, Spider Sulfur

Compound #14: Paracryl BLT (NBR)

Recipe:

PARACRIL BLT	100.00
Zinc Oxide	5.00
SRF (N–774) Black	100.00
TP–95	15.00
Paraplex G–25	5.00
AMINOX	1.50
Stearic Acid	1.00
ESEN	0.50
MONEX	1.50
Sulfur	0.75
	230.25

Number of Passes/Temperatures:
(NP) Temperature: 280°F
(P) Temperature: 220°F; add sulfur, MONEX, and possibly ESEN

Compound #15: Hypalon (CSM)

Recipe:

Hypalon 40	100.00
CLS 4 PBD	3.00
Carbo wax 4000	3.00
PE 617A	3.00
Mag Lite D	5.00
PE 200	3.00
Whiting (Atomite)	100.00
N650	100.00
TOTM Oil	70.00
MBTS	1.00
Tetrone A	1.50
NBC	0.50
HVA–2	0.50
	390.50

Uses of Formulas/Temperatures:
Number of Passes:
1 (P) Temperature: 280°F

RUBBER COMPOUND RECIPES

Compound #16: Fluoroelastomer (FKM)

Recipe:

Viton E60C	100.00
N990 Black	20.00
Calcium Hydroxide	6.00
Maglite D	3.00
	129.00

Compound #17: AEM (Vamac)

Recipe:

VAMAC*B–124 Masterbatch	124.00
ARMEEN 18D	.50
Stearic Acid	.20
SRF Carbon Black (N–774)	10.00
DIAK #1	4.00
DPG	4.00
	142.70

Compound #18: Hydrogenated Nitrile (HNBR)

Non–Productive Recipe:

HNBR Zetpol 2020	100.00
N650 Black	45.00
Flexone 7P	1.00
Agerite Resin D	1.00
ZMTI	1.00
Kadox 911 C	5.00
Stearic Acid	1.00
Trioctyl trimellitate (TOTM)	7.00
	161.00

Productive Recipe:

Sulfur	0.50
MBTS	1.50
TMTD	1.50
MTD Monex	.50
	165.00

Number of Passes/Temperatures:
1 (NP) Temperature: 275°F
2 (P) Temperature: 210°F

Compound #19: Silicone (VMQ)

Recipe:

Silicone Rubber	70.00
Silastic NPC–80 silicone rubber	30.00
5 Micron Min–U–Sil	68.00
Silastic HT–1 modifier	0.80
Vulcanizing agent: Varox DBPH 50	1.00
	169.80

RUBBER COMPOUND RECIPES

Compound #20: Acrylate Rubber (ACM)

Non–Productive Recipe:

Hytemp AR71	100.00
Stearic Acid	1.00
N 550	65.00
	166.00

Productive Recipe:

Non–Productive	166.00
Sodium Stearate	2.25
Potassium Stearate	0.75
Sulfur	0.30
	169.30

Number of Passes/Temperatures:
1 (NP) Temperature: 260°F
2 (P) Temperature: 220°F

Compound #21: Chlorinated Polyethylene (CPE)

Recipe:

CM 0136	100.00
Maglite D	10.00
N 774 Black	30.00
Sterling VH	35.00
DER 331 DLC	7.00
Agerite Resin D	0.20
TOTM Oil	35.00
Triallyl Isocyanurate Cure 5223 (provided by Gates)	2.90
Trigonox 17/40	10.00
	230.10

Number of Passes/Temperatures:
Single pass mixed to 240°F; add Triallyisocyanurate, Triganox 17/40 at 200°F.

Compound #22: Emulsion SBR (SBR 1502)

Non–Productive Recipe:

SBR 1502	100.00
N330 Carbon Black	58.50
Zinc Oxide	10.00
Stearic Acid	2.00
Agerite Resin D (Naugard Q)	2.00
Flexone 7P	1.00
Sunproof Super Wax	1.50
Sundex 790 Oil	7.00
	182.00

Productive Recipe:

Non–Productive	182.00
Rubber Makers Sulfur	2.00
TBBS	1.80
	185.80

Number of Passes/Temperatures:
Non–productive pass mixed to 330°F,
Second pass mixed to 220°F.

RUBBER COMPOUND RECIPES

Compound #23: Epichlorohydrin (ECO)

Recipe:

Hydrin 2000	100.00
N330 Carbon Black	50.00
Stearic Acid	1.00
Vulkanox MB-2/MG/C	1.00
Calcium Carbonate	5.00
Zisnet F-PT	1.00
Diphenylguanadine	0.50
Santogard PVI	0.50
	159.00

Number of Passes/Temperatures:
1 Pass at 240°F

Compound #24: Oil-Extended SBR (SBR 1712)*

SBR 1712	137.50
	137.50

Compound #25: Emulsion SBR (SBR 1500)*

SBR 1500	100.00
	100.00

Compound #26: Solution SBR (Duradene 707)*

Duradene 707	100.00
	100.00

* – Compounds 24, 25, and 26 were mixes of polymer only, with no fillers or cure system.

APPENDIX C

FIELD SAMPLING DATA SHEETS

FIELD PROGRAM LOG

Project No. _____
Client _____
Plant _____
Team Leader _____

Date	Time	Description of Events

Traverse Point Location for Circular and Rectangular Ducts

Project No.: _____

Client: _____

Date: _____

Sampling Location: _____

Internal Stack Diameter: _____

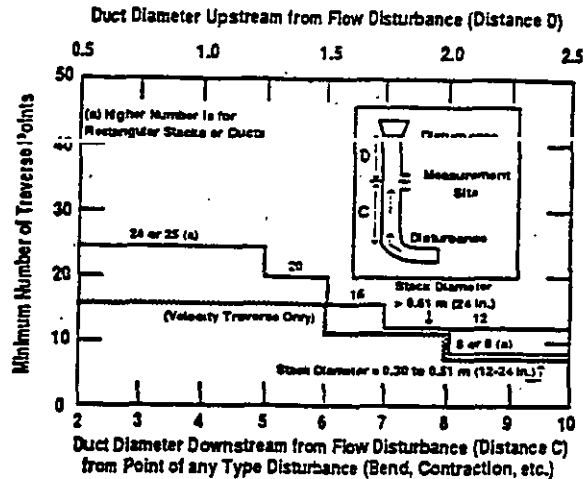
Nipple Length: _____

Total Stack Diameter: _____

Nearest Upstream Disturbance (C): _____

Nearest Downstream Disturbance (D): _____

Calculator: _____



Rectangular Duct Equivalent Diameter Determination = $\frac{2 \times L \times W}{L + W}$

Traverse Point Number	1 Fraction of Stack ID ($\frac{1}{100}$)	2 Stack ID	3 Traverse Point (1 = 2=Point)	4 Nipple Length	5 Traverse Point Inside of Far Wall to Outside of Port Nipple (3 + 4 = Point)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

Location of Traverse Points in Circular Stacks

	4	6	8	10	12	14	16	18	20	22	24
1	5.7	4.4	3.2	2.6	2.1	1.3	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6		95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10				97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11					93.3	85.4	78.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75.0	68.5	60.2
14						98.2	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77.0
17								95.6	90.3	85.4	80.5
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											98.9

Location of Traverse Points in Rectangular Stacks

	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	86.4	79.2
11										95.5	87.5
12											95.8

Moisture Determination
Wet Bulb-Dry Bulb Temperature Techniques

Project No.: _____ Date: _____

Client: _____ Source: _____

Plant: _____ Sample Location: _____

Calculated by: _____ Checked by: _____

Barometric Pressure PB = [ ] in Hg t_{dry} = [ ] °F

PST $\frac{}{13.6}$ in H_2O = [ ] in Hg t_{wet} = [ ] °F

PS = PB ± PST = [ ] in Hg

S.V.P. = water saturation vapor press at t_{wet} = [ ] in Hg

$$V.P. = S.V.P. - \left[0.000367\ (PS)\ (t_d - t_w) \left(1 + \frac{tw - 32}{1571}\right) \right]$$

$$V.P. = (\quad) - \left[0.000367\ (\quad)\ (\quad - \quad)\ 1 + \left(\frac{(\quad) - 32}{1571}\right) \right]$$

$$(\quad) - \left[0.000367\ (\quad)\ (\quad)\ (\quad) \right]$$

V.P. = [ ]

$$\%M = \frac{V.P.}{PS} \times 100 = \_\_\_\_\_ \times 100 = [\ ]$$

$$Md = 1 - \frac{\%M}{100} = 1 - \frac{}{100} = [\ 0.\ ]$$

AF-250

SATURATION TABLE

Stack Temp (F)	% H2O	Stack Temp (F)	% H2O	Stack Temp (F)	% H2O	Stack Temp (F)	% H2O
32	0.60	78	3.23	124	12.86	170	40.78
33	0.63	79	3.34	125	13.22	171	41.72
34	0.65	80	3.45	126	13.58	172	42.69
35	0.68	81	3.56	127	13.95	173	43.67
36	0.71	82	3.68	128	14.34	174	44.68
37	0.74	83	3.80	129	14.73	175	45.70
38	0.77	84	3.93	130	15.13	176	46.74
39	0.80	85	4.05	131	15.53	177	47.80
40	0.83	86	4.19	132	15.95	178	48.88
41	0.86	87	4.32	133	16.38	179	48.99
42	0.89	88	4.46	134	16.82	180	51.11
43	0.93	89	4.60	135	17.27	181	52.25
44	0.97	90	4.75	136	17.72	182	53.42
45	1.00	91	4.90	137	18.19	183	54.61
46	1.04	92	5.06	138	18.67	184	55.82
47	1.08	93	5.22	139	19.16	185	57.05
48	1.12	94	5.38	140	19.66	186	58.30
49	1.17	95	5.55	141	20.17	187	59.58
50	1.21	96	5.73	142	20.69	188	60.88
51	1.26	97	5.90	143	21.23	189	62.20
52	1.30	98	6.08	144	21.77	190	63.55
53	1.35	99	6.27	145	22.33	191	64.02
54	1.40	100	6.46	146	22.90	192	66.32
55	1.46	101	6.66	147	23.48	193	67.75
56	1.51	102	6.86	148	24.08	194	69.19
57	1.57	103	7.07	149	24.68	195	70.67
58	1.62	104	7.28	150	25.30	196	72.16
59	1.68	105	7.50	151	25.73	197	73.69
60	1.74	106	7.72	152	26.58	198	75.24
61	1.81	107	7.95	153	27.24	199	76.82
62	1.87	108	8.19	154	27.92	200	78.43
63	1.94	109	8.43	155	28.60	201	80.06
64	2.01	110	8.68	156	29.31	202	81.73
65	2.08	111	8.93	157	30.02	203	83.42
66	2.15	112	9.19	158	30.75	204	85.14
67	2.23	113	9.46	159	31.50	205	86.89
68	2.31	114	9.73	160	32.26	206	88.67
69	2.39	115	10.01	161	33.04	207	90.48
70	2.47	116	10.30	162	33.83	208	92.32
71	2.56	117	10.59	163	34.64	209	94.20
72	2.64	118	10.89	164	35.47	210	96.10
73	2.73	119	11.20	165	36.31	211	98.03
74	2.83	120	11.52	166	37.17	212	100.00
75	2.92	121	11.84	167	38.05		
76	3.02	122	12.17	168	38.84		
77	3.12	123	12.51	169	39.85		

Sheet 1 of ____

K-Factor Calculation Sheet

Project No.: ____________________

Date: ____________________

Client: ____________________

Source: ____________________

Plant: ____________________

Sample Location: ____________________

Calculated by: ____________________

Checked by: ____________________

TM & TS in °R

$K = \frac{\Delta H}{\Delta P} = 846.72 \ (DN)^4 \ \Delta H_@ \ CP^2 \ (Md)^2 \left(\frac{MWD}{MWS}\right) \left(\frac{TM}{TS}\right) \left(\frac{PS}{PM}\right)$; $\Delta H = K\Delta P$

$T_S = \boxed{}$ °F + 460 = ________ °R

$K = \frac{\Delta H}{\Delta P} = 846.72 \ (\quad)^4 \ (\quad) \ (\quad)^2 \ (\quad)^2 \left(\frac{\quad}{\quad}\right) \left(\frac{\quad}{\quad}\right) \left(\frac{\quad}{\quad}\right)$

$K = \boxed{}$ $\Delta\bar{P}$ = ________, $\Delta\bar{H}$ = ________, ΔP_{MAX} = ________, ΔH_{MAX} = ________,

---

$T_S = \boxed{}$ °F + 460 = ________ °R

$K = \frac{\Delta H}{\Delta P} = 846.72 \ (\quad)^4 \ (\quad) \ (\quad)^2 \ (\quad)^2 \left(\frac{\quad}{\quad}\right) \left(\frac{\quad}{\quad}\right) \left(\frac{\quad}{\quad}\right)$

$K = \boxed{}$ $\Delta\bar{P}$ = ________, $\Delta\bar{H}$ = ________, ΔP_{MAX} = ________, ΔH_{MAX} = ________,

---

$T_S = \boxed{}$ °F + 460 = ________ °R

$K = \frac{\Delta H}{\Delta P} = 846.72 \ (\quad)^4 \ (\quad) \ (\quad)^2 \ (\quad)^2 \left(\frac{\quad}{\quad}\right) \left(\frac{\quad}{\quad}\right) \left(\frac{\quad}{\quad}\right)$

$K = \boxed{}$ $\Delta\bar{P}$ = ________, $\Delta\bar{H}$ = ________, ΔP_{MAX} = ________, ΔH_{MAX} = ________,

---

$T_S = \boxed{}$ °F + 460 = ________ °R

$K = \frac{\Delta H}{\Delta P} = 846.72 \ (\quad)^4 \ (\quad) \ (\quad)^2 \ (\quad)^2 \left(\frac{\quad}{\quad}\right) \left(\frac{\quad}{\quad}\right) \left(\frac{\quad}{\quad}\right)$

$K = \boxed{}$ $\Delta\bar{P}$ = ________, $\Delta\bar{H}$ = ________, ΔP_{MAX} = ________, ΔH_{MAX} = ________,

---

$T_S = \boxed{}$ °F + 460 = ________ °R

$K = \frac{\Delta H}{\Delta P} = 846.72 \ (\quad)^4 \ (\quad) \ (\quad)^2 \ (\quad)^2 \left(\frac{\quad}{\quad}\right) \left(\frac{\quad}{\quad}\right) \left(\frac{\quad}{\quad}\right)$

$K = \boxed{}$ $\Delta\bar{P}$ = ________, $\Delta\bar{H}$ = ________, ΔP_{MAX} = ________, ΔH_{MAX} = ________,

---

AF-248/A

Calculation for Desired Nozzle Diameter

Project No.: _____ Date: _____

Client: _____ Source: _____

Plant: _____ Sample Location: _____

Calculated by: _____ Checked by: _____

T_S = _____ °F + 460 = ☐ °R ΔP_{AV} = ☐

T_M = _____ °F + 460 = ☐ °R C_p = ☐

MWD = ☐ # / # - mole

MWS = ☐ # / # - mole Sampling Rate, dscfm, Q_m

MD = ☐ (1) @ $\Delta H@$ = 0.75 (normal)

PB (PM) = ☐ (2) At any other ΔH:

$$\text{PST} = \frac{\text{PB}}{13.6} = \square \qquad \left(\frac{\Delta H}{\Delta H_@}\right)^{1/2} \times 0.75 = \left(\frac{\quad}{\quad}\right)^{1/2} 0.75 = \frac{\quad}{\text{dscfm}}$$

PS-(PB ± PST) = ☐

$$D_N \text{ (desired)} = \left[\left(\frac{(TS)\ (MWS)}{(PS)\ (\Delta P_{AV})}\right)^{1/2} \left(\frac{0.0357\ (Q_M)\ (PM)}{(TM)\ (C_p)\ (MD)}\right)\right]^{1/2}$$

$$= \left[\left(\frac{(\quad)(\quad)}{(\quad)(\quad)}\right)^{1/2} \left(\frac{0.0357\ (\quad)(\quad)}{(\quad)(\quad)(\quad)}\right)\right]^{1/2}$$

D_N = ☐ inches D_N Actual = ☐ inches

Stack Geometry & Gas Velocity Data

Page __ of __

Project No. _____ Source _____

Client _____ Sample Location _____

Plant _____ Run No. _____

Operator _____ Static, In. H_2O _____

Meter Box No. _____

Time (24 hr. Clock)	Sample Point	Stack Temp. °F or C°	Manom. Reading In. H_2O	Cyclonic Flow Null Angle

Sketch of Sampling Location

Stack Diameter _____

Diameters Upstream _____

Diameters Downstream _____

Wet Bulb _____

Dry Bulb _____

%M _____

017

Isokinetic Flue Gas Sampling Data Sheet

Project No. _____
Client _____
Facility _____
Source _____
Sample Location _____
Stack Diameter _____
Date _____
Run No. _____
Operator _____
Meter Box No. _____
Meter Δ H@ _____
Y Factor _____

Very Important - Fill in All Blanks

Read and Record at the Start of Each Test Point

Sketch

Sheet _____ of _____

Train Prepared By _____
Pitot Number and Side _____
Pitot Tube CP _____
Filter No. / Thimble No. _____
Ambient Temp.°F _____
Bar. Pressure., In. Hg _____
Assumed Moisture, % _____
Heater Box Setting, °F _____
Nozzle # / Dia., In. _____
Probe Length / Material _____
Probe Heater Setting _____

Point	Clock Time		Dry Gas Meter, (ft^3)	Pitot In. H_2O Δ P	Orifice Δ H In. H_2O		Dry Gas Temp. °F		Pump Vacuum In. Hg Gauge	Temperatures °F °C					
	24 - hr	min			Desired	Actual	Inlet	Outlet		Stack	Filter Box	Imp Temp	XAD Cond	Probe	Filter Outlet

Comments:

Train Leak Check:

Before Test: _____ CF _____ SEC _____ In. Hg
After Test: _____ CF _____ SEC _____ In. Hg

	I	F	Static Pressure			
Pitot Tube Leak Check			Port			
ORSAT Train Leak Check			In. H_2O			
			In. Hg			

AF-051

Isokinetic Flue Gas Sampling Data Sheet

Project No. ______________________ Date ______________________ Sheet _____ of _____

Client ______________________ Run No. ______________________

Facility ______________________ Sample Location ______________________ Operator ______________________

Source ______________________

Point	Clock Time		Dry Gas Meter, (ft^3)	Pitot In. H_2O ΔP	Orifice ΔH In. H_2O		Dry Gas Temp. °F		Pump Vacuum In. Hg Gauge	Temperatures °F °C					
	24 - hr	min			Desired	Actual	Inlet	Outlet		Stack	Filter Box	Imp Temp	XAD Cond	Probe	Filter Outlet
		Total													

Meter Leak Check During Test:

	Meter Reading Stop	Meter Reading Start
_____ CF _____ SEC _____ In. Hg	_____	_____
_____ CF _____ SEC _____ In. Hg	_____	_____

Static Pressure

Port	_____	_____	_____
In. H_2O	_____	_____	_____
In. Hg	_____	_____	_____

Comments:

AF-060

Sampling Train Setup and Recovery Sheet

Project No. _____ Run No. _____

Client _____ Train Type/# _____

Facility _____ Date _____

Source _____ Recovery Person _____

Filter No.	_____	_____	_____
Thimble No. (if applicable)	_____	_____	_____
XAD Trap No. (if applicable)	_____		

Moisture

Impinger #	_____	_____	_____	_____
Reagent	_____	_____	_____	_____
Final Volume (mLs)	_____	_____	_____	_____
Initial Volume (mLs)	_____	_____	_____	_____
Net Collected (g)	_____	_____	_____	_____

Impinger #	_____	_____	_____	_____
Reagent	_____	_____	_____	_____
Final Volume (mLs)	_____	_____	_____	_____
Initial Volume (mLs)	_____	_____	_____	_____
Net Collected (g)	_____	_____	_____	_____

Silica Gel	_____	_____	_____	_____
Final Weight (g)	_____	_____	_____	_____
Initial Weight (g)	_____	_____	_____	_____
Net Collected (g)	_____	_____	_____	_____

Total Moisture (Impingers and Silica Gel) (g) _____

ANALYZER DAILY CALIBRATION CHECK

Location _____ TIME START/STOP _____ Contract _____

Date _____ PERFORMED BY _____

Day _____

INSTRUMENT RESPONSE

Instrument	Zero		1		2		3		4	
	Conc.	Response	Conc.	Response	Conc.	Response	Conc.	Response	Conc.	Response
O_2										
CO_2										
CO										
SO_2										
NO_x										
THC										
THC										

CALIBRATION EQUATION

$y = mx + b$

	O_2	CO_2	CO	SO_2	NO_x	HCl
m =						
b =						
corr. coeff r^2 =						

616-900

Particulate Analysis

Project No. _____ Date _____

Client _____ Source _____

Plant _____ Analyst _____

A. SAMPLE VOLUME

_____ mL

B. WASH VOLUME

_____ mL
_____ mL
_____ mL
_____ mL
Total: _____ mL

C. BLANK CORRECTION

Sample: _____ mL x _____ g/mL = _____ g

Wash: _____ mL x _____ g/mL = _____ g

D. TARE WEIGHTS

	No.	Wt.
Container		_____ g
Filter		_____ g
Thimble		_____ g
Total		_____ g

E. GROSS WEIGHTS

RH/°F	Date/Time			RH/°F	Date/Time		
___/___	___/___	(1)	_____ g	___/___	___/___	(4)	_____ g
___/___	___/___	(2)	_____ g	___/___	___/___	(5)	_____ g
___/___	___/___	(3)	_____ g	___/___	___/___	(6)	_____ g

Final Gross Weight _____ g

Total Tare Weight _____ g

Residue Weight _____ g

Blank Weight _____ g

F. NET WEIGHT Net Weight _____ g = _____ mg

REMARKS: _____

_____

_____

CHAIN OF CUSTODY RECORD

Project Name ____________________

Project No.: ____________________

Sampling Date(s): ____________________

Laboratory: ____________________

Laboratory P.O. #: ____________________

Shipping Airbill No.: ____________________

Shipping Date(s): ____________________

Shipper's Name: ____________________

Sample Code	Sampled Date	Container Size	Container G/P	MATRIX: Aqueous	Organic Solvent	Ash/Soil/Sediment	Acidic	Basic	Other	Source Description	ANALYSIS: Trace Metals*	Mercury	Hexavalent Chromium	HCl	Cl2	Particulate Matter	PCDD/PCDF	Semi-Volatile Organics	Volatile Organics	Physical Parameters*					Comments

Relinquished by:	Date/Time:	Relinquished by:	Date/Time:
Received by:	Date/Time:	Received by:	Date/Time:

REMARKS (*):

№ 01846

WHITE — LABORATORY YELLOW — LABORATORY COPY PINK — OFFICE COPY GOLD — FIELD COPY

APPENDIX D

EMISSION CALCULATION SHEETS

Facility _____ Job No. _____

Source _____ Date _____

Run _____ Calc/Review _____

SAMPLE CALCULATIONS

Particulate Isokinetic Sampling

I. Calculations for stack volume and isokinetic Ratio

Time	Dry Gas Meter ft^3	Pitot ΔP, in. H_2O	Orifice ΔH, in. H_2O	Dry Gas Temp °F In	Dry Gas Temp °F Out	Stack Static Pressure in. H_2O	Stack Temp °F
T	VM	ΔP	PM	TMI	TMO	PST	TS

1. DN = Nozzle Diameter, inches _____ in.
2. PB = Barometric Pressure, inches Hg _____ in. Hg
3. TT = Net Sampling Time, minutes _____ min.
4. VM = VM final - VM initial = Sample Gas Volume, ft^3 _____ ft^3

4A. VML = Use only if any final or intermediate leak check rate is over 0.02 cfm.
LI = Leak rate after any given sampling period, cfm
TLI = Total time of sampling period in which leak occurred, min.
VML = VM - [(L1 - 0.02) TLI + (L2 - 0.02) TL2 + (L3 - 0.02) TL3 + (L4 - 0.02) TL4]
= _____ ft^3

5. TM = Average Dry Gas Temperature at Meter, °F.

$$TM = \frac{\text{Avg. TMI} + \text{Avg. TMO}}{2}$$

= _____ °F

6. PM = Average Orifice Pressure Drop, inches H_2O

PM = Avg. Δ H = _____ ÷ 13.6 = _____ in. Hg

7. Volume of dry gas sampled at standard conditions, dscf[a]

$$VMSTD = \frac{528(Y)(VM)\left(PB + \frac{PM}{13.6}\right)}{29.92(TM+460)}$$

Y = dry gas meter calibration factor
Y = _____ = _____ ft^3

8. VW = Total Water Collected = gm H_2O Silica gel + mL Imp. H_2O = _____ mL

9. Volume of water vapor at standard conditions, scf[b]

VW gas = 0.04715 x VW = _____ ft^3

Run No._____ Job No. _____

Date _____

10. Percent moisture in stack gas

$$\%\,M = \frac{100 \times VW\ gas}{VMSTD + VW\ gas} =$$ = _____ %

11. Mole fraction of dry gas (dimensionless)

$$MD = \frac{100-\%M}{100} =$$ = _____

12. Molecular weight of dry stack gas

$$MWD = \left(\%CO_2 \times \frac{44}{100}\right) + \left(\%O_2 \times \frac{32}{100}\right) + \left[(\%CO+\%N_2) \times \frac{28}{100}\right]$$ = _____ lb/lb mole dry

12A. %EA = %Excess Air =

$$\frac{[(\%O_2)-0.5(\%CO)]\times 100}{[(0.264)(\%N_2)]-(\%O_2)+0.5\%(CO)}$$ = _____ %

13. Molecular weight of wet stack gas

MW = MWD x MD + 18 (1-MD) = _____ lb/lb mole wet

14. AS = Stack Area, square inches

Circular, $= \left(\frac{\text{stack diameter}}{2}\right)^2 \pi$ = _____ sq. in.

Rectangular, = Length x width = _____ sq. in.

15. PS = Stack Pressure, absolute, inches Hg = PB ± AV PST
PST = Stack static pressure

PST in. Hg $= \frac{\text{PST in. } H_2O}{13.6}$ = _____ in. Hg

PS = PB ± Avg. PST = _____ in. Hg

16. TS_{AV} = Average Stack Temperature = _____ °F

Run No._____ Job No. _____

Date _____

17. $SDE_{AV} = (\sqrt{\Delta P})_{AV} \times \sqrt{TS_{AV} + 460}$ = _____

18. Stack gas velocity at stack conditions, afpm

$$VS = 5130^{c} \times Cp \times SDE_{AV} \times \left[\frac{1}{PS \times MW}\right]^{1/2} = \text{afpm}$$

Cp = pitot tube coefficient

Cp = _____ = _____ afpm

19. Stack gas volumetric flow rate at stack conditions, acfm[d]

$$Q_a = \frac{VS \times AS}{144} = \text{_____ acfm}$$

20. Stack gas volumetric flow rate at standard conditions, dscfm[e]

$$Q_s = \frac{Q_a \times 528 \times MD \times PS}{(29.92)(TS_{AV} + 460)} = \text{_____ dscfm}$$

21. Percent isokinetics

$$\%\ I = \frac{1{,}039^{f} \times (TS_{AV} + 460) \times VMSTD}{VS \times TT \times PS \times MD \times (DN)^2} = \text{_____ \%}$$

---

[a]Dry standard cubic feet at 68°F (528R) and 29.92 in. Hg.

[b]Standard conditions at 68°F (528R) and 29.92 in. Hg.

$$^{c}5130 = 85.5 \ \frac{ft}{sec} \left[\frac{(lb/lb\ mole)(in.\ Hg)}{(°R)(in.\ H_2O)}\right] \times 60\ sec/min$$

[d]Actual cubic feet per minute

[e]Dry standard cubic feet per minute at 68°F (528R) and 29.92 in. Hg.

$$^{f}1039 = \frac{29.92\ in\ Hg}{528\ Deg\ R} \times \frac{144\ in.^2}{ft^2} \times \frac{4}{\pi} \times 100$$

Run No._____ Job No. _____

Date _____

II. *Calculations for grain loading and emission rates*

22. Particulate, gr/dscf

$$gr/dscf = 0.0154 \times \frac{mg}{VMSTD}$$ = _____ gr/dscf

23. Particulate at stack conditions, gr/acf

$$gr/acf = \frac{528 \times gr/dscf \times PS \times MD}{29.92\ (TS_{AV} + 460)}$$ = _____ gr/acf

24. Particulate, lb/hr conc. method

$$lb/hr = \frac{60\ min/hr \times gr/dscf \times QS}{7000\ gr/lb}$$ = _____ lb/hr

25. Particulate, lb/hr area method

$$lb/hr = 0.132 \times \frac{gms\ particulate \times AS}{\pi \left(\frac{DN}{2} \right)^2 \times TT}$$ = _____ lb/hr

26. $\frac{lb/hr\ area \times 100}{lb/hr\ conc.}$ = _____ % I

27. Particulate, combustion lb/10^6 Btu heat input method

lb/hr = avg. of area and conc. method = _____ lb/hr

10^6 Btu from fuel flow, steam generation or heat rate = _____ 10^6 Btu

28. lb/10^6 Btu F Factor method =

$$\frac{gr/dscf}{7000} \times F \times \frac{20.9}{(20.9 - \%\ O_2)}$$ = _____ lb/10^6 Btu

Run No. _____ Job No. _____

Date _____

29. Density of stack gas

a. Wet at stack condition = MW lb/lb mol $/ \left[21.85 \times \left(\frac{TS_{AV} + 460}{PS} \right)\right]$

= _____ lb/lb mole wet

b. Dry at 68°F (528R) and 29.92 in. Hg = MWD/385.6 = _____ lb/lb mole dry

30. Exhaust gas flow rate

a. FRS = lb/hr dry = QS x 60 x dry density = _____ lb/hr

b. FRA = lb/hr wet = QA x 60 x wet density = _____ lb/hr

31. gr/dscf at 12% CO_2 = gr/dscf x $\frac{12}{\% CO_2}$ = _____ gr/dscf

32. gr/dscf at 50% excess air = $\frac{100 + EA}{150}$ x gr/dscf = _____ gr/dscf

33. lb pollutant/1000 lb flue gas at 12% CO_2 (wet or dry)

= $\frac{\text{lb pollutant/hr}}{\text{FRA or FRS}} \times \frac{12}{\% CO_2} \times 1000$ = _____ lb/1000 lb

34. gr/dscf at 7% O_2 =

gr/dscf $\left(\frac{14}{21 - \%O_2 \text{ dry}} \right)$ = _____ gr/dscf

SAMPLE CALCULATIONS

(1) DRE CALCULATIONS FOR POHCs --

$$DRE, \% = \frac{[(POHCin) - (POHCout)]}{(POHCin)} \times 100$$

$$POHCin, g/min = \frac{(WFR)(A)(B)}{(C)}$$

where,

WFR = waste feed rate, lb/min

A = 454 g/lb

B = POHC conc., wt %

C = 100

Compute for all streams fed to incinerator and for all POHCs

$$POHCout, g/min = \frac{(D)(E)(Qs)(F)}{(SV)}$$

where,

D = POHC quantity detected, ng

E = 28.32 L/dscf @ 68°F (20°C)

Qs = stack gas flowrate, dscfm

F = 1×10^{-9} g/ng

SV = sample volume, dsL @ 68°F (20°C)

$$SV = Vm_{std} = \frac{(Vm_{act})(PB_{act})(Tstd)}{(Pstd)(Tm_{act})}$$

where,

Vm_{std} = sample volume at std. cond., dsL

Vm_{act} = actual sample volume, aL

PB_{act} = atmospheric pressure at sampling location, mm Hg (in. Hg)

Tstd = standard temperature = 293°K

Pstd = standard pressure = 760 mm Hg (29.92 in. Hg)

Tm_{act} = actual meter temperature, °K

(2) ACID GAS EMISSION CALCULATIONS --

$$ER = \frac{(A)(B)(Qs)(C)(D)}{(SV)(E)}$$

where,

ER = HCl, HF, HI or HBr emission rate, lb/hr

A = quantity of Cl^-, F^-, I^- or Br^- collected, µg

B = 1×10^{-6} g/µg

Qs = stack gas flowrate, dscfm

C = 60 min/hr

D = 1.0282 g HCl/g Cl = 1.0526 g HF/g F

= 1.0125 g HBr/g Br = 1.0079 g HI/g I

SV = sample volume of air, dscf

E = 454 g/lb

(3) CEM POLLUTANT GAS CALCULATIONS --

$$ER = \frac{(A)(Qs)(MW)(B)}{(C)(D)}$$

where,

ER = emisison rate of CO, NO_x, THC, or SO_2, lb/hr

A = conc. of CO, NO_x, or SO_2, ppm (v)

Qs = stack gas flowrate, dscfm

MW = molecular weight, lb/lb-mole

= 28 for CO = 64 for SO_2

= 46 for NO_x (as NO_2) = 16 for THC (as methane)

B = 60 min/hr

C = 385.3 dscf/lb-mole @ 68°F (20°C)

D = 1×10^6

(4) METAL EMISSION CALCULATIONS --

$$MC = A/B \text{ and } MER = \frac{(MC)(C)(Qs)(D)}{(E)}$$

where,

MC = metal conc., µg/dscf

A = µg of metal collected

B = sample volume of air, dscf

MER = metal emission rate, lb/hr

C = 1×10^{-6} g/µg

Qs = stack gas flowrate, dscfm

D = 60 min/hr

E = 454 g/lb

(5) SULFURIC ACID MIST AND SULFUR DIOXIDE BY EPA REFERENCE METHOD 8 --

(a) Sulfuric Acid Mist (H_2SO_4/SO_3)

$$C = \frac{K_2\ N\ (V_t - V_{tb})\ (V_{sol}/V_a)}{V_{mstd}}$$

(b) Sulfur Dioxide (SO_2)

$$C = \frac{K_3\ N\ (V_t - V_{tb})\ (V_{sol}/V_a)}{V_{mstd}}$$

where,

C = Concentration, g/dscm or lb/dscf

K_2 = 0.04904 g/meq or 1.081×10^{-4} lb/meq

K_3 = 0.03203 g/meq or 7.061×10^{-5} lb/meq

N = Normality of barium perchlorate titrant, meq/mL

V_t = Volume of titrant used for sample, mL

V_{tb} = Volume of titrant used for blank, mL

V_{sol} = Total volume of sample solution, mL

V_a = Volume of sample aliquot titrated, mL

V_{mstd} = Gas sample volume corrected to standard conditions, dscm or dscf

(6) AMBIENT SAMPLING OR AUDIT GAS CALCULATIONS --

Conversion of compound concentration from ng/L to ppb (v):

$$\text{Conc., ppb (v)} = \frac{(A)(B)}{(MW)}$$

where,

A = 24.04 L/g-mole @ 68°F (20°C)

MW = compound molecular weight, g/g-mole

B = conc., ng/L

(7) PARTICULATE CONCENTRATION CORRECTIONS --

(a) Correction to 12% CO_2:

$$\text{gr/dscf @ 12\% } CO_2 = \text{gr/dscf} \left(\frac{12}{\%\ CO_2}\right)$$

(b) Correction to 7% O_2:

$$\text{gr/dscf @ 7\% } O_2 = \text{gr/dscf} \left(\frac{14}{21 - \%\ O_{2_{dry}}}\right)$$

(8) PRORATED EMISSION RATE TO ACCOUNT FOR SOOTBLOWING INTERVALS (Goerner, et al., Texas Air Control Board, 1978)

$$PMR_{AVG} = PMR_{SB} \frac{(A + B)\ S}{(A \times R)} + PMR_{NOSB} \left[\frac{(R - S)}{R} - \frac{(B \times S)}{(A \times R)}\right]$$

where,

PMR = Pollutant Mass Emission Rate (lb/hr, lb/10^6 Btu)

PMR_{AVG} = Average PMR for daily operating time

PMR_{SB} = Average PMR of sample(s) encompassing sootblowing

APPENDIX E

EQUIPMENT CALIBRATION FORMS

Dry Gas Meter Calibration

Calibrated By _____ Barometric Pressure, Pb= _____ in. Hg

Date _____ Meter Box No. _____

Orifice manometer setting ΔH, in. H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry test meter V_d, ft^3	Temperature				Time θ, °F	Y	$\Delta H\partial$	Deviation	
			Wet test	Dry gas meter							
			Meter t_w, °F	Inlet t_{di}, °F	Outlet t_{do}, °F	Average t_d, °F				Y	$\Delta H\partial$
						Average					

Calculations

Y	$\Delta H\partial$
$\frac{V_w \; P_b \; (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right) (t_w + 460)}$	$\frac{0.0317 \; \Delta H}{P_b(t_d + 460)} \left[\frac{(t_w + 460)\,\theta}{V_w}\right]^2$

Y = Ratio of accuracy of wet test meter to dry test meter.
Tolerance = ± 0.01

$\Delta H\partial$ = Orifice pressure differential that gives 0.75 cfm of air as 68° F and 29.92 inches of mercury, in. H_2O.
Tolerance = ± 0.15

METER BOX CALIBRATION WORKSHEET

Time Minutes	Inlet Temp.	Outlet Temp.	Meter Box Ser. #	Date
0			DGM Serial #	BAR Press (PB)
2			ΔH .5 1.0 2.0	Calibrated by
4				
6			Final DGM	Final WTM
8			Initial DGM	Initial WTM
10			Net DGM	Net WTM
12				
14			Vac. in. HG.	Average DGM Temperature
15				
			$y = \frac{\quad}{\quad} =$	
			$\Delta H = \frac{\quad}{\quad}\left[\frac{\quad}{\quad}\right]^2 =$	
		Wet Test Meter Temperature		
		Total Time, minutes; seconds		15.0

Calculations

Y	ΔH@
$\frac{V_w \; P_b \; (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)\left(t_w + 460\right)}$	$\frac{0.0317 \; \Delta H}{P_b(t_d + 460)} \left[\frac{(t_w + 460)\,\theta}{V_w}\right]^2$

AF-014A

Thermocouple Calibration Form

Thermocouple Number	Temperature Reading 1	Reference Temperature 1	Temperature Reading 2	Reference Temperature 2	Temperature Reading 3	Reference Temperature 3

Signature of Person Performing Calibration

Calibration Date

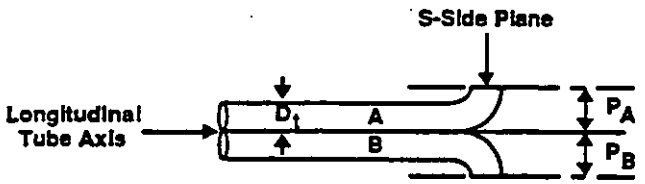
Type S Pitot Inspection Form

Pitot Tube No. _____

Tubing Diameter, D_t _____ in. $\left(\frac{3}{16} < D_t < \frac{3}{16}\right)$

Pitot Tube Assembly Level? Yes/No

Pitot Tube Opening Damaged? Yes/No



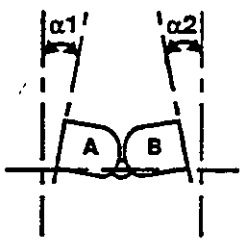
Note:

$1.05\ D_t < P < 1.50\ D_t$

$P_A = P_B$

P_A = _____ in.

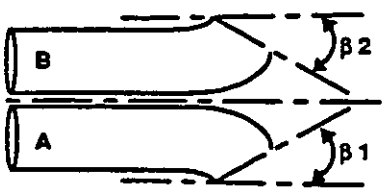
P_B = _____ in.



α 1 = _____°

α 2 = _____°

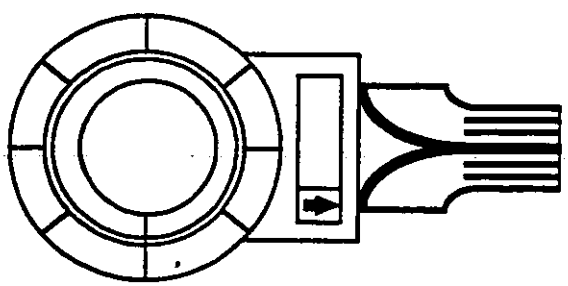
(< 10°)

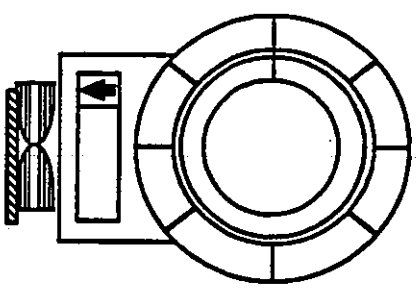


β 1 = _____°

β 2 = _____°

(< 5°)





Level Position to find γ = _____

Z = A' sin γ _____ in. (< 1/8 in.)

Level Position to find θ = _____

W = A' sin θ _____ in. (< 1/32 in.)

Comments: _____

_____

Checked by: _____

Date: _____

Calibration Required? _____

D_t = External Tube Diameter

A' = Distance Between Tips (P_A + P_B) Inches

Nozzle Calibration Data

Nozzle Set No. Date Tech.

Nozzle No.	Diameter* —	a	b	c	average**

*measure to nearest .001"
**three measurements must be within .004" of each other