UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
ADMINISTRATION
AND RESOURCES
MANAGEMENT

MEMORANDUM

SUBJECT: Guidelines for the Selection of Chemical Protective Clothing - Third Edition

FROM: David Weitzman, Acting Director David J. Weitzman
Occupational Health and Safety Staff

TO: Users of the Chemical Protective Clothing Guidelines

I am pleased to provide you with a copy of the "Guidelines for the Selection of Chemical Protective Clothing" - Third Edition. The Guidelines meet an important need of the Superfund program: to provide up-to-date recommendations for selecting chemical protective clothing. All chapters and appendices have been updated through December 1986.

This edition of the Guidelines contains approximately 3500 recommendations covering over 500 chemicals and 36 clothing materials. Qualitative chemical resistance information and quantative test data were combined to generate these recommendations. This represents an increase of 52% over the second edition.

The text remains essentially the same as the second edition except for the inclusion of a new chapter: Chapter 5 "Full-Body Protection", and three related appendices. Chapter 5 provides a detailed discussion of design features and physical properties of full-body encapsulating ensembles and product descriptions for splash suits. The new appendices, G through I, contain data sheets for encapsulating ensembles, product descriptions for splash suits, and describes the EPA's Environmental Response Team's levels of protection (A through D). The Guidelines is in loose-leaf format to permit easy update as additional information on chemical protective clothing becomes available.

My staff is also having this information computerized so that you can access the latest information at any time and run quick, convenient searches. We expect this system to be available later this year.

The Guidelines is the most comprehensive compilation of chemical protective clothing performance and use information currently available. We are continuing to update the performance and use information and are considering adding new chapters for future editions. If you have any suggestions or comments please contact Cherie Zieschang at (202) 382-3650.

I hope you find the updated Guidelines a useful reference.

Volume I: Field Guide

Guidelines for the Selection of Chemical Protective Clothing

3rd Edition

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February 1987

Office of Administration

Occupational Health and Safety Staff

DISCLAIMER

Arthur D. Little, Inc., prepared this document with what it believes is the best currently available information. The document is subject to revision as additional knowledge and experience are gained. Arthur D. Little cannot guarantee the accuracy of information used to develop the chemical protective clothing recommendations contained herein, and the mention of company names or products does not constitute endorsement by Arthur D. Little. Arthur D. Little accepts no responsibility for damages or liabilities of any kind which may be claimed to result from the use of this document.

ACKNOWLEDGEMENTS

This *Guidelines for the Selection of Chemical Protective Clothing* was prepared by Arthur D. Little, Inc., (Cambridge, Massachusetts), under subcontract to Los Alamos National Laboratory (New Mexico) for the U.S. Environmental Protection Agency (EPA) and the U.S. Coast Guard. Particularly helpful in the preparation of this, the third edition of the *Guidelines* were J.F. Stampfer and H.J. Ettinger (Los Alamos National Laboratory), and Krister Forsberg. Mr. Forsberg of the Royal Institute of Technology (Stockholm) reviewed each line of data presented in Appendix A of Volume II for consistency with the original literature sources. We also thank Dr. Douglas Walters of the National Toxicology Program for contributing an extensive compilation of glove permeation data generated for the NTP by the Radian Corporation.

The text, except for the addition of Chapter 5--Full-Body Protection to Volume I, remains essentially the same (although updated) as the first EPA and ACGIH editions for which we note the support and review comments of W. Aaroe, B.E. Benson, S.P. Berandinelli, R. Ellis, E.R. Hoyle, K. Hunninen, R.F. Kent, W.F. Keffer, R.C. Magor, A.P. Nielson, M.D. Royer, A. Smith, R.S. Stricoff, F. Thompson, R.D. Turpin. L. Walz, and R.W. Weeks. In addition, we appreciate the assistance of encapsulating ensemble manufacturers in the preparation of Appendix G of Volume I.

The authors also acknowledge the contributions of the Arthur D. Little project team which included William Hawes, whose programming skills greatly facilitated the information organization task, and T. Carroll, C. Luciano, M. Rourke, and D. Ryan, who assisted us in gathering and inputting the information. Finally, we thank the typists and report production specialists who assembled the document.

SPECIAL NOTE TO USERS

This document contains comprehensive tables of recommendations to aid and facilitate the selection of chemical protective clothing (CPC). The recommendations are based on an extensive compilation and analysis of CPC vendors' literature and experimental test data published in technical journals and reports. It is imperative that users of the recommendation tables familiarize themselves with the background information that precedes and accompanies the tables. The selection of CPC must take into account the potential hazard and the conditions of use--neither is considered in this document. The recommendations are *not* nor do they imply a guarantee of safety.

Although every effort has been made to prepare this document as accurately as possible, errors can and do occur. Users of this document are asked to notify Lt. Jeffrey O. Stull, Commandant (G-DMT-3), U.S. Coast Guard, 2100 Second Street, S.W., Washington, D.C. 20593 (202-267-0853), or Mr. David Weitzman, U.S. Environmental Protection Agency Office of Occupational Health and Safety, Room 3503, Waterside Mall, 401 M Street, S.W., Washington, D.C. 20460 (202-382-3647) of errors so that they can be corrected.

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CHAPTER 1

OVERVIEW

A. INTRODUCTION

Skin is an organ of the human body and has a surface area of about 1.8 m^2. A principal function of skin is to protect our internal organs from exposure to potentially harmful components of the external environment. Direct contact with chemicals can pose a significant challenge to the skin; possible reactions are:

- The skin will act as an effective barrier, and there will be no detrimental effect due to the contact.
- The skin will suffer a primary irritation such as a burn (corrosion), chafing due to extraction of essential oils, or dermatitis.
- The skin will become sensitized to the chemical. Once sensitized, the skin will react to quantities of chemicals much smaller than otherwise would have any effect. Some chemicals are both primary irritants and sensitizers.
- The skin will be penetrated by the chemical, and the chemical and/or its metabolites will enter the blood stream. This may or may not have a health effect, depending on the chemical and the amount of exposure.

The latter type of reaction, which would include, for example, irreparable liver damage and cancer, receives a high level of attention from both the lay and the technical communities. And, of course, such debilities warrant serious consideration. However, it is also important to recognize that primary skin irritations and sensitizations account for significantly greater numbers of lost time incidents. It is estimated that skin diseases account for two-thirds of all identified job-related diseases. Furthermore, seven out of ten industrial claims paid by insurance companies are for temporary disability resulting from dermatitis.

B. CHEMICAL PROTECTIVE CLOTHING

Along with engineering controls and carefully planned work procedures, chemical protective clothing (CPC) is a key element in minimizing the potential for worker exposure to chemicals. In the context of this document, CPC includes all items of clothing primarily intended to prevent chemical contact with the skin. These include gloves, coveralls, pants, jackets, and boots. Respirators are not included in this classification.

C. OBJECTIVE OF THE GUIDELINES

CPC in one form or another is commercially available from hundreds of vendors in the United States. Furthermore, the clothing is fabricated from a wide variety of plastic and rubber materials. In addition, the effectiveness of a particular item of clothing is highly dependent on the chemical with which it may be challenged. For example, a neoprene glove provides excellent protection from sulfuric acid, but it is rapidly permeated by toluene. Finally, the conditions under which the clothing is used can affect performance. These factors combine to create a perplexing situation for those who are involved in or responsible for the protection of workers who handle chemicals--for example, at a hazardous waste site.

In recognition of this problem, the EPA's Occupational Health and Safety Staff developed in 1983 the *Guidelines for the Selection of Chemical Protective Clothing*. To this third edition of the *Guidelines*, the Coast Guard's Office of Research and Development has added a chapter and three appendices pertinent to full-body protection. The objective of the *Guidelines* is that it be a concise, up-to-date source of information pertinent to the selection of clothing for protection from chemicals. All chapters and appendices have been updated as of December 1986.

D. AUDIENCE AND ORGANIZATION OF GUIDELINES

The *Guidelines* is principally directed towards:

- field safety personnel who are more typically faced with an immediate need to provide the best clothing for workers on a day-to-day basis, and

- planners and researchers who, for example, have the responsibility for developing the safety plan for a particular project. These personnel may have the time to investigate peculiarities in clothing performance or to prescribe clothing testing in anticipation of particular needs.

In order to satisfy such diverse requirements, the *Guidelines* is divided into two volumes. Volume I is intended to be useful as a "field manual." It contains a discussion of the basic concepts of permeation and chemical resistance, an overview of CPC vendors' literature, detailed discussion of full-body protection, an analysis of test methods for CPC, and, probably most importantly, two matrices for the selection of protective clothing. The matrices present clothing recommendations for 12 major clothing materials and cover approximately 500 chemicals or aqueous solutions. In addition, permeation data are provided for approximately 25 multi-component organic solutions. The appendices include an extensive listing of CPC sources organized by product type and principal chemical barrier material. Detailed information is provided for full-body ensembles. The appendices also include a glossary of CPC terms and instructions for selecting clothing types and doffing potentially contaminated clothing.

Volume I brings virtually all CPC performance information to one location, and provides the basic information required to select, order and intelligently use CPC. The sources are identified in the Bibliography of Volume II.

Volume II is more technical in content. It contains a more detailed discussion of permeation theory, CPC testing methods and CPC vendors' literature. The appendix to Volume II contains all the data on which are based the recommendations in the matrices of Volume I. In one sense, Volume II could be considered a supporting document for Volume I. In another, Volume II serves as the starting point for further investigation of CPC.

Together the two volumes represent the most comprehensive compilation of chemical protective clothing performance and use information available to the public. We urge the use of the *Guidelines* as an important means for maintaining the well-being of workers who may be exposed to potentially harmful chemicals. We, furthermore, urge all users of the *Guidelines* to participate in its continued improvement by sending comments and criticisms to:

Lt. Jeffrey O. Stull
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2100 Second Street, S.W.
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CHAPTER 2

CHEMICAL PROTECTIVE CLOTHING LIMITATIONS

The use of chemical protective clothing is but one component of the overall program for maintaining the health and safety of workers. It complements (and is not a substitute for) good planning, work practices, engineering and administrative controls, or personal hygiene. Several factors which should be considered in the specification and selection of CPC are discussed in the following paragraphs.

A. CHEMICAL RESISTANCE

The performance of CPC as a barrier to chemicals is determined by the materials and quality of its construction. Chemical protective clothing is based on plastic and elastomeric materials. Typically each chemical interacts with a given plastic or elastomer in a relatively unique manner. That is, each chemical/material pair has peculiar interactions. The situation becomes even more complex when multi-component solutions are involved. Four important factors to bear in mind when considering CPC are:

- In general, there is no such thing as "impermeable" plastic or rubber clothing.

- No one clothing material will be a barrier to all chemicals.

- For a given clothing material type, chemical resistance can vary significantly from product to product. For example, not all brands of nitrile gloves provide equivalent protection.

- For certain chemicals or combinations of chemicals, there is no commercially available glove or clothing that will provide more than an hour's protection following contact. In these cases, it is recommended that clothing be changed as soon as it is safely possible after any contact with the chemical or chemical mixture.

B. DESIGN AND CONSTRUCTION

Design and construction factors that can influence performance are as follows:

- Stitched seams of clothing may be highly penetrable by chemicals if not overlayed with tape or sealed with a coating.

- Lot-to-lot variations do occur and may have a significant effect on the barrier effectiveness of the CPC. They may go undetected due to quality control procedures insensitive to chemical resistance issues.

- Pinholes may exist in elastomeric or plastic products due to deficiencies or poor quality control in the formulation or in the manufacturing processes.

- Thickness may vary from point to point on the clothing item. Depending on the manufacturing process, the finger crotch area of the glove is particularly susceptible to thin coverage.

- Garment closures differ significantly from manufacturer to manufacturer and within one manufacturer's product line. Attention should be paid to button and zipper areas and the number of fabric overlaps in these areas.

Gloves are typically produced by one of two principal processes--latex-dipping and solvent (cement) dipping. Latex gloves predominate the market. Researchers have speculated, however, that the chemical resistance of a solvent-dipped glove may be greater than that of a latex-dipped glove of the same generic material. The principal reason being that the solvent-dipped glove is produced by a multiple-dip process while the latex process is a single-dip operation. In a multiple-dip process, imperfections in any one layer are covered by subsequent layers. Since the solvent-dip process is more involved, these products are generally more expensive. Consequently, the manufacturers of such gloves typically highlight the fact the gloves are solvent-dipped in justifying the cost. Factors that may affect the performance of encapsulating ensembles and splash suits are discussed in Chapter 5.

C. APPLICATION

The degree of protection provided by an item of clothing is also a function of the application. For example, a less durable piece of clothing may be more than adequate for a moderate duration, mild activity (e.g., sampling) whereas it would not endure more than 5 minutes of a vigorous, emergency response activity. Factors such as abrasion, puncture and tear resistance, and reaction to perspiration and crumpling should be considered. Temperature and, to some extent, humidity have significant influences on the performance of elastomeric and plastic CPC. Also with regard to application, it is important to recognize that protective clothing can be cumbersome and restrictive and thereby hasten the onset of worker fatigue. A result is that the period of safe and effective worker activity may be reduced.

D. REUSE

Protective clothing decontamination and reuse are controversial and unresolved issues at this time. Often surface contamination can be removed by scrubbing with soap and water. In other cases, especially with highly viscous liquids, surface decontamination may be practically impossible, and the CPC should be discarded. A more subtle problem arises with regard to the detection and removal of a chemical that has been absorbed into the elastomer or plastic. Once absorbed, some of this chemical will continue to diffuse through the material towards the inside surface even after the surface has been decontaminated. For highly resistant clothing the amount of chemical reaching the inside may be insignificant. However, for moderately performing materials significant amounts of chemical may reach the inside. This may not occur during the work shift but can take place while, for example, a glove is stored overnight. The next morning when the worker dons the glove, he may be putting his skin into direct contact with a hazardous chemical. In addition to chemical resistance, which is a function of temperature, both duration and the surface area exposed affect the amount of chemical that may reach the inside surface. Reuse decisions must consider these factors as well as the toxicity of the involved chemical(s). In fact, unless extreme care is taken to ensure decontamination, the reuse of CPC which has been contacted with highly toxic chemicals is not advisable. In summary, the decision to reuse CPC must take into account previous uses; unfortunately, there is little or no documented experience for guidance in this task.

E. SUBSTITUTION OF CPC

Particular caution is required when substituting clothing from one manufacturer for that of another manufacturer. Clothing performance is determined by the type of plastic or elastomer, the specific formulation of that plastic or elastomer, and the clothing manufacturing process. For example, materials classified generically as nitrile rubber can differ significantly in composition and, therefore, chemical resistance. Testing is the only means for identifying the superior products for a particular application.

F. COST

Cost is an important consideration in the selection and utilization of clothing, especially where clothing is likely to be damaged (e.g., tear, puncture, etc.). In some cases it may be more cost-effective to adopt the practice of using multiple changes of less expensive but relatively poorer performing clothing than to attempt to extend the use of better performing but more expensive clothing.

CHAPTER 3

PERMEATION THEORY

A. INTRODUCTION

This manual addresses the problem of selecting the most appropriate CPC for situations where human exposure to potentially hazardous chemicals is possible. An important concern in such situations is the effectiveness of the CPC as a barrier to the chemicals. Barrier properties may be estimated by simple immersion tests wherein the CPC or a portion thereof is exposed to the chemical(s) of concern, and the material examined for obvious signs of degradation, swelling, or weight changes. This has been the traditional method for generating the chemical resistance tables which are included in many CPC brochures. It is important to note, however, that permeation may occur with little or no visible or physical effect on clothing materials.

The barrier effectiveness of CPC can be measured by permeation testing. The standard procedure for performing permeation tests is American Society for Testing and Materials (ASTM) Method F739-85 promulgated by ASTM Committee F-23. This same committee has developed a standard battery of chemicals for permeation testing in ASTM F1001-86. The 15 chemicals in the battery represent a wide range of chemicals (e.g., ketones, acids, bases, hydrocarbons, etc.) and are listed across the top of Table 5.4. Permeation testing with these chemicals will facilitate the comparison of clothing materials.

An overview of permeation theory and associated concepts is presented in this chapter. For more detailed discussion, please refer to Chapter 2 of Volume II.

B. PERMEATION THEORY CONCEPTS

Permeation of a liquid or vapor through a rubber or plastic material is a three-step process involving:

- the sorption of the chemical at the outside surface of the CPC,
- the diffusion of the chemical through the CPC material, and
- the desorption of the chemical from the inside surface (i.e., towards the wearer) of the CPC.

Of principal importance in selecting CPC for protection from chemicals is the rate at which chemicals permeate the clothing materials and the time elapsed between the contact with the chemical and the appearance of the chemical on the inside of the CPC (i.e., breakthrough time).

1. Permeation Rate

Classical permeation theory (Fick's Law) states that the chemical permeation rate through a material is a function of the:

- diffusion coefficient of the permeating chemical in the material (this is a property of the chemical/material pair),
- the difference in chemical concentrations between the inside and outside surfaces of the material, and
- the thickness of the material.

Permeation rate is often expressed in terms of the amount of a chemical which passes through a given area of clothing per unit time. (Common units are micrograms per square centimeter per minute.) Thus, obviously, the total amount of chemical permeating an article of clothing increases as the area exposed to the chemical is increased and also as the duration of exposure is lengthened. For a given chemical/material pair, the permeation rate decreases as the material thickness is increased. The concentration gradient mentioned above pertains to concentrations in the clothing material itself. Thus, there is generally a decrease in permeation rate as the amount of chemical absorbed by the material decreases. This is discussed further in Paragraph C.3. below.

2. Breakthrough Time

Breakthrough time is defined as the elapsed time from initial contact of the outside surface of the CPC with chemical to the first detection of chemical on the inside surface. In some cases (e.g., when handling suspect carcinogens), breakthrough time may be the single most important criterion for CPC selection. Measured breakthrough times are readily determined by permeation testing and are dependent on the sensitivity of the analytical method used in the test and the test procedure. These factors should be considered when comparing breakthrough time data.

C. INFLUENCING FACTORS

1. Temperature

Most CPC permeation data and other chemical resistance information are generated at 20°-25°C. Permeation rates increase and breakthrough times decrease with increasing temperatures. The extent of the reduction in barrier performance with increasing temperature is dependent on the chemical/material pair.

2. CPC Thickness

For a given chemical/clothing material pair:

- Permeation is inversely proportional to thickness. Thus, doubling the thickness will theoretically halve the permeation rate.

- Breakthrough time increases with thickness. However, there is no simple mathematical relationship for calculating the breakthrough time at one thickness from that at another thickness.

3. Solubility Effect

Permeation rate is a direct function of the solubility of the chemical in the CPC material. Solubility is the amount of chemical that can be absorbed by a given amount of CPC material (i.e., grams liquid per gram material); absorption may be accompanied by swelling. In general, chemicals having high solubilities will rapidly permeate the CPC material in question. Thus, simple immersion testing to determine solubility is an expedient means for preliminary evaluation of candidate CPC items. (See Volume II for further discussion of solubility and permeation.)

Caution in interpreting solubility data is required, however, since low solubilities do not necessarily correspond to low permeation rates. It is important to remember that permeation rate is a function of both solubility and diffusion coefficient. Gases, for example, have low solubilities but high diffusion coefficients and may permeate CPC materials at rates several times greater than a liquid with moderate to high solubility in the material.

4. Multi-component Liquids

Multi-component liquids represent a difficult problem relative to the selection of the most appropriate CPC. Rarely is there any prior CPC experience with the particular solution of concern, and often the components of the solution are not known. Furthermore, mixtures of chemicals can be significantly more aggressive towards plastics and rubbers than any one of the components alone. Finally, the presence of a small fraction of a rapidly permeating component may carry a chemical that would permeate at a slower rate if in pure form.

At the present time, researchers are attempting to develop correlations for the prediction of multi-component permeation. Hovever, this work is in its early stages. In the meantime, immersion and permeation testing are recommended as the best means of selecting CPC for multi-component solutions.

5. Persistent Permeation

Once a chemical has begun to diffuse into a plastic/rubber material, it will continue to diffuse even after the chemical on the outside surface is removed. This is because a concentration gradient has been established with the material, and there is a natural tendency for the chemical to move towards areas of lower concentration. This phenomenon has significant implications relative to the reuse of CPC. For example, a possible field scenario is:

- chemical contacts and absorbs into a glove,
- breakthrough does not occur during the workday since the glove has low permeability to the chemical,
- prior to removal, the glove is washed to remove surface chemical, but
- the next morning some fraction of the absorbed chemical has reached the inside surface of the glove due to continued diffusion.

Of course, similar scenarios could occur over both shorter and longer time frames, for example, morning to afternoon or over a weekend. The user must take this possibility into account when reuse is considered. Factors influencing persistent permeation were discussed in Chapter 2, Part D.

CHAPTER 4

CLASSIFICATION OF CHEMICAL PROTECTIVE CLOTHING

Personal protective clothing (PPC) is a broad category into which is placed virtually any wearable item designed to protect the well-being of a worker. Chemical protective clothing is a subcategory of PPC and is intended to isolate the worker from contact with chemicals; it is the subject of this manual. Items within the subcategory range from goggles to gloves to full-body encapsulating ensembles. Respirators are not considered chemical protective clothing within the context of the *Guidelines*.

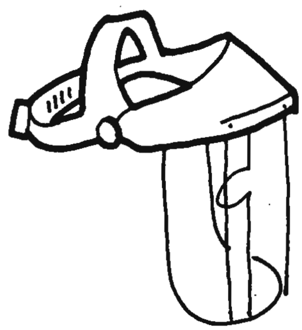
For the purposes of the *Guidelines*, the common items of CPC have been divided into ten types that represent specific parts of the body for which protection is designed. The objective is to facilitate the specification and purchase of CPC. The classification is presented in Table 4.1 which is followed by sketches of several of the items. Appendix C is a catalogue of presently available CPC and is organized according to CPC material, with subcategories for each clothing class. Appendix G addresses specifically full body protective clothing, and Appendix H addresses splash suits.

The EPA also classifies protective clothing by the level of protection that is required based on the severity of the hazard. The classification scheme and guidance for using it is represented as Appendix I. Other organizations may have different ways of classifying CPC based on either function, application, or level of protection. Full-body protection is discussed in more detail in Chapter 5.

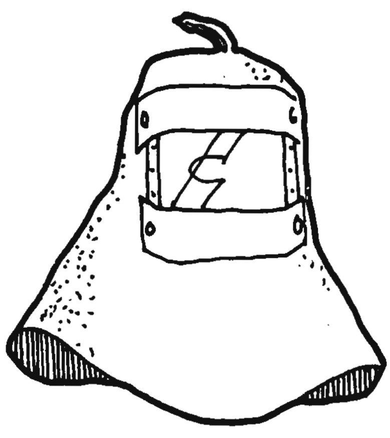
TABLE 4.1

CLASSIFICATION OF CPC

Coat, Jacket
Coverall
Apron
Pants, Bib Overall
Full-body Encapsulating
Hood
Shoe Cover
Boot
Face Shield
Glove



FACE SHIELD



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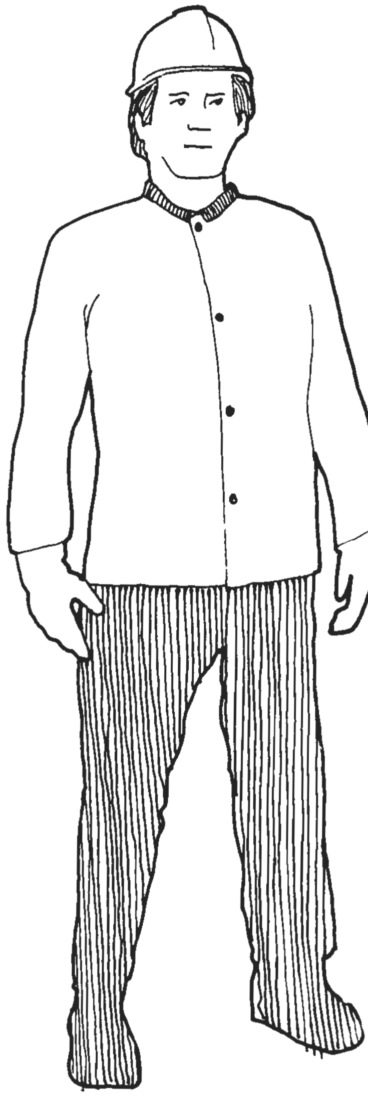
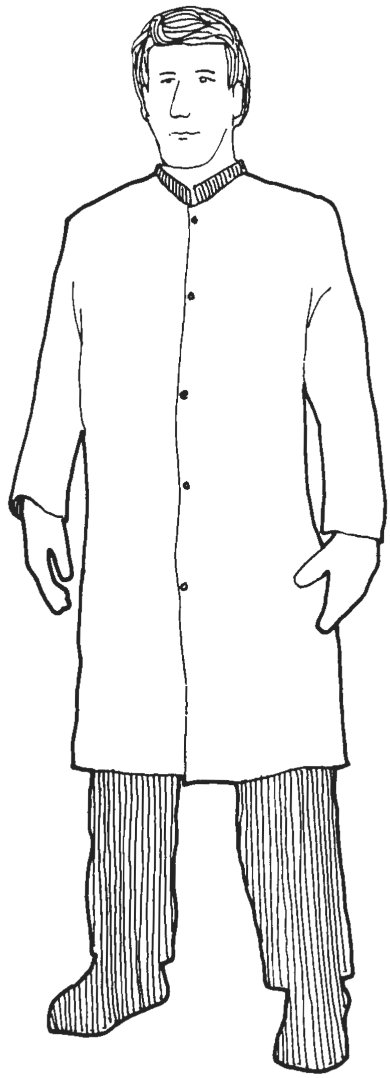


JACKET



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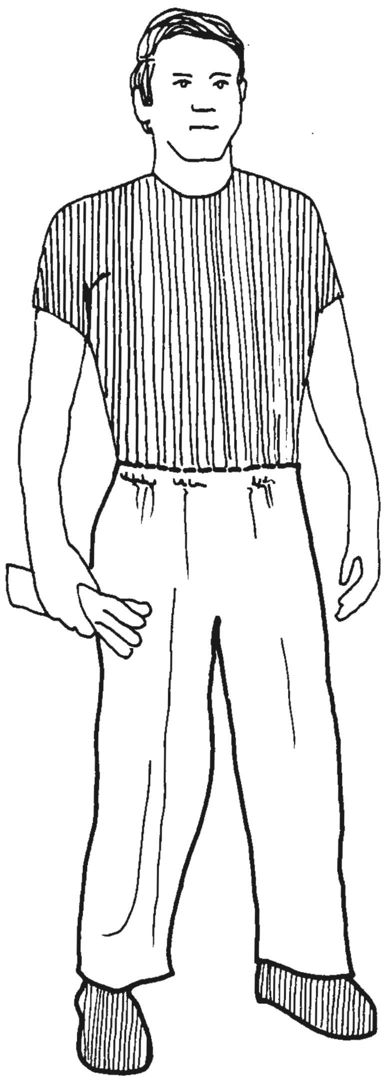

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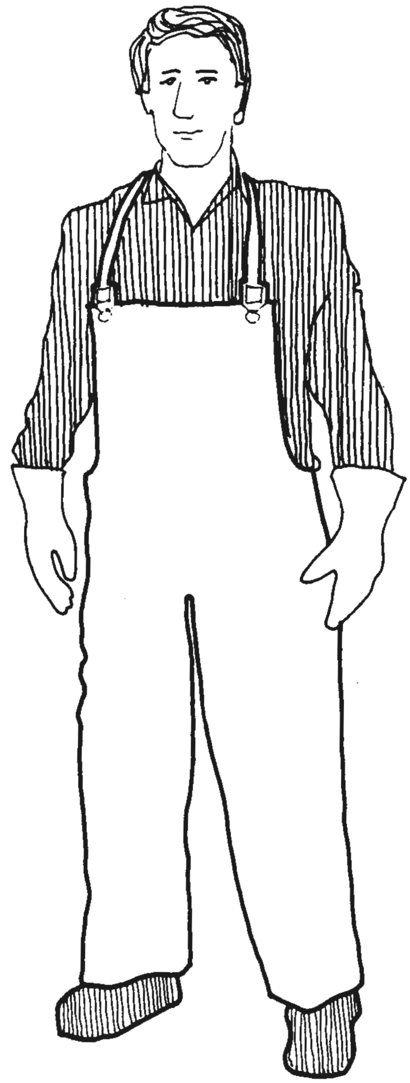
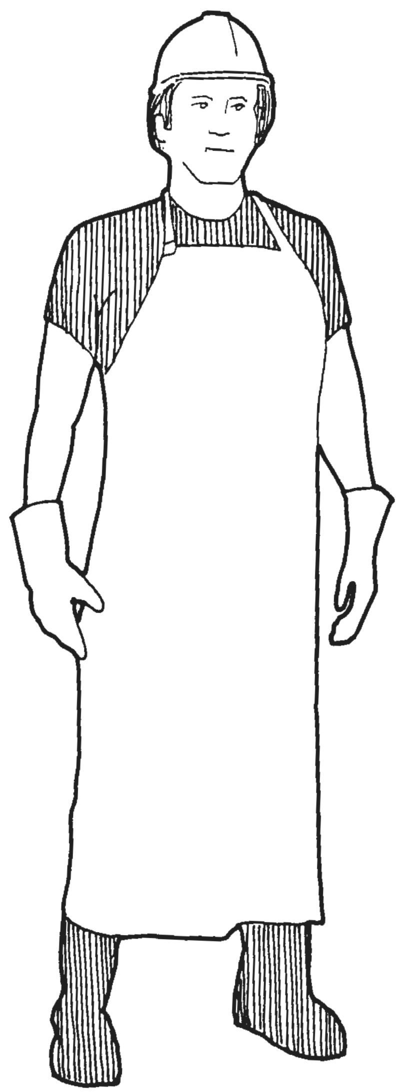
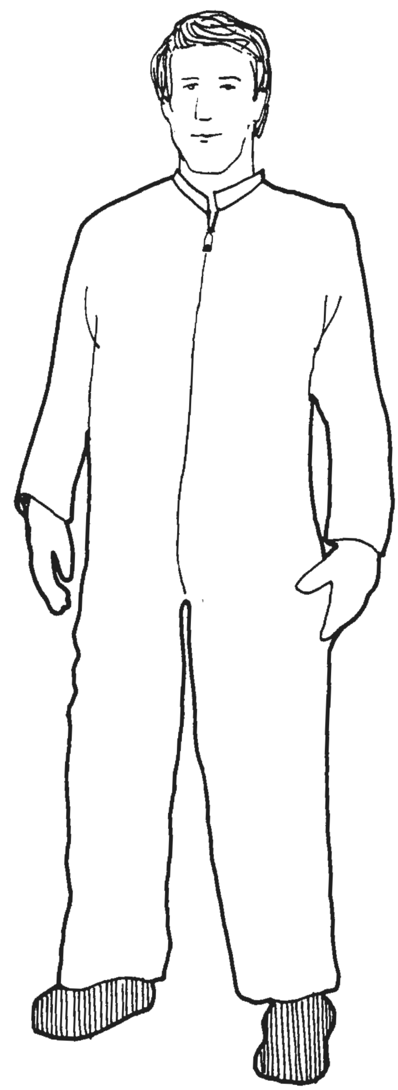


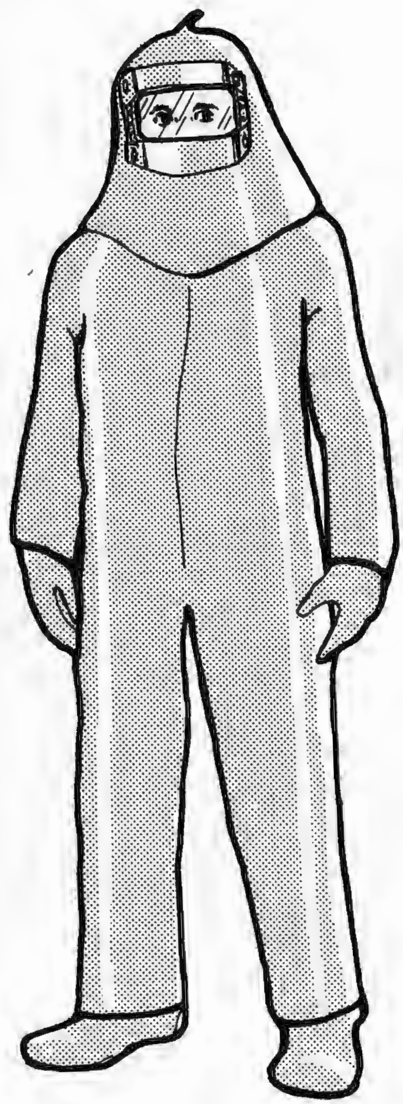
BIB OVERALL



APRON



COVERALLS



SPLASH SUIT

FULL BODY ENCAPSULATING SUIT

CHAPTER 5

FULL-BODY PROTECTION

A. INTRODUCTION

1. Purpose and Scope

The type of chemical protective clothing required for any given situation depends on the amount, composition and toxicity of the chemical(s) involved, and the duration of exposure. In the most severe cases or in cases where the above factors are poorly defined, the highest degree of body and respiratory protection is required. The EPA has categorized such protection as Level A protection. (See Appendix I.) As defined, Level A protection includes a fully encapsulating, single-piece, chemically resistant ensemble with gas-tight closures and interfaces between pants/boots and sleeves/gloves. It also includes a pressure-demand, self-contained breathing apparatus or, a pressure-demand, airline respirator (with escape bottle). Not all commercially available, fully encapsulating ensembles meet the EPA's criteria for Level A protection. The principal point of variance is the means for air supply and respiratory protection. (See Section 5.B.8.)

In less severe situations Level B or Level C protection is appropriate. Level B protection includes the same respiratory protection as Level A but two- as well as single-piece clothing is acceptable and gas-tight closures and interfaces are not required. Level C protection includes the same clothing as Level B, but an air-purifying respirator may be worn.

The National Fire Protection Association (NFPA) Subcommittee on Hazardous Chemical Protective Clothing is developing a classification for chemical protective suits that distinguishes "vapor protective" garments from "liquid (or splash) protective" garments. Each class is further divided into "rugged" or "limited use" types of garments. The result is four different classes of full-body protection. The performance requirements for each class are being established and will be promulgated as NFPA standards. Until the NFPA standard is finalized, there is no way of comparing the EPA and NFPA systems.

The purpose of this chapter is to provide information that will help guide the selection and specification of full-body encapsulating ensembles as well as so-called "splash suits." The chapter focuses on the design features and physical properties of both types. Test methods are also discussed. Tables and data sheets (Appendix G) are used to summarize the information and enable quick comparison of commercially available full-body protective clothing. A summary of chemical resistance information pertinent to specific ensemble materials is provided in Table 5.4. For more comprehensive discussions of chemical resistance, please refer to other chapters of the *Guidelines*. Respiratory protection is not addressed in the *Guidelines*.

2. Sources of Information

The information presented in this chapter was obtained principally from the vendors of ensembles and ensemble components and from review of the literature pertinent to materials testing.

In many cases the information is incomplete. Information gaps may be generally accounted for by one of three reasons: the test has not been performed, the information is proprietary, or the information was not known to the vendor. The latter situation is typical of cases in which the vendor was assembling an ensemble from components selected on the basis of overall performance rather than fundamental properties and composition.

B. ENSEMBLE DESIGN AND CONSTRUCTION

Individual data sheets that characterize thirty-nine commercially available fully encapsulating ensembles are presented as Appendix G. The data sheets are in a standard format to facilitate comparison of the various ensembles. In the following paragraphs, the fundamental elements of the ensembles and alternative approaches to their design are discussed under the headings:

- primary materials,
- seams,
- closures,
- gloves,
- boots,
- exhaust valves,
- visors,
- air supply systems,
- communication systems,
- cooling systems, and
- fittings.

Typically there are several designs available for each component. A summary of the advantages and disadvantages of various types is presented in Section 5.F.

1. Primary Materials

The primary material is the flexible plastic or rubber film, sheet, coated fabric, or laminate that composes the major portion of the external surface area of an encapsulating ensemble. In many cases the primary material includes a supporting fabric for increased resistance to tear and puncture. The primary materials of presently available encapsulating ensembles are listed alphabetically in Table 5.1, along with their respective ensemble vendors. In the table, each primary material is described from left to right in the sequence of its composition from external to internal surface. For example, for a material listed as butyl/polyester/chloroprene, butyl rubber is the outside surface of the ensemble and the chloroprene is the surface facing the wearer. Between these surface materials is a polyester fabric.

Nylon®, Dacron (polyester), and Nomex® fabrics are the principal supporting fabrics of encapsulating ensembles. The fabrics may be of woven or nonwoven type. The fabrics are either laminated to the plastic or rubber film/sheet under heat and pressure or coated with a solution of the plastic/rubber material. In addition to supplying strength, the fabric layer serves as a wear indicator. Its appearance warns of excessive abrasion and loss of thickness of the chemical barrier layer.

In some cases, a wear indicator layer is incorporated into the outer plastic/rubber material. Upon abrasion, the wear layer, which is a different color, becomes visible alerting the user to take appropriate action (i.e., repair or discard the suit).

As discussed in Chapter 3, the breakthrough time and permeation rate of a chemical through a primary material is strongly influenced by the material thickness. The primary materials listed in Table 5.1 range in thickness from 8 mils to 28 mils. (One mil is equivalent to 0.001 inches or 0.025 mm.) The strength and durability of a primary material is partially determined by its weight (i.e., weight per unit area). The materials listed in Table 5.1 range in weight from 2.5 oz/sq yd to 29 oz/sq yd. The supporting materials (fabrics) range in weight from about 1 oz/sq yd to 10 oz/sq yd.

2. Seams

The seams discussed in this section are those formed when two pieces of the primary material are joined. Other seams, such as those around closures and fittings, are discussed later. A seam should, at a minimum, equal the physical strength and chemical resistance of the primary material. Basic seaming techniques and components are described here:

<u>Stitching</u> - Stitching, typically with nylon thread, holds sections of the primary material together. In some cases the stitching is essential to the strength of the seam. Double stitching is usually used in these cases. For additional strength, the primary material is sometimes lapped (folded over) before stitching. In other cases, the stitching is not intended to provide physical strength, but rather to hold the sections in place while they are cemented or welded together. Needle holes produced by stitching are potential routes for chemical entry. The holes must be covered or sealed.

TABLE 5.1

ENCAPSULATING SUITS - PRIMARY MATERIALS

Primary Material[1]	Ensemble Vendor[2]
Butyl/Nylon/Butyl	Andover Industries Fyrepel Products Trelleborg
Butyl/Polyester/Chloroprene	Mine Safety Appliances
Chlorinated Polyethylene	ILC Dover
Chlorobutyl/Nomex®/Chlorobutyl	Arrowhead Products ILC Dover
Chloroprene/Nylon	National Draeger
Polyvinyl Chloride/Nylon	Andover Industries
Polyvinyl Chloride/Polyester	Standard Safety Equipment
Polyvinyl Chloride/Nylon/ Polyvinyl Chloride	Fyrepel Products National Draeger Trelleborg Wheeler Protective Apparel
Teflon®/Fiberglass/Teflon	Chemical Fabrics Corporation
Teflon/Nomex/Teflon	Chemical Fabrics Corporation
Viton/Nomex/Chlorobutyl	Andover Industries
Viton/Nylon/Chloroprene	Mine Safety Appliances National Draeger
Viton/Butyl/Nylon/Butyl	Trelleborg
Viton/Polyester/Viton	Fyrepel Products

[1]The primary materials are described with the external surface first and the surface facing the wearer last.
[2]See Appendix D for the address and telephone number of each vendor.

Strapping - Strapping is a narrow strip of plastic/rubber material that is cemented or welded over the seam. Strapping covers the needle holes of the stitching and provides additional strength to the seam.

Cement - Cements (adhesives) are solutions of plastics or rubbers in a solvent. Cements are used to attach strapping or to form the seam directly. When the solvent evaporates, the previously dissolved plastic/rubber remains. This residue must be equal in chemical resistance to the primary material.

Welding - Welding is the joining of materials on a molecular level and is contrasted with the mechanical approaches of stitching and adhesives. There are two types of welding: thermal and solvent. Thermal welding is achieved either by applying heat directly to the plastic or by passing an electric current through the material to generate heat (dielectric welding). Solvent welding is achieved by partially dissolving the surfaces of the plastic material and joining the surfaces under pressure. As the solvent dries, the molecules of the two surfaces become entangled and bonding occurs. A welded seam has the inherent chemical resistance of the primary material since no other material composes the seam. Not all primary materials are susceptible to welding; rubbers cannot be welded.

Sealant - Sealants (top coatings) are plastics/rubbers that are dissolved in a solvent. Sealants are used to fill the holes created by stitching. The chemical resistance of the sealant must equal that of the primary material.

3. Closures

Closures are used to seal the opening through which the ensemble is donned and doffed. There are three types of closures currently being used. The pressure sealing zipper is the most common. These zippers are designed such that the teeth of the zipper protrude only slightly through a plastic/rubber coated fabric. When the zipper is closed, the teeth lock, tightly pressing the plastic/rubber on the two sides of the zipper together forming a gas-tight seal.

Current pressure sealing zippers are manufactured using either chloroprene or polyvinyl chloride coated nylon or polyester fabric. Chloroprene is more commonly used because of the poor aging characteristics of polyvinyl chloride. The zippers are typically equipped with nickel-silver teeth and a brass slider. Zippers can be ordered with stainless steel components for additional chemical resistance.

The second type of closure found on encapsulating ensembles is based on extruded sealing lips. This closure is similar in principal to the "Ziploc®" closure of plastic bags. Sealing lips are often used in conjunction with a restraint zipper. The zipper provides closure strength and the sealing lips provide the gas-tight seal.

The third type of closure utilizes flaps of material (along both sides of the opening) which are thermally welded together after the suit is donned. Unsealing the suit is accomplished by cutting off the welded portion of the flaps. The flaps are initially sufficiently large to permit the closure to be sealed, cut, and resealed several times.

Closures may be located along one side or diagonally across the front of the garment, or along the center of the back. Frontal closures allow the user to seal or unseal his own suit. Rear closures provide easier donning and doffing but require two people to seal the suit. Rear closures are also less susceptible to liquid splashes. The lengths of current closure designs vary. The greater the closure length, the easier the donning and doffing; however, cost increases with length. Some garments also have a protective flap which covers the closure. The flap provides protection to the closure from physical abuse and chemical splashes.

Finally, the closure is typically attached to the primary material by one of the methods described above for seaming. Again, this interface must be of equal strength and chemical resistance as that of the primary material.

4. Glove/Sleeve Interface

Gloves used with Level A encapsulating ensembles must be attached to the garment in a gas-tight manner. Several physical configurations of the glove/sleeve interface are discussed here. Chemical resistance of glove materials is discussed elsewhere in the *Guidelines*.

Gas-tight glove/sleeve assemblies are of two types: integral and detachable. An integral glove is directly and permanently attached to the garment sleeve by seaming at the interface. Some manufacturers use a rigid ring at the interface to aid this attachment. Most often the seaming technique of the primary material seams (including stitching, strapping, etc.) is used. The glove can only be removed by cutting or debonding at the interface. The glove replacement procedure is not simple, and it is sometimes required that the suit be returned to the vendor. As with all seams, the glove/sleeve interface should be as strong and as chemically resistant as the primary material.

Detachable gloves are secured to the sleeve by mechanical means and can readily be replaced by the user. Alternative gloves can be used depending on the situation. There are three basic types of detachable glove/sleeve interfaces:

Concentric Rings - This interface is based on two, tapered rings about two inches wide and four inches in diameter. One ring is slightly smaller in diameter than the other and fits snugly into the larger one. The larger ring is positioned at the end of and inside the garment sleeve. The smaller ring is placed inside the glove at the glove cuff. The glove is then pushed down the garment sleeve from the shoulder. As the glove passes through the sleeve opening, the smaller insert is pressed inside the larger one, and a compression seal is formed.

Ring/Clamp - This interface uses a support ring in the sleeve and a clamp around the glove. The ring, about four inches in diameter and one inch wide, is placed in the garment sleeve near the cuff. The glove is then pulled over the ring on the outside of the garment. A glove clamp, similar to a hose clamp, is placed around the glove over the ring. The clamp is tightened to form the seal. Some ensembles include an additional piece of primary material at the end of the sleeve which folds over the clamp.

Connect Rings - In this type of interface, rings installed by the manufacturer at the glove and the sleeve cuffs are mechanically joined.

In general, the gloves should have equivalent or better chemical resistance than the primary material. However, this is not essential since the gloves can be replaced more readily than the ensemble.

Overgloves are sometimes used with encapsulating suits to provide an additional layer of chemical permeation protection and to help minimize physical abuse to attached gloves. Overgloves are typically large and bulky and are not usually attached to the suit in a gas-tight manner. Some encapsulating suits provide "splash guards" to prevent entrapment of liquid chemicals between the inner and outer gloves. A splash guard is a flap of primary material attached to the garment sleeve which can be pulled over the end of an overglove.

5. Boot/Pant Interface

There are three types of boots used with encapsulating ensembles: booties, standard boots (i.e., a boot having sole, heel and closure), and overboots. Booties are integral, sock-like terminations to the garment legs. These are typically fabricated of the primary material and are attached to the garment with a seam (usually of the same construction as the primary material seam). Booties are designed to be worn inside standard boots. Since the booties are attached to the garment with a gas-tight seam, the standard boots worn over them do not need a gas-tight interface. Typically, encapsulating suits with bootie leg terminations have "splash guards." A splash guard is a flap of primary material attached to the garment leg which can be pulled over the top of the boot in order to minimize the entry of liquids into the standard boot.

Standard boots may be integral or detachable. Gas-tight boot/pant interfaces are achieved by means similar to those described above for the glove/sleeve interfaces.

Overboots are designed to be worn over standard boots. Overboots are similar to booties (in that they have no firm sole or heel), but are much larger. Overboots can be made integral to the garment by seaming, in which case they are used in conjunction with standard boots which do not have a gas-tight interface. Alternatively, overboots can be of the pullover type with an elastic cuff, in which case they are used with standard boots which have gas-tight interfaces.

6. Exhaust Valves

Encapsulating suits are usually designed such that air from the respirator flows into the suit creating a positive pressure in the suit. The philosophy behind this design is that a positive pressure in the suit counters inward leakage of gases and liquids through any openings or pinholes in the suit. To prevent the build-up of excessive pressures which can restrict movement and stress the suit seams, encapsulating suits are equipped with exhaust valves. These valves are one-way valves designed to open at "cracking pressures" low enough to prevent excess pressures in and "ballooning" of the suits.

Cracking pressures range from less than a tenth of an inch of water to approximately 2.5 inches of water. Higher cracking pressures may restrict movement, while lower cracking pressures may allow an internal suit pressure to become negative relative to the outside atmosphere for a short period of time. Studies are on-going to determine the relationship between cracking pressure and suit performance. There are no current guidelines for the selection of appropriate suit exhaust valves.

There are two types of exhaust valves used in encapsulating ensembles. One type, the flapper valve, consists of a rubber diaphragm or disk supported under tension in a housing such that when there is equal pressure on both sides or less pressure on the inside of the ensemble, the valve is closed. When over pressure exists inside the suit, the diaphragm is pushed outward opening the valve. Flapper valves have a cracking pressure that is quite low, only several tenths of an inch of water, and cannot be adjusted.

The second type of exhaust valve employs a spring to hold the diaphragm pressed against the housing and the valve closed. When the pressure in the suit is greater than the force of the spring, the valve opens. The advantage of this type of exhaust valve is that the cracking pressure can be closely controlled.

In certain situations, such as when squatting, pressure can rapidly build inside the ensemble because of the sudden loss of free volume. This pressure must be relieved to prevent restricting the movement of the wearer and to prevent overstressing the seams. The valve must have sufficient air flow capacity to allow rapid pressure relief.

The design of the valve must provide a tight seal to prevent backflow or back diffusion of outside air which may be contaminated. Both spring controlled valves and flapper valves typically have diaphragms of natural or silicone rubber. The housings are either metal or plastic. These materials, as well as the metallic spring, are susceptible to chemical attack. The valves should routinely be inspected for material degradation and performance.

Both flapper and spring controlled valves are typically installed with covers designed to prevent direct exposure of the valve to liquid chemicals. Some valve covers are designed to seal themselves unless air is flowing out.

7. Visors

Visors are either permanently attached to the suit or are removable. Replacement of a permanently attached visor usually requires returning the suit to the vendor. Removable visors employ a mechanical clamping device and a rubber gasket to attach the visor in a gas-tight manner seal. Visors must allow clear vision with a wide field of view. The field of view should not be reduced significantly when the wearer turns his head. The materials must resist scratches and be chemically resistant. The thickness of the visor is another consideration; thin flexible visors may be subject to damage from creasing, whereas thick rigid visors are generally heavier, but can provide better physical integrity.

Visors are made from polycarbonate, acrylics, fluorinated ethylene propylene (FEP), and flexible polyvinyl chloride. All these materials have good clarity and strength. However, acrylic and polycarbonate visors are susceptible to crazing (i.e., surface cracking) upon exposure to certain chemicals. Crazing severely degrades vision clarity and can cause catastrophic failure of the visor. For these reasons, splash visors are sometimes worn over the primary visors. Splash visors are clear, flexible, disposable films of highly chemically resistant materials, such as FEP. They are intended to prevent liquid chemicals from coming into direct contact with the visor and thereby increase the useful life of the visor. However splash visors do not prevent visor exposure to vapors which, in certain situations, can also cause crazing.

8. Air Supply Systems

A detailed discussion of respirators is excluded from the *Guidelines*; however, the general respiratory protection requirements of the EPA for Levels A and B ensembles are reviewed here.

EPA guidelines on Levels A and B suits specify the use of a pressure-demand, supplied-air respirator approved by the Mine Safety and Health

Administration (MSHA) and National Institute for Occupational Safety and Health (NIOSH). Supplied-air respirators are of two general types:

- pressure-demand, self-contained breathing apparatus (SCBA), or
- pressure-demand, airline respirator (with escape bottle).

As discussed earlier in this chapter, not all encapsulating ensembles are of the Level A or B type. Several encapsulating ensembles are gas-tight but do not have a supplied-air respirator. The air supply for these suits is umbilically fed to an air distribution system in the ensemble, not to a respirator. In other ensembles the respirator or the self-contained breathing apparatus is not fully isolated from the external environment. The EPA designation for each of the thirty-nine commercially available encapsulating ensembles is shown in the upper right corner of the data sheets in Appendix G.

Egress bottles (or escape bottles) supply air to the wearer in the event that the airline is severed. Most vendors supply egress bottles as an option. In order to meet the criteria of Level A or B protection, egress bottles are required for an ensemble that is supplied air by umbilical hose.

A major consideration for selecting an air supply system is how well the garment accommodates the space requirements of the air supply system. The garment should provide sufficient space in its interior to allow a comfortable fit to the user wearing a breathing apparatus. Components of the air supply system should not chafe or cause internal wear of the garment.

9. Communications Sets

Voice communication when using full-body encapsulating ensemble can be achieved by three principal means: voice amplification, hard-wire systems, and wireless devices. Voice amplification systems, as the name implies, consist of a microphone attached through an amplifier to a belt mounted speaker. This system is useful when all persons are working within talking distance of one another. Hard-wired systems consist of a microphone and speaker headset which are connected by wire directly to other workers or to a central, base unit and then to other workers. This system is most conveniently used when the air supply to the ensemble is by umbilical hose. Wireless systems are based on radio transmitters/receivers and allow the greatest range of operations.

Whichever the system, it must be located and must operate in a manner that minimizes its impact on worker performance and safety. The total weight of the unit and the weight distribution of the unit, especially if it is worn on the head, must be considered. Also the system must not abrade the inside of the ensemble.

Microphones may be held in place against the neck (i.e., throat microphones), mounted on or in the respirator face piece, suspended in front of the mouth on a boom or, in the case of bone conduction microphones, mounted somewhere on the head. Neck microphones are well accepted and function well in high noise areas; however, some users report problems due to slippage of the microphone. Readjustment is difficult when wearing an encapsulating ensemble.

Three modes of operation are common: continuous, push-to-transmit, and voice-activated. Continuous systems are convenient to use and require virtually no training. However, they are continuously consuming power requiring frequent replacement of batteries. Push-to-transmit systems reduce battery consumption but require a free hand to operate. Voice-activated systems combine the advantages of both, they are low energy consumption and hand free operation. A slight drawback of voice-activated systems is that some training is required in their use since the first syllable of the first word is "lost" in activating the system.

Wireless systems operate on the basic principles of radio communication. So-called simplex systems transmit and receive on the same frequency. Thus, only one person can talk at a time and a fixed interval of time must elapse before the next person can begin talking. In a duplex system, two frequencies are utilized so that there can be rapid give-and-take conversation, e.g., the telephone is a duplex system. Through the use of a base station, duplex capability can be extended to large groups of people. Half-duplex systems allow one person (e.g., the foreman) to have full duplex capability but all others to have only simplex capability. Thus, the foreman can talk to and hear all members of his group but the group members can only talk to and hear the foreman. Obviously, each system has advantages and disadvantages in any given situation.

10. Cooling Systems

In isolating the worker from the environment, fully encapsulating ensembles can produce a significant thermal burden on the wearer. Cooling due to natural convection and evaporation is prevented. Thermal burden can be reduced by a variety of methods as follow:

> Passive systems such as vests containing ice, dry ice, frozen gels, or other heat sinks. These systems require equipment for pre-freezing the heat sink contents prior to use. Typically such systems have a service life of one to four hours, depending on the workload and the external temperatures. There is no control over the cooling rate or cooling distribution.
>
> Powered systems in which a chilled fluid is pumped in tubes in contact with the head, neck, chest and other body regions. The fluid may be air, water or some other heat transfer

medium. Similar to the passive systems, ice, dry ice, and frozen gels are the principal heat sinks. These systems are battery powered and typically have operating periods of one to four hours. Some systems can be controlled by the wearer.

- Umbilical air cooling systems which distribute air to the head, neck, and other body regions through a tubular manifold system. The air is exhausted through the pressure relief valves. Air flow rate can be controlled by the wearer.

- Umbilical air cooling systems in which pressurized air enters the ensemble through an expansion valve (i.e., vortex tube). The ensemble may contain one or more vortex tubes so that the cooling air is evenly distributed. However, the noise of the expansion restricts proximity to the head. With this system the wearer can control the rate of cooling.

- Powered cooling systems based on swing, Stirling cycle, and conventional compressors. Fuel- and battery-powered systems are available. To date these systems have not proven practical because of their weight. However, new developments in high efficiency, high storage capacity batteries may change this situation.

In addition to the above systems, cooling can also be achieved from the evaporation of water that is sprayed over the surface of the ensemble.

As with air supply systems, the selected cooling system (if any) should not chafe the inside of the garment.

11. Fittings

Certain ensemble configurations include umbilical or other external air supply, cooling and communication systems. Fittings are required where the lines for these systems enter the ensemble, usually through the primary material. The fittings should have standard threads or quick disconnects for attaching the lines. These fittings and the means with which they are attached to the ensemble must be selected with full consideration to chemical resistance. Furthermore their attachment to the ensemble must be sufficiently strong to prevent their being pulled out.

12. Disposable Suits

Disposable encapsulating suits are designed for limited use. Their low cost allows the user to discard the suit rather than decontaminate it after use. These suits are typically large and loose fitting and do not necessarily have gas-tight interfaces for glove and boot attachment and pressure sealing zippers. Because of their low cost, disposable suits are often used over standard encapsulating suits. This arrangement provides the user with the full, gas-tight protection offered by the standard suits and protects the (more expensive) standard suit from gross contamination.

Disposable encapsulating suits are fabricated using polyethylene-coated or Saranex®-laminated Tyvek®, or polyvinyl chloride film.

C. ENSEMBLE EVALUATION

1. Introduction

The performance of an encapsulating ensemble depends on its chemical resistance, physical properties, fit, design features, and sizing. Chemical resistance is discussed elsewhere in the *Guidelines*. The physical characteristics of encapsulating ensembles are for the most part determined on the component level and are described below. Methods for testing the overall ensemble are described in Section 5.C.4. Limited information is also provided for sizing and fit considerations.

2. Physical Properties

Standard tests exist for measuring many of the physical properties of ensemble materials and in many cases these tests are specific to an ensemble component. More than one test method exists for measuring some physical properties. Selected standard tests are listed in Tables 5.2 and 5.3. ASTM standard test methods were selected because they are readily available, regularly updated to reflect changes in the state of the art, and actively supported by an identifiable group of persons that are available for consultation.

The importance of material physical properties is often underestimated. Physical properties provide a means for estimating and comparing the strength and durability of various ensemble components. Information on certain of these properties is considered essential to the evaluation of ensembles. These key properties are identified in Tables 5.2 and 5.3 and discussed further in Section 5.C.3. Although no vendor provides data on all of the properties, it is useful for the user to be familiar with the terms:

<u>Abrasion Resistance</u> - The amount of material removed from a surface during relative motion against another surface.

<u>Antifog</u> - Measurement of the effect of water vapor condensation on the read-through characteristics of clear materials.

<u>Blocking</u> - The adherence of materials to one another or themselves.

TABLE 5.2

PHYSICAL PROPERTY TEST METHODS
(Not Including Visors)

Property	Test Method
Abrasion Resistance[1]	ASTM D3389
Blocking	ASTM D1893
Brittleness	ASTM D2137
Bursting Strength	ASTM 03786
Coating Adhesion	ASTM D751
Cut Resistance[1]	ASTM F23.20.01[2]
Durometer	ASTM D2240
Flammability[1]	ASTM D568
Flex Fatigue[1]	ASTM D671 (Plastics)
	ASTM D430 (Elastomers)
Hydrostatic Resistance	ASTM D751
Low Temperature Bending	ASTM D2136
Ozone Resistance	ASTM D3041
Penetration Resistance	ASTM F903
Pressure (Inflation) Testing	ASTM F23.50.01[2]
Puncture Propagation Tear	ASTM D2582
Puncture Resistance[1]	ASTM F23.20.02[2]
Qualitative Leak Testing	ASTM F23.50.02[2]
Seam Strength[1]	ASTM D751
Stiffness[1]	ASTM D1043 (Plastics)
	ASTM D1053 (Elastomers)
Tear Strength[1]	ASTM D751
Tensile Strength[1]	ASTM D751 (Supported Materials)
	ASTM D412 (Unsupported Materials)
Thickness	ASTM D751
UV Light Resistance	ASTM G26
Weight	ASTM D751
Zipper Strength[1]	ASTM 2061

[1] Key physical property. See Section 5.C.3.
[2] Test method is currently being developed.

TABLE 5.3

VISOR PHYSICAL PROPERTY TEST METHODS

Property	Test Method
Abrasion Resistance	ASTM D1044
Antifog	MIL-A-1542B
Distortion[1]	ASTM D881
Impact Strength[1]	ASTM D3029
Light Transmission and Haze[1]	ASTM D1003
Scratch Resistance[1]	ASTM F548
Stiffness[1]	ASTM D1043 (Plastics) ASTM D1053 (Elastomers)
Tear Resistance	ASTM D1004
Tensile Strength	ASTM D638
Thickness	ASTM D638
UV Light Resistance	ASTM G26

[1]Key property. See Section 5.C.3.

Brittleness - Evaluation of the lowest temperature at which flexible materials will not exhibit fractures or cracks when subjected to specified impact conditions.

Bursting Strength - The multidirectional force required to break a material.

Coating Adhesion - The force required to peel a coating from a substrate.

Compression Set - The residual deformation of a material when subjected to a compressive force then released.

Corrosion Resistance - The amount of mass or thickness loss from materials upon exposure to chemical environments.

Cut Resistance - The force required to cause a sharp-edged blade to cut the surface of a material.

Distortion - The deviation of the line of sight through flat or curved sections of transparent materials.

Durometer - The degree to which materials resist indentation by a specified probe under a specified load.

Flammability - The ignition, propagation, and self-extinguishing characteristics of a material.

Flex Fatigue - The number of repeated bends required to cause cracking in a flexible material.

Hydrostatic Resistance - The force required to cause the penetration of water through a coated fabric.

Impact Resistance - The force required to cause materials to exhibit fractures or cracks when subjected to impact.

Light Transmission and Haze - The light-scattering properties of transparent materials.

Low Temperature Bending - The degree of cracking that occurs at a specified temperature in a flexible material when the material is bent around a cylindrical rod.

Ozone Resistance - The degradation effects on a material as the result of ozone exposure.

Penetration - The flow of a liquid on a non-molecular level through closures, porous materials, seams, pinholes or imperfections in a protective clothing material.

Puncture Propagation Tear - The force required for a sharp object to snag and subsequently tear a material.

Puncture Resistance - The force required to penetrate a material with a cylindrical probe in a direction normal to the surface of the material.

Scratch Resistance - The degree to which clear materials are scratched or marred as a result of motion against another surface.

Seam Strength - The force required in tension to break a seam with the force applied perpendicular to the direction of the seam. This type of testing is similar to tensile testing of the primary material.

Static - The resistance to an accumulation of electrical charge.

Stiffness - The force required to twist or bend a material a specified amount or the amount of bending occurring as a result of a specific applied force.

Tear Strength - The force required to initiate or propagate a nick or cut in a direction normal to the direction of the applied force. Tear strength results are usually reported for both the warp and fill (woof) directions of coated fabrics. Warp refers to threads in a fabric running in the lengthwise direction (machine direction), and fill to the fibers in the crosswise direction (cross machine direction).

Tensile Strength - The force in tension required to break a material. Tensile strength results are usually reported for both the warp and fill directions of coated fabrics.

UV Light Resistance - The degradation effects on a material as the result of exposure to UV light.

Weight - There are two kinds of weight associated with encapsulating ensembles: the material weight and the ensemble weight. Material weight is the weight per unit area (e.g., oz/sq yd) of the primary material. The ensemble weight is the total weight of the fabricated garment. In some cases, the ensemble weight reported by vendors includes only the garment and detachable gloves and boots, while in other cases ensemble weight includes breathing apparatus and cooling. The ensemble weight reported on the data sheets in Appendix G includes only garment, gloves, and boots and not cooling and breathing apparatus.

Zipper Strength - The force required to pull a zipper apart in a direction perpendicular to the zipper direction. This is also known as zipper crosswise strength and can be applied to other types of garment closures.

3. Key Physical Properties

ASTM Committee F-23 and the NFPA are developing standards which describe a minimum battery of physical property tests to be preformed on an encapsulating ensemble. These tests will complement chemical resistance testing such as for permeation, degradation, and penetration resistance. The battery of physical tests will also standardize the methods used for measuring each physical property so that results can be compared from one product to another. Until the ASTM and NFPA standards are finalized, the tests marked with an asterisk in Tables 5.2 and 5.3 should be considered essential to the evaluation of the components of a fully encapsulating ensemble.

4. Chemical Resistance

Other chapters of the *Guidelines* address the issue of chemical resistance from the perspective of generic clothing materials categories. For example, all butyl rubber materials regardless of thickness, source, and formulation have been classified together in order to form the chemical resistance recommendations in Matrix A. Generic classifications provide general guidance as to chemical resistance but, as noted elsewhere, chemical resistance can vary significantly within a generic class. In Table 5.4, ensemble-specific chemical resistance information, for the fifteen chemicals composing the standard battery of test chemicals in ASTM F1001-86, is presented. Breakthrough time and permeation rate data are presented when available. In some other cases, qualitative ratings of chemical resistance are listed as supplied by the ensemble vendor. *The qualitative ratings should be used with extreme caution because, in several instances, it would appear that they are generic rather than specific to the clothing material.*

5. Complete Ensemble Testing

Only a few methods exist for evaluating the complete ensemble. These methods can be classified in the categories of garment pressure (inflation) testing, leak testing, and manned ensemble functionality testing. A variety of methods exists for each category and the quantitativeness of the results varies with the method. Draft ASTM standards have been proposed for both garment pressure testing and qualitative leak testing. These tests are described below.

Pressure testing measures the integrity of the suit and visor material, suit seams, and suit closures for gas tightness. The test involves the inflation of the garment to a specified pressure and either measuring a pressure drop over time or applying a soap solution to the outside of the garment to detect leaks (by the appearance of bubbles). The suit exhaust valves must be closed to perform the test and a provision must

TABLE 5.4
PRODUCT-SPECIFIC CHEMICAL RESISTANCE INFORMATION FOR FULL BODY ENCAPSULATING ENSEMBLES

Material	Vendor	Thickness (mils)	Acetone (Ketone)	Acetonitrile (Aliphatic Nitrile)	Carbon Disulphide (Sulphide)	Dichloro-methane (Aliphatic Halogen)	Diethylamine (Secondary Amine)	Dimethylformamide (Formamide)	Ethyl Acetate (Acetate)	n-Hexane (Hydrocarbon)	Methanol (Alcohol)	Nitrobenzene (Aromatic)	50% Sodium Hydroxide (Inorganic Base)	Sulfuric Acid (conc) (Inorganic Acid)	Tetrachloroethylene (Aliphatic Halogen)	Tetrahydrofuran (Furan)	Toluene (Aromatic Hydrocarbon)
Butyl/Nylon/Butyl	Andover(2)	14-15	A	U	U	U	B		B	U	A	U	A	B	U	B	U
	Fyrepel(4)	14	A		X	X	B	B	B	X	A	C	A	X	X	B	X
	Trelleborg(3)	15-18															
Butyl/Polyester/Chloroprene	MSA	19		8 ( )									8 ( )	8 ( )		0.2 ( )	
Chlorinated Polyethylene	ILC(4)	20	0.25 (1020)	1.3 ( )	0.1 ( )	0.3 ( )	B	C	1 ( )	>3 ( )	>3 ( )	1 ( )	>3 ( )	>3 ( )	C	0.5 ( )	1.2 ( )
Chlorobutyl/Nomex/Chlorobutyl	Arrowhead	19															
	ILC	20															
Chloroprene/Nylon	Draeger	ND(5)															
PVC/Nylon	Andover	15															
PVC/Polyester	Standard Safety	28-30															
PVC/Nylon/PVC	Fyrepel(4)	ND	X		X	X	B	X	X	B	A	X	B	A	X	X	X
	Draeger	ND															
	Trelleborg(3)	18	3	3	3	3	3		3	2	3	3	1	4	3	4	3
	Wheeler	20															
Teflon/Fiberglass/Teflon	ChemFab	10															
Teflon/Nomex/Teflon	ChemFab	18	>8 ( )	>8 ( )	0.3 (0.05)	0.8 (0.02)	>8 ( )	>8 ( )	>8 ( )	>8 ( )	>8 ( )	>8 ( )	>8 ( )	>8 ( )	>8 ( )	>8 ( )	>8 ( )
Viton/Nomex/Chlorobutyl	Andover(2)	20	U	U	A	B	U	U	U	A	C	B	B	A	A	U	A
Viton/Butyl/Nylon/Butyl	Trelleborg(3)	ND	3	3	1	2	3		3	2	2	2	2	2	2	3	2
Viton/Nylon/Chloroprene	MSA	23	0.7 ( )										8 ( )	8 ( )		0.1 ( )	
	Draeger	ND															
Viton/Polyester/Viton	Fyrepel(4)	8	X		A	B	X	X	X	A	C	B	B	A	A	X	A

(1) Number preceding parentheses is breakthrough time in hours; number in parentheses is permeation rate in $\mu g/cm^2/min$. If no parentheses follows number, see footnote (3).

(2) A = recommended; B = minor effect; C = moderate effect; U = not recommended

(3) 1 = not effected; 2 = slightly effected; 3, 4, 5 = material can be destroyed

(4) A = recommended; B = minor-to-moderate effect; C = moderate to severe; X = not recommended

(5) No data

be made for attaching a pressure gauge. Some manufacturers specify the pressure to which the suit should be inflated. The proposed ASTM method specifies a maximum inflation pressure (3 inches water gauge pressure), a test pressure (2 inches water), and an allowable pressure drop (20%) over a three-minute period. It also requires using the soap solution to locate leaks if the suit does not meet the pass/fail criteria.

Leak testing measures the integrity of the entire ensemble to a gas challenge agent in a manner simulating actual use. This testing involves exposing a test subject wearing the ensemble in a closed chamber to a challenge agent and measuring the agent concentration both inside and outside the suit. The proposed ASTM method employs ammonia gas at a concentration of 1000 to 2000 ppm and length of stain detection tubes. Other methods may use different gases or aerosols (at non-toxic concentrations) and appropriate detection methods. Dependent on the means used to measure the presence of gas, the test can be qualitative, semi-quantitative or quantitative. When concentration measurements are precise, the results can be used in a semi-quantitative manner by ratioing the external to internal gas challenge agent concentrations for calculating a protection factor. Large protection factors are indicative of high ensemble integrity.

Manned ensemble testing is often performed to determine the range of activities that a user can do while wearing the ensemble. These may include different types of exercises or tasks which simulate the end application of the suit. Results from these tests are generally subjective regarding the design, comfort, and fit of the garment. Measurement of the wearers physiological condition (e.g., core temperature, skin temperature, heart rate, and blood pressure) during this testing can help quantify the results when compared to tests with the subject not wearing the ensemble.

6. Ensemble Sizing and Fit

Manufacturers may offer one size or several sizes of their respective garments. (See Appendix G.) There are no standards for sizing these garments; consequently, one manufacturer's "large" may not fit the same group of people as another manufacturer's "large." Generally, the more sizes offered by a manufacturer, the greater the range of people who will comfortably (and functionally) be fit by a given garment design. The only way to gauge the fit of a garment is to actually try on each of the available sizes offered by the manufacturer.

D. QUALITY CONTROL

There is no industry standard test series by which the quality of fully encapsulating ensembles is controlled. The level of manufacturer quality assurance ranges from simple visual inspections to a large battery of tests on the ensemble and its components. Some manufacturers perform lot-by-lot tests to verify chemical resistance and physical properties of the primary materials. All the vendors listed in Table 5.1 subject completed ensembles to pressure (inflation) testing, as previously described. While closure, interface or seam imperfections are thereby located and corrected prior to shipping, this does not test exhaust values.

None of the vendors provided any insight into minimum physical property values or performance levels acceptable for any of the individual components of an encapsulating ensemble. Indeed, while limits would be most useful in evaluating suit components, it would be difficult to set such limits since they are highly dependent on the application conditions.

Both the ASTM F-23 Committee and the NFPA Subcommittee on Hazardous Chemical Protective Clothing are developing standards which would increase the information provided by manufacturers on the performance of these garments. The proposed ASTM standard would specify documentation requirements for chemical protective suits and suit components. The NFPA is writing performance standards for each type of chemical protective suit in its proposed suit classification system.

E. SPLASH SUITS

Level B (and Level C) protective clothing, as defined by the EPA, is used in situations where the atmospheric concentration of toxic substances requires a high level of respirator protection, but less skin protection than Level A. (See Appendix I for further explanation.) The garment should cover most of the body, but is not completely sealed. This type of clothing is commonly referred to as a "splash suit." Several of the major manufacturers of splash suits and their products are listed in Appendix H. The styles and primary materials are given along with the major construction features.

In many cases, chemical splash suits are almost identical to commercial rain gear. Splash suit components include jacket, pants (usually overalls), coveralls, and hood. Splash suits minimize exposure to liquids. However, the closures and interfaces are not gas- or liquid-tight.

The primary material in splash suits is typically a fabric-supported plastic or rubber film/sheet. The most commonly used plastic is polyvinyl chloride. Other polymers used include: polyethylene, chloroprene, styrene/butadiene rubber, polyurethane, a blend of nitrile rubber and polyvinyl chloride, and butyl rubber. The seams of the primary material are usually stitched and cemented or welded.

The closures on splash suits need not be liquid proof. They typically are either simple zippers or snaps. The snaps can be metal or plastic. Closures often have a storm fly front, which is an extra flap of material in front of the closure to prevent direct liquid contact with the closure.

Other construction features of splash suits include batwing sleeves (extra material under the arm for a greater degree of movement) and take-up snaps on the sleeves and pant cuffs (to reduce but not seal arm and leg openings). Splash suits do not include integral gloves, boots, or air supply systems; these are separate components.

Disposable splash suits are fabricated using polyethylene-coated or Saranex®-laminated Tyvek® as the primary material. Jackets, pants, coveralls, and hoods are available as disposables.

F. ENSEMBLE SELECTION CONSIDERATIONS

The selection of fully encapsulating ensembles and splash suits depends on:

- the nature and severity of the hazard,
- the type and duration of the tasks to be performed,
- the performance features and limitations of the available clothing, and
- cost.

The information provided in Appendix I provides considerable guidance to assist in matching the level of protection to the hazard. The selection of an ensemble for a specific application typically involves trade-offs among physical and chemical properties, design features, and human factors considerations.

There are no current ensembles which provide both flame and chemical protection. Nearly all CPC materials will ignite and burn when contacted by flame. These ensembles should not be used for situations where the probability of contact with flame or flashover conditions is high. Combined thermal and chemical protective suit systems should be considered carefully. Thermal protection may be worn either inside or outside the chemical protective suits. When externally worn, thermal protective clothing is subject to contamination and must be disposed of after use. When worn inside (e.g., aramid fiber jumpsuit), the integrity of the chemical protective clothing will be lost in a flame situation, resulting in a potentially life-threatening situation. Alternatively, thermal protection can be worn both inside and outside the suit.

In any of these cases, the additional burden (weight/heat stress) to the wearer must be considered.

In Table 5.5 are listed the advantages and disadvantages of many of alternatives discussed earlier. Chemical resistance issues are not included in the table as they are discussed elsewhere in the *Guidelines*. Neither is cost addressed. Ensemble design and component alternatives are characterized in a qualitative manner since there are no generally accepted quantitative criteria by which they can be assessed. The state of the art is not sufficiently advanced for setting minimum physical property or performance values for ensemble materials and components. However, the NFPA Subcommittee on Hazardous Chemical Protective Clothing is engaged in several studies to define performance levels for chemical protective suits used in emergency response.

TABLE 5.5

ADVANTAGES AND DISADVANTAGES OF ALTERNATIVE ENSEMBLE COMPONENTS

COMPONENT	ADVANTAGES	DISADVANTAGES	COMMENTS
PRIMARY MATERIAL			
COMPOSITION	WIDE VARIETY AVAILABLE		CHEMICAL RESISTANCE VARIES FROM MATERIAL TO MATERIAL AND FROM VENDOR TO VENDOR. FLAME RESISTANCE SHOULD BE CONSIDERED
SUPPORTING FABRIC	ADDS STRENGTH	INCREASES WEIGHT REDUCES FLEXIBILITY EDGES MUST BE SEALED	
WEAR INDICATOR	INDICATES REDUCED PROTECTION		PREFERRED
THICKNESS/ WEIGHT	INCREASES STRENGTH INCREASES PROTECTION	INCREASES WEIGHT REDUCES FLEXIBILITY	
SEAMS			
WELDED	CHEMICAL RESISTANCE EQUIVALENT TO THAT OF PRIMARY MATERIAL LESS BULKY LESS SUSCEPTIBLE TO SNAGGING	RUBBER MATERIALS CANNOT BE WELDED	
STITCHED	APPLICABLE TO ALL MATERIALS	REQUIRES STRAPPING OR SEALANTS MUST BE TESTED FOR CHEMICAL RESISTANCE PENETRATION THROUGH PINHOLES	LAPPED AND DOUBLE-STITCHED CONSTRUCTIONS PREFERRED

TABLE 5.5 (CONTINUED)

ADVANTAGES AND DISADVANTAGES OF ALTERNATIVE ENSEMBLE COMPONENTS

COMPONENT	ADVANTAGES	DISADVANTAGES	COMMENTS
CLOSURES			
PRESSURE SEALING ZIPPER	SIMPLE	AVAILABLE MATERIALS HAVE LIMITED CHEMICAL RESISTANCE	STAINLESS STEEL TEETH AND SLIDER AVAILABLE FLAP MAY BE ADDED TO PROTECT ZIPPER
SEALING LIP ZIPPER	PROTECTS ZIPPER FROM ENVIRONMENT	TWO-STEP PROCESS: ZIPPER AND SEAL REQUIRES DEXTERITY SOME SEALING LIP MATERIALS MAY BECOME STIFF/UNOPERABLE IN COLD WEATHER	
WELDED	CHEMICAL RESISTANCE EQUIVALENT TO THAT OF PRIMARY MATERIAL	HEAT SEALING EQUIPMENT REQUIRED DON/DOFF REQUIRES HELPER LIMITS NUMBER OF REUSES	
FRONT	MAY BE USER OPERATED, IF ZIPPER EMERGENCY DOFFING, IF ZIPPER	MORE DIFFICULT TO DON AND DOFF SUIT MORE SUSCEPTIBLE TO CHEMICAL EXPOSURE	
BACK	LESS SUSCEPTIBLE TO CHEMICAL EXPOSURE EASIER TO DON/DOFF SUIT	TWO-MAN OPERATION	
GLOVE/SLEEVE & BOOT/PANT INTERFACE			OVERGLOVES/BOOTS INCREASE PROTECTION AND SERVICE LIFE BUT REDUCE MOBILITY, TACTILITY AND DEXTERITY
INTEGRAL	FACTORY SEALED AND TESTED	DIFFICULT TO REPLACE, MAY REQUIRE RETURN TO FACTORY NOT INTERCHANGEABLE FOR FIT OR CHEMICAL RESISTANCE	

TABLE 5.5 (CONTINUED)

ADVANTAGES AND DISADVANTAGES OF ALTERNATIVE ENSEMBLE COMPONENTS

COMPONENT	ADVANTAGES	DISADVANTAGES	COMMENTS
DETACHABLE	EASY TO REPLACE CAN BE OPTIMIZED FOR FIT AND CHEMICAL RESISTANCE	SEAL IS MADE IN FIELD AND IS NOT READILY TESTED	
--CONCENTRIC RINGS	NO MECHANICAL PARTS	RELIES ON COMPRESSION SEAL; NO CLAMP OR LOCK DIFFICULT TO INSPECT	
--RING/CLAMP	SIMPLE EASILY INSPECTED MECHANICAL SEAL	MAY REQUIRE TWO PERSONS CORROSION OF CLAMP	
--CONNECT RINGS	EASE OF USE MECHANICAL SEAL	COMPLEXITY REPAIR MAY REQUIRE RETURN TO FACTORY	
EXHAUST VALVES			VALVES SHOULD BE COVERED TO PREVENT DIRECT EXPOSURE TO LIQUIDS. COVERS SHOULD BE OF A DESIGN WHICH MINIMIZES BACK DIFFUSION
FLAPPER	SIMPLE	CANNOT ADJUST CRACKING PRESSURE CHEMICAL RESISTANCE OF DIAPHRAGM	
SPRING-OPERATED	CAN ADJUST CRACKING PRESSURE	CORROSION RESISTANCE OF SPRING CHEMICAL RESISTANCE OF DIAPHRAGM	

TABLE 5.5 (CONTINUED)

ADVANTAGES AND DISADVANTAGES OF ALTERNATIVE ENSEMBLE COMPONENTS

COMPONENT	ADVANTAGES	DISADVANTAGES	COMMENTS
VISORS			SPLASH VISORS INCREASE PROTECTION AND VISOR SERVICE LIFE. SPLASH VISORS MAY RESTRICT HEAD ROTATION AND INTERFERE WITH VISION
INTEGRAL	FACTORY SEALED AND TESTED	REPLACEMENT REQUIRES RETURN TO FACTORY	
DETACHABLE	VISORS EASILY REPLACED	SEALING IS USER DEPENDENT CHEMICAL RESISTANCE OF GASKET	
FLEXIBLE	LIGHTWEIGHT	MAY CREASE RESULTING IN DECREASE IN CHEMICAL RESISTANCE	
RIGID	STURDY, DURABLE	HEAVY, MAY SHATTER (IF GLASS)	
AIR SUPPLY SYSTEMS			
SCBA	WIDE RANGE OF OPERATION	DURATION OF ACTIVITY LIMITED BY AIR SUPPLY ENSEMBLE MUST BE DESIGNED TO ACCOMODATE SCBA WEIGHT	
AIRLINE	LONG WORK PERIODS COOLING AIR CAN ALSO BE SUPPLIED	LIMITS RANGE OF OPERATIONS	CHEMICAL RESISTANCE OF AIRLINE SHOULD BE CONSIDERED

TABLE 5.5 (CONTINUED)

ADVANTAGES AND DISADVANTAGES OF ALTERNATIVE ENSEMBLE COMPONENTS

COMPONENT	ADVANTAGES	DISADVANTAGES	COMMENTS
COMMUNICATION SETS			VOICE COMMUNICATION IS ESSENTIAL FOR SAFE, EFFICIENT WORK
VOICE-AMPLICATION	INEXPENSIVE	FUNCTIONAL OVER SHORT DISTANCES	
HARD-WIRED SYSTEM	EXTENDS RANGE OF OPERATION	REQUIRES ALL PERSONS BE CONNECTED BY WIRE	
WIRELESS	VOICE/HEARING QUALITY HIGH ALLOWS WIDE RANGE OF OPERATION	BATTERY LIFE LIMITS OPERATION PERIOD SOME TRAINING REQUIRED	USER MUST DECIDE AMONG CONTINUOUSLY ON, PUSH TO ACTIVATE, OR VOICE ACTIVIATION. ALSO, AMONG SIMPLEX, DUPLEX OR HALF-DUPLEX
COOLING SYSTEMS	ALLOWS EXTENDED WORK PERIODS REDUCES LIKELIHOOD OF HEAT STRESS	ADDED WEIGHT/BULK UMBILICAL SYSTEMS RESTRICT RANGE OF OPERATION PASSIVE SYSTEMS ALLOW NO CONTROL OF COOLING RATE	

CHAPTER 6

CPC USE PROCEDURES

A. PURCHASE

Protective clothing is purchased either directly from the manufacturer or through a CPC distributor. Listings of these organizations may be found in, for example, the Thomas Register or Best's Safety Directory. A fairly extensive listing is provided as Appendices C and D. The larger distributors carry several manufacturers' products and a wide variety of products. Virtually every manufacturer has a catalogue of its products which describes each product as to the sizes available, thickness of the rubber or plastic barrier, and the materials of construction. For convenience, detailed summaries of this information for full-body ensembles is provided as Appendices G and H.

Many of the catalogues also contain chemical resistance ratings charts for the products. The reliability of the ratings varies from vendor to vendor. Some ratings are based on extensive testing, while others would appear to have minimal supporting evidence. Further comments on CPC vendors' literature are presented in Chapter 7.

In making CPC purchase decisions, important considerations are:

- the application to which the clothing will be put,
- the recommendations presented in Chapter 8,
- past experience with the particular item of clothing, and
- cost and availability.

B. PRE-USE INSPECTION

Each item of clothing should be inspected immediately upon removing it from the package. First determine that the material of construction is that which was ordered or specified for the task at hand. This will involve comparing the item number with the catalogue number. Items of different materials should be kept separated. (See Storage below.)

Visually inspect the items for defects such as imperfect seams, non-uniform coatings, pinholes, malfunctioning closures, and tears. Some flexible materials may stiffen during extended storage periods; flex the product and observe for surface cracks or other signs of shelf life deterioration. Pinholes may be detectable by holding the garment up to a light in a dark room. Gloves with holes can be identified by pressurizing the glove. This can be accomplished by blowing into the glove and then tightly rolling the gauntlet towards the fingers (thereby reducing volume and increasing pressure) while observing that the glove holds pressure. Alternatively, the glove could be inflated and then held under water and examined for the presence of air bubbles. Full-body encapsulating ensembles should be checked for the operation of pressure relief valves and the fittings at the wrists, ankles, and neck. Standard methods for leak testing full-body ensembles are discussed in Chapter 5.C.5.

C. DONNING

Each worker should thoroughly inspect the clothing he is to wear immediately before donning. Of principal concern are cuts, tears, punctures, and discoloration or stiffness which may be indicative of chemical attack resultant from previous use or non-uniformities in the rubber or plastic. The wearer should understand all aspects of the clothing operation and its limitations; this is especially important for full-body encapsulating ensembles where misuse could potentially result in suffocation. Note some materials may have temperature limitations; for example, some CPC become stiff and may be unusable at low temperatures.

Once the clothing is on, all closures should be secured and checked. Use the "buddy system." Finally, the fit of the clothing should be evaluated. Improperly fitting protective clothing represents a severe potential hazard. Where clothing is too small, worker movement is restricted, likelihood for tear is increased, and the potential for accelerated worker fatigue is increased. Where the clothing is too large, the possibility of snag is increased, and the dexterity and coordination of the worker may be compromised.

D. IN-USE

During the course of the work task, each worker should periodically inspect his protective clothing. Of principal concern are tears, punctures, seam discontinuities, or closure failure that may have developed while working. Evidence of chemical attack such as discoloration, swelling, stiffening, or softening should also be noted. (Note: Permeation can occur without any visible effects on the clothing material.) Any item of clothing that has been physically damaged or chemically degraded should be doffed and replaced as soon as safely possible.

E. DOFFING

A principal objective of the doffing process is to restrict the transfer of chemical from the work area. A second objective is to avoid contact of the person doffing the garment as well as others with chemical on the outside of the garment.

Detailed doffing procedures have been developed by the EPA and are contained in the *Interim Standard Operating Safety Procedures* of the Office of Emergency and Remedial Response, Hazardous Response Support Division. Part 7 and pertinent Annexes of the *Interim Standard* are included herein as Appendix J.

They address:

- doffing site location,
- decontamination, and
- disposal of contaminated garments.

F. REUSE AND STORAGE

Several considerations relative to the storage and reuse of protective clothing were discussed in Chapter 2. They primarily focus on hazards that could potentially develop upon the storage of contaminated clothing. Briefly, in cases where a chemical is absorbed by the clothing, the chemical begins to permeate into the clothing. Short duration washing of the clothing with soap and water removes surface contamination but not absorbed chemical. After surface decontamination, some of the absorbed chemical will continue to permeate the clothing material and may ultimately appear on the inside surface. This can happen during periods of overnight or weekend storage. Where such potential hazards may develop, clothing can be checked inside and out for discoloration or, if possible, by wipe testing for suspect chemicals prior to reuse. This is particularly important for full-body encapsulating ensembles which are generally subject to extensive reuse due to their cost. Note, however, that negative (i.e., no chemical found) test results do not necessarily preclude the possibility that some absorbed chemical will be released to the inside of the CPC during reuse.

It should be noted that, at the present time, there is very little documentation regarding clothing reuse. The use of disposable clothing, of course, obviates the problem. Where reusable CPC is required, however, the type of problem discussed above can best be minimized by selecting the most resistant clothing for the chemical at hand; such clothing will absorb little or no chemical. Furthermore, used clothing should be stored in well-ventilated areas. Ideally, there should be good air flow around each item of clothing.

Reuse of face shields and lens is a particularly important issue. Good vision is required for both safety and efficiency on the work site. All such items should be inspected for crazing, cracks, and fogginess prior to use. See Chapter 3, Part D, in Volume II.

Finally, in storing protective clothing, different types of materials of clothing should not be mixed. For example, gloves which are black in color and virtually indistinguishable from one another may be made from nitrile, neoprene, Viton, polyvinyl chloride, butyl, etc., materials. Each material has unique chemical barrier properties. Mixing the gloves significantly increases the chance that a worker will be wearing the wrong clothing for the chemical of concern. It may be possible to separate mixed gloves by using the manufacturer's product number that is often found in the gauntlet area.

CHAPTER 7

CPC VENDORS' LITERATURE

A. INTRODUCTION

The most widely available sources of information on CPC are the product catalogues of the CPC manufacturers and vendors. These booklets contain descriptions of the types, sizes, and varieties of CPC produced by each manufacturer. In most cases the basic materials of construction of the CPC are also included in the product descriptions. Many manufacturers also include information pertinent to the chemical resistance of their products or of the materials from which the products are fabricated. This information is often in the form of tables of qualitative chemical resistance ratings or use recommendations for the products/materials and particular chemicals. However, the leading manufacturers are increasingly providing information from permeation testing. A few vendors also provide information pertinent to abrasion, tear, etc., resistance but in general most catalogues do not address such application-related issues. Since the focus of these *Guidelines* is the selection of clothing for protection from exposure to chemicals, the vendors' chemical ratings and recommendations tables are the focus in this chapter; they are discussed in more detail in Chapter 4 of Volume II.

B. COMMENTS ON VENDORS' CPC RATINGS AND RECOMMENDATIONS

Of the 150 CPC catalogues which were obtained and reviewed in the preparation of the *Guidelines*, 26 contained some form of chemical resistance information for the products described therein. The information was both qualitative and quantitative. The qualitative ratings/recommendations typically were on a four-grade scale of "excellent," "good," "fair," and either "poor" or "not recommended." In a small number of cases, five- or six-grade scales were used. With the exception of those tables based on permeation testing, these tables do not include information as to the basis for the recommendations. From the results of interviews with several of the vendors who do not supply permeation test results, it would appear that, at present, most do not have (or at least are unwilling to share) performance specifications or quantitative test data for their products. The ratings/recommendations for a particular type of product (for example, nitrile gloves) for a particular chemical may vary from vendor to vendor. Both of these factors--little or no test data and inconsistencies among recommendation tables--make the selection, from qualitative information, of the best CPC for a given application a difficult and uncertain task.

An increasing number of vendors have available or are providing permeation test data, i.e., breakthrough times and permeation rates. These data allow the comparison of CPC products. However, such comparisons must be performed with caution since test results can be influenced by the testing method. For example, analytical sensitivity can strongly influence the detection of breakthrough. Also, some vendors report the earliest breakthrough time found in replicate tests while others report an average value.

Given the above facts, the most important consideration to keep in mind when using vendor recommendation tables, including those based on permeation tests, is that the tables are intended to provide guidance in the selection of CPC. That is, the tables are meant as a place to start the CPC selection process. The tables are meant for identifying candidate CPC for further evaluation and are particularly useful for identifying CPC from which poor performance would be expected and, therefore, which can be dropped from consideration. In no way do the recommendations address the wide variety of uses, challenges, and care to which the CPC may be subjected. Most vendors strongly emphasize this point in the descriptive text which accompanies the tables. Secondly, the vendors' recommendations were not developed by, nor are they sanctioned by, industrial hygienists or other safety professionals. CPC manufacturers are in business to sell clothing and not to set the standards for safety at any given work site. In conclusion, the principal purpose of the catalogues is to provide information about products in terms of the sizes, styles, and materials of construction. The ratings charts should only be used as a starting point for further evaluation if chemical resistance is an issue.

C. VENDORS' TEST METHODS

The quality of the test methods used by vendors to generate data to support their recommendations range from state of the art to rudimentary. Since the promulgation of ASTM Method F739, several CPC vendors have generated tabulations of permeation data for their products. As additional standards are developed, an increase in testing can be expected.

It would appear, however, that many purveyors of recommendation tables continue to rely on information provided by the supplier of the raw materials from which the clothing is fabricated. In general, the suppliers' ratings are based on some form of immersion testing, but little or no permeation testing. Two drawbacks of this approach are (1) the raw material supplier may be unaware of the special needs of CPC, and (2) the CPC vendor has no firsthand knowledge of the chemical resistance of his products. Potential problems associated with the first drawback are:

- Chemical permeation of a rubber or plastic material can occur with little or no physical effect on the rubber or plastic. This may or may not be detected by an immersion test.

- The information provided by the materials supplier is typically developed for a general elastomer/plastic formulation or type.

A result is that the recommendation may not take into account formulation modifications that are required to put the material into a form appropriate for CPC.

A further comment on recommendation tables based on immersion testing is that most are quite old, and based on subjective observation of immersion test specimens rather than quantification of swelling, weight, or strength changes. In many cases the details of the testing and the qualitative descriptions for defining "excellent," "good," etc., were not documented. Thus, it becomes impossible to compare results. Another consideration associated with the age of the recommendations is that as time passes and

1. raw materials suppliers change formulations,

2. CPC manufacturers change raw materials suppliers, and

3. CPC manufacturers change production methods,

the performance of the same "nominal" product may also change. There is no indication that recommendations are routinely updated to reflect these changes, except in a few exceptional cases. These considerations may also apply to permeation data and the recommendations based on them. *Again, the CPC recommendation tables should only be used for guidance. This includes those presented in the next chapter.*

CHAPTER 8

CPC RECOMMENDATIONS

In this chapter, CPC recommendations for approximately 500 chemicals or aqueous solutions are presented. In addition, the chemicals have been grouped into generic families (e.g., acids, amines, etc.) and general recommendations are made for each family which is represented by more than one chemical having CPC performance information for a given material. The recommendations are contained in Matrices A and B, and the data on which the recommendations are based are tabulated in Appendices A through E in Volume II. Appendix F in Volume II contains permeation data for several non-aqueous, multi-component solutions. The matrices are complemented by Appendices B through H which contain information pertinent to the acquisition of CPC such as a directory of vendors' addresses and telephone numbers.

A. SCOPE AND LIMITATIONS

1. Chemicals

Two matrices have been developed. Matrix A (pp. 66-120) contains CPC recommendations for approximately 500 chemicals or aqueous solutions and 33 clothing materials. The chemicals are the liquids included in the Clean Water Act (CWA) Sections 311 and 307a, the Clean Air Act (CAA) Section 112, and the Resource Conservation and Recovery Act (RCRA) Sections P, U, F, and K. Also included are any other chemicals (principally liquids but including some gases) for which there were CPC vendors' recommendations or technical reports of permeation test results. No recommendations are presented for non-aqueous, multi-component solutions. Vendors' recommendations or permeation data were not available for all the liquids addressed in the aforementioned acts. Approximately 40% of the chemicals are included in OSHA Directive Subpart 2--Toxic and Hazardous Substances, 29 CFR 1910.1000, Tables Z-1 and Z-2.

2. Chemical Classes

An alphabetical list of the chemicals is presented in Appendix B. Note where a percentage follows the name of the chemical, it is indicative of the concentration of the chemical in water. All other liquids are single-component. Multi-component organic solutions are not addressed although permeation data for some are presented in Appendix F in Volume II. The right-hand column of Appendix B contains two pieces of information for each chemical: the chemical abstract number (CAS number) and a numeric "chemical class" code. The code is the "key" to Matrix A since the matrix is organized numerically by chemical class, with the code shown in parentheses following the generic class name. The chemical classification scheme is summarized in Table 8.1 and is based on the

TABLE 8.1

LISTING OF CHEMICAL CLASSES

Class Name	Class Code
ACIDS, CARBOXYLIC, ALIPHATIC	
Unsubstituted	102
Substituted	103
Polybasic	104
Others	106
ACID HALIDES, CARBOXYLIC	
Aliphatic	111
Aromatic and Heterocyclic	112
ALDEHYDES	
Aliphatic and Alicyclic	121
Aromatic and Heterocyclic	122
AMIDES	
Amides	132
AMINES, ALIPHATIC & ALICYCLIC	
Primary	141
Secondary	142
Tertiary	143
Polyamine	144
AMINES, AROMATIC	
Primary	145
Secondary, Tertiary	146
Polyamine	147
ANHYDRIDES, CARBOXYLIC	
Aliphatic	161
CYANIDES	
Cyanides	215
ESTERS, CARBOXYLIC	
Formates	221
Acetates	222
Higher Monobasic	223
Polybasic	224
Aromatic Phthalates	226

TABLE 8.1 (Continued)

LISTING OF CHEMICAL CLASSES

Class Name	Class Code
ESTERS, OTHER THAN CARBOXYLIC	
Sulfonates	232
Others	233
ETHERS	
Aliphatic	241
Aromatic	242
Alkyl-Aryl	243
HALOGEN COMPOUNDS	
Aliphatic, Unsubstituted	261
Aliphatic, Substituted	262
Aromatic, Unsubstituted	263
Aromatic, Substituted	264
Polynuclear	265
Vinyl Halides	267
HETEROCYCLIC COMPOUNDS	
Nitrogen, Pyridines	271
Nitrogen, Quinolines	272
Nitrogen, Others	274
Oxygen, Epoxy Compounds	275
Oxygen, Furan Derivatives	277
Oxygen, Others	278
Sulfur	279
HYDRAZINES	
Hydrazines	280
HYDROCARBONS	
Aliphatic and Alicyclic	291
Aromatic	292
Polynuclear	293
HYDROXYL COMPOUNDS	
Aliphatic & Alicyclic, Primary	311
Aliphatic & Alicyclic, Secondary	312
Aliphatic & Alicyclic, Tertiary	313
Aliphatic & Alicyclic, Polyols	314
Aromatic	316

TABLE 8.1 (Continued)

LISTING OF CHEMICAL CLASSES

Class Name	Class Code
INORGANIC ACIDS	
Inorganic Acids	370
INORGANIC BASES	
Inorganic Bases	380
INORGANIC GASES	
Inorganic Gases	350
INORGANIC SALTS	
Inorganic Salts	340
ISOCYANATES	
Isocyanates	210
KETONES	
Aliphatic & Alicyclic	391
Alkyl-Aryl	393
LACTONES	
Lactones	400
MISCELLANEOUS	
Miscellaneous	560
NITRILES	
Aliphatic & Alicyclic	431
Aromatic	432
NITRO COMPOUNDS	
Unsubstituted	441
Substituted	442
Nitroso	443
ORGANIC SALTS	
Organic Salts	550
ORGANO-METALLIC COMPOUNDS	
Organo-Metallic Compounds	461

TABLE 8.1 (Continued)

LISTING OF CHEMICAL CLASSES

Class Name	Class Code
ORGANO-PHOSPHOROUS COMPOUNDS	
Organo-Phosphorous Compounds	460
ORGANO-SILICON COMPOUNDS	
Organo-Silicon Compounds	480
PEROXIDES	
Peroxides	300
QUINONES	
Quinones	490
SULFUR COMPOUNDS	
Thiols	501
Sulfides & Disulfides	502
Sulfoxides	503
Sulfonic Acids	504
Sulfonyl Chlorides	505
Others	507

system used by the Eastman Kodak Company. This system was selected because it addresses a large fraction of the chemicals of concern herein. Other classes have been added as needed.

In Matrix B (pp. 121-124), CPC recommendations are provided for the same 33 materials but in this case for generic families of chemicals. The chemicals in each family and on which the Matrix B recommendations are based are readily determined from Matrix A. Note that not all classes in Matrix A are presented in Matrix B; furthermore, recommendations are not given for all materials for all classes. The criterion for being given a recommendation in Matrix B is that the class must contain more than one chemical with CPC recommendation for the material of concern. In many cases there was considerable variability among the recommendations for chemicals within a class; these are indicated by double asterisks(**). In these cases, please refer to Matrix A for specific information.

3. Materials

The 12 materials for which the most information is available are listed across the top of the matrices. Where information on other materials was available, recommendations for these materials are in the right-most column of the matrices. There were 21 such materials. A general characterization of several of the physical properties of 13 of the materials is presented in Table 8.2.

The 33 material categories were reduced from the approximately 145 types and forms of clothing materials listed in Appendix E, and represent the materials of construction for well over 90% of the CPC considered in the *Guidelines*.

Multi-component materials are identified in two ways. Blends are indicated by a "+." For example, a blend of nitrile rubber and PVC is designated nitrile + PVC. Coated or laminated structures are indicated by a "/." For example, nitrile rubber coated polyester fabric is designated nitrile/polyester. By grouping several types and forms of clothing into one category, it is likely that in some cases particularly good or particularly poor items have gone unnoted since there can be significant differences in product quality between vendors. This is a compromise that must be accepted and recognized in summary compilations such as Matrices A and B. In general, however, a given material will exhibit the same performance relative to another material independent of whether the materials are free films or coatings and independent of source. For example, if a butyl rubber glove is more resistant than a nitrile rubber glove to a given chemical, then it is highly likely that butyl rubber gloves and clothing in both supported and unsupported form will be better barriers to that chemical than their nitrile counterparts. In other words, differences in performances between products of a given material will probably be small compared to performance differences between categories of materials. In using the matrices, it must be remembered that their purpose is to provide a starting point for CPC selections.

TABLE 8.2

PHYSICAL CHARACTERISTICS OF CPC MATERIALS*

Material (Designation in Matrices)	Abrasion Resistance	Cut Resistance	Flexibility	Heat Resistance	Ozone Resistance	Puncture Resistance	Tear Resistance	Relative Cost
Butyl Rubber (Butyl)	F	G	G	E	E	G	G	High
Chlorinated Polyethylene (CPE)	E	G	G	G	E	G	G	Low
Natural Rubber	E	E	E	F	P	E	E	Medium
Nitrile-Butadiene Rubber (NBR)	E	E	E	G	F	E	G	Medium
Neoprene	E	E	G	G	E	G	G	Medium
Nitrile Rubber (Nitrile)	E	E	E	G	F	E	G	Medium
Nitrile Rubber + Polyvinyl Chloride (Nitrile + PVC)	G	G	G	F	E	G	G	Medium
Polyethylene	F	F	G	F	F	P	F	Low
Polyurethane	E	G	E	G	G	G	G	High
Polyvinyl Alcohol (PVA)	F	F	P	G	E	F	G	Very High
Polyvinyl Chloride (PVC)	G	P	F	P	E	G	G	Low
Styrene-Butadiene Rubber (SBR)	E	G	G	G	F	F	F	Low
Viton	G	G	G	G	E	G	G	Very High

----

*Ratings are subject to variation depending on formulation, thickness, and whether the material is supported by fabric.
E-excellent; G-good; F-fair; P-poor

Selections based on the matrices' recommendations do not guarantee protection since in no way do the matrices take into account such key issues as the application of the CPC or quality differences between CPC products.

4. Performance Information

The information on which the matrices are based is from three sources:

- Vendors' qualitative chemical resistance charts that are often included in CPC catalogues. The ratings in the charts of approximately 26 vendors (including the five largest manufacturers of CPC) were tabulated and reviewed by chemical and material classes. In total, over 7,500 individual ratings composed the tabulation.

- Qualitative chemical resistance charts from the suppliers of CPC raw materials.

- The technical and product literature which addresses chemical resistance and permeation testing of CPC materials and products. In all, over 5,200 individual test results (such as breakthrough time, permeation rate, tensile property, and percent weight change) were tabulated.

The vendors use a variety of rating scales; some have three grades, most have four grades, and a few have five or six grades. In order to compare ratings, a normalized four-grade system (i.e., A, B, C, D) was developed. Briefly, products with the highest rating in a four- or three-grade system or the highest two ratings in the case of a six-grade system were given a normalized rating of "A." A normalized rating of "B" was given to the next highest vendor's ranking, which was generally call "good," but in some three-grade systems was called "fair." A normalized rating of "C" was given to the third highest vendor ranking except for the three-grade systems. Typically, vendors called this ranking "fair." Finally, all vendors' rankings of "poor" and "not recommended" were given a normalized rating of "D."

B. RECOMMENDATIONS

The recommendations in Matrices A and B resulted from a comprehensive analysis of all the information described above. Briefly, two separate computer data bases were developed: one for qualitative resistance information, and one for quantitative data from CPC testing. (The test data are presented in Appendices A through D of Volume II.) No attempt was made to validate any of the data prior to their input. The method of analysis served as an internal validation process. The information for each chemical/material pair in each data base was analyzed separately using computer algorithms which took into account the amount and consistency of the information for each pair. (The rationale is described in detail in Appendix H of Volume II.) For each data base, the result was a classification of each chemical/material pair into one of the four following groups:

Group 1 -- significant amount of information indicating excellent chemical resistance.

Group 2 -- lesser amount of information indicating excellent chemical resistance.

or

-- significant amount of information indicating good chemical resistance.

Group 3 -- significant amount of information indicating fair chemical resistance.

or

-- lesser amount of information indicating poor chemical resistance.

Group 4 -- significant amount of information indicating poor chemical resistance.

In all cases the algorithms were designed to produce a conservative classification; that is, inconsistencies were resolved in favor of the lower group.

The results of the quantitative and qualitative analyses were then combined to produce the recommendations shown in Matrix A. Again, this was performed by means of a computer. The rationale was that shown in Table 8.3. In all cases of inconsistencies between the data and qualitative ratings, the test data were more influential in forming the recommendation. In some cases (indicated by ** in the table), technical judgment rather than a computer algorithm was used because the information was not readily susceptible to simple computer analysis. Rather, it required careful consideration as to source, methods, and past experience.

Single and double, upper and lower case "r's" and "n's" are used to convey the recommendations. Briefly, RR, R, rr, and r indicate various degrees of good resistance and NN, N, nn, and n indicate various degrees of poor chemical resistance. Double characters indicate that there are test data to support the recommendations, and single characters indicate that only qualitative information was available. Upper case characters indicate consensus and a relatively large amount of information, whereas

TABLE 8.3

QUALITATIVE DESCRIPTION OF RECOMMENDATIONS IN MATRIX A*

		Qualitative Ratings					
	Quantity/ Resistance	Many/Excellent	Few/Excellent or Many/Good	Many/Fair or Few/Poor	Many/Poor	None
Test Data	Many/Excellent	RR	RR	**	**	RR
	Few/Excellent or Many/Good	rr	rr	**	**	rr
	Many/Fair or Few/Poor	nn	nn	nn	nn	nn
	Many/Poor	NN	NN	NN	NN	NN
	None	R	r	n	N	No Recommendation

*Recommendations obtained by computer algorithm. See Appendix H of Volume II for rationale.

**Recommendations for these combinations were determined on basis of technical judgement rather than computer algorithm.

lower case indicates a relatively small amount of information or inconsistencies.

The recommendations in Matrix B are based on the technical judgment of the authors upon review of Matrix A. As stated in Point 6 of Section C which follows, Matrix B is designed to provide general guidance to the initial steps of clothing selection.

C. USER INSTRUCTIONS

To make the most effective use of the *Guidelines*, references must be made to the matrices and the appendices. Assuming that the chemical(s) for which protection is required is known, the procedure would be as follows:

1. Go to Appendix B, an alphabetical listing of chemicals listed in Matrix A. Find the chemical and referring to the right-most column, its class code. If the chemical is not listed, go to Step 6.

2. Return to Matrix A, a numerical listing of the chemicals by class. Locate the class which contains the subject chemical by means of the numbers in the parentheses next to the class names. Table 8.1 is a listing of the chemical classes and their codes.

3. Locate the subject chemical and read across to determine which is (are) the preferred clothing material(s) for the chemical.

4. Go to Appendix C, an alphabetical listing of CPC by material type and by product type. The vendors for the CPC are listed in the right column. Additional information on the products can be found by referring to Appendix E and using the first two digits of the product code from Appendix C. Also additional information on encapsulating ensembles and splash suits can be found in Appendices G and H, respectively.

5. Go to Appendix D, an alphabetical listing of the vendors and their addresses and telephone numbers. Contact the vendor(s) and initiate procurement procedures.

6. When the specific chemical of interest is not listed in Appendix B, it may be possible to narrow the CPC alternatives through the use of Matrix B. With the help of Table 8.1, attempt to classify the chemical; then follow the general recommendations provided in Matrix B. At this point, two options are open: (a) follow Steps 4 and 5 above, or (b) return to Matrix A. In Matrix A, review all the chemicals in the class of interest and identify the one or two that are most similar to the specific chemical in question. Select CPC

on the basis of the recommendations for the similar chemicals. Note that in Matrix B, asterisks are indicative that the particular material exhibited considerable variability in its resistance to the chemicals of the given class. In these cases reference to Matrix A and caution in CPC selection is highly advised.

During the selection and eventual use of the CPC recommended in Matrices A and B, it is important to remember that:

1. The recommendations are based on the best information available. In some cases, however, this information is very limited.

2. The recommendations are a guide, not a guarantee.

3. The recommendations probably do not hold for extreme use conditions (e.g., high and low temperatures, long-term contact, high abrasion, etc.) nor do they consider the problems associated with reuse described in Chapter 6, Part F.

4. There may be certain products in each category that are better or poorer than the norm. Also, the quality of construction of even the "better" products can vary from batch to batch. In their present form, the matrices do not address quality issues. The assessment of quality and uniformity of quality can best be gained through field experience and, therefore, left as a task for the field personnel. It is possible that future *Guidelines* will be modified to include recommendations for specific products that are based on quality and field performance.

5. The "double" letter recommendations are based primarily on breakthrough time data; permeation rate data were given only secondary consideration.

A final comment pertains to the completeness of CPC product and vendor listings presented in the appendices. The objective was to include at least one source for any given item of CPC. The listings, therefore, are extensive but are probably not all-inclusive; it is unlikely that all distributors or all brands/lines of CPC are mentioned. The listings are designed such that they can be readily expanded to cover additional manufacturers or distributors as they become known to the EPA or U.S. Coast Guard. Furthermore, the recommendations can also be modified as additional performance information becomes available to the EPA or U.S. Coast Guard.

MATRIX A

RECOMMENDATIONS BY CHEMICAL

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Acids, Carboxylic, Aliphatic													
Unsubstituted (102)													
Acetic Acid	R	rr		nn	RR	nn	RR	nn	n	NN	rr		TEFLON(rr) NEOP+NAT RUB(RR) NEOPRENE+SBR(r) NAT+NEOP+NBR(r) POLYURETHANE(r) SARANEX(rr) SBR(r) VIT/CLORBUTL(rr) NEOP/NAT RUB(RR) SBR/NEOPRENE(r)
Acetic Acid, <30%					r			rr			n		
Acetic Acid, 30-70%		r		rr	rr		rr			rr			POLYURETHANE(r)
Acetic Acid, >70%				nn	n		rr			rr			SBR(r)
Acrylic Acid		r								n			TEFLON(rr)
Butyric Acid		r								r			
Diacetin			r									r	
2-Ethylhexanoic Acid					rr		rr			rr			
Formic Acid	R	r		R	R	R	r	NN		R	n		NEOP+NAT RUB(r) NEOPRENE+SBR(r) POLYURETHANE(R) SBR(R) SBR/NEOPRENE(r)
Formic Acid, 30-70%										r			
Formic Acid, >70%				rr	rr	nn	rr	nn	n	nn			NEOP+NAT RUB(rr)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Acids, Carboxylic, Aliphatic (cont.)													
Unsubstituted (cont.) (102)													
Glycerin Triacetate			r									r	
Lauric Acid				n	r					r			
Lauric Acid, 30-70%				rr	rr		rr			nn			
Linoleic Acid			r	n	r					r		r	
Methylacrylic Acid			n									r	
Oleic Acid	n	r	r	nn	rr	rr	rr	rr	rr	rr	r	r	NEOP+NAT RUB(r) NEOPRENE+SBR(n) POLYURETHANE(r) SBR(n) SBR/NEOPRENE(r)
Palmitic Acid				NN	rr		nn			rr	r		
Propionic Acid								NN					TEFLON(rr)
Stearic Acid	r			R	R	r	R			R			POLYURETHANE(R) SBR(R) SBR/NEOPRENE(r)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Acids, Carboxylic, Aliphatic (cont.)													
Substituted (103)													
Chloroacetic Acid								NN					SARANEX(rr)
Lactic Acid	R	r	r	R	R	R	R			R	r	r	NEOP+NAT RUB(n) NEOPRENE+SBR(r) POLYURETHANE(R) SBR(R) SBR/NEOPRENE(r)
Lactic Acid, <30%					r					r			
Lactic Acid, >70%				rr	rr	rr	rr	rr	rr	rr			
Malic Acid				r	r					r			
Polybasic (104)													
Maleic Acid	n			n	R	R	n		n	R	r		POLYURETHANE(n) SBR(r) SBR/NEOPRENE(r)
Maleic Acid, >70%				rr	rr	rr	rr	rr		rr			
Malic Acid				r	r					r			
Oxalic Acid	rr	r		RR	RR	RR	RR	rr	n	RR	rr		SBR(r)
Others (106)													
Benzenesulfonic Acid					rr		rr						

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Acid Halides, Carboxylic													
Aliphatic (111)													
Acetyl Chloride	n	r								n			TEFLON(rr) SARANEX(nn)
Ethyl Chlorocarbonate			r									n	
Aromatic and Heterocyclic (112)													
Benzoyl Chloride	rr	n	r		nn				rr	NN	nn	n	HYPALON(nn)
Aldehydes													
Aliphatic and Alicyclic (121)													
Acetaldehyde	RR	NN		NN	NN	NN	NN	NN	nn	NN	NN		TEFLON(rr) NEOPRENE+SBR(r) POLYURETHANE(r) SBR(n) VIT/CLORBUTL(nn) SILVERSHIELD(rr) SBR/NEOPRENE(n)
Acrolein	rr	NN					NN		nn		NN		VIT/CLORBUTL(rr)
Butyraldehyde	nn		n	R	nn	r	r		nn	R	nn	r	TEFLON(rr) POLYURETHANE(n) SBR(r) SBR/NEOPRENE(r)
Crotonaldehyde	rr	nn			nn				NN		NN		TEFLON(rr)
Decanal (all isomers)	rr		rr		rr			rr		NN	rr	rr	SARANEX(rr)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Aldehydes (cont.)													
Aliphatic and Alicyclic (cont.) (121)													
Formaldehyde, <37%	RR	rr	r	NN	NN	nn	NN	RR	n	NN	RR	r	TEFLON(rr) NEOP+NAT RUB(n) NEOPRENE+SBR(r) POLYURETHANE(r) SBR(R) SILVERSHIELD(rr) SBR/NEOPRENE(r)
Glutaraldehyde	rr				rr					rr	rr		
Hexanal			r									r	
Isobutyraldehyde	rr				nn				NN		NN		
Propionaldehyde	rr				nn				NN		NN		
Trichloroacetaldehyde	nn								rr	NN	nn		
Aromatic and Hetrocyclic (122)													
Benzaldehyde	rr	n	n	nn	nn	n	nn	NN	RR	N	n	r	NEOP+NAT RUB(n) NEOPRENE+SBR(n) POLYURETHANE(n) SBR(r) SBR/NEOPRENE(n)
Furfural	RR	r	n	NN	NN	nn	NN	NN	rr	N	rr	r	TEFLON(rr) NEOPRENE+SBR(n) POLYURETHANE(n) SBR(n) SILVERSHIELD(rr) SBR/NEOPRENE(n)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Amides													
Amides (132)													
N,N-Dimethylacetamide		nn		nn	nn		nn						NEOP+NAT RUB(n) SARANEX(rr)
Dimethylformamide	RR			nn	NN	n	NN	nn	NN	N	NN		TEFLON(rr) NEOP+NAT RUB(nn) SBR(r) VIT/CLORBUTL(rr) SILVERSHIELD(rr)
Formamide, 30%													NEOP+NAT RUB(r)
Hexamethylphosphoamide	rr				nn		nn	nn			nn		POLYURETHANE(nn)
Urea				r	r	r	r			r			
Amines, Aliphatic & Alicyclic													
Primary (141)													
Allylamine	nn			NN					nn	NN			
Butylamine	nn	NN	n	NN	nn					NN		n	TEFLON(rr) VIT/CLORBUTL(nn)
iso-Butylamine	nn	rr	n		NN				nn	NN		n	VIT/CLORBUTL(rr)
Cyclohexylamine	nn			NN	nn		nn						
Ethanolamine	rr	r	n	RR	RR	RR	RR	rr	rr	rr	n	n	NEOPRENE+SBR(n) POLYURETHANE(n) SBR(n) SBR/NEOPRENE(n)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Amines, Aliphatic & Alicyclic (cont.)													
Primary (141) (cont.)													
Ethylamine, 30-70%	rr						rr						TEFLON(rr) SILVERSHIELD(nn)
Isopropylamine	nn				nn					NN	NN		TEFLON(rr) PV ACETATE(rr)
Methylamine	r			nn	rr		rr		n	rr			SBR(r)
Methylamine, 30-70%	rr					nn	rr	NN		NN	rr		SILVERSHIELD(rr)
Monoisopropanolamine	rr				rr					rr	rr		
n-Propylamine	nn	NN											TEFLON(rr) PV ACETATE(rr)
Secondary (142)													
sec-Butylamine	nn				nn		nn			NN			
Diallyamine	nn								rr	NN	rr		
Di-n-amylamine					nn		rr			NN	rr		
Dibutylamine			n				nn		rr	NN	rr	n	
Diethylamine	nn		n	NN	NN	n	NN	NN	n	NN	nn	n	SARANEX(nn) SBR(r) VIT/CLORBUTL(nn) SILVERSHIELD(rr)
Diisobutylamine					nn		rr		rr		rr		

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Amines, Aliphatic & Alicyclic (cont.)													
Secondary (142) (cont.)													
Diisopropylamine					nn		rr			NN	rr		TEFLON(rr)
Dimethylamine	rr			NN	nn				nn	NN			
Dimethylethanolamine	rr			NN	nn		nn						
Dipropylamine	nn												TEFLON(rr) POLYCARBONAT(rr)
Ethyl-n-butylamine							nn		rr	NN	nn		
Ethylenimine	nn			nn	NN								
n-Methylethanolamine	rr			NN	rr								CELLUL ACRYL(rr)
Morpholine	RR			nn	N	r	NN		RR	n	RR		NEOPRENE+SBR(n) POLYURETHANE(n) SBR(n) SILVERSHIELD(rr) SBR/NEOPRENE(n)
Pyrrole			n									n	

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Amines, Aliphatic & Alicyclic (cont.)													
Tertiary (143)													
tert-Butylamine	nn				nn		nn			NN			SBR(n)
Diethanolamine	rr			n	rr	n	nn			r	rr		TEFLON(rr) NEOP+NAT RUB(r) POLYURETHANE(n) SBR(n) SBR/NEOPRENE(n)
Diethylaminoethanol	rr						rr		rr		rr		
Dimethylbutylamine	nn						nn		nn	NN			
n-Nitrosodimethylamine		nn											
Triallylamine					nn		rr			NN	rr		
Triethanolamine	r	r	r	N	R	rr	R	rr		rr	n	r	POLYURETHANE(n) SBR(n) SBR/NEOPRENE(n)
Triethanolamine, >70%				rr	rr	r	rr		rr	rr			
Triethylamine		rr	n		nn		RR			NN	rr	n	
Tri-n-propylamine					nn		rr		rr		rr		

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Amines, Aliphatic & Alicyclic (cont.)													
Polyamine (144)													
1,3-Diaminopropane	nn			NN	rr					NN			
Diethylenetriamine	rr				nn					nn	rr		
Dimethylaminopropylamine	nn			NN	nn					NN			
Ethylenediamine	rr	nn	n	NN	rr			nn		NN		n	TEFLON(rr) SARANEX(rr)
Iminobispropylamine	rr			NN	nn						rr		
3-Methylaminopropylamine	rr			NN	nn					NN			
Propylenediamine	rr				rr					nn	rr		
Tetraethylenepentamine	rr			nn	nn						rr		
N,N,N',N'-Tetramethylenediamine	nn						nn			NN	nn		
Triethylenetetramine	rr				rr		nn				rr		
Amines, Aromatic													
Primary (145)													
Aniline	RR	r	rr	NN	NN	NN	nn	NN	RR	NN	NN	rr	TEFLON(rr) NEOP+NAT RUB(rr) NEOPRENE+SBR(n) POLYURETHANE(r) SARANEX(rr) SBR(n) NEOP/NAT RUB(NN) SILVERSHIELD(rr) SBR/NEOPRENE(n)
Dimethylanaline			n									n	

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Amines, Aromatic (cont.)													
Secondary, Tertiary (146)													
Dicyclohexylamine			n									n	
1-Piperazineethaneamine	rr												
o-Toluidine													TEFLON(rr)
Polyamine (147)													
Methyl Aniline			n									n	
Phenylenediamine				n	r					n			
Anhydrides, Carboxylic													
Aliphatic (161)													
Acetic Anhydride	rr	rr		NN	nn					NN	n		TEFLON(rr)
Propionic Anhydride								NN					

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Cyanides													
Cyanides (215)													
Hydrocyanic Acid	rr				r			rr		nn	r		
Hylene					r					r			POLYURETHANE(r) SBR(n) SBR/NEOPRENE(n)
Potassium Cyanide										r			
Sodium Cyanide, <30%								rr					
Sodium Cyanide, 30-70%								NN					
Esters, Carboxylic													
Formates (221)													
Ethylene Acetate				n	n		n			n			
Ethyl Formate	r		n	r	R	n	R			N		n	POLYURETHANE(n) SBR(R) SBR/NEOPRENE(r)
Methyl Chloroformate	nn												
Methyl Formate			n									n	

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

Esters, Carboxylic (cont.)

Acetates (222)

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Amyl Acetate	R	n	n	nn	nn	nn	nn	NN	rr	nn	n	n	NEOP+NAT RUB(r) NEOPRENE+SBR(n) POLYURETHANE(n) SBR(N) SBR/NEOPRENE(n)
Butyl Acetate	rr	r		NN	NN	nn	NN	NN	rr	NN	nn		TEFLON(rr) NEOP+NAT RUB(NN) NEOPRENE+SBR(n) NAT+NEOP+NBR(r) POLYURETHANE(r) SBR(r) NEOP/NAT RUB(NN) SILVERSHIELD(rr) SBR/NEOPRENE(n)
Butyl Cellosolve Acetate													NAT+NEOP+NBR(r)
2-Ethoxyethyl Acetate			n	nn	nn		nn			n		r	NAT+NEOP+NBR(r)
Ethyl Acetate	rr	nn	n	NN	NN	nn	NN	NN	n	nn	n	n	TEFLON(rr) NEOP+NAT RUB(r) NEOPRENE+SBR(n) POLYURETHANE(r) SARANEX(nn) SBR(N) VIT/CLORBUTL(nn) SILVERSHIELD(rr) SBR/NEOPRENE(n)
Ethyl Acetoacetate			n									r	
Glycerin Triacetate			r									r	

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Esters, Carboxylic (cont.)													
Acetates (222) (cont.)													
Isoamyl Acetate	NN			NN	NN		nn	NN		NN			NEOP+NAT RUB(NN) HYPALON(nn) NEOP/NAT RUB(nn)
Isopropyl Acetate			n									n	
Methyl Acetate	rr		n	NN	r	n	n	NN	nn	NN		n	POLYURETHANE(n) SBR(n) SBR/NEOPRENE(n)
Methyl Cellosolve Acetate													NAT+NEOP+NBR(r)
Methyl Chloroacetate													SARANEX(rr)
Propyl Acetate	rr		n	NN	n	n	NN	NN	rr	N	n	n	NEOPRENE+SBR(n) POLYURETHANE(n) SBR(n) SILVERSHIELD(rr) SBR/NEOPRENE(n)
Vinyl Acetate	n	r								n			TEFLON(rr)
Higher Monobasic (223)													
Butyl Acrylate			n									n	TEFLON(rr)
Butyl Oleate			r									r	
Butyl Stearate			r									r	

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Esters, Carboxylic (cont.)													
Higher Monobasic (223) (cont.)													
Ethyl Acrylate	nn	NN	nn		NN			NN	rr	NN	NN	rr	TEFLON(rr) SARANEX(rr) VIT/CLORBUTL(nn)
Ethyl Methacrylate	nn	nn					nn		rr	NN			
Isobutyl Acrylate	nn						nn		rr	NN			
Isopropylmethacrylate	nn						nn		rr	NN			
Methyl Acrylate	rr		n	NN	nn				rr			n	TEFLON(rr)
Methyl Methacrylate	nn	n	n	NN	n	n	n	NN	RR	NN		n	TEFLON(rr)
Methyl Oleate			r									r	
Propylmethacrylate	nn						nn		rr	NN			
Polybasic (224)													
Dibenzyl Sebacate			r									r	
Dibutyl Sebacate			r									n	
Di-(2-Ethylhexyl)-Sebacate			r									r	
Diethyl Oxalate			r									r	
Diethyl Sebacate			r									r	
Diisooctyl Sebacate			r									r	
Tannic Acid	R	r		R	R	rr	R	rr		rr	r		NEOPRENE+SBR(r) POLYURETHANE(r) SBR(R) SBR/NEOPRENE(r)
Tannic Acid, 30-70%				rr	rr		rr			rr			
Tannic Acid, >70%				rr	rr		nn						

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Esters, Carboxylic (cont.)													
Aromatic Phthalates (226)													
Bis(2-Ethylhexyl) Phthalate	rr		r	rr	rr		RR		nn	NN	rr	r	
n-Butyl Phthalate	RR	n	r	nn	NN	rr	NN	rr	RR	N	rr	r	NEOPRENE+SBR(n) POLYURETHANE(n) SBR(r) SILVERSHIELD(rr) SBR/NEOPRENE(r)
Diisoctyl Phthalate			r									r	
Dimethyl Phthalate			r									r	
Di-n-octyl Phthalate				n	r	nn		NN		nn			NEOP+NAT RUB(r)
Di-Sec-Octyl Phthalate			r									r	
Methyl Salicylate			n									r	
Esters, other than Carboxylic													
Others (233)													
Ethyl Silicate			r									r	
Isobutyl Nitrite	nn						nn			NN	nn		
Tetrabutyl Orthotitanate			r									r	
Triisooctyl Phosphate			r									r	

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

Ethers

Aliphatic (241)

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Butyl Cellosolve			r				NN		rr	rr		n	NAT+NEOP+NBR(r)
Butyl Cellosolve Acetate													NAT+NEOP+NBR(r)
Dibenzyl Ether	r		n	N	R	r	r			R		r	POLYURETHANE(n) SBR(n) SBR/NEOPRENE(n)
Dibutylether			n									n	
2,2'-Dichloroethyl Ether	nn	rr											TEFLON(rr)
2-Ethoxyethyl Acetate			n	n	rr		n			n		r	NAT+NEOP+NBR(r)
Ethyl Cellosolve	RR		r	NN	NN		NN		NN	NN		n	NAT+NEOP+NBR(r)
Ethyl Ether	NN	r	n	NN	NN	nn	NN	NN	RR	nn	NN	n	TEFLON(rr) NEOP+NAT RUB(n) NEOPRENE+SBR(r) POLYURETHANE(n) SBR(R) VIT/CLORBUTL(NN) SILVERSHIELD(rr) SBR/NEOPRENE(r)
Isopropyl Ether		rr	n	NN	nn		rr		rr	nn	rr	n	NEOP/NAT RUB(NN)
Methyl Cellosolve	rr			n	R	r	nn			R			NEOP+NAT RUB(nn) NAT+NEOP+NBR(r) POLYURETHANE(n) SBR(n) SBR/NEOPRENE(n)
Methyl Cellosolve Acetate													
Methyl Cellulose				n	r		r			r			POLYURETHANE(r)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Ethers (cont.)													
Aromatic (242)													
1,3-Dioxolane			n									n	
Alkyl-Aryl (243)													
Phenyl Ethyl Ether			n									n	
Halogen Compounds													
Aliphatic, Unsubstituted (261)													
Allyl Chloride	r	rr								n			TEFLON(rr) PV ACETATE(rr)
n-Butyl Chloride							nn		rr	nn	rr		
Carbontetrabromide			r									n	
Carbon Tetrachloride	N	nn	r	NN	NN	NN	N	NN	RR	NN	rr	n	TEFLON(rr) NEOP+NAT RUB(NN) NEOPRENE+SBR(n) POLYURETHANE(n) SBR(N) NEOP/NAT RUB(NN) PV ACETATE(rr) SILVERSHIELD(rr) SBR/NEOPRENE(n)
2-Chloro-1,3-butadiene			r		NN		NN		rr	NN		n	
Chlorodibromomethane	nn								nn	NN	rr		
Chlorododecane			r									n	

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

Halogen Compounds (cont.)

Aliphatic, Unsubstituted (261) (cont.)

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Chloroform	N	NN	r	NN	NN	n	NN	NN	RR	NN	rr	n	TEFLON(rr) NEOP+NAT RUB(NN) NEOPRENE+SBR(n) POLYURETHANE(r) SARANEX(NN) SBR(N) VIT/CLORBUTL(rr) NEOP/NAT RUB(NN) SILVERSHIELD(NN) SBR/NEOPRENE(n)
Dichlorobromomethane	nn									NN	rr		VITON/BUTYL(rr)
1,4-Dichloro-2-butene	nn	NN			NN		NN	NN	rr	NN	RR		SARANEX(rr)
Dichloroethane			r	n	n		n			n		n	TEFLON(rr)
cis-Dichloroethylene	nn								NN	NN	rr		
1,2-Dichloroethylene							NN		nn	NN	nn		
trans-1,2-Dichloroethylene	NN								rr	NN	rr		
Dichloroethylene (all isomers)		n								n			
Dichloropropane (all isomers)		nn											TEFLON(RR)
Dichloropropane-Dichloropropene													TEFLON(rr)
2,3-Dichloro-1-propene	nn								rr	NN	rr		
1,3-Dichloropropene	nn								rr	NN	rr		
Ethyl Bromide					NN				rr	NN	nn		

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Halogen Compounds (cont.)													
Aliphatic, Unsubstituted (261) (cont.)													
Ethylene Dibromide	nn	nn	rr	NN	NN		NN	NN	RR	NN	nn	NN	TEFLON(RR) SARANEX(NN)
Ethylene Dichloride	nn	nn	r	NN	NN	n	NN	NN	nn	NN	rr	n	TEFLON(nn) NEOP+NAT RUB(NN) POLYURETHANE(nn) NEOP/NAT RUB(NN) SILVERSHIELD(rr)
Ethylidene Dichloride	nn								rr	NN	nn		
Freon 11	n		r	n	R		n			n	r	n	SBR(n)
Freon 12	r			n	R		r			n	r		SBR(n)
Freon 21				n	n		n			n			SBR(n)
Freon 22				r	r		n			n			SBR(n)
Freon 112			r									n	
Freon 114B2			r									n	
Freon TF	n		r	NN	RR	nn	RR	NN	nn	NN		r	NEOP+NAT RUB(NN) NEOP/NAT RUB(nn)
Freon TMC	rr	rr		NN	NN		NN		rr	rr			CHLOROBUTYL(rr) TEFLON(nn)
Halothane	nn								rr	NN	nn		
Hexachlorocyclopentadiene	nn						nn		rr		rr		
Isopropyl Chloride			r									r	

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Halogen Compounds (cont.)													
Aliphatic, Unsubstituted (261) (cont.)													
Methyl Bromide	n			N	r		r	nn		N	r		SARANEX(rr) SBR(r)
Methyl Chloride	n			N	n	n	n	n		N			NEOPRENE+SBR(n) POLYURETHANE(n) SBR(n) SBR/NEOPRENE(n)
Methyl Chloroform	NN	n	r	NN	NN	NN	NN	NN	RR	NN	rr	n	TEFLON(rr) NEOP+NAT RUB(NN) POLYURETHANE(NN) NEOP/NAT RUB(NN) SILVERSHIELD(rr)
Methylene Bromide				n	n	n	n	NN	rr	n			
Methylene Chloride	NN	nn	r	NN	NN	nn	NN	NN	nn	NN	nn	n	TEFLON(nn) NEOP+NAT RUB(NN) VIT/CLORBUTL(NN) NEOP/NAT RUB(NN) SILVERSHIELD(rr)
Methyl Iodide	nn			NN	NN		NN	NN	rr		rr		NEOP+NAT RUB(NN) NEOP/NAT RUB(NN)
Propyl Chloride													PV ACETATE(rr)
Propylene Dichloride	nn								rr	NN	rr		
Tetrachlorodifluoroethane			r									n	
1,1,1,2-Tetrachloroethane	nn								rr	NN	rr		
1,1,2,2-Tetrachloroethane	nn	n		NN	NN		nn	NN	rr	NN	rr		TEFLON(rr) NEOP+NAT RUB(NN)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

Halogen Compounds (cont.)

Aliphatic, Unsubstituted (261) (cont.)

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Tetrachloroethylene	NN	rr	r	NN	NN	NN	nn	NN	nn	NN	RR	n	TEFLON(nn) NEOP+NAT RUB(NN) NEOPRENE+SBR(n) POLYURETHANE(n) SARANEX(NN) SBR(N) SILVERSHIELD(rr) SBR/NEOPRENE(n)
Tetrafluoroethylene	rr				rr				rr		rr		
1,1,2-Trichloroethane	nn			NN	NN		NN	NN	nn	NN	rr		TEFLON(rr) POLYURETHANE(NN)
Trichloroethylene	NN	nn		NN	NN	NN	NN	NN	NN	NN	nn		CHLOROBUTYL(r) TEFLON(RR) NEOP+NAT RUB(NN) NEOPRENE+SBR(n) POLYURETHANE(nn) SARANEX(NN) SBR(N) NEOP/NAT RUB(NN) SILVERSHIELD(rr) SBR/NEOPRENE(n)
1,2,3-Trichloropropane	nn						nn		rr		rr		

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Halogen Compounds (cont.)													
Aliphatic, Substituted (262)													
2-Bromoethanol	rr			NN						NN	rr		
1-Bromo-2-propanol	rr			NN					rr		rr		
3-Bromo-1-propanol	rr				rr				rr		rr		
Chloroacetone	r		n	n	R	n				N		r	POLYURETHANE(n) SBR(n) SBR/NEOPRENE(n)
Chloroacetonitrile	rr			NN					rr		rr		
3-Chloro-2-methylpropene	nn								NN	NN	rr		
1-Chloro-2-propanol	rr			NN						NN	rr		
3-Chloro-1-propanol	rr								nn	NN	rr		
1,2-Dibromo-3-chloropropane		n								n			
Dichloroacetyl Chloride	nn								rr	NN	rr		
2,2'-Dichloroethyl Ether	nn	RR											TEFLON(rr)
Epichlorohydrin	nn	n		NN	nn		nn	NN	NN	nn	nn		TEFLON(RR) POLYURETHANE(nn) SARANEX(nn)
Ethylene Chlorohydrin	rr		r		rr				rr		rr	n	
Trichloroacetaldehyde	rr								rr	NN	rr		
2,2,2-Trichloroethanol													SARANEX(nn)
Trifluoroethanol				rr	rr		NN	RR		NN			NEOP+NAT RUB(rr) NEOP/NAT RUB(rr)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Halogen Compounds (cont.)													
Aromatic, Unsubstituted (263)													
Benzyl Chloride	n	nn	r	N	N	n	r			N		n	TEFLON(rr) POLYURETHANE(n) SBR(n) SBR/NEOPRENE(n)
Bromobenzene	nn		r				nn		rr		rr	n	
Bromochloromethane			r									r	
Chlorobenzene	nn	n	r	N	NN	n	nn	NN	nn	NN	RR	n	TEFLON(rr) NEOP+NAT RUB(n) SBR(n)
o-Chlorotoluene							nn				rr		
p-Chlorotoluene							nn				rr		
Dichlorobenzene	n	nn								n			
1,2-Dichlorobenzene			r				nn				rr	n	
1,3-Dichlorobenzene							nn				rr		
Fluorobenzene			r									n	
1,2,4-Trichlorobenzene	NN			NN	rr			NN	rr		NN		TEFLON(rr) SARANEX(nn)
Aromatic, Substituted (264)													
Pentachlorophenol					NN		rr		NN	rr			

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Halogen Compounds (cont.)													
Polynuclear (265)													
Chloronaphthalenes (all isomers)			r	N	n		n		rr	n	rr	r	SILVERSHIELD(RR)
Polychlorinated Biphenyls (PCB's)	nn	n		NN	rr			NN	rr	n	rr		TEFLON(rr) SARANEX(RR)
Vinyl Halides (267)													
Dimethylvinylchloride							NN		rr	NN	rr		
Vinyl Chloride	n	rr					NN			n	rr		SILVERSHIELD(rr)
Vinylidene Fluoride	rr			NN	NN					NN	rr		

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Heterocyclic Compounds													
Nitrogen, Pyridines (271)													
Pyridine	r			NN	NN		NN	rr			n		NEOP+NAT RUB(NN) NEOP/NAT RUB(nn)
Nitrogen, Others (274)													
Ethylenimine	nn			nn	NN								
Piperidine			n									n	
Oxygen, Epoxy Compounds (275)													
Allyl Glycidyl Ether	rr			rr	nn		rr		rr	rr			NEOP/NAT RUB(rr)
Epichlorohydrin	RR	n		NN	nn		nn	NN	NN	nn	nn		TEFLON(RR) POLYURETHANE(nn) SARNEX(nn)
1,2-Epoxybutane	nn				NN				rr		NN		
Ethylene Oxide	r	r			n		NN			n	n		
Phenyl Glycidyl Ether	rr			rr	nn		nn		rr	nn			NEOP/NAT RUB(nn)
Propylene Oxide	rr		n	NN	n	n	n	NN	NN	n	NN	n	TEFLON(rr)
1,3-Propylene Oxide	nn			NN					NN		NN		
Oxygen, Furan Derivatives (277)													
Furan	nn		n						rr	NN	nn	n	
Tetrahydrofuran	NN	NN	NN	NN	NN	n	NN	NN	n	NN	NN	NN	TEFLON(rr) NEOP+NAT RUB(NN) SARANEX(NN) VIT/CLORBUTL(NN) NEOP/NAT RUB(NN)
Oxygen, Others (278)													
1,4-Dioxane	RR	r		NN	NN	n	NN	NN	n	NN	NN		TEFLON(rr) NEOP+NAT RUB(nn) SARANEX(nn)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Hydrazines													
Hydrazines (280)													
1,1-Dimethylhydrazine	RR	nn	n	NN	NN		NN		NN	NN	nn	n	CHLOROBUTYL(rr) TEFLON(nn) NEOP/NAT RUB(NN)
1,2-Dimethylhydrazine			n									n	
Hydrazine	rr	n		r	rr		rr			rr	n		CHLOROBUTYL(rr) TEFLON(nn)
Hydrazine, 30-70%	rr			rr	rr	rr	RR	rr	n	rr			SILVERSHIELD(rr)
Methylhydrazine	NN	nn								nn	rr		CHLOROBUTYL(rr) CR 39(rr) TEFLON(NN)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Hydrocarbons													
Aliphatic and Alicyclic (291)													
Butadiene	rr			NN	nn					NN	rr		
Butane	n			N	R	r	n			N	r		NEOPRENE+SBR(r) POLYURETHANE(R) SBR(n) SBR/NEOPRENE(n)
Butene				n	r		r			n			
Butylene					r		r			r			SBR(r)
Cyclohexane	N	r	r	NN	NN	n	RR	NN	nn	NN	RR	n	TEFLON(rr) NEOP+NAT RUB(NN) NEOPRENE+SBR(n) POLYURETHANE(n) SBR(n)
Decahydronaphthalene			r									n	
Decane			r									n	
Diisobutylene			r									n	
Dipentene			r									n	
Ethane	n	r						rr		r			
Ethyl Silicate			r									r	
Gasoline	nn	r	rr	N	rr	NN	rr	NN	rr	NN	r	nn	NEOP+NAT RUB(NN) NEOPRENE+SBR(n) POLYURETHANE(R) SBR(n) SBR/NEOPRENE(n)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Hydrocarbons (cont.)													
Aliphatic and Alicyclic (cont.) (291)													
Heptane				NN	nn	rr	RR	rr		NN	rr		NEOP/NAT RUB(NN)
Hexane	NN	rr		NN	NN	NN	NN	NN	RR	NN	RR		TEFLON(rr) NEOPRENE+SBR(n) POLYURETHANE(R) SBR(N) VIT/CLORBUTL(rr) SILVERSHIELD(rr) SBR/NEOPRENE(n)
1-Hexene			r									n	
b-Ionone	rr								rr				
Isobutylene								rr					
Isooctane	n	r	r	NN	NN	nn	NN	nn	nn	NN	r	n	
Isoprene					nn		nn		rr		rr		
JP-4, Jet Fuel					n						r		
Kerosene	n		r	nn	N	rr	rr	nn	rr	nn	r	n	NEOP+NAT RUB(nn) NEOPRENE+SBR(n) POLYURETHANE(r) SBR(n) SBR/NEOPRENE(n)
Methane								rr					
Methyl Cyclopentane			r									n	
Mineral Spirits				N	rr	NN	rr	NN	rr	NN			NEOP+NAT RUB(nn) SARANEX(NN) SBR(r)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Hydrocarbons (cont.)													
Aliphatic and Alicyclic (cont.) (291)													
Naphtha, V.M.& P	N	rr	r	N	nn	NN	rr	NN	rr	NN	r	n	NEOP+NAT RUB(NN) NEOPRENE+SBR(n) POLYURETHANE(R) SBR(n) SBR/NEOPRENE(n)
Octadecane			r									n	
n-Octane			r	nn	rr	rr	rr			nn		n	NEOP+NAT RUB(n)
Pentane	n			NN	NN	NN	NN	NN	nn	NN	RR		NEOP+NAT RUB(NN) NEOP/NAT RUB(NN) SILVERSHIELD(rr)
Pentene					r		r			n			SBR(r)
Pinene (all isomers)			r									n	
Propane	N			N	R	R	n	rr		r	r		NEOPRENE+SBR(n) POLYURETHANE(R) SBR(n) SBR/NEOPRENE(n)
2,2,4-Trimethylpentane			r									n	
2,4,4-Trimethyl-1-pentene			r									n	
Turpentine	N	r	r	N	N	N	nn	nn	rr	N	r	n	TEFLON(rr) NEOP+NAT RUB(NN) NEOPRENE+SBR(n) POLYURETHANE(r) SBR(n) SBR/NEOPRENE(n)
4-Vinyl-1-cyclohexane	nn						nn		nn		rr		

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Hydrocarbons (cont.)													
Aromatic (292)													
Benzene	NN	nn	rr	NN	NN	NN	NN	NN	NN	NN	nn	rr	EVA(NN) TEFLON(NN) NEOP+NAT RUB(NN) NEOPRENE+SBR(n) POLYURETHANE(NN) NONWOVEN PE(NN) SARANEX(NN) SBR(N) NEOP/NAT RUB(NN) PV ACETATE(rr) SILVERSHIELD(rr) SBR/NEOPRENE(n)
p-tert-Butyl Toluene	RR				rr		rr		rr		RR		SILVERSHIELD(rr)
3-Chloro-2-methylpropene	nn								NN	NN	rr		
m-Cresol				nn	rr		rr	rr		NN			TEFLON(rr) NEOP+NAT RUB(nn) NEOP/NAT RUB(rr)
Cresols	n	r	r					nn		n		n	SARANEX(rr)
Cumene		rr	r									n	
Cymene			r									n	
Diethyl Benzene			r									n	
Diisopropyl Benzene (all isomers)			r									n	
Divinyl Benzene	RR						rr		rr		RR		SILVERSHIELD(rr)
Ethyl Benzene			r		n				nn	n		n	TEFLON(rr)
Gasoline	nn	r	rr	N	rr	NN	rr	NN	rr	NN	r	nn	NEOP+NAT RUB(NN) NEOPRENE+SBR(n) POLYURETHANE(R) SBR(n) SBR/NEOPRENE(n)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

Hydrocarbons (cont.)

Aromatic (cont.) (292)

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
JP-4, Jet Fuel					n						r		
Kerosene	n		r	nn	N	rr	rr	nn	rr	nn	r	n	NEOP+NAT RUB(nn) NEOPRENE+SBR(n) POLYURETHANE(r) SBR(n) SBR/NEOPRENE(n)
d-Limonene	rr		r		rr		rr		rr			n	
Natural Gas, Liquified			r									n	
Nitrobenzene	N	RR		NN	NN	n	NN		RR	N	RR		TEFLON(rr) NEOP+NAT RUB(n) NEOPRENE+SBR(r) POLYURETHANE(n) SBR(n) VIT/CLORBUTL(rr) SILVERSHIELD(rr) SBR/NEOPRENE(n)
Styrene	n	rr	r	NN	NN	NN	NN	NN	rr	NN	r	n	TEFLON(rr) SARANEX(nn) VIT/CLORBUTL(rr)
1,2,3,4-Tetrahydronaphthalene			r									n	
Toluene	NN	r	rr	NN	NN	nn	NN	NN	NN	NN	nn		TEFLON(rr) NEOP+NAT RUB(n) POLYURETHANE(r) SARANEX(NN) SBR(N) VIT/CLORBUTL(rr) NEOP/NAT RUB(NN) SILVERSHIELD(rr) SBR/NEOPRENE(n)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Hydrocarbons (cont.)													
Aromatic (cont.) (292)													
Xylene	n	n	r	NN	NN	NN	NN	NN	RR	NN	rr	n	TEFLON(rr) NEOP+NAT RUB(NN) SBR(n) NEOP/NAT RUB(NN)
m-Xylene	NN				nn		nn		rr		RR		
o-Xylene	nn	nn					nn		rr		rr		
p-Xylene	nn						nn		rr	NN	rr		

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Hydroxyl Compounds													
Aliphatic & Alicyclic, Primary (311)													
Allyl Alcohol	RR	rr	rr		RR			rr	nn	NN	rr	rr	TEFLON(rr) SARANEX(rr)
Amyl Alcohol	rr		r	NN	RR	NN	nn	nn	rr	NN	rr	r	NEOPRENE+SBR(R) POLYURETHANE(R) SBR(R) SBR/NEOPRENE(R)
Butyl Alcohol	R	r		nn	RR	nn	RR	RR	nn	nn	r		TEFLON(rr) NEOP+NAT RUB(nn) NEOPRENE+SBR(n) POLYURETHANE(r) SBR(n) SBR/NEOPRENE(n)
n-Butyl Carbitol			r									r	
Butyl Cellosolve			r				NN		rr	rr		n	NAT+NEOP+NBR(r)
Carbitol			r									r	
Diacetin			r									r	
Diethylaminoethanol	rr						nn		rr		rr		
Ethanol, 30-70%								rr					
Ethanol, >70%								rr					
Ethanolamine	rr	r	n	RR	RR	RR	rr	rr	n	RR	n	n	NEOPRENE+SBR(n) POLYURETHANE(n) SBR(n) SBR/NEOPRENE(n)
Ethyl Cellosolve	rr		r	NN	NN		NN		NN	NN		n	NAT+NEOP+NBR(R)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

Hydroxyl Compounds (cont.)

Aliphatic & Alicyclic, Primary (cont.) (311)

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Ethyl Alcohol	R			NN	NN	nn	RR	NN	rr	NN	r		TEFLON(rr) NEOP+NAT RUB(nn) NEOPRENE+SBR(r) POLYURETHANE(n) SBR(n) NEOP/NAT RUB(rr) SBR/NEOPRENE(r)
Ethylene Chlorohydrin	rr		r		rr				rr		rr	n	
2-Ethyl-1-Hexanol	rr				rr				rr		rr		
Glycols			r									r	
Hexyl Alcohol			r									r	
Isobutyl Alcohol	rr		r	nn	NN	NN	RR	NN	n	NN	rr	r	NEOP+NAT RUB(r) SBR(r)
Methanol	rr	rr	rr	NN	NN	nn	NN	nn	NN	NN	nn	rr	TEFLON(rr) NEOP+NAT RUB(NN) NEOPRENE+SBR(r) NAT+NEOP+NBR(r) POLYURETHANE(r) SARANEX(rr) SBR(R) VIT/CLORBUTL(rr) NEOP/NAT RUB(NN) PV ACETATE(rr) SBR/NEOPRENE(r)
Methanol, <30%								rr					
Methanol, >70%								rr					

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

Hydroxyl Compounds (cont.)

Aliphatic & Alicyclic, Primary (cont.) (311)

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Methyl Cellosolve	rr			n	R	r	nn			R			NEOP+NAT RUB(nn) NAT+NEOP+NBR(r) POLYURETHANE(n) SBR(n) SBR/NEOPRENE(n)
1-Octanol			r									r	
n-Octanol	r		r	nn	RR	rr	RR		rr	RR		r	POLYURETHANE(n) SBR(R) SBR/NEOPRENE(r)
Propyl Alcohol	r		r	nn	RR	NN	RR	NN	n	nn	r	r	TEFLON(rr) NEOPRENE+SBR(r) POLYURETHANE(r) SBR(r) PV ACETATE(rr) SBR/NEOPRENE(r)
2,2,2-Trichloroethanol													SARANEX(nn)
Trifluoroethanol				rr	rr		NN	RR		NN			NEOP+NAT RUB(rr) NEOP/NAT RUB(rr)
Aliphatic & Alicyclic, Secondary (312)													
Cumene		rr	r									n	
Cyclohexanol	n	r	r	NN	NN	nn	RR	rr	RR	rr	RR	r	SILVERSHIELD(rr)
2-Furylmethanol			n									r	
Isopropyl Alcohol	rr	rr	r	NN	RR	nn	RR	NN		nn	r	r	CHLOROBUTYL(rr) TEFLON(RR) NEOP+NAT RUB(NN) NAT+NEOP+NBR(r) SBR(r) NEOP/NAT RUB(nn)
Isopropyl Chloride			r									r	
Lactic Acid	R	r	r	R	R	R	R			R	r	r	

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Hydroxyl Compounds (cont.)													
Aliphatic & Alicyclic, Tertiary (313)													
Lactic Acid, <30%					r					r			
Lactic Acid, >70%				rr	rr	rr	rr	rr	rr	rr			
tert-Butanol	rr		r	NN	rr					NN		r	
Citric Acid	r			R	R	R	R			R	r		NEOP+NAT RUB(r) NEOPRENE+SBR(r) POLYURETHANE(R) SBR(R) SBR/NEOPRENE(r)
Citric Acid, <30%				rr	rr	rr	rr	rr	nn	rr			
Diacetone Alcohol	r		n	r	R	r				R		r	POLYURETHANE(n) SBR(r) SBR/NEOPRENE(r)
Terpineol			r									n	
Aliphatic & Alicyclic, Polyols (314)													
Diethylene Glycol			r		r					r		r	
Diisopropyl Ketone			n									n	
Ethylene Glycol	R	r	r	RR	rr	RR	RR	RR	rr	nn	r	r	TEFLON(rr) NEOP+NAT RUB(RR) NEOPRENE+SBR(n) POLYURETHANE(r) SBR(R) NEOP/NAT RUB(rr) SBR/NEOPRENE(r)
Glycerol	r		r	r	R	r	R			r		r	NEOP+NAT RUB(r) POLYURETHANE(n) SBR(R) SBR/NEOPRENE(r)
Phenolphthalein				rr	rr		rr			rr			
Propylene Glycol				rr		rr		RR		rr			NEOP/NAT RUB(rr)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Hydroxyl Compounds (cont.)													
Aromatic (316)													
Benzyl Alcohol	rr		r	r	R	r	r			R	rr	r	POLYURETHANE(n) SBR(R) SBR/NEOPRENE(r)
Benzyl Benzoate			r									r	
n-Butyl Benzoate			r									r	
Creosote	n		r	N	rr	r	R			r	rr	r	SBR(r)
Creosote, Wood					rr						rr		
m-Cresol				nn	rr		rr	rr		NN			TEFLON(rr) NEOP+NAT RUB(nn) NEOP/NAT RUB(rr)
Cresols	n	r	r					nn		n		n	SARANEX(rr)
Ethyl Benzoate			r									r	
Nonylphenol					rr		rr						
Pentachlorophenol					NN		rr		NN	rr			
Phenol	R	nn		NN	nn	n	NN	rr	nn	NN	n		TEFLON(rr) NEOP+NAT RUB(rr) NAT+NEOP+NBR(r) POLYURETHANE(r) SBR(n) NEOP/NAT RUB(rr) SBR/NEOPRENE(r)
Phenol, <30%								rr					
Phenol, >70%	RR				NN	nn	NN	rr		NN	RR		
Picric Acid	r			R	R	r	R		n	r	r		

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Inorganic Acids													
Inorganic Acids (370)													
Boric Acid	rr				rr		rr			r	rr		
Chlorosulfonic Acid					n			rr			n	n	SARANEX(rr)
Chromic Acid	n	r		NN	N	RR	N	rr		RR	r		
Chromic Acid, <30%													NEOP+NAT RUB(rr)
Chromic Acid, 30-70%				n	n	r	n		n	nn			
Fluoroboric Acid			r									r	
Fluorosilicic Acid			r									r	
Hydrobromic Acid	r			r	R	r				R			POLYURETHANE(n) SBR(r) SBR/NEOPRENE(r)
Hydrobromic Acid, 30-70%			r									r	
Hydrochloric Acid	nn	rr	rr	rr	RR	RR	rr			NN	rr	rr	CHLOROBUTYL(rr) TEFLON(nn) NEOP+NAT RUB(rr) NEOPRENE+SBR(n) NAT+NEOP+NBR(r) POLYCARBONAT(rr) POLYURETHANE(n) SARANEX(rr) SBR(r) NEOPRENE+PVC(rr) SBR/NEOPRENE(n)
Hydrochloric Acid, <30%	r			RR	rr	rr	rr	rr	n	rr	r		NEOP+NAT RUB(rr) SBR(r) NEOP/NAT RUB(rr)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Inorganic Acids (cont.)													
Inorganic Acids (cont.)(370)													
Hydrochloric Acid, 30-70%	r		r	RR	RR	n	RR	nn	n	nn	rr	r	NEOP+NAT RUB(rr) SARANEX(rr) NEOP/NAT RUB(RR) SILVERSHIELD(rr)
Hydrochloric Acid, >70%				rr									NEOP+NAT RUB(rr) NEOP/NAT RUB(rr)
Hydrofluoric Acid	nn	r	rr	N	N	n	n	rr		NN	rr	rr	NEOPRENE+SBR(n) POLYCARBONAT(rr) POLYURETHANE(n) SARANEX(rr) SBR(n) NEOPRENE+PVC(rr) SBR/NEOPRENE(n)
Hydrofluoric Acid, <30%				r	R		r			r			NAT+NEOP+NBR(r)
Hydrofluoric Acid, 30-70%			r	RR	rr	NN	nn	rr	n	nn	r	r	NEOP+NAT RUB(RR) SARANEX(nn) SBR(r) NEOP/NAT RUB(rr)
Hydrofluoric Acid, >70%				rr									NEOP+NAT RUB(rr) NEOP/NAT RUB(rr)
Iodine Pentafluoride			n									n	
Nitric Acid	n	rr	rr	n	rr	nn	n	rr		NN	rr	rr	CHLOROBUTYL(rr) TEFLON(nn) NEOP+NAT RUB(rr) NAT+NEOP+NBR(r) POLYURETHANE(n) SARANEX(rr) SBR(n) SILVERSHIELD(rr) NEOPRENE+PVC(rr) SBR/NEOPRENE(n)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Inorganic Acids (cont.)													
Inorganic Acids (cont.) (370)													
Nitric Acid, <30%	r	r		rr	rr	rr	rr	nn		rr	r		NEOP+NAT RUB(rr) NAT+NEOP+NBR(r) SBR(r) NEOP/NAT RUB(rr)
Nitric Acid, 30-70%				rr	n			nn	n	rr	r		NEOP+NAT RUB(rr) SARANEX(rr) NEOP/NAT RUB(rr)
Nitric Acid, >70%	n	n		nn	n	NN	nn	nn	n	NN	rr		SARANEX(rr) SBR(r) NEOP/NAT RUB(rr)
Nitric Acid, Fuming Red	nn	nn		rr	rr		rr		NN	NN	rr		CHLOROBUTYL(rr) TEFLON(nn) NEOP/NAT RUB(rr) SILVERSHIELD(nn)
Perchloric Acid	r		r	N	rr	rr	rr	rr		rr	r	r	NEOPRENE+SBR(n) POLYURETHANE(n) SBR(n) SBR/NEOPRENE(n)
Perchloric Acid, 30-70%				n	rr	r	rr		n	rr			
Phosphoric Acid	r			rr	rr	rr	rr	rr	n	rr			NEOP+NAT RUB(r) NEOPRENE+SBR(n) NAT+NEOP+NBR(r) POLYURETHANE(n) SARANEX(rr) SBR(r) SBR/NEOPRENE(n)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Inorganic Acids (cont.)													
Inorganic Acids (cont.)(370)													
Phosphoric Acid, <30%	r	r			r					r	r		
Phosphoric Acid, 30-70%					r						r		
Phosphoric Acid, >70%	r	r		RR	rr	rr	rr	rr		rr	r		NEOP+NAT RUB(rr) NEOP/NAT RUB(rr)
Phosphorus Oxychloride		nn			NN	nn				NN	nn		NONWOVEN PE(NN) SARANEX(nn) PV ACETATE(NN)
Phosphorus Trichloride			r									r	
Sulfuric Acid	n	RR	rr	N	rr	nn	n	rr		NN	rr	rr	CHLOROBUTYL(rr) TEFLON(nn) NEOP+NAT RUB(rr) NEOPRENE+SBR(n) NAT+NEOP+NBR(n) POLYURETHANE(n) NONWOVEN PE(NN) SARANEX(RR) SBR(n) VIT/CLORBUTL(rr) SILVERSHIELD(rr) NEOPRENE+PVC(rr) SBR/NEOPRENE(n)
Sulfuric Acid, <30%	r	r		r	R	rr	R	RR		rr	r		NEOP+NAT RUB(r) NAT+NEOP+NBR(r) NONWOVEN PE(nn) SARANEX(rr) SBR(r)
Sulfuric Acid, 30-70%	r	rr		rr	rr		rr	rr		rr	r		NEOP+NAT RUB(rr) NONWOVEN PE(NN) SARANEX(rr) NEOP/NAT RUB(rr)
Sulfuric Acid, >70%	r	r		n	n	nn	N	RR	n	NN	rr		TEFLON(rr) NONWOVEN PE(NN) SARANEX(rr) SBR(r) NEOP/NAT RUB(rr)
Sulfur Monochloride			r									n	

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

Inorganic Bases

Inorganic Bases (380)

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Ammonium Hydroxide	R	r		rr	rr	NN	rr	NN	n	NN	r		NEOP+NAT RUB(nn) NEOPRENE+SBR(r) POLYURETHANE(r) SBR(R) SBR/NEOPRENE(r)
Ammonium Hydroxide, <30%				RR	RR		RR			NN	rr		
Ammonium Hydroxide, 30-70%				rr	rr	r	rr	NN		R			
Calcium Hydroxide					r					r			
Potassium Hydroxide	r			R	R	r	R			R	n		NEOPRENE+SBR(r) POLYURETHANE(n) SBR(r) SBR/NEOPRENE(r)
Potassium Hydroxide, <30%					r						r		
Potassium Hydroxide, 30-70%	r	r	r	RR	RR	RR	RR	rr	n	RR		r	NEOP+NAT RUB(rr) SBR(r)
Sodium Hydroxide	n	rr		R	R	rr	R	rr		rr			POLYURETHANE(r) SBR(r) VIT/CLORBUTL(rr) SILVERSHIELD(rr) SBR/NEOPRENE(r)
Sodium Hydroxide, <30%								rr					NEOP+NAT RUB(rr)
Sodium Hydroxide, 30-70%	rr	r	rr	RR	RR	RR	RR	RR	n	RR	RR	rr	TEFLON(rr) NAT+NEOP+NBR(r) NONWOVEN PE(NN) SARANEX(RR) SBR(r) NEOP/NAT RUB(rr) NEOPRENE+PVC(rr)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Inorganic Gases													
Inorganic Gases (350)													
Ammonia			n		r					r	n	r	
Bromine								NN					
Chlorine	n	r	rr	n	rr		n	NN		NN	rr	rr	SARANEX(rr)
Fluorine			n	r	r					r		n	
Hydrocyanic Acid	rr				r			rr		nn	r		
Hydrogen Phosphide				nn	NN			nn		nn			
Hydrogen Sulfide	r	r		n	R	r				R			POLYURETHANE(n) SBR(r) SBR/NEOPRENE(n)
Nickel Carbonyl	r	r								r			
Nitric Oxide	r	r								r			
Nitrogen Dioxide			n									n	
Nitrogen Tetroxide	nn	rr	n					rr		nn	nn	n	CHLOROBUTYL(rr) TEFLON(NN) CR 39(rr)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Inorganic Salts													
Inorganic Salts (340)													
Ammonium Fluoride													NEOP+NAT RUB(r)
Ammonium Fluoride, 30-70%				rr	rr		rr			rr			
Ammonium Sulfate	r			R	R	r	r			R			POLYURETHANE(R) SBR(r) SBR/NEOPRENE(r)
Arsenic Trichloride			n									n	
Bromine Trifluoride			n									n	
Calcium Chloride	r			R	R	r	r			R			POLYURETHANE(r) SBR(r) SBR/NEOPRENE(r)
Calcium Hypochlorite	r			R	R	r	r			R			POLYURETHANE(r) SBR(n) SBR/NEOPRENE(n)
Copper Chloride				n	r		r			r			POLYURETHANE(r)
Copper Sulfate				n	R		r			R			POLYURETHANE(r) SBR(r)
Cupric Chloride	r			n	R	r				R			POLYURETHANE(r) SBR(n) SBR/NEOPRENE(n)
Cupric Sulfate	r			n	R	r	r			R			POLYURETHANE(r) SBR(n) SBR/NEOPRENE(n)
Ferric Chloride	r			r	R	r				R			POLYURETHANE(r) SBR(r) SBR/NEOPRENE(r)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Inorganic Salts (cont.)													
Inorganic Salts (cont.)(340)													
Potassium Dichromate	r			r	R	r				R			POLYURETHANE(n) SBR(r) SBR/NEOPRENE(r)
Potassium Bromide				r	r					r			
Potassium Chloride										r			
Potassium Cyanide										r			
Silver Nitrate				r	r					n			
Sodium Chloride										r			
Sodium Hypochlorite, 30-70%				rr	rr	rr	rr			rr			
Sodium Silicate			r									r	
Sodium Sulfide					r					r			
Sodium Thiosulfate					r					r			
Stannous Chloride	r			r	R	r				R			POLYURETHANE(r) SBR(r) SBR/NEOPRENE(r)
Isocyanates													
Isocyanates (210)													
Methyl Isocyanate	nn			NN	NN				rr		NN		
Toluene Diisocyanate	RR	rr		NN	n		rr	rr	RR	nn	RR		TEFLON(RR) SILVERSHIELD(RR)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Ketones													
Aliphatic & Alicyclic (391)													
Acetone	RR	NN		NN	NN	nn	NN	NN	NN	NN	NN		TEFLON(rr) NEOP+NAT RUB(NN) NEOPRENE+SBR(n) NAT+NEOP+NBR(r) POLYURETHANE(r) SARANEX(nn) SBR(n) VIT/CLORBUTL(nn) NEOP/NAT RUB(NN) PV ACETATE(rr) SILVERSHIELD(rr) SBR/NEOPRENE(n)
Cyclohexanone	rr	n	n				nn		rr	n	nn	n	NEOP+NAT RUB(nn) SILVERSHIELD(rr)
Diacetone Alcohol	r		n	r	R	r				R		r	POLYURETHANE(n) SBR(r) SBR/NEOPRENE(r)
Diisobutyl Ketone	n	n		nn	nn	n	rr	NN	rr	N			
Diisobutyl Ketone, >70%	RR						RR		rr		RR		SILVERSHIELD(rr)
Isophorone			n									r	
Mesityl Oxide		nn	n									r	VIT/CLORBUTL(rr)
4-Methoxy-4-methyl-2-pentanone	rr				rr				rr		nn		
Methyl n-Butyl Ketone			r									n	

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Ketones (cont.)													
Aliphatic & Alicyclic (cont.)(391)													
Methyl Ethyl Ketone	RR	nn	NN	NN	NN	NN	NN	NN	nn	NN	NN	NN	CHLOROBUTYL(rr) TEFLON(nn) NEOP+NAT RUB(NN) NEOPRENE+SBR(n) POLYURETHANE(r) SARANEX(NN) SBR(r) VIT/CLORBUTL(nn) NEOP/NAT RUB(NN) SBR/NEOPRENE(n)
Methyl Isobutyl Ketone	NN	n	n	NN	NN	nn	NN	NN	rr	nn	nn	n	TEFLON(rr) NEOP+NAT RUB(n) SBR(r)
Methyl-vinyl-ketone		nn											VIT/CLORBUTL(rr)
N-Methyl-2-pyrrolidone				NN	NN		NN			NN			
Alkyl-Aryl (393)													
Acetophenone			n									r	TEFLON(rr)
Lactones													
Lactones (400)													
beta-Propiolactone	rr			nn	nn		nn	NN		nn	nn		POLYURETHANE(NN)

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Miscellaneous													
Miscellaneous (560)													
Asphalt			r									n	
Mercury			r		r					r		r	
Mineral Oil			r									n	

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Nitriles													
Aliphatic & Alicyclic (431)													
Acetonitrile	RR	rr	nn	NN	NN		NN	NN	rr	NN	rr	rr	TEFLON(rr) NEOP+NAT RUB(r) SARANEX(rr) VIT/CLORBUTL(rr) SILVERSHIELD(rr)
Acrylonitrile	n	nn		N	r	n	n	NN		N	n		TEFLON(nn) NEOPRENE+SBR(n) POLYURETHANE(r) SARANEX(nn) SBR(n) SBR/NEOPRENE(n)
Bromoacetonitrile	rr			NN					rr		rr		
Chloroacetonitrile	rr			NN					rr		rr		
Ethyl Cyanide	nn			NN					rr	NN			
Isoamylnitrile					nn		rr		rr		rr		
Methacrylonitrile	rr			NN					nn	NN			
Trichloroacetonitrile	rr				rr				rr		rr		
Valeronitrile	rr			NN	nn				rr				
Aromatic (432)													
Benzonitrile	rr			NN					rr		nn		

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Nitro Compounds													
Unsubstituted (441)													
Nitrobenzene	rr	rr		NN	NN	n	NN		RR	N	RR		TEFLON(rr) NEOP+NAT RUB(n) NEOPRENE+SBR(r) POLYURETHANE(n) SBR(n) VIT/CLORBUTL(rr) SILVERSHIELD(rr) SBR/NEOPRENE(n)
Nitroethane	rr		n	NN	nn				rr			r	NEOP+NAT RUB(r)
Nitroglycerine	r	r											
Nitromethane	rr			NN	rr		nn	rr	NN	n	n		
Nitropropane	RR			n	nn	NN	NN	NN	NN	nn	nn		POLYURETHANE(nn) SILVERSHIELD(rr)
1-Nitropropane	rr						nn		rr		nn		TEFLON(rr)
2-Nitropropane	rr			NN	nn				rr				
Nitrotoluene					r					r			POLYURETHANE(n) SBR(r) SBR/NEOPRENE(r)
o-Nitrotoluene	nn												
p-Nitrotoluene	rr												POLYCARBONAT(rr)
2,4,6-Trinitrotoluene	n			N	N	r				R			POLYURETHANE(n) SBR(n) SBR/NEOPRENE(n)
Substituted (442)													
2-Chloro-2-nitropropane	rr			NN					rr		nn		
n-Nitrosodimethylamine		nn											
Picric Acid	r			R	R	r	R		n	r	r		

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Organic Salts													
Organic salts (550)													
Benzethonium Chloride	rr			rr	rr					rr			
Organo-Metallic Compounds													
Organo-Metallic Compounds (461)													
Titanium Tetrachloride			r									n	
Triethyl Aluminum			n									n	
Trioctyl Phosphine			r									r	
Organo-Phosphorous Compounds													
Organo-Phosphorous Compounds (460)													
Tributyl Phosphate			r									r	
Tricresyl Phosphate	rr	r	r	nn	nn	rr	n	rr	RR	rr	rr	r	NEOPRENE+SBR(n) POLYURETHANE(n) SBR(n) SBR/NEOPRENE(r)
Triisooctyl Phosphate			r									r	

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Peroxides													
Peroxides (300)													
alpha,alpha-Dimethylbenzyl Hydroperoxide													TEFLON(rr)
Hydrogen Peroxide	nn	rr	r	r	R	r	n			nn	r	r	TEFLON(nn) NEOP+NAT RUB(r) NEOPRENE+SBR(r) POLYURETHANE(r) SBR(r) SBR/NEOPRENE(r)
Hydrogen Peroxide, <30%													CHLOROBUTYL(rr) NAT+NEOP+NBR(r)
Hydrogen Peroxide, 30-70%				RR	NN		rr	rr	n	rr			NEOP+NAT RUB(rr) POLYURETHANE(r) SBR(r) NEOP/NAT RUB(rr)
Hydrogen Peroxide, >70%			r									n	
Methyl Ethyl Ketone Peroxide	rr			nn	rr						rr		
Quinones													
Quinones (490)													
Hydroquinone	n			R	R	rr	r	rr	n	rr	r		SBR(r)
Hydroquinone, <30%				rr	rr		rr			rr			

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B.
For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Sulfur Compounds													
Thiols (501)													
tert-Butyl Mercaptan			n									n	
Ethyl Mercaptan			n									n	
Thionyl Chloride			r									n	
Thiophenol	nn								rr				
Sulfides & Disulfides (502)													
Calcium Bisulfate, 30-70%			r									r	
Carbon Disulfide	NN	NN		N	N	n	NN	NN	RR	N	RR		TEFLON(nn) NEOP+NAT RUB(NN) POLYURETHANE(n) SBR(N) VIT/CLORBUTL(NN) SBR/NEOPRENE(n)
Sulfoxides (503)													
Dimethyl Sulfoxide		rr		RR	RR	rr	nn	rr		NN			VIT/CLORBUTL(rr) NEOP/NAT RUB(rr)
Sulfonic Acids (504)													
Methanesulfonic Acid					rr					rr			
p-Toluenesulfonic Acid		rr			rr					rr			
Others (507)													
Disulfur Dichloride			r									n	

Note: Numbers in parentheses are chemical class codes -- see Table 8.1 and Appendix B. For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Source: Arthur D. Little, Inc.

MATRIX B

RECOMMENDATIONS BY CHEMICAL CLASS

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Acids, Carboxylic, Aliphatic													
Unsubstituted	R	r	r	**	rr	**	rr	NN	**	**	**	r	
Polybasic					rr	rr	rr	rr	n	rr			
Aldehydes													
Aliphatic and Alicyclic	RR	NN	r	**	NN	nn	NN	**	NN	NN	**	r	
Aromatic and Hetrocyclic	rr		n	nn	nn	n	nn	NN	rr	N		r	
Amides													
Amides	rr			**	nn		nn	nn			nn		
Amines, Aliphatic & Alicyclic													
Primary	**	**	n	NN	**		rr		nn	**	**		
Secondary	**		n	NN	nn		**		**	NN	**	n	
Tertiary	**	**		**	**	**	**		**	**	rr		
Polyamine	**			NN	**		nn			NN	rr		
Cyanides													
Cyanides					r								
Esters, Carboxylic													
Formates			n							n		n	
Acetates	**	**	n	NN	nn	nn	NN	NN	**	NN	n	**	
Higher Monobasic	nn	nn	**	NN	nn		nn	NN	rr	NN		**	
Polybasic			r	r	r		**			rr		r	
Aromatic Phthalates	rr		r	**	**		**			nn	rr	r	
Ethers													
Aliphatic	**	rr	**	NN	**	**	**		**	**		**	

Note: For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Class recommendations only for chemicals classes in which two or more chemicals have recommendations for a given material. Double asterisks (**) indicate a wide variation in ratings.
Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Halogen Compounds													
Aliphatic, Unsubstituted	nn	nn	r	NN	NN	NN	NN	NN	**	NN	**	n	
Aliphatic, Substituted	**			NN	rr		nn		**	NN	rr		
Aromatic, Unsubstituted	nn	nn	r	N		n	nn	NN		N	rr	n	
Polynuclear				NN	nn					n	rr		
Vinyl Halides										n	rr		
Heterocyclic Compounds													
Epoxy Compounds	**			**	nn		nn	NN	**	nn	NN		
Furan Derivatives	nn		nn							NN	nn	n	
Hydrazines													
Hydrazines	**	nn	n	**	**		**		nn	**	**	n	
Hydrocarbons													
Aliphatic & Alicyclic	N	r	r	NN	**	**	**	**	**	NN	RR	n	
Aromatic	**	rr	r	NN	NN	NN	**	NN	**	NN	RR	n	
Hydroxyl Compounds													
Aliphatic & Alicyclic, Primary	RR	rr	rr	nn	**	nn	**	**	**	**	rr	**	
Aliphatic & Alicyclic, Secondary	rr	rr	r	**	**	**	rr		rr	**	rr	r	
Aliphatic & Alicyclic, Tertiary	r			**	rr	rr	rr			**			
Aliphatic & Alicyclic, Polyols	r		**	rr	rr	rr	rr			**		**	
Aromatic	**		r	**	**	**	**	**	nn	**	rr	r	
Inorganic Acids													
Inorganic Acids	**	**	rr	**	**	**	**	**	n	**	rr	**	

Note: For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3.
Class recommendations only for chemicals classes in which two or more chemicals have recommendations for a given material. Double asterisks (**) indicate a wide variation in ratings.

Source: Arthur D. Little, Inc.

	BUTYL	CPE	VITON/NEOPRENE	NATURAL RUBBER	NEOPRENE	NITRILE+PVC	NITRILE	PE	PV ALCOHOL	PVC	VITON	BUTYL/NEOPRENE	OTHER MATERIALS
Inorganic Bases													
Inorganic Bases	r	r		RR	RR	**	RR	**	n	**	rr	r	
Inorganic Gases													
Inorganic Gases	**	r	n	n	r			**		**	**	**	
Inorganic Salts													
Inorganic Salts	r		n	**	r	r	r			R			
Isocyanates													
Isocyanates				NN	n				rr				
Ketones, Aliphatic													
Ketones, Aliphatic	**	NN	n	NN	NN	N	**	NN	**	NN	NN	**	
Nitriles, Aliphatic													
Nitriles, Aliphatic	rr			NN	**			NN	rr	NN	rr		
Nitro Compounds													
Unsubstituted	rr	r		NN	**		nn		**	**	**		
Organo-Phosphorous Compounds													
Orgno-Phosphorous Compounds			r									r	
Peroxides													
Peroxides				r									
Sulfur Compounds													
Thiols			**									n	

Note: For explanation of recommendation codes (e.g. RR,R,NN, etc.) see Table 8.3. Class recommendations only for chemicals classes in which two or more chemicals have recommendations for a given material. Double asterisks (**) indicate a wide variation in ratings.

Source: Arthur D. Little, Inc.

APPENDIX A

GLOSSARY

GLOSSARY

<u>ABS</u> -- Polymer of acrylonitrile, butadiene, and styrene; a strong, rigid material used for structural components.

<u>Acetate</u> -- Polymer of cellulose acetate; a clear, relatively inexpensive material used for face and eye protection.

<u>Acrylic</u> -- Polymer of methyl methacrylate; clear plastic used for face and eye protection.

<u>Baypren</u> -- See Neoprene.

<u>Blend</u> -- An intimate mixture of two or more materials.

<u>Breakthrough Time</u> -- The time elapsed between initial contact of a chemical with the outside surface of a protective clothing material and the time at which the chemical can be detected at the inside surface of the material. Measured breakthrough times are dependent on the sensitivity of the analytical methods used to detect the chemical and the experimental procedures.

<u>Butyl Rubber</u> -- Copolymer of isobutylene and a small amount of isoprene. Material has good resistance to weathering and a wide variety of chemicals. Both supported and unsupported forms of butyl rubber are used as protective clothing.

<u>Cellulose Propionate</u> -- Polymer; clear plastic used for face and eye protection.

<u>Chlorinated Polyethylene</u> -- CPE, Chloropel™ . A polyethylene elastomer with a chlorine content of 36% to 45%. The material generally has better chemical resistance and physical properties than polyethylene.

<u>Chlorobutyl Rubber</u> -- A chlorinated form of butyl rubber. Generally has better heat than butyl rubber.

<u>Chloroprene Rubber</u> -- See Neoprene.

<u>Chlorosulphonated Polyethylene</u> -- See Hypalon™.

<u>Contamination</u> -- The presence of potentially harmful chemicals on the surface of or within the polymer of CPC.

<u>Copolymer</u> -- A long chain molecule synthesized by reaction of more than one monomer species with each other. Copolymers often have cost and/or performance advantages over polymers produced from a single monomer species.

CPE -- See Chlorinated Polyethylene.

CR-39™ -- Polymer of allyl diglycol carbonate. A clear, impact resistant plastic used for face and eye protection.

Decontamination -- The removal of potentially harmful chemicals from the surface of and from within the polymer of CPC. Note surface decontamination does not necessarily remove absorbed chemical.

Degradation -- The loss in physical properties of an item of protective clothing due to exposure to chemicals, use, or ambient conditions (e.g., sunlight).

Ethylene Vinyl Alcohol -- See EVOH.

EVAL™ -- See EVOH.

EVOH -- Polymer of ethylene vinyl alcohol. This polymer exhibits a high resistance to non-polar organic compounds. However since it is susceptible to attack by acids, bases and water, it is used as an internal layer in laminates.

FEP -- Polymer of fluorinated ethylene propylene. Polymer with exceptionally good chemical resistance with protective clothing applications in both film and coating form.

Flock-lined or Flocked -- A layer of fibers, typically cotton, adhered to the inside of rubber gloves. The lining absorbs perspiration and provides some insulating effect.

Gore-Tex™ Fabric -- A proprietary fabric in which microporous PTFE is laminated on one or both sides with a fabric. The fabric allows the transmittance of moisture vapor which reduces heat stress. It prevents penetration by many liquids and solids but does not provide vapor protection.

Hypalon™ -- Polymer produced by the post chlorination and sulfonation of polyethylene, thereby producing a rubbery material suitable for CPC.

Laminated -- Joining two or more sheets or fabrics together by means of heat or adhesive.

Latex -- A stable dispersion of polymer or rubber particles in water. Latex gloves and coated fabrics are prepared by coagulating and cross-linking the particles on a form or cloth substrate. Most natural rubber, neoprene, and nitrile gloves are prepared from latices.

Latex-Dipped -- A glove prepared by dipping a glove form or a fabric glove into a rubber latex bath. In one dip, the entire amount of rubber that will form the glove is deposited.

Natural Rubber -- Polyisoprene obtained from rubber plants. A highly flexible and conforming material used principally for gloves. High elasticity.

Neoprene -- Polychloroprene. A synthetic rubber having chemical and wear resistance properties that are generally superior to those of natural rubber.

NBR (Nitrile-Butadiene Rubber) -- See Nitrile Rubber.

Nitrile Rubber -- Copolymer of acrylonitrile and butadiene. Also known as acrylonitrile rubber, acrylonitrile-butadiene rubber, Buna-N, and nitrile-butadiene rubber (NBR). Trademark names include Hycar™, Kyrnac™, and Paracril™. Used for supported and unsupported gloves and coated fabric. Nitrile rubbers are available in a wide range of acrylonitrile concentrations. In general, the higher the acrylonitrile concentration the better the chemical resistance. However, stiffness also increases at higher acrylonitrile concentrations.

PE -- See Polyethylene.

Penetration -- The movement of chemical through zippers, stitched seams or imperfections (e.g., pinholes) in a protective clothing material.

Permeation -- The process by which a chemical dissolves in and moves through a protective clothing material on a molecular level.

Permeation Rate -- The rate at which the chemical moves through the clothing material. This is expressed in terms of amount per unit area per unit time.

Polycarbonate -- A hard, transparent plastic used for face and eye protection. It has exceptional impact resistance and good chemical resistance, and is commonly used as the lens of safety glasses.

Polyester -- A family of polymers that finds application in fiber form as clothing and in film form as a clear material for face and eye protection.

Polyethylene -- A fairly chemically resistant material that is used as a freestanding film (e.g., apron) or a fabric coating. Low density polyethylene is the most common form used in protective clothing.

Polyurethane -- An extensive and multi-branched family of polymers based on isocyanates. As used in protective clothing, polyurethanes are rubbery polymers that are either coated onto fabrics or formed into boots.

Polyvinyl Alcohol -- A water-soluble polymer that, as long as it is dry, exhibits exceptional resistance to many organic solvents that rapidly permeate most rubbers. The material is somewhat stiff, thus limiting dexterity.

PU -- See Polyurethane.

PVA -- See Polyvinyl Alcohol.

PVC -- See Polyvinyl Chloride.

PVDC -- Polymer of polyvinylidene chloride.

Polyvinyl Chloride -- A stiff polymer that is made suitable for protective clothing applications by the addition of plasticizers. Used as a freestanding material for gloves, aprons, etc., as well as coatings for fabrics. Clear forms are also available as flexible face shields.

Safeguard CPF -- A proprietary non-woven fabric for limited use (i.e., disposable) clothing.

Saran™ -- See PVDC.

Saranex® -- Multi-layer laminate of polyethylene and Saran™.

Solvent-Dipped -- A glove prepared by repeatedly dipping a glove form or glove substrate into a solution of the rubber in a solvent. The rubber is subsequently cured.

Sontara® -- Proprietary spun-laced, limited use fabric.

SBR (Styrene-Butadiene Rubber) -- Also known as Buna-S. Trademark names include Solprene™, Plioflex™, and Stereon™. Used for fabric coatings and boots.

Supported -- Materials containing a substrate such as cotton, polyester or nylon fabric or scrim which is coated, laminated or impregnated with a polymer or rubber.

TFE (PTFE) -- Polytetrafluoroethylene. An example is Teflon®.

Tyvek® -- A proprietary, porous non-woven fabric limited use (e.g., disposable) clothing. Tyvek® may be coated with polyethylene or Saranex™ film.

Viton® -- A proprietary fluoroelastomer. Highly chemically resistant, but expensive synthetic elastomer.

APPENDIX B

CHEMICAL INDEX

CHEMICAL NAMES AND SYNONYMS

NAME: Acetaldehyde
SYN:
CASNO: 00075070
CLASS: 121

NAME: Acetamide
SYN:
CASNO: 00060355
CLASS: 132

NAME: Acetic Acid
SYN:
CASNO: 00064197
CLASS: 102

NAME: Acetic Acid, <30%
SYN:
CASNO: 00064197
CLASS: 102

NAME: Acetic Acid, 30-70%
SYN:
CASNO: 00064197
CLASS: 102

NAME: Acetic Acid, >70%
SYN:
CASNO: 00064197
CLASS: 102

NAME: Acetic Anhydride
SYN:
CASNO: 00108247
CLASS: 161

NAME: Acetone
SYN:
CASNO: 00067641
CLASS: 391

NAME: Acetone Cyanohydrin
SYN: (See 2-Methylactonitrile)
CASNO:
CLASS:

NAME: Acetonitrile
SYN:
CASNO: 00075058
CLASS: 431

NAME: Acetophenone
SYN:
CASNO: 00098862
CLASS: 393

NAME: Acetyl Bromide
SYN:
CASNO: 00506967
CLASS: 111

NAME: Acetyl Chloride
SYN:
CASNO: 00075365
CLASS: 111

NAME: Acetylene
SYN:
CASNO: 00074862
CLASS: 291

CHEMICAL NAMES AND SYNONYMS

NAME: Acrolein
SYN:
CASNO: 00107028
CLASS: 121

NAME: Acrylamide
SYN: Propeneamide, 2
CASNO: 00079061
CLASS: 132

NAME: Acrylic Acid
SYN:
CASNO: 00079107
CLASS: 102

NAME: Acrylonitrile
SYN:
CASNO: 00107131
CLASS: 431

NAME: Adipic Acid
SYN: Hexanedioic Acid
CASNO: 00124049
CLASS: 104

NAME: Alkazene
SYN: Dibromoethylbenzene
CASNO: 00093527
CLASS: 262

NAME: Allyl Alcohol
SYN:
CASNO: 00107186
CLASS: 311

NAME: Allylamine
SYN:
CASNO: 00107119
CLASS: 141

NAME: Allyl Chloride
SYN:
CASNO: 00107051
CLASS: 261

NAME: Allyl Glycidyl Ether
SYN:
CASNO: 00106923
CLASS: 275

NAME: Aluminum Acetate
SYN: Burow's Solution
CASNO: 08006131
CLASS: 222

NAME: Aluminum Chloride
SYN:
CASNO: 07446700
CLASS: 340

NAME: Aluminum Fluoride
SYN:
CASNO: 07784181
CLASS: 340

NAME: Aluminum Hydroxide
SYN:
CASNO: 21645512
CLASS: 340

CHEMICAL NAMES AND SYNONYMS

NAME:	Aluminum Nitrate	CASNO:	13473900
SYN:		CLASS:	340
NAME:	Aluminum Phosphate	CASNO:	07784307
SYN:		CLASS:	340
NAME:	Aluminum Sulfate	CASNO:	10043013
SYN:		CLASS:	340
NAME:	Aminoethanol,2	CASNO:	
SYN:	(See Ethanolamine)	CLASS:	
NAME:	Ammonia	CASNO:	07664417
SYN:		CLASS:	350
NAME:	Ammonium Carbonate	CASNO:	10361292
SYN:		CLASS:	340
NAME:	Ammonium Chloride	CASNO:	12125029
SYN:		CLASS:	340
NAME:	Ammonium Fluoride	CASNO:	12125018
SYN:		CLASS:	340
NAME:	Ammonium Fluoride, 30-70%	CASNO:	12125018
SYN:		CLASS:	340
NAME:	Ammonium Hydroxide	CASNO:	01336216
SYN:		CLASS:	380
NAME:	Ammonium Hydroxide, <30%	CASNO:	01336216
SYN:		CLASS:	380
NAME:	Ammonium Hydroxide, 30-70%	CASNO:	01336216
SYN:		CLASS:	380
NAME:	Ammonium Hydroxide, >70%	CASNO:	01336216
SYN:		CLASS:	380
NAME:	Ammonium Nitrate	CASNO:	06484522
SYN:		CLASS:	340

CHEMICAL NAMES AND SYNONYMS

NAME:	Ammonium Nitrate, <30%	CASNO:	06484522
SYN:		CLASS:	340
NAME:	Ammonium Persulfate	CASNO:	07727540
SYN:		CLASS:	340
NAME:	Ammonium Phosphate	CASNO:	07722701
SYN:		CLASS:	340
NAME:	Ammonium Phosphate, <30%	CASNO:	07722701
SYN:		CLASS:	340
NAME:	Ammonium Sulfate	CASNO:	07783202
SYN:		CLASS:	340
NAME:	Ammonium Sulfide	CASNO:	12135761
SYN:		CLASS:	340
NAME:	Amyl Acetate	CASNO:	00628637
SYN:	Pentyl Acetate	CLASS:	222
NAME:	Amyl Alcohol	CASNO:	00071410
SYN:	Pentanol	CLASS:	311
NAME:	Aniline	CASNO:	00062533
SYN:	Benzamine	CLASS:	145
NAME:	Aniline, >70%	CASNO:	00062533
SYN:		CLASS:	145
NAME:	Antimony Pentachloride	CASNO:	07647189
SYN:		CLASS:	370
NAME:	Aroclor	CASNO:	
SYN:	(See Polychlorinated Biphenyls (PCBs))	CLASS:	
NAME:	Arsenic Trichloride	CASNO:	07784341
SYN:		CLASS:	340
NAME:	Asphalt	CASNO:	08052424
SYN:		CLASS:	560

NAME:	Aziridine	CASNO:	
SYN:	(See Ethylenimine)	CLASS:	
NAME:	Benzal Chloride	CASNO:	
SYN:	(See Benzyl Dichloride)	CLASS:	
NAME:	Benzaldehyde	CASNO:	00100527
SYN:		CLASS:	122
NAME:	Benzamine	CASNO:	
SYN:	(See Aniline)	CLASS:	
NAME:	Benzendiol,1,3	CASNO:	
SYN:	(See Resorcinol)	CLASS:	
NAME:	Benzene	CASNO:	00071432
SYN:		CLASS:	292
NAME:	Benzenesulfonic Acid	CASNO:	00098679
SYN:		CLASS:	106
NAME:	Benzenesulfonyl Chloride	CASNO:	00098099
SYN:		CLASS:	505
NAME:	Benzenethiol	CASNO:	
SYN:	(See Thiophenol)	CLASS:	
NAME:	Benzethonium Chloride	CASNO:	00121540
SYN:		CLASS:	550
NAME:	Benzidine	CASNO:	00092875
SYN:		CLASS:	147
NAME:	Benzonitrile	CASNO:	00100470
SYN:		CLASS:	432
NAME:	p-Benzoquinone	CASNO:	00106514
SYN:		CLASS:	490
NAME:	Benzotrichloride	CASNO:	00098077
SYN:	Trichloromethyl-benzene	CLASS:	263

CHEMICAL NAMES AND SYNONYMS

NAME:	Benzoyl Chloride	CASNO:	00098884
SYN:		CLASS:	112
NAME:	Benzyl Alcohol	CASNO:	00100516
SYN:		CLASS:	316
NAME:	Benzyl Benzoate	CASNO:	00120514
SYN:		CLASS:	316
NAME:	Benzyl Chloride	CASNO:	00100447
SYN:	Chloromethyl Benzene	CLASS:	263
NAME:	Benzyl Dichloride	CASNO:	00098873
SYN:	Benzal Chloride	CLASS:	263
NAME:	2,2'-Bioxirane	CASNO:	01464535
SYN:	Erythritol Anhydride	CLASS:	275
NAME:	Bis(2-chloroethoxy) Methane	CASNO:	00111911
SYN:		CLASS:	241 262
NAME:	Bis(chloromethyl) Ether	CASNO:	00542881
SYN:	Dichloromethyl Ether,sym-	CLASS:	262 241
NAME:	Bis(2-Ethylhexyl) Phthalate	CASNO:	00117817
SYN:		CLASS:	226
NAME:	Boric Acid	CASNO:	10043353
SYN:		CLASS:	370
NAME:	Bromine	CASNO:	07726956
SYN:		CLASS:	350
NAME:	Bromine Cyanide	CASNO:	
SYN:	(See Cyanogen Bromide)	CLASS:	
NAME:	Bromine Trifluoride	CASNO:	07787715
SYN:		CLASS:	340
NAME:	Bromoacetonitrile	CASNO:	00590170
SYN:		CLASS:	431

NAME:	Bromobenzene	CASNO:	00108861
SYN:		CLASS:	263
NAME:	Bromochloromethane	CASNO:	00074975
SYN:		CLASS:	263
NAME:	2-Bromoethanol	CASNO:	00540512
SYN:		CLASS:	262
NAME:	Bromomethane	CASNO:	
SYN:	(See Methyl Bromide)	CLASS:	
NAME:	4-Bromophenyl Phenyl Ether	CASNO:	00101553
SYN:		CLASS:	242 265
NAME:	1-Bromo-2-propanol	CASNO:	19686738
SYN:		CLASS:	262
NAME:	3-Bromo-1-propanol	CASNO:	00627189
SYN:		CLASS:	262
NAME:	Burow's Solution	CASNO:	
SYN:	(See Aluminum Acetate)	CLASS:	
NAME:	Butadiene	CASNO:	00106990
SYN:		CLASS:	291
NAME:	Butane	CASNO:	00106978
SYN:		CLASS:	291
NAME:	Butanediol,1,3	CASNO:	
SYN:	(See 1,3-Butylene Glycol)	CLASS:	
NAME:	Butanethiol, 1	CASNO:	
SYN:	(See n-Butyl Mercaptan)	CLASS:	
NAME:	Butanol, 1	CASNO:	
SYN:	(See Butyl Alcohol)	CLASS:	
NAME:	tert-Butanol	CASNO:	00075650
SYN:	Methylpropanol, 2-,2-	CLASS:	313

CHEMICAL NAMES AND SYNONYMS

NAME:	Butanone,2	CASNO:	
SYN:	(See Methyl Ethyl Ketone)	CLASS:	
NAME:	Butenal,trans-2	CASNO:	
SYN:	(See Crotonaldehyde)	CLASS:	
NAME:	Butene	CASNO:	00106989
SYN:		CLASS:	291
NAME:	Butoxyethanol, 2	CASNO:	
SYN:	(See Butyl Cellosolve)	CLASS:	
NAME:	Butoxyethylacetate, 2	CASNO:	
SYN:	(See Butyl Cellosolve Acetate)	CLASS:	
NAME:	Butyl Acetate	CASNO:	00123864
SYN:		CLASS:	222
NAME:	Butyl Acrylate	CASNO:	00141322
SYN:		CLASS:	223
NAME:	Butyl Alcohol	CASNO:	00071363
SYN:	Butanol, 1	CLASS:	311
NAME:	Butylamine	CASNO:	00109739
SYN:		CLASS:	141
NAME:	iso-Butylamine	CASNO:	00078819
SYN:	Methylpropylamine, 2-	CLASS:	141
NAME:	sec-Butylamine	CASNO:	13952846
SYN:		CLASS:	142
NAME:	tert-Butylamine	CASNO:	00075649
SYN:		CLASS:	143
NAME:	n-Butyl Benzoate	CASNO:	00136607
SYN:		CLASS:	316
NAME:	Butyl Benzyl Phthalate	CASNO:	00085687
SYN:		CLASS:	226

CHEMICAL NAMES AND SYNONYMS

NAME:	n-Butyl Carbitol	CASNO:	00112345
SYN:		CLASS:	311
NAME:	Butyl Cellosolve	CASNO:	00111762
SYN:	Butoxyethanol, 2	CLASS:	241 311
NAME:	Butyl Cellosolve Acetate	CASNO:	00112072
SYN:	Butoxyethylacetate, 2	CLASS:	222 241
NAME:	n-Butyl Chloride	CASNO:	00109693
SYN:	Chlorobutane,1-	CLASS:	261
NAME:	Butylene	CASNO:	25167673
SYN:		CLASS:	291
NAME:	1,3-Butylene Glycol	CASNO:	00107880
SYN:	Butanediol,1,3	CLASS:	314
NAME:	n-Butyl Mercaptan	CASNO:	00109795
SYN:	Butanethiol, 1	CLASS:	501
NAME:	tert-Butyl Mercaptan	CASNO:	00075661
SYN:		CLASS:	501
NAME:	Butyl Oleate	CASNO:	00142778
SYN:		CLASS:	223
NAME:	n-Butyl Phthalate	CASNO:	00084742
SYN:		CLASS:	226
NAME:	Butyl Stearate	CASNO:	00123955
SYN:		CLASS:	223
NAME:	p-tert-Butyl Toluene	CASNO:	27130212
SYN:		CLASS:	292
NAME:	Butyraldehyde	CASNO:	00123728
SYN:		CLASS:	121
NAME:	Butyric Acid	CASNO:	00107926
SYN:		CLASS:	102
NAME:	Calcium Bisulfate, 30-70%	CASNO:	13780035
SYN:		CLASS:	502

NAME:	SYN:	CASNO:	CLASS:
Calcium Chloride		10043524	340
Calcium Hydroxide		01305620	380
Calcium Hydroxide, <30%		01305620	380
Calcium Hypochlorite		07778543	340
Calcium Hypochlorite, <30%		07778543	340
Carbitol		00111900	311
Carbolic Acid	(See Phenol)		
Carbon Bisulfide	(See Carbon Disulfide)		
Carbon Disulfide	Carbon Bisulfide	00075150	502
Carbon Oxyfluoride		00353504	350
Carbontetrabromide	Tetrabromomethane	00558134	261
Carbon Tetrachloride	Tetrachloromethane	00056235	261
Carbonyl Chloride	(See Phosgene)		
Cellosolve Acetate	(See 2-Ethoxyethyl Acetate)		

NAME: Chloral
SYN: (See Trichloroacetaldehyde)
CASNO:
CLASS:

NAME: Chlorine
SYN:
CASNO: 07782505
CLASS: 350

NAME: Chlorine Cyanide
SYN: (See Cyanogen Chloride)
CASNO:
CLASS:

NAME: Chloroacetaldehyde
SYN:
CASNO: 00107200
CLASS: 121 262

NAME: Chloroacetic Acid
SYN:
CASNO: 00079118
CLASS: 103

NAME: Chloroacetone
SYN:
CASNO: 00078955
CLASS: 262

NAME: Chloroacetonitrile
SYN:
CASNO: 00107142
CLASS: 262 431

NAME: p-Chloroaniline
SYN: Chlorobenzamine,4
CASNO: 00106478
CLASS: 145 264

NAME: Chlorobenzamine,4
SYN: (See p-Chloroaniline)
CASNO:
CLASS:

NAME: Chlorobenzene
SYN:
CASNO: 00108907
CLASS: 263

NAME: 2-Chloro-1,3-butadiene
SYN: Chloroprene
CASNO: 00126998
CLASS: 261

NAME: Chlorobutane,1-
SYN: (See n-Butyl Chloride)
CASNO:
CLASS:

NAME: p-Chloro-m-cresol
SYN:
CASNO: 00059507
CLASS: 292 316 264

NAME: Chlorodibromomethane
SYN:
CASNO: 00124481
CLASS: 261

CHEMICAL NAMES AND SYNONYMS

NAME:	Chlorododecane	CASNO:	00112527
SYN:		CLASS:	261
NAME:	Chloroethane	CASNO:	00075003
SYN:		CLASS:	261
NAME:	Chloroethanol	CASNO:	
SYN:	(See Ethylene Chlorohydrin)	CLASS:	
NAME:	Chloroethene	CASNO:	
SYN:	(See Vinyl Chloride)	CLASS:	
NAME:	2-Chloroethyl Vinyl Ether	CASNO:	00110758
SYN:		CLASS:	241 262
NAME:	Chloroform	CASNO:	00067663
SYN:	Trichloromethane	CLASS:	261
NAME:	Chloromethane	CASNO:	
SYN:	(See Methyl Chloride)	CLASS:	
NAME:	Chloromethyl Benzene	CASNO:	
SYN:	(See Benzyl Chloride)	CLASS:	
NAME:	Chloromethyl Methyl Ether	CASNO:	00107302
SYN:		CLASS:	241 262
NAME:	3-Chloro-2-methylpropene	CASNO:	00563473
SYN:		CLASS:	262 292
NAME:	2-Chloronaphthalene	CASNO:	00091587
SYN:		CLASS:	265
NAME:	Chloronaphthalenes (all isomers)	CASNO:	25586430
SYN:		CLASS:	265
NAME:	2-Chloro-2-nitropropane	CASNO:	00594718
SYN:		CLASS:	442
NAME:	2-Chlorophenol	CASNO:	00095578
SYN:		CLASS:	316 264

NAME: 4-Chlorophenyl Phenyl Ether CASNO: 07005723
SYN: CLASS: 265 242

NAME: Chloroprene CASNO:
SYN: (See 2-Chloro-1,3-butadiene) CLASS:

NAME: Chloropropane CASNO:
SYN: (See Isopropyl Chloride) CLASS:

NAME: Chloropropane, 1 CASNO:
SYN: (See Propyl Chloride) CLASS:

NAME: 1-Chloro-2-propanol CASNO: 00127004
SYN: CLASS: 262

NAME: 3-Chloro-1-propanol CASNO: 00627305
SYN: CLASS: 262

NAME: 3-Chloropropionitrile CASNO: 00542767
SYN: CLASS: 262 431

NAME: Chlorosulfonic Acid CASNO: 07790945
SYN: CLASS: 370

NAME: o-Chlorotoluene CASNO: 00095498
SYN: CLASS: 263

NAME: p-Chlorotoluene CASNO: 00106434
SYN: CLASS: 263

NAME: Chromic Acid CASNO: 11115745
SYN: CLASS: 370

NAME: Chromic Acid, <30% CASNO: 11115745
SYN: CLASS: 370

NAME: Chromic Acid, 30-70% CASNO: 11115745
SYN: CLASS: 370

NAME: Chromic Acid, >70% CASNO: 11115745
SYN: CLASS: 370

CHEMICAL NAMES AND SYNONYMS

NAME: Citric Acid CASNO: 00077929
SYN: CLASS: 313

NAME: Citric Acid, <30% CASNO: 00077929
SYN: CLASS: 313

NAME: Copper Chloride CASNO: 01344678
SYN: CLASS: 340

NAME: Copper Sulfate CASNO: 01344736
SYN: CLASS: 340

NAME: Creosote CASNO: 08001589
SYN: CLASS: 316

NAME: Creosote, Wood CASNO: 08021394
SYN: CLASS: 316

NAME: m-Cresol CASNO: 00108394
SYN: CLASS: 292 316

NAME: Cresols CASNO: 01319773
SYN: CLASS: 292 316

NAME: Crotonaldehyde CASNO: 04170303
SYN: Butenal,trans-2 CLASS: 121

NAME: Cumene CASNO: 00098828
SYN: Methylethyl Benzene CLASS: 292 312

NAME: Cupric Chloride CASNO: 07447394
SYN: CLASS: 340

NAME: Cupric Chloride, <30% CASNO: 07447394
SYN: CLASS: 340

NAME: Cupric Nitrate CASNO: 03251238
SYN: CLASS: 340

NAME: Cupric Sulfate CASNO: 07758987
SYN: CLASS: 340

NAME:	Cupric Sulfate, <30%	CASNO:	07758987
SYN:		CLASS:	340
NAME:	Cyanogen	CASNO:	00460195
SYN:		CLASS:	350
NAME:	Cyanogen Bromide	CASNO:	00506683
SYN:	Bromine Cyanide	CLASS:	215 350
NAME:	Cyanogen Chloride	CASNO:	00506774
SYN:	Chlorine Cyanide	CLASS:	215 350
NAME:	Cyclohexane	CASNO:	00110827
SYN:		CLASS:	291
NAME:	Cyclohexanol	CASNO:	00108930
SYN:		CLASS:	312
NAME:	Cyclohexanone	CASNO:	00108941
SYN:		CLASS:	391
NAME:	Cyclohexylamine	CASNO:	00108918
SYN:		CLASS:	141
NAME:	Cymene	CASNO:	25155151
SYN:		CLASS:	292
NAME:	Decahydronaphthalene	CASNO:	00091178
SYN:		CLASS:	291
NAME:	Decanal (all isomsers)	CASNO:	00112312
SYN:		CLASS:	121
NAME:	Decane	CASNO:	00124185
SYN:		CLASS:	291
NAME:	Diacetin	CASNO:	25395317
SYN:	Glycerol Diacetate	CLASS:	311 102
NAME:	Diacetone Alcohol	CASNO:	00123422
SYN:		CLASS:	391 313

NAME:	Diallyamine	CASNO:	00124027
SYN:		CLASS:	142
NAME:	Diamine	CASNO:	
SYN:	(See Hydrazine)	CLASS:	
NAME:	Diaminoethane,1,2	CASNO:	
SYN:	(See Ethylenediamine)	CLASS:	
NAME:	1,3-Diaminopropane	CASNO:	00109762
SYN:		CLASS:	144
NAME:	Di-n-amylamine	CASNO:	02050922
SYN:		CLASS:	142
NAME:	Dibenzyl Ether	CASNO:	00103504
SYN:		CLASS:	241
NAME:	Dibenzyl Sebacate	CASNO:	00140249
SYN:		CLASS:	224
NAME:	1,2-Dibromo-3-chloropropane	CASNO:	00096128
SYN:		CLASS:	262
NAME:	Dibromoethane,1,2	CASNO:	
SYN:	(See Ethylene Dibromide)	CLASS:	
NAME:	Dibromoethylbenzene	CASNO:	
SYN:	(See Alkazene)	CLASS:	
NAME:	Dibromomethane	CASNO:	
SYN:	(See Methylene Bromide)	CLASS:	
NAME:	Dibutylamine	CASNO:	00111922
SYN:		CLASS:	142
NAME:	Dibutylether	CASNO:	00142961
SYN:		CLASS:	241
NAME:	Dibutyl Sebacate	CASNO:	00109433
SYN:		CLASS:	224

NAME: Dichloroacetyl Chloride — CASNO: 00079367
SYN: — CLASS: 262

NAME: Dichlorobenzene — CASNO: 25321226
SYN: — CLASS: 263

NAME: 1,2-Dichlorobenzene — CASNO: 00095501
SYN: — CLASS: 263

NAME: 1,3-Dichlorobenzene — CASNO: 00541731
SYN: — CLASS: 263

NAME: 1,4-Dichlorobenzene — CASNO: 00106467
SYN: — CLASS: 263

NAME: Dichlorobromomethane — CASNO: 00075274
SYN: — CLASS: 261

NAME: 1,4-Dichloro-2-butene — CASNO: 00110576
SYN: — CLASS: 261

NAME: Dichloroethane — CASNO: 01300216
SYN: — CLASS: 261

NAME: Dichloroethane,1,1 — CASNO:
SYN: (See Ethylidene Dichloride) — CLASS:

NAME: Dichloroethane,1,2 — CASNO:
SYN: (See Ethylene Dichloride) — CLASS:

NAME: cis-Dichloroethylene — CASNO: 00156592
SYN: — CLASS: 261

NAME: Dichloroethylene,1,1 — CASNO:
SYN: (See Vinylidene Chloride) — CLASS:

NAME: 1,2-Dichloroethylene — CASNO: 00540590
SYN: — CLASS: 261

NAME: trans-1,2-Dichloroethylene — CASNO: 00156605
SYN: — CLASS: 261

NAME: Dichloroethylene (all isomers) CASNO: 25323302
SYN: CLASS: 261

NAME: 2,2'-Dichloroethyl Ether CASNO: 00111444
SYN: CLASS: 241 262

NAME: Dichloroisopropyl Ether CASNO: 00108601
SYN: CLASS: 241 262

NAME: Dichloromethane CASNO:
SYN: (See Methylene Chloride) CLASS:

NAME: Dichloromethyl Ether,sym- CASNO:
SYN: (See Bis(chloromethyl) Ether) CLASS:

NAME: 2,4-Dichlorophenol CASNO: 00120832
SYN: CLASS: 264 316

NAME: 2,6-Dichlorophenol CASNO: 00087650
SYN: CLASS: 264 316

NAME: Dichlorophenylarsine CASNO: 00696286
SYN: Phenyl Dichloroarsine CLASS: 461

NAME: Dichloropropane 1,2 CASNO:
SYN: (See Propylene Dichloride) CLASS:

NAME: Dichloropropane (all isomers) CASNO: 26638197
SYN: CLASS: 261

NAME: Dichloropropane-Dichloropropene CASNO: 08003198
SYN: CLASS: 261

NAME: 2,3-Dichloro-1-propene CASNO: 00078886
SYN: CLASS: 261

NAME: Dichloropropene(s) CASNO: 26952238
SYN: CLASS: 261

NAME: 1,3-Dichloropropene CASNO: 00542756
SYN: CLASS: 261

NAME: Dicyclohexylamine CASNO: 00101837
SYN: CLASS: 146

NAME: Diethanolamine CASNO: 00111422
SYN: CLASS: 143

NAME: Diethylamine CASNO: 00109897
SYN: CLASS: 142

NAME: Diethylaminoethanol CASNO: 00100378
SYN: CLASS: 311 143

NAME: Diethylarsine CASNO: 00692422
SYN: CLASS: 461

NAME: Diethyl Benzene CASNO: 25340174
SYN: CLASS: 292

NAME: Diethylene Dioxide,1,4 CASNO:
SYN: (See 1,4-Dioxane) CLASS:

NAME: Diethylene Glycol CASNO: 00111466
SYN: CLASS: 314

NAME: Diethylenetriamine CASNO: 00111400
SYN: CLASS: 144

NAME: Di-(2-Ethylhexyl)-Sebacate CASNO: 00122623
SYN: Dioctyl Sebacate CLASS: 224

NAME: 1,2-Diethylhydrazine CASNO: 01615801
SYN: CLASS: 280

NAME: O,O-Diethyl S-Methyl Dithiophosphate CASNO: 03288582
SYN: CLASS: 460

NAME: Diethyl-p-nitrophenyl Phosphate CASNO: 00311455
SYN: CLASS: 460 442

NAME: Diethyl Oxalate CASNO: 00095921
SYN: CLASS: 224

NAME: Diethyl Phthalate CASNO: 00084662
SYN: CLASS: 226

NAME: Diethyl Sebacate CASNO: 00110407
SYN: CLASS: 224

NAME: Diheptyl Phthalate CASNO: 03648213
SYN: CLASS: 226

NAME: Dihydrosafrole CASNO: 00094586
SYN: CLASS: 278

NAME: Diisobutylamine CASNO: 00110963
SYN: CLASS: 142

NAME: Diisobutylene CASNO: 25167708
SYN: CLASS: 291

NAME: Diisobutyl Ketone CASNO: 00108838
SYN: CLASS: 391

NAME: Diisobutyl Ketone, >70% CASNO: 00108838
SYN: CLASS: 391

NAME: Diisobutyl Phthalate CASNO: 00084695
SYN: CLASS: 226

NAME: Diisoctyl Phthalate CASNO: 27554263
SYN: CLASS: 226

NAME: Diisodecyl Phthalate CASNO: 26761400
SYN: CLASS: 226

NAME: Diisononyl Phthalate CASNO: 28553120
SYN: CLASS: 226

NAME: Diisooctyl Sebacate CASNO: 27214900
SYN: CLASS: 224

NAME: Diisopropylamine CASNO: 00108189
SYN: CLASS: 142

NAME: Diisopropyl Benzene (all isomers) CASNO: 25321099
SYN: CLASS: 292

NAME: Diisopropyl Fluorophosphate CASNO: 00055914
SYN: CLASS: 460 262

NAME: Diisopropyl Ketone CASNO: 00565800
SYN: CLASS: 314

NAME: N,N-Dimethylacetamide CASNO: 00127195
SYN: CLASS: 132

NAME: Dimethylamine CASNO: 00124403
SYN: CLASS: 142

NAME: Dimethylaminopropylamine CASNO: 00109557
SYN: CLASS: 144

NAME: Dimethylanaline CASNO: 00121697
SYN: CLASS: 145

NAME: alpha,alpha-Dimethylbenzyl Hydroperoxide CASNO: 00080159
SYN: CLASS: 300

NAME: Dimethylbutylamine CASNO: 00108098
SYN: CLASS: 143

NAME: Dimethylethanolamine CASNO: 00108010
SYN: CLASS: 142

NAME: Dimethylformamide CASNO: 00068122
SYN: CLASS: 132

NAME: Dimethylhydrazine,sym- CASNO:
SYN: (See 1,2-Dimethylhydrazine) CLASS:

NAME: Dimethylhydrazine,unsym- CASNO:
SYN: (See 1,1-Dimethylhydrazine) CLASS:

NAME: 1,1-Dimethylhydrazine CASNO: 00057147
SYN: Dimethylhydrazine,unsym- CLASS: 280

NAME: 1,2-Dimethylhydrazine CASNO: 00540738
SYN: Dimethylhydrazine,sym- CLASS: 280

NAME: alpha,alpha-Dimethylphenethylamine CASNO: 00122098
SYN: CLASS: 141 145

NAME: 2,4-Dimethylphenol CASNO: 00105679
SYN: CLASS: 316

NAME: Dimethyl Phthalate CASNO: 00131113
SYN: CLASS: 226

NAME: Dimethyl Sulfate CASNO: 00077781
SYN: CLASS: 507

NAME: Dimethyl Sulfoxide CASNO: 00067685
SYN: CLASS: 503

NAME: Dimethylvinylchloride CASNO: 00513371
SYN: CLASS: 267

NAME: Dinonyl Phthalate CASNO: 00084764
SYN: CLASS: 226

NAME: Dioctyl Sebacate CASNO:
SYN: (See Di-(2-Ethylhexyl)-Sebacate) CLASS:

NAME: Di-n-octyl Phthalate CASNO: 00117840
SYN: CLASS: 226

NAME: 1,4-Dioxane CASNO: 00123911
SYN: Diethylene Dioxide,1,4 CLASS: 278

NAME: 1,3-Dioxolane CASNO: 00646060
SYN: CLASS: 242

NAME: Dipentene CASNO: 00138863
SYN: CLASS: 291

NAME: Dipropylamine CASNO: 00142847
SYN: CLASS: 142

CHEMICAL NAMES AND SYNONYMS

NAME:	Di-Sec-Octyl Phthalate	CASNO:	00131157
SYN:		CLASS:	226
NAME:	Disodium Phosphate	CASNO:	07558794
SYN:		CLASS:	330
NAME:	Disulfur Dichloride	CASNO:	10025679
SYN:		CLASS:	507
NAME:	Dithiophosphoric Acid	CASNO:	
SYN:	(See Tetraethyldithiopyrophosphate)	CLASS:	
NAME:	Diundecyl Phthalate	CASNO:	03648202
SYN:		CLASS:	226
NAME:	Divinyl Benzene	CASNO:	01321740
SYN:		CLASS:	292
NAME:	Epichlorohydrin	CASNO:	00106898
SYN:		CLASS:	275 262
NAME:	1,2-Epoxybutane	CASNO:	00106887
SYN:		CLASS:	275
NAME:	Erythritol Anhydride	CASNO:	
SYN:	(See 2,2'-Bioxirane)	CLASS:	
NAME:	Ethane	CASNO:	00074840
SYN:		CLASS:	291
NAME:	Ethanol	CASNO:	
SYN:	(See Ethyl Alcohol)	CLASS:	
NAME:	Ethanol, <30%	CASNO:	00064175
SYN:		CLASS:	311
NAME:	Ethanol, 30-70%	CASNO:	00064175
SYN:		CLASS:	311
NAME:	Ethanol, >70%	CASNO:	00064175
SYN:		CLASS:	311

CHEMICAL NAMES AND SYNONYMS

NAME:	Ethanolamine	CASNO:	00141435
SYN:	Aminoethanol,2	CLASS:	141 311
NAME:	Ethoxyethanol, 2	CASNO:	
SYN:	(See Ethyl Cellosolve)	CLASS:	
NAME:	2-Ethoxyethyl Acetate	CASNO:	00111159
SYN:	Cellosolve Acetate	CLASS:	222 241
NAME:	Ethyl Acetate	CASNO:	00141786
SYN:		CLASS:	222
NAME:	Ethyl Cellosolve	CASNO:	00110805
SYN:	Ethoxyethanol, 2	CLASS:	311 241
NAME:	Ethyl Acetoacetate	CASNO:	00141979
SYN:		CLASS:	222
NAME:	Ethyl Acrylate	CASNO:	00140885
SYN:		CLASS:	223
NAME:	Ethyl Alcohol	CASNO:	00064175
SYN:	Ethanol	CLASS:	311
NAME:	Ethylamine	CASNO:	00075047
SYN:	Monoethylamine	CLASS:	141
NAME:	Ethylamine, <30%	CASNO:	00075047
SYN:		CLASS:	141
NAME:	Ethylamine, 30-70%	CASNO:	00075047
SYN:		CLASS:	141
NAME:	Ethylamine, >70%	CASNO:	00075047
SYN:		CLASS:	141
NAME:	Ethyl Benzene	CASNO:	00100414
SYN:		CLASS:	292
NAME:	Ethyl Benzoate	CASNO:	00093890
SYN:		CLASS:	316

NAME: Ethyl Bromide — CASNO: 00074964
SYN: — CLASS: 261

NAME: Ethyl-n-butylamine — CASNO: 13360639
SYN: — CLASS: 142

NAME: Ethyl Chlorocarbonate — CASNO: 00541413
SYN: — CLASS: 111

NAME: Ethyl Cyanide — CASNO: 00107120
SYN: Propionitrile — CLASS: 431

NAME: Ethyldimethylmethane — CASNO:
SYN: (See Isopentane) — CLASS:

NAME: Ethylene Acetate — CASNO: 00111557
SYN: — CLASS: 221

NAME: Ethylene Chlorohydrin — CASNO: 00107073
SYN: Chloroethanol — CLASS: 311 262

NAME: Ethylenediamine — CASNO: 00107153
SYN: Diaminoethane,1,2 — CLASS: 144

NAME: Ethylene Dibromide — CASNO: 00106934
SYN: Dibromoethane,1,2 — CLASS: 261

NAME: Ethylene Dichloride — CASNO: 00107062
SYN: Dichloroethane,1,2 — CLASS: 261

NAME: Ethylene Glycol — CASNO: 00107211
SYN: — CLASS: 314

NAME: Ethylene Glycol Monoacetate — CASNO: 00524596
SYN: — CLASS: 103 314 313

NAME: Ethylene Oxide — CASNO: 00075218
SYN: Oxirane — CLASS: 275

NAME: Ethylenimine — CASNO: 00151564
SYN: Aziridine — CLASS: 274 142

NAME: Ethyl Ether CASNO: 00060297
SYN: CLASS: 241

NAME: Ethyl Formate CASNO: 00109944
SYN: CLASS: 221

NAME: 2-Ethylhexanoic Acid CASNO: 00149575
SYN: CLASS: 102

NAME: 2-Ethyl-1-Hexanol CASNO: 00104767
SYN: CLASS: 311

NAME: Ethylidene Dichloride CASNO: 00075343
SYN: Dichloroethane,1,1 CLASS: 261

NAME: Ethyl Mercaptan CASNO: 00075081
SYN: CLASS: 501

NAME: Ethyl Methacrylate CASNO: 00097632
SYN: CLASS: 223

NAME: Ethyl Methanesulfonate CASNO: 00062500
SYN: CLASS: 232

NAME: Ethyl Silicate CASNO: 00078104
SYN: CLASS: 233 291

NAME: Ferric Chloride CASNO: 07705080
SYN: CLASS: 340

NAME: Ferrous Chloride CASNO: 07758943
SYN: CLASS: 340

NAME: Fluorine CASNO: 07782414
SYN: CLASS: 350

NAME: Fluorobenzene CASNO: 00462066
SYN: CLASS: 263

NAME: Fluoroboric Acid CASNO: 16872110
SYN: Tetrafluoroboric Acid CLASS: 370

CHEMICAL NAMES AND SYNONYMS

NAME:	Fluorosilicic Acid	CASNO:	16961834
SYN:		CLASS:	370
NAME:	Fluorosulfonic Acid	CASNO:	07789211
SYN:		CLASS:	504
NAME:	Formaldehyde, <37%	CASNO:	00050000
SYN:	Formalin	CLASS:	121
NAME:	Formalin	CASNO:	
SYN:	(See Formaldehyde, <37%)	CLASS:	
NAME:	Formamide, 30%	CASNO:	00075127
SYN:		CLASS:	132
NAME:	Formic Acid	CASNO:	00064186
SYN:	Methanoic Acid	CLASS:	102
NAME:	Formic Acid, <30%	CASNO:	00064186
SYN:		CLASS:	102
NAME:	Formic Acid, 30-70%	CASNO:	00064186
SYN:		CLASS:	102
NAME:	Formic Acid, >70%	CASNO:	00064186
SYN:		CLASS:	102
NAME:	Freon 11	CASNO:	00075694
SYN:		CLASS:	261
NAME:	Freon 12	CASNO:	00075718
SYN:		CLASS:	261
NAME:	Freon 21	CASNO:	00075434
SYN:		CLASS:	261
NAME:	Freon 22	CASNO:	00075456
SYN:		CLASS:	261
NAME:	Freon 112	CASNO:	00076120
SYN:		CLASS:	261

NAME / SYN		CASNO / CLASS	
NAME:	Freon 114B2	CASNO:	00124732
SYN:		CLASS:	261
NAME:	Freon TF	CASNO:	00076131
SYN:		CLASS:	261
NAME:	Freon TMC	CASNO:	57762319
SYN:		CLASS:	261
NAME:	Furan	CASNO:	00110009
SYN:	Furfuran	CLASS:	277
NAME:	Furfural	CASNO:	00098011
SYN:		CLASS:	122
NAME:	Furfuran	CASNO:	
SYN:	(See Furan)	CLASS:	
NAME:	2-Furylmethanol	CASNO:	00098000
SYN:		CLASS:	312
NAME:	Gasoline	CASNO:	08006619
SYN:		CLASS:	291 292
NAME:	Glutaraldehyde	CASNO:	00111308
SYN:		CLASS:	121
NAME:	Glycerin Triacetate	CASNO:	00102761
SYN:	Triacetine	CLASS:	102 222
NAME:	Glycerol	CASNO:	00056815
SYN:	Propanetriol,1,2,3	CLASS:	314
NAME:	Glycerol Diacetate	CASNO:	
SYN:	(See Diacetin)	CLASS:	
NAME:	Glycidaldehyde	CASNO:	00765344
SYN:		CLASS:	275 122
NAME:	Glycols	CASNO:	68606213
SYN:		CLASS:	311

NAME: Halothane CASNO: 00151677
SYN: CLASS: 261

NAME: Heptane CASNO: 00142825
SYN: CLASS: 291

NAME: Hexachlorobenzene CASNO: 00118741
SYN: CLASS: 263

NAME: Hexachlorobutadiene CASNO: 00087683
SYN: CLASS: 261

NAME: Hexachlorocyclopentadiene CASNO: 00077474
SYN: CLASS: 261

NAME: Hexachloropropene CASNO: 01888717
SYN: CLASS: 261

NAME: Hexaethyltetraphosphate CASNO: 00757584
SYN: CLASS: 460

NAME: Hexamethylphosphoamide CASNO: 00680319
SYN: CLASS: 132

NAME: Hexanal CASNO: 00066251
SYN: CLASS: 121

NAME: Hexane CASNO: 00110543
SYN: CLASS: 291

NAME: Hexanedioic Acid CASNO:
SYN: (See Adipic Acid) CLASS:

NAME: Hexanol CASNO:
SYN: (See Hexyl Alcohol) CLASS:

NAME: Hexanone, 2 CASNO:
SYN: (See Methyl n-Butyl Ketone) CLASS:

NAME: 1-Hexene CASNO: 00592416
SYN: CLASS: 291

NAME:	Hexyl Alcohol	CASNO:	00111273
SYN:	Hexanol	CLASS:	311
NAME:	Hydrazine	CASNO:	00302012
SYN:	Diamine	CLASS:	280
NAME:	Hydrazine, <30%	CASNO:	00302012
SYN:		CLASS:	280
NAME:	Hydrazine, 30-70%	CASNO:	00302012
SYN:		CLASS:	280
NAME:	Hydrazine, >70%	CASNO:	00302012
SYN:		CLASS:	280
NAME:	Hydrobromic Acid	CASNO:	10035106
SYN:		CLASS:	370
NAME:	Hydrobromic Acid, 30-70%	CASNO:	10035106
SYN:		CLASS:	370
NAME:	Hydrochloric Acid	CASNO:	07647010
SYN:		CLASS:	370
NAME:	Hydrochloric Acid, <30%	CASNO:	07647010
SYN:		CLASS:	370
NAME:	Hydrochloric Acid, 30-70%	CASNO:	07647010
SYN:		CLASS:	370
NAME:	Hydrochloric Acid, >70%	CASNO:	07647010
SYN:		CLASS:	370
NAME:	Hydrocyanic Acid	CASNO:	00074908
SYN:		CLASS:	215 350
NAME:	Hydrocyanic Acid, <30%	CASNO:	00074908
SYN:		CLASS:	370
NAME:	Hydrofluoric Acid	CASNO:	07664393
SYN:	Hydrogen Fluoride	CLASS:	370

NAME:	Hydrofluoric Acid, <30%	CASNO:	07664393
SYN:		CLASS:	370
NAME:	Hydrofluoric Acid, 30-70%	CASNO:	07664393
SYN:		CLASS:	370
NAME:	Hydrofluoric Acid, >70%	CASNO:	07664393
SYN:		CLASS:	370
NAME:	Hydrogen Fluoride	CASNO:	
SYN:	(See Hydrofluoric Acid)	CLASS:	
NAME:	Hydrogen Peroxide	CASNO:	07722841
SYN:		CLASS:	300
NAME:	Hydrogen Peroxide, <30%	CASNO:	07722841
SYN:		CLASS:	300
NAME:	Hydrogen Peroxide, 30-70%	CASNO:	07722841
SYN:		CLASS:	300
NAME:	Hydrogen Peroxide, >70%	CASNO:	07722841
SYN:		CLASS:	300
NAME:	Hydrogen Phosphide	CASNO:	07803512
SYN:	Phosphine	CLASS:	350
NAME:	Hydrogen Sulfide	CASNO:	07783064
SYN:		CLASS:	350
NAME:	Hydroquinone	CASNO:	00123319
SYN:		CLASS:	490
NAME:	Hydroquinone, <30%	CASNO:	00123319
SYN:		CLASS:	490
NAME:	Hylene	CASNO:	00101655
SYN:		CLASS:	215
NAME:	Iminobispropylamine	CASNO:	00056188
SYN:		CLASS:	144

NAME:	Iodine Pentafluoride	CASNO:	07783666
SYN:		CLASS:	370
NAME:	b-Ionone	CASNO:	14901076
SYN:		CLASS:	291
NAME:	Isoamyl Acetate	CASNO:	00123922
SYN:		CLASS:	222
NAME:	Isoamylnitrile	CASNO:	00110463
SYN:		CLASS:	431
NAME:	Isobutene	CASNO:	
SYN:	(See Isobutylene)	CLASS:	
NAME:	Isobutyl Acrylate	CASNO:	00106638
SYN:		CLASS:	223
NAME:	Isobutyl Alcohol	CASNO:	00078831
SYN:		CLASS:	311
NAME:	Isobutylene	CASNO:	00115117
SYN:	Isobutene	CLASS:	291
NAME:	Isobutyl Nitrite	CASNO:	00542563
SYN:		CLASS:	233
NAME:	Isobutyraldehyde	CASNO:	00078842
SYN:		CLASS:	121
NAME:	Isooctane	CASNO:	26635643
SYN:		CLASS:	291
NAME:	Isopentane	CASNO:	00078784
SYN:	Ethyldimethylmethane	CLASS:	291
NAME:	Isophorone	CASNO:	00078591
SYN:		CLASS:	391
NAME:	Isoprene	CASNO:	00078795
SYN:		CLASS:	291

NAME:	Isopropyl Acetate	CASNO:	00108214
SYN:		CLASS:	222
NAME:	Isopropyl Alcohol	CASNO:	00067630
SYN:	Propanol, 2-	CLASS:	312
NAME:	Isopropylamine	CASNO:	00075310
SYN:		CLASS:	141
NAME:	Isopropyl Chloride	CASNO:	00075296
SYN:	Chloropropane	CLASS:	261 312
NAME:	Isopropyl Ether	CASNO:	00108203
SYN:		CLASS:	241
NAME:	Isopropylmethacrylate	CASNO:	04655349
SYN:		CLASS:	223
NAME:	Isosafrole	CASNO:	00120581
SYN:		CLASS:	278
NAME:	JP-4, Jet Fuel	CASNO:	99901291
SYN:		CLASS:	291 292
NAME:	Kerosene	CASNO:	08008206
SYN:		CLASS:	291 292
NAME:	Lactic Acid	CASNO:	00079334
SYN:		CLASS:	103 312
NAME:	Lactic Acid, <30%	CASNO:	00079334
SYN:		CLASS:	103 312
NAME:	Lactic Acid, >70%	CASNO:	00079334
SYN:		CLASS:	103 312
NAME:	Lauric Acid	CASNO:	00143077
SYN:		CLASS:	102
NAME:	Lauric Acid, 30-70%	CASNO:	00143077
SYN:		CLASS:	102

NAME: Ligroine CASNO:
SYN: (See Naphtha, V.M.& P) CLASS:

NAME: d-Limonene CASNO: 05989275
SYN: Menthadiene CLASS: 292

NAME: Linoleic Acid CASNO: 00060333
SYN: CLASS: 102

NAME: Maleic Acid CASNO: 00110167
SYN: CLASS: 104

NAME: Maleic Acid, >70% CASNO: 00110167
SYN: CLASS: 104

NAME: Malic Acid CASNO: 06915157
SYN: CLASS: 104 103

NAME: Malonitrile CASNO: 00109773
SYN: Propane Dinitrile CLASS: 431

NAME: Menthadiene CASNO:
SYN: (See d-Limonene) CLASS:

NAME: Mercury CASNO: 07439976
SYN: CLASS: 560

NAME: Mesityl Oxide CASNO: 00141797
SYN: Methylpentenone, 4-,3-,2- CLASS: 391

NAME: Methacrylonitrile CASNO: 00126987
SYN: CLASS: 431

NAME: Methane CASNO: 00074828
SYN: CLASS: 291

NAME: Methanesulfonic Acid CASNO: 00075752
SYN: CLASS: 504

NAME: Methanethiol CASNO:
SYN: (See Methylmercaptan) CLASS:

NAME: Methanoic Acid CASNO:
SYN: (See Formic Acid) CLASS:

NAME: Methanol CASNO: 00067561
SYN: Methyl Alcohol CLASS: 311

NAME: Methanol, <30% CASNO: 00067561
SYN: CLASS: 311

NAME: Methanol, 30-70% CASNO: 00067561
SYN: CLASS: 311

NAME: Methanol, >70% CASNO: 00067561
SYN: CLASS: 311

NAME: Methoxyethanol, 2 CASNO:
SYN: (See Methyl Cellosolve) CLASS:

NAME: 4-Methoxy-4-methyl-2-pentanone CASNO: 00107700
SYN: CLASS: 391

NAME: Methyl Acetate CASNO: 00079209
SYN: CLASS: 222

NAME: Methyl Alcohol CASNO:
SYN: (See Methanol) CLASS:

NAME: Methyl Acrylate CASNO: 00096333
SYN: CLASS: 223

NAME: Methylacrylic Acid CASNO: 00079414
SYN: CLASS: 102

NAME: 2-Methylactonitrile CASNO: 00075865
SYN: Acetone Cyanohydrin CLASS: 431 400

NAME: Methylamine CASNO: 00074895
SYN: Monomethylamine CLASS: 141

NAME: Methylamine, 30-70% CASNO: 00074895
SYN: CLASS: 141

NAME:	3-Methylaminopropylamine	CASNO:	06291845
SYN:		CLASS:	144
NAME:	Methyl Aniline	CASNO:	00100618
SYN:		CLASS:	147
NAME:	2-Methylaziridine	CASNO:	00075558
SYN:	Propylenimine,1,2	CLASS:	274 142
NAME:	Methyl Bromide	CASNO:	00074839
SYN:	Bromomethane	CLASS:	261
NAME:	Methylbutadiene,1	CASNO:	
SYN:	(See 1,3-Pentadiene)	CLASS:	
NAME:	Methyl n-Butyl Ketone	CASNO:	00591786
SYN:	Hexanone, 2	CLASS:	391
NAME:	Methyl Cellosolve	CASNO:	00109864
SYN:	Methoxyethanol, 2	CLASS:	311 241
NAME:	Methyl Cellosolve Acetate	CASNO:	00110496
SYN:		CLASS:	241 222
NAME:	Methyl Cellulose	CASNO:	09004675
SYN:		CLASS:	241
NAME:	Methyl Chloride	CASNO:	00074873
SYN:	Chloromethane	CLASS:	261
NAME:	Methyl Chloroacetate	CASNO:	00096344
SYN:		CLASS:	222
NAME:	Methyl Chloroform	CASNO:	00071556
SYN:	Trichloroethane,1,1,1	CLASS:	261
NAME:	Methyl Chloroformate	CASNO:	00079221
SYN:		CLASS:	221
NAME:	Methylcyclohexane	CASNO:	00108872
SYN:		CLASS:	291

NAME: Methyl Cyclopentane CASNO: 00096377
SYN: CLASS: 291

NAME: Methylene Bromide CASNO: 00074953
SYN: Dibromomethane CLASS: 261

NAME: Methylene Chloride CASNO: 00075092
SYN: Dichloromethane CLASS: 261

NAME: 4,4'-Methylenedianiline CASNO: 00101779
SYN: CLASS: 147

NAME: n-Methylethanolamine CASNO: 00109831
SYN: CLASS: 142

NAME: Methylethyl Benzene CASNO:
SYN: (See Cumene) CLASS:

NAME: Methyl Ethyl Ketone CASNO: 00078933
SYN: Butanone,2 CLASS: 391

NAME: Methyl Ethyl Ketone Peroxide CASNO: 01338234
SYN: CLASS: 300

NAME: Methyl Formate CASNO: 00107313
SYN: CLASS: 221

NAME: Methylhydrazine CASNO: 00060344
SYN: CLASS: 280

NAME: Methyl Iodide CASNO: 00074884
SYN: CLASS: 261

NAME: Methyl Isobutyl Ketone CASNO: 00108101
SYN: Methylpentanone, 4-,2- CLASS: 391

NAME: Methyl Isocyanate CASNO: 00624839
SYN: CLASS: 210

NAME: 1-Methyl-4-Isopropenylbenzene CASNO: 01195320
SYN: CLASS: 292

NAME:	Methylmercaptan	CASNO:	00074931
SYN:	Methanethiol	CLASS:	501
NAME:	Methyl Methacrylate	CASNO:	00080626
SYN:		CLASS:	223
NAME:	Methyl Oleate	CASNO:	00112629
SYN:		CLASS:	223
NAME:	Methyl Parathion	CASNO:	00298000
SYN:		CLASS:	460 442
NAME:	Methylpentanone, 4-,2-	CASNO:	
SYN:	(See Methyl Isobutyl Ketone)	CLASS:	
NAME:	Methylpentenone, 4-,3-,2-	CASNO:	
SYN:	(See Mesityl Oxide)	CLASS:	
NAME:	Methylpropanol, 2-,2-	CASNO:	
SYN:	(See tert-Butanol)	CLASS:	
NAME:	Methylpropylamine, 2-	CASNO:	
SYN:	(See iso-Butylamine)	CLASS:	
NAME:	Methylpyridine,2	CASNO:	
SYN:	(See alpha-Picoline)	CLASS:	
NAME:	Methyl Salicylate	CASNO:	00119368
SYN:		CLASS:	226
NAME:	Methyl-vinyl-ketone	CASNO:	00078944
SYN:		CLASS:	391
NAME:	Mineral Oil	CASNO:	08012951
SYN:		CLASS:	560
NAME:	Mineral Spirits	CASNO:	08052413
SYN:		CLASS:	291
NAME:	Monoethylamine	CASNO:	
SYN:	(See Ethylamine)	CLASS:	

NAME:	Monoisopropanolamine	CASNO:	00078966
SYN:		CLASS:	141
NAME:	Monomethylamine	CASNO:	
SYN:	(See Methylamine)	CLASS:	
NAME:	Morpholine	CASNO:	00110918
SYN:		CLASS:	142
NAME:	N-Methyl-2-pyrrolidone	CASNO:	00872504
SYN:		CLASS:	391
NAME:	Naphtha, V.M.& P	CASNO:	08032324
SYN:	Ligroine	CLASS:	291
NAME:	Napthalene	CASNO:	00091203
SYN:		CLASS:	293
NAME:	Natural Gas, Liquified	CASNO:	64741486
SYN:		CLASS:	292
NAME:	Nickel Carbonyl	CASNO:	13463393
SYN:		CLASS:	350
NAME:	Nickel Chloride	CASNO:	07718549
SYN:		CLASS:	340
NAME:	Nitric Acid	CASNO:	07697372
SYN:		CLASS:	370
NAME:	Nitric Acid, <30%	CASNO:	07697372
SYN:		CLASS:	370
NAME:	Nitric Acid, 30-70%	CASNO:	07697372
SYN:		CLASS:	370
NAME:	Nitric Acid, >70%	CASNO:	07697372
SYN:		CLASS:	370
NAME:	Nitric Acid, Fuming Red	CASNO:	08007587
SYN:		CLASS:	370

NAME: Nitric Oxide
SYN:
CASNO: 10102439
CLASS: 350

NAME: Nitrobenzene
SYN:
CASNO: 00098953
CLASS: 441 292

NAME: Nitroethane
SYN:
CASNO: 00079243
CLASS: 441

NAME: Nitrogen Dioxide
SYN:
CASNO: 10102440
CLASS: 350

NAME: Nitrogen Tetroxide
SYN:
CASNO: 10544726
CLASS: 350

NAME: Nitroglycerine
SYN:
CASNO: 00055630
CLASS: 441

NAME: Nitromethane
SYN:
CASNO: 00075525
CLASS: 441

NAME: Nitropropane
SYN:
CASNO: 25322014
CLASS: 441

NAME: 1-Nitropropane
SYN:
CASNO: 00108032
CLASS: 441

NAME: 2-Nitropropane
SYN:
CASNO: 00079469
CLASS: 441

NAME: Nitropropane, >70%
SYN:
CASNO: 25322014
CLASS: 441

NAME: n-Nitrosodimethylamine
SYN:
CASNO: 00055185
CLASS: 143 442

NAME: Nitrotoluene
SYN:
CASNO: 01321126
CLASS: 441

NAME: o-Nitrotoluene
SYN:
CASNO: 00088722
CLASS: 441

CHEMICAL NAMES AND SYNONYMS

NAME:	p-Nitrotoluene	CASNO:	00099990
SYN:		CLASS:	441
NAME:	Nonylphenol	CASNO:	25154523
SYN:		CLASS:	316
NAME:	Octadecane	CASNO:	00593453
SYN:		CLASS:	291
NAME:	n-Octane	CASNO:	00111659
SYN:		CLASS:	291
NAME:	1-Octanol	CASNO:	00111875
SYN:		CLASS:	311
NAME:	n-Octanol	CASNO:	29063283
SYN:		CLASS:	311
NAME:	Oleic Acid	CASNO:	00112801
SYN:		CLASS:	102
NAME:	Oxalic Acid	CASNO:	00144627
SYN:		CLASS:	104
NAME:	Oxirane	CASNO:	
SYN:	(See Ethylene Oxide)	CLASS:	
NAME:	Palmitic Acid	CASNO:	00057103
SYN:		CLASS:	102
NAME:	Paraldehyde	CASNO:	00123637
SYN:		CLASS:	121
NAME:	Pentachloroethane	CASNO:	00076017
SYN:		CLASS:	261
NAME:	Pentachlorophenol	CASNO:	00087865
SYN:		CLASS:	264 316
NAME:	1,3-Pentadiene	CASNO:	00504609
SYN:	Methylbutadiene,1	CLASS:	291

CHEMICAL NAMES AND SYNONYMS

NAME:	Pentane	CASNO:	00109660
SYN:		CLASS:	291
NAME:	Pentanol	CASNO:	
SYN:	(See Amyl Alcohol)	CLASS:	
NAME:	Pentene	CASNO:	25377724
SYN:		CLASS:	291
NAME:	Pentyl Acetate	CASNO:	
SYN:	(See Amyl Acetate)	CLASS:	
NAME:	Perchloric Acid	CASNO:	07601903
SYN:		CLASS:	370
NAME:	Perchloric Acid, <30%	CASNO:	07601903
SYN:		CLASS:	370
NAME:	Perchloric Acid, 30-70%	CASNO:	07601903
SYN:		CLASS:	370
NAME:	Perchloroethylene	CASNO:	
SYN:	(See Tetrachloroethylene)	CLASS:	
NAME:	Phenetole	CASNO:	
SYN:	(See Phenyl Ethyl Ether)	CLASS:	
NAME:	Phenol	CASNO:	00108952
SYN:	Carbolic Acid	CLASS:	316
NAME:	Phenol, <30%	CASNO:	00108952
SYN:		CLASS:	316
NAME:	Phenol, 30-70%	CASNO:	00108952
SYN:		CLASS:	316
NAME:	Phenol, >70%	CASNO:	00108952
SYN:		CLASS:	316
NAME:	Phenolphthalein	CASNO:	00077098
SYN:		CLASS:	314

CHEMICAL NAMES AND SYNONYMS

NAME: Phenyl Dichloroarsine CASNO:
SYN: (See Dichlorophenylarsine) CLASS:

NAME: Phenylenediamine CASNO: 00108452
SYN: CLASS: 147

NAME: Phenyl Ethyl Ether CASNO: 00103731
SYN: Phenetole CLASS: 243

NAME: Phenyl Glycidyl Ether CASNO: 00122601
SYN: CLASS: 275

NAME: Phenylhydrazine CASNO: 00110063
SYN: CLASS: 280

NAME: Phosgene CASNO: 00075445
SYN: Carbonyl Chloride CLASS: 350

NAME: Phosphine CASNO:
SYN: (See Hydrogen Phosphide) CLASS:

NAME: Phosphoric Acid CASNO: 07664382
SYN: CLASS: 370

NAME: Phosphoric Acid, <30% CASNO: 07664382
SYN: CLASS: 370

NAME: Phosphoric Acid, 30-70% CASNO: 07664382
SYN: CLASS: 370

NAME: Phosphoric Acid, >70% CASNO: 07664382
SYN: CLASS: 370

NAME: Phosphorus Oxychloride CASNO: 10025873
SYN: CLASS: 370

NAME: Phosphorus Trichloride CASNO: 07719122
SYN: CLASS: 370

NAME: 4-Picoline CASNO: 00108894
SYN: CLASS: 271

NAME: alpha-Picoline — CASNO: 00109068
SYN: Methylpyridine,2 — CLASS: 271

NAME: Picric Acid — CASNO: 00088891
SYN: Trinitrophenol,2,4,6 — CLASS: 316 442

NAME: Picric Acid, <30% — CASNO: 00088891
SYN: — CLASS: 316 442

NAME: Pinene (all isomers) — CASNO: 25766181
SYN: — CLASS: 291

NAME: 1-Piperazineethanamine — CASNO: 00140318
SYN: — CLASS: 146

NAME: Piperidine — CASNO: 00110894
SYN: — CLASS: 274

NAME: Polychlorinated Biphenyls (PCBs) — CASNO: 01336363
SYN: Aroclor — CLASS: 265

NAME: Potassium Dichromate — CASNO: 07778509
SYN: — CLASS: 340

NAME: Potassium Hydroxide — CASNO: 01310583
SYN: — CLASS: 380

NAME: Potassium Hydroxide, <30% — CASNO: 01310583
SYN: — CLASS: 380

NAME: Potassium Hydroxide, 30-70% — CASNO: 01310583
SYN: — CLASS: 380

NAME: Potassium Bromide — CASNO: 07758023
SYN: — CLASS: 340

NAME: Potassium Chloride — CASNO: 03811049
SYN: — CLASS: 340

NAME: Potassium Cyanide — CASNO: 00151508
SYN: — CLASS: 215 340

NAME:	Promethazinehydrochloride	CASNO:	00058333
SYN:		CLASS:	
NAME:	Propane	CASNO:	00074986
SYN:		CLASS:	291
NAME:	Propane Dinitrile	CASNO:	
SYN:	(See Malonitrile)	CLASS:	
NAME:	Propanetriol,1,2,3	CASNO:	
SYN:	(See Glycerol)	CLASS:	
NAME:	Propanol	CASNO:	
SYN:	(See Propyl Alcohol)	CLASS:	
NAME:	Propanol, 2-	CASNO:	
SYN:	(See Isopropyl Alcohol)	CLASS:	
NAME:	Propargyl Alcohol	CASNO:	00107197
SYN:		CLASS:	311
NAME:	Propeneamide, 2	CASNO:	
SYN:	(See Acrylamide)	CLASS:	
NAME:	beta-Propiolactone	CASNO:	00057578
SYN:		CLASS:	400
NAME:	Propionaldehyde	CASNO:	00123386
SYN:		CLASS:	121
NAME:	Propionic Acid	CASNO:	00079094
SYN:		CLASS:	102
NAME:	Propionic Anhydride	CASNO:	00123626
SYN:		CLASS:	161
NAME:	Propionitrile	CASNO:	
SYN:	(See Ethyl Cyanide)	CLASS:	
NAME:	Propyl Acetate	CASNO:	00109604
SYN:		CLASS:	222

CHEMICAL NAMES AND SYNONYMS

NAME:	Propyl Acetate, >70%	CASNO:	00109604
SYN:		CLASS:	222
NAME:	Propyl Alcohol	CASNO:	00071238
SYN:	Propanol	CLASS:	311
NAME:	n-Propylamine	CASNO:	00107108
SYN:		CLASS:	141
NAME:	Propyl Chloride	CASNO:	00540545
SYN:	Chloropropane, 1	CLASS:	261
NAME:	Propylenediamine	CASNO:	00078900
SYN:		CLASS:	144
NAME:	Propylene Dichloride	CASNO:	00078875
SYN:	Dichloropropane 1,2	CLASS:	261
NAME:	Propylene Glycol	CASNO:	00057556
SYN:		CLASS:	314
NAME:	Propylene Oxide	CASNO:	00075569
SYN:		CLASS:	275
NAME:	1,3-Propylene Oxide	CASNO:	00503300
SYN:		CLASS:	275
NAME:	Propylenimine,1,2	CASNO:	
SYN:	(See 2-Methylaziridine)	CLASS:	
NAME:	Propylmethacrylate	CASNO:	02210288
SYN:		CLASS:	223
NAME:	Pyrethrins	CASNO:	00121299
SYN:		CLASS:	223
NAME:	Pyridine	CASNO:	00110861
SYN:		CLASS:	271
NAME:	Pyrrole	CASNO:	00109977
SYN:		CLASS:	142

NAME: Quinoline CASNO: 00091225
SYN: CLASS: 272

NAME: Resorcinol CASNO: 00108463
SYN: Benzendiol,1,3 CLASS: 316

NAME: Safrole CASNO: 00094597
SYN: CLASS: 278

NAME: Silver Nitrate CASNO: 07761888
SYN: CLASS: 340

NAME: Sodium Chloride CASNO: 07647145
SYN: CLASS: 340

NAME: Sodium Cyanide CASNO: 00143339
SYN: CLASS: 215

NAME: Sodium Cyanide, <30% CASNO: 00143339
SYN: CLASS: 215

NAME: Sodium Cyanide, 30-70% CASNO: 00143339
SYN: CLASS: 215

NAME: Sodium Hydroxide CASNO: 01310732
SYN: CLASS: 380

NAME: Sodium Hydroxide, <30% CASNO: 01310732
SYN: CLASS: 380

NAME: Sodium Hydroxide, 30-70% CASNO: 01310732
SYN: CLASS: 380

NAME: Sodium Hydroxide, >70% CASNO: 01310732
SYN: CLASS: 380

NAME: Sodium Hypochlorite CASNO: 07681529
SYN: CLASS: 340

NAME: Sodium Hypochlorite, 30-70% CASNO: 07681529
SYN: CLASS: 340

NAME: Sodium Pentachlorophenate — CASNO: 00131522
SYN: — CLASS: 292

NAME: Sodiumpentachlorophenate, <30% — CASNO: 00131522
SYN: — CLASS: 292

NAME: Sodium Silicate — CASNO: 01344098
SYN: — CLASS: 340

NAME: Sodium Sulfate — CASNO: 07681381
SYN: — CLASS: 340

NAME: Sodium Sulfide — CASNO: 01313822
SYN: — CLASS: 340

NAME: Sodium Thiosulfate — CASNO: 07772987
SYN: — CLASS: 340

NAME: Stannous Chloride — CASNO: 07772998
SYN: — CLASS: 340

NAME: Stearic Acid — CASNO: 00057114
SYN: — CLASS: 102

NAME: Styrene — CASNO: 00100425
SYN: — CLASS: 292

NAME: Sulfuric Acid — CASNO: 07664939
SYN: — CLASS: 370

NAME: Sulfuric Acid, <30% — CASNO: 07664939
SYN: — CLASS: 370

NAME: Sulfuric Acid, 30-70% — CASNO: 07664939
SYN: — CLASS: 370

NAME: Sulfuric Acid, >70% — CASNO: 07664939
SYN: — CLASS: 370

NAME: Sulfur Monochloride — CASNO: 12771083
SYN: — CLASS: 370

NAME: Sulfurus Acid — CASNO: 07782992
SYN: — CLASS: 370

NAME: TNT — CASNO:
SYN: (See 2,4,6-Trinitrotoluene) — CLASS:

NAME: Tannic Acid — CASNO: 01401554
SYN: — CLASS: 224

NAME: Tannic Acid, <30% — CASNO: 01401554
SYN: — CLASS: 224

NAME: Tannic Acid, 30-70% — CASNO: 01401554
SYN: — CLASS: 224

NAME: Tannic Acid, >70% — CASNO: 01401554
SYN: — CLASS: 224

NAME: Terpineol — CASNO: 08000417
SYN: — CLASS: 313

NAME: Tetrabromomethane — CASNO:
SYN: (See Carbontetrabromide) — CLASS:

NAME: Tetrabutyl Orthotitanate — CASNO: 05593704
SYN: — CLASS: 233

NAME: 1,2,4,5-Tetrachlorobenzene — CASNO: 00095943
SYN: — CLASS: 263

NAME: Tetrachlorodifluoroethane — CASNO: 28605745
SYN: — CLASS: 261

NAME: 1,1,1,2-Tetrachloroethane — CASNO: 00630206
SYN: — CLASS: 261

NAME: 1,1,2,2-Tetrachloroethane — CASNO: 00079345
SYN: — CLASS: 261

NAME: Tetrachloroethylene — CASNO: 00127184
SYN: Perchloroethylene — CLASS: 261

CHEMICAL NAMES AND SYNONYMS

NAME:	Tetrachloromethane	CASNO:	
SYN:	(See Carbon Tetrachloride)	CLASS:	
NAME:	Tetraethyldithiopyrophosphate	CASNO:	03689245
SYN:	Dithiophosphoric Acid	CLASS:	460
NAME:	Tetraethylenepentamine	CASNO:	00112572
SYN:		CLASS:	144
NAME:	Tetraethyllead	CASNO:	00078002
SYN:		CLASS:	461
NAME:	Tetrafluoroboric Acid	CASNO:	
SYN:	(See Fluoroboric Acid)	CLASS:	
NAME:	Tetrafluoroethylene	CASNO:	00116143
SYN:		CLASS:	261
NAME:	Tetrahydrofuran	CASNO:	00109999
SYN:		CLASS:	277
NAME:	1,2,3,4-Tetrahydronaphthalene	CASNO:	00119642
SYN:	Tetralin	CLASS:	292
NAME:	Tetralin	CASNO:	
SYN:	(See 1,2,3,4-Tetrahydronaphthalene)	CLASS:	
NAME:	N,N,N',N'-Tetramethylenediamine	CASNO:	00110189
SYN:		CLASS:	144
NAME:	Tetranitromethane	CASNO:	00509148
SYN:		CLASS:	441
NAME:	Thionyl Chloride	CASNO:	07719097
SYN:		CLASS:	501
NAME:	Thiophene	CASNO:	00110021
SYN:		CLASS:	502 279
NAME:	Thiophenol	CASNO:	00108985
SYN:	Benzenethiol	CLASS:	501

NAME: Titanium Tetrachloride CASNO: 07550450
SYN: CLASS: 461

NAME: Toluene CASNO: 00108883
SYN: CLASS: 292

NAME: Toluene Diisocyanate CASNO: 26471625
SYN: CLASS: 210

NAME: p-Toluenesulfonic Acid CASNO: 00104154
SYN: CLASS: 504

NAME: o-Toluidine CASNO: 00095534
SYN: CLASS: 146

NAME: Triacetine CASNO:
SYN: (See Glycerin Triacetate) CLASS:

NAME: Triallylamine CASNO: 00102705
SYN: CLASS: 143

NAME: Tributyl Phosphate CASNO: 00126738
SYN: CLASS: 460

NAME: Trichloroacetaldehyde CASNO: 00075876
SYN: Chloral CLASS: 121 262

NAME: Trichloroacetic Acid CASNO: 00760390
SYN: CLASS: 103

NAME: Trichloroacetic Acid CASNO: 00076039
SYN: CLASS: 103

NAME: Trichloroacetonitrile CASNO: 00545062
SYN: CLASS: 431

NAME: 1,2,4-Trichlorobenzene CASNO: 00120821
SYN: CLASS: 263

NAME: 1,1,2-Trichloroethane CASNO: 00079005
SYN: CLASS: 261

NAME:	Trichloroethane,1,1,1	CASNO:	
SYN:	(See Methyl Chloroform)	CLASS:	
NAME:	2,2,2-Trichloroethanol	CASNO:	00115208
SYN:		CLASS:	311 262
NAME:	Trichloroethene	CASNO:	
SYN:	(See Trichloroethylene)	CLASS:	
NAME:	Trichloroethylene	CASNO:	00079016
SYN:	Trichloroethene	CLASS:	261
NAME:	Trichloromethane	CASNO:	
SYN:	(See Chloroform)	CLASS:	
NAME:	Trichloromethanethiol	CASNO:	00075707
SYN:		CLASS:	262 501
NAME:	Trichloromethyl-benzene	CASNO:	
SYN:	(See Benzotrichloride)	CLASS:	
NAME:	1,2,3-Trichloropropane	CASNO:	00096184
SYN:		CLASS:	261
NAME:	Tricresyl Phosphate	CASNO:	01330785
SYN:	Tritolyl Phosphate	CLASS:	460
NAME:	Triethanolamine	CASNO:	00102716
SYN:		CLASS:	143
NAME:	Triethanolamine, >70%	CASNO:	00102716
SYN:		CLASS:	143
NAME:	Triethyl Aluminum	CASNO:	00097938
SYN:		CLASS:	461
NAME:	Triethylamine	CASNO:	00121448
SYN:		CLASS:	143
NAME:	Triethylenetetraamine	CASNO:	00112243
SYN:		CLASS:	144

NAME: Trifluoroethanol CASNO: 00075898
SYN: CLASS: 311 262

NAME: Triisooctyl Phosphate CASNO: 25103122
SYN: CLASS: 233 460

NAME: Trimethylamine CASNO: 00075503
SYN: CLASS: 143

NAME: 2,2,4-Trimethylpentane CASNO: 00540841
SYN: CLASS: 291

NAME: 2,4,4-Trimethyl-1-pentene CASNO: 00107391
SYN: CLASS: 291

NAME: Trinitrophenol,2,4,6 CASNO:
SYN: (See Picric Acid) CLASS:

NAME: 2,4,6-Trinitrotoluene CASNO: 00118967
SYN: TNT CLASS: 441

NAME: Trioctyl Phosphine CASNO: 04731537
SYN: CLASS: 461

NAME: Tri-n-propylamine CASNO: 00102692
SYN: CLASS: 143

NAME: Tris(2,3-dibromopropyl) Phosphate CASNO: 00126727
SYN: CLASS: 460

NAME: Tritolyl Phosphate CASNO:
SYN: (See Tricresyl Phosphate) CLASS:

NAME: Turpentine CASNO: 08006642
SYN: CLASS: 291

NAME: Urea CASNO: 00057136
SYN: CLASS: 132

NAME: Valeronitrile CASNO: 00110598
SYN: CLASS: 431

CHEMICAL NAMES AND SYNONYMS

NAME:	Vinyl Acetate	CASNO:	00108054
SYN:		CLASS:	222
NAME:	Vinyl Chloride	CASNO:	00075014
SYN:	Chloroethene	CLASS:	267
NAME:	4-Vinyl-1-cyclohexane	CASNO:	00100403
SYN:		CLASS:	291
NAME:	Vinylidene Chloride	CASNO:	00075354
SYN:	Dichloroethylene,1,1	CLASS:	267
NAME:	Vinylidene Fluoride	CASNO:	00075387
SYN:		CLASS:	267
NAME:	Water	CASNO:	07732185
SYN:		CLASS:	560
NAME:	Xylene	CASNO:	00133207
SYN:		CLASS:	292
NAME:	m-Xylene	CASNO:	00108383
SYN:		CLASS:	292
NAME:	o-Xylene	CASNO:	00095476
SYN:		CLASS:	292
NAME:	p-Xylene	CASNO:	00106423
SYN:		CLASS:	292

APPENDIX C

PRODUCT INDEX

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
ACRYLIC(002)			
	Product: Acrylic, Face Shield and Lens		
	097	09	Leonard Safety Epuipment, Inc.(D)
	097	09	Protech Safety Equipment Inc.(D)
BUTYL(003)			
	Product: Butyl Rubber Latex Glove, Unsupported		
	012	00	Direct Safety Company(D)
	012	00	Hub Safety Equipment, Inc.(D)
	012	00	Latex Glove Co., Inc(M)
	012	00	Mine Safety Appliances Co.(M)
	012	00	North Hand Protection(M)
	012	00	Protech Safety Equipment Inc.(D)
	012	00	Safeco Inc.(D)
	Product: Butyl Rubber Latex Glove, Supported		
	013	00	Latex Glove Co., Inc(M)
	013	00	Mine Safety Appliances Co.(M)
	Product: Butyl Rubber Glove, Solvent Dipped, Unsupported		
	014	00	LRC Safety Products Co.(D)
	014	00	North Hand Protection(M)
	Product: Butyl Rubber, Sheet		
	034	03	Record Industrial Co.(M)
	034	05	Andover Industries, Inc.(M)
	034	07	General Scientific Safety Equipment Company(D)
	034	07	Safety Engineering & Supply Co.(D)
	034	07	Tingley Rubber Corp.(M)
	Product: Butyl Rubber/Nylon		
	064	03	General Scientific Safety Equipment Company(D)
	064	03	Steel Grip Safety Apparel Co., Inc.(M)
	064	05	Major Safety Service, Inc.(D)
	064	06	United States Safety Service Co.(D)
	Product: Butyl Rubber, Boots		
	085	08	Tingley Rubber Corp.(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
	Product: Butyl/Fabric/Butyl		
	130	05	Fyrepel Products Inc.(M)
	Product: Butyl/Nylon/Butyl		
	140	01	Record Industrial Co.(M)
	140	04	Record Industrial Co.(M)
	140	05	Goodall Rubber Company(M)
	140	05	Trelleborg, Inc.(M)
BUTYL/NEOPRENE(038)			
	Product: Butyl/Polyester/Chloroprene Rubber		
	110	05	Mine Safety Appliances Co.(M)
CELLULOSE ACETATE(001)			
	Product: Cellulose Acetate, Face Shield and Lens		
	099	09	Allied Glove & Safety Products Corp.(M)
	099	09	Arbill Inc.(D)
	099	09	Cesco Safety Products(M)
	099	09	Direct Safety Company(D)
	099	09	Eastco Industrial Safety Corp.(D)
	099	09	Fisher Scientific Company(D)
	099	09	General Scientific Safety Equipment Company(D)
	099	09	Hub Safety Equipment, Inc.(D)
	099	09	Inco Safety Products Co.(M)
	099	09	Industrial Safety and Security Co.(D)
	099	09	Latex Glove Co., Inc(M)
	099	09	Leonard Safety Epuipment, Inc.(D)
	099	09	Magid Glove and Safety Mfg. Co.(M)
	099	09	Masterman's(D)
	099	09	Protech Safety Equipment Inc.(D)
	099	09	Pulmosan Safety Equipment Corp.(D)
	099	09	Rockford Medical & Safety Co.(D)
	099	09	The Sager Corporation(M)
	099	09	Willson Safety Products(M)
CELLULOSE PROPIONATE(005)			
	Product: Cellulose Propionate, Face Shield and Lens		
	094	09	Eastco Industrial Safety Corp.(D)
	094	09	Industrial Safety and Security Co.(D)
	094	09	Interex Corp.(D)
	094	09	Leonard Safety Epuipment, Inc.(D)
	094	09	Rockford Medical & Safety Co.(D)
	094	09	The Sager Corporation(M)
	094	09	Willson Safety Products(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
CHLOROBUTYL(006)			
	Product: Chlorobutyl Rubber/Nomex		
	052	05	ILC Dover(M)
	Product: Chlorobutyl/Nomex/Chlorobutyl		
	142	05	Arrowhead Products(M)
CPE(007)			
	Product: Chlorinated Polyethylene		
	060	01	ILC Dover(M)
	060	01	Jones Safety Supply, Inc.(D)
	060	01	Safety Engineering & Supply Co.(D)
	060	01	Safety First Industries(M)
	060	03	Safety First Industries(M)
	060	04	ILC Dover(M)
	060	04	Jones Safety Supply, Inc.(D)
	060	04	Safety Engineering & Supply Co.(D)
	060	04	Safety First Industries(M)
	060	05	ILC Dover(M)
	060	05	Jones Safety Supply, Inc.(D)
	060	05	Safety First Industries(M)
	060	06	ILC Dover(M)
	060	06	Jones Safety Supply, Inc.(D)
	060	06	Safety First Industries(M)
CR 39(008)			
	Product: Cr 39, Lens and Face Shield		
	095	09	PPG Industries, Inc.(S)
	095	09	SGL Homalite Industries(S)
GORE-TEX(018)			
	Product: Microporous Teflon/Polyester		
	092	01	Goodall Rubber Company(M)
	092	02	Body-Guard(M)
	092	02	Goodall Rubber Company(M)
	092	02	Vidaro Corp.(M)
	092	04	Goodall Rubber Company(M)
	092	06	Goodall Rubber Company(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
NAT+NEOP+NBR(019)			
	Product: Natural Rubber+Chloroprene+Nitrile Glove, Unsupported		
	023	00	Allied Glove & Safety Products Corp.(M)
	023	00	Industrial Safety and Security Co.(D)
	023	00	Keystone Protection Corp.(D)
	023	00	Leonard Safety Epuipment, Inc.(D)
	023	00	Pioneer Industrial Products Co.(M)
NATURAL RUBBER(013)			
	Product: Natural Rubber Latex Glove, Supported		
	001	00	Allied Glove & Safety Products Corp.(M)
	001	00	Best Manufacturing Company(M)
	001	00	Boss Manufacturing Company(M)
	001	00	Comasec(M)
	001	00	Eastco Industrial Safety Corp.(D)
	001	00	Edmont Div. Becton, Dickinson & Co.(M)
	001	00	General Scientific Safety Equipment Company(D)
	001	00	Goodyear Rubber Products Corp.(S)
	001	00	Granet(M)
	001	00	Holland Safety Supply Co.(D)
	001	00	IPESCo., Inc.(M)
	001	00	Industrial Products Co., Inc.(D)
	001	00	Industrial Safety and Security Co.(D)
	001	00	Interex Corp.(D)
	001	00	Intermarket Latex, Inc.(M)
	001	00	Keystone Protection Corp.(D)
	001	00	Latex Glove Co., Inc(M)
	001	00	Magid Glove and Safety Mfg. Co.(M)
	001	00	Masterman's(D)
	001	00	Miller Products Co., Inc.(D)
	001	00	Mine Safety Appliances Co.(M)
	001	00	Monte Glove Company(M)
	001	00	Protech Safety Equipment Inc.(D)
	001	00	Safeco Inc.(D)
	001	00	W.H. Salisbury & Co.(M)
	001	00	Standard Glove & Safety Equip. Corp.(D)
	001	00	Stauffer Manufacturing Company(M)
	001	00	H. Texier Glove Company Inc.(D)
	Product: Natural Rubber Glove, Solvent Dipped, Unsupported		
	015	00	Arbill Inc.(D)
	015	00	North Hand Protection(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
Product: Natural Rubber Latex Glove, Unsupported			
	017	00	Allied Glove & Safety Products Corp.(M)
	017	00	Ansell Industrial Products(M)
	017	00	Best Manufacturing Company(M)
	017	00	Boss Manufacturing Company(M)
	017	00	Comasec(M)
	017	00	Dayton Flexible Products(M)
	017	00	Defense Apparel(M)
	017	00	Eastco Industrial Safety Corp.(D)
	017	00	Edmont Div. Becton, Dickinson & Co.(M)
	017	00	General Scientific Safety Equipment Company(D)
	017	00	Glover Latex, Inc.(M)
	017	00	Goodyear Rubber Products Corp.(S)
	017	00	Granet(M)
	017	00	Holland Safety Supply Co.(D)
	017	00	IPESCo., Inc.(M)
	017	00	Industrial Products Co., Inc.(D)
	017	00	Industrial Safety and Security Co.(D)
	017	00	Interex Corp.(D)
	017	00	Intermarket Latex, Inc.(M)
	017	00	Keystone Protection Corp.(D)
	017	00	LRC Safety Products Co.(D)
	017	00	Latex Glove Co., Inc(M)
	017	00	Leonard Safety Epuipment, Inc.(D)
	017	00	Magid Glove and Safety Mfg. Co.(M)
	017	00	Masterman's(D)
	017	00	Memphis Glove Company(M)
	017	00	Miller Products Co., Inc.(D)
	017	00	Mine Safety Appliances Co.(M)
	017	00	North Hand Protection(M)
	017	00	Pioneer Industrial Products Co.(M)
	017	00	Protech Safety Equipment Inc.(D)
	017	00	Renco Corp(M)
	017	00	Robar Protective Products(D)
	017	00	Rockford Medical & Safety Co.(D)
	017	00	Safeco Inc.(D)
	017	00	W.H. Salisbury & Co.(M)
	017	00	Standard Glove & Safety Equip. Corp.(D)
	017	00	Stauffer Manufacturing Company(M)
	017	00	H. Texier Glove Company Inc.(D)
Product: Natural Rubber, Sheet			
	045	03	Masterman's(D)
	045	06	General Scientific Safety Equipment Company(D)
	045	07	Allied Glove & Safety Products Corp.(M)
	045	07	Arbill Inc.(D)
	045	07	Boss Manufacturing Company(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
			Product: Natural Rubber, Sheet (cont.)
	045	07	Defense Apparel(M)
	045	07	La Crosse Footwear, Inc.(M)
	045	07	Latex Glove Co., Inc(M)
	045	07	Lehigh Safety Shoe Co.(M)
	045	07	Leonard Safety Epuipment, Inc.(D)
	045	07	Magid Glove and Safety Mfg. Co.(M)
	045	07	Ranger(M)
	045	07	Record Industrial Co.(M)
	045	07	Safety Engineering & Supply Co.(D)
	045	07	Tingley Rubber Corp.(M)
			Product: Natural Rubber, Boots
	080	08	Allied Glove & Safety Products Corp.(M)
	080	08	Arbill Inc.(D)
	080	08	Boss Manufacturing Company(M)
	080	08	Direct Safety Company(D)
	080	08	Eastco Industrial Safety Corp.(D)
	080	08	Interex Corp.(D)
	080	08	Iron Age Protective Company(M)
	080	08	Jordan David Safety Products(M)
	080	08	La Crosse Footwear, Inc.(M)
	080	08	Latex Glove Co., Inc(M)
	080	08	Lehigh Safety Shoe Co.(M)
	080	08	Leonard Safety Epuipment, Inc.(D)
	080	08	Masterman's(D)
	080	08	Miller Products Co., Inc.(D)
	080	08	Rainfair, Inc.(M)
	080	08	Record Industrial Co.(M)
	080	08	Robar Protective Products(D)
	080	08	Safety Engineering & Supply Co.(D)
	080	08	Tingley Rubber Corp.(M)
			Product: Natural Rubber/Nylon
	087	03	Frommelt Industries, Inc.(M)
			Product: Natural Rubber/Cotton
	089	01	Boss Manufacturing Company(M)
	089	01	Record Industrial Co.(M)
	089	02	Boss Manufacturing Company(M)
	089	03	Boss Manufacturing Company(M)
	089	03	Direct Safety Company(D)
	089	03	Fisher Scientific Company(D)
	089	03	Protech Safety Equipment Inc.(D)
	089	03	Rockford Medical & Safety Co.(D)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
	Product: Natural Rubber/Polyester		
	136	01	Plastex Protective Products, Inc.(M)
	136	03	Standard Glove & Safety Equip. Corp.(D)
	136	04	Plastex Protective Products, Inc.(M)
	136	06	Plastex Protective Products, Inc.(M)
NEOP+NAT RUBBER(015)			
	Product: Chloroprene+Natural Rubber Latex Glove, Unsupported		
	026	00	Ansell Industrial Products(M)
	026	00	Arbill Inc.(D)
	026	00	Clean Room Products, Inc.(M)
	026	00	Eastco Industrial Safety Corp.(D)
	026	00	Hub Safety Equipment, Inc.(D)
	026	00	Industrial Products Co., Inc.(D)
	026	00	Intermarket Latex, Inc.(M)
	026	00	International Playtex, Inc.(M)
	026	00	Keystone Protection Corp.(D)
NEOP/NAT RUBBER(039)			
	Product: Cloroprene/Natural Rubber Latex Glove, Unsupported		
	008	00	Ansell Industrial Products(M)
	008	00	Industrial Products Co., Inc.(D)
NEOPRENE(016)			
	Product: Chloroprene Latex Glove, Supported		
	002	00	Allied Glove & Safety Products Corp.(M)
	002	00	Arbill Inc.(D)
	002	00	Best Manufacturing Company(M)
	002	00	Boss Manufacturing Company(M)
	002	00	Comasec(M)
	002	00	Eastco Industrial Safety Corp.(D)
	002	00	Edmont Div. Becton, Dickinson & Co.(M)
	002	00	General Scientific Safety Equipment Company(D)
	002	00	Goodyear Rubber Products Corp.(S)
	002	00	Granet(M)
	002	00	Holland Safety Supply Co.(D)
	002	00	Hub Safety Equipment, Inc.(D)
	002	00	IPESCo., Inc.(M)
	002	00	Industrial Products Co., Inc.(D)
	002	00	Industrial Safety and Security Co.(D)
	002	00	Interex Corp.(D)
	002	00	Intermarket Latex, Inc.(M)
	002	00	Keystone Protection Corp.(D)
	002	00	Latex Glove Co., Inc(M)
	002	00	Leonard Safety Epuipment, Inc.(D)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
	Product: Chloroprene Latex Glove, Supported (cont.)		
	002	00	Magid Glove and Safety Mfg. Co.(M)
	002	00	Major Safety Service, Inc.(D)
	002	00	Masterman's(D)
	002	00	Miller Products Co., Inc.(D)
	002	00	Mine Safety Appliances Co.(M)
	002	00	Monte Glove Company(M)
	002	00	OKI Supply Co.(M)
	002	00	Pioneer Industrial Products Co.(M)
	002	00	Protech Safety Equipment Inc.(D)
	002	00	Rockford Medical & Safety Co.(D)
	002	00	Safeco Inc.(D)
	002	00	Standard Glove & Safety Equip. Corp.(D)
	002	00	Stauffer Manufacturing Company(M)
	002	00	H. Texier Glove Company Inc.(D)
	002	00	Trelleborg, Inc.(M)
	002	00	Wheeler Protective Apparel, Inc.(M)
	Product: Chloroprene Milled/Chloroprene Latex Glove, Unsupported		
	010	00	Allied Glove & Safety Products Corp.(M)
	010	00	Arbill Inc.(D)
	010	00	Boss Manufacturing Company(M)
	010	00	Direct Safety Company(D)
	010	00	Industrial Safety and Security Co.(D)
	010	00	Keystone Protection Corp.(D)
	010	00	Leonard Safety Epuipment, Inc.(D)
	010	00	Pioneer Industrial Products Co.(M)
	Product: Chloroprene Rubber Latex (Baypren) Glove, Unsupported		
	011	00	Allied Glove & Safety Products Corp.(M)
	011	00	Best Manufacturing Company(M)
	011	00	Direct Safety Company(D)
	011	00	Eastco Industrial Safety Corp.(D)
	011	00	Granet(M)
	011	00	IPESCo., Inc.(M)
	011	00	Interex Corp.(D)
	011	00	Safeco Inc.(D)
	Product: Chloroprene Rubber Latex Glove, Unsupported		
	018	00	Allied Glove & Safety Products Corp.(M)
	018	00	Ansell Industrial Products(M)
	018	00	Best Manufacturing Company(M)
	018	00	Eastco Industrial Safety Corp.(D)
	018	00	Edmont Div. Becton, Dickinson & Co.(M)
	018	00	General Scientific Safety Equipment Company(D)
	018	00	Goodyear Rubber Products Corp.(S)
	018	00	Holland Safety Supply Co.(D)
	018	00	Hub Safety Equipment, Inc.(D)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
Product: Chloroprene Rubber Latex Glove, Unsupported (cont.)			
	018	00	IPESCo., Inc.(M)
	018	00	Industrial Products Co., Inc.(D)
	018	00	Industrial Safety and Security Co.(D)
	018	00	Interex Corp.(D)
	018	00	Intermarket Latex, Inc.(M)
	018	00	Keystone Protection Corp.(D)
	018	00	LRC Safety Products Co.(D)
	018	00	Latex Glove Co., Inc(M)
	018	00	Leonard Safety Epuipment, Inc.(D)
	018	00	Magid Glove and Safety Mfg. Co.(M)
	018	00	Masterman's(D)
	018	00	Memphis Glove Company(M)
	018	00	Mine Safety Appliances Co.(M)
	018	00	Pioneer Industrial Products Co.(M)
	018	00	Protech Safety Equipment Inc.(D)
	018	00	Renco Corp(M)
	018	00	Rockford Medical & Safety Co.(D)
	018	00	Safeco Inc.(D)
	018	00	Standard Glove & Safety Equip. Corp.(D)
	018	00	Stauffer Manufacturing Company(M)
	018	00	H. Texier Glove Company Inc.(D)
Product: Chloroprene Rubber, Sheet			
	031	01	Miller Products Co., Inc.(D)
	031	02	Miller Products Co., Inc.(D)
	031	03	Acme Mills Company(M)
	031	03	Arbill Inc.(D)
	031	03	Boss Manufacturing Company(M)
	031	03	Magid Glove and Safety Mfg. Co.(M)
	031	03	Masterman's(D)
	031	04	Miller Products Co., Inc.(D)
	031	05	Andover Industries, Inc.(M)
	031	06	Miller Products Co., Inc.(D)
	031	07	General Scientific Safety Equipment Company(D)
	031	07	Ranger(M)
	031	07	Record Industrial Co.(M)
	031	07	Safety Engineering & Supply Co.(D)
	031	07	Tingley Rubber Corp.(M)
Product: Chloroprene Rubber/Polyester			
	051	02	Boss Manufacturing Company(M)
	051	03	Fairway Products(M)
	051	03	LRC Safety Products Co.(D)
	051	03	Pulmosan Safety Equipment Corp.(D)
	051	04	Boss Manufacturing Company(M)
	051	06	Boss Manufacturing Company(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
Product: Chloroprene Rubber, Boots			
	081	08	Allied Glove & Safety Products Corp.(M)
	081	08	Boss Manufacturing Company(M)
	081	08	Eastco Industrial Safety Corp.(D)
	081	08	General Scientific Safety Equipment Company(D)
	081	08	Keystone Protection Corp.(D)
	081	08	La Crosse Footwear, Inc.(M)
	081	08	Latex Glove Co., Inc(M)
	081	08	Lehigh Safety Shoe Co.(M)
	081	08	Magid Glove and Safety Mfg. Co.(M)
	081	08	Masterman's(D)
	081	08	Protech Safety Equipment Inc.(D)
	081	08	Rainfair, Inc.(M)
	081	08	Record Industrial Co.(M)
	081	08	Robar Protective Products(D)
	081	08	Safety Engineering & Supply Co.(D)
	081	08	Standard Safety Equipment Co.(M)
	081	08	Tingley Rubber Corp.(M)
Product: Chloroprene Rubber/Nylon			
	093	01	Eastco Industrial Safety Corp.(D)
	093	01	Encon Manufacturing Co.(M)
	093	01	Keystone Protection Corp.(D)
	093	01	Marathon Rubber(M)
	093	01	Miller Products Co., Inc.(D)
	093	01	Mine Safety Appliances Co.(M)
	093	01	National Safety Wear, Inc.(M)
	093	01	Protech Safety Equipment Inc.(D)
	093	01	Protexall Company(M)
	093	01	Rainfair, Inc.(M)
	093	01	Record Industrial Co.(M)
	093	01	Safeco Inc.(D)
	093	01	Safety Engineering & Supply Co.(D)
	093	01	Safety First Industries(M)
	093	01	Sawyer-Tower(M)
	093	01	Tingley Rubber Corp.(M)
	093	02	Encon Manufacturing Co.(M)
	093	02	Keystone Protection Corp.(D)
	093	02	Marathon Rubber(M)
	093	02	Miller Products Co., Inc.(D)
	093	03	Encon Manufacturing Co.(M)
	093	03	Protexall Company(M)
	093	03	Safety First Industries(M)
	093	04	Eastco Industrial Safety Corp.(D)
	093	04	Encon Manufacturing Co.(M)
	093	04	Keystone Protection Corp.(D)
	093	04	Marathon Rubber(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
	Product:	Chloroprene Rubber/Nylon (cont.)	
	093	04	Miller Products Co., Inc.(D)
	093	04	Mine Safety Appliances Co.(M)
	093	04	National Safety Wear, Inc.(M)
	093	04	Protech Safety Equipment Inc.(D)
	093	04	Rainfair, Inc.(M)
	093	04	Record Industrial Co.(M)
	093	04	Safeco Inc.(D)
	093	04	Safety Engineering & Supply Co.(D)
	093	04	Sawyer-Tower(M)
	093	04	Tingley Rubber Corp.(M)
	093	05	National Draeger, Inc.(M)
	093	06	Eastco Industrial Safety Corp.(D)
	093	06	Encon Manufacturing Co.(M)
	093	06	Keystone Protection Corp.(D)
	093	06	National Safety Wear, Inc.(M)
	093	06	Rainfair, Inc.(M)
	093	06	United States Safety Service Co.(D)
	Product:	Chloroprene Milled/Chloroprene Latex Glove, Supported	
	125	00	Direct Safety Company(D)
	125	00	Miller Products Co., Inc.(D)
	Product:	Chloroprene Rubber/Fabric	
	138	01	Safety Engineering & Supply Co.(D)
	138	01	Safety First Industries(M)
	138	01	Tingley Rubber Corp.(M)
	138	01	Wheeler Protective Apparel, Inc.(M)
	138	03	Protech Safety Equipment Inc.(D)
	138	03	Safety First Industries(M)
	138	04	Safety Engineering & Supply Co.(D)
	138	04	Tingley Rubber Corp.(M)
	138	04	Wheeler Protective Apparel, Inc.(M)
	138	06	Wheeler Protective Apparel, Inc.(M)
	Product:	Chloroprene/Fabric/Chloroprene	
	139	01	Eastco Industrial Safety Corp.(D)
	139	01	Rainfair, Inc.(M)
	139	01	Sawyer-Tower(M)
	139	04	Eastco Industrial Safety Corp.(D)
	139	04	Rainfair, Inc.(M)
	139	04	Sawyer-Tower(M)
	139	06	Eastco Industrial Safety Corp.(D)
	139	06	Rainfair, Inc.(M)
	Product:	Chloroprene Rubber/Kevlar	
	141	01	Safety First Industries(M)
	141	03	Safety First Industries(M)
	141	04	Safety First Industries(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
NEOPRENE+PVC(045)			
	Product: Chloroprene+PVC/Polyester		
	127	01	Direct Safety Company(D)
	127	02	Direct Safety Company(D)
	127	04	Direct Safety Company(D)
	127	06	Direct Safety Company(D)
NEOPRENE+SBR RUBBER(017)			
	Product: Chloroprene (35%)+SBR(65%)/Nylon--Tufflon		
	065	01	General Scientific Safety Equipment Company(D)
	065	01	Sawyer-Tower(M)
	065	04	General Scientific Safety Equipment Company(D)
	065	04	Sawyer-Tower(M)
	Product: Chloroprene(15%)+SBR(85%)/Cotton--Tuffprene		
	066	01	General Scientific Safety Equipment Company(D)
	066	01	Protech Safety Equipment Inc.(D)
	066	01	Safeco Inc.(D)
	066	01	Sawyer-Tower(M)
	066	04	General Scientific Safety Equipment Company(D)
	066	04	Protech Safety Equipment Inc.(D)
	066	04	Safeco Inc.(D)
	066	04	Sawyer-Tower(M)
	066	06	General Scientific Safety Equipment Company(D)
	066	06	Protech Safety Equipment Inc.(D)
	066	06	Safeco Inc.(D)
	066	06	Sawyer-Tower(M)
NITRILE(021)			
	Product: Nitrile Rubber Latex Glove, Supported		
	005	00	Allied Glove & Safety Products Corp.(M)
	005	00	Arbill Inc.(D)
	005	00	Best Manufacturing Company(M)
	005	00	Boss Manufacturing Company(M)
	005	00	Comasec(M)
	005	00	Eastco Industrial Safety Corp.(D)
	005	00	Edmont Div. Becton, Dickinson & Co.(M)
	005	00	General Scientific Safety Equipment Company(D)
	005	00	Goodyear Rubber Products Corp.(S)
	005	00	Granet(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
	Product: Nitrile Rubber Latex Glove, Supported (cont.)		
	005	00	Holland Safety Supply Co.(D)
	005	00	IPESCo., Inc.(M)
	005	00	Industrial Products Co., Inc.(D)
	005	00	Industrial Safety and Security Co.(D)
	005	00	Interex Corp.(D)
	005	00	Intermarket Latex, Inc.(M)
	005	00	Keystone Protection Corp.(D)
	005	00	LRC Safety Products Co.(D)
	005	00	Latex Glove Co., Inc(M)
	005	00	Leonard Safety Epuipment, Inc.(D)
	005	00	Magid Glove and Safety Mfg. Co.(M)
	005	00	Masterman's(D)
	005	00	Miller Products Co., Inc.(D)
	005	00	Monte Glove Company(M)
	005	00	North Hand Protection(M)
	005	00	Pioneer Industrial Products Co.(M)
	005	00	Protech Safety Equipment Inc.(D)
	005	00	Robar Protective Products(D)
	005	00	Safeco Inc.(D)
	005	00	Standard Glove & Safety Equip. Corp.(D)
	005	00	Stauffer Manufacturing Company(M)
	005	00	H. Texier Glove Company Inc.(D)
	Product: Nitrile Rubber Latex Glove, Unsupported		
	019	00	Allied Glove & Safety Products Corp.(M)
	019	00	Ansell Industrial Products(M)
	019	00	Arbill Inc.(D)
	019	00	Best Manufacturing Company(M)
	019	00	Boss Manufacturing Company(M)
	019	00	Clean Room Products, Inc.(M)
	019	00	Direct Safety Company(D)
	019	00	Eastco Industrial Safety Corp.(D)
	019	00	Edmont Div. Becton, Dickinson & Co.(M)
	019	00	General Scientific Safety Equipment Company(D)
	019	00	Glover Latex, Inc.(M)
	019	00	Goodyear Rubber Products Corp.(S)
	019	00	Granet(M)
	019	00	Holland Safety Supply Co.(D)
	019	00	Hub Safety Equipment, Inc.(D)
	019	00	IPESCo., Inc.(M)
	019	00	Industrial Products Co., Inc.(D)
	019	00	Industrial Safety and Security Co.(D)
	019	00	Interex Corp.(D)
	019	00	Intermarket Latex, Inc.(M)
	019	00	Keystone Protection Corp.(D)
	019	00	LRC Safety Products Co.(D)
	019	00	Latex Glove Co., Inc(M)
	019	00	Leonard Safety Epuipment, Inc.(D)
	019	00	Magid Glove and Safety Mfg. Co.(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
	Product: Nitrile Rubber Latex Glove, Unsupported (cont.)		
	019	00	Masterman's(D)
	019	00	Memphis Glove Company(M)
	019	00	North Hand Protection(M)
	019	00	Pioneer Industrial Products Co.(M)
	019	00	Protech Safety Equipment Inc.(D)
	019	00	Renco Corp(M)
	019	00	Rockford Medical & Safety Co.(D)
	019	00	Safeco Inc.(D)
	019	00	Standard Glove & Safety Equip. Corp.(D)
	019	00	Stauffer Manufacturing Company(M)
	019	00	H. Texier Glove Company Inc.(D)
	Product: Nitrile Rubber Glove, Solvent Dipped, Unsupported		
	020	00	Ansell Industrial Products(M)
	020	00	Industrial Products Co., Inc.(D)
	020	00	Intermarket Latex, Inc.(M)
	020	00	Keystone Protection Corp.(D)
	Product: Nitrile Rubber, Sheet		
	033	03	Boss Manufacturing Company(M)
	033	03	Record Industrial Co.(M)
	033	03	Rockford Medical & Safety Co.(D)
	Product: Nitrile Rubber/Polyester		
	059	03	Protexall Company(M)
	Product: Nitrile Rubber/Nylon		
	078	03	Protech Safety Equipment Inc.(D)
	078	03	Safeco Inc.(D)
	078	03	Sawyer-Tower(M)
	Product: Nitrile Rubber, Boots		
	084	08	Eastco Industrial Safety Corp.(D)
	084	08	Magid Glove and Safety Mfg. Co.(M)
	084	08	Rainfair, Inc.(M)
	Product: Nitrile/Fabric		
	132	01	General Scientific Safety Equipment Company(D)
	132	03	Allied Glove & Safety Products Corp.(M)
	132	03	Eastco Industrial Safety Corp.(D)
	132	03	Edmont Div. Becton, Dickinson & Co.(M)
	132	03	Goodyear Rubber Products Corp.(S)
	132	03	Holland Safety Supply Co.(D)
	132	03	Industrial Products Co., Inc.(D)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
	Product: Nitrile/Fabric (cont.)		
	132	03	Industrial Safety and Security Co.(D)
	132	03	Interex Corp.(D)
	132	03	Masterman's(D)
	132	03	Protech Safety Equipment Inc.(D)
	132	03	Safeco Inc.(D)
	132	03	Standard Glove & Safety Equip. Corp.(D)
	132	03	Stauffer Manufacturing Company(M)
	132	03	H. Texier Glove Company Inc.(D)
	132	04	General Scientific Safety Equipment Company(D)
	132	05	Eastco Industrial Safety Corp.(D)
NITRILE+PVC(020)			
	Product: Nitrile+PVC Glove, Supported		
	057	00	Barry Manufacturing Co. Ltd.(M)
	057	00	Comasec(M)
	057	00	North Hand Protection(M)
	Product: Nitrile+PVC/Fabric		
	058	01	Allied Glove & Safety Products Corp.(M)
	058	01	Eastco Industrial Safety Corp.(D)
	058	01	Edmont Div. Becton, Dickinson & Co.(M)
	058	01	Goodyear Rubber Products Corp.(S)
	058	01	Holland Safety Supply Co.(D)
	058	01	Industrial Products Co., Inc.(D)
	058	01	Industrial Safety and Security Co.(D)
	058	01	Interex Corp.(D)
	058	01	Masterman's(D)
	058	01	Protech Safety Equipment Inc.(D)
	058	01	Rainfair, Inc.(M)
	058	01	Safeco Inc.(D)
	058	01	Standard Glove & Safety Equip. Corp.(D)
	058	01	Stauffer Manufacturing Company(M)
	058	01	H. Texier Glove Company Inc.(D)
	058	02	Edmont Div. Becton, Dickinson & Co.(M)
	058	02	Goodyear Rubber Products Corp.(S)
	058	02	Holland Safety Supply Co.(D)
	058	02	Industrial Products Co., Inc.(D)
	058	02	Industrial Safety and Security Co.(D)
	058	02	Interex Corp.(D)
	058	02	Masterman's(D)
	058	02	Protech Safety Equipment Inc.(D)
	058	02	Standard Glove & Safety Equip. Corp.(D)
	058	02	Stauffer Manufacturing Company(M)
	058	02	H. Texier Glove Company Inc.(D)
	058	03	Protexall Company(M)
	058	04	Allied Glove & Safety Products Corp.(M)
	058	04	Eastco Industrial Safety Corp.(D)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
Product: Nitrile+PVC/Fabric (cont.)			
	058	04	Edmont Div. Becton, Dickinson & Co.(M)
	058	04	Goodyear Rubber Products Corp.(S)
	058	04	Industrial Products Co., Inc.(D)
	058	04	Industrial Safety and Security Co.(D)
	058	04	Interex Corp.(D)
	058	04	Masterman's(D)
	058	04	Protech Safety Equipment Inc.(D)
	058	04	Rainfair, Inc.(M)
	058	04	Safeco Inc.(D)
	058	04	Standard Glove & Safety Equip. Corp.(D)
	058	04	Stauffer Manufacturing Company(M)
	058	04	H. Texier Glove Company Inc.(D)
	058	06	Allied Glove & Safety Products Corp.(M)
	058	06	Eastco Industrial Safety Corp.(D)
	058	06	Edmont Div. Becton, Dickinson & Co.(M)
	058	06	Goodyear Rubber Products Corp.(S)
	058	06	Holland Safety Supply Co.(D)
	058	06	Industrial Products Co., Inc.(D)
	058	06	Industrial Safety and Security Co.(D)
	058	06	Interex Corp.(D)
	058	06	Masterman's(D)
	058	06	Protech Safety Equipment Inc.(D)
	058	06	Rainfair, Inc.(M)
	058	06	Safeco Inc.(D)
	058	06	Standard Glove & Safety Equip. Corp.(D)
	058	06	Stauffer Manufacturing Company(M)
	058	06	H. Texier Glove Company Inc.(D)
NONWOVEN FABRIC(024)			
Product: Sontara			
	025	01	Mar-Mac Manufacturing Co., Inc.(M)
	025	01	Protech Safety Equipment Inc.(D)
	025	02	Mar-Mac Manufacturing Co., Inc.(M)
	025	02	Protech Safety Equipment Inc.(D)
	025	03	Mar-Mac Manufacturing Co., Inc.(M)
	025	03	Protech Safety Equipment Inc.(D)
	025	04	Mar-Mac Manufacturing Co., Inc.(M)
	025	04	Protech Safety Equipment Inc.(D)
	025	05	Mar-Mac Manufacturing Co., Inc.(M)
	025	06	Mar-Mac Manufacturing Co., Inc.(M)
	025	06	Protech Safety Equipment Inc.(D)
	025	07	Protech Safety Equipment Inc.(D)

Resistant Material	Code	Type	Vendor Name
NONWOVEN PE(031)			
Product: Tyvek			
	071	01	Allied Glove & Safety Products Corp.(M)
	071	01	American Scientific Products(D)
	071	01	Arbill Inc.(D)
	071	01	Charkate(M)
	071	01	Clean Room Products, Inc.(M)
	071	01	Coyne Safety Equipment, Inc.(D)
	071	01	Daffin Disposables, Inc.(M)
	071	01	Direct Safety Company(D)
	071	01	Disposables Inc.(M)
	071	01	Durafab Disposables, Inc.(M)
	071	01	Eastco Industrial Safety Corp.(D)
	071	01	Edmont Div. Becton, Dickinson & Co.(M)
	071	01	Fisher Scientific Company(D)
	071	01	Goodyear Rubber Products Corp.(S)
	071	01	Holland Safety Supply Co.(D)
	071	01	Hub Safety Equipment, Inc.(D)
	071	01	IPESCo., Inc.(M)
	071	01	Industrial Products Co., Inc.(D)
	071	01	Industrial Safety and Security Co.(D)
	071	01	Interex Corp.(D)
	071	01	Kappler Disposables, Inc.(M)
	071	01	Latex Glove Co., Inc(M)
	071	01	Leonard Safety Epuipment, Inc.(D)
	071	01	Magid Glove and Safety Mfg. Co.(M)
	071	01	Mar-Mac Manufacturing Co., Inc.(M)
	071	01	Masterman's(D)
	071	01	Melco, Inc.(M)
	071	01	Mine Safety Appliances Co.(M)
	071	01	Protech Safety Equipment Inc.(D)
	071	01	Rockford Medical & Safety Co.(D)
	071	01	Safeco Inc.(D)
	071	01	Standard Glove & Safety Equip. Corp.(D)
	071	01	Stauffer Manufacturing Company(M)
	071	01	Superior Surgical Mfg. Co., Inc.(M)
	071	01	H. Texier Glove Company Inc.(D)
	071	01	United States Plastic Corp.(D)
	071	02	Allied Glove & Safety Products Corp.(M)
	071	02	American Scientific Products(D)
	071	02	Arbill Inc.(D)
	071	02	Boss Manufacturing Company(M)
	071	02	Charkate(M)
	071	02	Clean Room Products, Inc.(M)
	071	02	Coyne Safety Equipment, Inc.(D)
	071	02	Daffin Disposables, Inc.(M)
	071	02	Direct Safety Company(D)
	071	02	Disposables Inc.(M)
	071	02	Durafab Disposables, Inc.(M)
	071	02	Eastco Industrial Safety Corp.(D)
	071	02	Edmont Div. Becton, Dickinson & Co.(M)
	071	02	Fisher Scientific Company(D)
	071	02	General Scientific Safety Equipment Company(D)

Resistant Material	Code	Type	Vendor Name
	Product: Tyvek (cont.)		
	071	02	Goodyear Rubber Products Corp.(S)
	071	02	Holland Safety Supply Co.(D)
	071	02	Hub Safety Equipment, Inc.(D)
	071	02	IPESCo., Inc.(M)
	071	02	Industrial Products Co., Inc.(D)
	071	02	Industrial Safety and Security Co.(D)
	071	02	Interex Corp.(D)
	071	02	Kappler Disposables, Inc.(M)
	071	02	Latex Glove Co., Inc(M)
	071	02	Leonard Safety Epuipment, Inc.(D)
	071	02	Magid Glove and Safety Mfg. Co.(M)
	071	02	Mar-Mac Manufacturing Co., Inc.(M)
	071	02	Masterman's(D)
	071	02	Melco, Inc.(M)
	071	02	Mine Safety Appliances Co.(M)
	071	02	Protech Safety Equipment Inc.(D)
	071	02	Rockford Medical & Safety Co.(D)
	071	02	Safeco Inc.(D)
	071	02	Standard Glove & Safety Equip. Corp.(D)
	071	02	Stauffer Manufacturing Company(M)
	071	02	Superior Surgical Mfg. Co., Inc.(M)
	071	02	H. Texier Glove Company Inc.(D)
	071	02	United States Plastic Corp.(D)
	071	03	Acme Mills Company(M)
	071	03	Allied Glove & Safety Products Corp.(M)
	071	03	Arbill Inc.(D)
	071	03	Boss Manufacturing Company(M)
	071	03	Clean Room Products, Inc.(M)
	071	03	Coyne Safety Equipment, Inc.(D)
	071	03	Daffin Disposables, Inc.(M)
	071	03	Direct Safety Company(D)
	071	03	Disposables Inc.(M)
	071	03	Durafab Disposables, Inc.(M)
	071	03	Latex Glove Co., Inc(M)
	071	03	Leonard Safety Epuipment, Inc.(D)
	071	03	Magid Glove and Safety Mfg. Co.(M)
	071	03	Mar-Mac Manufacturing Co., Inc.(M)
	071	03	Masterman's(D)
	071	03	Melco, Inc.(M)
	071	03	Mine Safety Appliances Co.(M)
	071	03	Protech Safety Equipment Inc.(D)
	071	03	Rockford Medical & Safety Co.(D)
	071	03	Superior Surgical Mfg. Co., Inc.(M)
	071	03	United States Plastic Corp.(D)
	071	04	Allied Glove & Safety Products Corp.(M)
	071	04	Arbill Inc.(D)
	071	04	Charkate(M)
	071	04	Coyne Safety Equipment, Inc.(D)
	071	04	Daffin Disposables, Inc.(M)
	071	04	Direct Safety Company(D)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
	Product: Tyvek (cont.)		
	071	04	Disposables Inc.(M)
	071	04	Durafab Disposables, Inc.(M)
	071	04	Eastco Industrial Safety Corp.(D)
	071	04	Edmont Div. Becton, Dickinson & Co.(M)
	071	04	Goodyear Rubber Products Corp.(S)
	071	04	Holland Safety Supply Co.(D)
	071	04	Hub Safety Equipment, Inc.(D)
	071	04	IPESCo., Inc.(M)
	071	04	Industrial Products Co., Inc.(D)
	071	04	Industrial Safety and Security Co.(D)
	071	04	Interex Corp.(D)
	071	04	Kappler Disposables, Inc.(M)
	071	04	Latex Glove Co., Inc(M)
	071	04	Leonard Safety Epuipment, Inc.(D)
	071	04	Magid Glove and Safety Mfg. Co.(M)
	071	04	Mar-Mac Manufacturing Co., Inc.(M)
	071	04	Masterman's(D)
	071	04	Melco, Inc.(M)
	071	04	Mine Safety Appliances Co.(M)
	071	04	Protech Safety Equipment Inc.(D)
	071	04	Rockford Medical & Safety Co.(D)
	071	04	Safeco Inc.(D)
	071	04	Standard Glove & Safety Equip. Corp.(D)
	071	04	Stauffer Manufacturing Company(M)
	071	04	Superior Surgical Mfg. Co., Inc.(M)
	071	04	H. Texier Glove Company Inc.(D)
	071	04	United States Plastic Corp.(D)
	071	05	Charkate(M)
	071	05	Coyne Safety Equipment, Inc.(D)
	071	05	Daffin Disposables, Inc.(M)
	071	05	Direct Safety Company(D)
	071	05	Disposables Inc.(M)
	071	05	Durafab Disposables, Inc.(M)
	071	05	Hub Safety Equipment, Inc.(D)
	071	05	IPESCo., Inc.(M)
	071	05	Industrial Products Co., Inc.(D)
	071	05	Industrial Safety and Security Co.(D)
	071	05	Kappler Disposables, Inc.(M)
	071	05	Mar-Mac Manufacturing Co., Inc.(M)
	071	05	Mine Safety Appliances Co.(M)
	071	06	American Scientific Products(D)
	071	06	E.D. Bullard Company(M)
	071	06	Charkate(M)
	071	06	Clean Room Products, Inc.(M)
	071	06	Coyne Safety Equipment, Inc.(D)
	071	06	Direct Safety Company(D)
	071	06	Disposables Inc.(M)
	071	06	Durafab Disposables, Inc.(M)
	071	06	Eastco Industrial Safety Corp.(D)
	071	06	Edmont Div. Becton, Dickinson & Co.(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
	Product: Tyvek (cont.)		
	071	06	General Scientific Safety Equipment Company(D)
	071	06	Goodyear Rubber Products Corp.(S)
	071	06	Holland Safety Supply Co.(D)
	071	06	Industrial Products Co., Inc.(D)
	071	06	Industrial Safety and Security Co.(D)
	071	06	Interex Corp.(D)
	071	06	Kappler Disposables, Inc.(M)
	071	06	Mar-Mac Manufacturing Co., Inc.(M)
	071	06	Masterman's(D)
	071	06	Melco, Inc.(M)
	071	06	Mine Safety Appliances Co.(M)
	071	06	Protech Safety Equipment Inc.(D)
	071	06	Rockford Medical & Safety Co.(D)
	071	06	Safeco Inc.(D)
	071	06	Standard Glove & Safety Equip. Corp.(D)
	071	06	Stauffer Manufacturing Company(M)
	071	06	Superior Surgical Mfg. Co., Inc.(M)
	071	06	H. Texier Glove Company Inc.(D)
	071	06	United States Safety Service Co.(D)
	071	07	Allied Glove & Safety Products Corp.(M)
	071	07	American Scientific Products(D)
	071	07	Arbill Inc.(D)
	071	07	Charkate(M)
	071	07	Clean Room Products, Inc.(M)
	071	07	Coyne Safety Equipment, Inc.(D)
	071	07	Daffin Disposables, Inc.(M)
	071	07	Direct Safety Company(D)
	071	07	Disposables Inc.(M)
	071	07	Durafab Disposables, Inc.(M)
	071	07	General Scientific Safety Equipment Company(D)
	071	07	Hub Safety Equipment, Inc.(D)
	071	07	Industrial Products Co., Inc.(D)
	071	07	Industrial Safety and Security Co.(D)
	071	07	Kappler Disposables, Inc.(M)
	071	07	Leonard Safety Epuipment, Inc.(D)
	071	07	Mar-Mac Manufacturing Co., Inc.(M)
	071	07	Masterman's(D)
	071	07	Mine Safety Appliances Co.(M)
	071	07	Rockford Medical & Safety Co.(D)
	071	07	Superior Surgical Mfg. Co., Inc.(M)
NONWOVEN PP(023)			
	Product: Polypropylene, Nonwoven		
	135	02	Kimberly-Clark Corp.(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
PE(025)			
	Product: Polyethylene Glove, Unsupported		
	006	00	Allied Glove & Safety Products Corp.(M)
	006	00	Arbill Inc.(D)
	006	00	Armin Corporation(M)
	006	00	Eastco Industrial Safety Corp.(D)
	006	00	Edmont Div. Becton, Dickinson & Co.(M)
	006	00	General Scientific Safety Equipment Company(D)
	006	00	Goodyear Rubber Products Corp.(S)
	006	00	Granet(M)
	006	00	Holland Safety Supply Co.(D)
	006	00	Industrial Products Co., Inc.(D)
	006	00	Industrial Safety and Security Co.(D)
	006	00	Interex Corp.(D)
	006	00	Latex Glove Co., Inc(M)
	006	00	Magid Glove and Safety Mfg. Co.(M)
	006	00	Masterman's(D)
	006	00	Protech Safety Equipment Inc.(D)
	006	00	Protexall Company(M)
	006	00	Rockford Medical & Safety Co.(D)
	006	00	Safeco Inc.(D)
	006	00	Standard Glove & Safety Equip. Corp.(D)
	006	00	Stauffer Manufacturing Company(M)
	006	00	H. Texier Glove Company Inc.(D)
	006	00	United States Plastic Corp.(D)
	Product: Polyethylene, High Density, Film		
	041	01	Miller Products Co., Inc.(D)
	Product: Polyethylene, Medium Density, Film		
	042	03	Allied Glove & Safety Products Corp.(M)
	042	03	Eastco Industrial Safety Corp.(D)
	042	03	General Scientific Safety Equipment Company(D)
	042	03	Keystone Protection Corp.(D)
	042	03	Latex Glove Co., Inc(M)
	042	03	Rockford Medical & Safety Co.(D)
	042	06	Magid Glove and Safety Mfg. Co.(M)
	042	07	General Scientific Safety Equipment Company(D)
	042	07	Interex Corp.(D)
	042	07	Latex Glove Co., Inc(M)
	042	07	Magid Glove and Safety Mfg. Co.(M)
	Product: Polyethylene, Low Density, Film		
	048	03	Masterman's(D)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
Product: Polyethylene, Density Unknown, Film			
	056	03	American Scientific Products(D)
	056	03	Armin Corporation(M)
	056	03	Charkate(M)
	056	03	Edmont Div. Becton, Dickinson & Co.(M)
	056	03	Goodyear Rubber Products Corp.(S)
	056	03	Granet(M)
	056	03	Holland Safety Supply Co.(D)
	056	03	Industrial Products Co., Inc.(D)
	056	03	Industrial Safety and Security Co.(D)
	056	03	Interex Corp.(D)
	056	03	Masterman's(D)
	056	03	Protech Safety Equipment Inc.(D)
	056	03	Protexall Company(M)
	056	03	Safeco Inc.(D)
	056	03	Standard Glove & Safety Equip. Corp.(D)
	056	03	Stauffer Manufacturing Company(M)
	056	03	H. Texier Glove Company Inc.(D)
Product: Polyethylene/Tyvek			
	076	01	Allied Glove & Safety Products Corp.(M)
	076	01	Arbill Inc.(D)
	076	01	Daffin Disposables, Inc.(M)
	076	01	Durafab Disposables, Inc.(M)
	076	01	Eastco Industrial Safety Corp.(D)
	076	01	Edmont Div. Becton, Dickinson & Co.(M)
	076	01	Goodyear Rubber Products Corp.(S)
	076	01	Holland Safety Supply Co.(D)
	076	01	Industrial Products Co., Inc.(D)
	076	01	Industrial Safety and Security Co.(D)
	076	01	Interex Corp.(D)
	076	01	Kappler Disposables, Inc.(M)
	076	01	Latex Glove Co., Inc(M)
	076	01	Magid Glove and Safety Mfg. Co.(M)
	076	01	Mar-Mac Manufacturing Co., Inc.(M)
	076	01	Masterman's(D)
	076	01	Mine Safety Appliances Co.(M)
	076	01	Protech Safety Equipment Inc.(D)
	076	01	Rockford Medical & Safety Co.(D)
	076	01	Safeco Inc.(D)
	076	01	Standard Glove & Safety Equip. Corp.(D)
	076	01	Stauffer Manufacturing Company(M)
	076	01	H. Texier Glove Company Inc.(D)
	076	02	Arbill Inc.(D)
	076	02	Daffin Disposables, Inc.(M)
	076	02	Disposables Inc.(M)
	076	02	Durafab Disposables, Inc.(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
	Product: Polyethylene/Tyvek (cont.)		
	076	02	IPESCo., Inc.(M)
	076	02	Industrial Products Co., Inc.(D)
	076	02	Industrial Safety and Security Co.(D)
	076	02	Kappler Disposables, Inc.(M)
	076	02	Latex Glove Co., Inc(M)
	076	02	Magid Glove and Safety Mfg. Co.(M)
	076	02	Mar-Mac Manufacturing Co., Inc.(M)
	076	02	Melco, Inc.(M)
	076	02	Mine Safety Appliances Co.(M)
	076	02	Protech Safety Equipment Inc.(D)
	076	02	Rockford Medical & Safety Co.(D)
	076	03	Charkate(M)
	076	03	Daffin Disposables, Inc.(M)
	076	03	Durafab Disposables, Inc.(M)
	076	03	Mar-Mac Manufacturing Co., Inc.(M)
	076	03	Melco, Inc.(M)
	076	03	Mine Safety Appliances Co.(M)
	076	03	Protech Safety Equipment Inc.(D)
	076	03	Rockford Medical & Safety Co.(D)
	076	04	Allied Glove & Safety Products Corp.(M)
	076	04	Arbill Inc.(D)
	076	04	Durafab Disposables, Inc.(M)
	076	04	Eastco Industrial Safety Corp.(D)
	076	04	Edmont Div. Becton, Dickinson & Co.(M)
	076	04	Goodyear Rubber Products Corp.(S)
	076	04	Holland Safety Supply Co.(D)
	076	04	Industrial Products Co., Inc.(D)
	076	04	Industrial Safety and Security Co.(D)
	076	04	Interex Corp.(D)
	076	04	Kappler Disposables, Inc.(M)
	076	04	Latex Glove Co., Inc(M)
	076	04	Magid Glove and Safety Mfg. Co.(M)
	076	04	Mar-Mac Manufacturing Co., Inc.(M)
	076	04	Masterman's(D)
	076	04	Mine Safety Appliances Co.(M)
	076	04	Protech Safety Equipment Inc.(D)
	076	04	Rockford Medical & Safety Co.(D)
	076	04	Safeco Inc.(D)
	076	04	Standard Glove & Safety Equip. Corp.(D)
	076	04	Stauffer Manufacturing Company(M)
	076	04	H. Texier Glove Company Inc.(D)
	076	05	Charkate(M)
	076	05	Daffin Disposables, Inc.(M)
	076	05	Disposables Inc.(M)
	076	05	Durafab Disposables, Inc.(M)
	076	05	Hub Safety Equipment, Inc.(D)
	076	05	Industrial Products Co., Inc.(D)
	076	05	Industrial Safety and Security Co.(D)
	076	05	Kappler Disposables, Inc.(M)
	076	05	Mar-Mac Manufacturing Co., Inc.(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
	Product: Polyethylene/Tyvek (cont.)		
	076	05	Rockford Medical & Safety Co.(D)
	076	06	Charkate(M)
	076	06	Durafab Disposables, Inc.(M)
	076	06	Industrial Products Co., Inc.(D)
	076	06	Industrial Safety and Security Co.(D)
	076	06	Kappler Disposables, Inc.(M)
	076	06	Mar-Mac Manufacturing Co., Inc.(M)
	076	06	Melco, Inc.(M)
	076	06	Protech Safety Equipment Inc.(D)
	076	07	Daffin Disposables, Inc.(M)
	076	07	Durafab Disposables, Inc.(M)
	076	07	Industrial Products Co., Inc.(D)
	076	07	Industrial Safety and Security Co.(D)
	076	07	Kappler Disposables, Inc.(M)
	076	07	Mar-Mac Manufacturing Co., Inc.(M)
	076	07	Protech Safety Equipment Inc.(D)
	Product: Polyethylene/Fabric		
	091	01	General Scientific Safety Equipment Company(D)
	091	02	General Scientific Safety Equipment Company(D)
	091	03	Fisher Scientific Company(D)
	091	04	General Scientific Safety Equipment Company(D)
	091	06	General Scientific Safety Equipment Company(D)
	Product: Polyethylene/Polyester		
	137	03	Protexall Company(M)
POLYCARBONATE(026)			
	Product: Polycarbonate, Lens and Face Shield		
	098	09	Arbill Inc.(D)
	098	09	Eastco Industrial Safety Corp.(D)
	098	09	Fisher Scientific Company(D)
	098	09	Inco Safety Products Co.(M)
	098	09	Industrial Safety and Security Co.(D)
	098	09	Interex Corp.(D)
	098	09	Magid Glove and Safety Mfg. Co.(M)
	098	09	Rockford Medical & Safety Co.(D)
	098	09	The Sager Corporation(M)
POLYESTER(027)			
	Product: Polyester, Face Shield and Lens		
	096	09	SGL Homalite Industries(S)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
POLYURETHANE(028)			
	Product: Polyurethane Rubber, Unsupported		
	027	00	Colonial Glove & Garment Inc.(M)
	Product: Polyurethane Rubber/Nylon		
	050	01	Boss Manufacturing Company(M)
	050	01	Eastco Industrial Safety Corp.(D)
	050	01	Jordan David Safety Products(M)
	050	01	Miller Products Co., Inc.(D)
	050	01	Mine Safety Appliances Co.(M)
	050	01	National Safety Wear, Inc.(M)
	050	01	Rainfair, Inc.(M)
	050	01	Rockford Medical & Safety Co.(D)
	050	02	Boss Manufacturing Company(M)
	050	02	Miller Products Co., Inc.(D)
	050	04	Eastco Industrial Safety Corp.(D)
	050	04	Jordan David Safety Products(M)
	050	04	Miller Products Co., Inc.(D)
	050	04	Mine Safety Appliances Co.(M)
	050	04	National Safety Wear, Inc.(M)
	050	04	Rainfair, Inc.(M)
	050	04	Rockford Medical & Safety Co.(D)
	050	06	Eastco Industrial Safety Corp.(D)
	050	06	Rainfair, Inc.(M)
	Product: Polyurethane Rubber, Boots		
	082	08	Eastco Industrial Safety Corp.(D)
	082	08	Jordan David Safety Products(M)
	082	08	Rainfair, Inc.(M)
PV ALCOHOL(029)			
	Product: Polyvinyl Alcohol Glove, Supported		
	004	00	Arbill Inc.(D)
	004	00	Eastco Industrial Safety Corp.(D)
	004	00	Edmont Div. Becton, Dickinson & Co.(M)
	004	00	Goodyear Rubber Products Corp.(S)
	004	00	Holland Safety Supply Co.(D)
	004	00	Industrial Products Co., Inc.(D)
	004	00	Industrial Safety and Security Co.(D)
	004	00	Interex Corp.(D)
	004	00	LRC Safety Products Co.(D)
	004	00	Magid Glove and Safety Mfg. Co.(M)
	004	00	Major Safety Service, Inc.(D)
	004	00	Masterman's(D)
	004	00	Protech Safety Equipment Inc.(D)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
	Product: Polyvinyl Alcohol Glove, Supported (cont.)		
	004	00	Safeco Inc.(D)
	004	00	Standard Glove & Safety Equip. Corp.(D)
	004	00	Stauffer Manufacturing Company(M)
	004	00	H. Texier Glove Company Inc.(D)
	Product: Polyvinyl Alcohol Glove, Unsupported		
	102	00	General Scientific Safety Equipment Company(D)
PVC(030)			
	Product: Polyvinyl Chloride Glove, Unsupported		
	003	00	Alliance Supply, Inc.(M)
	003	00	Allied Glove & Safety Products Corp.(M)
	003	00	Arbill Inc.(D)
	003	00	Armin Corporation(M)
	003	00	Best Manufacturing Company(M)
	003	00	Boss Manufacturing Company(M)
	003	00	Clean Room Products, Inc.(M)
	003	00	Dayton Flexible Products(M)
	003	00	Defense Apparel(M)
	003	00	Eastco Industrial Safety Corp.(D)
	003	00	Edmont Div. Becton, Dickinson & Co.(M)
	003	00	Goodyear Rubber Products Corp.(S)
	003	00	Holland Safety Supply Co.(D)
	003	00	Hub Safety Equipment, Inc.(D)
	003	00	IPESCo., Inc.(M)
	003	00	Industrial Products Co., Inc.(D)
	003	00	Industrial Safety and Security Co.(D)
	003	00	Interex Corp.(D)
	003	00	Intermarket Latex, Inc.(M)
	003	00	Keystone Protection Corp.(D)
	003	00	Latex Glove Co., Inc(M)
	003	00	Leonard Safety Epuipment, Inc.(D)
	003	00	Magid Glove and Safety Mfg. Co.(M)
	003	00	Masterman's(D)
	003	00	Miller Products Co., Inc.(D)
	003	00	Mine Safety Appliances Co.(M)
	003	00	Monte Glove Company(M)
	003	00	North Hand Protection(M)
	003	00	OKI Supply Co.(M)
	003	00	Oak Technical, Inc.(M)
	003	00	Pioneer Industrial Products Co.(M)
	003	00	Protech Safety Equipment Inc.(D)
	003	00	Protexall Company(M)
	003	00	Rockford Medical & Safety Co.(D)
	003	00	Safeco Inc.(D)
	003	00	Standard Glove & Safety Equip. Corp.(D)
	003	00	Stauffer Manufacturing Company(M)
	003	00	H. Texier Glove Company Inc.(D)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
Product: Polyvinyl Chloride, Sheet			
	049	04	Aramsco(M)
	049	04	Coyne Safety Equipment, Inc.(D)
	049	04	Falcon Industries, Inc.(M)
	049	04	Latex Glove Co., Inc(M)
	049	04	Leonard Safety Epuipment, Inc.(D)
	049	04	Miller Products Co., Inc.(D)
	049	04	Protech Safety Equipment Inc.(D)
	049	04	Safeco Inc.(D)
	049	04	Safety Engineering & Supply Co.(D)
	049	04	Sawyer-Tower(M)
	049	04	Standard Safety Equipment Co.(M)
	049	05	Andover Industries, Inc.(M)
	049	05	Direct Safety Company(D)
	049	05	Mine Safety Appliances Co.(M)
	049	06	Aramsco(M)
	049	06	Coyne Safety Equipment, Inc.(D)
	049	06	Direct Safety Company(D)
	049	06	Falcon Industries, Inc.(M)
	049	06	General Scientific Safety Equipment Company(D)
	049	06	Leonard Safety Epuipment, Inc.(D)
	049	06	Magid Glove and Safety Mfg. Co.(M)
	049	06	Miller Products Co., Inc.(D)
	049	06	Mine Safety Appliances Co.(M)
	049	06	Plastex Protective Products, Inc.(M)
	049	06	Protexall Company(M)
	049	06	Steele & Associates, Inc.(M)
	049	07	Arbill Inc.(D)
	049	07	Armin Corporation(M)
	049	07	Direct Safety Company(D)
	049	07	Interex Corp.(D)
	049	07	La Crosse Footwear, Inc.(M)
	049	07	Protexall Company(M)
	049	07	Ranger(M)
	049	07	Standard Safety Equipment Co.(M)
	049	07	Steele & Associates, Inc.(M)
Product: Polyvinyl Chloride/Fabric			
	053	01	Allied Glove & Safety Products Corp.(M)
	053	01	Aramsco(M)
	053	01	Boss Manufacturing Company(M)
	053	01	Durafab Disposables, Inc.(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
	Product: Polyvinyl Chloride/Fabric (cont.)		
	053	01	Jomac Products Inc.(M)
	053	01	Jones Safety Supply, Inc.(D)
	053	01	Jordan David Safety Products(M)
	053	01	Keystone Protection Corp.(D)
	053	01	Major Safety Service, Inc.(D)
	053	01	Masterman's(D)
	053	01	Mine Safety Appliances Co.(M)
	053	01	OKI Supply Co.(M)
	053	01	Plastex Protective Products, Inc.(M)
	053	01	Protech Safety Equipment Inc.(D)
	053	01	Record Industrial Co.(M)
	053	01	Robar Protective Products(D)
	053	01	Safeco Inc.(D)
	053	01	Safety Engineering & Supply Co.(D)
	053	01	Sawyer-Tower(M)
	053	01	Standard Safety Equipment Co.(M)
	053	01	Tingley Rubber Corp.(M)
	053	01	Wheeler Protective Apparel, Inc.(M)
	053	02	Boss Manufacturing Company(M)
	053	02	Durafab Disposables, Inc.(M)
	053	02	Jomac Products Inc.(M)
	053	02	Jones Safety Supply, Inc.(D)
	053	02	Keystone Protection Corp.(D)
	053	02	Major Safety Service, Inc.(D)
	053	02	Standard Safety Equipment Co.(M)
	053	03	Allied Glove & Safety Products Corp.(M)
	053	03	Charkate(M)
	053	03	Durafab Disposables, Inc.(M)
	053	03	Eastco Industrial Safety Corp.(D)
	053	03	Edmont Div. Becton, Dickinson & Co.(M)
	053	03	Fisher Scientific Company(D)
	053	03	Goodyear Rubber Products Corp.(S)
	053	03	Holland Safety Supply Co.(D)
	053	03	Industrial Products Co., Inc.(D)
	053	03	Industrial Safety and Security Co.(D)
	053	03	Interex Corp.(D)
	053	03	Jomac Products Inc.(M)
	053	03	Jones Safety Supply, Inc.(D)
	053	03	Keystone Protection Corp.(D)
	053	03	Major Safety Service, Inc.(D)
	053	03	Masterman's(D)
	053	03	Protech Safety Equipment Inc.(D)
	053	03	Safeco Inc.(D)
	053	03	Standard Glove & Safety Equip. Corp.(D)
	053	03	Standard Safety Equipment Co.(M)
	053	03	Stauffer Manufacturing Company(M)
	053	03	H. Texier Glove Company Inc.(D)
	053	03	Wheeler Protective Apparel, Inc.(M)
	053	04	Jomac Products Inc.(M)
	053	04	Jones Safety Supply, Inc.(D)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
Product: Polyvinyl Chloride/Fabric (cont.)			
	053	04	Jordan David Safety Products(M)
	053	04	Keystone Protection Corp.(D)
	053	04	Major Safety Service, Inc.(D)
	053	04	Masterman's(D)
	053	04	Mine Safety Appliances Co.(M)
	053	04	OKI Supply Co.(M)
	053	04	Plastex Protective Products, Inc.(M)
	053	04	Protech Safety Equipment Inc.(D)
	053	04	Record Industrial Co.(M)
	053	04	Robar Protective Products(D)
	053	04	Safeco Inc.(D)
	053	04	Safety Engineering & Supply Co.(D)
	053	04	Sawyer-Tower(M)
	053	04	Tingley Rubber Corp.(M)
	053	04	Wheeler Protective Apparel, Inc.(M)
	053	05	Major Safety Service, Inc.(D)
	053	05	Safety Engineering & Supply Co.(D)
	053	05	Standard Safety Equipment Co.(M)
	053	05	Wheeler Protective Apparel, Inc.(M)
	053	06	Boss Manufacturing Company(M)
	053	06	Jomac Products Inc.(M)
	053	06	Jones Safety Supply, Inc.(D)
	053	06	Major Safety Service, Inc.(D)
	053	06	Plastex Protective Products, Inc.(M)
	053	06	Pulmosan Safety Equipment Corp.(D)
	053	06	Standard Safety Equipment Co.(M)
	053	06	United States Safety Service Co.(D)
	053	06	Wheeler Protective Apparel, Inc.(M)
Product: Polyvinyl Chloride, Film			
	054	01	Defense Apparel(M)
	054	01	Durafab Disposables, Inc.(M)
	054	01	OKI Supply Co.(M)
	054	01	Plastimayd Corp.(M)
	054	01	Robar Protective Products(D)
	054	02	Defense Apparel(M)
	054	02	Durafab Disposables, Inc.(M)
	054	03	Durafab Disposables, Inc.(M)
	054	03	Fairway Products(M)
	054	03	LRC Safety Products Co.(D)
	054	03	Melco, Inc.(M)
	054	03	OKI Supply Co.(M)
	054	03	Plastimayd Corp.(M)
	054	03	Pulmosan Safety Equipment Corp.(D)
	054	03	Ronco Textile Products, Inc.(M)
	054	04	Defense Apparel(M)
	054	04	OKI Supply Co.(M)
	054	04	Plastimayd Corp.(M)
	054	04	Robar Protective Products(D)

Resistant Material	Code	Type	Vendor Name
Product: Polyvinyl Chloride, Film (cont.)			
	054	06	General Scientific Safety Equipment Company(D)
	054	06	Melco, Inc.(M)
	054	06	Pulmosan Safety Equipment Corp.(D)
	054	07	Allied Glove & Safety Products Corp.(M)
	054	07	Defense Apparel(M)
	054	07	Eastco Industrial Safety Corp.(D)
	054	07	General Scientific Safety Equipment Company(D)
	054	07	Interex Corp.(D)
	054	07	Iron Age Protective Company(M)
	054	07	Leonard Safety Epuipment, Inc.(D)
	054	07	Melco, Inc.(M)
	054	07	Plastex Protective Products, Inc.(M)
	054	07	Pulmosan Safety Equipment Corp.(D)
	054	07	United States Plastic Corp.(D)
Product: Polyvinyl Chloride/Nylon			
	077	01	Allied Glove & Safety Products Corp.(M)
	077	01	Aramsco(M)
	077	01	Boss Manufacturing Company(M)
	077	01	Direct Safety Company(D)
	077	01	Eastco Industrial Safety Corp.(D)
	077	01	Edmont Div. Becton, Dickinson & Co.(M)
	077	01	Goodyear Rubber Products Corp.(S)
	077	01	Holland Safety Supply Co.(D)
	077	01	Industrial Products Co., Inc.(D)
	077	01	Industrial Safety and Security Co.(D)
	077	01	Interex Corp.(D)
	077	01	Jomac Products Inc.(M)
	077	01	Jones Safety Supply, Inc.(D)
	077	01	Jordan David Safety Products(M)
	077	01	Masterman's(D)
	077	01	Miller Products Co., Inc.(D)
	077	01	Mine Safety Appliances Co.(M)
	077	01	National Safety Wear, Inc.(M)
	077	01	OKI Supply Co.(M)
	077	01	Plastex Protective Products, Inc.(M)
	077	01	Protech Safety Equipment Inc.(D)
	077	01	Rainfair, Inc.(M)
	077	01	Robar Protective Products(D)
	077	01	Rockford Medical & Safety Co.(D)
	077	01	Safeco Inc.(D)
	077	01	Safety Engineering & Supply Co.(D)
	077	01	Sawyer-Tower(M)
	077	01	Standard Glove & Safety Equip. Corp.(D)
	077	01	Stauffer Manufacturing Company(M)
	077	01	H. Texier Glove Company Inc.(D)
	077	01	Tingley Rubber Corp.(M)
	077	02	Boss Manufacturing Company(M)
	077	02	Jomac Products Inc.(M)

Resistant Material	Code	Type	Vendor Name
	Product: Polyvinyl Chloride/Nylon (cont.)		
	077	02	Jones Safety Supply, Inc.(D)
	077	02	Miller Products Co., Inc.(D)
	077	02	Plastex Protective Products, Inc.(M)
	077	03	Boss Manufacturing Company(M)
	077	03	Frommelt Industries, Inc.(M)
	077	03	Jomac Products Inc.(M)
	077	03	Jones Safety Supply, Inc.(D)
	077	03	OKI Supply Co.(M)
	077	03	Plastex Protective Products, Inc.(M)
	077	03	Protech Safety Equipment Inc.(D)
	077	04	Allied Glove & Safety Products Corp.(M)
	077	04	Direct Safety Company(D)
	077	04	Eastco Industrial Safety Corp.(D)
	077	04	Edmont Div. Becton, Dickinson & Co.(M)
	077	04	Goodyear Rubber Products Corp.(S)
	077	04	Holland Safety Supply Co.(D)
	077	04	Industrial Products Co., Inc.(D)
	077	04	Industrial Safety and Security Co.(D)
	077	04	Interex Corp.(D)
	077	04	Jomac Products Inc.(M)
	077	04	Jones Safety Supply, Inc.(D)
	077	04	Jordan David Safety Products(M)
	077	04	Masterman's(D)
	077	04	Miller Products Co., Inc.(D)
	077	04	Mine Safety Appliances Co.(M)
	077	04	National Safety Wear, Inc.(M)
	077	04	OKI Supply Co.(M)
	077	04	Plastex Protective Products, Inc.(M)
	077	04	Protech Safety Equipment Inc.(D)
	077	04	Rainfair, Inc.(M)
	077	04	Robar Protective Products(D)
	077	04	Rockford Medical & Safety Co.(D)
	077	04	Safeco Inc.(D)
	077	04	Safety Engineering & Supply Co.(D)
	077	04	Sawyer-Tower(M)
	077	04	Standard Glove & Safety Equip. Corp.(D)
	077	04	Stauffer Manufacturing Company(M)
	077	04	H. Texier Glove Company Inc.(D)
	077	04	Tingley Rubber Corp.(M)
	077	05	Mine Safety Appliances Co.(M)
	077	06	Allied Glove & Safety Products Corp.(M)
	077	06	Boss Manufacturing Company(M)
	077	06	Colonial Glove & Garment Inc.(M)
	077	06	Direct Safety Company(D)
	077	06	Eastco Industrial Safety Corp.(D)
	077	06	Edmont Div. Becton, Dickinson & Co.(M)
	077	06	Falcon Industries, Inc.(M)
	077	06	General Scientific Safety Equipment Company(D)
	077	06	Goodyear Rubber Products Corp.(S)
	077	06	Holland Safety Supply Co.(D)

Resistant Material	Code	Type	Vendor Name
			Product: Polyvinyl Chloride/Nylon (cont.)
	077	06	Industrial Products Co., Inc.(D)
	077	06	Industrial Safety and Security Co.(D)
	077	06	Interex Corp.(D)
	077	06	Jomac Products Inc.(M)
	077	06	Jones Safety Supply, Inc.(D)
	077	06	Masterman's(D)
	077	06	Plastex Protective Products, Inc.(M)
	077	06	Protech Safety Equipment Inc.(D)
	077	06	Pulmosan Safety Equipment Corp.(D)
	077	06	Rainfair, Inc.(M)
	077	06	Robar Protective Products(D)
	077	06	Safeco Inc.(D)
	077	06	Standard Glove & Safety Equip. Corp.(D)
	077	06	Stauffer Manufacturing Company(M)
	077	06	H. Texier Glove Company Inc.(D)
			Product: Polyvinyl Chloride, Boots
	083	08	Allied Glove & Safety Products Corp.(M)
	083	08	Boss Manufacturing Company(M)
	083	08	Defense Apparel(M)
	083	08	Direct Safety Company(D)
	083	08	Eastco Industrial Safety Corp.(D)
	083	08	Interex Corp.(D)
	083	08	Iron Age Protective Company(M)
	083	08	Jordan David Safety Products(M)
	083	08	La Crosse Footwear, Inc.(M)
	083	08	Latex Glove Co., Inc(M)
	083	08	Lehigh Safety Shoe Co.(M)
	083	08	Masterman's(D)
	083	08	Miller Products Co., Inc.(D)
	083	08	Protexall Company(M)
	083	08	Rainfair, Inc.(M)
	083	08	Standard Safety Equipment Co.(M)
	083	08	Steele & Associates, Inc.(M)
	083	08	Tingley Rubber Corp.(M)
	083	08	The Tracies Co.(M)
	083	08	Trelleborg, Inc.(M)
	083	08	Wheeler Protective Apparel, Inc.(M)
			Product: Polyvinyl Chloride/Rayon
	088	01	Direct Safety Company(D)
	088	01	Jomac Products Inc.(M)
	088	01	Jones Safety Supply, Inc.(D)
	088	01	Protech Safety Equipment Inc.(D)
	088	03	Jomac Products Inc.(M)
	088	03	Jones Safety Supply, Inc.(D)
	088	04	Direct Safety Company(D)
	088	04	Jomac Products Inc.(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
Product: Polyvinyl Chloride/Rayon (cont.)			
	088	04	Jones Safety Supply, Inc.(D)
	088	06	Direct Safety Company(D)
	088	06	Falcon Industries, Inc.(M)
	088	06	Jomac Products Inc.(M)
	088	06	Jones Safety Supply, Inc.(D)
Product: Polyvinyl Chloride/Fabric/Polyvinyl Chloride			
	131	01	Eastco Industrial Safety Corp.(D)
	131	01	Rainfair, Inc.(M)
	131	01	Sawyer-Tower(M)
	131	04	Eastco Industrial Safety Corp.(D)
	131	04	Rainfair, Inc.(M)
	131	04	Sawyer-Tower(M)
	131	05	Fyrepel Products Inc.(M)
	131	06	Eastco Industrial Safety Corp.(D)
	131	06	Rainfair, Inc.(M)
Product: Polyvinyl Chloride/Nylon/Polyvinyl Chloride			
	133	01	Edmont Div. Becton, Dickinson & Co.(M)
	133	01	Goodyear Rubber Products Corp.(S)
	133	01	Holland Safety Supply Co.(D)
	133	01	Industrial Products Co., Inc.(D)
	133	01	Industrial Safety and Security Co.(D)
	133	01	Interex Corp.(D)
	133	01	Masterman's(D)
	133	01	Plastex Protective Products, Inc.(M)
	133	01	Protech Safety Equipment Inc.(D)
	133	01	Safeco Inc.(D)
	133	01	Standard Glove & Safety Equip. Corp.(D)
	133	01	Stauffer Manufacturing Company(M)
	133	01	Superior Surgical Mfg. Co., Inc.(M)
	133	01	H. Texier Glove Company Inc.(D)
	133	02	Superior Surgical Mfg. Co., Inc.(M)
	133	03	Edmont Div. Becton, Dickinson & Co.(M)
	133	03	Goodyear Rubber Products Corp.(S)
	133	03	Holland Safety Supply Co.(D)
	133	03	Industrial Products Co., Inc.(D)
	133	03	Industrial Safety and Security Co.(D)
	133	03	Interex Corp.(D)
	133	03	Masterman's(D)
	133	03	Protech Safety Equipment Inc.(D)
	133	03	Standard Glove & Safety Equip. Corp.(D)
	133	03	Stauffer Manufacturing Company(M)
	133	03	H. Texier Glove Company Inc.(D)
	133	04	Edmont Div. Becton, Dickinson & Co.(M)
	133	04	Goodyear Rubber Products Corp.(S)
	133	04	Holland Safety Supply Co.(D)
	133	04	Industrial Products Co., Inc.(D)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
	Product:	Polyvinyl Chloride/Nylon/Polyvinyl Chloride (cont.)	
	133	04	Industrial Safety and Security Co.(D)
	133	04	Interex Corp.(D)
	133	04	Masterman's(D)
	133	04	Plastex Protective Products, Inc.(M)
	133	04	Protech Safety Equipment Inc.(D)
	133	04	Safeco Inc.(D)
	133	04	Standard Glove & Safety Equip. Corp.(D)
	133	04	Stauffer Manufacturing Company(M)
	133	04	H. Texier Glove Company Inc.(D)
	133	05	Goodall Rubber Company(M)
	133	05	National Draeger, Inc.(M)
	133	05	Trelleborg, Inc.(M)
	133	06	Edmont Div. Becton, Dickinson & Co.(M)
	133	06	Goodyear Rubber Products Corp.(S)
	133	06	Holland Safety Supply Co.(D)
	133	06	Industrial Products Co., Inc.(D)
	133	06	Industrial Safety and Security Co.(D)
	133	06	Interex Corp.(D)
	133	06	Masterman's(D)
	133	06	Plastex Protective Products, Inc.(M)
	133	06	Protech Safety Equipment Inc.(D)
	133	06	Safeco Inc.(D)
	133	06	Standard Glove & Safety Equip. Corp.(D)
	133	06	Stauffer Manufacturing Company(M)
	133	06	H. Texier Glove Company Inc.(D)
	Product:	Polyvinyl Chloride/Polyester	
	144	03	Steel Grip Safety Apparel Co., Inc.(M)
SARANEX(032)			
	Product:	PE/Polyvinylidenechloride/PE/Tyvek	
	061	01	Magid Glove and Safety Mfg. Co.(M)
	061	01	Mar-Mac Manufacturing Co., Inc.(M)
	061	01	Protech Safety Equipment Inc.(D)
	061	01	Rockford Medical & Safety Co.(D)
	061	02	Charkate(M)
	061	02	Daffin Disposables, Inc.(M)
	061	02	Durafab Disposables, Inc.(M)
	061	02	Industrial Products Co., Inc.(D)
	061	02	Industrial Safety and Security Co.(D)
	061	02	Kappler Disposables, Inc.(M)
	061	02	Magid Glove and Safety Mfg. Co.(M)
	061	02	Mar-Mac Manufacturing Co., Inc.(M)
	061	02	Melco, Inc.(M)
	061	02	Protech Safety Equipment Inc.(D)
	061	03	Charkate(M)
	061	03	Mar-Mac Manufacturing Co., Inc.(M)

Resistant Material	Code	Type	Vendor Name
	Product:	PE/Polyvinylidenechloride/PE/Tyvek (cont.)	
	061	03	Protech Safety Equipment Inc.(D)
	061	04	Magid Glove and Safety Mfg. Co.(M)
	061	04	Mar-Mac Manufacturing Co., Inc.(M)
	061	04	Protech Safety Equipment Inc.(D)
	061	04	Rockford Medical & Safety Co.(D)
	061	05	Charkate(M)
	061	05	Daffin Disposables, Inc.(M)
	061	05	Durafab Disposables, Inc.(M)
	061	05	Hub Safety Equipment, Inc.(D)
	061	05	Leonard Safety Epuipment, Inc.(D)
	061	05	Mar-Mac Manufacturing Co., Inc.(M)
	061	05	Mar-Mac Manufacturing Co., Inc.(M)
	061	05	Mine Safety Appliances Co.(M)
	061	05	Rockford Medical & Safety Co.(D)
	061	06	Industrial Products Co., Inc.(D)
	061	06	Industrial Safety and Security Co.(D)
	061	06	Kappler Disposables, Inc.(M)
	061	06	Protech Safety Equipment Inc.(D)
	061	07	Daffin Disposables, Inc.(M)
	061	07	Industrial Products Co., Inc.(D)
	061	07	Industrial Safety and Security Co.(D)
	061	07	Kappler Disposables, Inc.(M)
	061	07	Mar-Mac Manufacturing Co., Inc.(M)
SBR(033)			
	Product:	Styrenebutadiene Rubber/Fabric	
	063	01	Eastco Industrial Safety Corp.(D)
	063	01	Rainfair, Inc.(M)
	063	01	Safety Engineering & Supply Co.(D)
	063	01	Tingley Rubber Corp.(M)
	063	03	Protexall Company(M)
	063	04	Eastco Industrial Safety Corp.(D)
	063	04	Rainfair, Inc.(M)
	063	04	Safety Engineering & Supply Co.(D)
	063	04	Tingley Rubber Corp.(M)
	063	06	Eastco Industrial Safety Corp.(D)
	063	06	Rainfair, Inc.(M)
SBR/NEOPRENE(047)			
	Product:	Styrenebutadiene/Cotton/Chloroprene	
	149	03	Steel Grip Safety Apparel Co., Inc.(M)
SILVER SHIELD(042)			
	Product:	Silver Shield (North Product), Glove	
	122	00	Arbill Inc.(D)
	122	00	North Hand Protection(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
TEFLON(014)			
	Product: FEP Glove		
	036	00	Clean Room Products, Inc.(M)
	Product: TFE/Nomex/TFE		
	069	05	Chemical Fabrics Corporation(M)
	Product: TFE/Fiberglass/TFE		
	146	05	Chemical Fabrics Corporation(M)
VITON(034)			
	Product: Fluoroelastomer Glove, Solvent Dipped, Unsupported		
	009	00	Direct Safety Company(D)
	009	00	Hub Safety Equipment, Inc.(D)
	009	00	Latex Glove Co., Inc(M)
	009	00	Mine Safety Appliances Co.(M)
	009	00	North Hand Protection(M)
	009	00	Protech Safety Equipment Inc.(D)
	009	00	Safeco Inc.(D)
	Product: Fluoroelastomer, Sheet		
	032	01	Mine Safety Appliances Co.(M)
	032	04	Mine Safety Appliances Co.(M)
	032	05	Andover Industries, Inc.(M)
	Product: Fluoroelastomer/Fabric/Fluoroelastomer		
	129	05	Fyrepel Products Inc.(M)
	Product: Fluoroelastomer/Polyester/Fluoroelastomer		
	143	03	Steel Grip Safety Apparel Co., Inc.(M)
	143	04	Superior Surgical Mfg. Co., Inc.(M)
VITON/BUTYL(035)			
	Product: Fluoroelastomer/Butyl/Nylon/Butyl		
	100	02	Trelleborg, Inc.(M)
	100	05	Goodall Rubber Company(M)
	100	05	Trelleborg, Inc.(M)

PRODUCT VENDORS BY RESISTANT MATERIAL

Resistant Material	Code	Type	Vendor Name
VITON/CHLOROBUTYL(036)			
Product: Fluoroelastomer/Nomex/Chlorobutyl			
	152	05	Andover Industries, Inc.(M)
VITON/NEOPRENE(011)			
Product: Fluoroelastomer/Nylon/Chloroprene			
	111	05	Mine Safety Appliances Co.(M)
	111	05	National Draeger, Inc.(M)

APPENDIX D

VENDOR DIRECTORY

VENDOR DIRECTORY

Ackwell
Address not available.

Acme Mills Company
5151 Loraine
Detroit, MI 48208
313/894-7110

Alliance Supply, Inc.
3 Bridge Street
Newton, MA 02158
617/244-2900

Allied Glove & Safety Products Corp.
325 E. Chicago Street
Milwaukee, WI 53202
414/272-0302

American Scientific Products
Division of American Hospital Supply
1430 Waukegan Road
McGaw Park, IL 60085
800/842-1208

Andover Industries, Inc.
15 Union Street
Lawrence, MA 01840
617/794-1793

Angelica Uniform Group
700 Rosedale Avenue
St. Louis, MO 63112
800/325-8032

Ansell Industrial Products
Industrial Road
P.O. Box 1252
Dothan, AL 36302
800/633-0909

Aramsco

Thorofare, NJ 08086
800/257-8146

Arbill Inc.
2207 W. Glenwood Avenue
Philadelphia, PA 19132
215/228-4011

Armin Corporation
One Penn Plaza
New York, NY 10119
212/736-2201

Arrowhead Products
4411 Katella Avenue
Los Alamitos, CA 90720
714/828-7770

Bard Parker
Address not available.

Barry Manufacturing Co. Ltd.
920 Lakeshore Road East
Mississauga, ON CAN
416/274-3691

Bel-Art Products
Industrial Road
Pequannock, NJ 07440
201/694-0500

Best Manufacturing Company
Edison Street
Menlo, GA 30731
800/241-0323

Body-Guard
Division of Lion Uniform Inc.
P.O. Box 14343
Dayton, OH 45414
714/540-8010

Boss Manufacturing Company
221 W. First Street
Kewanee, IL 61443
309/852-2131

Broner Glove Co.
359 Robbins Drive
Troy, MI 48084
800/521-1318

E.D. Bullard Company
2680 Bridgeway
Sausalito, CA 94965
415/332-0410

California Safety
Address not available.

Cesco Safety Products
1535 Walnut Steet
Kansas City, MO 64108
816-842-8500

Charkate
130 West 10th Street
Huntington Station, NY 11746
516/427-1802

Chemical Fabrics Corporation
Daniel Webster Highway
P.O. Box 1137
Merrimack, NH 03054
603/424-9000

Clean Room Products, Inc.
1800 Ocean Avenue
Ronkonkoma, NY 11779
516/588-7000

Cofish International, Inc.
P.O. Box 13
East Haddam, CT 06423
203/873-9500

Colonial Glove & Garment Inc.
1800 Ocean Avenue
Ronkonkoma, NY 11779
516/588-6900

Comasec
Drawer 10
Niblick Road
Enfield, CT 06082
203/741-2207

Converse Inc.
55 Fordham Road
Wilmington, MA 01887
617/657-5500

Coyne Safety Equipment, Inc.
725 Route 113
P.O. Box 390
Sellersville, PA 18960
215/723-0926

Daffin Disposables, Inc.
One Daffin Square
Secretary, MD 21664
301/943-8777

Dayton Flexible Products
Division of Baxter Travenol
2210 Arbor Boulevard
Dayton, OH 45439
513/298-7511

Defense Apparel
247 Addison Road
Windsor, CT 06095
800/243-3847

Direct Safety Company
7815 South 46th Street
Phoenix, AZ 85044
800/528-7405

Disposables Inc.
14 Locust Street
Manhasset, NY 11030
516/627-4554

VENDOR DIRECTORY

Dorsey Safety Products Co.
P.O. Box 23465
Chattanooga, TN 37422
615/894-7233

Dow Chemical Company
2020-T Dow Center
Midland, MI 48640
517/636-1000

E.I. du Pont de Nemours & Co., Inc.
Spunbonded Products Division
Centre Road Building
Wilmington, DE 19898
302/999-3095

E.I. du Pont de Nemours & Company
Business and Marketing Service
Elastomers
Wilmington, DE 19898
800/441-7111

Durafab Disposables, Inc.
Box 658
Cleburne, TX 76031
817/645-8851

Eastco Industrial Safety Corp.
130 West 10th Street
Huntington Station, NY 11746
516/427-1802

Edmont Div. Becton, Dickinson & Co.
1300 Walnut Street
Coshocton, OH 43812
614/622-4201

Elliott Glove Company, Inc.
504 Pecor Street
Oconto, WI 54153
414/834-5622

Encon Manufacturing Co.
13333 Northwest Freeway
P.O. Box 3826
Houston, TX 77253
713/462-4723

Erista
Rex Gummiwarenfabric Gmbh
D-6102
Pfungstadt, FRG

Exxon Chemical Company
Polymers Group
A Division of Exxon Corporation
P.O. Box 3272
Houston, TX 77253
713/870-6546

Fairway Products
303 Arch Street
Hillsdale, MI 49242
517/439-9376

Falcon Industries, Inc.
401 Isom Road
San Antonio, TX 78216
512-344-3469

Fisher Scientific Company
711 Forbes Avenue
Pittsburg, PA 15219
412/562-8300

Frommelt Industries, Inc.
Safety Products Division
4343 Chavenelle Drive
P.O. Box 658
Dubuque, IA 52004
800/553-5560

Fyrepel Products Inc.
Box 518
Newark, OH 43055
614/344-0391

General Scientific Safety Equipment Company
1821 John F. Kennedy Boulevard
Philadelphia, PA 19103
215/564-6366

Glover Latex, Inc.
514 S. Rose Street
P.O. Box 167
Anaheim, CA 92805
714/535-8920

Goodall Rubber Company
P.O. Box 8237
Trenton, NJ 08650
609/587-4000

Goodyear Rubber Products Corp.
329 McCarter Highway
Newark, NJ 07114
201/242-5550

Granet
25 Loring Drive
P.O. Box 588
Framingham, MA 01701
617/875-3521

Greene Rubber Co., Inc.
160 Second Street
Cambridge, MA 02142
617/547-7655

Halprin Supply Co.
3804 S. Broadway Pl.
Los Angeles, CA 90037
213/232-3131

Handgards Inc.
901 Hawkins
P.O. Box 27018
El Paso, TX 79926
915/779-6606

Holcomb Safety Garment Co.
4925 W. Grand Avenue
Chicago, IL 60639
312/648-1778

Holland Safety Supply Co.
P.O. Box 645
208 Market Street
Lexington, NC 27292
800/222-8133

Hub Safety Equipment, Inc.
121 Liberty Street
P.O. Box 454
South Quincy, MA 02269
617-773-2487

Hy-Test Safety Shoes
Div. International Shoe Company
P.O. Box 14485
St. Louis, MO 63178
314/426-1675

ILC Dover
P.O. Box 266
Frederica, DE 19946
302/335-3911

IPESCo., Inc.
1903 Sharon Forest Drive
Charlotte, NC 28212
704/535-5550

Inco Safety Products Co.
Box 1733
Reading, PA 19603
215/376-6161

Industrial Products Co., Inc.
21 Cabot Blvd.
Langhorne, PA 19047
800/523-3944

Industrial Safety and Security Co.
1390 Newbrecht Road
Lima, OH 45801
800/537-9721

Interex Corp.
3 Strathmore Rd.
Natick, MA 01760
800/225-5910

Intermarket Latex, Inc.
213 Hanna Building
Cleveland, OH 44115
800/824-7419

International Playtex, Inc.
Glove Division
700 Fairfield Ave.
Stamford, CT 06902
203/356-8000

Iron Age Protective Company
2406 Woodmere Drive
Pittsburgh, PA 15205
412/922-7000

Jomac Products Inc.
863 Easton Road
Warrington, PA 18976
215/343-0800

Jones Safety Supply, Inc.
719 Gainsboro Road, NW
P.O. Box 111
Roanoke, VA 24002
703/982-8444

Jordan David Safety Products
P.O. Box 400
Warrington, PA 18976
215/343-6470

KID AB
S-71100
Lindesberg, Sweden

Kappler Disposables, Inc.
P.O. Box 218
Guntersville, AL 35976
800/633-2410

Keller Glove Mfg. Co.
Route 611
Plumsteadville, PA 18949
215/343-1135

Keystone Protection Corp.
520 E. Luzerne Street
Philadelphia, PA 19124
215/426-3600

Kimberly-Clark Corp.
Industrial Garments Fabrics
1400 Holcomb Bridge Road
Roswell, GA 30076
404/587-8000

LRC Safety Products Co.
Rt. 46 West
Little Falls, NJ 07424
201/256-4100

La Crosse Footwear, Inc.
P.O. Box 1328
La Crosse, WI 54602
608/782-3020

Lab Safety Supply Company
Div. Science Related Materials, Inc.
3430 North Palmer Drive
Janesville, WA 53547
608/754-2345

Latex Glove Co., Inc
318 Huehl Road
Northbrook, IL 60062
800/323-8393

Lehigh Safety Shoe Co.
Division of Endicott Johnson
1100 E. Main Street
Endicott, NY 13760
607/754-7980

Leonard Safety Epuipment, Inc.
253 Waterman Ave.
P.O. Box 4344
E. Providence, RI 02914
800/556-7170

Lion Uniform, Inc.
2735 Kearns Avenue
Dayton, OH 45414
513/278-6531

Magid Glove and Safety Mfg. Co.
2060 N. Kolmar Ave.
Chicago, IL 60639
312/384-2070

Major Safety Service, Inc.
4500 Patent Rd.
Norfolk, VA 23502
800/446-8274

Mar-Mac Manufacturing Co., Inc.
P.O. Box 278
McBee, SC 29101
803/335-8211

Marathon Rubber
510 Sherman Street
Wausau, WI 54401
715/845-6255

Masterman's
Auburn Industrial Park
P.O. Box 224
Auburn, MA 01501
617/755-7861

Melco, Inc.
6603 Governor Printz Blvd.
Wilmington, DE 19809
800/441-9749

Memphis Glove Company
Division of Shelby Group, Inc.
P.O. Box 171814
Memphis, TN 38187
901/795-0672

Miller Products Co., Inc.
29 Warren Street
New York, NY 10007
212-267-5334

Mine Safety Appliances Co.
608 Penn Center Blvd.
Pittsburgh, PA 15235
800/672-2222

Monte Glove Company
Monte Lane
Maben, MI 39750
601/263-5353

National Draeger, Inc.
101 Technology Drive
P.O. Box 120
Pittsburgh, PA 15230
412/787-8383

National Safety Wear, Inc.
18 East Main St.
Malone, NY 12953
518/483-7246

Neese Industries Inc.
P.O. Box 628
Gonzales, LA 70737
800/535-8042

Nolato
Address not available.

North Hand Protection
A Division of Siebe North, Inc.
4090 Azalea Drive
P.O. Box 70729
Charleston, SC 29405
803/554-0660

OKI Supply Co.
7584 Reinhold Drive
Cincinnati, OH 45237
513/761-9811

Oak Medical Supply Co.
Subsidiary of The Oak Rubber Company
219 S. Sycamore Street
Ravenna, OH 44266
216-296-3416

Oak Technical, Inc.
218 Sycamore Street
Ravenna, OH 44266
216/296-3416

PPG Industries, Inc.
Optical Products, Chemical
One PPG Place
Pittsburgh, PA 15272
412/434-3751

Panelgraphic Corporation
10 Henderson Drive
W. Caldwell, NJ 07006
800/222-0618

Pendergast Safety Equipment Co.
6900 Tulip St.
Philadelphia, PA 19135
215/332-1663

Pharmaseal Laboratories Inc.
1015 Grandview Avenue
Glendale, CA 91201
213/240-8900

Pioneer Industrial Products Co.
512 East Tiffin Street
Willard, OH 44890
419/933-2211

Plastex Protective Products, Inc.
9 Grand Street
P.O. Box 57
Garfield, NJ 07026
201/779-4946

Plastimayd Corp.
2204 S.E. Seventh Avenue
P.O. Box 14217
Portland, OR 97214
503/232-5101

Protech Safety Equipment Inc.
P.O. Box 455
Linden, NJ 07036
201/862-1550

Protexall Company
P.O. Box 307
Green Lake, WI 54941
414/294-6511

Pulmosan Safety Equipment Corp.
30-48 Linden Place
Flushing, NY 11354
212/939-3200

Rainfair, Inc.
P.O. Box 1647
Racine, WI 53401
800/558-5990

Ranger
Division of Endicott Johnson
1100 E. Main St.
Endicott, NY 13760
607/757-4260

Record Industrial Co.
1020 Eighth Avenue
P.O. Box 407
King of Prussia, PA 19406
215/337-2500

Renco Corp.
2060 Fairfax Avenue
Cherry Hill, NJ 08003
609/424-5755

Rich Industries
Address not available.

Robar Protective Products
2213 W. Glenwood Avenue
Philadelphia, PA 19132
800/523-5367

Rockford Medical & Safety Co.
4620 Hydraulic Rd.
P.O. Box 5166
Rockford, IL 61125
815/874-7891

Ronco Textile Products, Inc.
1405 East Lake Avenue
Peoria Heights, IL 61614
309/685-7266

SGL Homalite Industries
P.O. 3049
Wilmington, DL 19804
302/652-3686

Safeco Inc.
337 E. Center Street
P.O. Box 28
Kingsport, TN 37660
615/246-3552

Safety Engineering & Supply Co.
P.O. Box 147
Deer Park, TX 77536
713/476-9118

Safety First Industries
4900 Campbell Road
Willoughby, OH 44094
216/946-1880

The Sager Corporation
65 E. Palatine Road
Prospect Heights, IL 60070
312/541-1361

W.H. Salisbury & Co.
Box 1060
7520 N. Long Avenue
Skokie, IL 60077
312/679-6700

Sawyer-Tower
Division of Lion Uniform
2735 Kerns Avenue
Dayton, OH 45414

Seiberling
Address not available.

Shelby-Wolverine Glove Company
P.O. Box 8735
Grand Rapids, MI 49518
616/698-7220

Singer Safety Co.
3800 N. Milwaukee Ave.
Chicago, IL 60641
312/286-1000

VENDOR DIRECTORY

Standard Glove & Safety Equip. Corp.
34300 Lakeland Boulevard
Eastlake, OH 44094
216-951-7440

Standard Safety Equipment Co.
P.O. Box 188
Palatine, IL 60078
312/359-1400

Stauffer Manufacturing Company
P.O. Box 45
6th Street
Red Hill, PA 18076
215/679-4446

Steel Grip Safety Apparel Co., Inc.
700 Garfield Street
Danville, IL 61832
217/442-6240

Steele & Associates, Inc.
P.O. Box 20368
Seattle, WA 98102
206/324-9445

Superior Surgical Mfg. Co., Inc.
Superior Surgical Park
Seminole Boulevard at 100th Terrace
Seminole, FL 33542
813/397-9611

Surety-Sure Seal
Address not available.

VENDOR DIRECTORY

H. Texier Glove Company Inc.
Highway 22 at Mountain Avenue
North Plainfield, NJ 07061
201/757-0616

3M Company
3M Center
Bldg. 220-7W
St. Paul, MN 55144
612/733-6234

Tingley Rubber Corp.
P.O. Box 100
South Plainfield, NJ 07080
201/757-7474

The Tracies Co.
102 Cabot St.
Holyoke, MA 01040
413/533-7141

Trelleborg, Inc.
30700 Solon Industrial Parkway
Solon, OH 44139
216/248-8600

United States Plastic Corp.
1390 Neubrecht Road
Lima, OH 45801
419/228-2242

United States Safety Service Co.
1535 Walnut St.
P.O. Box 1237
Kansas City, MO 64141
816/842-8500

Vidaro Corp.
333-T Martinel Drive
P.O. Box 535-T
Kent, OH 44240
216/673-7413

Vinylprodukter
S-261
23 Landskrona, Sweden

Wheeler Protective Apparel, Inc.
4330 W. Belmont Ave.
Chicago, IL 60641
312/685-5551

Willson Safety Products
P.O. Box 622
Reading, PA 19603
215/376--6161

APPENDIX E

PRODUCT DESCRIPTION CODE

PRODUCT DESCRIPTION CODES AND RESISTANT MATERIALS

"/"	INDICATES A LAYERED (EITHER COATED OR LAMINATED) MATERIAL STRUCTURE. LAYERS ARE DESCRIBED BEGINING WITH THE EXTERIOR SURFACE.
"+"	INDICATES A POLYMER BLEND.
SUPPORTED:	BARRIER MATERIAL IS COATED ONTO A CLOTH GLOVE.
UNSUPPORTED:	BARRIER MATERIAL IS PRESENT AS A FREE-STANDING OR FLOCKED MEMBRANE.
NOTE:	FABRICS SUCH AS DISPOSAGUARD, DURAGUARD, GOR-TEX, SAFE-GUARD, SONTARA, AND TYVEK ARE NOT COATED AND, THEREFORE, ARE PERMEABLE TO AIR AND MORE COMFORTABLE TO WEAR. THEY ARE PRIMARILY RECOMMENDED AS BARRIERS TO PARTICULATES. CAUTION IS RECOMMENDED WHEN USING THESE FABRICS AS SPLASH PROTECTION SINCE THEY ARE RAPIDLY PENETRATED BY GASES AND MANY ORGANIC LIQUIDS.

Product Description Codes and Resistant Materials
(in numerical order -- alphabetical listing follows)

Product Code	Resistant Material	Product Description
001	NATURAL RUBBER	Natural Rubber Latex Glove, Supported
002	NEOPRENE	Chloroprene Latex Glove, Supported
003	PVC	Polyvinyl Chloride Glove, Unsupported
004	PV ALCOHOL	Polyvinyl Alcohol Glove, Supported
005	NITRILE	Nitrile Rubber Latex Glove, Supported
006	PE	Polyethylene Glove, Unsupported
007	PVC	Polyvinyl Chloride Glove, Supported
008	NEOP/NAT RUBBER	Cloroprene/Natural Rubber Latex Glove, Unsupported
009	VITON	Fluoroelastomer Glove, Solvent Dipped, Unsupported
010	NEOPRENE	Chloroprene Milled/Chloroprene Latex Glove, Unsupported
011	NEOPRENE	Chloroprene Rubber Latex (Baypren) Glove, Unsupported
012	BUTYL	Butyl Rubber Latex Glove, Unsupported
013	BUTYL	Butyl Rubber Latex Glove, Supported
014	BUTYL	Butyl Rubber Glove, Solvent Dipped, Unsupported
015	NATURAL RUBBER	Natural Rubber Glove, Solvent Dipped, Unsupported
016	BUTYL/NAT RUBBER	Butyl/Natural Rubber Latex Glove, Supported
017	NATURAL RUBBER	Natural Rubber Latex Glove, Unsupported
018	NEOPRENE	Chloroprene Rubber Latex Glove, Unsupported
019	NITRILE	Nitrile Rubber Latex Glove, Unsupported
020	NITRILE	Nitrile Rubber Glove, Solvent Dipped, Unsupported
022	VITON/NEOPRENE	Fluoroelastomer/Chloroprene Glove, Solv Dipped, Unsupp
023	NAT+NEOP+NBR	Natural Rubber+Chloroprene+Nitrile Glove, Unsupported
025	NONWOVEN FABRIC	Sontara
026	NEOP+NAT RUBBER	Chloroprene+Natural Rubber Latex Glove, Unsupported
027	POLYURETHANE	Polyurethane Rubber, Unsupported
028	PVC	Polyvinyl Chloride/Tyvek
029	PTX	Polymethylpentane, Face Shield
030	PVC	Polyvinyl Chloride, Face Shield
031	NEOPRENE	Chloroprene Rubber, Sheet
032	VITON	Fluoroelastomer, Sheet
033	NITRILE	Nitrile Rubber, Sheet
034	BUTYL	Butyl Rubber, Sheet
035	PV ALCOHOL	Polyvinyl Alcohol, Sheet
036	TEFLON	FEP Glove
040	POLYURETHANE	Polyurethane Rubber/Polyester
041	PE	Polyethylene, High Density, Film
042	PE	Polyethylene, Medium Density, Film
044	TEFLON	FEP Glove (Crumpled)
045	NATURAL RUBBER	Natural Rubber, Sheet
046	BUTYL/NEOPRENE	Butyl/Chloroprene Rubber, Boots
047	SBR	Styrenebutadiene Rubber Latex Glove
048	PE	Polyethylene, Low Density, Film
049	PVC	Polyvinyl Chloride, Sheet
050	POLYURETHANE	Polyurethane Rubber/Nylon
051	NEOPRENE	Chloroprene Rubber/Polyester
052	CHLOROBUTYL	Chlorobutyl Rubber/Nomex
053	PVC	Polyvinyl Chloride/Fabric
054	PVC	Polyvinyl Chloride, Film
055	TEFLON	FEP/Fiberglass
056	PE	Polyethylene, Density Unknown, Film
057	NITRILE+PVC	Nitrile+PVC Glove, Supported

Product Description Codes and Resistant Materials
(in numerical order -- alphabetical listing follows)

Product Code	Resistant Material	Product Description
058	NITRILE+PVC	Nitrile+PVC/Fabric
059	NITRILE	Nitrile Rubber/Polyester
060	CPE	Chlorinated Polyethylene
061	SARANEX	PE/Polyvinylidenechloride/PE/Tyvek
062	TEFLON	FEP/Nylon
063	SBR	Styrenebutadiene Rubber/Fabric
064	BUTYL	Butyl Rubber/Nylon
065	NEOPRENE+SBR RUBBER	Chloroprene (35%)+SBR(65%)/Nylon--Tufflon
066	NEOPRENE+SBR RUBBER	Chloroprene(15%)+SBR(85%)/Cotton--Tuffprene
067	TEFLON	TFE/Nomex
068	TEFLON	FEP/Nomex
069	TEFLON	TFE/Nomex/TFE
070	CPE	Chlorinated Polyethylene/Nylon
071	NONWOVEN PE	Tyvek
072	TEFLON	TFE/Nomex/TFE Glove
073	TEFLON	FEP, Face Shield and Lens
074	EVA	Ethylene(86%) Vinyl Acetate(14%)/Polyester
075	PE	Polyethylene/Sontara
076	PE	Polyethylene/Tyvek
077	PVC	Polyvinyl Chloride/Nylon
078	NITRILE	Nitrile Rubber/Nylon
079	GORE-TEX	Microporous Teflon/Nomex
080	NATURAL RUBBER	Natural Rubber, Boots
081	NEOPRENE	Chloroprene Rubber, Boots
082	POLYURETHANE	Polyurethane Rubber, Boots
083	PVC	Polyvinyl Chloride, Boots
084	NITRILE	Nitrile Rubber, Boots
085	BUTYL	Butyl Rubber, Boots
086	NONWOVEN PP	Safeguard, Duraguard, Corovin
087	NATURAL RUBBER	Natural Rubber/Nylon
088	PVC	Polyvinyl Chloride/Rayon
089	NATURAL RUBBER	Natural Rubber/Cotton
090	VITON	Fluoroelastomer/Fiberglass
091	PE	Polyethylene/Fabric
092	GORE-TEX	Microporous Teflon/Polyester
093	NEOPRENE	Chloroprene Rubber/Nylon
094	CELLULOSE PROPIONATE	Cellulose Propionate, Face Shield and Lens
095	CR 39	Cr 39, Lens and Face Shield
096	POLYESTER	Polyester, Face Shield and Lens
097	ACRYLIC	Acrylic, Face Shield and Lens
098	POLYCARBONATE	Polycarbonate, Lens and Face Shield
099	CELLULOSE ACETATE	Cellulose Acetate, Face Shield and Lens
100	VITON/BUTYL	Fluoroelastomer/Butyl/Nylon/Butyl
101	VITON/NITRILE	Fluoroelastomer/Nitrile Rubber Glove, Unsupported
102	PV ALCOHOL	Polyvinyl Alcohol Glove, Unsupported
103	EPDM/BUTYL	Ethylenepropylene/Butyl Rubber Glove, Unsupported
104	HYPALON/NEOPRENE	Chlorosulfonated Polyethylene/Chloroprene Glov,Unsupp
105	PE	Polyethylene/Polypropylene Nonwoven
106	PVC	Polyvinyl Chloride Glove, Kid 490, Supported
107	BUTYL	Butyl Rubber/Nomex
108	HYPALON	Chlorosulfonated Polyethylene Rubber Glove, Unsupp

Product Description Codes and Resistant Materials
(in numerical order -- alphabetical listing follows)

Product Code	Resistant Material	Product Description
109	PE/EVOH/PE	PE/Ethylene Vinyl Alcohol/PE Glove, Unsupported
110	BUTYL/NEOPRENE	Butyl/Polyester/Chloroprene Rubber
111	VITON/NEOPRENE	Fluoroelastomer/Nylon/Chloroprene
112	VITON/CHLOROBUTYL	Fluoroelastomer/Polyester/Chlorobutyl
113	ECO/BUTYL	Epichlorohydrin/Butyl Rub Glove, Solv Dipped, Unsupp
114	VITON/BUTYL	Fluoroelastomer/Butyl Glove, Solvent Dipped, Unsupported
115	BUTYL/NEOPRENE	Butyl/Chloroprene Rubber Glove, Supported
116	BUTYL/NEOPRENE	Butyl/Chloroprene Rubber Glove, Unsupported
117	HYPALON	Hypalon/Polyester/Hypalon
118	BUTYL	Butyl/Polyester/Butyl Rubber
119	HYPALON/NEOPRENE	Hypalon/Polyester/Chloroprene
122	SILVER SHIELD	Silver Shield (North Product), Glove
124	PV ACETATE	Polyvinyl Acetate, Sheet
125	NEOPRENE	Chloroprene Milled/Chloroprene Latex Glove, Supported
126	NEOP+NAT RUBBER	Chloroprene+Nat Rub/Chloroprene+Nat Rub, Unsupported
127	NEOPRENE+PVC	Chloroprene+PVC/Polyester
128	ETHYLENE-METHYL ACRL	Ethylene-methyl Acrylate Glove
129	VITON	Fluoroelastomer/Fabric/Fluoroelastomer
130	BUTYL	Butyl/Fabric/Butyl
131	PVC	Polyvinyl Chloride/Fabric/Polyvinyl Chloride
132	NITRILE	Nitrile/Fabric
133	PVC	Polyvinyl Chloride/Nylon/Polyvinyl Chloride
134	PE	Polyethylene/Nylon
135	NONWOVEN PP	Polypropylene, Nonwoven
136	NATURAL RUBBER	Natural Rubber/Polyester
137	PE	Polyethylene/Polyester
138	NEOPRENE	Chloroprene Rubber/Fabric
139	NEOPRENE	Chloroprene/Fabric/Chloroprene
140	BUTYL	Butyl/Nylon/Butyl
141	NEOPRENE	Chloroprene Rubber/Kevlar
142	CHLOROBUTYL	Chlorobutyl/Nomex/Chlorobutyl
143	VITON	Fluoroelastomer/Polyester/Fluoroelastomer
144	PVC	Polyvinyl Chloride/Polyester
145	VITON	Fluoroelastomer/Dacron
146	TEFLON	TFE/Fiberglass/TFE
147	NITRILE	Nitrile/Fabric/Nitrile
148	NEOPRENE	Chloroprene/Cotton/Chloroprene
149	SBR/NEOPRENE	Styrenebutadiene/Cotton/Chloroprene
150	NITRILE+PVC	Nitrile+PVC Boot
152	NITRILE+PVC	Nitrile+PVC/Fabric/Nitrile+PVC
153	VITON/CHLOROBUTYL	Fluoroelastomer/Nomex/Chlorobutyl

Product Description Codes and Resistant Materials
(in alphabetical order of resistant material)

Product Code	Resistant Material	Product Description
097	ACRYLIC	Acrylic, Face Shield and Lens
012	BUTYL	Butyl Rubber Latex Glove, Unsupported
013	BUTYL	Butyl Rubber Latex Glove, Supported
014	BUTYL	Butyl Rubber Glove, Solvent Dipped, Unsupported
034	BUTYL	Butyl Rubber, Sheet
064	BUTYL	Butyl Rubber/Nylon
085	BUTYL	Butyl Rubber, Boots
107	BUTYL	Butyl Rubber/Nomex
118	BUTYL	Butyl/Polyester/Butyl Rubber
130	BUTYL	Butyl/Fabric/Butyl
140	BUTYL	Butyl/Nylon/Butyl
016	BUTYL/NAT RUBBER	Butyl/Natural Rubber Latex Glove, Supported
046	BUTYL/NEOPRENE	Butyl/Chloroprene Rubber, Boots
110	BUTYL/NEOPRENE	Butyl/Polyester/Chloroprene Rubber
115	BUTYL/NEOPRENE	Butyl/Chloroprene Rubber Glove, Supported
116	BUTYL/NEOPRENE	Butyl/Chloroprene Rubber Glove, Unsupported
099	CELLULOSE ACETATE	Cellulose Acetate, Face Shield and Lens
094	CELLULOSE PROPIONATE	Cellulose Propionate, Face Shield and Lens
052	CHLOROBUTYL	Chlorobutyl Rubber/Nomex
142	CHLOROBUTYL	Chlorobutyl/Nomex/Chlorobutyl
060	CPE	Chlorinated Polyethylene
070	CPE	Chlorinated Polyethylene/Nylon
095	CR 39	Cr 39, Lens and Face Shield
113	ECO/BUTYL	Epichlorohydrin/Butyl Rub Glove, Solv Dipped, Unsupp
103	EPDM/BUTYL	Ethylenepropylene/Butyl Rubber Glove, Unsupported
128	ETHYLENE-METHYL ACRL	Ethylene-methyl Acrylate Glove
074	EVA	Ethylene(86%) Vinyl Acetate(14%)/Polyester
079	GORE-TEX	Microporous Teflon/Nomex
092	GORE-TEX	Microporous Teflon/Polyester
108	HYPALON	Chlorosulfonated Polyethylene Rubber Glove, Unsupp
117	HYPALON	Hypalon/Polyester/Hypalon
104	HYPALON/NEOPRENE	Chlorosulfonated Polyethylene/Chloroprene Glov,Unsupp
119	HYPALON/NEOPRENE	Hypalon/Polyester/Chloroprene
023	NAT+NEOP+NBR	Natural Rubber+Chloroprene+Nitrile Glove, Unsupported
001	NATURAL RUBBER	Natural Rubber Latex Glove, Supported
015	NATURAL RUBBER	Natural Rubber Glove, Solvent Dipped, Unsupported
017	NATURAL RUBBER	Natural Rubber Latex Glove, Unsupported
045	NATURAL RUBBER	Natural Rubber, Sheet
080	NATURAL RUBBER	Natural Rubber, Boots
087	NATURAL RUBBER	Natural Rubber/Nylon
089	NATURAL RUBBER	Natural Rubber/Cotton
136	NATURAL RUBBER	Natural Rubber/Polyester
026	NEOP+NAT RUBBER	Chloroprene+Natural Rubber Latex Glove, Unsupported
126	NEOP+NAT RUBBER	Chloroprene+Nat Rub/Chloroprene+Nat Rub, Unsupported
008	NEOP/NAT RUBBER	Cloroprene/Natural Rubber Latex Glove, Unsupported
002	NEOPRENE	Chloroprene Latex Glove, Supported
010	NEOPRENE	Chloroprene Milled/Chloroprene Latex Glove, Unsupported
011	NEOPRENE	Chloroprene Rubber Latex (Baypren) Glove, Unsupported
018	NEOPRENE	Chloroprene Rubber Latex Glove, Unsupported
031	NEOPRENE	Chloroprene Rubber, Sheet
051	NEOPRENE	Chloroprene Rubber/Polyester

Product Description Codes and Resistant Materials
(in alphabetical order of resistant material)

Product Code	Resistant Material	Product Description
081	NEOPRENE	Chloroprene Rubber, Boots
093	NEOPRENE	Chloroprene Rubber/Nylon
125	NEOPRENE	Chloroprene Milled/Chloroprene Latex Glove, Supported
138	NEOPRENE	Chloroprene Rubber/Fabric
139	NEOPRENE	Chloroprene/Fabric/Chloroprene
141	NEOPRENE	Chloroprene Rubber/Kevlar
148	NEOPRENE	Chloroprene/Cotton/Chloroprene
127	NEOPRENE+PVC	Chloroprene+PVC/Polyester
065	NEOPRENE+SBR RUBBER	Chloroprene (35%)+SBR(65%)/Nylon--Tufflon
066	NEOPRENE+SBR RUBBER	Chloroprene(15%)+SBR(85%)/Cotton--Tuffprene
005	NITRILE	Nitrile Rubber Latex Glove, Supported
019	NITRILE	Nitrile Rubber Latex Glove, Unsupported
020	NITRILE	Nitrile Rubber Glove, Solvent Dipped, Unsupported
033	NITRILE	Nitrile Rubber, Sheet
059	NITRILE	Nitrile Rubber/Polyester
078	NITRILE	Nitrile Rubber/Nylon
084	NITRILE	Nitrile Rubber, Boots
132	NITRILE	Nitrile/Fabric
147	NITRILE	Nitrile/Fabric/Nitrile
057	NITRILE+PVC	Nitrile+PVC Glove, Supported
058	NITRILE+PVC	Nitrile+PVC/Fabric
150	NITRILE+PVC	Nitrile+PVC Boot
152	NITRILE+PVC	Nitrile+PVC/Fabric/Nitrile+PVC
025	NONWOVEN FABRIC	Sontara
071	NONWOVEN PE	Tyvek
086	NONWOVEN PP	Safeguard, Duraguard, Corovin
135	NONWOVEN PP	Polypropylene, Nonwoven
006	PE	Polyethylene Glove, Unsupported
041	PE	Polyethylene, High Density, Film
042	PE	Polyethylene, Medium Density, Film
048	PE	Polyethylene, Low Density, Film
056	PE	Polyethylene, Density Unknown, Film
075	PE	Polyethylene/Sontara
076	PE	Polyethylene/Tyvek
091	PE	Polyethylene/Fabric
105	PE	Polyethylene/Polypropylene Nonwoven
134	PE	Polyethylene/Nylon
137	PE	Polyethylene/Polyester
109	PE/EVOH/PE	PE/Ethylene Vinyl Alcohol/PE Glove, Unsupported
098	POLYCARBONATE	Polycarbonate, Lens and Face Shield
096	POLYESTER	Polyester, Face Shield and Lens
027	POLYURETHANE	Polyurethane Rubber, Unsupported
040	POLYURETHANE	Polyurethane Rubber/Polyester
050	POLYURETHANE	Polyurethane Rubber/Nylon
082	POLYURETHANE	Polyurethane Rubber, Boots
029	PTX	Polymethylpentane, Face Shield
124	PV ACETATE	Polyvinyl Acetate, Sheet
004	PV ALCOHOL	Polyvinyl Alcohol Glove, Supported
035	PV ALCOHOL	Polyvinyl Alcohol, Sheet
102	PV ALCOHOL	Polyvinyl Alcohol Glove, Unsupported
003	PVC	Polyvinyl Chloride Glove, Unsupported

Product Description Codes and Resistant Materials
(in alphabetical order of resistant material)

Product Code	Resistant Material	Product Description
007	PVC	Polyvinyl Chloride Glove, Supported
028	PVC	Polyvinyl Chloride/Tyvek
030	PVC	Polyvinyl Chloride, Face Shield
049	PVC	Polyvinyl Chloride, Sheet
053	PVC	Polyvinyl Chloride/Fabric
054	PVC	Polyvinyl Chloride, Film
077	PVC	Polyvinyl Chloride/Nylon
083	PVC	Polyvinyl Chloride, Boots
088	PVC	Polyvinyl Chloride/Rayon
106	PVC	Polyvinyl Chloride Glove, Kid 490, Supported
131	PVC	Polyvinyl Chloride/Fabric/Polyvinyl Chloride
133	PVC	Polyvinyl Chloride/Nylon/Polyvinyl Chloride
144	PVC	Polyvinyl Chloride/Polyester
061	SARANEX	PE/Polyvinylidenechloride/PE/Tyvek
047	SBR	Styrenebutadiene Rubber Latex Glove
063	SBR	Styrenebutadiene Rubber/Fabric
149	SBR/NEOPRENE	Styrenebutadiene/Cotton/Chloroprene
122	SILVER SHIELD	Silver Shield (North Product), Glove
036	TEFLON	FEP Glove
044	TEFLON	FEP Glove (Crumpled)
055	TEFLON	FEP/Fiberglass
062	TEFLON	FEP/Nylon
067	TEFLON	TFE/Nomex
068	TEFLON	FEP/Nomex
069	TEFLON	TFE/Nomex/TFE
072	TEFLON	TFE/Nomex/TFE Glove
073	TEFLON	FEP, Face Shield and Lens
146	TEFLON	TFE/Fiberglass/TFE
009	VITON	Fluoroelastomer Glove, Solvent Dipped, Unsupported
032	VITON	Fluoroelastomer, Sheet
090	VITON	Fluoroelastomer/Fiberglass
129	VITON	Fluoroelastomer/Fabric/Fluoroelastomer
143	VITON	Fluoroelastomer/Polyester/Fluoroelastomer
145	VITON	Fluoroelastomer/Dacron
100	VITON/BUTYL	Fluoroelastomer/Butyl/Nylon/Butyl
114	VITON/BUTYL	Fluoroelastomer/Butyl Glove, Solvent Dipped, Unsupported
112	VITON/CHLOROBUTYL	Fluoroelastomer/Polyester/Chlorobutyl
153	VITON/CHLOROBUTYL	Fluoroelastomer/Nomex/Chlorobutyl
022	VITON/NEOPRENE	Fluoroelastomer/Chloroprene Glove, Solv Dipped, Unsupp
111	VITON/NEOPRENE	Fluoroelastomer/Nylon/Chloroprene
101	VITON/NITRILE	Fluoroelastomer/Nitrile Rubber Glove, Unsupported

APPENDIX F

CLOTHING CLASSIFICATION CODE

CLOTHING TYPE CODE

(Number corresponds to type shown in Appendix C.)

Coat, Jacket	01
Coveralls	02
Apron	03
Pants, Bib Overall	04
Full-body Encapsulating Suit	05
Hood	06
Shoe Cover	07
Boot	08
Face Shield	09
Glove	00

APPENDIX G

DATA SHEETS FOR ENCAPSULATING ENSEMBLES

(For definitions of terms used in this appendix, see Chapter 5 and Appendix A)

MATERIAL
Butyl/Nylon/Butyl

PROTECTION LEVEL
EPA: A (with emergency egress unit.)

STYLE
LL-100 — Toxicological Butyl
THICKNESS: 14 mils
MATERIAL WGT: 12 oz/sq yd
ENSEMBLE WGT: No data
SIZES: No data

VENDOR
Andover Industries Inc.
15 Union Street
Lawrence, MA 01840
(617) 794-1792

GARMENT SEAM
Stitched, strapped with butyl.

CLOSURE
Pressure sealing zipper (Talon, Inc.). Teeth and slider: 67% copper, 12% nickel, 11% zinc.
LOCATION: Front. **LENGTH:** 48 inches.
CLOSURE/SUIT SEAM: Same as garment.
SPLASH COVER: Yes.

GLOVES
TYPE: Integral gloves (optional).
MATERIAL: Butyl.
INTERFACE: Same as garment seam.

TYPE: Detachable gloves (optional).
MATERIAL: Butyl.
INTERFACE: Inserts in glove and sleeve create compression seal or support ring in sleeve with glove clamp.

BOOTS
TYPE: Integral booties or overboots.
MATERIAL: Butyl/nylon/butyl.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR
TYPE: Integral (optional).
MATERIAL: Polycarbonate with 2.5 mil FEP or 30 mil PVC splash visor.
INTERFACE: No data.

TYPE: Detachable (optional).
MATERIAL: Polycarbonate/triacetate.
INTERFACE: Chloroprene gasket.

EXHAUST VALVES
NUMBER: 4. **TYPE:** Flapper valve.
MATERIALS: No data.
LOCATION: Shoulder and leg areas.
CRACKING PRESSURE: 1/2-inch water.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
Umbilical feed. Hood accommodates face mask, suit accommodates internal, emergency egress unit.

COOLING
Air distribution system (optional).

FITTINGS
AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Butyl/Nylon/Butyl

PROTECTION LEVEL
EPA: A (with emergency egress unit.)

STYLE
LL-100 — Chemical Butyl
THICKNESS: 15 mils
MATERIAL WGT: 11.5 oz/sq yd
ENSEMBLE WGT: No data
SIZES: No data

VENDOR
Andover Industries Inc.
15 Union Street
Lawrence, MA 01840
(617) 794-1792

GARMENT SEAM
Stitched, strapped with butyl.

CLOSURE
Pressure sealing zipper (Talon, Inc.). Teeth and slider: 67% copper, 12% nickel, 11% zinc.
LOCATION: Front. **LENGTH:** 48 inches.
CLOSURE/SUIT SEAM: Same as garment.
SPLASH COVER: Yes.

GLOVES
TYPE: Integral gloves (optional).
MATERIAL: Butyl.
INTERFACE: Same as garment seam.

TYPE: Detachable gloves (optional).
MATERIAL: Butyl.
INTERFACE: Inserts in glove and sleeve create compression seal or support ring in sleeve with glove clamp.

BOOTS
TYPE: Integral booties or overboots.
MATERIAL: Butyl/nylon/butyl.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR
TYPE: Integral (optional).
MATERIAL: Polycarbonate with 2.5 mil FEP or 30 mil PVC splash visor.
INTERFACE: No data.

TYPE: Detachable (optional).
MATERIAL: Polycarbonate/triacetate.
INTERFACE: Chloroprene gasket.

EXHAUST VALVES
NUMBER: 4. **TYPE:** Flapper valve.
MATERIALS: No data.
LOCATION: Shoulder and leg areas.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
Umbilical feed. Hood accommodates face mask, suit accommodates internal, emergency egress unit.

COOLING
Air distribution system (optional).

FITTINGS
AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Butyl/Nylon/Butyl

PROTECTION LEVEL
EPA: A

STYLE
305 B/BA
THICKNESS: 14 mils
MATERIAL WGT: 14 oz/sq yd
ENSEMBLE WGT: 12 lbs
SIZES: S, M, L, XL
(for heights 5′4″ - 6′5″)

VENDOR
Fyrepel Products Inc.
Box 518
Newark, OH 43055
(614) 344-0391

GARMENT SEAM
Stitched, strapped with butyl.

CLOSURE
Pressure sealing zipper.
LOCATION: Back. **LENGTH:** 48 inches.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: Yes.

GLOVES
TYPE: Detachable gloves.
MATERIAL: User specified and supplied.
INTERFACE: Inserts in glove and sleeve create compression seal.

BOOTS
TYPE: Integral booties or boots.
MATERIAL: Butyl/nylon/butyl.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR
TYPE: Detachable.
MATERIAL: Poly(methyl methacrylate).
INTERFACE: No data.

EXHAUST VALVES
NUMBER: 4. **TYPE:** Flapper valve (Glendale, Inc.)
MATERIALS: No data.
LOCATION: Back of legs.
CRACKING PRESSURE: 0.4 psi.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
Expanded back accommodates self-contained breathing apparatus or umbilical feed. Hood accommodates face mask.

COOLING
Air distribution system or ice vest/jacket.

FITTINGS
AIRLINE: 1/4-inch brass.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Butyl/Nylon/Butyl

PROTECTION LEVEL
EPA: A

STYLE

306 B/BA
THICKNESS: 14 mils
MATERIAL WGT: 14 oz/sq yd
ENSEMBLE WGT: 12 lbs
SIZES: S, M, L, XL
(for heights 5'4" - 6'5")

VENDOR

Fyrepel Products Inc.
Box 518
Newark, OH 43055
(614) 344-0391

GARMENT SEAM

Stitched, strapped with butyl.

CLOSURE

Pressure sealing zipper.
LOCATION: Front. **LENGTH:** No data.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: Yes.

GLOVES

TYPE: Detachable gloves.
MATERIAL: User specified and supplied.
INTERFACE: Inserts in glove and sleeve create compression seal.

BOOTS

TYPE: Integral booties or boots.
MATERIAL: Butyl/nylon/butyl.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR

TYPE: Detachable.
MATERIAL: Poly(methyl methacrylate).
INTERFACE: No data.

EXHAUST VALVES

NUMBER: 4. **TYPE:** Flapper valve (Glendale, Inc.)
MATERIALS: No data.
LOCATION: Back of legs.
CRACKING PRESSURE: 0.4 psi.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

Expanded back accommodates self-contained breathing apparatus or umbilical feed. Hood accommodates face mask.

COOLING

Air distribution system or ice vest/jacket.

FITTINGS

AIRLINE: 1/4-inch brass.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Butyl/Nylon/Butyl

PROTECTION LEVEL
EPA: A

STYLE

Trellchem, Butyl Extra
THICKNESS: 15-18 mils
MATERIAL WGT: 15 oz/sq yd
ENSEMBLE WGT: 15 lbs
SIZES: S, M, L, XL

VENDOR

Trelleborg, Inc.
30700 Solon Industrial Parkway
Solon, OH 44139
(216) 248-8600

GARMENT SEAM

Double lapped, stitched, cemented, interior strapped with chloroprene, exterior strapped with butyl.

CLOSURE

Pressure sealing zipper.
LOCATION: Front. **LENGTH:** 53 inches.
CLOSURE/SUIT SEAM: Same as garment seam.
SPLASH COVER: Yes.

GLOVES

TYPE: Detachable gloves.
MATERIAL: Chloroprene or butyl.
INTERFACE: Support ring in sleeve, elastic band.

BOOTS

TYPE: Integral boots or booties.
MATERIAL: Polyvinyl chloride.
INTERFACE: Same as garment.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guard.

VISOR

TYPE: Integral.
MATERIAL: 80 mil PVC visor.
INTERFACE: Adhesive bonded, interior strapped with butyl.

EXHAUST VALVES

NUMBER: 1. **TYPE:** No data.
MATERIALS: Polyethylene/polystryrene, rubber diaphragm.
LOCATION: Hood area.
CRACKING PRESSURE: 0.3-inch water.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

Expanded back accommodates self-contained breathing apparatus. Hood accommodates face mask.

COOLING

Air distribution system.

FITTINGS

AIRLINE: No data.
COMMUNICATION: None.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES

(PRIMARY MATERIAL)

Tensile Strength: (ASTM D-751), 110 lbs/inch.
Tear Strength: (ASTM D-751), 10 lbs.
Seam Strength: (ASTM D-1682), 110 lbs.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Butyl/Nylon/Butyl

PROTECTION LEVEL
EPA: B

STYLE
Trellchem, Butyl
THICKNESS: 15-18 mils
MATERIAL WGT: 15 oz/sq yd
ENSEMBLE WGT: 13 lbs
SIZES: S, M, L, XL

VENDOR
Trelleborg, Inc.
30700 Solon Industrial Parkway
Solon, OH 44139
(216) 248-8600

GARMENT SEAM
Double lapped, stitched, cemented, interior strapped with chloroprene, exterior strapped with butyl.

CLOSURE
Pressure sealing zipper.
LOCATION: Front. **LENGTH:** 41 inches.
CLOSURE/SUIT SEAM: Same as garment seam.
SPLASH COVER: Yes.

GLOVES
TYPE: Detachable gloves.
MATERIAL: Chloroprene or butyl.
INTERFACE: Support ring in sleeve, elastic band.

BOOTS
TYPE: Integral boots or booties.
MATERIAL: Polyvinyl chloride.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guard.

VISOR
TYPE: Detachable.
MATERIAL: No data.
INTERFACE: No data.

EXHAUST VALVES
NUMBER: 1. **TYPE:** No data.
MATERIALS: Polyethylene/polystyrene, rubber diaphragm.
LOCATION: Chest area.
CRACKING PRESSURE: 0.3-inch water.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
External back pack or umbilical feed.

COOLING
Air distribution system.

FITTINGS
AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: Yes.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: (ASTM D-751), 110 lbs/in.
Tear Strength: (ASTM D-751), 10 lbs.
Seam Strength: (ASTM D-1682), 110 lbs.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Butyl/Polyester/Chloroprene

PROTECTION LEVEL
EPA: A

STYLE

Chempruf II, Betex/SCBA
THICKNESS: 19 mils
MATERIAL WGT: 15.9 oz/sq yd
ENSEMBLE WGT: No data
SIZES: One size

VENDOR

Mine Safety Appliances Co.
P.O. Box 426
Pittsburgh, PA 15230
(412) 273-5000

GARMENT SEAM

Double stitched, interior strapped with chloroprene, exterior sealed with liquid butyl.

CLOSURE

Pressure sealing zipper (Dynat, Inc.), stainless steel teeth, brass slider, chloroprene backing.
LOCATION: Front. **LENGTH:** 72 inches.
CLOSURE/SUIT SEAM: Same as garment.
SPLASH COVER: None.

GLOVES

TYPE: Detachable gloves.
MATERIAL: Chloroprene or butyl.
INTERFACE: Brass support ring in sleeve, stainless steel glove clamp, natural rubber glove ring sleeve.

TYPE: Detachable overgloves.
MATERIAL: Viton or butyl.
INTERFACE: None.

BOOTS

TYPE: Detachable booties.
MATERIAL: Butyl/polyester/chloroprene.
INTERFACE: None.

TYPE: Detachable boots.
MATERIAL: NBR + SBR + natural rubber.
INTERFACE: Aluminum support ring in garment leg, stainless steel boot clamp.

VISOR

TYPE: Detachable.
MATERIAL: 5/32-inch poly(methyl methacrylate) or 1/8-inch glass.
INTERFACE: Natural rubber gasket.

EXHAUST VALVES

NUMBER: 3. **TYPE:** Flapper valve.
MATERIALS: Chloroprene valve cover, chloroprene and natural rubber valve disk, nylon valve seat, stainless steel slide ring, nylon threaded ring.
LOCATION: Hood area.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: None.

AIR SUPPLY

Expanded back accommodates self-contained breathing apparatus. Hood accommodates face mask.

COOLING

Air distribution system (optional).

FITTINGS

AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Butyl/Polyester/Chloroprene

PROTECTION LEVEL
EPA: A

STYLE
Chempruf II, Betex/DPBA
THICKNESS: 19 mils
MATERIAL WGT: 15.9 oz/sq yd
ENSEMBLE WGT: No data
SIZES: One size

VENDOR
Mine Safety Appliances Co.
P.O. Box 426
Pittsburgh, PA 15230
(412) 273-5000

GARMENT SEAM
Double stitched, interior strapped with chloroprene, exterior sealed with liquid butyl.

CLOSURE
Pressure sealing zipper (Dynat, Inc.), stainless steel teeth, brass slider, chloroprene backing.
LOCATION: Front. **LENGTH:** 72 inches.
CLOSURE/SUIT SEAM: Same as garment.
SPLASH COVER: None.

GLOVES
TYPE: Detachable gloves.
MATERIAL: Chloroprene or butyl.
INTERFACE: Brass support ring in sleeve, stainless steel glove clamp, natural rubber glove ring sleeve.

TYPE: Detachable overgloves.
MATERIAL: Butyl or Viton.
INTERFACE: None.

BOOTS
TYPE: Detachable booties.
MATERIAL: Butyl/polyester/chloroprene.
INTERFACE: None.

TYPE: Detachable boots.
MATERIAL: NBR + SBR + natural rubber.
INTERFACE: Aluminum support ring in garment leg, stainless steel boot clamp.

VISOR
TYPE: Detachable.
MATERIAL: 5/32-inch poly(methyl methacrylate) or 1/8-inch glass.
INTERFACE: Natural rubber gasket.

EXHAUST VALVES
NUMBER: 3. **TYPE:** Flapper valve.
MATERIALS: Chloroprene valve cover, chloroprene and natural rubber valve disk, nylon valve seat, stainless steel slide ring, nylon threaded ring.
LOCATION: Hood area.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: None.

AIR SUPPLY
Expanded back accommodates self-contained breathing apparatus or umbilical feed. Hood accommodates face mask.

COOLING
Air distribution system (optional).

FITTINGS
AIRLINE: Aluminum and vinyl washers, brass fittings, quick disconnect.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Chlorinated Polyethylene

PROTECTION LEVEL
EPA: No Rating (See Section 5.B.8.)

STYLE
Chemturion, Model 12
THICKNESS: 20 mils
MATERIAL WGT: 19.7 oz/sq yd
ENSEMBLE WGT: 4 lbs
SIZES: L, XL
(for heights 5'4" - 6'8")

VENDOR
ILC Dover, Inc.
P.O. Box 266
Frederica, DE 19946
(302) 335-3911

GARMENT SEAM
Thermally welded.

CLOSURE
Inner restraint zipper with extruded chlorinated polyethylene sealing lips.
LOCATION: Front. **LENGTH:** No data.
CLOSURE/SUIT SEAM: Same as garment.
SPLASH COVER: None.

GLOVES
TYPE: Detachable gloves.
MATERIAL: User specified and supplied.
INTERFACE: Molded ABS connect ring in sleeve, rubber connect ring in glove.

BOOTS
TYPE: Integral booties.
MATERIAL: Chlorinated polyethylene.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR
TYPE: Integral.
MATERIAL: Press-polished optical grade 40 mil vinyl with polyester splash visors.
INTERFACE: No data.

EXHAUST VALVES
NUMBER: 2. **TYPE:** Flapper valve.
MATERIALS: No data.
LOCATION: Shoulder area.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
Umbilical feed.

COOLING
Air distribution system or liquid body cooling.

FITTINGS
AIRLINE: 1/4-inch NPT brass.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)
Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Chlorinated Polyethylene

PROTECTION LEVEL
EPA: A

STYLE

Chemturion, Model 13
THICKNESS: 20 mils
MATERIAL WGT: 19.7 oz/sq yd
ENSEMBLE WGT: 4 lbs
SIZES: One size (for heights 5'4" - 6'4")

VENDOR

ILC Dover, Inc.
P.O. Box 266
Frederica, DE 19946
(302) 335-3911

GARMENT SEAM

Thermally welded.

CLOSURE

Inner restraint zipper with extruded chlorinated polyethylene sealing lips.
LOCATION: Front. **LENGTH:** No data.
CLOSURE/SUIT SEAM: Same as garment.
SPLASH COVER: None.

GLOVES

TYPE: Detachable gloves.
MATERIAL: User specified and supplied.
INTERFACE: Molded ABS connect ring in sleeve, rubber connect ring in glove.

BOOTS

TYPE: Integral booties.
MATERIAL: Chlorinated polyethylene.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR

TYPE: Integral.
MATERIAL: Press-polished optical grade 40 mil vinyl with polyester splash visors.
INTERFACE: No data.

EXHAUST VALVES

NUMBER: 2. **TYPE:** Flapper valve.
MATERIALS: No data.
LOCATION: Shoulder area.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

Expanded back accommodates self-contained breathing apparatus. Hood accommodates face mask.

COOLING

Liquid body cooling (optional).

FITTINGS

AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Chlorinated Polyethylene

PROTECTION LEVEL
EPA: A

STYLE
Chemturion, Model 51
THICKNESS: 20 mils
MATERIAL WGT: 19.7 oz/sq yd
ENSEMBLE WGT: 4 lbs
SIZES: S, M, L
(for heights 5'4" - 6'4")

VENDOR
ILC Dover, Inc.
P.O. Box 266
Frederica, DE 19946
(302) 335-3911

GARMENT SEAM
Thermally welded.

CLOSURE
Inner restraint zipper with extruded chlorinated polyethylene sealing lips.
LOCATION: Rear. **LENGTH:** No data.
CLOSURE/SUIT SEAM: Same as garment.
SPLASH COVER: None.

GLOVES
TYPE: Integral gloves.
MATERIAL: Polyvinyl chloride.
INTERFACE: Same as garment seam.

BOOTS
TYPE: Integral booties.
MATERIAL: Chlorinated polyethylene.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR
TYPE: Integral.
MATERIAL: Polycarbonate with antifog coating and splash visors.
INTERFACE: No data.

EXHAUST VALVES
NUMBER: 4. **TYPE:** Spring operated.
MATERIALS: No data.
LOCATION: Legs and shoulder areas.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
Expanded back accommodates self-contained breathing apparatus (Bio-Marine Bio-Pak 60P rebreather). Hood accommodates face mask.

COOLING
Liquid body cooling.

FITTINGS
AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: Standard tire valve.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Chlorobutyl/Nomex/Chlorobutyl

PROTECTION LEVEL
EPA: No Rating (See Section 5.B.8.)

STYLE

SCAPE RFHCO
THICKNESS: 19 mils
MATERIAL WGT: 17 oz/sq yd
ENSEMBLE WGT: No data
SIZES: Nine sizes

VENDOR

Arrowhead Products
4411 Katella Avenue
Los Alamitos, CA 90720
(714) 828-7770

GARMENT SEAM

Cemented, strapped with butyl.

CLOSURE

Pressure sealing zipper (B.F. Goodrich), brass teeth and slider, chloroprene coated nylon filled cotton fabric.
LOCATION: Front. **LENGTH:** 45 or 50 in.
CLOSURE/SUIT SEAM: Sewn in and overlaid with cement bonded suit material strapping.
SPLASH COVER: Yes.

GLOVES

TYPE: Detachable gloves.
MATERIAL: Butyl.
INTERFACE: Molded butyl connect ring in sleeve and glove with butyl rolldown covers.

BOOTS

TYPE: Detachable boots.
MATERIAL: PVC.
INTERFACE: Molded butyl connect rings in garment leg and boot with butyl rolldown covers.

VISOR

TYPE: Detachable
MATERIAL: 25 mil modified acrylic.
INTERFACE: Butyl rubber gasket.

EXHAUST VALVES

NUMBER: 3. **TYPE:** Flapper valve - Sierra Eng 50.

MATERIALS: Aluminum housing and plate, butyl rubber antibackstreaming valve.
LOCATION: Hip and hood areas.
CRACKING PRESSURE: 0.5-inch water.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

Expanded back accommodates self-contained, 2-hour back pack, liquid air charged, 7.0 liters, or umbilical feed.

COOLING

Liquid air evaporation, air distribution system.
Vortex cooling (optional).

FITTINGS

AIRLINE: Stainless steel quick disconnect for vortex cooling system.
COMMUNICATION: Various types (optional).
COOLING: See AIRLINE.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES

(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Chlorobutyl/Nomex/Chlorobutyl

PROTECTION LEVEL
EPA: No Rating (See Section 5.B.8.)

STYLE

Propellant Handlers Ensemble
THICKNESS: 20 mils
MATERIAL WGT: No data
ENSEMBLE WGT: No data
SIZES: No data

VENDOR

ILC Dover, Inc.
P.O. Box 266
Frederica, DE 19946
(302) 335-3911

GARMENT SEAM

Nylon stitched, strapped with chlorobutyl (chloroprene adhesive).

CLOSURE

Inner restraint zipper with extruded chlorinated polyethylene sealing lips.
LOCATION: No data. **LENGTH:** No data.
CLOSURE/SUIT SEAM: Same as garment.
SPLASH COVER: None.

GLOVES

TYPE: Detachable gloves.
MATERIAL: User specified and supplied.
INTERFACE: Metal connect rings in sleeve and glove.

BOOTS

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Metal connect rings in garment leg and boot.

VISOR

TYPE: Detachable.
MATERIAL: Polycarbonate.
INTERFACE: No data.

EXHAUST VALVES

NUMBER: 4. **TYPE:** Flapper valve.
MATERIALS: No data.
LOCATION: Legs and shoulder areas.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

External back pack or umbilical feed.

COOLING

No data.

FITTINGS

AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Chloroprene/Nylon

PROTECTION LEVEL
EPA: B

STYLE

Type 500 CK
THICKNESS: No data
MATERIAL WGT: No data
ENSEMBLE WGT: No data
SIZES: Above 5'11"
Below 5'11"

VENDOR

National Draeger, Inc.
101 Technology Drive
Pittsburgh, PA 15230
(412) 787-8383

GARMENT SEAM

Double stitched, exterior strapped with chloroprene.

CLOSURE

Pressure sealing zipper.
LOCATION: Front. **LENGTH:** No data.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: Yes.

GLOVES

TYPE: Detachable gloves.
MATERIAL: Viton.
INTERFACE: Support ring in sleeve, steel glove clamp.

BOOTS

TYPE: Detachable boots.
MATERIAL: Chloroprene.
INTERFACE: Support ring in garment leg, steel boot clamp.

VISOR

TYPE: Detachable.
MATERIAL: No data.
INTERFACE: No data.

EXHAUST VALVES

NUMBER: None. **TYPE:** Not available.
MATERIALS: Not available.
LOCATION: Not available.
CRACKING PRESSURE: Not available.
MAX FLOW RATE: Not available.
SPLASH COVER: Not available.

AIR SUPPLY

External back pack. Face mask incorporated in suit.

COOLING

None.

FITTINGS

AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES

(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Chloroprene/Nylon

PROTECTION LEVEL
EPA: No Rating (See Section 5.B.8.)

STYLE

Type 600 CK
THICKNESS: No data
MATERIAL WGT: No data
ENSEMBLE WGT: No data
SIZES: One size

VENDOR

National Draeger, Inc.
101 Technology Drive
Pittsburgh, PA 15230
(412) 787-8383

GARMENT SEAM

Double stitched, exterior strapped with chloroprene.

CLOSURE

Pressure sealing zipper.
LOCATION: Front. **LENGTH:** No data.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: None.

GLOVES

TYPE: Detachable gloves.
MATERIAL: Viton.
INTERFACE: Support ring in sleeve, steel glove clamp.

BOOTS

TYPE: Detachable boots.
MATERIAL: Chloroprene.
INTERFACE: Support ring in garment leg, steel boot clamp.

VISOR

TYPE: Integral.
MATERIAL: No data.
INTERFACE: No data.

EXHAUST VALVES

NUMBER: 1. **TYPE:** No data.
MATERIALS: No data.
LOCATION: Chest area.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

Expanded back accommodates self-contained breathing apparatus. Face mask incorporated in suit.

COOLING

None.

FITTINGS

AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES

(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Polyvinyl Chloride/Nylon

PROTECTION LEVEL
EPA: A (with emergency egress unit.)

STYLE
LL-100 — Polyvinyl Chloride
THICKNESS: 15 mils
MATERIAL WGT: 10 oz/sq yd
ENSEMBLE WGT: No data
SIZES: No data

VENDOR
Andover Industries Inc.
15 Union Street
Lawrence, MA 01840
(617) 794-1792

GARMENT SEAM
Stitched, strapped with PVC.

CLOSURE
Pressure sealing zipper (Talon, Inc.). Teeth and slider: 67% copper, 12% nickel, 11% zinc.
LOCATION: Front. **LENGTH:** 48 inches.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: Yes.

GLOVES
TYPE: Integral gloves (optional).
MATERIAL: Polyvinyl chloride.
INTERFACE: Same as garment seam.

TYPE: Detachable gloves (optional).
MATERIAL: Polyvinyl chloride.
INTERFACE: Support ring in sleeve, stainless steel glove clamp.

BOOTS
TYPE: Integral booties.
MATERIAL: PVC/nylon.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR
TYPE: Integral (optional).
MATERIAL: Polycarbonate with 2.5 mil FEP or 30 mil PVC splash visor.
INTERFACE: No data.

TYPE: Detachable (optional).
MATERIAL: Polycarbonate/triacetate.
INTERFACE: Chloroprene gasket.

EXHAUST VALVES
NUMBER: 4. **TYPE:** Flapper valve.
MATERIALS: No data.
LOCATION: Shoulder and leg areas.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
Umbilical feed. Hood accommodates face mask, suit accommodates internal, emergency egress unit.

COOLING
Air distribution system (optional).

FITTINGS
AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)
Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Polyvinyl Chloride/Polyester

PROTECTION LEVEL
EPA: No Rating (See Section 5.B.8.)

STYLE
Stasafe, Accordion
THICKNESS: 28-30 mils
MATERIAL WGT: 27 oz/sq yd
ENSEMBLE WGT: No data
SIZES: No data

VENDOR
Standard Safety Equipment Co.
P.O. Box 188
Palatine, IL 60078-0188
(312) 359-1400

GARMENT SEAM
Stitched, strapped with PVC (welded).

CLOSURE
Pressure sealing zipper.
LOCATION: Rear. **LENGTH:** No data.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: None.

GLOVES
TYPE: Detachable gloves.
MATERIAL: Polyvinyl chloride.
INTERFACE: Inserts in glove and sleeve create compression seal.

BOOTS
TYPE: Integral overboots (optional).
MATERIAL: Polyvinyl chloride.
INTERFACE: Same as garment seam.
TYPE: Detachable boots (optional).
MATERIAL: Chloroprene.
INTERFACE: Inserts in boot and garment leg create compression seal.

VISOR
TYPE: Integral.
MATERIAL: 40 mil flexible vinyl.
INTERFACE: No data.

EXHAUST VALVES
NUMBER: 4. **TYPE:** Flapper valve.
MATERIALS: ABS housing, natural rubber flapper.
LOCATION: Back and leg areas.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
External back pack or umbilical feed. Face mask incorporated in suit.

COOLING
Air distribution system or vortex cooling.

FITTINGS
AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)
Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Polyvinyl Chloride/Polyester

PROTECTION LEVEL
EPA: A

STYLE
Stasafe, Acidmaster
THICKNESS: 28-30 mils
MATERIAL WGT: 27 oz/sq yd
ENSEMBLE WGT: No data
SIZES: M, L, XL
(for heights 5'8" - 6'5")

VENDOR
Standard Safety Equipment Co.
P.O. Box 188
Palatine, IL 60078-0188
(312) 359-1400

GARMENT SEAM
Stitched, strapped with PVC (welded).

CLOSURE
Pressure sealing zipper.
LOCATION: Rear. **LENGTH:** No data.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: None.

GLOVES
TYPE: Detachable gloves.
MATERIAL: Polyvinyl chloride.
INTERFACE: PVC inserts in glove and sleeve create compression seal.

BOOTS
TYPE: Integral booties or overboots.
MATERIAL: Polyvinyl chloride.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: Polyvinyl chloride.
INTERFACE: PVC inserts in boot and garment leg create compression seal.

VISOR
TYPE: Integral.
MATERIAL: 40 mil flexible PVC.
INTERFACE: No data.

EXHAUST VALVES
NUMBER: 4. **TYPE:** Flapper valve.
MATERIALS: ABS housing, natural rubber flapper.
LOCATION: Back and leg areas.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
Expanded back accommodates self-contained breathing apparatus. Hood accommodates face mask.

COOLING
Air distribution system or vortex cooling.

FITTINGS
AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Polyvinyl Chloride/Polyester

PROTECTION LEVEL
EPA: A (with emergency egress unit.)

STYLE
Stasafe, Compressed Air
THICKNESS: 28-30 mils
MATERIAL WGT: 27 oz/sq yd
ENSEMBLE WGT: No data
SIZES: One size

VENDOR
Standard Safety Equipment Co.
P.O. Box 188
Palatine, IL 60078-0188
(312) 359-1400

GARMENT SEAM
Stitched, strapped with PVC (welded).

CLOSURE
Standard zipper. Pressure sealing zipper optional.
LOCATION: Rear. **LENGTH:** No data.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: Yes.

GLOVES
TYPE: Detachable gloves.
MATERIAL: Polyvinyl chloride.
INTERFACE: PVC inserts in glove and sleeve create compression seal.

BOOTS
TYPE: Integral overboots (optional).
MATERIAL: Polyvinyl chloride.
INTERFACE: Same as garment seam.
TYPE: Detachable boots (optional).
MATERIAL: Chloroprene.
INTERFACE: PVC inserts in boot and garment leg create compression seal.

VISOR
TYPE: Integral.
MATERIAL: 40 mil flexible PVC.
INTERFACE: No data.

EXHAUST VALVES
NUMBER: 4. **TYPE:** Flapper valve.
MATERIALS: ABS housing, natural rubber flapper.
LOCATION: Back and leg areas.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
Umbilical feed. Hood accommodates face mask. Egress bottle (optional).

COOLING
Air distribution system or vortex cooling.

FITTINGS
AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)
Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Polyvinyl Chloride (PVC)/Nylon/PVC

PROTECTION LEVEL
EPA: A

STYLE

305 PVC/BA
THICKNESS: No data
MATERIAL WGT: 10 oz/sq yd
ENSEMBLE WGT: No data
SIZES: S, M, L, XL
(for heights 5'4" - 6'5")

VENDOR

Fyrepel Products Inc.
Box 518
Newark, OH 43055
(614) 344-0391

GARMENT SEAM

Stitched, strapped with PVC.

CLOSURE

Pressure sealing zipper.
LOCATION: Back. **LENGTH:** 48 inches.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: Yes.

GLOVES

TYPE: Detachable gloves.
MATERIAL: User specified and supplied.
INTERFACE: Inserts in glove and sleeve create compression seal.

BOOTS

TYPE: Integral booties or boots.
MATERIAL: PVC/nylon/PVC.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR

TYPE: Detachable.
MATERIAL: Poly(methyl methacrylate).
INTERFACE: No data.

EXHAUST VALVES

NUMBER: 4. **TYPE:** Flapper valve (Glendale, Inc.)
MATERIALS: No data.
LOCATION: Back of legs.
CRACKING PRESSURE: 0.4 psi.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

Expanded back accommodates self-contained breathing apparatus or umbilical feed. Hood accommodates face mask.

COOLING

Air distribution system or ice vest/jacket.

FITTINGS

AIRLINE: 1/4-inch brass.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Polyvinyl Chloride (PVC)/Nylon/PVC

PROTECTION LEVEL
EPA: A

STYLE

306 PVC/BA
THICKNESS: No data
MATERIAL WGT: 10 oz/sq yd
ENSEMBLE WGT: No data
SIZES: S, M, L, XL (for heights 5'4" - 6'5")

VENDOR

Fyrepel Products Inc.
Box 518
Newark, OH 43055
(614) 344-0391

GARMENT SEAM

Stitched, strapped with PVC.

CLOSURE

Pressure sealing zipper.
LOCATION: Front. **LENGTH:** No data.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: Yes.

GLOVES

TYPE: Detachable gloves.
MATERIAL: User specified and supplied.
INTERFACE: Inserts in sleeve and glove create compression seal.

BOOTS

TYPE: Integral booties or boots.
MATERIAL: PVC/nylon/PVC.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR

TYPE: Detachable.
MATERIAL: Poly(methyl methacrylate).
INTERFACE: No data.

EXHAUST VALVES

NUMBER: 4. **TYPE:** Flapper valve (Glendale, Inc.)
MATERIALS: No data.
LOCATION: Back of legs.
CRACKING PRESSURE: 0.4 psi.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

Expanded back accommodates self-contained breathing apparatus or umbilical feed. Hood accommodates face mask.

COOLING

Air distribution system or ice vest/jacket.

FITTINGS

AIRLINE: 1/4-inch brass.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Polyvinyl Chloride (PVC)/Nylon/PVC

PROTECTION LEVEL
EPA: B

STYLE

Type 500 PVC
THICKNESS: No data
MATERIAL WGT: No data
ENSEMBLE WGT: 13.2 lbs
SIZES: Above 5'11"
Below 5'11"

VENDOR

National Draeger, Inc.
101 Technology Drive
Pittsburgh, PA 15230
(412) 787-8383

GARMENT SEAM

Double stitched, exterior strapped with PVC.

CLOSURE

Pressure sealing zipper.
LOCATION: Front. **LENGTH:** No data.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: Yes.

GLOVES

TYPE: Detachable gloves.
MATERIAL: Viton.
INTERFACE: Support ring in sleeve, steel glove clamp.

BOOTS

TYPE: Detachable boots.
MATERIAL: Chloroprene.
INTERFACE: Support ring in garment leg, steel boot clamp.

VISOR

TYPE: Detachable.
MATERIAL: No data.
INTERFACE: No data.

EXHAUST VALVES

NUMBER: None. **TYPE:** Not available.
MATERIALS: Not available.
LOCATION: Not available.
CRACKING PRESSURE: Not available.
MAX FLOW RATE: Not available.
SPLASH COVER: Not available.

AIR SUPPLY

External back pack. Face mask incorporated in suit.

COOLING

None.

FITTINGS

AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES

(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Polyvinyl Chloride (PVC)/Nylon/PVC

PROTECTION LEVEL
EPA: No Rating (See Section 5.B.8.)

STYLE
Type 600 PVC
THICKNESS: No data.
MATERIAL WGT: No data.
ENSEMBLE WGT: 14.3 lbs
SIZES: One size

VENDOR
National Draeger, Inc.
101 Technology Drive
Pittsburgh, PA 15230
(412) 787-8383

GARMENT SEAM
Double stitched, exterior strapped with PVC.

CLOSURE
Pressure sealing zipper.
LOCATION: Front. **LENGTH:** No data.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: None.

GLOVES
TYPE: Detachable gloves.
MATERIAL: Viton.
INTERFACE: Support ring in sleeve, steel glove clamp.

BOOTS
TYPE: Detachable boots.
MATERIAL: Chloroprene.
INTERFACE: Support ring in garment leg, steel boot clamp.

VISOR
TYPE: Integral.
MATERIAL: No data.
INTERFACE: No data.

EXHAUST VALVES
NUMBER: 1. **TYPE:** No data.
MATERIALS: No data.
LOCATION: Chest area.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
Expanded back accommodates self-contained breathing apparatus. Face mask incorporated in suit.

COOLING
None.

FITTINGS
AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)
Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Polyvinyl Chloride (PVC)/Nylon/PVC

PROTECTION LEVEL
EPA: A

STYLE

Type 700 PVC
THICKNESS: No data
MATERIAL WGT: No data
ENSEMBLE WGT: 12.1 lbs
SIZES: One size

VENDOR

National Draeger, Inc.
101 Technology Drive
Pittsburgh, PA 15230
(412) 787-8383

GARMENT SEAM

Double stitched, exterior strapped with PVC.

CLOSURE

Pressure sealing zipper.
LOCATION: Front. **LENGTH:** No data.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: None.

GLOVES

TYPE: Detachable gloves.
MATERIAL: Viton.
INTERFACE: Support ring in sleeve, steel glove clamp.

BOOTS

TYPE: Detachable boots.
MATERIAL: Chloroprene.
INTERFACE: Support ring in garment leg, steel boot clamp.

VISOR

TYPE: Detachable.
MATERIAL: Polyvinyl chloride.
INTERFACE: No data.

EXHAUST VALVES

NUMBER: 2. **TYPE:** No data.
MATERIALS: No data.
LOCATION: Hood area.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

Expanded back accommodates self-contained breathing apparatus. Hood accommodates face mask.

COOLING

None.

FITTINGS

AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Polyvinyl Chloride (PVC)/Nylon/PVC

PROTECTION LEVEL
EPA: B

STYLE
Trellchem, Light
THICKNESS: 15-18 mils
MATERIAL WGT: 14.5 oz/sq yd
ENSEMBLE WGT: 12.5 lbs
SIZES: S, M, L, XL

VENDOR
Trelleborg, Inc.
30700 Solon Industrial Parkway
Solon, OH 44139
(216) 248-8600

GARMENT SEAM
Double lapped, stitched, exterior welded.

CLOSURE
Pressure sealing zipper.
LOCATION: Front. **LENGTH:** 41 inches.
CLOSURE/SUIT SEAM: Stitched, cemented, interior and exterior strapped with PVC.
SPLASH COVER: Yes.

GLOVES
TYPE: Detachable gloves.
MATERIAL: Chloroprene.
INTERFACE: Support ring in sleeve, elastic band.

BOOTS
TYPE: Integral boots or booties.
MATERIAL: Polyvinyl chloride.
INTERFACE: Adhesive bonded.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guard.

VISOR
TYPE: Detachable.
MATERIAL: No data.
INTERFACE: No data.

EXHAUST VALVES
NUMBER: 1. **TYPE:** No data.
MATERIALS: Polyethylene/polystyrene, rubber diaphragm.
LOCATION: Chest area.
CRACKING PRESSURE: 0.3-inch water.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
External back pack or umbilical feed.

COOLING
Air distribution system.

FITTINGS
AIRLINE: No data.
COMMUNICATION: None.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: (ASTM D-751), 110 lbs/in.
Tear Strength: (ASTM D-751), 10 lbs.
Seam Strength: (ASTM D-1682), 110 lbs.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Polyvinyl Chloride (PVC)/Nylon/PVC

PROTECTION LEVEL
EPA: A

STYLE
Trellchem, Light Extra
THICKNESS: 15-18 mils
MATERIAL WGT: 14.5 oz/sq yd
ENSEMBLE WGT: 12.5 lbs
SIZES: S, M, L, XL

VENDOR
Trelleborg, Inc.
30700 Solon Industrial Parkway
Solon, OH 44139
(216) 248-8600

GARMENT SEAM
Double lapped, stitched, exterior welded

CLOSURE
Pressure sealing zipper.
LOCATION: Front. **LENGTH:** 53 inches.
CLOSURE/SUIT SEAM: Stitched, cemented, interior and exterior strapped with PVC.
SPLASH COVER: Yes.

GLOVES
TYPE: Detachable gloves.
MATERIAL: Chloroprene.
INTERFACE: Support ring in sleeve, elastic band.

BOOTS
TYPE: Integral boots or booties.
MATERIAL: Polyvinyl chloride.
INTERFACE: Adhesive bonded.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guard.

VISOR
TYPE: Integral.
MATERIAL: 80 mil PVC visor.
INTERFACE: Adhesive bonded, interior strapped with PVC.

EXHAUST VALVES
NUMBER: 1. **TYPE:** No data.
MATERIALS: Polyethylene/polystyrene, rubber diaphragm.
LOCATION: Hood area.
CRACKING PRESSURE: 0.3-inch water.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
Expanded back accommodates self-contained breathing apparatus. Hood accommodates face mask.

COOLING
Air distribution system.

FITTINGS
AIRLINE: No data.
COMMUNICATION: None.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: (ASTM D-751), 110 lbs/in.
Tear Strength: (ASTM D-751), 10 lbs.
Seam Strength: (ASTM D-1682), 110 lbs/in.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Polyvinyl Chloride (PVC)/Nylon/PVC

PROTECTION LEVEL
EPA: A

STYLE

Acid King
THICKNESS: 20 mils
MATERIAL WGT: 14 oz/sq yd
ENSEMBLE WGT: No data
SIZES: Short, Regular, Long (for heights 5'4" - 6'6")

VENDOR

Wheeler Protective Apparel, Inc.
4330 West Belmont Avenue
Chicago, IL 60641
(312) 685-5551

GARMENT SEAM

Stitched, thermally welded.

CLOSURE

Pressure sealing zipper.
LOCATION: Rear. **LENGTH:** 44 inches.
CLOSURE/SUIT SEAM: Stitched, thermally welded.
SPLASH COVER: None.

GLOVES

TYPE: Detachable gloves.
MATERIAL: PVC.
INTERFACE: Support ring in sleeve, steel glove clamp.

BOOTS

TYPE: Detachable boots.
MATERIAL: PVC.
INTERFACE: Support ring in garment leg, steel boot clamp.

VISOR

TYPE: Integral (optional).
MATERIAL: 40 mil PVC.
INTERFACE: No data.

TYPE: Detachable (optional).
MATERIAL: 125 mil poly(methyl methacrylate).
INTERFACE: No data.

EXHAUST VALVES

NUMBER: 2. **TYPE:** Flapper valve.
MATERIALS: No data.
LOCATION: Shoulder and leg areas.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

Expanded back accommodates self-contained back pack or umbilical feed. Hood accommodates face mask.

COOLING

Air distribution system (optional).

FITTINGS

AIRLINE: 1/4-inch NPT.
COMMUNICATION: No data.
COOLING: 1/4-inch NPT or 3/4-inch GH thread.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES

(PRIMARY MATERIAL)
Tensile Strength: (FTM 191A, 5100), 94.1 lbs (W), 100 lbs (F).
Tear Strength: (ASTM D-1117), 33.9 lbs (W), 24.4 lbs (F).
Seam Strength: (ASTM 1683), 63 lbs.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: (FTM 191A, 5120), 21.2 lbs.
Abrasion Resistance: (FTM 191A, 5306), 3,000 cyc, no wear.
Flammability: (FTM 191A, 5903.2), pass.
Stiffness: No data.
Flex Fatigue: (U.S.T. Method), 1,000 cyc, no cracking.

MATERIAL
Teflon/Fiberglass/Teflon

PROTECTION LEVEL
EPA: A

STYLE

Challenge 5200
THICKNESS: 10 mils
MATERIAL WGT: 14.6 oz/sq yd
ENSEMBLE WGT: 10 lbs
SIZES: No data

VENDOR

Chemical Fabrics Corporation
P.O. Box 1137
Merrimack, NH 03054
(603) 424-9000

GARMENT SEAM

Welded half-inch lap seam, exterior strapped with Teflon tape.

CLOSURE

Pressure sealing zipper (YKK, Inc.).
Chloroprene tape, brass teeth and slider.
LOCATION: Back. **LENGTH:** 36 inches.
CLOSURE/SUIT SEAM: Fiberglass heat sealed to garment, zipper chloroprene tape bonded to fiberglass with toluene base adhesive.
SPLASH COVER: Yes.

GLOVES

TYPE: Detachable gloves.
MATERIAL: 10 mil Teflon.
INTERFACE: Support ring in sleeve, stainless steel glove clamp, splash guard.

TYPE: Detachable gloves.
MATERIAL: 10 mil, solvent-dipped butyl.
INTERFACE: Elastic butyl rubber band.

BOOTS

TYPE: Integral booties.
MATERIAL: Teflon/fiberglass/Teflon.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR

TYPE: Integral.
MATERIAL: 10 mil FEP.
INTERFACE: 5-6 mil Teflon tape heat sealed on both sides.

EXHAUST VALVES

NUMBER: 4. **TYPE:** Halkey Roberts 780-RPA.1.
MATERIALS: Nylon housing, silicon rubber diaphragm, 304 stainless steel spring.
LOCATION: Upper back.
CRACKING PRESSURE: 2-inch water.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

Expanded back accommodates self-contained breathing apparatus. Hood accommodates face mask.

COOLING

None.

FITTINGS

AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: (FTM 191, 5102.2), 221 lbs/in (W), 192 lbs/in (F).
Tear Strength: (FTM 191, 5134), 13.7 lbs (W), 9.0 lbs (F).
Seam Strength: (ASTM 3786), 50 psi.
Zipper Strength: (FTM 191, 5100.1), 70 pli.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: (FTM 191, 5302), 0.064 grams lost.
Flammability: (ASTM D-568), non-burning.
Stiffness: (FTM 191, 5200.1), 4.0 cm.
Flex Fatigue: No data.

MATERIAL
Teflon/Nomex/Teflon

PROTECTION LEVEL
EPA: A

STYLE

Challenge 5100
THICKNESS: 18 mils
MATERIAL WGT: 13.9 oz/sq yd
ENSEMBLE WGT: 14 lbs
SIZES: One (large)

VENDOR

Chemical Fabrics Corporation
P.O. Box 1137
Merrimack, NH 03054
(603) 424-9000

GARMENT SEAM

Stitched, interior and exterior strapped with Teflon tape (welded).

CLOSURE

Pressure sealing zipper (YKK, Inc.).
Chloroprene tape, brass teeth and slider.
LOCATION: Back. **LENGTH:** 36 inches.
CLOSURE/SUIT SEAM: Fiberglass heat sealed to garment, zipper chloroprene tape bonded to fiberglass with toluene base adhesive.
SPLASH COVER: Yes.

GLOVES

TYPE: Integral gloves.
MATERIAL: 4 mil Teflon.
INTERFACE: Bonded at glove ring with toluene-based adhesive.

TYPE: Detachable gloves.
MATERIAL: 10 mil, solvent-dipped butyl.
INTERFACE: Elastic butyl rubber band.

BOOTS

TYPE: Integral booties.
MATERIAL: Teflon/Nomex/Teflon.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR

TYPE: Integral.
MATERIAL: 10 mil FEP.
INTERFACE: 5-6 mil Teflon tape heat sealed on both sides.

EXHAUST VALVES

NUMBER: 2. **TYPE:** Stratotech, Part No. 739-1.5.
MATERIALS: Aluminum housing, silicon rubber diaphragm, 304 stainless steel spring.
LOCATION: Upper back.
CRACKING PRESSURE: 1- to 1.5-inch water.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

Expanded back accommodates self-contained breathing apparatus. Hood accommodates face mask.

COOLING

External cooling ice pouch/heat exchanger interfaces with full body cooling garment and pouch which circulates water through garment.

FITTINGS

AIRLINE: None.
COMMUNICATION: None.
COOLING: No data.
INFLATION VALVE: None.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: (ASTM D-751), 113.7 lbs/in (W), 95.8 lbs/in (F).
Tear Strength: (ASTM D-751), 21.0 lbs (W), 19.6 lbs (F).
Seam Strength: (ASTM 3786), 50 psi.
Zipper Strength: (FTM 191, 5100.1), 70 pli.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: (FTM 191, 5302), 0.656 grams lost.
Flammability: (ASTM D-568), non-burning.
Stiffness: (FTM 191, 5200.1), 4.5 cm.
Flex Fatigue: No data.

MATERIAL
Viton/Nomex/Chlorobutyl

PROTECTION LEVEL
EPA: A

STYLE

Metro S.S.
THICKNESS: 20 mils
MATERIAL WGT: 29 oz/sq yd
ENSEMBLE WGT: No data
SIZES: S, M, L, XL, XXL
(for heights 5'6" - 6'7")

VENDOR

Andover Industries Inc.
15 Union Street
Lawrence, MA 01840
(617) 794-1792

GARMENT SEAM

Double stitched, interior strapped with butyl, exterior strapped with Viton.

CLOSURE

Pressure sealing zipper.
LOCATION: Front. **LENGTH:** 60 inches.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: Yes.

GLOVES

TYPE: Detachable gloves.
MATERIAL: Viton.
INTERFACE: Inserts in glove and sleeve create compression seal.

BOOTS

TYPE: Integral booties.
MATERIAL: Viton/Nomex/chlorobutyl.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR

TYPE: Detachable (optional).
MATERIAL: Polycarbonate with FEP splash cover.
INTERFACE: Chloroprene gasket.

TYPE: Detachable (optional).
MATERIAL: User specified.
INTERFACE: Chloroprene gasket.

EXHAUST VALVES

NUMBER: 2. **TYPE:** Flapper valve.
MATERIALS: No data.
LOCATION: Chest and sleeve areas.
CRACKING PRESSURE: 1/2-inch water.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

Expanded back accommodates self-contained breathing apparatus. Hood accommodates face mask.

COOLING

Air distribution system (optional).

FITTINGS

AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Viton/Nylon/Chloroprene

PROTECTION LEVEL
EPA: A

STYLE
Chempruf II, Vautex/SCBA
THICKNESS: 23 mils
MATERIAL WGT: 19.1 oz/sq yd
ENSEMBLE WGT: No data
SIZES: One size

VENDOR
Mine Safety Appliances Co.
P.O. Box 426
Pittsburgh, PA 15230
(412) 273-5000

GARMENT SEAM
Double stitched, interior strapped with chloroprene, exterior sealed with liquid Viton.

CLOSURE
Pressure sealing zipper (Dynat, Inc.), stainless steel teeth, brass slider, chloroprene backing.
LOCATION: Front. **LENGTH:** 72 inches.
CLOSURE/SUIT SEAM: Same as garment.
SPLASH COVER: None.

GLOVES
TYPE: Detachable gloves.
MATERIAL: Chloroprene or Viton.
INTERFACE: Brass support ring in glove, stainless steel glove clamp, natural rubber glove ring sleeve.

TYPE: Detachable overgloves.
MATERIAL: Butyl or Viton.
INTERFACE: None.

BOOTS
TYPE: Detachable booties.
MATERIAL: Viton/nylon/chloroprene.
INTERFACE: None.

TYPE: Detachable boots.
MATERIAL: NBR + SBR + natural rubber.
INTERFACE: Aluminum support ring in garment leg, stainless steel boot clamp.

VISOR
TYPE: Detachable.
MATERIAL: 5/32-inch poly(methyl methacrylate) or 1/8-inch glass.
INTERFACE: Natural rubber gasket.

EXHAUST VALVES
NUMBER: 3. **TYPE:** Flapper valve.
MATERIALS: Chloroprene valve cover, chloroprene and natural rubber valve disk, nylon valve seat, stainless steel slide ring, nylon threaded ring.
LOCATION: Hood area.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: None.

AIR SUPPLY
Expanded back accommodates self-contained breathing apparatus. Hood accommodates face mask.

COOLING
Air distribution system (optional).

FITTINGS
AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)
Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Viton/Nylon/Chloroprene

PROTECTION LEVEL
EPA: A

STYLE
Chempruf II, Vautex/DPBA
THICKNESS: 23 mils
MATERIAL WGT: 19.1 oz/sq yd
ENSEMBLE WGT: No data
SIZES: One size

VENDOR
Mine Safety Appliances Co.
P.O. Box 426
Pittsburgh, PA 15230
(412) 273-5000

GARMENT SEAM
Double stitched, interior strapped with chloroprene, exterior sealed with liquid Viton.

CLOSURE
Pressure sealing zipper (Dynat, Inc.), stainless steel teeth, brass slider, chloroprene backing.
LOCATION: Front. **LENGTH:** 72 inches.
CLOSURE/SUIT SEAM: Same as garment.
SPLASH COVER: None.

GLOVES
TYPE: Detachable gloves.
MATERIAL: Chloroprene or Viton.
INTERFACE: Brass support ring in sleeve, stainless steel glove ring, natural rubber glove ring sleeve.

TYPE: Detachable overgloves.
MATERIAL: Butyl or Viton.
INTERFACE: None.

BOOTS
TYPE: Detachable booties.
MATERIAL: Viton/nylon/chloroprene.
INTERFACE: None.

TYPE: Detachable boots.
MATERIAL: NBR + SBR + natural rubber.
INTERFACE: Aluminum support ring in garment leg, stainless steel boot clamp.

VISOR
TYPE: Detachable.
MATERIAL: 5/32-inch poly(methyl methacrylate) or 1/8-inch glass.
INTERFACE: Natural rubber gasket.

EXHAUST VALVES
NUMBER: 3. **TYPE:** Flapper valve.
MATERIALS: Chloroprene valve cover, chloroprene and natural rubber valve disk, nylon valve seat, stainless steel slide ring, nylon threaded ring.
LOCATION: Hood area.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: None.

AIR SUPPLY
Expanded back accommodates self-contained breathing apparatus or umbilical feed. Hood accommodates face mask.

COOLING
Air distribution system (optional).

FITTINGS
AIRLINE: Aluminum and vinyl washers, brass fittings, quick disconnect.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Viton/Nylon/Chloroprene

PROTECTION LEVEL
EPA: B

STYLE

Type 500 PF
THICKNESS: No data
MATERIAL WGT: No data
ENSEMBLE WGT: No data
SIZES: Above 5'11"
Below 5'11"

VENDOR

National Draeger, Inc.
101 Technology Drive
Pittsburgh, PA 15230
(412) 787-8383

GARMENT SEAM

Double stitched, interior strapped with chloroprene, exterior sealed with Viton sealing compound.

CLOSURE

Pressure sealing zipper.
LOCATION: Front. **LENGTH:** No data.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: Yes.

GLOVES

TYPE: Detachable gloves.
MATERIAL: Viton.
INTERFACE: Support ring in sleeve, steel glove clamp.

BOOTS

TYPE: Detachable boots.
MATERIAL: Chloroprene.
INTERFACE: Support ring in garment leg, steel boot clamp.

VISOR

TYPE: Detachable.
MATERIAL: No data.
INTERFACE: No data.

EXHAUST VALVES

NUMBER: None. **TYPE:** Not available.
MATERIALS: Not available.
LOCATION: Not available.
CRACKING PRESSURE: Not available.
MAX FLOW RATE: Not available.
SPLASH COVER: Not available.

AIR SUPPLY

External back pack. Face mask incorporated in suit.

COOLING

None.

FITTINGS

AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

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MATERIAL
Viton/Nylon/Chloroprene

PROTECTION LEVEL
EPA: A

STYLE

Type 700 PF
THICKNESS: No data
MATERIAL WGT: No data
ENSEMBLE WGT: No data
SIZES: One size

VENDOR

National Draeger, Inc.
101 Technology Drive
Pittsburgh, PA 15230
(412) 787-8383

GARMENT SEAM

Double stitched, interior strapped with chloroprene, exterior sealed with Viton sealing compound.

CLOSURE

Pressure sealing zipper.
LOCATION: Front. **LENGTH:** No data.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: None.

GLOVES

TYPE: Detachable gloves.
MATERIAL: Viton.
INTERFACE: Support ring in sleeve, steel glove clamp.

BOOTS

TYPE: Detachable boots.
MATERIAL: Chloroprene.
INTERFACE: Support ring in garment leg, steel boot clamp.

VISOR

TYPE: Detachable.
MATERIAL: Polyvinyl chloride.
INTERFACE: No data.

EXHAUST VALVES

NUMBER: 2. **TYPE:** No data.
MATERIALS: No data.
LOCATION: Hood area.
CRACKING PRESSURE: No data.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

Expanded back accommodates self-contained breathing apparatus. Hood accommodates face mask.

COOLING

None.

FITTINGS

AIRLINE: No data.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Viton/Polyester/Viton

PROTECTION LEVEL
EPA: A

STYLE
305 V/BA
THICKNESS: 8 mils
MATERIAL WGT: 2.5 oz/sq yd
ENSEMBLE WGT: No data
SIZES: S, M, L, XL
(for heights 5'4" - 6'5")

VENDOR
Fyrepel Products Inc.
Box 518
Newark, OH 43055
(614) 344-0391

GARMENT SEAM
Stitched, strapped with Viton.

CLOSURE
Pressure sealing zipper.
LOCATION: Back. **LENGTH:** 48 inches.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: Yes.

GLOVES
TYPE: Detachable gloves.
MATERIAL: User specified and supplied.
INTERFACE: Inserts in glove and sleeve create compression seal.

BOOTS
TYPE: Integral booties or boots.
MATERIAL: Viton/polyester/Viton.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR
TYPE: Detachable.
MATERIAL: Poly(methyl methacrylate).
INTERFACE: No data.

EXHAUST VALVES
NUMBER: 4. **TYPE:** Flapper valve (Glendale, Inc.)
MATERIALS: No data.
LOCATION: Back of legs.
CRACKING PRESSURE: 0.4 psi.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
Expanded back accommodates self-contained breathing apparatus or umbilical feed. Hood accommodates face mask.

COOLING
Air distribution system or ice vest/jacket.

FITTINGS
AIRLINE: 1/4-inch brass.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Viton/Polyester/Viton

PROTECTION LEVEL
EPA: A

STYLE

306 V/BA
THICKNESS: 8 mils
MATERIAL WGT: 2.5 oz/sq yd
ENSEMBLE WGT: No data
SIZES: S, M, L, XL
(for heights 5'4" - 6'5")

VENDOR

Fyrepel Products Inc.
Box 518
Newark, OH 43055
(614) 344-0391

GARMENT SEAM

Stitched, strapped with Viton.

CLOSURE

Pressure sealing zipper.
LOCATION: Front. **LENGTH:** No data.
CLOSURE/SUIT SEAM: No data.
SPLASH COVER: Yes.

GLOVES

TYPE: Detachable gloves.
MATERIAL: User specified and supplied.
INTERFACE: Inserts in glove and sleeve create compression seal.

BOOTS

TYPE: Integral boots or booties.
MATERIAL: Viton/polyester/Viton.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guards.

VISOR

TYPE: Detachable.
MATERIAL: Poly(methyl methacrylate).
INTERFACE: No data.

EXHAUST VALVES

NUMBER: 4. **TYPE:** Flapper valve (Glendale, Inc.)
MATERIALS: No data.
LOCATION: Back of legs.
CRACKING PRESSURE: 0.4 psi.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

Expanded back accommodates self-contained breathing apparatus or umbilical feed. Hood accommodates face mask.

COOLING

Air distribution system or ice vest/jacket.

FITTINGS

AIRLINE: 1/4-inch brass.
COMMUNICATION: No data.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)

Tensile Strength: No data.
Tear Strength: No data.
Seam Strength: No data.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Viton/Butyl/Nylon/Butyl

PROTECTION LEVEL
EPA: B

STYLE

Trellchem, Super
THICKNESS: 15-18 mils
MATERIAL WGT: 16 oz/sq yd
ENSEMBLE WGT: 13 lbs
SIZES: S, M, L, XL

VENDOR

Trelleborg, Inc.
30700 Solon Industrial Parkway
Solon, OH 44139
(216) 248-8600

GARMENT SEAM

Double lapped, stitched, cemented, interior strapped with chloroprene, exterior strapped with Viton.

CLOSURE

Pressure sealing zipper.
LOCATION: Front. **LENGTH:** 41 inches.
CLOSURE/SUIT SEAM: Same as garment seam.
SPLASH COVER: Yes.

GLOVES

TYPE: Detachable gloves.
MATERIAL: Chloroprene or Viton/butyl.
INTERFACE: Support ring in sleeve, elastic band.

BOOTS

TYPE: Integral boots or booties.
MATERIAL: Polyvinyl chloride.
INTERFACE: Same as garment seam.

TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guard.

VISOR

TYPE: Detachable.
MATERIAL: No data.
INTERFACE: No data.

EXHAUST VALVES

NUMBER: 1. **TYPE:** No data.
MATERIALS: Polyethylene/polystyrene, rubber diaphragm.
LOCATION: Chest area.
CRACKING PRESSURE: 0.3-inch water.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY

External back pack or umbilical feed.

COOLING

Air distribution system.

FITTINGS

AIRLINE: No data.
COMMUNICATION: None.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES

(PRIMARY MATERIAL)

Tensile Strength: (ASTM D-751), 110 lbs/in.
Tear Strength: (ASTM D-751), 10 lbs.
Seam Strength: (ASTM D-1682),, 110 lbs.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

MATERIAL
Viton/Butyl/Nylon/Butyl

PROTECTION LEVEL
EPA: A

STYLE
Trellchem, Super Extra
THICKNESS: 15-18 mils
MATERIAL WGT: 16 oz/sq yd
ENSEMBLE WGT: 15 lbs
SIZES: S, M, L, XL

VENDOR
Trelleborg, Inc.
30700 Solon Industrial Parkway
Solon, OH 44139
(216) 248-8600

GARMENT SEAM
Double lapped, stitched, cemented, interior strapped with chloroprene, exterior strapped with Viton.

CLOSURE
Pressure sealing zipper.
LOCATION: Front. **LENGTH:** 53 inches.
CLOSURE/SUIT SEAM: Same as garment seam.
SPLASH COVER: Yes.

GLOVES
TYPE: Detachable gloves.
MATERIAL: Chloroprene or Viton/butyl.
INTERFACE: Support ring in sleeve, elastic band.

BOOTS
TYPE: Integral boots or booties.
MATERIAL: Polyvinyl chloride.
INTERFACE: Same as garment seam.
TYPE: Detachable boots.
MATERIAL: User specified and supplied.
INTERFACE: Splash guard.

VISOR
TYPE: Integral.
MATERIAL: 80 mil PVC.
INTERFACE: Adhesive bonded, interior strapped with Viton/butyl.

EXHAUST VALVES
NUMBER: 1. **TYPE:** No data.
MATERIALS: Polyethylene/polystyrene, rubber diaphragm.
LOCATION: Hood area.
CRACKING PRESSURE: 0.3-inch water.
MAX FLOW RATE: No data.
SPLASH COVER: Yes.

AIR SUPPLY
Expanded back accommodates self-contained breathing apparatus. Hood accommodates face mask.

COOLING
Air distribution system.

FITTINGS
AIRLINE: No data.
COMMUNICATION: None.
COOLING: No data.
INFLATION VALVE: No data.

PHYSICAL PROPERTIES
(PRIMARY MATERIAL)
Tensile Strength: (ASTM D-751), 110 lbs/in.
Tear Strength: (ASTM D-751), 10 lbs.
Seam Strength: (ASTM D-1682), 110 lbs.
Zipper Strength: No data.
Cut Resistance: No data.
Puncture Resistance: No data.
Abrasion Resistance: No data.
Flammability: No data.
Stiffness: No data.
Flex Fatigue: No data.

APPENDIX H

PRODUCT DESCRIPTIONS FOR SPLASH SUITS

SPLASH SUITS

VENDOR/ STYLE	PRIMARY MATERIAL	DESCRIPTION
BOSS MFG. CO.		
3PC	PVC/COTTON	TYPES: JACKET, HOOD, PANTS, BIB OVERALL.
3PN	PVC/NYLON	
3PN	PVC/NYLON/PVC	FEATURES: PVC SEAMS SEWN AND THERMALY WELDED; CHLOROPRENE AND SBR SEAMS CEMENTED; BATWING OR RAGLAN SLEEVES; STORM FLY FRONT; NICKLE PLATED SNAPS OR NON-CORROSIVE, NON-CONDUCTIVE PLASTIC SNAPS.
3NN	CHLOROPRENE/NYLON	
3RC	SBR/COTTON	
3RC	SBR/COTTON/SBR	
3NP	POLYURETHANE/NYLON	
3PR	PVC/POLYESTER	
3PF	UNSUPPORTED PVC	
DAFFIN DISPOSABLES		
PCT	POLYETHYLENE/TYVEK	TYPES: JACKET, PANTS, COVERALLS, ENCAPSULATING SUIT.
SARANEX	SARANEX/TYVEK	FEATURES: STORM FLY FRONT; ZIPPER CLOSURE; ELASTIC CUFFS ON SLEEVES AND LEGS; INTEGRAL OVERBOOTS ON SUITS; POUND SEAMS;EXPANDED BACK ACCOMMODATES SELF CONTAINED AIR SUPPLY OR SUIT IS UMBILICALLY FED.
DEFENSE APPAREL		
	UNSUPPORTED PVC	TYPES: JACKET, PANTS, BIB OVERALL, COVERALL.
		FEATURES: ZIPPER CLOSURES.
DIRECT SAFETY COMPANY		
RAINMASTER	SUPPORTED PVC	TYPES: JACKET, PANTS, BIB OVERALLS.
RAINMASTER	UNSUPPORTED PVC	
	PVC/NYLON/PVC	FEATURES: NON-CONDUCTIVE SNAPS.
DISPOSABLES INC.		
P.E.	POLYETHYLENE/TYVEK	TYPES: COVERALLS, ENCAPSULATING SUIT.
		FEATURES: STORM FLY FRONT; ELASTIC CUFFS ON SLEEVES; INTEGRAL OVERBOOTS ON SUITS; ZIPPER CLOSURE; MYLAR FACE SHIELD IN ENCAPSULATING SUIT; UMBILICALLY FED SUIT.

VENDOR/ STYLE	PRIMARY MATERIAL	DESCRIPTION
DURAFAB DISPOSABLES		
POLYLAMINATED TYVEK	POLYETHYLENE/TYVEK	TYPES: JACKET, HOOD, PANTS, COVERALL, ENCAPSULATING SUIT.
SARANEX STYLE	SARANEX/TYVEK	FEATURES: STITCHED, BOUND, OR BOUND AND SEALED SEAMS; RAGLAN SLEEVES; SNAPS OR ZIPPER CLOSURE; ZIPPER CLOSURE ON SUIT; ELASTIC CUFFS ON SLEEVES AND LEGS; EXPANDED BACK ON ENCAPSULATING SUITS WILL ACCOMMODATE SELF CONTAINED AIR SUPPLY OR SUIT IS UMBILLICALLY FED.
EDMONT		
WET WEAR 500	PVC/NYLON/PVC	TYPES: JACKET, HOOD, PANTS, BIB OVERALLS.
WET WEAR 550	SUPPORTED PVC	
WET WEAR 600	PVC/NYLON/PVC	FEATURES: THERMALLY WELDED SEAMS; BATWING SLEEVES; NON-CORROSIVE, NON-CONDUCTING SNAPS.
WET WEAR 700	NITRILE+PVC/NYLON	
ENCON		
	CHLOROPRENE/NYLON	TYPES: JACKET, HOOD, PANTS, BIB OVERALLS.
FALCON		
PREMIUM GRADE	RAYON SUPPORTED PVC	TYPES: JACKET, HOOD, PANTS, BIB OVERALLS.
CONTRACT GRADE	PVC-RAYON-PVC	
NYGRID	PVC-NYLON-PVC	FEATURES: LAPPED, DOUBLE-STITCHED, WELDED SEAMS; RAGLAN SLEEVES; NON-CONDUCTIVE SNAPS; SPLIT SNAPS TO PREVENT "FREEZING"; WAIST, WRIST, AND ANKLE TAKE UPS; DRAW-STRING COAT HEM; WELDED REINFORCEMENT IN CROTCH AND ARMPIT.
	UNSUPPORTED PVC	
KAPPLER		
P.E.	POLYETHYLENE/TYVEK	TYPES: JACKET, PANTS, COVERALL, HOOD, ENCAPSULATING SUIT.
SARANEX	SARANEX/TYVEK	FEATURES: BOUND OR WELDED SEAMS; ZIPPER CLOSURE; STORM FLY FRONT; ELASITIC CUFFS ON SLEEVES AND LEGS; INTEGRAL OVERBOOTS; EXPANDED BACK ACCOMMODATES SELF CONTAINED AIR SUPPLY OR SUIT IS UMBILLICALLY FED.
MAGID		
STANDARD DUTY	SUPPORTED PVC	TYPES: JACKET, HOOD, PANTS, BIB OVERALLS.
		FEATURES: WELDED SEAMS; NON-METALIC SNAPS; STORM FLY FRONT.

VENDOR/ STYLE	PRIMARY MATERIAL	DESCRIPTION
RAINFAIR		
POLYLON	POLYURETHANE/NYLON	TYPES: JACKET, HOOD, PANTS, BIB OVERALLS.
SUPER NYLO-GARD	CHLOROPRENE/NYLON/CHLOROPRENE	
NYLO-GARD	CHLOROPRENE/NYLON	FEATURES: STITCHED AND STRAPPED OR CEMENTED SEAMS; STORM FLY FRONT; BATWING SLEEVES; REFLECTIVE TRIM.
DOLPHIN	POLYURETHANE/NYLON	
ACID SUIT	PVC/POLYESTER/PVC	
SUPER NEOTEX	CHLOROPRENE/COTTON/CHLOROPRENE	
SUPER NYLO-SEAL	CHLOROPRENE/NYLON	
VULTEX	SBR/COTTON/CHLOROPRENE	
CHEM-KING	PVC/NYLON	
SBR YANKEE	SBR/COTTON	
RECORD INDUSTRIAL CO.		
COATED CLOTHING	BUTYL/NYLON/BUTYL	TYPES: JACKET, HOOD, PANTS, BIB OVERALLS.
	CHLOROPRENE/COTTON	
	SUPPORTED PVC	FEATURES: STORM FLY FRONT; RAGLAN SLEEVES; METAL OR PLASTIC SNAPS; WAIST ADJUSTERS.
SIEBE NORTON		
F-100	CHLOROPRENE/NYLON/CHLOROPRENE	TYPES: JACKET, HOOD, PANTS, BIB OVERALLS, COVERALL.
TUFFLON	CHLOROPRENE+SBR/NYLON	
SUPER TUFFPRENE	CHLOROPRENE/COTTON/CHLOROPRENE	FEATURES: LAP FRONT OR STORM FLY FRONT; DOUBLE STITCHED SEAM W/SEALANT OR THERMALLY WELDED. BATWING OR RAGLAN SLEEVES; INNER CUFF IN SLEEVE; TAKE-UP SNAPS ON CUFF; NON-CONDUCTIVE SNAPS.
TUFFPRENE	CHLOROPRENE+SBR/COTTON	
NSPN	CHLOROPRENE+SBR/COTTON	
SHIELD BRAND	PVC/NYLON/PVC	
TUFFGARD	PVC/NYLON/PVC	
006 1/2 H	PVC/NYLON/PVC	
NSPVH	PVC/NYLON/PVC	
RAINMASTER	SUPPORTED PVC	
RAINMASTER	UNSUPPORTED PVC	
WHEELER		
34 LINE FABRIC	SUPPORTED CHLOROPRENE	TYPES: JACKET, HOOD, PANTS, BIB OVERALLS.
36 LINE FABRIC	SUPPORTED PVC	
35 LINE FILM	UNSUPPORTED PVC	FEATURES: STITCHED AND THERMALLY WELDED SEAMS; STORM FLY FRONT; PLASTIC SNAPS.

APPENDIX I

DEFINITION OF PROTECTION LEVELS

(Excerpted from "Hazardous Materials Incident Response Operations," 1984, Office of Emergency and Remedial Response, Hazardous Response Support Division, U.S. Environmental Protection Agency)

PART 5

SITE ENTRY - LEVELS OF PROTECTION

I. INTRODUCTION

Personnel must wear protective equipment when response activities involve known or suspected atmospheric contamination, when vapors, gases, or particulates may be generated by site activities, or when direct contact with skin-affecting substances may occur. Full face-piece respirators protect lungs, gastrointestinal tract, and eyes against airborne toxicants. Chemical-resistant clothing protects the skin from contact with skin-destructive and absorbable chemicals. Good personal hygiene limits or prevents ingestion of material.

Equipment to protect the body against contact with known or anticipated toxic chemicals has been divided into four categories according to the degree of protection afforded:

- Level A: Should be worn when the highest level of respiratory, skin, and eye protection is needed.

- Level B: Should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection.

- Level C: Should be worn when the criteria for using air-purifying respirators are met.

- Level D: Should be worn only as a work uniform and not on any site with respiratory or skin hazards. It provides no protection against chemical hazards.

The Level of Protection selected should be based on:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity.

- Potential for exposure to substances in air, splashes of liquids, or other direct contact with material due to work being done.

In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate Level of Protection must be selected based on professional experience and judgment until the hazards can be better identified.

While personnel protective equipment reduces the potential for contact with toxic substances, ensuring the health and safety of responders requires, in addition, safe work practices, decontamination, site entry protocols, and other safety procedures. Together, these provide an integrated approach for reducing harm to workers.

II. LEVELS OF PROTECTION

A. Level A Protection

1. Personnel protective equipment

   - Supplied-air respirator approved by the Mine Safety and Health Administration (MSHA) and National Institute for Occupational Safety and Health (NIOSH).
     Respirators may be:

     -- pressure-demand, self-contained breathing apparatus (SCBA)

     or

     -- pressure-demand, airline respirator (with escape bottle for Immediately Dangerous to Life and Health (IDLH) or potential for IDLH atmosphere)

   - Fully encapsulating chemical-resistant suit
   - Coveralls*
   - Long cotton underwear*
   - Gloves (inner), chemical-resistant
   - Boots, chemical-resistant, steel toe and shank. (Depending on suit construction, worn over or under suit boot)
   - Hard hat* (under suit)
   - Disposable gloves and boot covers* (Worn over fully encapsulating suit)
   - Cooling unit*
   - 2-Way radio communications* (inherently safe)

2. Criteria for selection

   Meeting any of these criteria warrants use of Level A Protection:

   - The chemical substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on:

     -- measured (or potential for) high concentration of

*Optional

atmospheric vapors, gases, or particulates

or

-- site operations and work functions involves high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials highly toxic to the skin.

- Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible.

- Operations must be conducted in confined, poorly ventilated areas until the absence of substances requiring Level A protection is determined.

- Direct readings on field Flame Ionization Dectors (FID) or Photoionization Detectors (PID) and similar instruments indicate high levels of unidentified vapors and gases in the air. (See Appendixes I and II.)

3. Guidance on selection

a. Fully encapsulating suits are primarily designed to provide a gas or vapor tight barrier between the wearer and atmospheric contaminants. Therefore Level A is generally worn when high concentrations of airborne substances are known or thought to be present and these substances could severely effect the skin. Since Level A requires the use of a self-contained breathing apparatus, the eyes and respiratory system are also more protected.

Until air surveillance data are available to assist in the selection of the appropriate Level of Protection, the use of Level A may have to be based on indirect evidence of the potential for atmospheric contamination or other means of skin contact with severe skin affecting substances.

Conditions that may require Level A protection include:

- Confined spaces: Enclosed, confined, or poorly ventilated areas are conducive to build up of toxic vapors, gases, or particulates. (Explosive or oxygen-deficient atmospheres also are more probable in confined spaces.) Confined space entry does not automatically warrant wearing Level A protection, but should serve as a cue to carefully consider and to justify a lower Level of Protection.

- Suspected/known highly toxic substances: Various substances that are highly toxic especially through skin absorption for example, fuming corrosives, cyanide compounds, concentrated pesticides, Department of Transportation Poison "A" materials, suspected carcinogens, and infectious substances may be known or suspected to be involved. Field instruments may not be available to detect or quantify air concentrations of these materials. Until these substances are identified and concentrations measured, maximum protection may be necessary.

- Visible emissions: Visible air emissions from leaking containers or railroad/vehicular tank cars, as well as smoke from chemical fires and others, indicate high potential for concentrations of substances that could be extreme respiratory or skin hazards.

- Job functions: Initial site entries are generally walk-throughs in which instruments and visual observations are used to make a preliminary evaluation of the hazards. In initial site entries, Level A should be worn when:

  -- there is a probability for exposure to high concentrations of vapors, gases, or particulates.

  -- substances are known or suspected of being extremely toxic directly to the skin or by being absorbed.

Subsequent entries are to conduct the many activities needed to reduce the environmental impact of the incident. Levels of Protection for later operations are based not only on data obtained from the initial and subsequent environmental monitoring, but also on the probability of contamination and ease of decontamination.

Examples of situations where Level A has been worn are:

- Excavating of soil to sample buried drums suspected of containing high concentrations of dioxin.

- Entering a cloud of chlorine to repair a value broken in a railroad accident.

- Handling and moving drums known to contain oleum.

- Responding to accidents involving cyanide, arsenic, and undiluted pesticides.

b. The fully encapsulating suit provides the highest degree of protection to skin, eyes, and respiratory system if the suit material resists chemicals during the time the suit is worn. While Level A provides maximum protection, all suit material may be rapidly permeated and degraded by certain chemicals from extremely high air concentrations, splashes, or immersion of boots or gloves in concentrated liquids or sludges. These limitations should be recognized when specifying the type of fully encapsulating suit. Whenever possible, the suit material should be matched with the substance it is used to protect against.

B. Level B Protection

1. Personnel protective equipment

- Supplied-air respirator (MSHA/NIOSH approved). Respirators may be:

  -- pressure-demand, self-contained breathing apparatus

  or

  -- pressure-demand, airline respirator (with escape bottle for IDLH or potential for IDLH atmosphere)

- Chemical-resistant clothing (overalls and long-sleeved jacket; hooded, one or two-piece chemical-splash suit; disposable chemical-resistant, one-piece suits)
- Long cotton underwear*
- Coveralls*
- Gloves (outer), chemical-resistant
- Gloves (inner), chemical-resistant
- Boots (outer), chemical-resistant, steel toe and shank
- Boot covers (outer), chemical-resistant (disposable)*
- Hard hat (face shield)*
- 2-Way radio communications* (intrinsically safe)

2. Criteria for selection

Meeting any one of these criteria warrants use of Level B protection:

- The type and atmospheric concentration of toxic substances has been identified and requires a high level of respiratory protection, but less skin protection than Level A. These would be atmospheres:

*Optional

-- with concentrations Immediately Dangerous to Life and Health, but substance or concentration in the air does not represent a severe skin hazard

or

-- that do not meet the selection criteria permitting the use of air-purifying respirators.

- The atmosphere contains less than 19.5% oxygen.

- It is highly unlikely that the work being done will generate high concentrations of vapors, gases or particulates, or splashes of material that will affect the skin of personnel wearing Level B protection.

- Atmospheric concentrations of unidentified vapors or gases are indicated by direct readings on instruments such as the FID or PID or similar instruments, but vapors and gases are not suspected of containing high levels of chemicals toxic to skin. (See Appendixes I and II.)

3. Guidance on selection

a. Level B does not afford the maximum skin (and eye) protection as does a fully encapsulating suit since the chemical-resistant clothing is not considered gas, vapor, or particulate tight. However, a good quality, hooded, chemical-resistant, one-piece garment, with taped wrist, ankles, and hood does provides a reasonable degree of protection against splashes and to lower concentrations in air. At most abandoned hazardous waste sites, ambient atmospheric gas or vapor levels have not approached concentrations sufficiently high to warrant Level A protection. In all but a few circumstances (where highly toxic materials are suspected) Level B should provide the protection needed for initial entry. Subsequent operations at a site require a reevaluation of Level B protection based on the probability of being splashed by chemicals, their effect on the skin, the presence of hard-to-detect air contaiminants, or the generation of highly toxic gases, vapors, or particulates, due to the work being done.

b. The chemical-resistant clothing required in Level B is available in a wide variety of styles, materials, construction detail, and permeability. One or two-piece garments are available with or without hoods. Disposal suits with a variety of fabrics and design characteristics are also available. Taping joints between the gloves, boots and suit, and between hood and respirator reduces the possiblity for splash and vapor or gas penetration. These factors and other selection criteria all affect the degree of protection afforded. Therefore, a specialist should select the most effective chemical-resistant clothing based on the known or anticipated hazards and job function.

Level B equipment does provides a high level of protection to the respiratory tract. Generally, if a self-contained breathing apparatus is required for respiratory protection, selecting chemical-resistant clothing (Level B) rather than a fully encapsulating suit (Level A) is based on needing less protection against known or anticipated substances affecting the skin. Level B skin protection is selected by:

- Comparing the concentrations of known or identified substances in air with skin toxicity data.

- Determining the presence of substances that are destructive to or readily absorbed through the skin by liquid splashes, unexpected high levels of gases, vapor, or particulates, or other means of direct contact.

- Assessing the effect of the substance (at its measured air concentrations or potential for splashing) on the small areas left unprotected by chemical-resistant clothing. A hooded garment taped to the mask, and boots and gloves taped to the suit further reduces area of exposure.

c. For initial site entry and reconnaissance at an open site, approaching whenever possible from upwind, Level B protection (with good quality, hooded, chemical-resistant clothing) should protect response personnel, providing the conditions described in selecting Level A are known or judged to be absent.

C. <u>Level C Protection</u>

1. Personnel protective equipment

- Air-purifying respirator, full-face, canister-equipped (MSHA/NIOSH approved)

- Chemical-resistant clothing (coveralls; hooded, one-piece or two-piece chemical splash suit; chemical-resistant hood and apron; disposable chemical-resistant coveralls)

- Coveralls*

- Long cotton underwear*

- Gloves (outer), chemical-resistant

- Gloves (inner), chemical-resistant*

- Boots (outer), chemical-resistant, steel toe and shank

- Boot covers (outer), chemical-resistant (disposable)*

- Hard hat (face shield*)

- Escape mask*

- 2-Way radio communications* (inherently safe)

2. Criteria for selection

Meeting all of these criteria permits use of Level C protection:

- Oxygen concentrations are not less than 19.5% by volume.

- Measured air concentrations of identified substances will be reduced by the respirator below the substance's threshold limit value (TLV) and the concentration is within the service limit of the canister.

- Atmospheric contaminant concentrations do not exceed IDLH levels.

- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any body area left unprotected by chemical-resistant clothing.

- Job functions do not require self-contained breathing apparatus.

- Direct readings are a few ppms above background on instruments such as the FID or PID. (See Appendices I and II.)

3. Guidance on selection

   a. Level C protection is distinguished from Level B by the equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main selection criterion for Level C is that conditions permit wearing air-purifying respirators.

   The air-purifying device must be a full-face respirator (MSHA/NIOSH approved) equipped with a canister suspended from the chin or on a harness. Canisters must be able to

*Optional

remove the substances encountered. Quarter-or half-masks or cheekcartridge, full-face masks should be used only with the approval of a qualified individual.

In addition, a full-face, air-purifying mask can be used only if:

- Substance has adequate warning properties.
- Individual passes a qualitative fit-test for the mask.
- Appropriate cartridge/canister is used, and its service limit concentration is not exceeded.

b. An air surveillance program is part of all response operations when atmospheric contamination is known or suspected. It is particularly important that the air be thoroughly monitored when personnel are wearing air-purifying respirators. Periodic surveillance using direct-reading instruments and air sampling is needed to detect any changes in air quality necessitating a higher level of respiratory protection.

c. Level C protection with a full-face, air-purifying respirator should be worn routinely in an atmosphere only after the type of air contaminant is identified, concentrations measured and the criteria for wearing air-purifying respirator met. To permit flexibility in precribing a Level of Protection at certain environmental incidents, a specialist could consider using air-purifying respirators in unidentified vapor/gas concentrations of a few parts per million above background as indicated by a needle deflection on the FID or PID. However a needle deflection of a few parts per million above background should not be the sole criterion for selecting Level C. Since the individual components may never be completely identified, a decision on continuous wearing of Level C must be made after assessing all safety considerations, including:

- The presence of (or potential for) organic or inorganic vapors/gases against which a canister is ineffective or has a short service life.
- The known (or suspected) presence in air of substances with low TLVs or IDLH levels.
- The presence of particulates in air.
- The errors associated with both the instruments and monitoring procedures used.

*Optional

- The presence of (or potential for) substances in air which do not elicit a response on the instrument used.

- The potential for higher concentrations in the ambient atmosphere or in the air adjacent to specific site operations.

d. The continuous use of air-purifying respirators (Level C) must be based on the identification of the substances contributing to the total vapor or gas concentration and the application of published criteria for the routine use of air-purifying devices. Unidentified ambient concentrations of organic vapors or gases in air approaching or exceeding a few ppm above background require, as a minimum, Level B protection.

D. Level D Protection

1. Personnel protective equipment

- Coveralls

- Gloves*

- Boots/shoes, leather or chemical-resistant, steel toe and shank

- Safety glasses or chemical splash goggles*

- Hard hat (face shield)*

2. Criteria for selection

Meeting any of these criteria allows use of Level D protection:

- No contaminants are present.

- Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

Level D protection is primarily a work uniform. It can be worn only in areas where there is no possibility of contact with contamination.

III. PROTECTION IN UNKNOWN ENVIRONMENTS

In all incident response, selecting the appropriate personnel protection equipment is one of the first steps in reducing health effects from toxic substances. Until the toxics hazards at an environmental incident can be identified and personnel safety measures commensurate with the hazards instituted, preliminary measures will have to be based on experience, judgment, and professional knowledge. One of the first concerns in evaluating an unknown situation is atmospheric hazards. Toxic concentrations (or potential concentrations) of vapors, gases, and particulates; low oxygen content explosive potential and, to a lesser degree, the possibility of radiation exposure all represent immediate atmospheric hazards. In addition to making air measurements to determine these hazards, visual observation and review of existing data can help determine the potential risks from other materials.

Once immediate hazards, other than toxic substances have been eliminated, the initial on-site survey and reconnaissance, which may consist of more than one entry, continues. Its purpose is to further characterize toxic hazards and, based on these findings, refine preliminary safety requirements. As data are obtained from the initial survey, the Level of Protection and other safety procedures are adjusted. Initial data also provide information on which to base further monitoring and sampling. No one method can determine a Level of Protection in all unknown environments. Each situation must be examined individually.

APPENDIX J

DOFFING PROCEDURES

(Excerpted from "Standard Operating Safety Guidelines," 1984, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency)

PART 7

SITE CONTROL - DECONTAMINATION

I. INTRODUCTION

Personnel responding to hazardous substance incidents may become contaminated in a number of ways including:

- Contacting vapors, gases, mists, or particulates in the air.
- Being splashed by materials while sampling or opening containers.
- Walking through puddles of liquids or on contaminated soil.
- Using contaminated instruments or equipment.

Protective clothing and respirators help prevent the wearer from becoming contaminated or inhaling contaminants; while good work practices help reduce contamination on protective clothing, instruments, and equipment.

Even with these safeguards, contamination may occur. Harmful materials can be transferred into clean areas, exposing unprotected personnel. In removing contaminated clothing, personnel may contact contaminants on the clothing or inhale them. To prevent such occurrences, methods to reduce contamination, and decontamination procedures must be developed and established before anyone enters a site and must continue (modified when necessary) throughout site operations.

Decontamination consists of physically removing contaminants or changing their chemical nature to innocuous substances. How extensive decontamination must be depends on a number of factors, the most important being the type of contaminants involved. The more harmful the contaminant, the more extensive and thorough decontamination must be. Less harmful contaminants may require less decontamination.

Combining decontamination, the correct method of doffing personnel protective equipment, and the use of site work zones minimizes cross-contamination from protective clothing to wearer, equipment to personnel, and one area to another. Only general guidance can be given on methods and techniques for decontamination. The exact procedure to use must be determined after evaluating a number of factors specific to the incident.

II. PRELIMINARY CONSIDERATIONS

A. Initial Planning

The initial decontamination plan assumes all personnel and equipment leaving the Exclusion Zone (area of potential contamination) are grossly contaminated. A system is then set up for personnel decontamination to wash and rinse, at least once, all the protective equipment worn. This is done in combination with a sequential doffing of protective equipment, starting at the first station with the most heavily contaminated item and progressing to the last station with the least contaminated article. Each piece precedure requires a separate station.

The spread of contaminants during the washing/doffing process is further reduced by separating each decontamination station by a minimum of 3 feet. Ideally, contamination should decrease as a person moves from one station to another further along in the line.

While planning site operations, methods should be developed to prevent the contamination of people and equipment. For example, using remote sampling techniques, not opening containers by hand, bagging monitoring instruments, using drum grapplers, watering down dusty areas, and not walking through areas of obvious contamination would reduce the probability of becoming contaminated and require a less elaborate decontamination procedure.

The initial decontamination plan is based on a worst-case situation or assumes no information is available about the incident. Specific conditions at the site are then evaluated, including:

- Type of contaminant.

- The amount of contamination.

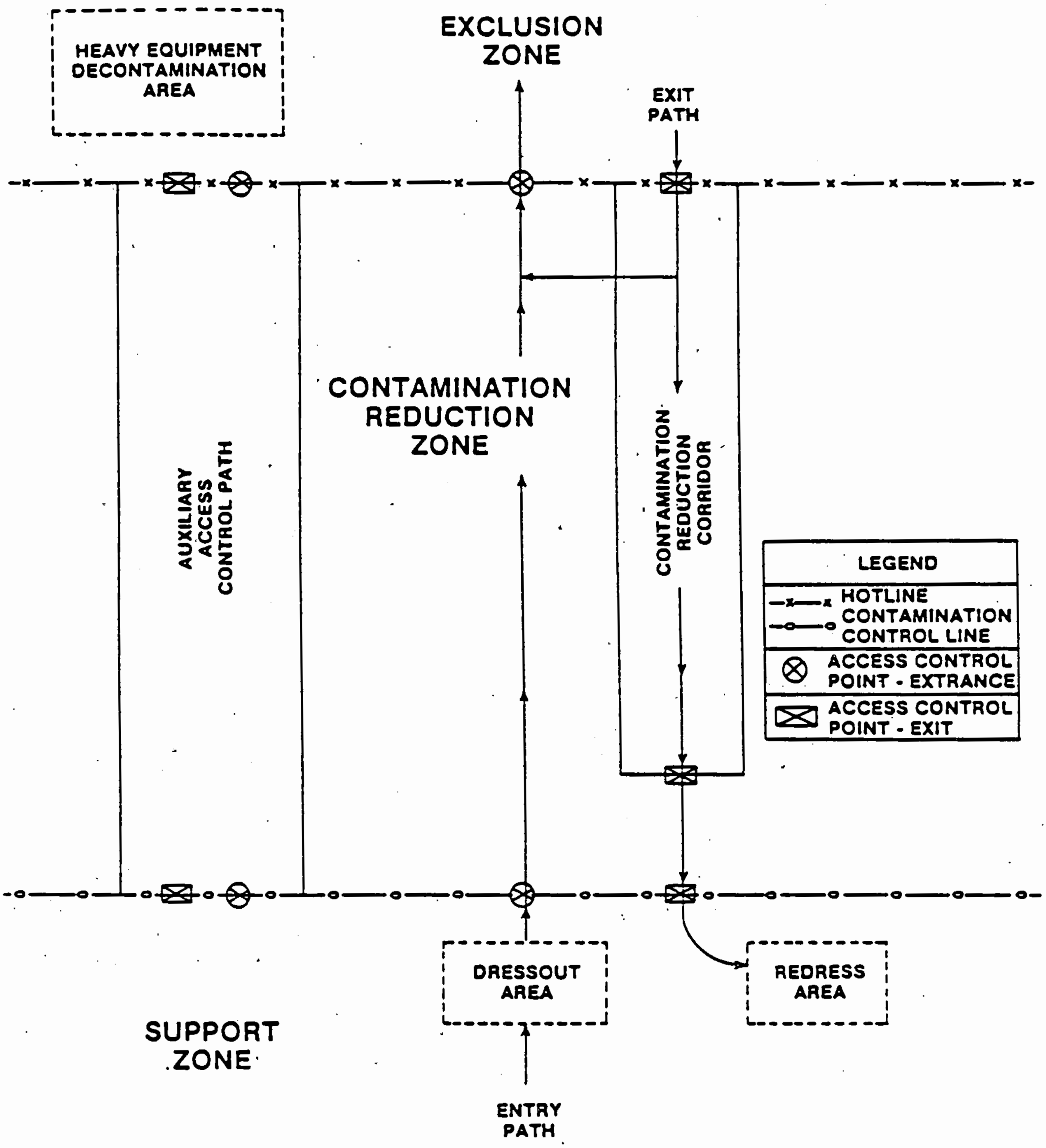
- Levels of protection required.

- Type of protective clothing worn.

The initial decontamination plan is modified, eliminating unnecessary stations or otherwise adapting it to site conditions. For instance, the initial plan might require a complete wash and rinse of chemical protective garments. If disposable garments are worn, the wash/rinse step could be omitted. Wearing disposable boot covers and gloves could eliminate washing and rinsing these items and reduce the number of stations needed.

B. Contamination Reduction Corridor

An area within the Contamination Reduction Zone is designated the Contamination Reduction Corridor (CRC). The CRC controls access into and out of the Exclusion Zone and confines decontamination activities to a limited area. The size of the corridor depends on the number of stations in the decontamination procedure,



CONTAMINATION REDUCTION ZONE LAYOUT
FIGURE 7-1

overall dimensions of work control zones, and amount of space available at the site. A corridor of 75 feet by 15 feet should be adequate for full decontamination. Whenever possible, it should be a straight path.

The CRC boundaries should be conspicuously marked, with entry and exit restricted. The far end is the hotline - the boundary between the Exclusion Zone and the Contamination Reduction Zone. Personnel exiting the Exclusion Zone must go through the CRC. Anyone in the CRC should be wearing the Level of Protection designated for the decontamination crew. Another corridor may be required for heavy equipment needing decontamination. Within the CRC, distinct areas are set aside for decontamination of personnel, portable field equipment, removed clothing, etc. These areas should be marked and personnel restricted to those wearing the appropriate Level of Protection. All activities within the corridor are confined to decontamination.

Personnel protective clothing, respirators, monitoring equipment, and sampling supplies are all maintained outside of the CRC. Personnel don their protective equipment away from the CRC and enter the Exclusion Zone through a separate access control point at the hotline.

III. EXTENT OF DECONTAMINATION REQUIRED

A. Modifications of Initial Plan

The original decontamination plan must be adapted to specific conditions found at incidents. These conditions may require more or less personnel decontamination than planned, depending on a number of factors.

1. Type of Contaminant

The extent of personnel decontamination depends on the effects the contaminants have on the body. Contaminants do not exhibit the same degree of toxicity (or other hazard). Whenever it is known or suspected that personnel can become contaminated with highly toxic or skin-destructive substances, a full decontamination procedure should be followed. If less hazardous materials are involved, the procedure can be downgraded.

2. Amount of Contamination

The amount of contamination on protective clothing is usually determined visually. If it is badly contaminated, a thorough decontamination is generally required. Gross material remaining on the protective clothing for any extended period of time may degrade or permeate it. This likelihood increases with higher air concentrations and greater amounts of liquid contamination. Gross contamination also increases the probability of personnel contact. Swipe tests may help determine the type and quantity of surface contaminants.

3. Level of Protection

The Level of Protection and specific pieces of clothing worn determine on a preliminary basis the layout of the decontamination line. Each Level of Protection incorporates different problems in decontamination and doffing of the equipment. For example: decontamination of the harness straps and backpack assembly of the self-contained breathing apparatus is difficult. A butyl rubber apron worn over the harness makes decontamination easier. Clothing variations and different Levels of Protection may require adding or deleting stations in the original decontamination procedure.

4. Work Function

The work each person does determines the potential for contact with hazardous materials. In turn, this dictates the layout of the decontamination line. For example, observers, photographers, operators of air samplers, or others in the Exclusion Zone performing tasks that will not bring them in contact with contaminants may not need to have their garments washed and rinsed. Others in the Exclusion Zone with a potential for direct contact with the hazardous material will require more thorough decontamination. Different decontamination lines could be set up for different job functions, or certain stations in a line could be omitted for personnel performing certain tasks.

5. Location of Contamination

Contamination on the upper areas of protective clothing poses a greater risk to the worker because volatile compounds may generate a hazardous breathing concentration both for the worker and for the decontamination personnel. There is also an increased probability of contact with skin when doffing the upper part of clothing.

6. Reason for Leaving Site

The reason for leaving the Exclusion Zone also determines the need and extent of decontamination. A worker leaving the Exclusion Zone to pick up or drop off tools or instruments and immediately returning may not require decontamination. A worker leaving to get a new air cylinder or to change a respirator or canister, however, may require some degree of decontamination. Individuals departing the CRC for a break, lunch, or at the end of day, must be thoroughly decontaminated.

B. Effectiveness of Decontamination

There is no method to immediately determine how effective decontamination is in removing contaminants. Discolorations, stains, corrosive effects, and substances adhering to objects may indicate contaminants have not been removed. However, observable effects only indicate surface contamination and not permeation (absorption) into clothing. Also many contaminants are not easily observed.

A method for determining effectiveness of surface decontamination is swipe testing. Cloth or paper patches - swipes - are wiped over predetermined surfaces of the suspect object and analyzed in a laboratory. Both the inner and outer surfaces of protective clothing should be swipe tested. Positive indications of both sets of swipes would indicate surface contamination has not been removed and substances have penetrated or permeated through the garment. Swipe tests can also be done on skin or inside clothing. Permeation of protective garments requires laboratory analysis of a piece of the material. Both swipe and permeation testing provide after-the-fact information. Along with visual observations, results of these tests can help evaluate the effectiveness of decontamination.

C. Equipment

Decontamination equipment, materials, and supplies are generally selected based on availability. Other considerations are ease of equipment decontamination or disposability. Most equipment and supplies can be easily procured. For example, soft-bristle scrub brushes or long-handle brushes are used to remove contaminants. Water in buckets or garden sprayers is used for rinsing. Large galvanized wash tubs or stock tanks can hold wash and rinse solutions. Children's wading pools can also be used. Large plastic garbage cans or other similar containers lined with plastic bags store contaminated clothing and equipment. Contaminated liquids can be stored temporarily in metal or plastic cans or drums. Other gear includes paper or cloth towels for drying protective clothing and equipment.

D. Decontamination Solution

Personnel protective equipment, sampling tools, and other equipment are usually decontaminated by scrubbing with detergent-water using a soft-bristle brush followed by rinsing with copious amounts of water. While this process may not be fully effective in removing some contaminants (or in a few cases, contaminants may react with water), it is a relatively safe option compared with using a chemical decontaminating solution. This requires that the contaminant be identified. A decon chemical is then needed that will change the contaminant into a less harmful substance. Especially troublesome are unknown substances or mixtures from a variety of known or unknown substances. The appropriate decontamination solution must be selected in consultation with an experienced chemist.

E. Establishment of Procedures

Once decontamination procedures have been established, all personnel requiring decontamination must be given precise instructions (and practice, if necessary). Compliance must be frequently checked. The time it takes for decontamination must be ascertained. Personnel wearing SCBA's must leave their work area with sufficient air to walk to CRC and go through decontamination.

IV. DECONTAMINATION DURING MEDICAL EMERGENCIES

A. Basic Considerations

Part of overall planning for incident response is managing medical emergencies. The plan should provide for:

- Some response team members fully trained in first aid and CPR.
- Arrangements with the nearest medical facility for transportation and treatment of injured, and for treatment of personnel suffering from exposure to chemicals.
- Consultation services with a toxicologist.
- Emergency eye washes, showers, and/or wash stations.
- First aid kits, blankets, stretcher, and resuscitator.

In addition, the plan should establish methods for decontaminating personnel with medical problems and injuries. There is the possibility that the decontamination may aggravate or cause more serious health effects. If prompt life-saving first aid and medical treatment is required, decontamination procedures should be omitted. Whenever possible, response personnel should accompany contaminated victims to the medical facility to advise on matters involving decontamination.

B. Physical Injury

Physical injuries can range from a sprained ankle to a compound fracture, from a minor cut to massive bleeding. Depending on the seriousness of the injury, treatment may be given at the site by trained response personnel. For more serious injuries, additional assistance may be required at the site or the victim may have to be treated at a medical facility.

Life-saving care should be instituted immediately without considering decontamination. The outside garments can be removed (depending on the weather) if they do not cause delays, interfere with treatment, or aggravate the problem. Respirators and backpack assemblies must always be removed. Fully encapsulating suits or chemical-resistant clothing can be cut away. If the outer contaminated garments cannot be safely removed, the individual should be wrapped in plastic, rubber, or blankets to help prevent contaminating the inside of ambulances and medical personnel. Outside garments are then removed at the medical facility. No attempt should be made to wash or rinse the victim at the site. One exception would be if it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life. For minor medical problems or injuries, the normal decontamination procedure should be followed.

C. Heat Stress

Heat-related illnesses range from heat fatigue to heat stroke, the most serious. Heat stroke requires prompt treatment to prevent irreversible damage or death. Protective clothing may have to be cut off. Less serious forms of heat stress require prompt attention or they may lead to a heat stroke. Unless the victim is obviously contaminated, decontamination should be omitted or minimized and treatment begun immediately.

D. Chemical Exposure

Exposure to chemicals can be divided into two categories:

- Injuries from direct contact, such as acid burns or inhalation of toxic chemicals.

- Potential injury due to gross contamination on clothing or equipment.

For inhaled contaminants treatment can only be by qualified physicians. If the contaminant is on the skin or in the eyes, immediate measures must be taken to counteract the substance's effect. First aid treatment usually is flooding the affected area with water; however, for a few chemicals, water may cause more severe problems.

When protective clothing is grossly contaminated, contaminants may be transferred to treatment personnel or the wearer and cause injuries. Unless severe medical problems have occurred simultaneously with splashes, the protective clothing should be washed off as rapidly as possible and carefully removed.

V. PROTECTION FOR DECONTAMINATION WORKERS

The Level of Protection worn by decontamination workers is determined by:

- Expected or visible contamination on workers.
- Type of contaminant and associated respiratory and skin hazards.
- Total vapor/gas concentrations in the CRC.
- Particulates and specific inorganic or organic vapors in the CRC.
- Results of swipe tests.

A. Level C Use

Level C includes a full-face, canister-type air-purifying respirator, hard hat with face shield (if splash is a problem), chemical-resistant boots and gloves, and protective clothing. The body covering recommended is chemical-resistant overalls with an apron, or chemical-resistant overalls and jacket.

A face shield is recommended to protect against splashes because respirators alone may not provide this protection. The respirator should have a canister approved for filtering any specific known contaminants such as ammonia, organic vapors, acid gases, and particulates.

B. Level B Use

In situations where site workers may be contaminated with unknowns, highly volatile liquids, or highly toxic materials, decontamination workers should wear Level B protection.
Level B protection includes SCBA, hard hat with face shield, chemical-resistant gloves, and protective covering. The clothing suggested is chemical-resistant overalls, jacket, and a rubber apron. The rubber apron protects the SCBA harness assembly and regulator from becoming contaminated.

VI. DECONTAMINATION OF EQUIPMENT

Insofar as possible, measures should be taken to prevent contamination of sampling and monitoring equipment. Sampling devices become contaminated, but monitoring instruments, unless they are splashed, usually do not. Once contaminated, instruments are difficult to clean without damaging them. Any delicate instrument which cannot be easily decontaminated should be protected while it is being used. It should be placed in a clear plastic bag, and the bag taped and secured around the instrument. Openings are made in the bag for sample intake.

A. Decontamination Procedures

1. Sampling devices

Sampling devices require special cleaning. The EPA Regional Laboratories can provide information on proper decontamination methods.

2. Tools

Wooden tools are difficult to decontaminate because they absorb chemicals. They should be kept on site and handled only by protected workers. At the end of the response, wooden tools should be discarded. For decontaminating other tools, Regional Laboratories should be consulted.

3. Respirators

Certain parts of contaminated respirators, such as the harness assembly and leather or cloth components, are difficult to decontaminate. If grossly contaminated, they may have to be discarded. Rubber components can be soaked in soap and water and scrubbed with a brush. Regulators must be maintained according to manufacturer's recommendations. Persons responsible for decontaminating respirators should be thoroughly trained in respirator maintenance.

4. Heavy Equipment

Bulldozers, trucks, back-hoes, bulking chambers, and other heavy equipment are difficult to decontaminate. The method generally used is to wash them with water under high pressure and/or to scrub accessible parts with detergent/water solution under pressure, if possible. In some cases, shovels, scoops, and lifts have been sand blasted or steam cleaned. Particular care must be given to those components in direct contact with contaminants such as tires and scoops. Swipe tests should be utilized to measure effectiveness.

B. Sanitizing of Personnel Protective Equipment

Respirators, reusable protective clothing, and other personal articles not only must be decontaminated before being reused, but also sanitized. The inside of masks and clothing becomes soiled due to exhalation, body oils, and perspiration. The manufacturer's instructions should be used to sanitize the respirator mask. If practical, protective clothing should be machine washed after a thorough decontamination; otherwise it must be cleaned by hand.

C. Persistent Contamination

In some instances, clothing and equipment will become contaminanted with substances that cannot be removed by normal decontamination procedures. A solvent may be used to remove such contamination from equipment if it does not destroy or degrade the protective material. If persistent contamination is expected, disposable garments should be used. Testing for persistent contamination of protective clothing and appropriate decontamination must be done by qualified laboratory personnel.

D. Disposal of Contaminated Materials

All materials and equipment used for decontamination must be disposed of properly. Clothing, tools, buckets, brushes, and all other equipment that is contaminated must be secured in drums or other containers and labeled. Clothing not completely decontaminated on-site should be secured in plastic bags before being removed from the site.

Contaminated wash and rinse solutions should be contained by using step-in-containers (for example, child's wading pool) to hold spent solutions. Another containment method is to dig a trench about 4 inches deep and line it with plastic. In both cases the spent solutions are transferred to drums, which are labeled and disposed of with other substances on site.

VII. ANNEXES

Annex 1, 2, and 3 describe basic decontamination procedures for a worker wearing Level A, B, or C protection. The basic decontamination lines (Situation 1), consisting of approximately 19 stations, are almost identical except for changes necessitated by different protective clothing or respirators. For each annex, three specific situations are described in which the basic (or full decontamination) procedure is changed to take into account differences in the extent of contamination, the accompanying changes in equipment worn, and other factors. The situations illustrate decontamination setups based on known or assumed conditions at an incident. Many other variations are possible.

Annex 4 describes a minimum layout for Level A personnel decontamination. The number of individual stations have been reduced. Although the decontamination equipment and amount of space required is less than needed in the procedures previously described, there is also a much higher probability of cross-contamination.

ANNEX 1

LEVEL A DECONTAMINATION

A. EQUIPMENT WORN

The full decontamination procedure outlined is for workers wearing Level A protection (with taped joints between gloves, boots, and suit) consisting of:

- Fully encapsulating suit.
- Self-contained breathing apparatus.
- Hard hat (optional).
- Chemical-resistant, steel toe and shank boots.
- Boot covers.
- Inner and outer gloves.

B. PROCEDURE FOR FULL DECONTAMINATION

Station 1: Segregated Equipment Drop

Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross-contamination.

Equipment: various size containers
plastic liners
plastic drop cloths

Station 2: Boot Cover and Glove Wash

Scrub outer boot covers and gloves with decon solution or detergent/water.

Equipment: container (20-30 gallons)
decon solution
or
detergent water
2-3 long-handle, soft-bristle scrub brushes

Station 3: Boot Cover and Glove Rinse

Rinse off decon solution from Station 2 using copious amounts of water. Repeat as many times as necessary.

Equipment: container (30-50 gallons)
or
high-pressure spray unit
water
2-3 long-handle, soft-bristle scrub brushes

Station 4: Tape Removal

Remove tape around boots and gloves and deposit in container with plastic liner.

Equipment: container (20-30 gallons)
plastic liners

Station 5: Boot Cover Removal

Remove boot covers and deposit in container with plastic liner.

Equipment: container (30-50 gallons)
plastic liners
bench or stool

Station 6: Outer Glove Removal

Remove outer gloves and deposit in container with plastic liner.

Equipment: container (20-30 gallons)
plastic liners

Station 7: Suit/Safety Boot Wash

Thoroughly wash fully encapsulating suit and boots. Scrub suit and boots with long-handle, soft-bristle scrub brush and copious amounts of decon solution or detergent/water. Repeat as many times as necessary.

Equipment: container (30-50 gallons)
decon solution
or
detergent/water
2-3 long-handle, soft-bristle scrub brushes

Station 8: Suit/Safety Boot Rinse

Rinse off decon solution or detergent/water using copious amounts of water. Repeat as many times as necessary.

Equipment: container (30-50 gallons)
or
high-pressure spray unit
water
2-3 long handle, soft-bristle scrub brushes

Station 9: Tank Change

If worker leaves Exclusion Zone to change air tank, this is the last step in the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boots covers donned, and joints taped. Worker then returns to duty.

Equipment: air tanks
tape
boot covers
gloves

Station 10: Safety Boot Removal

Remove safety boots and deposit in container with plastic liner.

Equipment: container (30-50 gallons)
plastic liners
bench or stool
boot jack

Station 11: Fully Encapsulating Suit and Hard Hat Removal

With assistance of helper, remove fully encapsulating suit (and hard hat). Hang suits on rack or lay out on drop cloths.

Equipment: rack
drop cloths
bench or stool

Station 12: SCBA Backpack Removal

While still wearing facepiece, remove backpack and place on table. Disconnect hose from regulator valve and proceed to next station.

Equipment: table

Station 13: Inner Glove Wash

Wash with decon solution or detergent/water that will not harm skin. Repeat as many times as necessary.

Equipment: basin or bucket
decon solution
or
detergent/water
small table

Station 14: Inner Glove Rinse

Rinse with water. Repeat as many times as necessary.

Equipment: water basin
basin or bucket
small table

Station 15: Facepiece Removal

Remove facepiece. Deposit in container with plastic liner. Avoid touching face with fingers.

Equipment: container (30-50 gallons)
plastic liners

Station 16: Inner Glove Removal

Remove inner gloves and deposit in container with plastic liner.

Equipment: container (20-30 gallons)
plastic liners

Station 17: Inner Clothing Removal

Remove clothing soaked with perspiration. Place in container with plastic liner. Inner clothing should be removed as soon as possible since there is a possibility that small amounts of contaminants might have been transferred in removing fully encapsulating suit.

Equipment: container (30-50 gallons)
plastic liners

Station 18: Field Wash

Shower if highly toxic, skin-corrosive or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available.

Equipment: water
soap
small table
basin or bucket
field showers
towels

Station 19: Redress

Put on clean clothes. A dressing trailer is needed in inclement weather.

Equipment: tables
chairs
lockers
clothes

C. FULL DECONTAMINATION (SIT. 1) AND THREE MODIFICATIONS

SIT	STATION NUMBER																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
2	X	X	X	X	X	X	X	X	X										
3	X						X	X		X	X	X			X	X	X	X	
4	X						X	X	X										

Situation 1: The individual entering the Contamination Reduction Corridor is observed to be grossly contaminated or extremely toxic substances are known or suspected to be present.

Situation 2: Same as Situation 1 except individual needs new air tank and will return to Exclusion Zone.

Situation 3: Individual entering the CRC is expected to be minimally contaminated. Extremely toxic or skin-corrosive materials are not present. No outer gloves or boot covers are worn. Inner gloves are not contaminated.

Situation 4: Same as Situation 3 except individual needs new air tank and will return to Exclusion Zone.

ANNEX 2

LEVEL B DECONTAMINATION

A. EQUIPMENT WORN

The full decontamination procedure outlined is for workers wearing Level B protection (with taped joints between gloves, boot, and suit) consisting of:

- One-piece, hooded, chemical-resistant splash suit.
- Self-contained breathing apparatus.
- Hard hat.
- Chemical-resistant, steel toe and shank boots.
- Boot covers
- Inner and outer gloves.

B. PROCEDURE FOR FULL DECONTAMINATION

Station 1: Segregated Equipment Drop

Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross-contamination.

Equipment: various size containers
plastic liners
plastic drop cloths

Station 2: Boot Cover and Glove Wash

Scrub outer boot covers and gloves with decon solution or detergent/water.

Equipment: container (20-30 gallons)
decon solution
or
detergent water
2-3 long-handle, soft-bristle scrub brushes

Station 3: Boot Cover and Glove Rinse

Rinse off decon solution from Station 2 using copious amounts of water. Repeat as many times as necessary.

Equipment: container (30-50 gallons)
or
high-pressure spray unit
water
2-3 long-handle, soft-bristle scrub brushes

Station 4: Tape Removal

Remove tape around boots and gloves and deposit in container with plastic liner.

Equipment: container (20-30 gallons)
plastic liners

Station 5: Boot Cover Removal

Remove boot covers and deposit in container with plastic liner.

Equipment: container (30-50 gallons)
plastic liners
bench or stool

Station 6: Outer Glove Removal

Remove outer gloves and deposit in container with plastic liner.

Equipment: container (20-30 gallons
plastic liners

Station 7: Suit/Safety Boot Wash

Thoroughly wash chemical-resistant splash suit, SCBA, gloves, and safety boots. Scrub with long-handle, soft-bristle scrub brush and copious amounts of decon solution or detergent/water. Wrap SCBA regulator (if belt-mounted type) with plastic to keep out water. Wash backpack assembly with sponges or cloths.

Equipment: container (30-50 gallons)
decon solution
or
detergent/water
2-3 long-handle, soft-bristle scrub brushes
small buckets
sponges or cloths

Station 8: Suit/SCBA/Boot/Glove Rinse

Rinse off decon solution or detergent/water using copious amounts of water. Repeat as many times as necessary.

Equipment: container (30-50 gallons)
or
high-pressure spray unit
water
small buckets
2-3 long-handle, soft-bristle scrub brushes
sponges or cloths

Station 9: Tank Change

If worker leaves Exclusion Zone to change air tank, this is the last step in the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boots covers donned, and joints taped. Worker returns to duty.

Equipment: air tanks
tape
boot covers
gloves

Station 10: Safety Boot Removal

Remove safety boots and deposit in container with plastic liner.

Equipment: container (30-50 gallons)
plastic liners
bench or stool
boot jack

Station 11: SCBA Backpack Removal

While still wearing facepiece, remove backpack and place on table. Disconnect hose from regulator valve and proceed to next station.

Equipment: table

Station 12: Splash Suit Removal

With assistance of helper, remove splash suit. Deposit in container with plastic liner.

Equipment: container (30-50 gallons)
plastic liners
bench or stool

Station 13: Inner Glove Wash

Wash inner gloves with decon solution or detergent/water that will not harm skin. Repeat as many times as necessary.

Equipment: decon solution
or
detergent/water
basin or bucket
small table

Station 14: Inner Glove Rinse

Rinse inner gloves with water. Repeat as many times as necessary.

Equipment: water
basin or bucket
small table

Station 15: Facepiece Removal

Remove facepiece. Avoid touching face with gloves. Deposit in container with plastic liner.

Equipment: container (30-50 gallons)
plastic liners

Station 16: Inner Glove Removal

Remove inner gloves and deposit in container with plastic liner.

Equipment: container (20-30 gallons)
plastic liners

Station 17: Inner Clothing Removal

Remove clothing soaked with perspiration. Place in container with plastic liner. Do not wear inner clothing off-site since there is a possibility small amounts of contaminants might have been transferred in removing fully encapsulating suit.

Equipment: container (30-50 gallons)
plastic liners

Station 18: Field Wash

Shower if highly toxic, skin-corrosive, or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available.

Equipment: water
soap
small tables
basins or buckets
field showers

Station 19: Redress

Put on clean clothes. A dressing trailer is needed in inclement weather.

Equipment: tables
chairs
lockers
clothes

C. FULL DECONTAMINATION (SIT. 1) AND THREE MODIFICATIONS

SIT	STATION NUMBER																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
2	X	X	X	X	X	X	X	X	X										
3	X						X	X		X	X	X			X	X	X	X	X
4	X						X	X	X										

Situation 1: The individual entering the Contamination Reduction Corridor is observed to be grossly contaminated or extremely toxic substances are known or suspected to be present.

Situation 2: Same as Situation 1 except individual needs new air tank and will return to Exclusion Zone.

Situation 3: Individual entering the CRC is expected to be minimally contaminated. Extremely toxic or skin-corrosive materials are not present No outer gloves or boot covers are worn. Inner gloves are not contaminated.

Situation 4: Same as Situation 3 except individual needs new air tank and will return to Exclusion Zone.

ANNEX 3

LEVEL C DECONTAMINATION

A. EQUIPMENT WORN

The full decontamination procedure outlined is for workers wearing Level C protection (with taped joints between gloves, boots, and suit) consisting of:

- One-piece, hooded, chemical-resistant splash suit.
- Canister equipped, full-face mask.
- Hard hat.
- Chemical-resistant, steel toe and shank boots.
- Boot covers.
- Inner and outer gloves.

B. PROCEDURE FOR FULL DECONTAMINATION

Station 1: Segregated Equipment Drop

Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross-contamination.

Equipment: various size containers
plastic liners
plastic drop cloths

Station 2: Boot Cover and Glove Wash

Scrub outer boot covers and gloves with decon solution or detergent/water.

Equipment: container (20-30 gallons)
decon solution
or
detergent water
2-3 long-handle, soft-bristle scrub brushes

Station 3: Boot Cover and Glove Rinse

Rinse off decon solution from Station 2 using copious amounts of water. Repeat as many times as necessary.

Equipment: container (30-50 gallons)
or
high-pressure spray unit
water
2-3 long-handle, soft bristle scrub brushes

Station 4: Tape Removal

Remove tape around boots and gloves and deposit in container with plastic liner.

Equipment: container (20-30 gallons)
plastic liners

Station 5: Boot Cover Removal

Remove boot covers and deposit in container with plastic liner.

Equipment: container (30-50 gallons)
plastic liners
bench or stool

Station 6: Outer Glove Removal

Remove outer gloves and deposit in container with plastic liner.

Equipment: container (20-30 gallons)
plastic liners

Station 7: Suit/Safety Boot Wash

Thoroughly wash splash suit and safety boots. Scrub with long-handle, soft-bristle scrub brush and copious amounts of decon solution or detergent/water. Repeat as many times as necessary.

Equipment: container (30-50 gallons)
decon solution
or
detergent/water
2-3 long-handle, soft-bristle scrub brushes

Station 8: Suit/Safety Boot Rinse

Rinse off decon solution or detergent/water using copious amounts of water. Repeat as many times as necessary.

Equipment: container (30-50 gallons)
or
high-pressure spray unit
water
2-3 long-handle, soft-bristle scrub brushes

Station 9: Canister or Mask Change

If worker leaves Exclusion Zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boots covers donned, and joints taped. Worker returns to duty.

Equipment: canister (or mask)
tape
boot covers
gloves

Station 10: Safety Boot Removal

Remove safety boots and deposit in container with plastic liner.

Equipment: container (30-50 gallons)
plastic liners
bench or stool
boot jack

Station 11: Splash Suit Removal

With assistance of helper, remove splash suit. Deposit in container with plastic liner.

Equipment: container (30-50 gallons)
bench or stool
liner

Station 12: Inner Glove Wash

Wash inner gloves with decon solution or detergent/water that will not harm skin. Repeat as many times as necessary.

Equipment: decon solution
or
detergent/water
basin or bucket

Station 13: Inner Glove Rinse

Rinse inner gloves with water. Repeat as many times as necessary.

Equipment: water
basin or bucket
small table

Station 14: Facepiece Removal

Remove facepiece. Avoid touching face with gloves. Deposit facepiece in container with plastic liner.

Equipment: container (30-50 gallons)
plastic liners

Station 15: Inner Glove Removal

Remove inner gloves and deposit in container with plastic liner.

Equipment: container (20-30 gallons)
plastic liners

Station 16: Inner Clothing Removal

Remove clothing soaked with perspiration. Place in container with plastic liner. Do not wear inner clothing off-site since there is a possibility small amounts of contaminants might have been transferred in removing splash suite.

Equipment: container (30-50 gallons)
plastic liners

Station 17: Field Wash

Shower if highly toxic, skin-corrosive or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available.

Equipment: water
soap
tables
wash basins/buckets
field showers

Station 18: Redress

Put on clean clothes. A dressing trailer is needed in inclement weather.

Equipment: tables
chairs
lockers
clothes

C. FULL DECONTAMINATION (SIT. 1) AND THREE MODIFICATIONS

SIT	STATION NUMBER																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	X	X	X	X	X	X	X	X	X									
3	X						X	X		X	X			X	X	X	X	
4	X						X	X	X									

Situation 1: The individual entering the Contamination Reduction Corridor is observed to be grossly contaminated or extremely skin corrosive substances are known or suspected to be present.

Situation 2: Same as Situation 1 except individual needs new canister or mask and will return to Exclusion Zone.

Situation 3: Individual entering the CRC is expected to be minimally contaminated. Extremely skin-corrosive materials are not present. No outer gloves or boot covers are worn. Inner gloves are not contaminated.

Situation 4: Same as Situation 3 except individual needs new canister or mask and will return to Exclusion Zone.

ANNEX 4

LEVEL A DECONTAMINATION, MINIMUM LAYOUT

A. EQUIPMENT WORN

The decontamination procedure outlined is for workers wearing Level A protection (with taped joints between gloves, boots, and suit) consisting of:

- Fully encapsulating suit with integral boots and gloves.
- Self-contained breathing apparatus.
- Hard hat (optional).
- Chemical-resistant, steel toe and shank boots.
- Boot covers.
- Inner and outer gloves.

B. PROCEDURE FOR FULL DECONTAMINATION

Station 1: Segregated Equipment Drop

Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross-contamination.

Equipment: various size containers
plastic liners
plastic drop clothes

Station 2: Outer Garment, Boots, and Gloves Wash and Rinse

Scrub outer boots, outer gloves, and fully-encapsulating suit with decon solution or detergent water. Rinse off using copious amounts of water.

Equipment: containers (30-50 gallons)
decon solution
or
detergent water

rinse water
2-3 long-handle, soft-bristle scrub brushes

Station 3: Outer Boot and Glove Removal

Remove outer boots and gloves. Deposit in container with plastic liner.

Equipment: container (30-50 gallons)
plastic liners
bench or stool

Station 4: Tank Change

If worker leaves Exclusion Zone to change air tank, this is the last step in the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.

Equipment: air tanks
tape
boot covers
gloves

Station 5: Boot, Gloves, and Outer Garment Removal

Boots, fully-encapsulating suit, and inner gloves removed and deposited in separate containers lined with plastic.

Equipment: containers (30-50 gallons)
plastic liners
bench or stool

Station 6: SCBA Removal

SCBA backpack and facepiece is removed. Hands and face are thoroughly washed. SCBA deposited on plastic sheets.

Equipment: plastic sheets
basin or bucket
soap and towels
bench

Station 7: Field Wash

Thoroughly wash hands and face. Shower as soon as possible.

Equipment: water
soap
tables
wash basin/bucket

Volume II: Technical and Reference Manual

Guidelines for the Selection of Chemical Protective Clothing

3rd Edition

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February 1987

Office of Administration
Occupational Health and Safety Staff

DISCLAIMER

Arthur D. Little, Inc., prepared this document with what it believes is the best currently available information. The document is subject to revision as additional knowledge and experience are gained. Arthur D. Little cannot guarantee the accuracy of information used to develop the chemical protective clothing recommendations contained herein, and the mention of company names or products does not constitute endorsement by Arthur D. Little. Arthur D. Little accepts no responsibility for damages or liabilities of any kind which may be claimed to result from the use of this document.

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The text, except for the addition of Chapter 5--Full-Body Protection to Volume I, remains essentially the same (although updated) as the first EPA and ACGIH editions for which we note the support and review comments of W. Aaroe, B.E. Benson, S.P. Berandinelli, R. Ellis, E.R. Hoyle, K. Hunninen, R.F. Kent, W.F. Keffer, A.P. Nielson, R.C. Magor, M.D. Royer, A. Smith, R.S. Stricoff, F. Thompson, R.D. Turpin, L. Walz, and R.W. Weeks. In addition, we appreciate the assistance of encapsulating ensemble manufacturers in the preparation of Appendix G of Volume I.

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SPECIAL NOTE TO USERS

This document contains comprehensive tables of recommendations to aid and facilitate the selection of chemical protective clothing (CPC). The recommendations are based on an extensive compilation and analysis of CPC vendors' literature and experimental test data published in technical journals and reports. It is imperative that users of the recommendation tables familiarize themselves with the background information that precedes and accompanies the tables. The selection of CPC must take into account the potential hazard and the conditions of use--neither is considered in this document. The recommendations are *not* nor do they imply a guarantee of safety.

Although every effort has been made to prepare this document as accurately as possible, errors can and do occur. Users of this document are asked to notify Lt. Jeffrey O. Stull, Commandant (G-DMT-3), U.S. Coast Guard, 2100 Second Street, S.W., Washington, D.C. 20593 (202-267-0853), or Mr. David Weitzman, U.S. Environmental Protection Agency, Office of Occupational Health and Safety, Room 3503, Waterside Mall, 401 M Street, S.W., Washington, D.C. 20460 (202-382-3647) of errors so that they can be corrected.

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VOLUME II

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CHAPTER 1

OBJECTIVES, LIMITATIONS, AND ASSUMPTIONS FOR THE GUIDELINES

A. INTRODUCTION

The selection of the best chemical protective clothing (CPC) for use against a particular chemical can be a difficult and perplexing task. A principal reason for this situation is that the necessary information, if any is available, has not been organized. Vendors' recommendations tables provide guidance but there is little or no basis on which to compare products. Technical reports of CPC performance have increased in number in recent years, but are scattered through the literature, and again, there is no standard format for reporting data.

The EPA's Occupational Health and Safety staff has repeatedly faced this situation in its attempts to provide guidance to field personnel involved in the clean-up of hazardous waste sites. Furthermore, the U.S. Coast Guard has particular needs for consolidating information on full-body protective ensembles. We, therefore, have developed this two-volume *Guidelines for the Selection of Chemical Protective Clothing*. This third edition of the *Guidelines* has been completely updated from those of 1983 and 1985. The key objectives, limitations, assumptions, and instructions for use of this publication are described in the following paragraphs.

B. OBJECTIVES

The main objective of the *Guidelines* is that it be a concise, up-to-date source for information relative to selection of personal protective clothing. Its principal focus is clothing for protection against chemicals which are potentially harmful to humans. More specifically, the *Guidelines* addresses the chemical resistance of protective clothing materials and the design features of full-body protective ensembles and splash suits. The *Guidelines* is designed to:

- Educate (or review for) the user the technical concepts associated with the chemical resistant clothing. The goal is to provide the *Guidelines* user the background necessary to make the best possible decisions relative to selecting and using CPC.

- Bring together and compare the considerable amount of vendors' chemical resistance information with data published in the technical literature pertinent to CPC performance. The goal is to provide consensus recommendations as to the most appropriate clothing for the chemicals of interest.

- Provide listings of CPC products and a directory of CPC vendors.

- Provide specific, detailed information on full-body protective clothing.

- Aid further study of CPC by inclusion of a comprehensive reference listing.

- Be readily updateable as more information becomes available.

C. LIMITATIONS

The scope of the *Guidelines* is limited to gloves, garments, boots, and lenses and face shields. Respirators are not covered. The chemicals are principally liquids, but a small number of gases and some solids with high vapor pressures are included. The chemicals were selected from the listings of Clean Water Act (CWA) Sections 311 and 307a, Clean Air Act (CAA) Section 112, and Resource Conservation and Recovery Act (RCRA) Sections P, U, F, and K. Also addressed were any other chemicals for which there were CPC manufacturers' or vendors' recommendations or technical reports of permeation or compatibility test results.

Regarding the CPC manufacturers and vendors referred to in the directory, the listing is not all inclusive. The objective, however, is to include at least one source for any given item of CPC. In other words, it is unlikely that all distributors of certain brands/lines of CPC are mentioned. The listing is designed such that it can be readily expanded to cover additional manufacturers or distributors as they become known.

The recommendations, which compose Matrices A and B, Volume I, Chapter 8, are the result of comparative analysis of both the vendors' and technical literature in combination with technical judgment. For many chemicals the information available was sufficient for there to be a high level of confidence in the recommendations; these recommendations are listed as double upper case letters in the Matrices. For other chemicals there was less information and the recommendations are listed in lower case. For many chemicals there was no information and no recommendation is given.

A further limitation is that the *Guidelines* does not address multi-component solutions in-depth. Such mixtures, especially where several organic solvents are involved can have greater permeation than any one of the components alone. Special care must be taken when solutions are involved. Furthermore, the *Guidelines* does not consider all the possible applications to which CPC will be put.

D. ASSUMPTIONS

The *Guidelines* is developed under three key assumptions:

- Its users would have a background in the physical sciences and, specifically, chemistry.
- Its users would have some information about the identity of the chemicals to which the CPC may be exposed.
- Its users would have some information about the degree of hazard with which the worker may be faced. The *Guidelines* provides ratings of the expected performance of the materials of construction of CPC. The *Guidelines* does not prescribe the level of clothing necessary for a given task, although Appendix I of Volume I provides some assistance in this regard.

E. INSTRUCTIONS FOR GUIDELINES USE

The *Guidelines* is divided into two volumes. Volume I is directed more towards day-to-day field use, while Volume II is designed more as a reference manual. The individual responsible for selecting CPC at the hazardous waste site should be familiar with all aspects of Volume I. It provides:

- Basic discussions of chemical resistance and permeation of CPC materials.
- Recommendations for CPC for 509 chemicals or aqueous solutions.
- Detailed descriptions of full-body encapsulating ensembles.
- Sources for acquisition of recommended clothing.

The responsible on-site individual should also be aware of Volume II and its contents. Volume II, however, was designed principally to be used by the occupational health and safety professional providing further guidance to field personnel.

The volumes are in loose-leaf format to allow for rapid update in response to additional information on CPC performance and user comments. In this regard, all *Guidelines* users are asked to inform Lt. Jeffrey O. Stull, Commandant (G-DMT-3), U.S. Coast Guard, 2100 Second Street, S.W., Washington, D.C. 20593 (202-267-0853), or Mr. David Weitzman, U.S. Environmental Protection Agency, Office of Occupational Health and Safety, Room 3503, Waterside Mall, 401 M Street, S.W., Washington, D.C. 20460 (202-382-3647) of problems in understanding or using the *Guidelines*.

CHAPTER 2

PERMEATION THEORY

A. INTRODUCTION

The purpose of the *Guidelines* is to facilitate the selection of CPC on the basis of its effectiveness as a barrier to potentially hazardous chemicals. Since chemical resistance is the focus, it is appropriate to include a discussion of permeation theory. In Chapter 3, Volume I, a brief overview of the key aspects of the theory is presented. The present chapter contains a more in-depth discussion of the subject. In addition several other theoretical factors which were considered in developing the CPC recommendations are summarized.

B. IDEAL PERMEATION

Permeation of a chemical through a barrier is a three-step transport process involving (1) the sorption of molecules of the chemical at the contacted surface of the barrier, (2) the diffusion of the sorbed molecules through the barrier, and (3) the desorption of the molecules from the opposite surface of the barrier.[83,84] In cases involving direct liquid contact with a clothing material, the diffusion step is the rate controlling step in the permeation process and, therefore, is the topic of the remainder of the discussion.

The rate of mass diffusion through a unit surface area of a clothing barrier (or membrane) is proportional to the concentration gradient of the chemical (permeant) across the barrier. This relationship is most often expressed by Fick's Law:

$$J = -D \frac{dc}{dx} \qquad (1)$$

where

- J is the mass flux, $\mu g/min/cm^2$;
- D is the diffusion coefficient, cm^2/min;
- c is the concentration in the membrane, $\mu g/cm^3$; and
- x is the distance, in cm, from the contacted membrane surface.

The minus sign in the equation accounts for a decreasing c as x increases.

Integration of equation (1) results in a relationship which is useful for determining the diffusion coefficient from test data. Once D is known for a given chemical/material pair, then the chemical flux can be estimated over a wide range of thicknesses and challenge concentration conditions. Such a prediction is appropriate since permeation criteria for protective clothing might ultimately be specified as a maximum allowable flux rather than a breakthrough time, as is more commonly the case today.

Where D is not a function of chemical concentration, membrane thickness, or contact time (such as during the steady-state permeation of a non-reactive gas), this integration is straightforward and yields equation (2):

$$J = D \frac{C_1 - C_2}{\ell} \tag{2}$$

where

C_1 is the permeant concentration in the upstream (higher concentration) surface of the membrane (at $x = 0$);

C_2 is the permeant concentration in the downstream surface of the membrane (at $x = \ell$); and

ℓ is the membrane thickness.

In cases where D is a function of concentration, an integral diffusion coefficient $\overline{D}$ can be defined as:

$$\overline{D} = \frac{1}{C_1 - C_2} \int_{C_2}^{C_1} D\,dc \tag{3}$$

Examples of $\overline{D}$ as a function of concentration would include:

$$\begin{aligned} \overline{D} &= D_o\ (1 + f\ (c)) \\ \overline{D} &= D_o\ e^{f(c)} \end{aligned} \tag{4}$$

where D_o is the zero-concentration diffusion coefficient. Such a concentration dependence may occur when organics, such as solvent liquids, diffuse through polymeric materials. The result of integrating equation (1) with an integral diffusion coefficient is Equation (5):

$$J = \overline{D} \frac{C_1 - C_2}{\ell} \tag{5}$$

It should be noted here that many polymers swell--thereby changing their thickness--upon the invasion of a permeating chemical. Crank discusses this on page 28 of The Mathematics of Diffusion.[83] Conventional practice is to disregard this change in the above integration and subsequent calculation of D.

D or $\bar{D}$ can be determined by measuring both C_1 and the permeation flux. C_2 is considered to be 0 when permeation tests are carried out such that downstream membrane surface (at $x = \ell$) is continuously exposed to and flushed by a fluid in which the concentration of the permeant is far below saturation. In the case of the diffusion of a neat chemical, C_1 is the solubility of the compound in the polymer (i.e., $C_1 = C_s$) and can be determined by a separate, long-term immersion experiment. The rate of permeation is typically determined by analytical methods such as GC, IR, UV, or scintillation counting (in the case that the permeant is radio-labeled) of a collecting fluid that contacts the downstream surface of the membrane. ASTM Method F739-85 is an appropriate procedure for such testing. A graphical, idealized representation of chemical permeation through a membrane is presented in Figure 1 in terms of measured concentration versus contact time.

In practice, the determination of the diffusion coefficient is not always straightforward. Consequently, techniques have been developed for estimating this parameter at particular stages of the permeation process. Of particular importance because of the relative ease of their determination and their utility in predictive models are the steady-state diffusion coefficient, D_s, and the lag time diffusion coefficient, D_L. In the following paragraphs, the significance of these diffusion coefficients and methods for their determination are described. Other, more complex, methods for estimating D are presented by Crank[83] and Crank and Park.[84]

1. Steady-State Diffusion Coefficient (D_s)

In ideal diffusion, a constant concentration gradient develops across the membrane and the flux becomes constant (i.e., steady-state permeation) following the transition period after breakthrough. (In many cases involving CPC, non-ideal diffusion occurs and a steady state does not develop.[222]) A steady-state diffusion coefficient, D_s, can be calculated directly from equation (6):

$$D_S = \frac{J\ell}{C_1} \qquad (6)$$

assuming C_2 is small compared to C_1.

The steady-state coefficient may be useful in the selection of clothing materials in cases where some limited exposure to a permeating chemical may be acceptable.

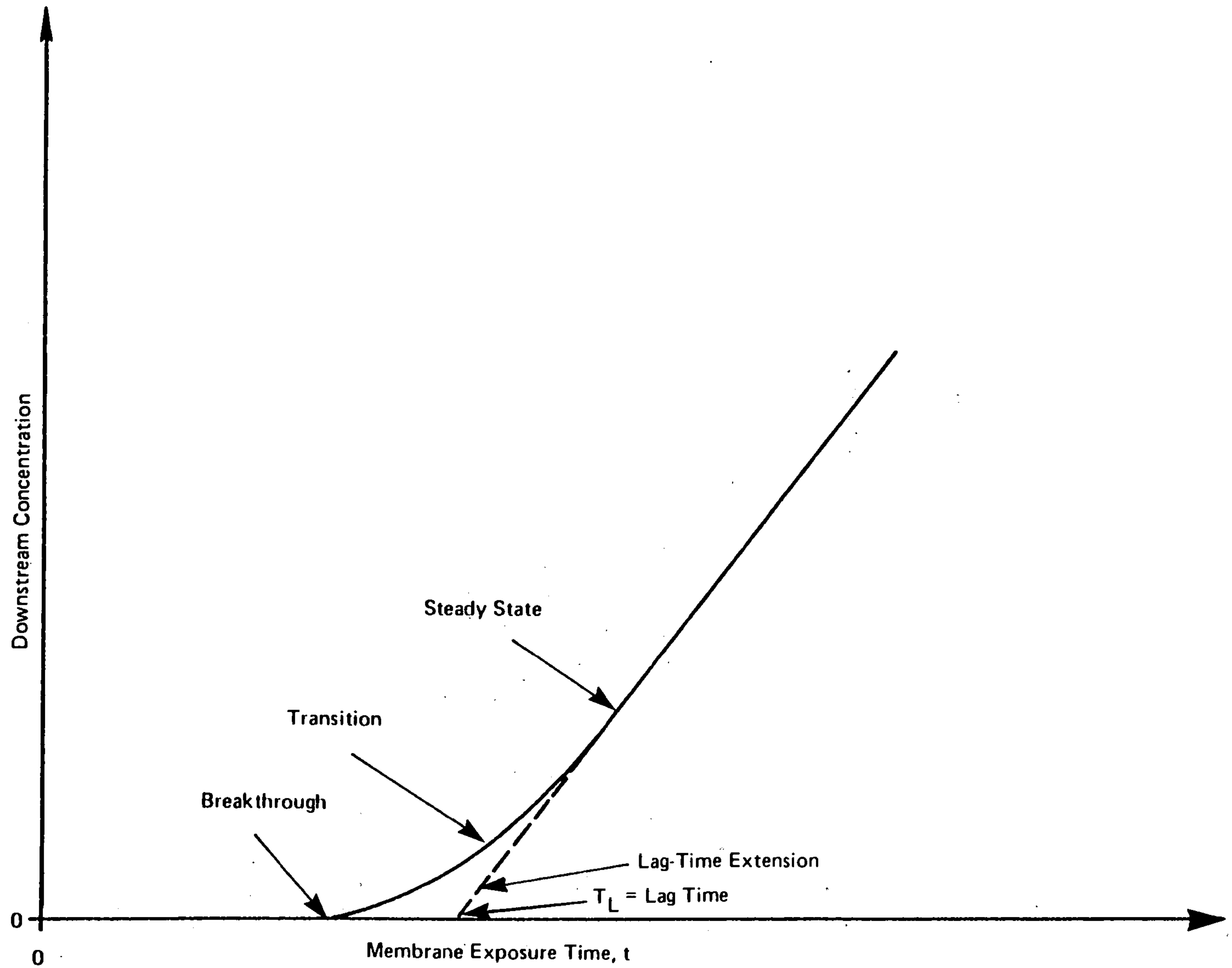

FIGURE 1 IDEAL PERMEATION THROUGH A POLYMERIC MEMBRANE – FIXED COLLECTION VOLUME

2. Lag Time Diffusion Coefficient (D_L)

Another technique for calculating a diffusion coefficient is the lag time method. The lag time coefficient, D_L, is determined by extending the steady-state portion of the permeation curve (see Figure 1) to the time axis. The time, T_L, at the intercept is substituted into equation (7):

$$D_L = \frac{\ell^2}{6T_L} \qquad (7)$$

and D_L calculated. D_L may then be used in equation (2), but this is strictly valid only for those barriers in which the diffusion coefficient is constant. In many cases, D_L is a good approximation for D_S and in some cases a fair approximation to $\overline{D}$ for those barriers in which the diffusion coefficient is variable.

In conclusion, it must be noted that at present there is no overall theory that allows the prediction of the permeability of CPC. Some of the problems faced in developing predictive methods are discussed in the next paragraph.

C. ANOMALOUS PERMEATION

In the previous paragraph ideal permeation was described as a diffusion process in which the breakthrough time is followed by a period of smooth transition to a steady-state situation in which the permeation rate does not change with time. Ideal diffusion is likely to occur with many of the chemical/material pairs experienced on a hazardous waste site. It should be recognized, however, that deviations (i.e., anomalies) from the ideal may occur in a large fraction of the cases. As the name implies, anomalous permeation is not predictable. However, there are several general conditions under which the probability of non-ideal permeation is increased:

- where there may be a reaction of the chemical with the plastic/elastomer of the CPC or some other component of the material. In some cases the reaction will lengthen the breakthrough time and reduce permeation rate by consuming chemical. In other cases the reaction will reduce the barrier effectiveness of the CPC by degrading its properties.

- where the chemical, merely by its being absorbed, changes the properties of the CPC. Many organic liquids are known to craze (produce surface cracks) in the hard, clear plastics used for lenses and face shields.

- where the chemical extracts components from the CPC materials. For example, leaching of plasticizer from PVC clothing will significantly affect its barrier as well as functional properties.

Nelson et al.[222], Weeks et al.[326,327], and Crank and Park[84] present additional discussions of this subject.

D. PERSISTENT PERMEATION

Once a chemical has begun to diffuse into a plastic/elastomer, it will continue to diffuse even after the chemical on the surface is removed. This is due to the concentration gradient that develops within the CPC and the natural tendency for a gradient to equilibrate with its surroundings. This phenomenon has significant implications relative to decontamination and reuse of CPC.

First, in the case of CPC which has not suffered chemical breakthrough but has absorbed some chemical before the chemical is removed from the surface, the chemical may eventually appear on its inside surface. The amount of chemical reaching the inside will be dependent upon the amount of chemical absorbed and its permeation rate. For example, where the absorbed amount is small and the rate slow, it is likely that a large fraction of the absorbed chemical will return to the outside surface where, if it is volatile, it will evaporate to the air, and little or no chemical will reach the inside surface. On the other hand where the permeation rate is fast, there is the potential that a large amount of chemical will appear on the inside surface, perhaps after overnight storage in a locker.[116]

Second, in order to achieve complete decontamination of the CPC, both surface and absorbed chemical must be removed. Since the absorbed chemical will leave the CPC only by a diffusional process, either very long times or conditions which accelerate diffusion are required. These would include high temperatures, vacuum, or perhaps a dry-cleaning process in which a chemical non-degrading to the CPC is used to extract the hazardous chemical. Because of this problem of persistent permeation, extreme caution is advised when using CPC that has been exposed to highly toxic chemicals. In fact, where such chemicals are involved, it may be prudent practice to use disposable clothing.

E. CHEMICAL CLASSIFICATION AND SOLUBILITY PARAMETER

The *Guidelines* provides CPC recommendations for 509 chemicals or aqueous solutions. For those chemical/material pairs for which no recommendations are given, it is suggested that CPC can be selected on the basis of the family to which the chemicals belong. The premise, which is substantiated in permeation literature, is that chemicals of similar composition or functional groups tend to permeate a given material at relatively similar rates. Extensions and refinements of this premise are that:[262,315]

- higher molecular weight members of a homologous series of chemicals permeate at slower rates than lower molecular weight members.

- pendant groups (which increase the size of a molecule) tend to slow the permeation rate relative to that of the simple molecule.

- permeation rate tends to decrease with increasing boiling point.

- polar chemicals tend to permeate polar materials more rapidly than non-polar chemicals, and the converse is true.

The 509 chemicals or aqueous solutions were categorized into 29 main classes and 67 subclasses according to structure and functional groups.[177] For example, hydrocarbons is a main class which is divided into aliphatic, aromatic, and polynuclear aromatic subclasses. The classes are listed in Table 8.1, Chapter 8 of Volume I. The class into which each chemical was placed can be determined from Appendix B of Volume I.

Upon review of those classes which contain a sufficient number of chemicals on which to base a conclusion, the above generalizations relative to the chemical resistance of materials would appear to apply for most of the chemical/material pairs addressed in this study.

A second means for predicting the chemical resistance of CPC materials is through the use of solubility parameter theory. This theory attempts to quantify the qualitative nature of the above generalizations. According to the theory, the physical and chemical properties of a chemical can be combined mathematically to yield a parameter that is then compared to an empirically determined parameter for the plastic/elastomer. In cases where the parameter of the chemical approximates that of the material, the chemical is predicted to have a high solubility in, or dissolve the material. In other words "likes dissolve likes." Extrapolation of this theory to CPC implies that a material is not likely to be resistant to a chemical having a similar solubility parameter. An especially attractive feature of the theory is that solubility parameters can be calculated for multi-component solutions by weighting the individual parameters according to the relative concentrations of each component in the solution. Consequently, there is the potential for making decisions relative to selecting CPC for the virtually limitless number of solutions that may be encountered.

Typical variations of the theory relate to the factors that are included in the calculation of the solubility parameter and how these parameters are weighted. One of the more widely accepted concepts is the three-component parameter which combines factors for the hydrogen bonding, polarity and dispersion forces of the chemical to yield its overall solubility parameter. Other systems deal with two of these factors. Still other systems favor the single-component solubility parameter and then make adjustments for polarity or hydrogen bonding depending on the application. Similar considerations are also required for the plastic/rubber of CPC.

The results of a limited number of tests of the theory relative to CPC materials show some promise for its application to CPC selection.[287] Henriksen has reviewed the theory in considerable detail, and applied it to the data of Nelson et al. and his own data for epoxy solutions.[147] Christensen[70] has also subjected the data of Nelson et al. to an analysis based on solubility parameter. The data of Nelson are particularly useful in this regard since they result from a large number of experiments with a broad variety of chemicals with well-specified CPC. However, it is important to note that the theory is just that, "a theory," and that there are many variations of the theory, several of which are reviewed by Barton[38] and more recently by L. Snyder.[283,284]

Although solubility parameter theory offers promise for predicting CPC performance, the application of the theory to CPC is in its early stages. Significant problems must be solved before the theory can be applied to the confident selection of CPC. For example, methods must be developed for estimating the two- and/or three-component factors for chemicals other than relatively simple solvents. Similarly, methods are required for estimating the solubility parameters of CPC materials. Perkins et al. have estimated the solubility parameters of selected CPC materials.[235] However, solubility parameters of CPC materials may be strongly influenced by formulation. Finally, it must be remembered that solubility parameter theory is an equilibrium concept. It does not take into account the dynamics of the permeation process. Also needed are approaches to predicting the time-containing element of the permeation equation, i.e., the diffusion coefficient.

CHAPTER 3

TEST METHODS

A. INTRODUCTION

The barrier effectiveness of a particular item of clothing to a particular chemical/mixture is dependent on the specific interactions between the clothing material and the chemical/mixture. This in turn is determined by the formulation of the clothing material, its method of manufacture, and its thickness. Temperature and other conditions of use also influence clothing barrier properties. Finally, the composition of the chemical/mixture is of major importance since relatively small percentages of a second, third, etc., component can drastically alter the way in which a chemical interacts with a material.

With the above in mind it is highly desirable that protective clothing selection decisions be based on the results of testing of the chemical/clothing material pair of interest. The objective of such testing is to quantify the key parameters discussed in Chapter 2. Of particular concern are:

- The solubility of the chemical/mixture in the clothing material.
- The breakthrough time of the chemical for the material.
- The permeation rate of the chemical through the material.

B. SOLUBILITY

Solubility is the weight of chemical absorbed by a known weight of material. In general, chemicals having solubilities > 10% rapidly permeate the rubber or plastic. ASTM Method D471-79 and ISO Method 2025 (International Standards Organization) describe methods for determining solubility. The procedure simply involves immersing the material in the chemical. In case of multi-layered clothing materials, only the normally outside surface should be exposed to chemical. If the solubility values are to be later used in calculating permeation rates, then each material of the multi-layer system should be tested separately. Periodically the material is removed, patted dry and weighed until a constant weight is obtained. In addition to noting weight changes, the chemical and the material should be inspected for discoloration, indicative of decomposition of the clothing material. Also the clothing material should be examined for physical degradation using a knife, spatula, or other probe.

Solubility testing is simple and can readily be performed wherever at least a two decimal place balance is available. Multiple tests can be performed simultaneously using as little as 0.5 g and as much as 100 g of clothing material per test, depending on the sensitivity of the balance.

Solubility testing represents the minimum level of evaluation that can be performed for any unknown or multi-component hazardous waste.

C. DEGRADATION

The physical and/or aesthetic qualities of CPC can be significantly and and undesirably changed due to exposure to chemicals. Chemical degradation testing simply involves measuring the properties or qualities of interest before and after exposure to the chemical. The results are compared and the change, if there is any, judged as to its acceptability for the intended application of the item of clothing. ASTM Method D543 describes one such method for plastic materials. ASTM Committee F-23 is presently developing a method specifically focussed on clothing materials.

Similar to solubility testing, degradation can be performed in the field and can be used as a means for screening candidate clothing materials prior to more involved and expensive testing such as the permeation test described below.

D. PERMEATION

Breakthrough time and permeation rate are determined by means of a permeation test. ASTM Method F739-85 was specifically developed for the evaluation of protective clothing materials.[149] (A printed copy of this method is available from ASTM, 1916 Race Street, Philadelphia, PA 19103.) The method uses a test cell which is divided into two chambers at the midline by the clothing material to be tested. (See Figure 2.) The potentially hazardous chemical is placed in one chamber and the other chamber (i.e., the collection chamber) is monitored for the chemical of interest. As shown, the cell is assembled for a liquid challenge chemical. Gaseous chemicals can also be tested by forming the cell from two collection chambers. The test gas is then flowed continuously through the challenge chamber. Of interest are the time the chemical is first detected (i.e., breakthrough time) and the subsequent rate of permeation. Of critical importance in conducting the test is that the collecting medium not interact with the clothing material; air, nitrogen, helium, or water are preferred collection media.

The detection of breakthrough is dependent on the sensitivity of the analytical method used for measuring the chemical in the collection medium. Typical preferred analytical methods include gas, liquid and ion chromatography, analysis for total combustible organics, ultraviolet and infrared spectrophotometry, and radioanalysis. The properties of the chemical, the sensitivity requirements for the test, and cost are the

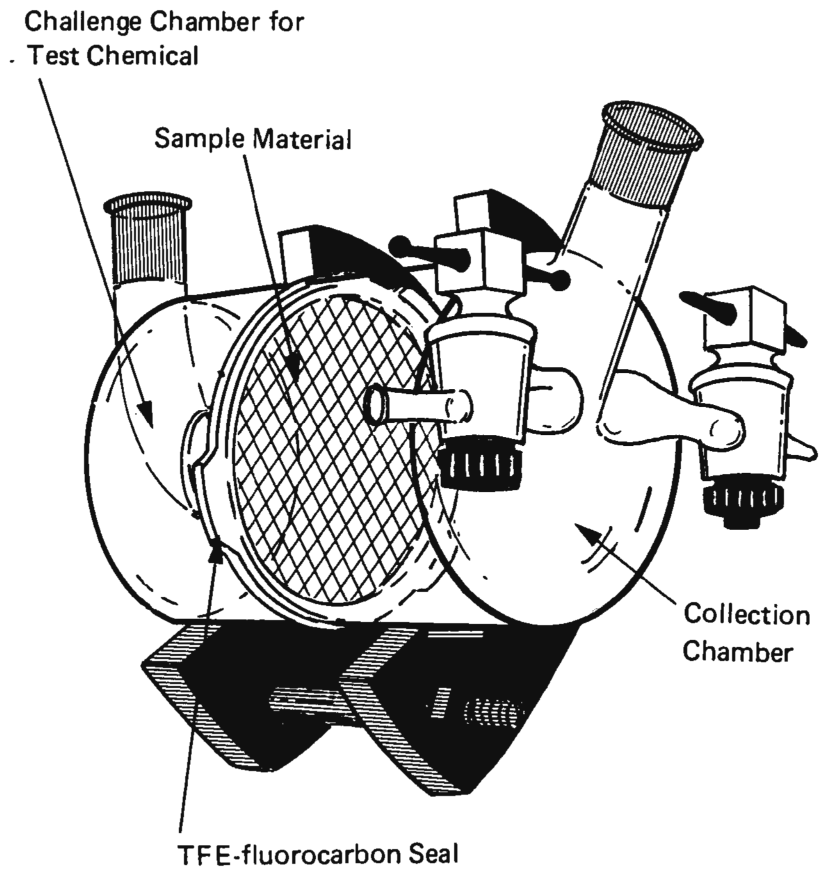

FIGURE 2. SKETCH OF ASTM F739-85 PERMEATION TEST CHAMBER

principal factors considered in selecting an analytical method. For relatively volatile chemicals, gas chromatography and infrared spectrophotometry are the preferred methods. Liquid chromatography is used for relatively nonvolatile organic compounds. Ion chromatography is particularly useful for inorganic acids and salts. Finally, radiolabelled compounds may be preferred where high sensitivity and specificity is required; furthermore, if the compound of interest is readily available in radiolabelled form, radiochemical methods may be significantly less costly than the development and use of the other techniques.

Permeation testing of protective clothing materials has increased significantly during the past five years. The *Journal of the American Industrial Hygiene Association* has become the principal vehicle for dissemination of test findings. (See Bibliography.) Also of note is Standard Technical Publication 900 of the ASTM which contains several pertinent articles.[32] In addition permeation data are available from several clothing and clothing material vendors.[45,80,107,213,227,236]

The International Standards Organization (ISO) has promulgated two other methods for evaluating chemical protective clothing:

- Method 6529 - Protective Clothing Resistant to Penetration by Dangerous Liquid Chemicals.

- Method 6530 - Clothing for *Limited* (ed.) Protection Against Dangerous Liquid Chemicals.

Neither method is recommended since the results are difficult to interpret relative to the selection of CPC. Presently ISO is in the final stages of developing a standard permeation test. This standard is analogous to ASTM Method F739.

A notable difference between the ASTM and ISO standards is the inclusion of clothing labelling (marking) instructions in the ISO method. The label must indicate the performance of the clothing material as a barrier to the test chemicals. Such labeling is an aid to those considering the use of the clothing much the same as fire extinguisher labels are.

With the significant increase in permeation data in recent years, the need and opportunity for data interpretation and comparison have also increased. Permeation test results are highly dependent on the experimental procedure, generic material, cell configuration, and analytical sensitivity. ASTM Committee F-23 is presently developing a specification for data reporting that will facilitate interpretation and comparison of test results. This same committee has promulgated a list of fifteen chemicals (ASTM F1001-86) that can serve as a standard battery for ranking clothing barrier properties. The fifteen chemicals represent a wide range of chemical families and are: acetone, acetonitrile, carbon disulphide, dichloromethane, diethylamine, dimethylformamide, ethyl acetate, n-hexane, methanol, nitrobenzene, 50% sodium hydroxide, sulfuric acid, tetrachloroethylene, tetrahydrofuran, and toluene.

E. VISIBILITY

Face shields and lenses, in addition to being chemical barriers, must provide clear, undistorted vision to the wearer. Hard, inflexible face shields and lenses may be subject to crazing (i.e., surface cracking) upon contact with certain chemicals. Crazing renders the surface foggy and can drastically reduce vision. Since chemical contact with the face shield or lens is more likely to occur in uncontrolled or emergency situations when reduced vision would be an additional severe hazard, shields and lens materials should be tested for resistance to chemical attack. Crazing can also reduce the impact strength of the material.

ANSI/ASTM Method F484-77 describes a procedure for measuring stress crazing by chemicals. A method for assessing the effect of chemicals on clear plastics is by measuring the transparency of the plastic before and after exposure to the chemical; ASTM D1746 describes one such method. While both these methods will adequately show up potential incompatibilities, they require equipment that is not likely to be available in field or chemistry laboratories. A simpler test, which could be performed on site, requires only a placard on which are printed letters ranging from large to small in size. Analogous to a common vision test, the placard is read through an unexposed face shield or lens material, with a distance of 10 to 15 feet between the plastic and the placard. Note is made of the ease with which the letters can be read and the minimum size letter which can be read. The face shield or lens material is then swabbed or immersed in the chemical of interest for at least one hour. (Note, if the face shield or lens has different coatings or plastic layers on the inside and outside surfaces, only the outside surface should be exposed to the chemical.) Remove the material from the chemical and allow to air dry. Inspect the material and repeat the placard reading test.

F. PENETRATION

In addition to permeation, which occurs by molecular diffusion, liquid chemicals can cross a CPC barrier by penetration. Penetration is the movement of chemical through holes such as at seams, zippers, and other closures as well as through flaws in the CPC. Penetration can also occur through porous woven and non-woven fabrics and through fabrics based on microporous films. Gore-Tex™ is one brand of such microporous film-based fabric.

ASTM Committee F-23 has promulgated method F903-84 for the evaluation of the penetration resistance of CPC and its materials of construction. Briefly, a swatch of material or seam or closure is clamped in a twochambered cell. The chemical of concern is charged to one chamber and pressure applied. The unexposed surface in the second chamber is observed for appearance of the chemical.

G. OTHER FACTORS

The focus of the *Guidelines* and the above discussion is chemical resistance of clothing materials. It is important to consider, however, that in the selection and use of protective clothing other factors may be of equal or greater importance. For example, gloves must provide the wearer some minimum level of dexterity, and the fabrics must have some level of tear resistance. The relative importance of the performance factors is largely dependent on the work tasks to be carried out.

At present there is no standard, overall protocol for evaluating protective clothing or clothing materials for all the performance parameters of importance to workers on hazardous waste sites. Instead, individual tests appropriate for the evaluation of specific parameters must be selected from the volumes of procedures promulgated by federal, military, and standards organizations. A 1978 NIOSH study addressed this problem and resulted in a listing of test methods especially pertinent to protective clothing.[78] That compilation has been expanded where appropriate and is presented herein as Table 3.1. For completeness, the chemical resistance methods mentioned above are included in the Table. In addition to this listing, several tests specific to full-body protective clothing are discussed in Chapter 5 of Volume I.

TABLE 3.1

TEST METHODS FOR CHEMICAL PROTECTIVE CLOTHING*

Characteristics	Test
A. Chemical Resistance	
1. Permeation Resistance	ASTM F739-81: Resistance of Protective Clothing Materials to Permeation by Hazardous Liquid Chemicals
2. Swelling and Solubility	ASTM D471-79: Rubber Property--Effects of Liquids
3. Strength Degradation	ASTM D543: Resistance of Plastics to Chemical Reagents
4. Crazing	ASTM F484-77: Stress Crazing of Acrylic Plastics in Contact With Liquid or Semi-Liquid Compounds
5. Transparency	ASTM 1746-70: Transparency of Plastic Sheeting
6. Penetration Resistance	ASTM F903-84: Resistance of Protective Clothing Materials to Penetration by Liquids
B. Strength	
1. Tear Resistance and Strength	ASTM D751-73: Testing of Coated Fabrics
	ASTM D412-75: Rubber Properties in Tension
	Fed. 191A-5102 (ASTM D1682): Strength and Elongation, Breaking of Woven Cloth: Cut Strip Method
	Fed. 191A-5134 (ASTM D2261): Tearing Strength of Woven Fabrics by the Tongue Method
2. Puncture Resistance	See Reference 78
3. Abrasion Resistance	ASTM D1175: Abrasion Resistance of Textile Fabrics

TABLE 3.1 (Continued)

TEST METHODS FOR CHEMICAL PROTECTIVE CLOTHING*

Characteristics	Test
C. Dexterity/Flexibility	
1. Dexterity (gloves only)	See References 78, 122, 289
2. Flexibility	ASTM D1388: Stiffness of Fabrics, Cantilever Test Method
D. Aging Resistance	
1. Ozone Resistance	ASTM D3041-72: Coated Fabrics--Ozone Cracking in a Chamber
	ASTM D1149-64: Rubber Deterioration--Dynamic Ozone Cracking in a Chamber
2. UV Resistance	ASTM G27: Operating Xenon-Arc Type Apparatus for Light Exposure of Non-Metallic Materials--Method A--Continuous Exposure to Light

*Physical property tests are listed in Tables 5.2 and 5.3 of Volume I.

CHAPTER 4

ANALYSIS OF THE VENDORS' LITERATURE

A. INTRODUCTION

Chapter 7 of Volume I contains an overview of the major strengths and weaknesses of the literature supplied by CPC vendors. The purpose and strength of this literature is to describe the composition, styles, and sizes of protective clothing. In recent years the literature of several clothing manufacturers has also become an important source of chemical resistance information, particularly permeation data. However, much of the literature remains weak in its level of documentation as to the basis for the qualitative chemical resistance tables. As noted in Volume I, ratings tables are intended for and should be used only for <u>guidance</u> in the selection of CPC. This chapter extends the depth of the Volume I discussion of the present vendors' chemical resistance tables and discusses their future.

B. REVIEW OF VENDORS' LITERATURE

The catalogues of 150 CPC vendors and materials suppliers were reviewed during the preparation of the *Guidelines*. Twenty-six of these documents included chemical resistance ratings charts for some or all of the products listed. These tables encompassed both qualitative and quantitative ratings. In only a few cases was the rationale for the qualitative ratings described in the catalogues. The rationale is necessary for any attempt to form conclusions regarding the expected performance of CPC and to compare products. Consequently, telephone interviews were conducted with the CPC vendors who provided qualitative ratings. The telephone interviews yielded little information that would further aid the utilization of the qualitative ratings. The overall impression was that most vendors are either not testing clothing or are not willing to share their results.

The situation is much different for the chemical resistance tables that are based on permeation test results. Virtually all vendors who provide such data followed ASTM Method F739, or a similar procedure.

1. Permeation Testing

Permeation data are supplied or available on request from at least ten CPC vendors or materials suppliers. This number is up from six in 1985. Furthermore, the number of chemicals and range of products have increased significantly, and this increase can be expected to continue. CPC users have become more demanding of the vendors and the vendors have found that test data are useful as points of product differentiation.

However, the increased availability of test results carries with it the problems associated with comparing and interpreting data. The vendors do not use a standard format for presenting the data and, as discussed earlier, the test results can be highly dependent on the testing procedure. In order to compare breakthrough times, it is necessary to know the sensitivity of the detector, the surface area of the clothing material, and the collection medium volume if the test is performed in a closed-loop mode or the collection medium flowrate if the test is performed in an open-loop mode. The following discussion provides some insights into reviewing and utilizing published breakthrough time and permeation rate data.

Test results are available from the following vendors: Ansell, Best, ChemFab, Comasec, DuPont, Edmont, MSA, North, Pioneer, and Playtex. (see the Appendix D of Volume I for the complete corporate name and address.) All except Best provide breakthrough time data; Best ranks by breakthrough time the materials tested. All except MSA report permeation rate data. The units used by all except Edmont for permeation rate are $mg/m^2/s$; Edmont reports values $\mu g/cm^2/min$, consistent with ASTM F739. Multiply the Edmont values by 0.167 to convert them to $mg/m^2/s$. Only Best and ChemFab report the sensitivity of the instrument used to detect breakthrough. Only MSA provides information on the mode of testing (open-loop) and the collection medium flowrate. Some of the others provide information on the mode of testing but not the collection medium volume or flowrate. Consequently, it is not possible to rigorously compare breakthrough time data from vendor to vendor. As suggested above and by the vendors themselves the data should be used for guidance only and imply no guarantee of protection.

2. Immersion Testing

Most qualitative recommendations tables appear to be based on simple immersion tests in which the material was merely observed after some time period. There is no standard time for immersion and, of course, the rating associated with any given test is likely to vary from observer to observer. Furthermore, in some cases materials that were swelled by chemicals may have been given an acceptable recommendation if upon drying they returned to their original size and appearance. Obviously a material which is visibly swelled by a chemical will not be a barrier to that chemical and should be given a "not recommended" rating.

At present there is no standard immersion test for CPC. ASTM Committee F-23 is considering several, but final acceptance is not expected before 1988. It is likely that the procedure will specify the immersion time and two or three properties to be measured before and after immersion. Initially a standard immersion test will be useful for identifying chemical/material pairs that are grossly incompatible. In time, once larger amounts of data become available from standard immersion and permeation tests, correlations may be developed that will allow more sensitive prediction of CPC performance from immersion test data alone.

3. Applicability of Ratings Tables

The degree of applicability of some of the ratings tables to presently available CPC is somewhat limited by two factors: age and materials composition. Many of the tables are more than ten years old. Between the time that the tables were generated and now, it is probable that the actual elastomer/plastic formulation used in the CPC has been changed. This may have resulted from a CPC manufacturer switching raw materials suppliers or modifying the formulation to meet changed processing, use or cost requirements. Changes to, for example, the plasticizer, lubricant, filler, and so forth, level in a elastomer/plastic formulation can in some cases significantly influence the chemical resistance of the final product.

Significant differences exist between various vendors' ratings for nominally the same CPC chemical/material pair. While this may be due to the subjectivity of the test methods, there also may be real differences between products. The difference may in part be due to the fact that the different formulations of the same base elastomer/plastic material may perform differently, and in part due to the manufacturing methods. In other words, it is possible for one supplier to have a more chemically resistant material (e.g., PVC or butyl rubber, etc.) than another supplier. This point has been documented in the literature.[268]

Similarly, most of the ratings charts appear to have been developed for a general class of material (for example, natural rubber or PVC) and not the specific formulations used for protective clothing. Thus, the ratings may or may not be directly applicable to CPC.

The form of the elastomer/plastic can also influence the results on which recommendations may be based. For example, a molded neoprene rubber can have significantly different properties from those of a neoprene prepared from a latex. Within the realm of CPC, it has recently been suggested that gloves prepared by a latex process may perform differently from gloves prepared by a solvent-dip process, but that additional evaluation was required before definite conclusions could be reached.[326] It is not clear whether the recommendations of manufacturers which have switched from solvent to latex processing during the past 10 to 15 years have been modified to reflect any performance differences that may have resulted.

The temperature range over which the ratings apply is not generally stated. CPC users should note that there can be significant temperature effects on permeation over the temperature range likely to be encountered in the field. For example, the breakthrough times for benzene through a 0.08 cm neoprene were found to be 40 min at 7°C, 24 min at 22°C, and 16 min at 37°C.[78]

Finally, the sensitivity, if any, of the ratings to lot-to-lot variations in the products are not provided. Also some manufacturers rate several grades or thicknesses of a given CPC material as if they all performed similarly. In these cases, the CPC user must carefully scrutinize the catalogues in order to differentiate among the products and make the best selection for the application at hand.

4. Multi-component Solutions

Multi-componet solutions represent a potentially large and difficult area for CPC selection and use. In general most vendors address only aqueous solutions in their ratings tables. Several vendors are careful to designate a concentration range for each recommendation; many do not. Small fractions of particularly permeable chemicals in a solution can severely degrade clothing materials or can provide pathways for the movement of other components of the solutions. Furthermore, there is an unlimited number of solution compositions possible. Generally, the vendors recommend that the CPC buyer conduct his own tests with the specific solutions of concern. Multi-component solutions are of growing interest to the research community and others.[104,124,278,302]

5. Experience

Several manufacturers reported that some of the recommendations appearing in their tables were based on experience rather than testing. This may or may not be appropriate depending on how the experience was judged. For example, in many cases an item of CPC may be considered good for a particular application because it does not fall apart or because it returns to its original shape/size upon evaporation of absorbed chemical. Obviously such criteria are not appropriate if skin contact with the chemical is a primary concern.

On the other hand, experience can be a suitable basis for a recommendation when it originates from careful observation of worker well-being. For example, a particular type of glove may prevent contact dermatitis where all other gloves fail.

C. PERSPECTIVES ON VENDORS' LITERATURE

Although the above findings and comments can be rather perplexing, for those responsible for selecting CPC, the situation is changing rapidly for the better:

- There is a growing general understanding among CPC buyers that chemicals can permeate CPC without there being any outward sign of degradation or swelling of the material.

- There is growing technical/scientific interest in CPC performance. Many of the larger chemical companies, several independent testing laboratories, and some universities now have groups evaluating CPC materials. Furthermore, the federal government has become keenly aware of the need for rigorous analysis of CPC performance, as evidenced by this publication and an increase in government sponsored research and development.

- The general acceptance of a standard permeation test method.

- Vendors are becoming more comfortable with the liability aspects of publishing test data. In fact publishing data obtained under well-specified conditions may be less risky than the promulgation of qualitative recommendations tables. Vendors routinely print disclaimers along with their test data which caution that they may not apply to the particular condition to which the buyer intends to subject CPC. The buyer is also advised to perform his own testing with the actual chemical/chemical mixtures at the use temperatures.

D. CONCLUSION

The primary sources of information pertinent to the chemical resistance of CPC are the CPC vendors and manufacturers. This is not likely to change in the near future. Users of the vendors' recommendations and data tables must always bear in mind the limitations of the charts, as described above. The tables are for <u>guidance</u> only. That is the charts are a good place to start the CPC selection process, but they are not guarantees of safety. Whenever possible, the potential CPC user should evaluate candidate products against the particular chemicals and solutions of concern. Final selection must take into account the CPC application.

During the next several years, other sources for CPC recommendations can be expected to increase. Such sources, of which this publication is an example, will be based on the compilation of both manufacturers' recommendations and the scientific literature. It is reasonable to predict and it is hoped that the existence of one or more key secondary sources will stimulate more testing and quantitative reporting of CPC performance by both the vendors and the technical community at large. The result will be more firmly based CPC selection decisions.

CHAPTER 5

SOURCES FOR CHEMICAL PROTECTIVE CLOTHING INFORMATION

A. INDUSTRY

By far the best source for information on CPC is the CPC vendors. The large, full-line vendors and the specialty products manufacturers generally have tested their products against a wide range of chemicals. Furthermore, they have years of experience with their products, and typically have a very good understanding of the products' capabilities and limitations. A listing of vendors is given in Volume I, Appendix D.

A second source of information is the chemical manufacturers. These organizations provide clothing for their workers and often conduct their own analysis of protective clothing performance for their chemical products.

B. GOVERNMENT

Principal sources of CPC information within federal government agencies are:

EPA - Office of Occupational Health and Safety, Room 3503, Waterside Mall, 401 M Street, S.W., Washington, D.C. 20460. Telephone 202-382-3647 (David Weitzman).

Federal Emergency Management Agency (FEMA) - United States Fire Administration, Office of Firefighter Health and Safety, 16825 South Seton Avenue, Emmitsburg, MD 21727. Telephone 301-447-1182 (Robert McCarthy).

OHSA - Technical Assistance, Room N3657, 200 Constitution Avenue, NW Washington, D.C. 20210. Telephone 202-523-7505 (Ching Bien).

NIOSH - Division of Safety Research, Testing and Criteria Branch, ASI Section, 944 Chestnut Ridge Road, Morgantown, WV 26505. Telephone 304-291-4339 (Stephen Berardinelli).

U.S. Coast Guard - Headquarters, Office of Research and Development, Commandant, G-DMT-3, 2100 Second Street, S.W., Washington, D.C. 20593. Telephone 202-267-0853 (Lt. Jeffrey Stull).

These agencies are involved in the study, development, and utilization of protective clothing.

C. PROFESSIONAL ORGANIZATIONS

In the United States, three professional organizations have committees directly focused on protective clothing. ASTM formed Committee F-23 in 1977 for the purpose of developing standard test methods for protective clothing. Subcommittees of F-23 are addressing the chemical resistance of clothing, the physical properties of clothing, clothing classification methods, and the performance of full-body protective ensembles. The committee is composed of industry, government, and general interest members. It meets twice a year and is a forum for discussing protective clothing test methods. In addition in 1984 and in 1987 Committee F-23 sponsored international symposia on all aspects of protective clothing. Proceedings of the symposia are published by ASTM as Standard Technical Publications. For further information, telephone ASTM headquarters (215-299-5579).

The American Industrial Hygiene Association addresses CPC through its technical committee Personal Protective Devices (other than respirators). The committee meets once a year in coincidence with the American Industrial Hygiene Conference. This week-long conference typically includes one or two sessions devoted to protective clothing. At these sessions, technical papers are presented describing research, evaluation or use of protective clothing. Information on this and other AIHA activities may be obtained from AIHA headquarters (216-762-7924).

The National Fire Protection Association (NFPA) formed a subcommittee on Hazardous Chemical Protective Clothing in 1986. This subcommittee was established under the NFPA Technical Committee on Protective Equipment for Firefighters. The subcommittee is engaged in writing performance oriented (manufacturing) standards on chemical protective suits for emergency response personnel. Its membership is composed of representatives from users, manufacturers, testing laboratories, and government. It meets three times a year and plans to complete proposed standards for chemical protective suits by December 1987. For further information, contact Bruce Teele of the NFPA (617-770-3000).

D. TECHNICAL LITERATURE

In recent years, the principal sources of published technical papers and reports on personal protective clothing have been the:

- American Industrial Hygiene Association Journal, a monthly publication. AIHA, 475 Wolf Ledges Park, Akron, OH 44311-1087. Telephone 216-762-7924.

- National Technical Information Service (NTIS). Essentially all federal government sponsored studies may be obtained through NTIS. NTIS, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161. Telephone 703-487-4650.

A new journal, Applied Industrial Hygiene, has been started by the American Conference of Governmental Industrial Hygienist (ACGIH), 6500 Glenway Avenue, Bldg. D-7, Cincinnati, OH 45211. Telephone 513-661-7881. Also articles on protective clothing are usually included in the proceedings of Hazardous Materials Management Conference (Tower Conference Management Company, Wheaton, IL 60187) and the Hazardous Material Spills Conference (Government Industries, Inc., Rockville, MD 20850).

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APPENDICES

DESCRIPTION OF COLUMN HEADINGS FOR APPENDICES A THROUGH E

Chemical Name:	Alphabetical listing of chemicals as shown in Appendix B of Volume I. Synonym, if given, in parentheses.
CAS No:	Chemical Abstract Service (CAS) Registry Number.
Resistant Material:	The normally outside material of the CPC (i.e., the chemical contact surface). See Appendix E of Volume I.
Product Description:	See column 1 of Appendix E in Volume I.
Vendor:	See Appendix E of Volume II. UNK = Unknown.
Breakthrough Time:	See Appendix A of Volume I.
Permeation Rate:	See Appendix A of Volume I.
Percent Weight Change/ Immersion Time:	Change in weight of CPC specimen due to immersion in chemical for time indicated.
Percent Swell/ Immersion Time:	Volume change due to immersion in chemical for time indicated.
Diffusion Coefficient:	$a \times 10^{b}\ cm^{2}/sec$.
Temperature:	Test temperature, if reported; otherwise assumed to be 25°C.
Thickness:	Initial thickness of test specimen, if reported; otherwise no value is given.
Ref Number:	Source of data. See Bibliography.

APPENDIX A

PERMEATION DATA

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
Acetaldehyde								
000750700	BUTYL	014	118	9.58	.40	23.	.04	323
				9.60	.40	23.		227
	CPE	060	113	.17 - .50		25.	.07	302
			UNK	.66		23.		142
				.28		23.		142
	NATURAL RUBBER	001	103		48.10	23.		045
		017	100	.12	90.18 - 901.80	23.	.05	107
	NEOPRENE	002	100	.28	901.80 - 9,018.00	23.		107
		018	100	.20	199.00	23.	.05	323
				.17	901.80 - 9,018.00	23.	.04	107
		125	103		72.14	23.		045
	NITRILE	019	103		529.06	23.		045
			118	< .01	967.93	23.	.03	323
				.07	967.93	23.	.04	227
	NITRILE+PVC	058	100	.05	901.80 - 9,018.00	23.		107
	PE	076	100	.05	901.80 - 9,018.00	23.		107
	PV ALCOHOL	102	100	.27	282.56	23.	.03	323
	PVC	007	103		264.53	23.		045
		077	100	.05	9.02 - 90.18	23.		107
				.08	901.80 - 9,018.00	23.		107
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
	VITON	009	118	< .01	1,694.78	23.	.03	323
	VITON/CHLOROBUTYL	112	113	.50 - .66		25.	.04	302
			UNK	> 3.00		23.		142
Acetic Acid								
000641970	CPE	060	113	> 3.00		25.	.07	302
				3.95		23.	.05	204
				2.40	42.08	23.	.05	204
	NATURAL RUBBER	001	UNK	.68		23.		052
		015	UNK	.85		23.	.04	052
		017	100	2.25		23.	.05	107
			102	4.50		23.	.05	026
				2.50		23.	.05	026
				1.50		23.	.05	026
				2.00		23.	.05	026
	NEOP+NAT RUBBER	026	102	1.50		23.	.06	026
				1.50		23.	.04	026
				3.50		23.	.05	026
			121	1.27	96.19	23.	.05	237
	NEOP/NAT RUBBER	008	102	3.50		23.		026
			UNK	> 1.00		23.		052
	NEOPRENE	002	100	> 6.00		23.		107
			210	6.00		23.		080
		018	100	7.00		23.	.04	107
			UNK	> 1.00		23.	.06	052
				> 1.00		23.	.09	052
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	4.50		23.	.06	107
			UNK	> 1.00		23.	.05	052

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000641970	NITRILE+PVC	057	210	6.00	< .02	23.		080
		058	100	.27		23.		107
	PE	076	100	.25		23.		107
			127	5.00		23.		104
	PVC	003	UNK	.08		23.	.02	052
		007	100	3.00		23.		107
			210	4.00	12.02	23.		080
			UNK	> 1.00		23.		052
		077	100	.75		23.		107
				.10		23.		107
	SARANEX	061	127	> 66.67		23.		104
	TEFLON	069	510	> 4.00	< .02	25.	.05	303
	VITON	009	UNK	> 1.00		23.	.03	052
	VITON/CHLOROBUTYL	112	113	> 3.00		25.	.04	302
Acetic Acid, >70%								
000641973	NATURAL RUBBER	001	120	.35	18.04	23.	.05	236
	NITRILE	005	120	1.97	1,328.65	23.	.06	236
	PVC	003	120	1.42	1.80	23.	.08	236
Acetic Anhydride								
001082470	BUTYL	014	118	> 8.00	< .02	23.	.09	323
	CPE	060	113	1.25		23.	.05	204
				1.20	54.11	23.	.05	204
	NATURAL RUBBER	001	250	.05	10.02	20.	.02	323
	NEOPRENE	018	100	3.50	6.01	20.	.05	323
	PVC	007	100	.07	120.24	20.	.02	323
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
Acetone								
000676410	BUTYL	014	118	> 20.33		23.	.08	323
				> 17.00		23.	.04	227
			216	> 4.00		21.	.07	124
	CPE	060	113	.33 - .42		25.	.07	302
				.53 - .58		22.	.07	302
				.45 - .52		25.	.07	302
				.28		23.	.05	204
				.25	1,022.04	23.	.05	204
	NATURAL RUBBER	001	103		288.58	23.		045
			210	.10	60.12	23.		080
			UNK	.23	35.07	23.	.12	274
		017	100	.09	110.22	25.	.03	222
				.17	90.18 - 901.80	23.	.05	107
			102	.13	4.81	23.	.05	026
				.17	9.02	23.	.05	026
				.13	5.41	23.	.05	026
				.15	7.21	23.	.05	026
			120	.04	210.42	25.	.02	222
			502	.10	82.16	25.	.05	222
			504	.25	66.13	25.	.05	222
				.45	45.09	25.	.06	222
			UNK	.10	> 140.28	23.	.04	274
	NEOP+NAT RUBBER	026	102	.08	100.20	25.	.05	222

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000676410	NEOP+NAT RUBBER	026	102	.12	8.42	23.	.06	026
				.08	12.63	23.	.04	026
				.13	4.81	23.	.05	026
			121	.05	126.25	23.	.05	237
	NEOP/NAT RUBBER	008	102	.13	4.81	23.		026
			114	.13	46.09	25.	.05	222
			UNK	.13	> 150.30	23.	.05	274
	NEOPRENE	002	100	.17	90.18 - 901.80	23.		107
				.04	180.36	25.	.08	222
			120	.04	310.62	25.	.07	222
			210	.10	72.14	23.		080
		018	100	.23	334.27	23.	.05	323
				.08	90.18 - 901.80	23.	.04	107
			118	.95	86.17	25.	.08	222
			120	.32	140.28	25.	.05	222
				.53	170.34	25.	.07	222
				.55	90.18	25.	.05	222
				.27	140.28	25.	.03	222
			UNK	> 1.00		23.	.09	274
				.43	120.24	23.	.06	274
		125	103		1,557.11	23.		045
	NITRILE	005	210	.33	480.96	23.		080
		019	100	.09	2,004.00	25.	.04	222
				.22	< 801.60	25.	.06	222
				.08	< 801.60	25.	.04	222
			181	.07	801.60	25.	.03	222
			503	.05	1,503.00	25.	.03	222
			UNK	.08	> 150.30	23.	.05	274
				.10	> 110.22	23.	.05	274
	NITRILE+PVC	057	210	.25	312.62	23.		080
	PE	006	100	> 1.00	< 30.06	25.	.01	222
			505	.07	2.00	25.	.01	222
		076	100	.05	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	> 4.00		21.		124
			UNK	.50	> 60.12	23.	.12	274
		102	100	.07	13.83	23.	.04	323
	PVC	007	210	.30	541.08	23.		080
			UNK	.15	> 140.28	23.	.16	274
	SARANEX	061	127	.55	19.84	23.		104
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
				> 3.50	< .02	25.	.05	303
	VITON	009	118	< .01	4,843.87	23.	.02	323
			UNK	.03	> 150.30	23.	.03	274
	VITON/CHLOROBUTYL	112	113	.87 - 1.28		25.	.04	302
				1.58 - 1.63		20.	.04	302
				.72 - .88		27.	.04	302
				.88 - 1.02		25.	.04	302
Acetonitrile 000750580	BUTYL	014	118	> 8.00		23.	.07	323
				> 8.00		23.	.04	227
		064	117	> 8.00		23.	.02	213

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000750580	BUTYL	064	117	> 8.00		23.	.01	213
				> 8.00		23.	.02	213
	BUTYL/NEOPRENE	110	117	> 8.00		23.	.02	213
	CPE	060	113	1.33 - 1.42		25.	.07	302
	NATURAL RUBBER	001	103		150.30	23.		045
			506	< .01	117.23	23.	.01	323
	NEOPRENE	018	100	1.27	10.82	23.	.06	323
		093	117	< .18		23.	.02	213
		125	103		72.14	23.		045
		138	117	.58		23.	.03	213
		139	117	.83		23.	.01	213
	NITRILE	019	103		66.13	23.		045
	PE	076	117	< .01		23.	.02	213
	PV ALCOHOL	102	100	> 8.00		23.	.04	323
	PVC	007	103		66.13	23.		045
		049	117	.05		23.	.01	213
	SARANEX	061	117	> 8.00		23.	.01	213
	SILVER SHIELD	122	118	> 8.00		23.	.01	227
	TEFLON	069	510	> 4.50	< .02	25.	.05	303
	VITON	145	117	> 8.00		23.	.01	213
	VITON/CHLOROBUTYL	112	113	1.50 - 1.75		25.	.04	302
	VITON/NEOPRENE	111	117	.75		23.	.02	213
Acetophenone 000988620	TEFLON	069	510	> 92.00	< .02	25.	.05	303
Acetyl Chloride 000753650	SARANEX	061	127	.62	1.10	23.		104
	TEFLON	069	510	> 3.10	< .02	23.	.05	303
Acrolein 001070280	BUTYL	014	118	> 15.00		23.	.06	323
	CPE	060	UNK	.13		23.		142
				.92		23.		142
	NITRILE	019	100	.07	966.13	23.	.04	323
	PV ALCOHOL	102	100	.25	3.01	23.	.03	323
	VITON	009	118	< .01	432.86	23.	.02	323
	VITON/CHLOROBUTYL	112	UNK	> 3.00		23.		142
Acrylic Acid 000791070	TEFLON	069	510	> 3.00	< .02	23.	.05	303
Acrylonitrile 001071310	CPE	070	UNK	.28		23.	.05	004
	PE	076	127	.08	< .02	23.		104
	SARANEX	061	127	.38	< .02	23.		104
	TEFLON	069	510	.90	.08	23.		303
Allyl Alcohol 001071860	BUTYL	014	UNK	> 8.17		25.		287
		064	117	> 8.00		23.	.02	213
				> 8.00		23.	.01	213
				> 8.00		23.	.02	213

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001071860	BUTYL/NEOPRENE	110	117	> 8.00		23.	.02	213
	CPE	070	UNK	2.00		23.	.05	004
	NEOPRENE	002	UNK	2.35	1.44	25.		287
		093	117	1.58		23.	.02	213
		138	117	6.08		23.	.03	213
		139	117	3.42		23.	.02	213
	PE	076	117	1.67		23.	.01	213
	PV ALCOHOL	004	UNK	.24	33.07	25.		287
	PVC	049	117	1.75		23.	.01	213
		077	117	< .08		23.	.01	213
	SARANEX	061	117	> 8.00		23.	.01	213
	TEFLON	069	510	> 3.10	< .02	23.	.05	303
	VITON	145	117	> 8.00		23.	.01	213
	VITON/NEOPRENE	111	117	> 8.00		23.	.02	213
Allylamine								
001071190	BUTYL	014	118	3.92	70.44	20.	.06	323
	NATURAL RUBBER	001	250	< .02	6,633.24	20.	.01	323
	PV ALCOHOL	102	100	.20	12,114.18	23.	.07	323
	PVC	007	100	< .02	9,829.62	20.	.02	323
Allyl Chloride								
001070510	CPE	070	UNK	1.25		23.	.05	004
	TEFLON	069	510	1.70	< .02	23.	.05	303
				2.76	< .02	23.	.05	303
Ammonium Fluoride, 30-70%								
121250182	NATURAL RUBBER	017	100	> 6.00		23.	.05	107
	NEOPRENE	002	100	> 6.00		23.		107
		018	100	> 6.00		23.	.04	107
	NITRILE	019	100	> 6.00		23.	.06	107
	PVC	007	100	> 6.00		23.		107
Ammonium Hydroxide								
013362160	NATURAL RUBBER	001	210	2.00		23.		080
	NEOP+NAT RUBBER	026	121	.45	18.04	23.	.05	237
	NEOPRENE	002	210	6.00	< .02	23.		080
	NITRILE	005	210	6.00	< .02	23.		080
	NITRILE+PVC	057	210	3.00		23.		080
		058	100	.18		23.		107
	PE	076	100	.07		23.		107
	PVC	007	210	.75		23.		080
		077	100	> 6.00		23.		107
				.30		23.		107
Ammonium Hydroxide, <30%								
013362161	NATURAL RUBBER	001	UNK	> 1.00		23.		052
		017	100	1.75		23.	.05	107
	NEOPRENE	002	100	> 6.00		23.		107
		018	100	> 6.00		23.	.04	107
			UNK	> 1.00		23.	.06	052
				> 1.00		23.	.09	052
	NITRILE	019	100	> 6.00		23.	.06	107

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
013362161	NITRILE	019	UNK	> 1.00		23.	.05	052
	PVC	003	UNK	.02		23.	.02	052
		007	100	4.00		23.		107
	VITON	009	UNK	> 1.00		23.	.03	052
Ammonium Hydroxide; 30-70%								
013362162	PE	076	127	< .02	10.32	23.		104
Amyl Acetate (Pentyl Acetate)								
006286370	NATURAL RUBBER	001	210	.20	60.12	23.		080
	NEOPRENE	002	210	.25	66.13	23.		080
	NITRILE	005	210	.67	30.06	23.		080
		019	100	1.00	9.02 - 90.18	23.	.06	107
	NITRILE+PVC	057	210	.83	42.08	23.		080
	PE	076	100	< .05	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
	PVC	007	210	.50	48.10	23.		080
Amyl Alcohol (Pentanol)								
000714100	BUTYL	014	118	> 8.00	< .02	23.	.07	323
	NATURAL RUBBER	017	100	.12	.90 - 9.02	23.	.05	107
	NEOPRENE	002	100	> 6.00	< .90	23.		107
		018	100	> 6.00	< .90	23.	.04	107
				5.35	.20	23.	.05	323
	NITRILE	019	100	.50	< .90	23.	.06	107
				> 8.00	< .02	23.	.04	323
	NITRILE+PVC	058	100	.08	.90 - 9.02	23.		107
	PE	076	100	.20	< .90	23.		107
	PV ALCOHOL	004	100	3.50	< .90	23.		107
	PVC	007	100	.20	< .90	23.		107
		077	100	.17 - .54	9.02	23.		107
				.17	< .90	23.		107
	VITON	009	118	> 8.00	< .02	23.	.05	323
Aniline (Benzamine)								
000625330	BUTYL	012	UNK	> 6.50	1.99	25.	.04	273
				> 6.50	1.99	25.	.04	273
				> 22.00	< .02	25.	.06	273
				> 22.00	< .02	25.	.06	273
				7.00	< .02	25.	.04	273
				7.00	< .02	25.	.04	273
				> 23.00	< .02	25.	.06	273
				> 23.00	< .02	25.	.06	273
				7.00	1.20	25.	.04	273
				7.00	< .02	25.	.04	273
				> 8.00	< .02	25.	.06	273
				> 8.00	< .02	25.	.06	273
		014	118	> 8.00		23.	.03	323
				> 8.00		23.	.04	227
		064	117	> 8.00		23.	.02	213
				> 8.00		23.	.01	213
				> 8.00		23.	.02	213
	BUTYL/NEOPRENE	110	117	> 8.00		23.	.02	213

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000625330	NATURAL RUBBER	001	210	1.00	6.01	23.		080
			UNK	.53		23.	.12	274
		017	100	> 1.00	< 40.08	25.	.03	222
				.50	.90 - 9.02	23.	.05	107
			120	> 1.00	< 40.08	25.	.02	222
			504	> 1.00	< 40.08	25.	.05	222
				> 1.00	< 40.08	25.	.06	222
			UNK	.50	> 10.02	23.	.04	274
	NEOP+NAT RUBBER	026	121	1.00	252.50	23.	.05	237
	NEOP/NAT RUBBER	008	114	.09	15.03	25.	.05	222
			UNK	> 1.00		23.	.05	274
	NEOPRENE	002	100	3.00	.90 - 9.02	23.		107
			120	> 1.00	< 40.08	25.	.07	222
			210	.50	12.02	23.		080
		018	100	.58	.90 - 9.02	23.	.04	107
			120	> 1.00	< 40.08	25.	.05	222
				> 1.00	< 40.08	25.	.05	222
				> 1.00	< 40.08	25.	.03	222
			UNK	> 1.00		23.	.06	274
				> 1.00		23.	.09	274
				.50	6.01	25.	.04	273
				1.00	6.01	25.	.04	273
				2.00	3.01	25.	.06	273
				2.50	9.02	25.	.06	273
		093	117	1.73		23.	.02	213
		138	117	4.33		23.	.03	213
		139	117	2.75		23.	.02	213
	NITRILE	005	210	2.50	30.06	23.		080
		019	100	1.60	120.24	25.	.04	222
			118	1.05	270.54	23.	.04	323
				1.10	270.54	23.	.04	227
			503	.30	180.36	25.	.03	222
			UNK	> 1.00		23.	.05	274
				> 1.00		23.	.05	274
				1.50	3.01	25.	.04	273
				1.50	3.01	25.	.04	273
				2.50	3.01	25.	.06	273
				5.42	3.01	25.	.06	273
	NITRILE+PVC	057	210	6.00	< .02	23.		080
		058	100	.17	.90 - 9.02	23.		107
	PE	006	100	> 1.00	< 40.08	25.	.01	222
			505	.05		25.	.01	222
		076	100	.07	.90 - 9.02	23.		107
			117	6.58		23.	.01	213
	PV ALCOHOL	004	100	1.50	.90 - 9.02	23.		107
			UNK	> 1.00		23.	.12	274
		102	100	> 16.00		23.	.03	323
	PVC	003	120	.05	180.36	25.	.01	222
				.30	160.32	25.	.03	222
				.15	160.32	25.	.02	222
		007	100	3.00	.90 - 9.02	23.		107
			210	4.00	8.42	23.		080
			UNK	> 1.00		23.	.16	274

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000625330	PVC	049	117	1.25		23.	.01	213
		077	100	.33	.90 - 9.02	23.		107
				.50	.90 - 9.02	23.		107
	SARANEX	061	117	> 8.00		23.	.01	213
	SILVER SHIELD	122	118	> 8.00		23.	.01	227
	TEFLON	069	510	> 3.30	< .02	23.	.05	303
	VITON	009	118	.10	112.42	23.	.03	323
				.17	112.42	23.	.02	227
			UNK	> 1.00		23.	.03	274
		145	117	.83		23.	.01	213
	VITON/NEOPRENE	111	117	> 8.00		23.	.02	213
Benzaldehyde								
001005270	BUTYL	014	118	> 9.00		23.	.07	323
	NATURAL RUBBER	017	100	.23	9.02 - 90.18	23.	.05	107
	NEOPRENE	018	100	.65	24.05	23.	.05	323
	NITRILE	019	100	.40	25.85	23.	.03	323
	PE	076	100	.17	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
		102	100	> 16.00		23.	.03	323
	VITON	009	118	9.93	24.05	23.	.03	323
Benzene								
000714320	BUTYL	014	118	.52	194.19	23.	.04	323
				.52	194.19	23.	.04	227
			UNK	.33		23.	.02	327
		034	UNK	1.47	130.26	22.	.08	078
		064	117	.08		23.	.02	213
				> .08		23.	.01	213
				.67		23.	.02	213
			507	1.00	90.18	22.	.06	078
			UNK	.13		23.	.04	327
	BUTYL/NEOPRENE	110	117	> 8.00		23.	.02	213
	CPE	070	UNK	.43		23.	.05	004
	EVA	074	UNK	.01		23.	.02	327
	NATURAL RUBBER	001	210	.18	396.79	23.		080
		017	100	.04	3,206.40	25.	.03	222
			120	.03	5,611.20	25.	.02	222
			502	.05	2,605.20	25.	.05	222
			504	.06	2,204.40	25.	.05	222
				.12	1,603.20	25.	.06	222
			508	.03	501.00	22.	.03	078
			UNK	.01		23.	.05	327
				.02		23.	.02	327
	NEOP+NAT RUBBER	026	102	.05	2,805.60	25.	.04	222
			121	.05	2,254.50	23.	.05	237
	NEOP/NAT RUBBER	008	114	.09	2,004.00	25.	.05	222
				.05	400.80	22.	.05	078
	NEOPRENE	002	100	.25	80.16	22.	.07	078
				.02	951.90	25.	.08	222
			120	.40	300.60	25.	.07	222
			210	.25	559.12	23.		080
			UNK	.29	517.03	22.	.11	333

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000714320	NEOPRENE	002	UNK	.14	1,167.33	22.	.08	333
		010	120	.11	521.04	22.	.04	078
		018	100	.28	165.93	23.	.05	323
				.10	300.60	22.	.04	078
			120	.19	1,002.00	25.	.05	222
				.27	1,102.20	25.	.07	222
				.27	801.60	25.	.05	222
				.08	1,803.60	25.	.03	222
			UNK	.12		22.	.04	333
				.10		22.	.05	333
				.19	1,893.78	22.	.05	333
				.33		23.	.06	327
		031	UNK	3.10	50.10	22.	.24	078
				1.00	80.16	22.	.16	078
				.41	230.46	22.	.08	078
				.27	330.66	37.	.08	078
				.67	190.38	7.	.08	078
				.40	230.46	22.	.08	078
				.11	501.00	22.	.04	078
		093	117	< .08		23.	.02	213
		138	117	< .08		23.	.03	213
		139	117	> 8.00		23.	.02	213
	NITRILE	005	210	.33	901.80	23.		080
			503	.10	501.00	22.	.02	078
		019	100	.32	.03	23.	.04	323
				1.05	400.80	25.	.04	222
				.77	511.02	25.	.06	222
				.32	851.70	25.	.05	222
			181	.15	1,102.20	25.	.03	222
			503	.07	1,302.60	25.	.03	222
			UNK	.17		23.	.04	327
				.23	870.74	22.	.04	333
				.32	939.88	22.	.04	333
		033	UNK	.08	501.00	22.	.04	078
	NITRILE+PVC	057	210	.75	180.36	23.		080
		058	100	.03	901.80 - 9,018.00	23.		107
	NONWOVEN PE	071	UNK	.01		23.	.01	327
	PE	006	100	< .01	250.50	25.	.01	222
			209	< .02	350.70	22.	.01	078
			505	.07	50.10	25.	.01	222
		042	UNK	< .03		23.	.01	327
		076	100	.03	90.18 - 901.80	23.		107
			117	.08		23.	.01	213
			UNK	.01		23.	.01	327
				.02	220.44	22.	.01	078
	POLYURETHANE	050	178	.03	110.22	22.	.02	078
	PV ALCOHOL	004	100	.12	< .90	23.		107
				.17	8.02	22.	.02	078
			UNK	> 33.33		22.	.09	333
				.33		23.	.02	327
		035	UNK	.05	39.08	22.	.01	078
		102	100	.82	< .02	23.	.03	323
	PVC	003	100	< .01	1,182.56	23.	.02	323

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000714320	PVC	003	120	.01	3,507.00	25.	.01	222
				.01	4,108.20	25.	.01	222
				.04	1,503.00	25.	.03	222
				.04	1,603.20	25.	.02	222
			500	< .01	4,709.40	25.	.01	222
			501	.01	3,607.20	25.	.01	222
				< .01	4,909.80	25.	.02	222
			UNK	.02		23.	.01	327
		007	210	.50	240.48	23.		080
			UNK	.30	481.96	22.	.10	333
				.17	599.20	22.	.11	333
				.31	421.84	22.	.11	333
		049	117	.10		23.	.01	213
		077	117	< .16		23.	.01	213
			168	.10	150.30	22.	.04	078
	SARANEX	061	117	.25		23.	.01	213
			UNK	.17		23.	.01	327
	SILVER SHIELD	122	118	> 8.00		23.	.01	227
	TEFLON	036	UNK	.17		23.	.01	327
		069	510	> 3.20	< .02	23.	.05	303
				> 3.00	< .02	25.	.05	303
	VITON	009	118	5.93	.07	23.	.02	323
				6.00	.07	23.	.02	227
			UNK	.50		23.	.02	327
		032	UNK	15.00	.50	22.	.16	078
		145	117	> 8.00		23.	.01	213
	VITON/NEOPRENE	111	117	3.50		23.	.02	213
Benzenesulfonic Acid								
000986790	NEOPRENE	018	100	> 20.00		23.	.05	123
	NITRILE	020	216	> 4.00		23.	.04	123
Benzethonium Chloride								
001215400	BUTYL	014	118	> 8.00	< .02	22.	.06	323
	NATURAL RUBBER	001	250	> 8.00	< .02	21.	.02	323
	NEOPRENE	018	100	> 8.00	< .02	19.	.05	323
	PVC	007	100	> 8.00	< .02	19.	.02	323
Benzonitrile								
001004700	BUTYL	014	118	> 8.00		23.	.06	323
	NATURAL RUBBER	001	506	< .01	24.05	23.	.01	323
	PV ALCOHOL	102	100	> 8.00		23.	.03	323
	VITON	009	118	.93	24.05	23.	.03	323
Benzoyl Chloride								
000988840	BUTYL	014	118	6.28	99.80	23.	.06	323
	HYPALON	108	210	.33		23.	.06	123
	NEOPRENE	018	100	.25		23.	.05	123
	PV ALCOHOL	102	100	> 8.00		23.	.05	323
	PVC	003	100	< .01	596.39	23.	.02	323
	VITON	009	118	> 8.00		23.	.02	323
				.75		23.	.03	123

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
Benzyl Alcohol								
001005160	BUTYL	014	216	> 4.00		23.	.07	123
	VITON	009	118	> 20.00		23.	.03	123
Benzyl Chloride (Chloromethyl Benzene)								
001004470	CPE	070	UNK	.78		23.	.05	004
	TEFLON	069	510	> 3.20	< .02	23.	.05	303
Bis(2-Ethylhexyl) Phthalate								
001178170	BUTYL	014	118	> 8.00		23.	.09	323
	NATURAL RUBBER	017	100	> 6.00	< .90	23.	.05	107
	NEOPRENE	002	100	2.00	< .90	23.		107
		018	100	> 6.00	< .90	23.	.04	107
	NITRILE	019	100	> 6.00	< .90	23.	.06	107
				4.33	12.02	23.	.05	323
	PV ALCOHOL	004	100	.50	90.18 - 901.80	23.		107
	PVC	003	100	.03	12.02	23.	.02	323
	VITON	009	118	> 8.00		23.	.05	323
Boric Acid								
100433530	BUTYL	014	118	> 8.00	< .02	20.	.07	323
	NEOPRENE	018	100	> 8.00	< .02	19.	.05	323
	NITRILE	019	100	> 8.00	< .02	21.	.04	323
	VITON	009	118	> 8.00	< .02	20.	.03	323
Bromine								
077269560	PE	076	127	< .02		23.		104
Bromoacetonitrile								
005901700	BUTYL	014	118	> 8.00		23.	.06	323
	NATURAL RUBBER	001	506	< .01	57.11	23.	.01	323
	PV ALCOHOL	102	100	> 8.00		23.	.03	323
	VITON	009	118	> 8.00		23.	.02	323
Bromobenzene								
001088610	BUTYL	014	118	.53	239.28	23.	.06	323
	NITRILE	019	118	.22	54.71	23.	.04	323
	PV ALCOHOL	102	100	> 8.00		23.	.02	323
	VITON	009	118	> 8.00		23.	.03	323
2-Bromoethanol								
005405120	BUTYL	014	118	> 8.00		23.	.09	323
	NATURAL RUBBER	001	250	.02	66.13	23.	.02	323
	PVC	003	100	.03	456.91	23.	.02	323
	VITON	009	118	> 8.00		23.	.05	323
1-Bromo-2-propanol								
196867380	BUTYL	014	118	> 8.00		23.	.06	323
	NATURAL RUBBER	001	506	.02	45.69	23.	.01	323
	PV ALCOHOL	102	100	> 8.00		23.	.02	323
	VITON	009	118	> 8.00		23.	.02	323

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
3-Bromo-1-propanol								
006271890	BUTYL	014	118	> 8.00		23.	.06	323
	NEOPRENE	018	100	> 8.00		23.	.05	323
	PV ALCOHOL	102	100	> 8.00		23.	.03	323
	VITON	009	118	> 8.00		23.	.02	323
Butadiene								
001069900	BUTYL	014	118	> 8.00		23.	.07	323
	NATURAL RUBBER	001	250	< .02	637.27	23.	.02	323
	NEOPRENE	018	100	.78	1.80	23.	.05	323
	PVC	003	100	< .02	126.25	23.	.02	323
	VITON	009	118	> 8.00		23.	.05	323
tert-Butanol (Methylpropanol, 2-,2-)								
000756500	BUTYL	014	118	> 8.00		23.	.07	323
	NATURAL RUBBER	001	250	.02	18.04	23.	.02	323
	NEOPRENE	018	100	2.75	.05	23.	.05	323
	PVC	007	100	.08	18.04	23.	.02	323
Butyl Acetate								
001238640	BUTYL	014	118	1.90	45.76	23.	.04	227
				1.53	36.07	23.	.05	086
	NATURAL RUBBER	001	210	.13	216.43	23.		080
		017	100	.07	1,402.80	25.	.03	222
			102	.07	72.14	23.	.05	026
				.07	72.14	23.	.05	026
				.07	72.14	23.	.05	026
				.07	72.14	23.	.05	026
			120	.03	2,905.80	25.	.02	222
			502	.11	941.88	25.	.05	222
			504	.13	881.76	25.	.05	222
				.23	511.02	25.	.06	222
	NEOP+NAT RUBBER	026	102	.11	641.28	25.	.05	222
				.07	72.14	23.	.06	026
				.07	72.14	23.	.04	026
				.07	72.14	23.	.05	026
	NEOP/NAT RUBBER	008	102	.07	72.14	23.		026
			114	.15	641.28	25.	.05	222
	NEOPRENE	002	100	.09	220.44	25.	.08	222
			120	.06	320.64	25.	.07	222
			210	.25	72.14	23.		080
		018	100	.32	210.42	23.	.06	086
			118	> 1.00	< 21.04	25.	.08	222
			120	.48	320.64	25.	.05	222
				.87	320.64	25.	.07	222
				> 1.00	< 21.04	25.	.05	222
				.18	831.66	25.	.03	222
	NITRILE	005	210	1.33	90.18	23.		080
		019	100	.55	480.96	25.	.04	222
				1.25	90.18 - 901.80	23.	.06	107
				.97	250.50	25.	.06	222
				.67	450.90	25.	.04	222

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001238640	NITRILE	019	100	1.08	102.20	23.	.06	086
			118	.48	327.05	23.	.04	227
				.25	300.60	23.	.04	086
			120	.53	217.10	23.	.05	086
			503	.33	350.70	25.	.03	222
		020	503	.32	150.30	23.	.04	086
	NITRILE+PVC	057	210	.67	60.12	23.		080
	PE	006	100	.03	20.04	25.	.01	222
			505	.20	6.01	25.	.01	222
			512	.03	66.13	23.	.01	086
		076	100	.17	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
	PVC	003	120	.02	6,012.00	25.	.01	222
				.02	6,913.80	25.	.01	222
				.04	3,306.60	25.	.03	222
				.03	4,308.60	25.	.02	222
			500	.01		25.	.01	222
			501	.03	6,412.80	25.	.01	222
				.03	4,108.20	25.	.02	222
		007	210	.33	72.14	23.		080
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
	VITON	009	118	.23	318.97	23.	.04	086
Butyl Acrylate								
001413220	TEFLON	069	510	> 3.00	< .02	23.	.05	303
Butyl Alcohol (Butanol, 1)								
000713630	NATURAL RUBBER	001	210	2.00	12.02	23.		080
		017	100	.25	9.02 - 90.18	23.	.05	107
	NEOP+NAT RUBBER	026	121	.58	> 6.01	23.	.05	237
	NEOPRENE	002	100	> 8.00	< .90	23.		107
			210	6.00	< .02	23.		080
		018	100	4.00	.90 - 9.02	23.	.04	107
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	> 6.00	< .90	23.	.06	107
	NITRILE+PVC	057	210	6.00	< .02	23.		080
		058	100	.58	.90 - 9.02	23.		107
	PE	076	100	> 6.00	< .90	23.		107
			127	> 8.00	< 30.06	23.		104
	PV ALCOHOL	004	100	.50	9.02 - 90.18	23.		107
				> 8.00		23.		123
				> 4.00		21.		124
	PVC	007	100	3.00	.90 - 9.02	23.		107
			210	2.00	15.03	23.		080
		077	100	.42	< .90	23.		107
				.67	9.02 - 90.18	23.		107
	TEFLON	069	510	> 15.60	< .02	23.	.05	303
Butylamine								
001097390	BUTYL	014	118	1.73	501.00	15.	.10	323
	CPE	060	UNK	.50		23.		142
				1.00		23.		142

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001097390	CPE	070	UNK	.33		23.	.05	004
	NATURAL RUBBER	001	250	.02	7,745.46	20.	.02	323
	NEOPRENE	018	100	.20	2,474.94	18.	.05	323
	PVC	007	100	.02	5,531.04	18.	.02	323
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
	VITON/CHLOROBUTYL	112	UNK	.50		23.		142
iso-Butylamine (Methylpropylamine, 2-)								
000788190	BUTYL	014	118	3.70	60.12	28.	.09	323
	CPE	060	UNK	2.28		23.		142
				2.42		23.		142
	NEOPRENE	018	100	.32	889.78	26.	.05	323
		138	117	< .08		23.	.03	213
	PV ALCOHOL	102	100	.32	835.67	23.	.07	323
	PVC	007	100	.02	3,432.85	28.	.02	323
	VITON/CHLOROBUTYL	112	UNK	1.25		23.		142
sec-Butylamine								
139528460	BUTYL	014	118	2.68	180.36	21.	.09	323
	NEOPRENE	018	100	.27	1,402.80	25.	.05	323
	NITRILE	019	100	.33	1,482.96	14.	.04	323
	PVC	007	100	.01	4,529.04	24.	.02	323
tert-Butylamine								
000756490	BUTYL	014	118	> 8.00	< .02	15.	.09	323
	NEOPRENE	018	100	1.17	360.72	23.	.05	323
	NITRILE	019	100	1.40	240.48	21.	.04	323
	PVC	007	100	.03	3,036.06	20.	.02	323
Butyl Cellosolve (Butoxyethanol, 2)								
001117620	NITRILE	019	100	.45		37.	.06	107
				.35		37.	.06	107
			118	> 4.00		22.	.03	122
				.15	200.40	34.	.04	122
	PV ALCOHOL	004	100	> 18.00		22.	.04	122
n-Butyl Chloride (Chlorobutane,1-)								
001096930	NITRILE	019	100	.20	661.32	23.	.05	323
	PV ALCOHOL	004	100	> 8.00	< .02	23.	.08	323
	PVC	003	100	.20	2,278.55	23.	.02	323
	VITON	009	118	7.42	3.01	23.	.05	323
n-Butyl Phthalate								
000847420	BUTYL	014	118	> 16.00		23.	.04	323
				> 16.00		23.	.04	227
	NATURAL RUBBER	017	100	.28		23.	.05	107
	NEOPRENE	002	100	5.00	.90 - 9.02	23.		107
		018	100	2.00	< .90	23.	.04	107
		125	103		< .02	23.		045
	NITRILE	019	100	> 6.00	< .90	23.	.06	107
			103		< .02	23.		045
			118	> 16.00		23.	.03	323
				> 16.00		23.	.04	227

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000847420	NITRILE+PVC	058	100	> 6.00		23.		107
	PE	076	100	> 6.00		23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
		102	100	> 16.00		23.	.03	323
	PVC	077	100	> 6.00		23.		107
				> 6.00		23.		107
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	VITON	009	118	> 8.00		23.	.03	323
				> 8.00		23.	.02	227
p-tert-Butyl Toluene								
271302120	BUTYL	014	118	1.78	48.10	23.	.06	323
				1.70	48.10	23.	.04	227
	NEOPRENE	018	100	1.22	421.44	23.	.05	323
	NITRILE	019	100	> 6.00		23.	.04	323
	PV ALCOHOL	102	100	> 7.00		23.	.03	323
	SILVER SHIELD	122	118	> 8.00		23.	.01	227
	VITON	009	118	> 8.00		23.	.02	323
				> 8.00		23.	.02	227
Butyraldehyde								
001237280	BUTYL	014	118	> 15.00		23.	.07	323
	NEOPRENE	018	100	.73	75.75	23.	.05	323
	PV ALCOHOL	102	100	.27	.78	23.	.03	323
	TEFLON	069	510	> 7.50	< .02	23.	.05	303
	VITON	009	118	.90	54.11	23.	.03	323
Carbon Disulfide (Carbon Bisulfide)								
000751500	BUTYL	014	118	.05	591.58	23.	.06	323
				.12	588.24	23.	.04	227
	CPE	060	113	.13 - .17		25.	.07	302
		070	UNK	.13		23.	.05	004
	NEOP+NAT RUBBER	026	121	.02	889.78	23.	.05	237
	NITRILE	019	100	.50	90.18 - 901.80	23.	.06	107
			118	.15	306.61	23.	.04	323
				.22	306.61	23.	.04	227
	PE	076	100	.12	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
		102	100	> 16.00		23.	.03	323
	TEFLON	069	510	.36	.05	23.	.05	303
				.34	.07	23.	.05	303
				.30	.05	23.	.05	303
				.22		24.	.05	303
				.22		24.	.05	303
				.60		24.	.05	303
				.60		24.	.05	303
	VITON	009	118	> 16.00		23.	.03	323
				> 16.00		23.	.02	227
	VITON/CHLOROBUTYL	112	113	.18 - .25		25.	.04	302
Carbon Tetrachloride (Tetrachloromethane)								
000562350	CPE	060	113	3.48		23.	.05	204
				3.45	78.16	23.	.05	204

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000562350	NATURAL RUBBER	017	100	.06	1,603.20	25.	.03	222
			120	.03	6,012.00	25.	.02	222
			502	.08	5,110.20	25.	.05	222
			504	.50	801.60	25.	.05	222
				.18	1,603.20	25.	.06	222
	NEOP+NAT RUBBER	026	102	.07	4,609.20	25.	.05	222
	NEOP/NAT RUBBER	008	114	.17	3,106.20	25.	.05	222
	NEOPRENE	002	100	.50	100.20	25.	.08	222
			120	.08	501.00	25.	.07	222
			UNK	.24	300.60	22.	.11	333
				.17	619.24	22.	.08	333
		018	118	> 1.00	< 6.01	25.	.08	222
			120	.57	801.60	25.	.05	222
				.68	901.80	25.	.07	222
				.38	901.80	25.	.05	222
				.22	801.60	25.	.03	222
			UNK	.14	2,244.48	22.	.05	333
				.32	1,756.51	22.	.05	333
				.24	1,997.99	22.	.04	333
	NITRILE	019	100	> 1.00	< 6.01	25.	.04	222
				2.50	9.02 - 90.18	23.	.06	107
				> 1.00	< -1,669.98	25.	.06	222
				> 1.00	< 6.01	25.	.04	222
			118	3.40	30.06	23.	.04	227
			181	> 1.00	< 6.01	25.	.03	222
			503	> 1.00	< 6.01	25.	.03	222
			UNK	> 3.33		22.	.04	333
				> 3.33		22.	.04	333
	NITRILE+PVC	058	100	.05	9.02 - 90.18	23.		107
	PE	006	100	.03	501.00	25.	.01	222
			505	.13	80.16	25.	.01	222
		076	100	.08	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
			UNK	> 3.33	3.01	22.	.09	333
		102	100	> 8.00		23.	.04	323
	PVC	003	120	.01	1,002.00	25.	.01	222
				.03	2,004.00	25.	.01	222
				.14	601.20	25.	.03	222
				.04	801.60	25.	.02	222
			500	.02	2,104.20	25.	.01	222
			501	.02	2,505.00	25.	.01	222
				.02	2,004.00	25.	.02	222
		007	100	.42	90.18 - 901.80	23.		107
			UNK	.22	496.99	22.	.11	333
				.66	203.41	22.	.11	333
				.51	250.50	22.	.10	333
		077	100	.12	9.02 - 90.18	23.		107
				.25	9.02 - 90.18	23.		107
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
	VITON	009	118	> 13.00		23.	.02	227

Chlorine

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
077825050	BUTYL	064	117	> 8.00		23.	.02	213
				> 8.00		23.	.01	213
				> 8.00		23.	.02	213
	BUTYL/NEOPRENE	110	117	> 8.00		23.	.02	213
	NEOPRENE	093	117	> 8.00		23.	.02	213
		138	117	> 8.00		23.	.03	213
		139	117	> 8.00		23.	.02	213
	PE	076	117	.08		23.	.01	213
	PVC	049	117	.92		23.	.01	213
				.08		23.	.01	213
		053	117	< .08		23.	.02	213
	SARANEX	061	117	> 8.00		23.	.01	213
	VITON	145	117	> 8.00		23.	.01	213
	VITON/NEOPRENE	111	117	> 8.00		23.	.02	213
Chloroacetic Acid								
000791180	PE	076	127	> 8.00		23.		104
				.08		65.		104
	SARANEX	061	127	1.00		65.		104
Chloroacetonitrile								
001071420	BUTYL	014	118	> 8.00		23.	.06	323
	NATURAL RUBBER	001	506	< .01	75.75	23.	.01	323
	PV ALCOHOL	102	100	> 8.00		23.	.03	323
	VITON	009	118	> 8.00		23.	.03	323
Chlorobenzene								
001089070	BUTYL	014	118	.58	3,086.16	23.	.07	323
	NEOPRENE	002	UNK	.18		23.	.05	186
	NITRILE	005	229	.21	940.21	23.	.11	210
		019	120	.25	960.25	23.	.04	210
	PE	076	100	.07	90.18 - 901.80	23.		107
	PV ALCOHOL	004	100	.25	9.02 - 90.18	23.		107
		102	100	> 8.00	< .02	23.	.08	323
	PVC	007	100	.03	3,757.50	23.	.02	323
			UNK	.15		23.	.05	186
				.31		23.	.07	186
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
	VITON	009	118	> 4.00		23.	.03	210
				> 8.00	< .02	23.	.03	323
2-Chloro-1,3-butadiene (Chloroprene)								
001269980	NEOPRENE	002	UNK	.05	1,764.52	22.	.08	333
				.05	783.56	22.	.11	333
		018	UNK	.07		22.	.04	333
				.11		22.	.05	333
				.10	3,164.32	22.	.05	333
	NITRILE	019	UNK	.06	2,329.65	22.	.04	333
				.12	2,077.15	22.	.04	333
	PV ALCOHOL	004	UNK	> 16.67		22.	.09	333
	PVC	007	UNK	.08	669.34	22.	.11	333
				.09	851.70	22.	.10	333
				.07	954.91	22.	.11	333

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
Chlorodibromomethane								
001244810	BUTYL	012	118	3.27	149.75	23.	.10	323
	PV ALCOHOL	004	100	.60	.02	23.	.07	323
	PVC	003	100	.03	1,106.21	23.	.02	323
	VITON	009	118	> 8.00		23.	.04	323
Chloroform (Trichloromethane)								
000676630	CPE	060	113	.50 - .58		25.	.07	302
		070	UNK	.20		23.	.05	004
	NATURAL RUBBER	017	100	.03	4,008.00	25.	.03	222
			120	.01	15,030.00	25.	.02	222
			502	.04	7,615.20	25.	.05	222
			504	.05	5,611.20	25.	.05	222
				.05	7,014.00	25.	.06	222
	NEOP+NAT RUBBER	026	102	.05	7,014.00	25.	.05	222
	NEOP/NAT RUBBER	008	114	.11	4,408.80	25.	.05	222
	NEOPRENE	002	100	.02	2,705.40	25.	.08	222
			120	.01	6,813.60	25.	.07	222
		018	118	.36	2,004.00	25.	.08	222
			120	.16	3,206.40	25.	.05	222
				.23	2,805.60	25.	.07	222
				.17	2,505.00	25.	.05	222
				.06	4,408.80	25.	.03	222
		031	UNK	.20		23.	.04	187
	NITRILE	019	100	.08	9,418.80	25.	.04	222
				.21	5,611.20	25.	.06	222
				.04	9,919.80	25.	.04	222
			118	.07	2,116.22	23.	.04	227
			503	.07	7,014.00	25.	.03	222
		033	UNK	.16		23.	.05	187
	PE	006	100	.01	1,603.20	25.	.01	222
			505	.05		25.	.01	222
		056	UNK	.07		23.	.01	187
		076	100	.10	9.02 - 90.18	23.		107
			127	< .02	348.70	23.		104
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
		102	100	> 8.00		23.	.03	323
	PVC	003	120	.01	15,030.00	25.	.01	222
				.01	> 16,699.98	25.	.01	222
				.01	5,410.80	25.	.03	222
				.01	11,022.00	25.	.02	222
			500	.01	15,030.00	25.	.01	222
			501	.01	12,024.00	25.	.01	222
				.01	13,026.00	25.	.02	222
		049	UNK	.14		23.	.03	187
	SARANEX	061	127	< .02	201.40	23.		104
	SILVER SHIELD	122	118	.17	.05	23.	.01	227
	TEFLON	069	510	> 3.60	< .02	23.	.05	303
	VITON	009	118	9.50	2.77	23.	.02	227
	VITON/CHLOROBUTYL	112	113	> 3.00		25.	.04	302

3-Chloro-2-methylpropene

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
005634730	BUTYL	014	118	.50	120.24	23.	.06	323
	PV ALCOHOL	004	100	.03	80.16	23.	.04	323
	PVC	007	100	.01	120.24	23.	.02	323
	VITON	009	118	3.83	30.06	23.	.03	323
Chloronaphthalenes (all isomers)								
255864300	NITRILE	019	118	2.90	> 7.93	23.	.04	227
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
	SILVER SHIELD	122	118	> 8.00		23.	.01	227
	VITON	009	118	> 16.00	< 1,669.98	23.	.02	227
2-Chloro-2-nitropropane								
005947180	BUTYL	012	118	> 8.00	< .02	23.	.09	323
	NATURAL RUBBER	017	506	.02	270.54	23.	.02	323
	PV ALCOHOL	004	100	> 8.00	< .02	23.	.07	323
	VITON	009	118	2.05	120.24	23.	.04	323
1-Chloro-2-propanol								
001270040	BUTYL	014	118	> 8.00		23.	.06	323
	NATURAL RUBBER	001	506	< .01		23.	.01	323
	PVC	003	100	.02	230.86	23.	.02	323
	VITON	009	118	> 8.00		23.	.03	323
3-Chloro-1-propanol								
006273050	BUTYL	014	118	> 8.00		23.	.06	323
	PV ALCOHOL	102	100	.80	92.58	23.	.04	323
	PVC	003	100	.18	409.42	23.	.02	323
	VITON	009	118	> 8.00		23.	.03	323
Chlorosulfonic Acid								
077909450	PE	076	127	1.05		23.		104
	SARANEX	061	127	5.83		23.		104
o-Chlorotoluene								
000954980	NITRILE	005	229	.29	1,163.99	23.	.11	210
		019	120	.88	988.64	23.	.04	210
	VITON	009	118	> 4.00		23.	.03	210
p-Chlorotoluene								
001064340	NITRILE	005	229	.25	1,224.11	23.	.11	210
		019	120	.42	890.11	23.	.04	210
	VITON	009	118	> 4.00		23.	.03	210
Chromic Acid								
111157450	NATURAL RUBBER	001	210	1.17		23.		080
	NEOPRENE	002	210	1.25		23.		080
	NITRILE	005	210	6.00	< .02	23.		080
	NITRILE+PVC	057	210	6.00	< .02	23.		080
		058	100	> 6.00		23.		107
	PE	076	100	> 6.00		23.		107
	PVC	007	210	6.00	< .02	23.		080
		077	100	> 6.00		23.		107
				> 6.00		23.		107

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
Chromic Acid, <30%								
111157451	NEOP+NAT RUBBER	026	121	> 8.00	< .02	23.	.05	237
Chromic Acid, 30-70%								
111157452	NITRILE	019	100	4.00		23.	.06	107
	PVC	007	100	> 6.00		23.		107
Citric Acid, <30%								
000779291	NATURAL RUBBER	017	100	> 6.00		23.	.05	107
	NEOPRENE	002	100	> 6.00		23.		107
		018	100	> 6.00		23.	.04	107
	NITRILE	019	100	> 6.00		23.	.06	107
	NITRILE+PVC	058	100	> 6.00		23.		107
	PE	076	100	> 6.00		23.		107
	PV ALCOHOL	004	100	.83		23.		107
	PVC	007	100	> 6.00		23.		107
		077	100	> 6.00		23.		107
				> 6.00		23.		107
Creosote								
080015890	BUTYL	034	UNK	> 90.00		22.	.08	078
	NEOPRENE	031	UNK	4.50		22.	.08	078
	VITON	032	UNK	> 96.00		22.	.04	078
Creosote, Wood								
080213940	NEOPRENE	018	100	> 4.00		23.	.05	123
	VITON	009	118	> 19.00		23.	.03	123
m-Cresol								
001083940	NATURAL RUBBER	017	100	.60		25.	.03	222
			120	.23	15.03	25.	.02	222
			502	.50	2.00	25.	.05	222
			504	> 1.00	1.00	25.	.05	222
				> 1.00	1.00	25.	.06	222
	NEOP+NAT RUBBER	026	102	.50	2.00	25.	.05	222
	NEOP/NAT RUBBER	008	114	> 1.00	1.00	25.	.05	222
	NEOPRENE	002	100	> 1.00	1.00	25.	.08	222
		018	118	> 1.00	1.00	25.	.08	222
			120	> 1.00	1.00	25.	.05	222
				> 1.00	1.00	25.	.07	222
				> 1.00	1.00	25.	.05	222
				> 1.00	1.00	25.	.03	222
	NITRILE	019	100	> 1.00	1.00	25.	.04	222
				> 1.00	1.00	25.	.06	222
				> 1.00	1.00	25.	.04	222
			503	> 1.00	1.00	25.	.03	222
	PE	006	100	> 1.00	1.00	25.	.01	222
			505	> 1.00	< .10	25.	.01	222
	PVC	003	120	.20	67.13	25.	.01	222
				.23	59.12	25.	.01	222
				> 1.00	1.00	25.	.03	222
				.23	63.13	25.	.02	222

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001083940	PVC	003	500	.13	44.09	25.	.01	222
			501	.13	55.11	25.	.01	222
				.12	56.11	25.	.02	222
	TEFLON	069	510	> 4.00	< .02	23.	.05	303
Cresols								
013197730	PE	076	127	.67 - 1.00	.40	23.		104
	SARANEX	061	127	> 2.00	< .13	23.		104
Crotonaldehyde (Butenal,trans-2)								
041703030	BUTYL	014	118	> 8.00		23.	.07	323
	CPE	070	UNK	.63		23.	.05	004
	NEOPRENE	018	100	.35	209.22	23.	.05	323
	PV ALCOHOL	102	100	< .01	57.72	23.	.03	323
	TEFLON	069	510	> 3.10	< .02	23.	.05	303
	VITON	009	118	.12	313.83	23.	.03	323
Cumene (Methylethyl Benzene)								
000988280	CPE	070	UNK	1.30		23.	.05	004
Cyclohexane								
001108270	BUTYL	014	118	1.15	122.04	23.	.07	323
				1.10	122.04	23.	.04	227
	NATURAL RUBBER	001	210	.10	2,044.08	23.		080
		017	100		10.02	25.	.03	222
			120	.03	1,503.00	25.	.02	222
			502	.13	1,302.60	25.	.05	222
			504	.16	1,102.20	25.	.05	222
				.30	801.60	25.	.06	222
	NEOP+NAT RUBBER	026	102	.08	1,402.80	25.	.05	222
	NEOPRENE	002	120	.16	70.14	25.	.07	222
			210	.10	1,082.16	23.		080
		018	100	.95	.18	23.	.04	323
			120	> 1.00	< 10.02	25.	.05	222
				.48	100.20	25.	.05	222
				1.20	100.20	25.	.03	222
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	> 6.00		23.	.04	323
				> 1.00	< 10.02	25.	.04	222
				> 1.00	< 1.00	25.	.06	222
				> 1.00	< 1.00	25.	.04	222
			181	> 1.00	< 1.00	25.	.03	222
			503	> 1.00	< 10.02	25.	.03	222
	NITRILE+PVC	057	210	3.00	12.02	23.		080
	PE	006	100	.03	100.20	25.	.01	222
			505	.17	28.06	25.	.01	222
	PV ALCOHOL	102	100	.78	< .02	23.	.03	323
	PVC	003	120	.03	501.00	25.	.01	222
				.04	340.68	25.	.01	222
				.27	100.20	25.	.03	222
				.09	200.40	25.	.02	222
			500	.03	310.62	25.	.01	222
			501	.01	450.90	25.	.01	222

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001108270	PVC	003	501	.04	300.60	25.	.02	222
		007	210	.55	216.43	23.		080
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	TEFLON	069	510	> 3.40	< .02	23.	.05	303
	VITON	009	118	> 7.00		23.	.02	323
				> 7.00		23.	.02	227
Cyclohexanol								
001089300	BUTYL	014	118	> 11.00		23.	.07	323
				> 11.00		23.	.04	227
	NATURAL RUBBER	001	210	.42	72.14	23.		080
		017	100	.25	9.02 - 90.18	23.	.05	107
	NEOPRENE	002	100	3.00	< .90	23.		107
			210	3.00	60.12	23.		080
		018	100	2.50	.90 - 9.02	23.	.04	107
			UNK	> 8.00		23.	.08	323
		031	511	- 8.00	******** - -1,669.98	23.	.01	323
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	> 6.00	< .90	23.	.06	107
			118	> 16.00		23.	.03	323
				> 16.00		23.	.04	227
	NITRILE+PVC	057	210	6.00	< .02	23.		080
		058	100	.25	.90 - 9.02	23.		107
	PE	076	100	> 6.00	< .90	23.		107
	PV ALCOHOL	004	100	6.00	< .90	23.		107
		102	100	> 16.00		23.	.03	323
	PVC	007	100	6.00	< .90	23.		107
			210	6.00	< .02	23.		080
		077	100	1.00	< .90	23.		107
				> 6.00	< .90	23.		107
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	VITON	009	118	> 8.00		23.	.03	323
				> 8.00		23.	.02	227
Cyclohexanone								
001089410	BUTYL	014	118	> 16.00		23.	.05	323
				> 16.00		23.	.04	227
	NEOP+NAT RUBBER	026	121	.28	132.26	23.	.05	237
	NITRILE	019	118	.48	518.84	23.	.03	227
	PV ALCOHOL	102	100	> 7.00		23.	.03	323
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	VITON	009	118	.48	518.84	23.	.03	323
Cyclohexylamine								
001089180	BUTYL	014	118	2.93	290.58	20.	.06	323
	NATURAL RUBBER	001	250	.02	8,977.92	20.	.02	323
	NEOPRENE	018	100	.60	1,322.64	22.	.05	323
	NITRILE	019	100	1.02	1,843.68	24.	.04	323
Decanal (all isomsers)								
001123120	BUTYL	064	117	> 8.00		23.	.02	213
				> 8.00		23.	.01	213
				> 8.00		23.	.02	213

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001123120	BUTYL/NEOPRENE	110	117	2.50		23.	.02	213
	NEOPRENE	093	117	4.00		23.	.02	213
		138	117	> 8.00		23.	.03	213
		139	117	> 8.00		23.	.02	213
	PE	076	117	> 8.00		23.	.01	213
	PVC	049	117	< .08		23.	.01	213
	SARANEX	061	117	> 8.00		23.	.01	213
	VITON	145	117	> 8.00		23.	.01	213
	VITON/NEOPRENE	111	117	> 8.00		23.	.02	213
Diallyamine								
001240270	BUTYL	014	118	3.33	90.18	21.	.09	323
	PV ALCOHOL	004	100	7.08	20.04	23.	.08	323
	PVC	007	100	.02	2,364.72	22.	.02	323
	VITON	009	118	4.62		19.	.03	323
1,3-Diaminopropane								
C01097620	BUTYL	014	118	> 8.00	< .02	22.	.06	323
	NATURAL RUBBER	001	250	.05	440.88	25.	.02	323
	NEOPRENE	018	100	4.53	33.40	23.	.05	323
	PVC	007	100	.11	103.54	21.	.02	323
Di-n-amylamine								
020509220	NEOPRENE	018	100	2.15	110.22	16.	.05	323
	NITRILE	019	100	> 8.00	< .02	20.	.04	323
	PVC	007	100	.12	280.56	13.	.02	323
	VITON	009	118	> 8.00	< .02	16.	.03	323
Dibutylamine								
001119220	NITRILE	019	100	> 8.00	< .02	24.	.04	323
	PV ALCOHOL	102	100	> 8.00	< .02	23.	.08	323
	PVC	007	100	.05	741.48	20.	.02	323
	VITON	009	118	> 8.00	< .02	20.	.03	323
Dichloroacetyl Chloride								
000793670	BUTYL	014	118	3.92	72.14	23.	.09	323
	PV ALCOHOL	102	100	3.47		23.	.07	323
	PVC	003	100	.03	438.88	23.	.02	323
	VITON	009	118	> 8.00		23.	.03	323
Dichlorobenzene								
253212260	CPE	070	UNK	.65		23.	.05	004
1,2-Dichlorobenzene								
000955010	NITRILE	005	229	.33	1,015.36	23.	.11	210
		019	120	.63	1,140.61	23.	.04	210
	VITON	009	118	> 4.00		23.	.03	210
1,3-Dichlorobenzene								
005417310	NITRILE	005	229	.28	1,130.59	23.	.11	210
		019	120	.50	1,157.31	23.	.04	210
	VITON	009	118	> 4.00		23.	.03	210

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
Dichlorobromomethane								
000752740	BUTYL	014	118	.68	1,897.80	23.	.07	323
	PVC	007	100	.02	6,943.86	23.	.02	323
	VITON	009	118	7.83	.37	23.	.03	323
	VITON/BUTYL	100	102	1.78	.02	23.	.08	323
1,4-Dichloro-2-butene								
001105760	BUTYL	064	UNK	> 24.00		23.	.07	334
	CPE	060	UNK	.58	400.80	23.	.05	334
		070	UNK	.75		23.	.05	004
	NEOPRENE	002	UNK	1.10		22.	.12	333
				.77		22.	.10	333
				.22		22.	.08	333
				.17		22.	.07	333
				.57	118.24	22.	.11	333
				.36	51.10	22.	.08	333
				.45	31.06	23.	.10	335
				.68	27.05	23.	.12	335
				.80	27.05	23.	.14	335
		018	UNK	.49	126.25	22.	.05	333
				.37		22.	.05	333
				.35		22.	.05	333
				.26		22.	.04	333
				.23	41.08	22.	.05	333
				.30	38.08	23.	.04	335
		031	UNK	1.38	80.16	23.	.14	334
				.97	80.16	23.	.13	334
				1.23	121.24	23.	.13	334
		081	UNK	1.97	101.20	23.	.15	335
				3.35	40.08	23.	.18	335
				2.97	41.08	23.	.20	335
				1.60	121.24	23.	.14	335
				.92	113.23	23.	.14	335
	NITRILE	019	UNK	.43	156.31	23.	.04	335
				.33		22.	.04	333
				.27		22.	.04	333
				.33		22.	.04	333
				.44	156.31	22.	.04	333
		078	UNK	.04	330.66	23.	.03	334
	PE	006	UNK	> 24.00		23.	.01	334
		075	UNK	.04	33.07	23.	.03	334
		076	127	1.25		23.		104
			UNK	> 24.00		23.	.01	334
	PV ALCOHOL	004	UNK	> 83.33		22.	.09	333
	PVC	007	UNK	.37		22.	.11	333
				.58	72.14	22.	.11	333
				.52	108.22	22.	.10	333
				.58	87.17	22.	.11	333
				.60		22.	.12	333
				.58	31.06	23.	.10	335
				.50	30.06	23.	.11	335
		049	UNK	.10	380.76	23.	.05	334

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR		BREAKTHROUGH TIME HOURS		PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001105760	PVC	049	UNK		.05		370.74	23.	.04	334
					2.87		144.29	23.	.20	334
		053	UNK		.06		400.80	23.	.03	334
					.09		250.50	23.	.05	334
					.13		330.66	23.	.05	334
		077	UNK		.02		430.86	23.	.02	334
		083	UNK		6.43		81.16	23.	.26	335
					2.73		122.24	23.	.20	335
	SARANEX	061	UNK	>	24.00			23.	.02	334
	VITON	009	UNK	>	8.30			23.	.03	335
		090	UNK	>	24.00			23.	.02	334
Dichloroethane										
013002160	TEFLON	069	510	>	5.70	<	.02	23.	.05	303
				>	3.00	<	.02	25.	.05	303
cis-Dichloroethylene										
001565920	BUTYL	014	118		.32		2,925.84	23.	.07	323
	PV ALCOHOL	004	100		.08		3,547.08	23.	.05	323
	PVC	007	100		.02		3,316.62	23.	.02	323
	VITON	009	118		1.68		30.06	23.	.03	323
1,2-Dichloroethylene										
005405900	NITRILE	019	100		.12		781.56	29.	.04	323
	PV ALCOHOL	004	100		.23		.50	23.	.04	323
	PVC	007	100	<	.01		841.68	23.	.02	323
	VITON	009	118		.95		50.10	23.	.03	323
trans-1,2-Dichloroethylene										
001566050	BUTYL	014	118		.13		14,739.42	23.	.06	323
	PV ALCOHOL	004	100		2.63		1,142.28	23.	.09	323
	PVC	007	100		.02		6,262.50	23.	.02	323
	VITON	009	118		1.18		20.04	23.	.03	323
2,2'-Dichloroethyl Ether										
001114440	CPE	060	113		1.20			23.	.05	204
					1.45		480.96	23.	.05	204
		070	UNK		1.33			23.	.05	004
	TEFLON	069	510	>	3.00	<	.02	23.	.05	303
Dichloropropane (all isomers)										
266381970	CPE	070	UNK		.60			23.	.05	004
	TEFLON	069	510	>	3.10	<	.02	23.	.05	303
Dichloropropane-Dichloropropene										
080031980	TEFLON	069	510	>	3.00	<	.02	23.	.05	303
2,3-Dichloro-1-propene										
000788860	BUTYL	014	118		1.90		140.28	23.	.09	323
	PV ALCOHOL	102	100	>	8.00	<	.02	23.	.09	323
	PVC	007	100		.02		5,330.64	23.	.02	323
	VITON	009	118	>	8.00	<	.02	23.	.03	323

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
1,3-Dichloropropene								
005427560	BUTYL	014	118	1.30	320.64	23.	.07	323
	PV ALCOHOL	102	100	> 8.00	< .02	23.	.07	323
	PVC	007	100	.02	6,513.00	23.	.02	323
	VITON	009	118	> 8.00	< .02	23.	.03	323
Diethanolamine								
001114220	BUTYL	014	118	> 8.00		24.	.09	323
	NEOPRENE	018	100	> 8.00		22.	.05	323
	NITRILE	019	100	> 8.00		26.	.04	323
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
	VITON	009	118	> 8.00		27.	.03	323
Diethylamine								
001098970	BUTYL	014	118	.78	460.92	23.	.09	323
	NATURAL RUBBER	001	103		534.40	23.		045
	NEOPRENE	125	103		396.79	23.		045
	NITRILE	019	100	.75	90.18 - 901.80	23.	.06	107
				.20	1,332.66	24.	.04	323
			103		583.16	23.		045
	PE	076	100	.08	90.18 - 901.80	23.		107
	PVC	007	100	.02	3,707.40	24.	.02	323
			103		414.83	23.		045
	SARANEX	061	127	.73	38.08	23.		104
	SILVER SHIELD	122	118	> 8.00		23.	.01	227
	VITON	009	118	.58	8,537.04	20.	.03	323
	VITON/CHLOROBUTYL	112	113	.45 - .50		25.	.04	302
Diethylaminoethanol								
001003780	BUTYL	014	118	> 8.00	< .02	22.	.07	323
	NITRILE	019	118	> 8.00	< .02	22.	.04	323
	PV ALCOHOL	102	100	> 8.00	< .02	23.	.09	323
	VITON	009	118	> 8.00	< .02	22.	.03	323
Diethylenetriamine								
001114000	BUTYL	014	118	> 8.00	< .02	24.	.08	323
	NEOPRENE	018	100	> 8.00	< .02	22.	.05	323
	PVC	007	100	.63	3.01	22.	.02	323
	VITON	009	118	> 8.00	< .02	23.	.03	323
Diisobutylamine								
001109630	NEOPRENE	018	100	.87	138.28	22.	.05	323
	NITRILE	019	100	> 8.00		20.	.04	323
	PV ALCOHOL	102	100	> 8.00		23.	.08	323
	VITON	009	118	> 8.00		22.	.02	323
Diisobutyl Ketone								
001088380	NATURAL RUBBER	001	210	.25	583.16	23.		080
	NEOPRENE	002	210	.25	450.90	23.		080
	NITRILE	005	210	4.75	30.06	23.		080
		019	100	2.00	90.18 901.80	23.	.06	107
	NITRILE+PVC	057	210	1.25	3.01	23.		080

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001088380	PE	076	100	.08	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
	PVC	007	210	1.00	8.42	23.		080
Diisobutyl Ketone, >70%								
001088383	BUTYL	014	118	3.27	247.69	23.	.04	323
				3.30	247.69	23.	.04	227
	NITRILE	019	118	2.93	294.59	23.	.03	323
				3.00	293.99	23.	.03	227
	PV ALCOHOL	102	100	> 16.00		23.	.03	323
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	VITON	009	118	1.13	544.69	23.	.03	323
				1.20	544.69	23.	.02	227
Diisopropylamine								
001081890	NEOPRENE	018	100	.67	450.90	12.	.05	323
	NITRILE	019	100	3.25	90.18	10.	.04	323
	PVC	007	100	.03	1,322.64	11.	.02	323
	TEFLON	069	510	> 4.50	< .02	24.	.05	303
	VITON	009	118	> 8.00	< .02	12.	.03	323
N,N-Dimethylacetamide								
001271950	CPE	070	UNK	.67		23.	.05	004
	SARANEX	061	127	1.07	2.00	23.		104
Dimethylamine								
001244030	BUTYL	014	118	> 8.00	< .02	22.	.06	323
	NATURAL RUBBER	001	250	.03	80.16	20.	.02	323
	NEOPRENE	018	100	> 8.00	< .02	22.	.05	323
	PV ALCOHOL	102	100	.28	40.08	23.	.07	323
	PVC	007	100	.10	20.04	20.	.02	323
Dimethylaminopropylamine								
001095570	BUTYL	014	118	> 8.00	< .02	16.	.09	323
	NATURAL RUBBER	001	250	.01	2,114.22	16.	.02	323
	NEOPRENE	018	100	.48	470.94	20.	.05	323
	PVC	077	100	.03	2,189.37	20.	.02	323
alpha,alpha-Dimethylbenzyl Hydroperoxide								
000801590	TEFLON	069	510	> 3.50	< .02	23.	.05	303
Dimethylbutylamine								
001080980	BUTYL	014	118	1.68	320.64	24.	.06	323
	NITRILE	019	100	1.35	711.42	19.	.04	323
	PV ALCOHOL	102	100	.33	140.28	23.	.08	323
	PVC	007	100	.05	2,575.14	21.	.02	323
Dimethylethanolamine								
001080100	BUTYL	014	118	> 8.00	< .02	12.	.09	323
	NATURAL RUBBER	001	250	.08	100.20	19.	.02	323
	NEOPRENE	018	100	3.92	30.06	21.	.05	323
	NITRILE	019	100	> 8.00	< .02	9.	.04	323

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
Dimethylformamide								
000681220	BUTYL	012	UNK	22.00	< .02	25.	.04	273
				23.00	< .02	25.	.04	273
				> 71.00	< .02	25.	.06	273
				> 71.00	< .02	25.	.06	273
				> 24.00	< .02	25.	.04	273
				> 24.00	< .02	25.	.04	273
				> 24.00	< .02	25.	.06	273
				> 24.00	< .02	25.	.06	273
				> 6.00	1.20	25.	.04	273
				> 6.00	1.20	25.	.04	273
				> 7.00	< -1,669.98	25.	.06	273
				> 7.00	< -1,669.98	25.	.06	273
		014	118	> 8.00		23.	.04	323
				> 8.00		23.	.04	227
		107	UNK	> 8.00		25.	.04	149
				> 8.00		25.	.04	149
				> 8.00		25.	.04	149
	NATURAL RUBBER	001	210	1.00	721.44	23.		080
		017	100	.50	90.18 - 901.80	23.	.05	107
	NEOP+NAT RUBBER	026	121	.62	66.13	23.	.05	237
	NEOPRENE	002	100	1.00	9.02 - 90.18	23.		107
			210	.13	96.19	23.		080
		018	100	.85	66.13	23.	.05	323
				.17	9.02 - 90.18	23.	.04	107
			UNK	3.00	1.20	25.	.04	273
				3.50	1.20	25.	.04	273
				> 5.50	< .02	25.	.06	273
				> 6.00	< .02	25.	.06	273
		031	UNK	.02	18.04	25.	.04	149
				.57	47.09	25.	.04	149
				1.10	74.15	25.	.04	149
				.10	20.04	25.	.04	149
		125	103		54.11	23.		045
	NITRILE	005	120	.58	54.11	23.	.06	236
			210	1.00	120.24	23.		080
		019	103		114.23	23.		045
			118	.15	90.18	23.	.04	323
				.22	> 90.18	23.	.04	227
			UNK	3.50	10.82	25.	.04	273
				3.50	12.02	25.	.04	273
				> 5.00	10.82	25.	.06	273
				> 5.00	10.22	25.	.06	273
	NITRILE+PVC	057	210	1.50	132.26	23.		080
	PE	076	100	.50	< .90	23.		107
	PV ALCOHOL	035	UNK	.08	900.80	25.	.07	149
				.37	1,057.78	25.	.07	149
				.33	48.10	25.	.07	149
				.12	2,191.37	25.	.07	149
		102	100	.33	78.16	23.	.04	323
				.20	24.65	23.	.03	323
	PVC	007	210	1.00	138.28	23.		080

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000681220	SILVER SHIELD	122	118	> 8.00		23.	.01	227
	TEFLON	069	510	> 11.20	< .02	23.	.05	303
	VITON	009	118	.13	39.08	23.	.03	323
				.13	39.08	23.	.02	227
	VITON/CHLOROBUTYL	112	113	> 3.00		25.	.04	302
1,1-Dimethylhydrazine (Dimethylhydrazine,unsym-)								
000571470	BUTYL	014	118	> 1.50		23.	.03	001
				> 1.50		23.	.04	001
				> 1.50		23.	.08	001
		034	UNK	23.00 - 27.00	2.91	22.	.08	078
	CHLOROBUTYL	052	205	> 1.50		23.	.05	001
	CPE	060	113	.50		23.	.05	001
	NATURAL RUBBER	017	100	.17		23.	.04	001
				.23		23.	.05	001
				.06		23.	.02	001
				.18		23.	.04	001
				.06		23.	.02	001
			101	.10		23.	.05	001
			110	.22		23.	.05	001
	NEOP/NAT RUBBER	008	114	.03		23.	.04	001
				.15		23.	.04	001
				.15		23.	.04	001
	NEOPRENE	002	100	1.12		23.	.12	001
				> 1.50		23.	.13	001
		018	100	.63		23.	.05	001
		031	UNK	.42 - .67	450.90	22.	.08	078
	NITRILE	019	100	.15		23.	.04	001
				.23		23.	.04	001
				.10		23.	.03	001
			118	.12		23.	.03	001
	PV ALCOHOL	004	100	.13		23.	.09	001
	PVC	003	120	.22		23.	.05	001
				.68		23.	.10	001
				.03		23.	.03	001
		007	100	.47		23.	.09	001
				.58		23.	.11	001
				.28		23.	.10	001
		053	189	.05		23.	.06	001
				.16		23.	.07	001
				.33		23.	.05	001
		054	189	.53		23.	.05	001
				.02		23.	.05	001
		077	168	.08 - .17	190.38	22.	.04	078
			212	.08		23.	.03	001
	VITON	009	118	.20		23.	.03	001
Dimethyl Sulfoxide								
000676850	CPE	060	113	> 3.00		25.	.07	302
	NATURAL RUBBER	001	210	1.33	721.44	23.		080
			UNK	1.50 - 2.00		25.	.02	276
		017	100	> 1.00	< 10.02	25.	.03	222
				1.00	.90 - 9.02	23.	.05	107

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC. CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000676850	NATURAL RUBBER	017	120	> 1.00	< 10.02	25.	.02	222
			203	> 1.00	< 10.02	25.	.05	222
				> 1.00	< 10.02	25.	.06	222
	NEOP/NAT RUBBER	008	114	4.00		25.	.05	276
	NEOPRENE	002	100	> 8.00		25.	.05	276
				> 3.00	9.02 - 90.18	23.		107
			120	> 1.00	< 10.02	25.	.07	222
			210	6.00	< .02	23.		080
			UNK	1.77		23.	.05	186
		018	100	> 6.00	< .90	23.	.04	107
			120	> 1.00	< 10.02	25.	.05	222
				1.00	< 10.02	25.	.05	222
				> 1.00	< 10.02	25.	.03	222
	NITRILE	005	210	4.33	5.41	23.		080
		019	100	> 1.00	< 10.02	25.	.04	222
				2.00 - 3.00		25.	.04	276
				> 4.00	.90 - 9.02	23.	.06	107
			191	.47	350.70	25.	.03	222
	NITRILE+PVC	057	210	1.33	4.81	23.		080
	PE	006	100	> 1.00	< 10.02	25.	.01	222
	PVC	003	120	.05	380.76	25.	.01	222
				.70	300.60	25.	.03	222
				.57	320.64	25.	.02	222
		007	100	1.17	.90 - 9.02	23.		107
			210	.83	6.01	23.		080
	VITON/CHLOROBUTYL	112	113	> 3.00		25.	.04	302
Dimethylvinylchloride								
005133710	NITRILE	019	100	.15	354.71	23.	.05	323
	PV ALCOHOL	004	100	1.18	6.01	23.	.08	323
	PVC	003	100	.02	420.84	23.	.02	323
	VITON	009	118	2.22	24.05	23.	.04	323
Di-n-octyl Phthalate								
001178400	NITRILE+PVC	058	100	.42		23.		107
	PE	076	100	.08		23.		107
	PVC	077	100	.42		23.		107
				> 6.00	< .90	23.		107
1,4-Dioxane (Diethylene Dioxide,1,4)								
001239110	BUTYL	014	118	> 20.00		23.	.07	323
				> 20.00		23.	.04	227
	NATURAL RUBBER	017	100	.15	420.84	25.	.03	222
				.08	90.18 - 901.80	23.	.05	107
			120	.04	801.60	25.	.02	222
			502	.20	340.68	25.	.05	222
			504	.17	280.56	25.	.05	222
				.45	150.30	25.	.06	222
	NEOP+NAT RUBBER	026	102	.28	340.68	25.	.05	222
	NEOP/NAT RUBBER	008	114	.30	220.44	25.	.05	222
	NEOPRENE	002	100	.14	220.44	25.	.08	222
			120	.09	330.66	25.	.07	222
		018	100	.27	560.92	23.	.05	323

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001239110	NEOPRENE	018	118	1.78	150.30	25.	.08	222
			120	.73	300.60	25.	.05	222
				.73	240.48	25.	.07	222
				.47	370.74	25.	.05	222
				.25	551.10	25.	.03	222
		125	103		360.72	23.		045
	NITRILE	019	100	.42	861.72	25.	.04	222
				1.05	3.01	25.	.06	222
				.45	821.64	25.	.04	222
			103		2,068.13	23.		045
			118	.40	463.53	23.	.04	323
				.47	463.53	23.	.04	227
			503	.28	711.42	25.	.03	222
	PE	006	100	.02	300.60	25.	.01	222
			505	.17	60.12	25.	.01	222
		076	100	.05	.90 - 9.02	23.		107
	PV ALCOHOL	102	100	> 16.00		23.	.03	323
	PVC	003	120	.03	3,707.40	25.	.01	222
				.01	4,008.00	25.	.01	222
				.11	1,503.00	25.	.03	222
				.06	1,102.20	25.	.02	222
			500	.02	5,010.00	25.	.01	222
			501	.02	3,807.60	25.	.01	222
				.02	4,008.00	25.	.02	222
		007	103		402.80	23.		045
	SARANEX	061	127	.83	17.43	23.		104
	SILVER SHIELD	122	118	> 8.00		23.	.01	227
	TEFLON	069	510	> 3.20	< .02	23.	.05	303
	VITON	009	118	.38	161.12	23.	.03	323
				.38	161.12	23.	.02	227
Dipropylamine								
001428470	TEFLON	069	510	> 3.00	< .02	23.	.05	303
Divinyl Benzene								
013217400	BUTYL	014	118	2.22	1,430.86	23.	.05	323
				2.20	1,430.86	23.	.04	227
	NITRILE	019	100	1.00	2,703.60	23.	.04	323
	PV ALCOHOL	102	100	> 18.00		23.	.03	323
	SILVER SHIELD	122	118	> 8.00		23.	.01	227
	VITON	009	118	> 17.00		23.	.02	323
				> 17.00		23.	.02	227
Epichlorohydrin								
001068980	BUTYL	014	118	24.00		23.	.04	291
				24.00		23.	.04	291
				24.00		23.	.04	291
				24.00		23.	.04	291
				> 8.00	< -1,669.98	23.	.07	323
				> 8.00	< -1,669.98	23.	.07	323
		034	UNK	79.00	.20	22.	.08	078
	NATURAL RUBBER	001	250	< .02	504.34	23.	.02	323
				< .02	504.34	23.	.02	323

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001068980	NATURAL RUBBER	017	UNK	.05	130.26	23.	.02	291
				.06	138.28	23.	.02	291
	NEOPRENE	018	100	.33	362.72	23.	.04	291
				.25	314.63	23.	.04	291
		031	UNK	1.00 - 1.33	110.22	22.	.08	078
	NITRILE	020	503	.42	1,252.50	23.	.04	291
				.33	1,152.30	23.	.04	291
	PE	006	100	.05	9.45	23.	.01	291
				.05	9.74	23.	.01	291
	PV ALCOHOL	035	UNK	< .08	130.26	22.	.01	078
		102	100	.05	127.25	23.	.05	291
				.02	105.21	23.	.05	291
				5.82	.30	23.	.07	323
				5.82	.30	23.	.07	323
	SARANEX	061	127	1.00	3.32	23.	.02	291
				1.00	3.44	23.	.02	291
				.95	52.30	23.		104
	TEFLON	036	214	7.00	.02	23.	.01	291
				7.00	.02	23.	.01	291
		069	510	> 3.40	< .02	23.	.05	303
	VITON	009	118	1.00	51.20	23.	.02	291
				1.00	51.90	23.	.02	291
				1.00	50.70	23.	.02	291
				2.05	6.13	23.	.03	323
				2.05	6.13	23.	.03	323
1,2-Epoxybutane								
001068870	BUTYL	014	118	.75	20.04	23.	.06	323
	NEOPRENE	018	100	.07	20.04	23.	.05	323
	PV ALCOHOL	004	100	> 8.00	< .02	23.	.04	323
	VITON	009	118	.03	20.04	23.	.03	323
Ethanolamine (Aminoethanol,2)								
001414350	BUTYL	014	118	> 8.00		26.	.07	323
	NATURAL RUBBER	001	210	4.50	6.61	23.		080
		017	100	3.50	.90 - 9.02	23.	.05	107
	NEOPRENE	002	100	> 6.00	< .90	23.		107
			210	6.00	< .02	23.		080
		018	100	> 6.00	< .90	23.	.04	107
				> 8.00		20.	.05	323
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	> 6.00	< .90	23.	.06	107
	NITRILE+PVC	057	210	5.00	4.21	23.		080
		058	100	> 6.00		23.		107
	PE	076	100	> 6.00		23.		107
	PV ALCOHOL	004	100	2.50	.90 - 9.02	23.		107
	PVC	007	100	> 6.00	< .90	23.		107
				> 8.00		25.	.02	323
			210	2.00	7.82	23.		080
		077	100	> 6.00		23.		107
				> 6.00		23.		107
	VITON	009	118	> 8.00		22.	.05	323

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
Ethyl Acetate								
001417860	BUTYL	014	118	7.60	20.44	23.	.04	227
	CPE	060	113	.97 - 1.17		25.	.07	302
	NATURAL RUBBER	001	210	.18	54.11	23.		080
		017	100	.08	9.02 - 90.18	23.	.05	107
	NEOPRENE	002	100	.33	9.02 - 90.18	23.		107
			210	.20	48.10	23.		080
		018	100	.25	9.02 - 90.18	23.	.04	107
	NITRILE	005	210	.50	66.13	23.		080
		019	118	.13	871.74	23.	.04	227
	NITRILE+PVC	057	210	.50	48.10	23.		080
	PE	076	100	.07	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
	PVC	007	210	.33	78.16	23.		080
	SARANEX	061	127	.60	6.61	23.		104
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	TEFLON	069	510	> 3.10	< .02	23.	.05	303
				> 4.30	< .02	24.	.05	303
	VITON/CHLOROBUTYL	112	113	.33 - .66		25.	.04	302
Ethyl Cellosolve (Ethoxyethanol, 2)								
001108050	BUTYL	014	118	> 8.00		23.	.06	323
				> 8.00		23.	.08	323
	NATURAL RUBBER	001	103		1.20	23.		045
			250	.02	72.14	23.	.02	323
			506	< .01	49.30	23.	.01	323
	NEOPRENE	018	100	4.08	18.64	23.	.06	323
		125	103		6.01	23.		045
	NITRILE	019	100	1.53	56.51	23.	.04	323
			103		54.11	23.		045
	PV ALCOHOL	102	100	.05	132.26	23.	.08	323
	PVC	007	100	.07	162.32	23.	.02	323
			103		6.01	23.		045
Ethyl Acrylate								
001408850		250	250	.02	1,040.08	23.	.02	323
	BUTYL	014	118	> 8.00		23.	.09	323
		064	117	.67		23.	.02	213
				.88		23.	.01	213
				.67		23.	.02	213
	BUTYL/NEOPRENE	110	117	1.00		23.	.02	213
	CPE	060	113	1.08 - 1.17		25.	.07	302
			UNK	.50		23.		142
				1.42		23.		142
		070	UNK	.40		23.	.05	004
	NEOPRENE	093	117	< .08		23.	.02	213
		138	117	.08		23.	.03	213
		139	117	< .25		23.	.02	213
	PE	076	117	< .08		23.	.01	213
	PV ALCOHOL	102	100	> 8.00		23.	.08	323
	PVC	003	100	.03	1,040.08	23.	.02	323
		049	117	.05		23.	.01	213

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001408850	SARANEX	061	117	1.33		23.	.01	213
	TEFLON	069	510	> 17.00	< .02	23.	.05	303
	VITON	145	117	< .08		23.	.01	213
	VITON/CHLOROBUTYL	112	113	.23 - .53		25.	.04	302
			UNK	> 3.00		23.		142
	VITON/NEOPRENE	111	117	.20		23.	.02	213
Ethyl Alcohol (Ethanol)								
000641750	NATURAL RUBBER	001	210	1.50	6.01	23.		080
		017	100	.47	4.01	25.	.03	222
				.50	.90 - 9.02	23.	.05	107
			120	.20	14.03	25.	.02	222
			502	> 1.00	< 4.01	25.	.05	222
			504	> 1.00	< 4.01	25.	.05	222
				> 1.00	< 4.01	25.	.06	222
	NEOP+NAT RUBBER	026	121	.37	> .33	23.	.05	237
	NEOP/NAT RUBBER	008	114	> 1.00	< 4.01	25.	.05	222
	NEOPRENE	002	100	3.00	.90 - 9.02	23.		107
				> 1.00	< 4.01	25.	.08	222
			120	> 1.00	< 4.01	25.	.07	222
			210	2.00	3.01	23.		080
		018	100	1.50	.90 - 9.02	23.	.04	107
			118	> 1.00	< 4.01	25.	.08	222
			120	> 1.00	< 4.01	25.	.05	222
				> 1.00	< 4.01	25.	.07	222
				> 1.00	< 4.01	25.	.05	222
				> 1.00	< 4.01	25.	.03	222
		031	511	- .82	- 1.80	23.		323
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	> 1.00	< 4.01	25.	.04	222
				4.00	.90 - 9.02	23.	.06	107
				> 1.00	< 4.01	25.	.06	222
				> 1.00	< 4.01	25.	.04	222
			503	> 1.00	< 4.01	25.	.03	222
	NITRILE+PVC	057	210	6.00	< .02	23.		080
		058	100	.25	.90 - 9.02	23.		107
	PE	006	505	> 1.00	< 4.01	25.	.01	222
		076	100	.05	> 9,018.00	23.		107
	PV ALCOHOL	004	100	1.67	55.11	23.		123
				1.67	5.51	21.		124
	PVC	003	120	.05	43.09	25.	.01	222
				.08	37.07	25.	.01	222
				.33	28.06	25.	.03	222
				.18	43.09	25.	.02	222
			500	.06	28.06	25.	.01	222
			501	.05	34.07	25.	.01	222
				.03	57.11	25.	.02	222
		007	100	1.00	.90 - 9.02	23.		107
			210	2.50	6.01	23.		080
		077	100	.25	< .90	23.		107
				.50	.90 - 9.02	23.		107
	TEFLON	069	510	> 3.00	< .02	23.	.05	303

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
Ethylamine, 30-70%								
000750472	BUTYL	014	118	> 12.00	< -1,669.98	23.	.04	227
	NITRILE	019	118	1.10	180.96	23.	.04	227
	SILVER SHIELD	122	118	.47	36.07	23.	.01	227
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
Ethyl Benzene								
001004140	PV ALCOHOL	102	100	.55		23.	.08	323
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
Ethyl Bromide								
000749640	NEOPRENE	018	100	.07	1,322.64	23.	.04	323
	PV ALCOHOL	102	100	1.07	.42	23.	.08	323
	PVC	003	100	< .02	2,104.20	23.	.02	323
	VITON	009	118	1.43	30.06	23.	.04	323
Ethyl-n-butylamine								
133606390	NITRILE	019	100	1.22	210.42	24.	.04	323
	PV ALCOHOL	102	100	6.72	20.04	23.	.09	323
	PVC	007	100	.06	2,648.62	24.	.02	323
	VITON	009	118	3.80	1,482.96	23.	.03	323
Ethyl Cyanide (Propionitrile)								
001071200	BUTYL	014	118	.40	167.73	23.	.06	323
	NATURAL RUBBER	001	506	< .01	79.36	23.	.01	323
	PV ALCOHOL	102	100	> 8.00		23.	.03	323
	PVC	003	100	< .01	18.04	23.	.02	323
Ethylene Chlorohydrin (Chloroethanol)								
001070730	BUTYL	014	118	> 8.00	< .02	23.	.06	323
	NEOPRENE	018	100	4.98	.70	23.	.05	323
	PV ALCOHOL	102	100	1.85	20.04	23.	.09	323
	VITON	009	118	> 8.00	< .02	23.	.05	323
Ethylenediamine (Diaminoethane,1,2)								
001071530	BUTYL	014	118	> 8.00	< .02	18.	.07	323
	CPE	060	113	2.00		23.	.05	204
				2.67	36.07	23.	.05	204
	NATURAL RUBBER	001	250	.08	501.00	20.	.01	323
	NEOPRENE	018	100	6.65	20.04	18.	.05	323
	PE	076	127	.25	10.22	23.		104
	PVC	007	100	.17	80.16	16.	.02	323
	SARANEX	061	127	> 8.00	< .02	23.		104
	TEFLON	069	510	> 3.20	< .02	23.	.05	303
Ethylene Dibromide (Dibromoethane,1,2)								
001069340	BUTYL	014	118	1.70	75.15	23.	.04	291
				1.83	79.16	23.	.04	291
				3.33	36.07	23.	.07	323
		064	117	.55		23.	.02	213
				.38		23.	.01	213
				.38		23.	.02	213

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001069340	BUTYL/NEOPRENE	110	117	< .08		23.	.02	213
	CPE	070	UNK	.73		23.	.05	004
	NATURAL RUBBER	017	UNK	< .02	> 731.46	23.	.02	291
				< .02	> 731.46	23.	.02	291
	NEOPRENE	018	100	.13	> 731.46	23.	.04	291
				.20	> 731.46	23.	.04	291
		093	117	< .33		23.	.02	213
		125	103		354.71	23.		045
		139	117	.08		23.	.02	213
	NITRILE	019	103		583.16	23.		045
		020	503	.58	> 731.46	23.	.04	291
				.45	> 731.46	23.	.04	291
	PE	006	100	< .03	158.32	23.	.01	291
				< .03	141.28	23.	.01	291
		076	117	.75		23.	.01	213
	PV ALCOHOL	102	100	> 24.00		23.	.05	291
				> 24.00		23.	.05	291
				> 8.00		23.	.08	323
	PVC	007	100	.03	1,406.81	23.	.02	323
			103		294.59	23.		045
		049	117	.12		23.	.01	213
	SARANEX	061	117	.55		23.	.01	213
			127	.17	49.10	23.	.02	291
				.13	49.10	23.	.02	291
	TEFLON	036	214	1.00		23.	.01	291
				> 24.00		23.	.01	291
				> 24.00		23.	.01	291
		069	510	> 3.40	< .02	23.	.05	303
	VITON	009	118	> 24.00		23.	.02	291
				> 24.00		23.	.02	291
				> 8.00		23.	.03	323
		145	117	.58		23.	.01	213
	VITON/NEOPRENE	111	117	1.08		23.	.02	213
Ethylene Dichloride (Dichloroethane,1,2)								
001070620	BUTYL	014	118	2.98	531.06	23.	.06	323
				2.90	318.64	23.	.04	227
			UNK	2.33		23.	.06	326
		064	UNK	1.17		23.	.04	326
	CPE	070	UNK	.25		23.	.05	004
	NATURAL RUBBER	001	250	.01	350.70	23.	.02	323
		017	100	.01	1,603.20	25.	.03	222
			120	.02	3,106.20	25.	.02	222
			502	.08	1,302.60	25.	.05	222
			504	.06	2,505.00	25.	.05	222
				.16	801.60	25.	.06	222
			UNK	.03		23.	.02	326
	NEOP+NAT RUBBER	026	102	.08	1,302.60	25.	.05	222
	NEOP/NAT RUBBER	008	114	.01	1,302.60	25.	.05	222
	NEOPRENE	002	100	.03	701.40	25.	.08	222
			120	.04	801.60	25.	.07	222
		018	118	.70	501.00	25.	.08	222
			120	.27	701.40	25.	.05	222

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001070620	NEOPRENE	018	120	.47	801.60	25.	.07	222
				.14	1,002.00	25.	.05	222
				.06	1,803.60	25.	.03	222
			UNK	.33		23.	.06	326
	NITRILE	019	100	.11	3,807.60	25.	.04	222
				.28	2,605.20	25.	.06	222
				.12	3,907.80	25.	.04	222
			118	.13	1,869.73	23.	.04	227
			503	.08	3,907.80	25.	.03	222
			UNK	.04		23.	.02	326
		020	UNK	.04		23.	.03	326
	PE	006	100	.02	10.02	25.	.01	222
			505	.09	10.02	25.	.01	222
		042	UNK	.04		23.	.01	326
		076	100	.05	.90 - 9.02	23.		107
	PV ALCOHOL	004	100	> 3.00	.90 - 9.02	23.		107
				> 8.00	< .02	23.	.03	323
		102	100	> 8.00		23.	.04	323
				5.50		23.	.05	323
			UNK	.37		23.	.04	326
	PVC	003	120	.01	11,022.00	25.	.01	222
				.01	9,719.40	25.	.01	222
				.03	4,509.00	25.	.03	222
				.02	6,913.80	25.	.02	222
			500	.01		25.	.01	222
			501	.01	13,026.00	25.	.01	222
				.01	7,815.60	25.	.02	222
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	TEFLON	036	UNK	> 24.00		23.	.01	326
		044	UNK	1.50		23.	.01	326
	VITON	009	118	6.90	4.88	23.	.02	227
				> 8.00	< .02	23.	.03	323
			UNK	13.67		23.	.03	326
Ethylene Glycol								
001072110	NATURAL RUBBER	001	210	6.00	< .02	23.		080
		017	100	> 1.00	< 10.02	25.	.03	222
				> 6.00	< .90	23.	.05	107
			120	> 1.00	< 10.02	25.	.02	222
			502	> 1.00	< 10.02	25.	.05	222
			504	> 1.00	< 10.02	25.	.05	222
				> 1.00	< 10.02	25.	.06	222
	NEOP+NAT RUBBER	026	102	> 1.00	< 10.02	25.	.05	222
			121	> 8.00	< .02	23.	.05	237
	NEOP/NAT RUBBER	008	114	> 1.00	< 10.02	25.	.05	222
	NEOPRENE	002	100	> 6.00	< .90	23.		107
				> 1.00	< 10.02	25.	.08	222
			210	6.00	< .02	23.		080
		018	100	> 6.00	< .90	23.	.04	107
			118	> 1.00	< 10.02	25.	.08	222
			120	> 1.00	< 10.02	25.	.05	222
				> 1.00	< 10.02	25.	.07	222
				> 1.00	< 10.02	25.	.05	222

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001072110	NEOPRENE	018	120	> 1.00	< 10.02	25.	.03	222
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	> 1.00	< 10.02	25.	.04	222
				> 6.00	< .90	23.	.06	107
				> 1.00	< 10.02	25.	.04	222
			503	> 1.00	< 10.02	25.	.03	222
	NITRILE+PVC	057	210	6.00	< .02	23.		080
		058	100	> 6.00	< .90	23.		107
	PE	006	100	> 1.00	< 10.02	25.	.01	222
			505	> 1.00	< .10	25.	.01	222
		076	100	> 6.00	< .90	23.		107
	PV ALCOHOL	004	100	2.00	.90 - 9.02	23.		107
	PVC	003	120	> 1.00	< 10.02	25.	.01	222
				> 1.00		25.	.01	222
				> 1.00	< 10.02	25.	.03	222
				> 1.00	< 10.02	25.	.02	222
			500	> 1.00	< 10.02	25.	.01	222
			501	> 1.00	< 10.02	25.	.01	222
				> 1.00	< 10.02	25.	.02	222
		007	100	> 6.00	< .90	23.		107
			210	6.00	< .02	23.		080
		077	100	.75	.90 - 9.02	23.		107
				> 6.00	< .90	23.		107
	TEFLON	069	510	> 16.80	< .02	23.	.05	303
Ethylene Oxide (Oxirane)								
000752180	NITRILE	019	103		.37	23.		045
Ethylenimine (Aziridine)								
001515640	BUTYL	034	UNK	10.00 - 16.00	4.51	22.	.08	078
	NEOPRENE	010	120	< .08		22.	.02	078
Ethyl Ether								
000602970	BUTYL	014	118	.13	554.31	23.	.04	227
	NATURAL RUBBER	001	210	.17	1,563.12	23.		080
	NEOPRENE	002	100	.17	9.02 - 90.18	23.		107
			210	.20	1,232.46	23.		080
		018	100	.17	9.02 - 90.18	23.	.04	107
		125	103		330.66	23.		045
	NITRILE	005	210	2.30	84.17	23.		080
		019	100	2.00	9.02 - 90.18	23.	.06	107
			103		264.53	23.		045
			118	.23	131.06	23.	.04	227
	NITRILE+PVC	057	210	.42	1,863.72	23.		080
	PE	076	100	.03	90.18 - 901.80	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
		102	100	> 8.00		23.	.04	323
	PVC	007	210	.33	2,104.20	23.		080
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
				> 3.00	< .02	23.	.05	303
	VITON	009	118	.20	129.26	23.	.03	323
				.20	129.26	23.	.02	227

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000602970	VITON/CHLOROBUTYL	112	113	.02 - .17		25.	.04	302
2-Ethylhexanoic Acid								
001495750	NEOPRENE	018	100	> 4.00		23.	.05	123
	NITRILE	019	100	> 4.00		23.	.04	123
	PVC	003	215	> 4.00		23.	.04	123
2-Ethyl-1-Hexanol								
001047670	BUTYL	014	118	> 8.00		23.	.07	323
	NEOPRENE	018	100	> 8.00		23.	.05	323
	PV ALCOHOL	102	100	> 8.00		23.	.09	323
	VITON	009	118	> 8.00		23.	.03	323
Ethylidene Dichloride (Dichloroethane,1,1)								
000753430	BUTYL	012	118	1.52	186.37	23.	.09	323
	PV ALCOHOL	004	100	2.73		23.	.08	323
	PVC	003	100	.02	1,902.46	23.	.02	323
				.03	1,929.85	23.	.02	323
	VITON	009	118	2.43	36.07	23.	.04	323
Ethyl Methacrylate								
000976320	BUTYL	014	118	6.57	12.02	23.	.09	323
	CPE	070	UNK	.53		23.	.05	004
	NITRILE	019	100	.38	186.37	23.	.05	323
	PV ALCOHOL	102	100	> 8.00		23.	.06	323
	PVC	003	100	.03	84.17	23.	.02	323
Formaldehyde, <37% (Formalin)								
000500000	BUTYL	014	118	> 16.00		23.	.04	323
				> 16.00		23.	.04	227
	CPE	070	UNK	> 3.00		23.	.05	004
	NATURAL RUBBER	001	506	.20	.02	23.	.02	323
		017	100	1.00	.90 - 9.02	23.	.05	107
			UNK	.10	3.34	26.	.02	148
	NEOPRENE	002	100	2.00	.90 - 9.02	23.		107
		018	100	2.00	< .90	23.	.04	107
		125	103		< .02	23.		045
	NITRILE	019	100	> 6.00	< .90	23.	.06	107
			103		< .02	23.		045
			118	> 21.00		23.	.04	323
				> 21.00		23.	.04	227
			UNK	> 6.00	< .02	26.	.03	148
	NITRILE+PVC	058	100	.50	.90 - 9.02	23.		107
	PE	076	100	> 6.00	< .90	23.		107
			127	> 8.00	< .02	23.		104
	PVC	003	100	.07	.05	23.	.02	323
		007	100	1.33	.90 - 9.02	23.		107
			103		< .02	23.		045
		077	100	.33	.90 - 9.02	23.		107
				6.00	9.02 - 90.18	23.		107
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
	VITON	009	118	> 16.00		23.	.02	323

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000500000	VITON	009	118	> 16.00		23.	.02	227
Formic Acid (Methanoic Acid)								
000641860	PE	076	127	.07	.03	23.		104
Formic Acid, >70%								
000641863	NATURAL RUBBER	017	100	2.00		23.	.05	107
	NEOP+NAT RUBBER	026	121	3.20	12.02	23.	.05	237
	NEOPRENE	002	100	> 6.00		23.		107
		018	100	> 6.00		23.	.04	107
	NITRILE	019	100	4.00		23.	.06	107
	NITRILE+PVC	058	100	.50		23.		107
	PE	076	100	.20		23.		107
	PVC	007	100	> 6.00		23.		107
		077	100	.67		23.		107
				1.25		23.		107
Freon TF								
000761310	NATURAL RUBBER	017	100	.15	1,002.00	25.	.03	222
			120	.04	3,006.00	25.	.02	222
			502	.28	821.64	25.	.05	222
			504	.27	701.40	25.	.05	222
				.48	591.18	25.	.06	222
	NEOP+NAT RUBBER	026	102	.27	701.40	25.	.05	222
			121	.27	474.95	23.	.05	237
	NEOP/NAT RUBBER	008	114	.27	791.58	25.	.05	222
	NEOPRENE	002	100	2.00	.90 - 9.02	23.		107
				> 1.00	< 10.02	25.	.08	222
			120	3.00	20.04	25.	.07	222
		018	100	4.00	< .90	23.	.04	107
			118	> 1.00	< 10.02	25.	.08	222
			120	> 1.00	< 10.02	25.	.05	222
				> 1.00	< 10.02	25.	.07	222
				> 1.00	< 10.02	25.	.05	222
				> 1.00	< 10.02	25.	.03	222
	NITRILE	019	100	> 1.00	< 10.02	25.	.04	222
				> 6.00	< .90	23.	.06	107
				> 1.00	< 10.02	25.	.06	222
				> 1.00	< 10.02	25.	.04	222
			503	> 1.00	< 10.02	25.	.03	222
	NITRILE+PVC	058	100	.25	90.18 - 901.80	23.		107
	PE	006	100	.08	10.02	25.	.01	222
			505	> 1.00	< 1.00	25.	.01	222
		076	100	.13	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	.50	.90 - 9.02	23.		107
	PVC	003	120	.04	3,406.80	25.	.01	222
				.09	2,204.73	25.	.01	222
				.18	190.38	25.	.03	222
				.13	240.48	25.	.02	222
			500	.04	2,605.20	25.	.01	222
			501	.04	3,006.00	25.	.01	222
				.05	1,903.80	25.	.02	222
		077	100	.30	9.02 - 90.18	23.		107

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000761310	PVC	077	100	1.00	9.02 - 90.18	23.		107
Freon TMC								
577623190	NATURAL RUBBER	017	100	.05	901.80 - 9,018.00	23.	.05	107
	NEOPRENE	002	100	.17	90.18 - 901.80	23.		107
		018	100	.05	901.80 - 9,018.00	23.	.04	107
	NITRILE	019	100	.17	901.80 - 9,018.00	23.	.06	107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
Furan (Furfuran)								
001100090	BUTYL	014	118	1.35	60.12	23.	.09	323
	PV ALCOHOL	102	100	1.89	.08	23.	.09	323
	PVC	003	100	.02	2,951.89	23.	.02	323
	VITON	009	118	.33	138.28	23.	.05	323
Furfural								
000980110	BUTYL	014	118	> 16.00		23.	.04	323
				> 16.00		23.	.04	227
	NATURAL RUBBER	001	210	.25	30.06	23.		080
		017	100	.25	9.02 - 90.18	23.	.05	107
	NEOPRENE	002	100	2.00	9.02 - 90.18	23.		107
			210	.50	18.04	23.		080
		018	100	.33	9.02 - 90.18	23.	.04	107
	NITRILE	005	210	.92	156.31	23.		080
		019	118	.40	1,591.38	23.	.03	323
				.47	1,593.18	23.	.04	227
	NITRILE+PVC	057	210	.67	144.29	23.		080
	PE	076	100	.08	< .90	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
		102	100	> 16.00		23.	.03	323
	PVC	007	210	1.17	108.22	23.		080
	SILVER SHIELD	122	118	> 8.00		23.	.01	227
	TEFLON	069	510	> 1.00	< .02	23.	.05	303
	VITON	009	118	3.50	88.98	23.	.03	323
				3.60	88.98	23.	.02	227
Gasoline								
080066190	BUTYL	064	117	.58		23.	.02	213
	BUTYL/NEOPRENE	110	117	.33		23.	.02	213
	NEOP+NAT RUBBER	026	121	.07	1,076.15	23.	.05	237
	NITRILE	019	100	> 6.00	< .90	23.	.06	107
	NITRILE+PVC	058	100	.08	90.18 - 901.80	23.		107
	PE	076	100	.05	90.18 - 901.80	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
	PVC	077	100	.07	9.02 - 90.18	23.		107
				.08	90.18 - 901.80	23.		107
	VITON/NEOPRENE	111	117	> 8.00		23.	.02	213
Glutaraldehyde								
001113080	BUTYL	014	118	> 8.00	< .02	23.	.09	323
	NEOPRENE	018	100	> 8.00	< .02	23.	.05	323
	PVC	003	100	1.17	6.01	23.	.02	323
	VITON	009	118	> 8.00	< .02	23.	.04	323

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
Halothane								
001516770	BUTYL	014	118	3.07	138.28	23.	.09	323
	PV ALCOHOL	102	100	> 8.00		23.	.07	323
	PVC	007	100	.03	4,064.11	23.	.02	323
	VITON	009	118	.62	432.86	23.	.05	323
Heptane								
001428250	NATURAL RUBBER	001	210	.10	703.07	23.		080
			UNK	.02	> 521.04	23.	.12	274
		017	UNK	.03	> 531.06	23.	.04	274
	NEOP/NAT RUBBER	008	UNK	.08	> 526.05	23.	.05	274
	NEOPRENE	002	210	.75	499.00	23.		080
		018	UNK	> 1.00		23.	.06	274
				> 1.00		23.	.09	274
	NITRILE	005	210	6.00	< .02	23.		080
		019	UNK	> 1.00		23.	.05	274
				> 1.00		23.	.05	274
	NITRILE+PVC	057	210	3.00	18.04	23.		080
	PVC	007	210	.50	180.36	23.		080
			UNK	.25	> 450.90	23.	.16	274
	VITON	009	UNK	> 1.00		23.	.03	274
Hexachlorocyclopentadiene								
000774740	BUTYL	014	118	> 8.00	< .02	23.	.06	323
	NITRILE	019	100	> 8.00	< .02	23.	.04	323
	PV ALCOHOL	102	100	> 8.00	< .02	23.	.08	323
	VITON	009	118	> 8.00	< .02	23.	.03	323
Hexamethylphosphoamide								
006803190	BUTYL	034	UNK	1.00 - 1.50	.02	22.	.08	078
	NITRILE	033	UNK	1.00 - 1.50	13.03	22.	.09	078
	PE	006	209	.25 - .42	4.01	22.	.01	078
Hexane								
001105430	BUTYL	012	UNK	.13	> 2,344.68	25.	.04	273
				.17	1,923.84	25.	.04	273
				.33	1,833.66	25.	.06	273
				.42	1,238.47	25.	.06	273
				.03	> 2,344.68	25.	.04	273
				.17	2,314.62	25.	.04	273
				.50	1,370.74	25.	.06	273
				.50	1,226.45	25.	.06	273
				.12	> 2,344.68	25.	.04	273
				.17	> 2,344.68	25.	.04	273
				.33	1,172.34	25.	.06	273
				.33	1,490.98	25.	.06	273
		014	UNK	.04	256.11	25.		287
		107	UNK	.35		23.	.04	094
				.17		45.	.04	094
	CPE	060	113	> 3.00		25.	.07	302
	NATURAL RUBBER	001	210	.08	751.50	23.		080
	NEOPRENE	002	100	1.50	9.02 - 90.18	23.		107

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001105430	NEOPRENE	002	210	.67	576.15	23.		080
			UNK	.86		23.	.05	186
				.06	27.66	25.		287
		018	100	.75	.03	23.	.05	323
				.75	90.18 - 901.80	23.	.04	107
			UNK	1.00	121.44	25.	.04	273
				1.00	75.15	25.	.04	273
				1.00	91.38	25.	.06	273
				1.00	52.91	25.	.06	273
		031	UNK	.33		37.	.04	187
		125	103		12.02	23.		045
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	> 4.00		23.	.04	323
				> 6.00	< .90	23.	.06	107
			103		6.01	23.		045
			UNK	> 7.00	< .02	25.	.04	273
				> 18.00	< .02	25.	.04	273
				> 17.00	< .02	25.	.06	273
				> 17.00	< .02	25.	.06	273
		033	UNK	1.31		37.	.05	187
	NITRILE+PVC	057	210	1.50	42.08	23.		080
		058	100	.07	90.18 - 901.80	23.		107
	PE	056	UNK	.07		37.	.01	187
		076	100	.01	90.18 - 901.80	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
			UNK	> 8.17		25.		287
		102	100	> 14.00		23.	.03	323
	PVC	007	103		90.18	23.		045
			210	.42	270.54	23.		080
			UNK	.31		23.	.05	186
				.62		23.	.07	186
		049	UNK	.48		37.	.03	187
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	TEFLON	069	510	> 5.00	< .02	23.	.05	303
				> 5.00	< .02	23.	.05	303
	VITON	009	118	> 11.00		23.	.02	323
				> 11.00		23.	.02	227
	VITON/CHLOROBUTYL	112	113	> 3.00		25.	.04	302
				> 3.00		25.	.04	302
Hydrazine (Diamine)								
003020120	BUTYL	014	118	> 8.00		23.	.04	323
	NEOPRENE	018	100	> 16.00		23.	.05	323
	NITRILE	019	118	> 8.00		23.	.04	323
	PVC	003	100	> 8.00		23.	.03	323
Hydrazine, 30-70%								
003020122	BUTYL	014	118	> 8.00	< .02	23.	.04	227
	NATURAL RUBBER	017	100	> 6.00	< .90	23.	.05	107
	NEOPRENE	002	100	> 6.00	< .90	23.		107
		018	100	> 6.00	< .90	23.	.04	107
	NITRILE	019	100	> 6.00	< .90	23.	.06	107
			118	> 8.00	< .02	23.	.04	227

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PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
003020122	NITRILE+PVC	058	100	> 6.00		23.		107
	PE	076	100	> 6.00		23.		107
	PVC	007	100	> 6.00	< .90	23.		107
		077	100	> 6.00		23.		107
				> 6.00		23.		107
	SILVER SHIELD	122	118	2.10	6.01	23.	.01	227
Hydrochloric Acid								
076470100	BUTYL	064	117	> 8.00		23.	.02	213
				> 8.00		23.	.01	213
				> 8.00		23.	.02	213
	BUTYL/NEOPRENE	110	117	> 8.00		23.	.02	213
	CPE	070	UNK	> 3.00		23.	.05	004
	NATURAL RUBBER	001	210	6.00	< .02	23.		080
	NEOP+NAT RUBBER	026	121	4.42	12.02	23.	.05	237
	NEOPRENE	002	210	6.00	< .02	23.		080
		093	117	> 8.00		23.	.02	213
		138	117	> 8.00		23.	.03	213
	NEOPRENE+PVC	127	117	> 8.00		23.	.02	213
	NITRILE	005	210	6.00	< .02	23.		080
	NITRILE+PVC	057	210	6.00	< .02	23.		080
		058	117	1.75		23.	.01	213
	PVC	007	210	6.00	< .02	23.		080
		049	117	> 8.00		23.	.01	213
				> 8.00		23.	.01	213
		053	117	5.17		23.	.02	213
		077	117	< 5.00		23.	.01	213
				2.92		23.	.01	213
		144	117	4.33		23.	.02	213
	SARANEX	061	117	5.00		23.	.01	213
	VITON	145	117	> 8.00		23.	.02	213
	VITON/NEOPRENE	111	117	> 8.00		23.	.02	213
Hydrochloric Acid, <30%								
076470101	NATURAL RUBBER	017	100	> 6.00		23.	.05	107
			102	> 8.00		23.	.05	026
				> 8.00		23.	.05	026
				> 8.00		23.	.05	026
				> 8.00		23.	.05	026
	NEOP+NAT RUBBER	026	102	> 8.00		23.	.06	026
				> 8.00		23.	.04	026
				> 8.00		23.	.05	026
	NEOP/NAT RUBBER	008	102	> 8.00		23.		026
	NEOPRENE	002	100	> 6.00		23.		107
		018	100	> 6.00		23.	.04	107
	NITRILE	019	100	> 6.00		23.	.06	107
	NITRILE+PVC	058	100	> 6.00		23.		107
	PE	076	100	> 6.00		23.		107
	PVC	007	100	> 6.00		23.		107
		077	100	> 6.00		23.		107
				> 6.00		23.		107

Hydrochloric Acid, 30-70%

SUMMARY OF PERFORMANCE DETAIL TESTS
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076470102	NATURAL RUBBER	001	UNK	> 1.00		23.		052
		015	UNK	> 1.00		23.	.04	052
		017	100	> 5.00		23.	.05	107
			102	> 8.00		23.	.05	026
				5.50		23.	.05	026
				> 8.00		23.	.05	026
				> 8.00		23.	.05	026
	NEOP+NAT RUBBER	026	102	> 2.50		23.	.06	026
				> 8.00		23.	.04	026
				> 8.00		23.	.05	026
	NEOP/NAT RUBBER	008	102	> 8.00		23.		026
			UNK	> 1.00		23.		052
	NEOPRENE	002	100	> 6.00		23.		107
		018	100	> 6.00		23.	.04	107
			UNK	> 1.00		23.	.06	052
	NITRILE	019	100	> 6.00		23.	.06	107
			UNK	> 1.00		23.	.05	052
	PE	076	127	.58		23.		104
	PVC	003	UNK	.40		23.	.02	052
		007	100	> 5.00		23.		107
			UNK	> 1.00		23.		052
	SARANEX	061	127	> 46.67	< .02	23.		104
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	VITON	009	UNK	> 1.00		23.	.03	052
Hydrochloric Acid, >70%								
076470103	NATURAL RUBBER	017	102	> 6.00		23.	.05	026
				5.50		23.	.05	026
				> 6.00		23.	.05	026
				5.50		23.	.05	026
	NEOP+NAT RUBBER	026	102	> 2.50		23.	.06	026
				5.50		23.	.04	026
				> 6.00		23.	.05	026
	NEOP/NAT RUBBER	008	102	> 6.00		23.		026
Hydrocyanic Acid								
000749080	BUTYL	034	UNK	1.00	< .02	*****	.04	148
	PE	076	UNK	1.00	.12	*****	.02	148
	PVC	049	UNK	.50	.28	*****	.08	148
Hydrofluoric Acid (Hydrogen Fluoride)								
076643930	BUTYL	064	117	> 8.00		23.	.02	213
				> 8.00		23.	.01	213
				7.08		23.	.02	213
	BUTYL/NEOPRENE	110	117	> 8.00		23.	.02	213
	NEOPRENE	093	117	> 8.00		23.	.02	213
		138	117	4.25		23.	.03	213
		139	117	> 8.00		23.	.02	213
	NEOPRENE+PVC	127	117	3.50		23.	.02	213
	NITRILE+PVC	058	117	1.08		23.	.01	213
	PE	076	117	1.50		23.	.01	213
	PVC	049	117	> 8.00		23.	.01	213
				2.17		23.	.01	213

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
076643930	PVC	053	117	2.08		23.	.02	213
				1.67		23.	.02	213
		077	117	< .08		23.	.01	213
				.92		23.	.01	213
		144	117	.42		23.	.02	213
	SARANEX	061	117	3.17		23.	.01	213
	VITON	145	117	> 8.00		23.	.01	213
	VITON/NEOPRENE	111	117	> 8.00		23.	.02	213
Hydrofluoric Acid, 30-70%								
076643932	NATURAL RUBBER	017	100	3.50		23.	.05	107
			102	> 8.00		23.	.05	026
				1.50		23.	.05	026
				> 8.00		23.	.05	026
				4.50		23.	.05	026
	NEOP+NAT RUBBER	026	102	3.00		23.	.06	026
				3.50		23.	.04	026
				> 8.00		23.	.05	026
			121	> 8.00	< .02	23.	.05	237
	NEOP/NAT RUBBER	008	102	> 8.00		23.		026
	NEOPRENE	002	100	1.25		23.		107
		018	100	1.00		23.	.04	107
	NITRILE	019	100	2.00		23.	.06	107
	NITRILE+PVC	058	100	.08		23.		107
	PE	076	100	> 6.00		23.		107
			127	> .50	< .10	23.		104
	PVC	007	100	.67		23.		107
		077	100	2.00		23.		107
				1.50		23.		107
	SARANEX	061	127	> .50	< .10	23.		104
Hydrofluoric Acid, >70%								
076643933	NATURAL RUBBER	017	102	4.00		23.	.05	026
				1.50		23.	.05	026
				4.00		23.	.05	026
				1.50		23.	.05	026
	NEOP+NAT RUBBER	026	102	1.50		23.	.06	026
				1.50		23.	.04	026
				4.00		23.	.05	026
	NEOP/NAT RUBBER	008	102	4.00		23.		026
Hydrogen Peroxide, 30-70%								
077228412	NATURAL RUBBER	017	100	> 6.00		23.	.05	107
			102	> 8.00		23.	.05	026
				> 8.00		23.	.05	026
				> 8.00		23.	.05	026
				> 8.00		23.	.05	026
	NEOP+NAT RUBBER	026	102	> 8.00		23.	.06	026
				> 8.00		23.	.04	026
				> 8.00		23.	.05	026
	NEOP/NAT RUBBER	008	102	> 8.00		23.		026
	NEOPRENE	002	100	.12		23.		107
		018	100	.08		23.	.04	107

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
077228412	NITRILE	019	100	> 6.00		23.	.06	107
	PVC	007	100	> 6.00		23.		107
Hydrogen Phosphide (Phosphine)								
078035120	NATURAL RUBBER	087	UNK	.50	< .02	23.	.05	173
	NEOPRENE	031	UNK	.42	< .02	23.	.05	173
		093	UNK	.17	< .02	23.	.03	173
	PE	091	UNK	.33	< .02	23.	.04	173
				.42	< .02	23.	.04	173
	PVC	054	UNK	1.67	< .02	23.	.02	173
				.67	< .02	23.	.02	173
Hydroquinone								
001233190	NITRILE+PVC	058	100	> 6.00		23.		107
	PE	076	100	> 6.00		23.		107
	PVC	077	100	> 6.00		23.		107
				> 6.00		23.		107
Hydroquinone, <30%								
001233191	NATURAL RUBBER	017	100	> 6.00	< .90	23.	.05	107
	NEOPRENE	002	100	> 6.00	< .90	23.		107
		018	100	> 6.00	< .90	23.	.04	107
	NITRILE	019	100	> 6.00	< .90	23.	.06	107
	PVC	007	100	> 6.00	< .90	23.		107
Iminobispropylamine								
000561880	BUTYL	014	118	> 8.00		28.	.09	323
	NATURAL RUBBER	001	250	.10	84.17	26.	.02	323
	NEOPRENE	018	100	> 8.00		27.	.05	323
	VITON	009	118	> 8.00		27.	.04	323
b-Ionone								
149010760	BUTYL	014	118	> 9.00		23.	.06	323
	PV ALCOHOL	102	100	> 14.00		23.	.04	323
				> 8.00		23.	.03	323
			118	> 8.00		23.	.03	323
Isoamyl Acetate								
001239220	BUTYL	107	120	.03	1,903.80	25.	.02	222
	HYPALON	108	120	.50	350.70	25.	.05	222
	NATURAL RUBBER	017	100	.09	1,102.20	25.	.03	222
			502	.16	791.58	25.	.05	222
			504	.17	661.32	25.	.05	222
				.32	470.94	25.	.06	222
	NEOP+NAT RUBBER	026	102	.16	761.52	25.	.05	222
	NEOP/NAT RUBBER	008	114	.20	731.46	25.	.05	222
	NEOPRENE	002	100	.20	140.28	25.	.08	222
			120	.09	120.24	25.	.07	222
		018	118	> 1.00		25.	.08	222
			120	.50	310.62	25.	.05	222
				.27	541.08	25.	.03	222
	NITRILE	019	100	> 1.00		25.	.04	222
				> 1.00		25.	.06	222

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001239220	NITRILE	019	100	1.08	63.13	25.	.04	222
			191	.70	130.26	25.	.03	222
	PE	006	100	.03	20.04	25.	.01	222
			505	> 1.00	< 10.02	25.	.01	222
	PVC	003	120	.02	3,306.60	25.	.01	222
				.02	3,306.60	25.	.01	222
				.08	1,603.20	25.	.03	222
				.06	2,505.00	25.	.02	222
			500	.02		25.	.01	222
			501	.02	4,509.00	25.	.01	222
				.03	2,104.20	25.	.02	222
Isoamylnitrile								
001104630	NEOPRENE	018	100	.78	224.25	23.	.05	000
	NITRILE	019	100	2.93	9.62	23.	.04	323
	PV ALCOHOL	102	100	> 8.00		23.	.03	323
	VITON	009	118	1.13	55.31	23.	.02	323
Isobutyl Acrylate								
001066380	BUTYL	014	118	> 8.00		23.	.09	323
	NITRILE	019	100	1.13	126.25	23.	.05	323
	PV ALCOHOL	102	100	> 8.00		23.	.08	323
	PVC	003	100	.02	204.41	23.	.02	323
Isobutyl Alcohol								
000788310	BUTYL	014	118	> 8.00		23.	.07	323
	NATURAL RUBBER	001	210	2.00	4.51	23.		080
		017	100	.42	9.02 - 90.18	23.	.05	107
	NEOPRENE	002	100	> 6.00	< .90	23.		107
			210	6.00	< .02	23.		080
		018	100	.17	< .90	23.	.04	107
				> 8.00		23.	.05	323
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	> 6.00	< .90	23.	.06	107
			118	> 8.00		23.	.05	323
	NITRILE+PVC	057	210	4.00	4.81	23.		080
		058	100	.12	.90 - 9.02	23.		107
	PE	076	100	.05	.90 - 9.02	23.		107
	PVC	007	100	.17	< .90	23.		107
			210	2.00	4.51	23.		080
		077	100	.50	< .90	23.		107
				2.00	.90 - 9.02	23.		107
	VITON	009	118	> 8.00		23.	.05	323
Isobutyl Nitrite								
005425630	BUTYL	014	118	1.30	132.26	23.	.04	323
	NITRILE	019	100	1.63	6.01	23.	.06	323
	PVC	003	100	.03	1,454.90	23.	.02	323
	VITON	009	118	.33	619.24	23.	.04	323
Isobutyraldehyde								
000788420	BUTYL	014	118	> 8.00		23.	.06	323
	NEOPRENE	018	100	.42	48.70	23.	.05	323

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000788420	PV ALCOHOL	102	100	.02	1.57	23.	.04	323
	VITON	009	118	.07	69.14	23.	.03	323
Isooctane								
266356430	NATURAL RUBBER	001	103		294.59	23.		045
	NEOPRENE	002	100	6.00	< .90	23.		107
		018	100	1.00	9.02 - 90.18	23.	.04	107
		125	103		< .02	23.		045
	NITRILE	019	100	6.00	< .90	23.	.06	107
			103		< .02	23.		045
	NITRILE+PVC	058	100	.28	.90 - 9.02	23.		107
	PE	076	100	.23	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	.67	.90 - 9.02	23.		107
	PVC	007	103		3.01	23.		045
		077	100	.25	.90 - 9.02	23.		107
				1.25	.90 - 9.02	23.		107
Isoprene								
000787950	NEOPRENE	018	100	.27	192.38	23.	.05	323
	NITRILE	019	100	.87	27.66	23.	.04	323
	PV ALCOHOL	102	100	> 12.00		23.	.03	323
	VITON	009	118	6.20	1.14	23.	.03	323
Isopropyl Alcohol (Propanol, 2-)								
000676300	CPE	060	113	> 8.00		23.	.05	204
	NATURAL RUBBER	001	210	1.50	12.63	23.		080
		017	100	.12	< .90	23.	.05	107
			102	.25	.12	23.	.05	026
				.17	1.80	23.	.05	026
				.25	.12	23.	.05	026
				.37	1.20	23.	.05	026
	NEOP+NAT RUBBER	026	102	.15	1.20	23.	.06	026
				.23	1.20	23.	.04	026
				.25	.12	23.	.05	026
			121	.52	6.01	23.	.05	237
	NEOP/NAT RUBBER	008	102	.25	.12	23.		026
	NEOPRENE	002	100	> 6.00	< .90	23.		107
			210	2.00	4.81	23.		080
		018	100	> 6.00	< .90	23.	.04	107
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	> 6.00	< .90	23.	.06	107
	NITRILE+PVC	057	210	6.00	< .02	23.		080
		058	100	.58	.90 - 9.02	23.		107
	PE	076	100	.17	.90 - 9.02	23.		107
	PVC	007	100	2.50	< .90	23.		107
			210	2.17	12.02	23.		080
		077	100	.50	.90 - 9.02	23.		107
				.50	.90 - 9.02	23.		107
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
Isopropylamine								
000753100	BUTYL	014	118	4.08	36.07	24.	.09	323
	NEOPRENE	018	100	.23	913.82	21.	.05	323

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000753100	PVC	007	100	.03	4,671.32	18.	.02	323
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
	VITON	009	118	.18	3,342.67	26.	.04	323
Isopropyl Ether								
001082030	CPE	070	UNK	> 3.00		23.	.05	004
	NATURAL RUBBER	017	UNK	.06	> 480.96	23.	.04	274
	NEOP/NAT RUBBER	008	UNK	.12	> 501.00	23.	.05	274
	NEOPRENE	018	UNK	> 1.00		23.	.09	274
				.71	> 10.02	23.	.06	274
	NITRILE	019	UNK	> 1.00		23.	.05	274
	PV ALCOHOL	004	UNK	> 1.00		23.	.12	274
	PVC	007	UNK	.25	> 501.00	23.	.16	274
	VITON	009	UNK	> 1.00		23.	.03	274
Isopropylmethacrylate								
046553490	BUTYL	014	118	> 8.00		23.	.09	323
	NITRILE	019	100	1.88	36.07	23.	.05	323
	PV ALCOHOL	102	100	> 8.00		23.	.09	323
	PVC	003	100	.02	354.71	23.	.02	323
Kerosene								
080082060	NATURAL RUBBER	017	100	.50	.90 - 9.02	23.	.05	107
	NEOP+NAT RUBBER	026	121	.60	12.02	23.	.05	237
	NEOPRENE	002	100	> 6.00	< .90	23.		107
		018	100	> 6.00	< .90	23.	.04	107
	NITRILE	019	100	> 6.00	< .90	23.	.06	107
	NITRILE+PVC	058	100	1.25	9.02 - 90.18	23.		107
	PE	076	100	.20	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
	PVC	007	100	> 6.00	< .90	23.		107
		077	100	.50	9.02 - 90.18	23.		107
				3.00	9.02 - 90.18	23.		107
Lactic Acid, >70%								
000793343	NATURAL RUBBER	017	100	> 6.00	< .90	23.	.05	107
	NEOPRENE	002	100	> 6.00	< .90	23.		107
		018	100	> 6.00	< .90	23.	.04	107
	NITRILE	019	100	> 6.00	< .90	23.	.06	107
	NITRILE+PVC	058	100	> 6.00	< .90	23.		107
	PE	076	100	> 6.00	< .90	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
	PVC	007	100	> 6.00	< .90	23.		107
		077	100	> 6.00	< .90	23.		107
				> 6.00	< .90	23.		107
Lauric Acid, 30-70%								
001430772	NATURAL RUBBER	017	100	> 6.00		23.	.05	107
	NEOPRENE	002	100	> 6.00		23.		107
		018	100	> 6.00		23.	.04	107
	NITRILE	019	100	> 6.00		23.	.06	107
	PVC	007	100	.25		23.		107

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
d-Limonene (Menthadiene)								
059892750	BUTYL	014	118	> 8.00		23.	.02	323
	NEOPRENE	018	100	1.08		23.	.05	323
	NITRILE	019	100	> 20.00		23.	.04	323
	PV ALCOHOL	102	100	> 8.00		23.	.03	323
Maleic Acid, >70%								
001101673	NATURAL RUBBER	017	100	> 6.00		23.	.05	107
	NEOPRENE	002	100	> 6.00		23.		107
		018	100	> 6.00		23.	.04	107
	NITRILE	019	100	> 6.00		23.	.06	107
	NITRILE+PVC	058	100	> 6.00		23.		107
	PE	076	100	> 6.00		23.		107
	PVC	007	100	> 6.00		23.		107
		077	100	> 6.00		23.		107
				> 6.00		23.		107
Mesityl Oxide (Methylpentenone, 4-,3-,2-)								
001417970	CPE	060	UNK	1.83		23.		142
				.33		23.		142
	VITON/CHLOROBUTYL	112	UNK	> 3.00		23.		142
Methacrylonitrile								
001269870	BUTYL	014	118	> 8.00		23.	.09	323
	NATURAL RUBBER	001	250	< .02	1,803.60	23.	.02	323
	PV ALCOHOL	102	100	.40	.48	23.	.06	323
	PVC	003	100	.03	1,142.28	23.	.02	323
Methanesulfonic Acid								
000757520	NEOPRENE	018	100	> 4.00		23.	.05	123
	PVC	003	215	> 4.00		23.	.05	123
Methanol (Methyl Alcohol)								
000675610	BUTYL	064	117	> 8.00		23.	.02	213
				> 8.00		23.	.01	213
				> 8.00		23.	.02	213
	BUTYL/NEOPRENE	110	117	> 8.00		23.	.02	213
	CPE	060	113	> 3.00		25.	.07	302
	NATURAL RUBBER	001	210	6.00	< .02	23.		080
		017	100	.33	8.02	25.	.03	222
				.22	< .90	23.	.05	107
			102	.25	1.20	23.	.05	026
				.25	1.20	23.	.05	026
				.25	1.20	23.	.05	026
				.25	1.20	23.	.05	026
			120	.03	18.04	25.	.02	222
			502	> 1.00	< 4.01	25.	.05	222
			504	.30	4.01	25.	.05	222
				> 1.00	< 4.01	25.	.06	222
			UNK	> 1.00		23.	.04	274
	NEOP+NAT RUBBER	026	102	.25	1.20	23.	.06	026

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS		PERMEATION RATE UG/CM**2/MIN			TEMP DEG C	THICKNESS CM	REF NUM
000675610	NEOP+NAT RUBBER	026	102		.25			1.20	23.	.05	026
			121		.30		>	6.01	23.	.05	237
	NEOP/NAT RUBBER	008	102		.25			1.20	23.		026
			114		.40			4.01	25.	.05	222
			UNK	>	1.00				23.	.05	274
	NEOPRENE	002	100		.25		<	.90	23.		107
					.29			6.01	25.	.08	222
			120		.38			5.01	25.	.07	222
			210		6.00		<	.02	23.		080
		018	100		1.00		<	.90	23.	.04	107
			118	>	1.00		<	4.01	25.	.08	222
			120	>	1.00		<	4.01	25.	.05	222
				>	1.00		<	4.01	25.	.07	222
				>	1.00		<	4.01	25.	.05	222
				>	1.00		<	4.01	25.	.03	222
			UNK	>	1.00				23.	.09	274
				>	1.00				23.	.06	274
		031	UNK		1.03				23.	.04	187
		093	117		5.92				23.	.02	213
		138	117		5.00				23.	.03	213
		139	117	>	8.00				23.	.02	213
	NITRILE	005	210		6.00		<	.02	23.		080
		019	100		1.15			23.05	25.	.04	222
					.18	90.18	-	901.80	23.	.06	107
				>	1.00		<	4.01	25.	.06	222
					.90			36.07	25.	.04	222
			503		.65			29.06	25.	.03	222
			UNK	>	1.00				23.	.05	274
		033	UNK		.91				23.	.05	187
	NITRILE+PVC	057	210		6.00		<	.02	23.		080
		058	100		.33	.90	-	9.02	23.		107
	PE	006	100	>	1.00		<	4.01	25.	.01	222
			505	>	1.00		<	4.01	25.	.01	222
		076	100		.22		<	.90	23.		107
			117	>	8.00				23.	.01	213
	PV ALCOHOL	004	100		.02			124.75	23.		123
					.02			124.75	21.		124
			UNK		.04		>	30.06	23.	.12	274
	PVC	003	120		.03			36.07	25.	.01	222
					.03			34.07	25.	.01	222
					.05			18.04	25.	.03	222
					.05			23.05	25.	.02	222
			500		.03			34.07	25.	.01	222
			501		.02			38.08	25.	.01	222
					.04			30.06	25.	.02	222
		007	100		.75	9.02	-	90.18	23.		107
			210		6.00		<	.02	23.		080
			UNK	>	1.00				23.	.16	274
					1.50				23.	.07	186
					.77				23.	.05	186
		049	117		.83				23.	.01	213
			UNK		.68				23.	.03	187
		077	100		.17		<	.90	23.		107

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000675610	PVC	077	100	.50	9.02 - 90.18	23.		107
			117	< .08		23.	.01	213
	SARANEX	061	117	> 8.00		23.	.01	213
	TEFLON	069	510	> 14.20	< .02	23.	.05	303
				> 5.00	< .02	24.	.05	303
	VITON	009	UNK	> 1.00		23.	.03	274
		145	117	.83		23.	.01	213
	VITON/CHLOROBUTYL	112	113	> 3.00		25.	.04	302
	VITON/NEOPRENE	111	117	> 8.00		23.	.02	213
4-Methoxy-4-methyl-2-pentanone								
001077000	BUTYL	014	118	> 13.00		23.	.07	323
	NEOPRENE	018	100	1.65	33.07	23.	.05	323
	PV ALCOHOL	102	100	> 14.00		23.	.03	323
	VITON	009	118	.40	116.03	23.	.03	323
Methyl Acetate								
000792090	BUTYL	014	118	> 8.00		23.	.09	323
	NATURAL RUBBER	001	250	< .02	6,012.00	23.	.02	323
	PE	076	100	.07	.90 - 9.02	23.		107
	PV ALCOHOL	102	100	.68	12.02	23.	.07	323
	PVC	003	100	< .02	6,012.00	23.	.02	323
Methyl Acrylate								
000963330	BUTYL	014	118	> 8.00		23.	.09	323
	NATURAL RUBBER	001	250	.02	625.25	23.	.02	323
	NEOPRENE	018	100	.25	3,168.32	23.	.05	323
	PV ALCOHOL	102	100	1.50	1.80	23.	.07	323
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
Methylamine (Monomethylamine)								
000748950	NATURAL RUBBER	017	100	.42	9.02 - 90.18	23.	.05	107
	NEOPRENE	002	100	6.00	< .90	23.		107
		018	100	4.50	9.02 - 90.18	23.	.04	107
	NITRILE	019	100	> 6.00	< .90	23.	.06	107
	PVC	007	100	2.25	.90 - 9.02	23.		107
Methylamine, 30-70%								
000748952	BUTYL	014	118	> 15.00	< .02	23.	.04	227
	NITRILE	019	118	> 8.00		23.	.04	227
	NITRILE+PVC	058	100	.50	9.02 - 90.18	23.		107
	PE	076	100	.17	9.02 - 90.18	23.		107
	PVC	077	100	.17	< .90	23.		107
				1.00	.90 - 9.02	23.		107
	SILVER SHIELD	122	118	1.90	12.02	23.	.01	227
	VITON	009	118	> 16.00	< .02	23.	.02	227
3-Methylaminopropylamine								
062918450	BUTYL	014	118	> 8.00	< .02	20.	.07	323
	NATURAL RUBBER	001	250	.05	731.46	16.	.02	323
	NEOPRENE	018	100	1.05	160.32	16.	.05	323
	PVC	007	100	.03	671.34	14.	.02	323

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
Methyl Bromide (Bromomethane)								
000748390	SARANEX	061	127	> 8.00		23.		104
Methyl Cellosolve (Methoxyethanol, 2)								
001098640	BUTYL	014	118	> 20.00		23.	.05	123
	NEOP+NAT RUBBER	026	121	.58	6.01	23.	.05	237
	NITRILE	019	100	.67	60.12	23.		123
Methyl Chloroacetate								
000963440	SARANEX	061	127	> 8.00	18.04	23.		104
Methyl Chloroform (Trichloroethane,1,1,1)								
000715560	BUTYL	014	118	.48	918.50	25.	.04	288
			UNK	.48	919.84	23.	.04	100
				1.00		25.	.05	326
		064	UNK	.42		25.	.04	326
	NATURAL RUBBER	001	210	.13	901.80	23.		080
		017	100	.06	2,605.20	25.	.03	222
			120	.03	5,711.40	25.	.02	222
			502	.12	3,106.20	25.	.05	222
			504	.12	1,803.60	25.	.05	222
				.22	1,202.40	25.	.06	222
			UNK	.07		25.	.02	326
	NEOP+NAT RUBBER	026	102	.13	3,006.00	25.	.05	222
	NEOP/NAT RUBBER	008	114	.17	2,404.80	25.	.05	222
	NEOPRENE	002	100	.07	1,002.00	25.	.08	222
			120	.04	701.40	25.	.07	222
			210	.20	781.56	23.		080
		010	100	.40	895.12	25.	.05	288
		018	100	.32	745.49	23.	.05	323
			120	.32	1,002.00	25.	.05	222
				.80	801.60	25.	.07	222
				.42	901.80	25.	.05	222
				.27	1,002.00	25.	.03	222
			UNK	.40	895.79	23.	.05	100
				.75		25.	.06	326
	NITRILE	005	210	2.00	601.20	23.		080
		019	100	.18	4,108.20	25.	.04	222
				2.00	901.80 - 9,018.00	23.	.06	107
				> 1.00	< 10.02	25.	.06	222
				.93	< 50.10	25.	.04	222
			118	.62	459.32	23.	.04	323
				.68	459.32	23.	.04	227
			181	.60		25.	.03	222
			503	.06	2,605.20	25.	.03	222
			UNK	.50		25.	.02	326
				.28	282.56	23.	.03	100
		020	100	.28	282.23	25.	.03	288
	NITRILE+PVC	057	210	.83	96.19	23.		080
		058	100	.15	90.18 - 901.80	23.		107
				.10	901.80 - 9,018.00	23.		107
	PE	006	100	.03	130.26	25.	.01	222

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000715560	PE	006	100	< .02	154.48	25.	.01	288
			505	.20	30.06	25.	.01	222
			UNK	< .02	154.48	23.	.01	100
		042	UNK	.05		25.	.01	326
		076	100	.13	.90 - 9.02	23.		107
				.02	90.18 - 901.80	23.		107
			UNK	.20		25.	.01	326
	POLYURETHANE	050	UNK	.03		25.	.01	326
	PV ALCOHOL	004	100	1.00	< .90	23.		107
		102	100	> 8.00		23.	.03	323
				> 6.00		25.	.05	288
			UNK	> 8.00		23.	.05	100
	PVC	003	118	.02	1,593.18	25.	.01	288
			500	.01	3,206.40	25.	.01	222
			501	.01	4,008.00	25.	.02	222
			UNK	.02	1,593.18	23.	.01	100
		007	210	.50	120.24	23.		080
		077	100	.10	9.02 - 90.18	23.		107
				.25	9.02 - 90.18	23.		107
				.03	90.18 - 901.80	23.		107
			UNK	.05		25.	.03	326
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
	VITON	009	118	> 15.17		23.	.03	323
				> 15.00		23.	.02	227
				> 6.00		25.	.02	288
			UNK	> 8.00		23.	.02	100
				> 24.00		25.	.03	326
Methylene Bromide (Dibromomethane)								
000749530	PE	076	100	.03	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
Methylene Chloride (Dichloromethane)								
000750920	BUTYL	014	118	.17	698.06	25.	.04	288
			UNK	.17	696.39	23.	.04	100
	CPE	060	113	.25 - .42		25.	.07	302
	NATURAL RUBBER	001	210	.10	1,803.60	23.		080
			UNK	.03	> 140.28	23.	.12	274
		017	100	.02	8,216.40	25.	.03	222
			120	.01	13,026.00	25.	.02	222
			502	.05	4,308.60	25.	.05	222
			504	.03	4,809.60	25.	.05	222
				.05	3,807.60	25.	.06	222
			UNK	.03	> 120.24	23.	.04	274
	NEOP+NAT RUBBER	026	102	.05	4,609.20	25.	.05	222
			121	.03	1,274.54	23.	.05	237
	NEOP/NAT RUBBER	008	114	.07	3,406.80	25.	.05	222
			UNK	.03	> 160.32	23.	.05	274
	NEOPRENE	002	100	.13	1,102.20	25.	.08	222
			120	.01	2,805.60	25.	.07	222
			210	.08	1,803.60	23.		080
		010	100	< .02	2,688.70	25.	.05	288

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000750920	NEOPRENE	018	118	.22	2,004.00	25.	.08	222
			120	.07	3,507.00	25.	.05	222
				.15	2,605.20	25.	.07	222
				.11	2,805.60	25.	.05	222
				.03	4,809.60	25.	.03	222
			UNK	< .02	2,687.36	23.	.05	100
				.21	> 150.30	23.	.09	274
				.08	> 140.28	23.	.06	274
		125	103		1,881.76 - .02	23.		045
	NITRILE	005	210	3.00	5,410.80	23.		080
		019	100	.04	12,024.00	25.	.04	222
				.11	8,216.40	25.	.06	222
				.04	13,026.00	25.	.04	222
			103		4,016.02	23.		045
			118	.07	4,605.19	23.	.04	227
			503	.03	1,903.80	25.	.03	222
			UNK	< .02	5,639.26	23.	.03	100
				.04	> 125.25	23.	.05	274
				.03	> 150.30	23.	.05	274
		020	100	< .02	5,644.60	25.	.03	288
	NITRILE+PVC	057	210	.20	2,645.28	23.		080
	PE	006	100	.01	300.60	25.	.01	222
				< .02	420.84	25.	.01	288
			505	.03	100.20	25.	.01	222
			UNK	< .02	420.84	23.	.01	100
		076	100	.02	90.18 - 901.80	23.		107
	PV ALCOHOL	004	100	.28	< .90	23.		107
			UNK	> 1.00		23.	.12	274
		102	100	> 8.00		23.	.04	323
				> 6.00		25.	.05	288
			UNK	> 8.00		23.	.05	100
	PVC	003	118	< .02		25.	.01	288
			120	.01		25.	.01	222
				.01	> 16,699.98	25.	.01	222
				.02	12,024.00	25.	.03	222
				.01	> 16,699.98	25.	.02	222
			500	.01	> 16,699.98	25.	.01	222
			501	.01	> 16,699.98	25.	.01	222
				.01	> 16,699.98	25.	.02	222
			UNK	< .02		23.	.01	100
		007	103		2,555.10	23.		045
			210	.10	3,486.96	23.		080
			UNK	.17	> 150.30	23.	.16	274
	SILVER SHIELD	122	118	1.90	.02	23.	.01	227
	TEFLON	069	510	.78	.02	23.	.05	303
				.84	.02	23.	.05	303
				.92	.02	23.	.05	303
				.62		24.	.05	303
				.62		24.	.05	303
				.58		24.	.05	303
				.75		24.	.05	303
	VITON	009	118	1.00	44.00	23.	.02	227
				1.38	23.38	25.	.02	288

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000750920	VITON	009	UNK	1.38	22.85	23.	.02	100
				.95	> 10.02	23.	.03	274
	VITON/CHLOROBUTYL	112	113	.42 - .60		25.	.04	302
				1.03 - 1.12		15.	.04	302
				.30 - .47		25.	.04	302
				.15 - .23		35.	.04	302
n-Methylethanolamine								
001098310	BUTYL	014	118	> 8.00	< .02	19.	.07	323
	CELLULOSE ACETATE	099	118	> 8.00	< .02	20.	.03	323
	NATURAL RUBBER	001	250	.08	150.30	20.	.02	323
	NEOPRENE	018	100	> 8.00	< .02	20.	.06	323
Methyl Ethyl Ketone (Butanone,2)								
000789330	BUTYL	014	118	> 8.00	< .02	23.	.06	323
			216	> 4.00		23.	.07	123
				> 4.00		21.		124
		064	117	1.67		23.	.02	213
				2.33		23.	.01	213
				2.00		23.	.02	213
	BUTYL/NEOPRENE	110	117	.08		23.	.02	213
	CPE	060	113	.47 - .58		25.	.07	302
	NATURAL RUBBER	001	103		925.85	23.		045
					517.03	23.		045
			210	.10	1,022.04	23.		080
			250	.02	100.20	23.	.01	323
		017	100	.04	601.20	25.	.03	222
				.17	901.80 - 9,018.00	23.	.05	107
			120	.02	801.60	25.	.02	222
			502	.12	320.64	25.	.05	222
			504	.13	400.80	25.	.05	222
				.27	200.40	25.	.06	222
	NEOP+NAT RUBBER	026	102	.09	310.62	25.	.05	222
			121	.08	1,004.00	23.	.05	237
	NEOP/NAT RUBBER	008	114	.15	230.46	25.	.05	222
	NEOPRENE	002	100	.28	200.40	25.	.08	222
			120	.04	501.00	25.	.07	222
			210	.12	721.44	23.		080
		018	100	.22	3,066.12	23.	.05	323
			118	.65	230.46	25.	.08	222
			120	.13	601.20	25.	.05	222
				.45	330.66	25.	.07	222
				.17	601.20	25.	.05	222
				.07	901.80	25.	.03	222
		093	117	< .08		23.	.02	213
		125	103		.60	23.		045
		138	117	< .08		23.	.03	213
		139	117	< .08		23.	.02	213
	NITRILE	005	210	.33	492.98	23.		080
		019	100	.11	3,106.20	25.	.04	222
				.20	1,903.80	25.	.06	222
				.10	2,204.40	25.	.04	222
			103		1.20	23.		045

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000789330	NITRILE	019	181	.06	2,805.60	25.	.03	222
			503	.16	1,503.00	25.	.03	222
	NITRILE+PVC	057	210	.15	607.21	23.		080
	PE	006	100	> .02	10.02	25.	.01	222
			505	.16	< 3.01	25.	.01	222
		076	100	.05	9.02 - 90.18	23.		107
			117	.03		23.	.01	213
	PV ALCOHOL	004	100	.50	9.02 - 90.18	23.		107
		102	100	5.37	.15	23.	.07	323
	PVC	007	103		4.81	23.		045
			210	.27	721.44	23.		080
		049	117	.08		23.	.01	213
	SARANEX	061	117	.15		23.	.01	213
			127	.48	7.82	23.		104
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
	VITON	145	117	< .16		23.	.01	213
	VITON/CHLOROBUTYL	112	113	.42 - .66		25.	.04	302
	VITON/NEOPRENE	111	117	.07		23.	.02	213
Methyl Ethyl Ketone Peroxide								
013382340	BUTYL	014	118	> 4.00		23.	.07	323
	NATURAL RUBBER	001	250	.75	6.01	23.	.02	323
	NEOPRENE	018	100	> 4.00		23.	.05	323
	VITON	009	118	> 4.00		23.	.04	323
Methylhydrazine								
000603440	BUTYL	014	118	> 2.00		22.	.23	321
				> 2.00		22.	.04	321
		064	113	.01		22.	.03	321
		085	211	> 2.00		22.	.11	321
	CHLOROBUTYL	052	205	> 2.00		23.	.04	321
	CPE	060	113	.87		22.	.05	321
		070	113	1.10		22.	.05	321
	CR 39	095	122	> 2.00		22.	.17	321
	PVC	003	103	.52		22.	.13	321
				1.90		22.	.13	321
		053	126	> 2.00		22.	.05	321
		083	211	> 2.00		22.	.20	321
	TEFLON	055	210	< .01		22.	.02	321
		062	UNK	< .01		22.	.02	321
		067	UNK	< .01		22.	.02	321
		068	UNK	< .01		22.	.02	321
		069	UNK	< .01		22.	.02	321
	VITON	009	118	1.50		22.	.05	321
Methyl Iodide								
000748840	BUTYL	014	118	.92	492.98	23.	.09	323
	NATURAL RUBBER	017	100	.03	13,026.00	25.	.03	222
			120	.03	> 16,699.98	25.	.02	222
			502	.05	8,116.20	25.	.05	222
			504	.04	9,218.40	25.	.05	222
				.06	6,913.80	25.	.06	222
	NEOP+NAT RUBBER	026	102	.03	8,917.80	25.	.04	222

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PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000748840	NEOP/NAT RUBBER	008	114	.09	5,310.60	25.	.05	222
	NEOPRENE	002	100	.25	1,402.80	25.	.08	222
			120	.01	4,609.20	25.	.07	222
		018	100	.10	7,893.76	23.	.05	323
			118	.28	2,905.80	25.	.08	222
			120	.07	6,312.60	25.	.05	222
				.20	3,707.40	25.	.07	222
				.07	5,611.20	25.	.05	222
				.04	7,915.80	25.	.03	222
	NITRILE	019	100	.01	6,613.20	25.	.03	222
				.13	8,016.00	25.	.05	222
				.09	6,012.00	25.	.04	222
			181		8,216.40	25.	.03	222
			503	.03	11,022.00	25.	.03	222
	PE	006	100	.01	1,102.20	25.	.01	222
			505	.04	300.60	25.	.01	222
	PV ALCOHOL	102	100	> 8.00		23.	.07	323
	VITON	009	118	6.35	4.21	23.	.04	323
Methyl Isobutyl Ketone (Methylpentanone, 4-,2-)								
001081010	BUTYL	012	UNK	1.50	19.24	25.	.04	273
				2.67	22.24	25.	.04	273
				5.00	52.30	25.	.06	273
				4.50	39.08	25.	.06	273
				1.50	36.07	25.	.04	273
				2.17	40.88	25.	.04	273
				5.00	4.81	25.	.06	273
				5.67	1.20	25.	.06	273
				.17	30.06	25.	.04	273
				.83	70.34	25.	.04	273
				3.00	16.83	25.	.06	273
				3.75	7.82	25.	.06	273
		014	118	4.07	6.01	23.	.05	086
	NATURAL RUBBER	001	210	.25	420.84	23.		080
		017	100	.10	90.18 - 901.80	23.	.05	107
	NEOPRENE	002	210	.25	541.08	23.		080
		010	120	.62	277.22	23.	.06	086
		018	100	.47	529.39	23.	.06	086
			UNK	.33	303.61	25.	.04	273
				.33	284.37	25.	.04	273
				.50	298.80	25.	.06	273
				.53	277.75	25.	.06	273
	NITRILE	005	210	1.67	841.68	23.		080
		019	100	.80	402.47	23.	.06	086
			118	.20	492.65	23.	.04	086
			120	.35	848.36	23.	.05	086
			UNK	.50	304.81	25.	.04	273
				.50	290.38	25.	.04	273
				1.17	290.38	25.	.06	273
				1.17	256.71	25.	.06	273
		020	503	.32	1,033.73	23.	.04	086
	NITRILE+PVC	057	210	.30	781.56	23.		080
	PE	006	512	.01	60.12	23.	.01	086

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001081010	PE	076	100	.03	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
	PVC	007	210	.50	991.98	23.		080
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
	VITON	009	118	.20	1,743.48	23.	.04	086
Methyl Isocyanate								
006248390	BUTYL	014	118	.72		13.	.06	323
				1,012.00	90.18	23.	.07	323
	NATURAL RUBBER	001	250	.01		20.	.02	323
				.02	10,641.24	23.	.01	323
	NEOPRENE	018	100	.01		20.	.05	323
				.02	2,254.50	23.	.04	323
	PV ALCOHOL	004	100	> 8.00	< .02	23.	.03	323
				> 8.00	< .02	23.	.05	323
	VITON	009	118	.02		21.	.03	323
				.07	1,212.42	23.	.03	323
Methyl Methacrylate								
000806260	BUTYL	014	118	4.98	24.05	23.	.09	323
	NATURAL RUBBER	001	250	< .02	9,619.20	23.	.02	323
	PE	076	100	.03	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
		102	100	> 8.00		23.	.06	323
	PVC	003	100	< .02	9,619.20	23.	.02	323
	TEFLON	069	510	> 3.10	< .02	23.	.05	303
Methyl-vinyl-ketone								
000789440	CPE	060	UNK	.50		23.		142
				1.67		23.		142
	VITON/CHLOROBUTYL	112	UNK	> 3.00		23.		142
Mineral Spirits								
080524130	NEOP+NAT RUBBER	026	121	.22	138.28	23.	.05	237
	NEOPRENE	002	100	> 6.00	< .90	23.		107
		018	100	1.50	.90 - 9.02	23.	.04	107
	NITRILE	019	100	> 6.00	< .90	23.	.06	107
	NITRILE+PVC	058	100	.10	9.02 - 90.18	23.		107
	PE	076	100	.10	9.02 - 90.18	23.		107
			127	< .08	7.01	23.		104
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
	PVC	007	100	2.50	.90 - 9.02	23.		107
		077	100	.10	.90 - 9.02	23.		107
				.10	9.02 - 90.18	23.		107
	SARANEX	061	127	> .17	< .20	23.		104
Monoisopropanolamine								
000789660	BUTYL	014	118	> 8.00		25.	.07	323
	NEOPRENE	018	100	> 8.00		24.	.05	323
	PVC	007	100	> 8.00		25.	.02	323
	VITON	009	118	> 8.00		25.	.04	323
Morpholine								

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM.
001109180	BUTYL	014	118	> 16.00		23.	.04	323
				> 16.00		23.	.04	227
	NATURAL RUBBER	017	100	.50	.90 - 9.02	23.	.05	107
	NITRILE	019	118	.73	1,240.28	23.	.03	323
				.80	1,238.47	23.	.04	227
	PV ALCOHOL	004	100	3.00	< .90	23.		107
		102	100	6.17	25.25	23.	.03	323
	SILVER SHIELD	122	118	> 8.00		23.	.01	227
	VITON	009	118	1.80	581.36	23.	.02	323
				1.90	583.16	23.	.02	227
N-Methyl-2-pyrrolidone								
008725040	NATURAL RUBBER	001	103		3.61	23.		045
	NEOPRENE	125	103		6.01	23.		045
	NITRILE	019	103		24.05	23.		045
	PVC	007	103		24.05	23.		045
Naphtha, V.M.& P (Ligroine)								
080323240	CPE	070	UNK	> 3.00		23.	.05	004
	NEOP+NAT RUBBER	026	121	.07	96.19	23.	.05	237
	NEOPRENE	002	100	> 6.00	< .90	23.		107
		018	100	.25	90.18 - 901.80	23.	.04	107
	NITRILE	019	100	> 6.00	< .90	23.	.06	107
	NITRILE+PVC	058	100	.15	9.02 - 90.18	23.		107
	PE	076	100	.05	90.18 - 901.80	23.		107
	PV ALCOHOL	004	100	> 7.00	< .90	23.		107
	PVC	007	100	2.00	< .90	23.		107
		077	100	.08	.90 - 9.02	23.		107
				.33	9.02 - 90.18	23.		107
Nitric Acid								
076973720	BUTYL	064	117	> 8.00		23.	.02	213
				> 8.00		23.	.01	213
				> 8.00		23.	.02	213
	BUTYL/NEOPRENE	110	117	> 8.00		23.	.02	213
	CPE	070	UNK	> 3.00		23.	.05	004
	NATURAL RUBBER	001	210	2.00		23.		080
	NEOP+NAT RUBBER	026	121	> 8.00	< .02	23.	.05	237
	NEOPRENE	002	210	2.00		23.		080
		093	117	2.67		23.	.01	213
		138	117	1.33		23.	.03	213
		139	117	3.08		23.	.02	213
	NEOPRENE+PVC	127	117	1.08		23.	.02	213
	NITRILE	005	210	4.00		23.		080
	NITRILE+PVC	057	210	4.50		23.		080
		058	117	.42		23.	.01	213
	PE	076	117	8.00		23.	.01	213
	PVC	007	210	3.75		23.		080
		049	117	3.00		23.	.01	213
				.42		23.	.01	213
		053	117	< .33		23.	.02	213
		077	117	< .08		23.	.01	213
				.75		23.	.01	213

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
076973720	PVC	144	117	.58		23.	.02	213
	SARANEX	061	117	5.00		23.	.01	213
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	VITON	145	117	> 8.00		23.	.01	213
	VITON/NEOPRENE	111	117	> 8.00		23.	.02	213
Nitric Acid, <30%								
076973721	NATURAL RUBBER	017	100	> 6.00		23.	.05	107
			102	> 8.00		23.	.05	026
				> 8.00		23.	.05	026
				> 8.00		23.	.05	026
				> 8.00		23.	.05	026
	NEOP+NAT RUBBER	026	102	> 8.00		23.	.06	026
				> 8.00		23.	.04	026
				> 8.00		23.	.05	026
	NEOP/NAT RUBBER	008	102	> 8.00		23.		026
	NEOPRENE	002	100	> 6.00		23.		107
		018	100	> 6.00		23.	.04	107
	NITRILE	019	100	> 6.00		23.	.06	107
	NITRILE+PVC	058	100	> 6.00		23.		107
	PE	076	100	.75		23.		107
	PVC	007	100	> 6.00		23.		107
		077	100	> 6.00		23.		107
				4.75		23.		107
Nitric Acid, 30-70%								
076973722	NATURAL RUBBER	017	102	> 6.00		23.	.05	026
				3.00		23.	.05	026
				5.50		23.	.05	026
				> 8.00		23.	.05	026
	NEOP+NAT RUBBER	026	102	> 3.00		23.	.06	026
				2.00		23.	.04	026
				> 6.00		23.	.05	026
	NEOP/NAT RUBBER	008	102	> 6.00		23.		026
	NEOPRENE	002	100	> 6.00		23.		107
		018	100	2.33		23.	.04	107
	PE	076	127	.83		23.		104
	PVC	007	100	5.75		23.		107
	SARANEX	061	127	46.67	< .02	23.		104
Nitric Acid, >70%								
076973723	NATURAL RUBBER	001	UNK	> 1.00		23.		052
		015	UNK	> 1.00		23.	.04	052
	NEOP/NAT RUBBER	008	UNK	> 1.00		23.		052
	NEOPRENE	018	UNK	> 1.00		23.	.09	052
				> 1.00		23.	.06	052
	NITRILE	019	UNK	> 1.00		23.	.05	052
	NITRILE+PVC	058	100	.10		23.		107
	PE	076	100	.22		23.		107
	PVC	003	UNK	.10		23.	.02	052
		007	UNK	> 1.00		23.		052
	SARANEX	061	127	1.78		23.		104
	VITON	009	UNK	> 1.00		23.	.03	052

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
Nitric Acid, Fuming Red								
080075870	BUTYL	014	118	> 1.50		23.	.03	001
				> 1.50		23.	.04	001
				> 1.50		23.	.08	001
	CHLOROBUTYL	052	205	> 1.50		23.	.05	001
	CPE	060	113	.45		23.	.05	001
	NATURAL RUBBER	017	100	> 1.50		23.	.04	001
				> 1.50		23.	.05	001
				> 1.50		23.	.04	001
			101	> 1.50		23.	.05	001
			110	> 1.50		23.	.05	001
	NEOP/NAT RUBBER	008	114	> 1.50		23.	.04	001
				> 1.50		23.	.04	001
				> 1.50		23.	.04	001
	NEOPRENE	002	100	> 1.50		23.	.13	001
				> 1.50		23.	.13	001
		018	100	> 1.50		23.	.05	001
	NITRILE	019	100	> 1.50		23.	.04	001
				> 1.50		23.	.04	001
				> 1.50		23.	.03	001
			118	> 1.50		23.	.03	001
	PV ALCOHOL	004	100	< .01		23.	.09	001
	PVC	003	120	.20		23.	.05	001
				.57		23.	.10	001
				.07		23.	.03	001
		007	100	.92		23.	.09	001
				.67		23.	.11	001
				.43		23.	.10	001
		053	189	.37		23.	.07	001
				.07		23.	.06	001
				.25		23.	.07	001
		054	189	.04		23.	.05	001
				.01		23.	.05	001
		077	212	.12		23.	.03	001
	SILVER SHIELD	122	118	.58		23.	.01	227
	VITON	009	118	> 1.50		23.	.03	001
Nitrobenzene								
000989530	BUTYL	014	118	> 23.00		23.	.06	323
				> 23.00		23.	4.00	227
		064	117	> 8.00		23.	.01	213
	CPE	060	113	1.03		25.	.07	302
		070	UNK	1.03		23.	.05	004
	NATURAL RUBBER	017	100	.08	9.02 - 90.18	23.	.05	107
	NEOPRENE	018	100	.75	1.14	23.	.05	323
		031	511	.67	- 132.26	23.		323
	NITRILE	019	118	.48	10.22	23.	.04	323
				.55	10.22	23.	.04	227
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
		102	100	> 16.00		23.	.03	323
	SILVER SHIELD	122	118	> 8.00		23.	.01	227
	TEFLON	069	510	> 3.00	< .02	23.	.05	303

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000989530	TEFLON	069	510	> 3.00	< .02	24.	.05	303
	VITON	009	118	> 8.00		23.	.03	323
				> 8.00		23.	.02	227
	VITON/CHLOROBUTYL	112	113	2.83 - 3.00		25.	.04	302
Nitroethane								
000792430	BUTYL	014	118	> 8.00		23.	.09	323
	NATURAL RUBBER	001	250	.03	186.37	23.	.02	323
	NEOPRENE	018	100	.82	102.20	23.	.04	323
	PV ALCOHOL	102	100	3.52	2.40	23.	.07	323
Nitrogen Tetroxide								
105447260	BUTYL	014	118	> 2.00		22.	.23	321
				.68		22.	.05	321
		064	113	.60		22.	.03	321
		085	211	> 2.00		22.	.11	321
	CHLOROBUTYL	052	205	> 2.00		23.	.04	321
	CPE	060	113	1.15		22.	.05	321
		070	113	1.25		22.	.06	321
	CR 39	095	122	> 2.00		22.	.17	321
	PE	091	UNK	1.17		22.	.04	321
	PVC	003	103	.33		22.	.13	321
				.20		22.	.13	321
		053	126	.65		22.	.05	321
		083	211	> 2.00		22.	.19	321
	TEFLON	062	UNK	< .01		23.	.02	321
		067	UNK	< .01		23.	.02	321
		069	UNK	< .01		23.	.02	321
				< .01		23.	.02	321
	VITON	009	118	.77		22.	.03	321
Nitromethane								
000755250	BUTYL	014	118	> 8.00		23.	.09	323
	NATURAL RUBBER	001	250	< .02	96.19	23.	.02	323
		017	100	.07	< .90	23.	.05	107
	NEOPRENE	002	100	1.50	< .90	23.		107
		018	100	1.00	.90 - 9.02	23.	.04	107
				1.07	3.01	23.	.05	323
	NITRILE	019	100	.50	90.18 - 901.80	23.	.06	107
	PE	076	100	> 6.00	< .90	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
		102	100	.17	30.06	23.	.07	323
Nitropropane								
253220140	BUTYL	014	118	> 8.00	< .02	23.	.04	227
		034	UNK	> 101.00		22.	.08	078
	NITRILE	019	118	.27	177.35	23.	.04	227
		033	UNK	.42 - .83	200.40	22.	.09	078
	NITRILE+PVC	058	100	< .08	9.02 - 90.18	23.		107
	PE	076	100	.05	9.02 - 90.18	23.		107
	PV ALCOHOL	035	UNK	< .08	44.09	22.	.02	078
	SILVER SHIELD	122	118	> 8.00		23.	.01	227
	VITON	009	118	.35	73.41	23.	2.00	227

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
1-Nitropropane								
001080320	BUTYL	014	118	> 8.00		23.	.04	323
	NITRILE	019	118	.20	177.35	23.	.04	323
	PV ALCOHOL	102	100	> 15.00		23.	.03	323
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
	VITON	009	118	.28	156.91	23.	.03	323
2-Nitropropane								
000794690	BUTYL	014	118	> 8.00		23.	.08	323
	NATURAL RUBBER	001	250	.03	192.38	23.	.02	323
	NEOPRENE	018	100	.72	144.29	23.	.04	323
	PV ALCOHOL	102	100	> 8.00		23.	.06	323
n-Nitrosodimethylamine								
000551850	CPE	060	113	.50		23.	.05	204
				.70	438.88	23.	.05	204
Nonylphenol								
251545230	NEOPRENE	018	100	> 20.00		23.	.05	123
	NITRILE	019	100	> 4.00		23.	.04	123
n-Octane								
001116590	NATURAL RUBBER	001	210	.33	120.24	23.		080
	NEOPRENE	002	210	7.00	216.43	23.		080
	NITRILE	005	210	6.00	< .02	23.		080
	NITRILE+PVC	057	210	4.75	72.14	23.		080
	PVC	007	210	.92	108.22	23.		080
n-Octanol								
290632830	NATURAL RUBBER	001	210	.75	10.22	23.		080
		017	100	1.00	< .90	23.	.05	107
	NEOPRENE	002	100	> 7.00	< .90	23.		107
			210	6.00	< .02	23.		080
		018	100	7.00	< .90	23.	.04	107
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	> 6.00	< .90	23.	.06	107
	NITRILE+PVC	057	210	6.00	< .02	23.		080
	PV ALCOHOL	004	100	4.00	< .90	23.		107
	PVC	007	100	> 6.00	< .90	23.		107
			210	6.00	< .02	23.		080
Oleic Acid								
001128010	NATURAL RUBBER	017	100	.50	.90 - 9.02	23.	.05	107
	NEOPRENE	002	100	2.50	< .90	23.		107
		018	100	1.00	.90 - 9.02	23.	.04	107
	NITRILE	019	100	> 6.00	< .90	23.	.06	107
	NITRILE+PVC	058	100	> 6.00	< .90	23.		107
	PE	076	100	> 6.00	< .90	23.		107
	PV ALCOHOL	004	100	1.00	< .90	23.		107
	PVC	007	100	1.50	.90 - 9.02	23.		107
		077	100	> 6.00	< .90	23.		107
				> 6.00	< .90	23.		107

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
Oxalic Acid								
001446270	BUTYL	014	118	> 8.00	< .02	19.	.07	323
	NATURAL RUBBER	001	210	6.00	< .02	23.		080
		017	100	> 6.00		23.	.05	107
	NEOPRENE	002	100	> 6.00		23.		107
			210	6.00	< .02	23.		080
		018	100	> 6.00		23.	.04	107
				> 8.00	< .02	19.	.05	323
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	> 6.00		23.	.06	107
				> 8.00	< .02	19.	.04	323
	NITRILE+PVC	057	210	6.00	< .02	23.		080
		058	100	> 6.00		23.		107
	PE	076	100	> 6.00		23.		107
	PVC	007	100	> 6.00		23.		107
			210	6.00	< .02	23.		080
		077	100	> 6.00		23.		107
				> 6.00		23.		107
	VITON	009	118	> 8.00	< .02	20.	.03	323
Palmitic Acid								
000571030	NATURAL RUBBER	017	100	.08		23.	.05	107
	NEOPRENE	002	100	> 6.00		23.		107
		018	100	> 6.00		23.	.04	107
	NITRILE	019	100	.50		23.	.06	107
	PVC	007	100	1.25		23.		107
Pentachlorophenol								
000878650	NEOPRENE	002	100	.10	< .90	23.		107
		018	100	.10	< .90	23.	.04	107
	NITRILE	019	100	> 6.00	< .90	23.	.06	107
	PV ALCOHOL	004	100	.12	90.18 - 901.80	23.		107
	PVC	007	100	3.00	< .90	23.		107
Pentane								
001096600	NATURAL RUBBER	001	210	.05	913.82	23.		080
		017	100	.03	2,705.40	25.	.03	222
			120	.01	5,711.40	25.	.02	222
			502	.06	1,803.60	25.	.05	222
			504	.06	1,803.60	25.	.05	222
				.09	1,603.20	25.	.06	222
	NEOP+NAT RUBBER	026	102	.07	1,803.60	25.	.05	222
	NEOP/NAT RUBBER	008	114	.03	2,304.60	25.	.05	222
	NEOPRENE	002	100	.75	.90 - 9.02	23.		107
				.11	25.05	25.	.08	222
			120	.11	24.05	25.	.07	222
			210	.50	667.33	23.		080
		018	100	.08	.28	23.	.05	000
				.50	90.18 - 901.80	23.	.04	107
			118	> 1.00	< 2.00	25.	.08	222
			120	1.08	10.02	25.	.05	222
				> 1.00	2.00	25.	.07	222

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001096600	NEOPRENE	018	120	.63	16.03	25.	.05	222
				.33	21.04	25.	.03	222
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	.03	< .02	23.	.04	323
				> 1.00	< 2.00	25.	.04	222
				> 6.00	< .90	23.	.06	107
				> 1.00	< 2.00	25.	.06	222
				> 1.00	< 2.00	25.	.04	222
			503	.09	10.02	25.	.03	222
	NITRILE+PVC	057	210	1.25	90.18	23.		080
		058	100	.18	9.02 - 90.18	23.		107
	PE	006	100	.01	400.80	25.	.01	222
			505	.05	70.14	25.	.01	222
		076	100	.08	90.18 - 901.80	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
		102	100	.25	< .02	23.	.03	323
	PVC	003	120	.01	1,102.20	25.	.01	222
				.01	811.62	25.	.01	222
				.15	100.20	25.	.03	222
				.04	250.50	25.	.02	222
			500	.01	721.44	25.	.01	222
			501	.01	1,603.20	25.	.01	222
				.02	1,603.20	25.	.02	222
		007	210	.33	210.42	23.		080
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	VITON	009	118	> 8.00		23.	.02	323
				> 8.00		23.	.02	227
Perchloric Acid								
076019030	NATURAL RUBBER	001	210	6.00	< .02	23.		080
	NEOPRENE	002	210	6.00	< .02	23.		080
	NITRILE	005	210	6.00	< .02	23.		080
	NITRILE+PVC	057	210	6.00	< .02	23.		080
		058	100	> 6.00		23.		107
	PE	076	100	> 6.00		23.		107
	PVC	007	210	6.00	< .02	23.		080
		077	100	> 6.00		23.		107
				> 6.00		23.		107
Perchloric Acid, 30-70%								
076019032	NATURAL RUBBER	017	100	> 6.00		23.	.05	107
	NEOPRENE	002	100	> 6.00		23.		107
		018	100	> 6.00		23.	.04	107
	NITRILE	019	100	> 6.00		23.	.06	107
	PVC	007	100	> 6.00		23.		107
Phenol (Carbolic Acid)								
001089520	CPE	060	113	3.40		23.	.05	204
				2.92	60.12	23.	.05	204
	NATURAL RUBBER	001	210	.58		23.		080
		017	100	> 1.00	< 3.01	25.	.03	222
				1.00	9.02 - 90.18	23.	.05	107
			120	.27	15.03	25.	.02	222

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001089520	NATURAL RUBBER	017	502	> 1.67	< 3.01	25.	.05	222
			504	> 1.00	< 3.01	25.	.05	222
				> 1.00	< 3.01	25.	.06	222
	NEOP+NAT RUBBER	026	102	> 1.00	< 3.01	25.	.05	222
	NEOP/NAT RUBBER	008	114	> 1.00	< 3.01	25.	.05	222
	NEOPRENE	002	100	> 6.50	< .90	23.		107
				> 1.65	< 3.01	25.	.08	222
			210	.67		23.		080
		018	100	3.00	9.02 - 90.18	23.	.04	107
			118	> 1.00	< 3.01	25.	.08	222
			120	> 1.00	< 3.01	25.	.05	222
				> 1.00	< 3.01	25.	.07	222
				> 1.00	< 3.01	25.	.05	222
				> 1.00	< 3.01	25.	.03	222
	NITRILE	005	210	.67		23.		080
		019	100	.93	300.60	25.	.04	222
				> 1.00	< 3.01	25.	.06	222
				.53	300.60	25.	.04	222
			503	.60	> 250.50	25.	.03	222
	NITRILE+PVC	057	210	2.00		23.		080
	PE	006	100	> 1.00	< 3.01	25.	.01	222
			505	1.00	3.01	25.	.01	222
	PV ALCOHOL	004	100	.50	9.02 - 90.18	23.		107
	PVC	003	120	.05	190.38	25.	.01	222
				.13	120.24	25.	.01	222
				.53	77.15	25.	.03	222
				.25	100.20	25.	.02	222
			500	.10	130.26	25.	.01	222
			501	.10	120.24	25.	.01	222
				.06	120.24	25.	.02	222
		007	100	1.25	.90 - 9.02	23.		107
			210	1.33		23.		080
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
Phenol, >70%								
001089523	BUTYL	014	118	> 20.00		23.	.06	323
				> 20.00		23.	.04	227
	NEOPRENE	018	100	> 10.67		23.	.05	000
		125	103		< .02	23.		045
	NITRILE	019	103		18.04	23.		045
			118	.58	1,274.54	23.	.03	323
				.65	> 9,018.00	23.	.04	227
	NITRILE+PVC	058	100	.83	.90 - 9.02	23.		107
	PE	076	100	6.00	< .90	23.		107
	PVC	007	103		18.04	23.		045
		077	100	.50	.90 - 9.02	23.		107
				1.50	.90 - 9.02	23.		107
	VITON	009	118	> 15.00		23.	.03	323
				> 15.00	< .02	23.	.02	227
Phenolphthalein								
000770980	NATURAL RUBBER	017	506	> 8.00		23.	.02	323
	NEOPRENE	018	100	> 8.00		23.	.04	323

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000770980	NITRILE	019	100	> 8.00		23.	.04	323
	PVC	003	100	> 8.00		23.	.02	323
Phosphoric Acid								
076643820	NATURAL RUBBER	001	210	6.00	< .02	23.		080
	NEOPRENE	002	210	6.00	< .02	23.		080
	NITRILE	005	210	6.00	< .02	23.		080
	NITRILE+PVC	057	210	6.00	< .02	23.		080
	PE	076	127	> 14.00		23.		104
	PVC	007	210	6.00	< .02	23.		080
	SARANEX	061	127	> 14.00		23.		104
Phosphoric Acid, >70%								
076643823	NATURAL RUBBER	017	100	> 6.00		23.	.05	107
			102	> 6.00		23.	.05	026
				> 6.00		23.	.05	026
				> 6.00		23.	.05	026
				> 6.00		23.	.05	026
	NEOP+NAT RUBBER	026	102	> 6.00		23.	.06	026
				> 6.00		23.	.04	026
				> 6.00		23.	.05	026
	NEOP/NAT RUBBER	008	102	> 6.00		23.		026
	NEOPRENE	002	100	> 6.00		23.		107
		018	100	> 6.00		23.	.04	107
	NITRILE	019	100	> 6.00		23.	.06	107
	NITRILE+PVC	058	100	> 6.00		23.		107
	PE	076	100	> 6.00		23.		107
	PVC	007	100	> 6.00		23.		107
		077	100	> 6.00		23.		107
				> 6.00		23.		107
Phosphorus Oxychloride								
100258730	CPE	060	UNK	.83		23.		052
	NEOPRENE	002	UNK	< .01		23.		052
		018	UNK	> 1.00		23.	.09	052
				.57		23.	.06	052
	NITRILE+PVC	058	UNK	.48		23.		052
	NONWOVEN PE	071	UNK	.08		23.		052
	PV ACETATE	124	UNK	.03		23.		052
	PVC	007	UNK	< .01		23.		052
	SARANEX	061	UNK	.84		23.		052
	VITON	009	UNK	.26		23.	.03	052
1-Piperazineethanamine								
001403180	BUTYL	014	118	> 4.00		23.	.05	123
Polychlorinated Biphenyls (PCBs) (Aroclor)								
013363630	BUTYL	014	118	24.00		23.	.04	290
				> 24.00		23.	.04	290
	CPE	070	UNK	> 3.00		23.	.05	004
	NATURAL RUBBER	017	UNK	1.00		23.	.02	290
				.08		23.	.02	290
	NEOPRENE	010	UNK	> 24.00		23.	.03	290

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS			PERMEATION RATE UG/CM**2/MIN		TEMP DEG C	THICKNESS CM	REF NUM
013363630	NEOPRENE	010	UNK		>	24.00			23.	.03	290
					>	24.00			23.	.03	290
					>	24.00			23.	.03	290
		018	100		>	24.00			23.	.04	290
					>	24.00			23.	.04	290
						24.00			23.	.04	290
						24.00			23.	.04	290
	PE	006	100			1.00			23.	.01	290
						1.00			23.	.01	290
		076	127		<	1.00	<	.02	23.		104
	PV ALCOHOL	102	100		>	24.00			23.	.05	290
					>	24.00			23.	.05	290
	SARANEX	061	127	1.00	-	2.00	<	.02	23.		104
						6.00			23.	.02	290
						7.00			23.	.02	290
						7.00			23.	.02	290
	TEFLON	036	UNK		>	24.00			23.	.01	290
					>	24.00			23.	.01	290
					>	24.00			23.	.01	290
	VITON	009	118		>	24.00			23.	.02	290
					>	24.00			23.	.02	290
					>	24.00			23.	.02	290
Potassium Hydroxide, 30-70%											
013105832	NATURAL RUBBER	001	210			1.33			23.		080
		017	100		>	6.00			23.	.05	107
	NEOP+NAT RUBBER	026	121		>	8.00	<	.02	23.	.05	237
	NEOPRENE	002	100		>	6.00			23.		107
			210			3.00			23.		080
		018	100		>	6.00			23.	.04	107
	NITRILE	005	210			6.00	<	.02	23.		080
		019	100		>	6.00			23.	.06	107
	NITRILE+PVC	057	210			6.00	<	.02	23.		080
		058	100		>	6.00			23.		107
	PE	076	100		>	6.00			23.		107
	PVC	007	100		>	6.00			23.		107
			210			6.00	<	.02	23.		080
		077	100		>	6.00			23.		107
					>	6.00			23.		107
Promethazinehydrochloride											
000583330	BUTYL	014	118		>	8.00	<	.02	19.	.06	323
	NEOPRENE	018	100		>	8.00	<	.02	19.	.02	323
	NITRILE	019	100		>	8.00	<	.02	22.	.02	323
	PVC	007	100		>	8.00	<	.02	20.	.05	323
beta-Propiolactone											
000575780	NATURAL RUBBER	017	508	.25	-	.33		4.31	22.	.03	078
	PE	006	209	.17	-	.50		1.20	22.	.01	078
	POLYURETHANE	050	178		<	.08		831.66	22.	.01	078
Propionaldehyde											
001233860	BUTYL	014	118		>	13.00			23.	.06	323

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001233860	NEOPRENE	018	100	.20	67.94	23.	.05	323
	PV ALCOHOL	102	100	< .01	27.05	23.	.04	323
	VITON	009	118	< .01	85.37	23.	.03	323
Propionic Acid								
000790940	PE	076	127	.05	1.62	23.		104
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
Propionic Anhydride								
001236260	PE	076	127	.08	76.35	23.		104
Propyl Acetate								
001096040	BUTYL	014	118	2.70	17.20	23.	.04	227
	NATURAL RUBBER	017	100	.08	90.18 - 901.80	23.	.05	107
	NITRILE	019	100	.33	9.02 - 90.18	23.	.06	107
			118	.28	435.87	23.	.04	227
	PE	076	100	.05	.90 - 9.02	23.		107
	PV ALCOHOL	004	100	2.00	.90 - 9.02	23.		107
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
Propyl Alcohol (Propanol)								
000712380	NATURAL RUBBER	001	210	1.17	9.02	23.		080
		017	100	.33	.90 - 9.02	23.	.05	107
	NEOPRENE	002	100	> 6.00	< .90	23.		107
			210	1.50	6.01	23.		080
		018	100	2.50	< .90	23.	.04	107
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	> 6.00	< .90	23.	.06	107
	NITRILE+PVC	057	210	6.00	< .02	23.		080
		058	100	.05	.90 - 9.02	23.		107
	PE	076	100	.05	.90 - 9.02	23.		107
	PVC	007	100	1.50	.90 - 9.02	23.		107
			210	2.00	9.02	23.		080
		077	100	.33	.90 - 9.02	23.		107
				.25	.90 - 9.02	23.		107
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
n-Propylamine								
001071080	CPE	070	UNK	.15		23.	.05	004
	TEFLON	069	510	> 10.20	< .02	23.	.05	303
Propylenediamine								
000789000	BUTYL	014	118	> 8.00	< .02	17.	.07	323
	NEOPRENE	018	100	> 8.00	< .02	24.	.05	323
	PVC	007	100	.30	9.02	17.	.02	323
	VITON	009	118	> 8.00	< .02	25.	.02	323
Propylene Dichloride (Dichloropropane 1,2)								
000788750	BUTYL	014	118	2.15	190.38	23.	.08	323
	PV ALCOHOL	102	100	> 8.00	< .02	23.	.07	323
	PVC	007	100	.03	11,452.86	23.	.02	323
	VITON	009	118	> 8.00	< .02	23.	.03	323

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
Propylene Glycol								
000575560	NATURAL RUBBER	001	503	> 3.00		23.	.06	086
		017	120	> 3.00		23.	.05	086
	NEOP/NAT RUBBER	008	114	> 3.00		23.	.06	086
	NITRILE+PVC	058	100	> 6.00		23.		107
	PE	006	512	> 3.00		23.	.01	086
		076	100	> 6.00		23.		107
	PVC	077	100	> 6.00		23.		107
				> 6.00		23.		107
Propylene Oxide								
000755690	BUTYL	014	118	2.20	42.08	23.	.06	323
	NATURAL RUBBER	001	506	< .01	1,973.14	23.	.02	323
	PE	076	100	.05	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	.58	9.02 - 90.18	23.		107
		102	100	.07	.90	23.	.03	323
	TEFLON	069	510	2.28	.02	23.	.05	303
				2.83	.02	23.	.05	303
	VITON	009	118	.02	10,769.30	23.	.03	323
1,3-Propylene Oxide								
005033000	BUTYL	014	118	1.13	561.12	23.	.07	323
	NATURAL RUBBER	001	250	< .01	30.06	23.	.02	323
	PV ALCOHOL	004	100	.17	3.01	23.	.03	323
	VITON	009	118	.03	30.06	23.	.03	323
Propylmethacrylate								
022102880	BUTYL	014	118	6.83	48.10	23.	.08	323
	NITRILE	019	100	1.00	150.30	23.	.04	323
	PV ALCOHOL	004	100	> 8.00	< .02	23.	.07	323
	PVC	003	100	.03	462.92	23.	.02	323
Pyridine								
001108610	NATURAL RUBBER	017	100	.04	701.40	25.	.03	222
			120	.03	1,202.40	25.	.02	222
			502	.13	400.80	25.	.05	222
			504	.20	501.00	25.	.05	222
				.43	300.60	25.	.06	222
	NEOP+NAT RUBBER	026	102	.14	400.80	25.	.05	222
	NEOP/NAT RUBBER	008	114	.23	300.60	25.	.05	222
	NEOPRENE	002	100	.65	200.40	25.	.08	222
			120	.03	701.40	25.	.07	222
		018	118	.85	400.80	25.	.08	222
			120	.33	901.80	25.	.05	222
				.63	601.20	25.	.07	222
				.43	701.40	25.	.05	222
				.07	1,703.40	25.	.03	222
	NITRILE	019	100	.18	3,206.40	25.	.04	222
				.25	3,006.00	25.	.06	222
				.16	3,507.00	25.	.04	222
			181	.09	4,008.00	25.	.03	222
			503	.17	2,404.80	25.	.03	222

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001108610	PE	006	100	> 1.00	< 100.20	25.	.01	222
			505	> 1.00	< 10.02	25.	.01	222
Sodium Cyanide, <30%								
001433391	PE	076	127	6.00	< .02	60.		104
Sodium Cyanide, 30-70%								
001433392	PE	076	127	< 4.00	< .02	70.		104
Sodium Hydroxide								
013107320	CPE	060	113	> 3.00		25.	.07	302
	NITRILE+PVC	058	100	> 6.00		23.		107
	PE	076	100	> 6.00		23.		107
	PVC	077	100	> 6.00		23.		107
				> 6.00		23.		107
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	VITON/CHLOROBUTYL	112	113	> 3.00		25.	.04	302
Sodium Hydroxide, <30%								
013107321	NEOP+NAT RUBBER	026	121	> 8.00	< .02	23.	.05	237
Sodium Hydroxide, 30-70%								
013107322	BUTYL	064	117	> 8.00		23.	.02	213
				> 8.00		23.	.01	213
	BUTYL/NEOPRENE	110	117	> 8.00		23.	.02	213
	NATURAL RUBBER	001	210	6.00	< .02	23.		080
			UNK	> 1.00		23.		052
		015	UNK	> 1.00		23.	.04	052
		017	100	> 6.00		23.	.05	107
	NEOP/NAT RUBBER	008	UNK	> 1.00		23.		052
	NEOPRENE	002	100	> 6.00		23.		107
			210	6.00	< .02	23.		080
		018	100	> 6.00		23.	.04	107
			UNK	> 1.00		23.	.09	052
				> 1.00		23.	.06	052
		093	117	> 8.00		23.	.02	213
		138	117	> 8.00		23.	.03	213
		139	117	> 8.00		23.	.01	213
	NEOPRENE+PVC	127	117	> 8.00		23.	.02	213
	NITRILE	005	210	6.00	< .02	23.		080
		019	100	> 6.00		23.	.06	107
			UNK	> 1.00		23.	.05	052
	NITRILE+PVC	057	210	6.00	< .02	23.		080
		058	117	> 8.00		23.	.01	213
	NONWOVEN PE	071	127	< .17	.63	23.		104
	PE	076	117	> 8.00		23.	.01	213
			127	> 8.00	< .02	23.		104
	PVC	003	UNK	> 1.00		23.	.02	052
		007	100	> 6.00		23.		107
			210	6.00	< .02	23.		080
			UNK	> 1.00		23.		052
		049	117	> 8.00		23.	.01	213
				> 8.00		23.	.01	213

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
013107322	PVC	053	117	> 8.00		23.	.02	213
		144	117	> 8.00		23.	.02	213
	SARANEX	061	117	> 8.00		23.	.01	213
			127	> 8.00		23.		104
	TEFLON	069	510	> 71.00	< .02	16.	.05	303
	VITON	009	UNK	> 1.00		23.	.03	052
		145	117	> 8.00		23.	.01	213
	VITON/NEOPRENE	111	117	> 8.00		23.	.02	213
Sodium Hypochlorite, 30-70%								
076815292	NATURAL RUBBER	001	210	6.00	< .02	23.		080
	NEOPRENE	002	210	6.00	< .02	23.		080
	NITRILE	005	210	6.00	< .02	23.		080
	NITRILE+PVC	057	210	6.00	< .02	23.		080
	PVC	007	210	6.00	< .02	23.		080
Styrene								
001004250	CPE	060	113	1.00 - 1.17		25.	.07	302
	NATURAL RUBBER	001	210	.17	348.70	23.		080
	NEOPRENE	002	210	.20	517.03	23.		080
		125	103		30.06	23.		045
	NITRILE	005	210	.50	733.46	23.		080
		019	103		456.91	23.		045
	NITRILE+PVC	057	210	.67	186.37	23.		080
		058	100	.07	9.02 - 90.18	23.		107
	PE	076	100	.17	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
	PVC	007	103		156.31	23.		045
			210	.33	216.43	23.		080
	SARANEX	061	127	.72	69.74	23.		104
	TEFLON	069	510	> 4.00	< .02	23.	.05	303
	VITON/CHLOROBUTYL	112	113	> 3.00		25.	.04	302
Sulfuric Acid								
076649390	BUTYL	064	117	> 8.00		23.	.02	213
				> 8.00		23.	.01	213
				> 8.00		23.	.02	213
	BUTYL/NEOPRENE	110	117	> 8.00		23.	.02	213
	CPE	060	113	> 3.00		25.	.07	302
		070	UNK	> 3.00		23.	.05	004
	NATURAL RUBBER	001	210	1.33		23.		080
	NEOP+NAT RUBBER	026	121	1.53	462.92	23.	.05	237
	NEOPRENE	002	210	2.50		23.		080
		093	117	1.17		23.	.02	213
		138	117	2.25		23.	.03	213
		139	117	3.67		23.	.02	213
	NEOPRENE+PVC	127	117	1.33		23.	.02	213
	NITRILE	005	210	6.00	< .02	23.		080
	NITRILE+PVC	057	210	4.00		23.		080
		058	117	.42		23.	.01	213
	NONWOVEN PE	071	127	< .08	3,006.00	23.		104
	PE	076	117	> 8.00		23.	.01	213
	PVC	007	210	1.75		23.		080

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
076649390	PVC	049	117	1.33		23.	.01	213
				.42		23.	.01	213
		053	117	.42		23.	.02	213
				< .42		23.	.02	213
		077	117	< .08		23.	.01	213
				.33		23.	.01	213
		144	117	.42		23.	.02	213
	SARANEX	061	117	> 8.00		23.	.01	213
			127	> 8.00		23.		104
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	VITON	145	117	> 8.00		23.	.01	213
	VITON/CHLOROBUTYL	112	113	> 3.00		25.	.04	302
	VITON/NEOPRENE	111	117	> 8.00		23.	.02	213
Sulfuric Acid, <30%								
076649391	NITRILE+PVC	058	100	2.00		23.		107
	NONWOVEN PE	071	127	.50	.92	23.		104
	PE	076	100	> 5.00		23.		107
			127	> 8.00	< .02	23.		104
	PVC	077	100	3.00		23.		107
				2.33		23.		107
	SARANEX	061	127	> 8.00	< .02	23.		104
Sulfuric Acid, 30-70%								
076649392	CPE	070	UNK	> 3.00		23.	.05	004
	NATURAL RUBBER	017	102	> 6.00		23.	.05	026
				> 6.00		23.	.05	026
				> 6.00		23.	.05	026
				> 6.00		23.	.05	026
	NEOP+NAT RUBBER	026	102	> 6.00		23.	.06	026
				> 6.00		23.	.04	026
				> 6.00		23.	.05	026
	NEOP/NAT RUBBER	008	102	> 6.00		23.		026
	NONWOVEN PE	071	127	.10	4.51	23.		104
	PE	076	127	> 8.00	< .02	23.		104
	SARANEX	061	127	> 8.00	< .02	23.		104
Sulfuric Acid, >70%								
076649393	NATURAL RUBBER	001	UNK	> 1.00		23.		052
		015	UNK	> 1.00		23.	.04	052
	NEOP/NAT RUBBER	008	UNK	> 1.00		23.		052
	NEOPRENE	002	100	> 6.00		23.		107
		018	100	3.00		23.	.04	107
			UNK	> 1.00		23.	.09	052
				> 1.00		23.	.06	052
	NITRILE	019	UNK	> 1.00		23.	.05	052
	NITRILE+PVC	058	100	.62		23.		107
	NONWOVEN PE	071	127	< .08	38.38	23.		104
	PE	076	100	> 6.00		23.		107
			127	> 8.00	< .02	23.		104
				> 2.00	< .02	65.		104
	PVC	003	UNK	.15		23.	.02	052
		007	100	3.67		23.		107

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
076649393	PVC	007	UNK	> 1.00		23.		052
		077	100	.25		23.		107
				1.00		23.		107
	SARANEX	061	127	5.50		65.		104
				> 8.00	< .02	23.		104
	TEFLON	069	510	> 72.00	< .02	25.	.05	303
	VITON	009	UNK	> 1.00		23.	.03	052
Tannic Acid								
014015540	NITRILE+PVC	058	100	> 6.00		23.		107
	PE	076	100	> 6.00		23.		107
	PVC	077	100	> 6.00		23.		107
				> 6.00		23.		107
Tannic Acid, 30-70%								
014015542	NATURAL RUBBER	017	100	> 6.00	< .90	23.	.05	107
	NEOPRENE	002	100	> 6.00	< .90	23.		107
		018	100	> 6.00	< .90	23.	.04	107
	NITRILE	019	100	> 6.00	< .90	23.	.06	107
	PVC	007	100	> 6.00	< .90	23.		107
1,1,1,2-Tetrachloroethane								
006302060	BUTYL	014	118	2.30	138.28	23.	.07	323
	PV ALCOHOL	102	100	> 8.00		23.	.08	323
	PVC	007	100	.05	330.66	23.	.02	323
	VITON	009	118	> 8.00		23.	.03	323
1,1,2,2-Tetrachloroethane								
000793450	BUTYL	014	118	4.60	70.14	23.	.07	323
	NATURAL RUBBER	017	100	.11	2,605.20	25.	.03	222
			120	.03	5,611.20	25.	.02	222
			502	.09	2,905.80	25.	.05	222
			504	.17	1,402.80	25.	.04	222
				.35	1,302.60	25.	.06	222
	NEOP+NAT RUBBER	026	102	.15	3,206.40	25.	.05	222
	NEOPRENE	002	100	.10	501.00	25.	.08	222
			120	.09	601.20	25.	.07	222
		018	118	> 1.07	< 20.04	25.	.08	222
			120	.53	1,102.20	25.	.05	222
				.83	1,002.00	25.	.07	222
				.30	1,402.80	25.	.05	222
				.16	2,204.40	25.	.03	222
	NITRILE	019	100	.37	3,206.40	25.	.04	222
				1.23	> 300.60	25.	.06	222
				.22	3,106.20	25.	.04	222
			503	.32	2,204.40	25.	.03	222
	PE	006	100	.07	10.02	25.	.01	222
			114	.31	1,402.80	25.	.05	222
			505	> 1.00	< 2.00	25.	.01	222
	PV ALCOHOL	004	100	> 8.00	< .02	23.	.04	323
	PVC	003	120	.02	5,410.80	25.	.01	222
				.02	6,012.00	25.	.01	222
				.10	2,505.00	25.	.03	222

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000793450	PVC	003	120	.04	4,008.00	25.	.02	222
			500	.01		25.	.01	222
			501	.02	4,108.20	25.	.01	222
				.03	3,106.20	25.	.01	222
		007	100	< .01	70.14	23.	.02	323
	TEFLON	069	510	> 15.20	< .02	23.	.05	303
	VITON	009	118	> 8.00	< .02	23.	.03	323
Tetrachloroethylene (Perchloroethylene)								
001271840	BUTYL	014	118	.17	> 751.50	23.	.04	291
				.17	> 751.50	23.	.04	291
				.13	895.12	25.	.04	288
			UNK	.13	895.79	23.	.04	100
	CPE	070	UNK	1.07		23.	.05	004
	NATURAL RUBBER	001	210	.10	601.20	23.		080
		017	UNK	< .02	> 751.50	23.	.02	291
				< .02	> 751.50	23.	.02	291
	NEOP+NAT RUBBER	026	121	.05	1,478.95	23.	.05	237
	NEOPRENE	002	210	.12	571.14	23.		080
		010	100	.20	980.29	25.	.05	288
		018	100	.10	> 641.28	23.	.04	291
				.13	> 641.28	23.	.04	291
			UNK	.20	979.96	23.	.05	100
	NITRILE	005	210	4.00	6.01	23.		080
		019	100	5.00	.90 - 9.02	23.	.06	107
			118	1.28	33.07	23.	.04	323
				1.30	33.07	23.	.04	227
			UNK	3.52	28.26	23.	.03	100
		020	100	3.52	28.22	25.	.03	288
			191	7.25	47.09	23.	.04	291
				5.33	41.08	23.	.04	291
	NITRILE+PVC	057	210	6.20	90.18	23.		080
		058	100	.08	90.18 - 901.80	23.		107
	PE	006	100	< .02	> 686.37	23.	.01	291
				< .02	> 686.37	23.	.01	291
				< .02	769.87	25.	.01	288
			UNK	< .02	769.54	23.	.01	100
		076	100	.08	90.18 - 901.80	23.		107
	PV ALCOHOL	004	100	5.00	< .90	23.		107
		102	100	> 16.00		23.	.04	323
				.60	2.00	23.	.05	291
				.35	11.62	23.	.05	291
				.80	1.20	23.	.05	291
				> 6.00		25.	.05	288
			UNK	> 8.00		23.	.05	100
	PVC	003	100	< .01	180.96	23.	.02	323
			118	< .02	744.82	25.	.01	288
			UNK	< .02	745.49	23.	.01	100
		007	210	.75	114.23	23.		080
	SARANEX	061	127	.27	1.14	23.		104
				.08	10.02	23.	.02	291
				.03	20.04	23.	.02	291
	SILVER SHIELD	122	118	> 6.00		23.	.01	227

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001271840	TEFLON	036	214	.43	2.30	23.	.01	291
				> 24.00		23.	.01	291
		069	510	> 10.40	< .02	23.	.05	303
				1.80		25.	.05	303
	VITON	009	118	> 17.00		23.	.03	323
				> 17.00		23.	.02	227
				3.17	4.21	45.	.02	291
				3.00	4.21	45.	.02	291
				> 24.00		23.	.02	291
				> 24.00		23.	.02	291
				> 24.00		10.	.02	291
				> 24.00		10.	.02	291
				> 6.00		25.	.02	288
			UNK	> 8.00		23.	.02	100
Tetraethylenepentamine								
001125720	BUTYL	012	118	> 8.00		25.	.09	323
	NATURAL RUBBER	017	506	1.77	12.02	28.	.02	323
	NEOPRENE	018	100	> 8.00		27.	.05	323
	VITON	009	118	> 8.00		23.	.04	323
Tetrafluoroethylene								
001161430	BUTYL	014	118	> 8.00		23.	.06	323
	NEOPRENE	018	100	> 8.00		23.	.06	323
	PV ALCOHOL	102	100	> 8.00		23.	.03	323
	VITON	009	118	> 8.00		23.	.03	323
Tetrahydrofuran								
001099990	BUTYL	014	118	.45	671.54	23.	.07	323
				.52	673.34	23.	.04	227
		064	117	.12		23.	.02	213
				.10		23.	.01	213
				.08		23.	.02	213
	BUTYL/NEOPRENE	110	117	< .08		23.	.02	213
	CPE	060	113	.45 - .05		25.	.07	302
		070	UNK	.20		23.	.05	004
	NATURAL RUBBER	017	100	.04	> 16,699.98	25.	.03	222
			120	.02	> 16,699.98	25.	.02	222
			502	.06	> 16,699.98	25.	.05	222
			504	.04	3,507.00	25.	.05	222
				.11	2,404.80	25.	.06	222
	NEOP+NAT RUBBER	026	102	.06	> 16,699.98	25.	.05	222
	NEOP/NAT RUBBER	008	114	.02	> 16,699.98	25.	.05	222
	NEOPRENE	002	100	.03	8,016.00	25.	.08	222
			120	.02	9,619.20	25.	.07	222
		018	118	.33	9,018.00	25.	.08	222
			120	.09	16,032.00	25.	.05	222
				.23	11,022.00	25.	.07	222
				.08	14,028.00	25.	.05	222
				.05	> 16,699.98	25.	.03	222
		093	117	.03		23.	.02	213
		125	103		829.66	23.		045
		138	117	< .08		23.	.03	213

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001099990	NEOPRENE	139	117	.10		23.	.02	213
	NITRILE	019	100	.10	3,707.40	25.	.04	222
				.10	2,705.40	25.	.06	222
				.08	4,308.60	25.	.04	222
			103		931.86	23.		045
			118	< .01	1,005.81	23.	.04	323
				.07	1,004.00	23.	.04	227
			503	.04	3,507.00	25.	.03	222
	PE	006	100	.01	200.40	25.	.01	222
			505	.05	4.01	25.	.01	222
		076	100	.25	.90 - 9.02	23.		107
			117	.10		23.	.01	213
	PV ALCOHOL	102	100	4.72	2.52	23.	.03	323
	PVC	003	120	.01		25.	.01	222
				.01		25.	.01	222
				.03		25.	.03	222
				.02		25.	.02	222
			500	.01		25.	.01	222
			501	.01		25.	.01	222
		049	117	< .16		23.	.01	213
	SARANEX	061	117	.03		23.	.01	213
	TEFLON	069	510	> 5.50	< .02	25.	.05	303
	VITON	009	118	< .01	1,964.09	23.	.03	323
				.07	1,965.92	23.	.02	227
		145	117	.08		23.	.01	213
	VITON/CHLOROBUTYL	112	113	.15 - .18		25.	.04	302
	VITON/NEOPRENE	111	117	.17		23.	.02	213
N,N,N',N'-Tetramethylenediamine								
001101890	BUTYL	012	118	1.08	48.10	20.	.07	323
		014	118	1.08	48.10	23.	.07	323
	NITRILE	019	100	1.80	90.18	23.	.05	323
				1.80	90.18	24.	.05	323
	PVC	003	100	.03	1,923.84	23.	.02	323
	VITON	009	118	.43	1,725.44	23.	.04	323
				.43	1,725.44	24.	.04	323
Thiophenol (Benzenethiol)								
001089850	BUTYL	014	118	.28	2,024.04	21.	.05	124
	PV ALCOHOL	004	100	> 4.00		21.		124
Toluene								
001088830	BUTYL	012	UNK	.17	273.55	25.	.04	273
				.33	254.31	25.	.04	273
				.50	277.75	25.	.06	273
				.50	276.55	25.	.06	273
				.17	267.53	25.	.04	273
				.25	304.81	25.	.04	273
				.50	281.36	25.	.06	273
				.67	251.30	25.	.06	273
				.17	245.29	25.	.04	273
				.17	253.71	25.	.04	273
				.33	300.60	25.	.06	273

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CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001088830	BUTYL	012	UNK	.50	281.36	25.	.06	273
		014	118	.35	132.87	23.	.06	323
				.28	1,503.00	22.	.05	122
			216	.15		37.	.06	122
		107	UNK	.18	59.12	25.	.04	149
				.47	69.14	25.	.04	149
				.18	1,503.00	25.	.04	149
				.15	167.33	25.	.04	149
				.70	141.28	25.	.04	149
	CPE	060	113	1.15 - 1.25		25.	.07	302
	NATURAL RUBBER	001	210	.15	637.27	23.		080
			UNK	.01	> 521.04	23.	.12	274
				.28	649.30	25.	.19	088
				.30	913.82	25.	.24	088
		017	100	.03	4,709.40	25.	.03	222
			120	.01	9,218.40	25.	.02	222
			502	.06	2,705.40	25.	.05	222
			504	.05	3,607.20	25.	.05	222
				.07	2,805.60	25.	.06	222
			UNK	.01	> 521.04	23.	.04	274
	NEOP/NAT RUBBER	008	114	.08	4,709.40	25.	.05	222
			UNK	.07	> 541.08	23.	.05	274
	NEOPRENE	002	100	.03	1,002.00	25.	.08	222
			120	.02	2,605.20	25.	.07	222
			210	.15	499.00	23.		080
			UNK	.21		23.	.05	186
		018	100	.20	131.06	23.	.05	323
			118	.53	701.40	25.	.08	222
			120	.23	1,402.80	25.	.05	222
				.43	1,302.60	25.	.07	222
				.28	901.80	25.	.05	222
				.07	2,505.00	25.	.03	222
			509	.52	> 1,503.00	22.	.09	122
			UNK	.46	> 526.05	23.	.09	274
				.21	> 531.06	23.	.06	274
				.08	274.75	25.	.04	273
				.08	240.48	25.	.04	273
				.25	274.75	25.	.06	273
				.33	235.67	25.	.06	273
		031	UNK	.08	3,509.00	25.	.04	149
				.12	767.53	25.	.04	149
				.02	400.80	25.	.04	149
				.37	2,143.28	25.	.04	149
				.12	2,732.45	25.	.04	149
				.31		23.	.04	187
	NITRILE	005	210	1.00	330.66	23.		080
		019	100	.38	300.60	22.	.04	122
				.32	701.40	25.	.04	222
				.17	90.18 - 901.80	23.	.06	107
				.45		37.	.06	122
				.35		37.	.06	122
				1.20	400.80	37.	.06	122
				> 1.00	< 300.60	25.	.06	222

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001088830	NITRILE	019	100	.24	200.40	34.	.04	122
				.25	300.60	22.	.04	122
				.16		37.	.04	122
				.60	501.00	25.	.04	222
			118	.18	409.42	23.	.04	227
				.25	200.40	22.	.03	122
				.13		37.	.04	122
				.28	200.40	22.	.04	122
			181		400.80	25.	.03	222
			503	.17	801.60	25.	.03	222
			509	.55	300.60	22.	.06	122
			UNK	.36	> 526.05	23.	.05	274
				> 1.00		23.	.05	274
				.33	260.32	25.	.04	273
				.33	201.40	25.	.04	273
				.58	211.62	25.	.06	273
				.67	238.68	25.	.06	273
		020	216	.12	601.20	22.	.03	122
				.10		37.	.04	122
				.11	701.40	34.	.04	122
				.68	501.00	22.	.09	122
			UNK	.13	1,184.36	25.	.03	088
				.13	1,244.48	25.	.03	088
		033	UNK	.23		23.	.05	187
	NITRILE+PVC	057	210	.67	365.73	23.		080
	PE	006	100	.01	2,204.40	25.	.01	222
			505	.03	601.20	25.	.01	222
		056	UNK	.12		23.	.01	187
		076	100	.02	.90 - 9.02	23.		107
			127	< .08	165.33	23.		104
	PV ALCOHOL	004	100	> 25.00		22.	.04	122
				.25	.90 - 9.02	23.		107
			UNK	> 1.00		23.	.12	274
		035	UNK	1.02	11.02	25.	.07	149
				2.30	90.18	25.	.07	149
				.02	4.01	25.	.07	149
				.02	317.63	25.	.07	149
	PVC	003	120	< .01	8,817.60	25.	.01	222
				< .01	5,110.20	25.	.01	222
				.05	2,104.20	25.	.03	222
				.06	1,803.60	25.	.02	222
			215	.20	> 1,503.00	22.	.06	122
			500	< .01	5,310.60	25.	.01	222
			501	< .01	5,911.80	25.	.01	222
				.01	4,809.60	25.	.02	222
		007	129	.20		37.	.05	122
				.13	300.60	22.	.06	122
				.47	200.40	22.	.07	122
				.13	300.60	34.	.05	122
			210	.50	426.85	23.		080
			UNK	.23	> 526.05	23.	.16	274
				.28		23.	.07	186
				.14		23.	.05	186

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
001088830	PVC	007	UNK	.15	829.66	25.	.13	088
				.15	859.72	25.	.13	088
				.09	898.79	25.	.10	088
				.08	829.66	25.	.11	088
		049	UNK	.38		23.	.03	187
	SARANEX	061	127	< .08	20.04	23.		104
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
				> 18.50	< .02	25.	.05	303
	VITON	009	118	> 16.00	< .02	23.	.02	227
				.58		37.	.02	122
				> 3.30		34.	.03	122
				> 4.50		22.	.03	122
				> 7.00		22.	.03	122
			UNK	> 1.00		23.	.03	274
	VITON/CHLOROBUTYL	112	113	> 3.00		25.	.04	302
	VITON/NEOPRENE	022	216	1.67		37.	.06	122
				4.20	200.40	22.	.06	122
Toluene Diisocyanate								
264716250	BUTYL	014	118	> 8.00		23.	.04	323
				> 8.00		23.	.04	227
	CPE	070	UNK	> 3.00		23.	.05	004
	NATURAL RUBBER	017	100	.12	9.02 - 90.18	23.	.05	107
	NITRILE	005	120	> 8.00		23.	.06	236
		019	118	3.86	10.82	23.	.03	323
				3.70	10.82	23.	.04	227
	PE	076	100	1.00	.90 - 9.02	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
		102	100	> 16.00		23.	.03	323
	SILVER SHIELD	122	118	> 8.00		23.	.01	227
	TEFLON	069	510	> 3.30	< .02	23.	.05	303
	VITON	009	118	> 16.00		23.	.03	323
				> 16.00		23.	.02	227
p-Toluenesulfonic Acid								
001041540	CPE	070	UNK	> 3.00		23.	.05	004
	NEOPRENE	018	100	> 4.00		23.	.05	123
	PVC	003	215	> 4.00		23.	.05	123
o-Toluidine								
000955340	TEFLON	069	510	> 3.30	< .02	23.	.05	303
Triallylamine								
001027050	NEOPRENE	018	100	1.05	561.12	19.	.05	323
	NITRILE	019	100	> 8.00	< .02	22.	.04	323
	PVC	007	100	.08	621.24	20.	.02	323
	VITON	009	118	> 8.00	< .02	17.	.03	323
Trichloroacetaldehyde (Chloral)								
000758760	BUTYL	014	118	3.32	50.10	23.	.07	323
	PV ALCOHOL	102	100	> 8.00	< .02	23.	.08	323
	PVC	007	100	.07	2,845.68	23.	.02	323

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS		PERMEATION RATE UG/CM**2/MIN		TEMP DEG C	THICKNESS CM	REF NUM
000758760	VITON	009	118		7.28	<	.02	23.	.03	323
Trichloroacetonitrile										
005450620	BUTYL	014	118		1.98		316.23	23.	.06	323
	NEOPRENE	018	100		1.12		927.65	23.	.06	323
	PV ALCOHOL	102	100	>	8.00			23.	.06	323
	VITON	009	118		1.00		184.57	23.	.03	323
1,2,4-Trichlorobenzene										
001208210	BUTYL	014	UNK		.08			23.	.04	290
					.08			23.	.04	290
	NATURAL RUBBER	017	UNK		.08			23.	.02	290
					.08			23.	.02	290
	NEOPRENE	010	UNK		4.00			23.	.03	290
					5.00			23.	.03	290
		018	UNK		1.00			23.	.04	290
	PE	006	UNK		.17			23.	.01	290
					.17			23.	.01	290
		076	127	<	.25		5.01	23.		104
	PV ALCOHOL	102	UNK		1.00			23.	.05	290
					1.00			23.	.05	290
	SARANEX	061	127	.25 -	1.00		.10	23.		104
			UNK		1.00			23.	.02	290
					1.00			23.	.02	290
	TEFLON	036	UNK		1.00			23.	.01	290
					8.00			23.	.01	290
	VITON	009	UNK		.17			23.	.02	290
					.17			23.	.02	290
1,1,2-Trichloroethane										
000790050	BUTYL	014	118		5.78		42.08	23.	.09	323
			UNK		.83			23.	.06	326
		064	UNK		.75			23.	.04	326
	NATURAL RUBBER	017	UNK		.02			23.	.02	326
	NEOPRENE	018	UNK		.12			23.	.06	326
	NITRILE	019	UNK		.03			23.	.02	326
	PE	042	UNK		.06			23.	.01	326
	POLYURETHANE	050	UNK	<	.02			23.	.01	326
	PV ALCOHOL	102	100	>	8.00			23.	.07	323
			UNK		.25			23.	.04	326
	PVC	003	118		.03		1,238.47	23.	.02	323
	TEFLON	036	UNK	>	24.00			23.	.01	326
		044	UNK		2.92			23.	.01	326
	VITON	009	118	>	8.00			23.	.05	323
			UNK	>	24.00			23.	.03	326
2,2,2-Trichloroethanol										
001152080	SARANEX	061	127		.32		13.23	23.		104
Trichloroethylene (Trichloroethene)										
000790160	BUTYL	014	118		.23		3,308.40	23.	.06	323
					.08	>	826.65	23.	.04	291
					.08	>	826.65	23.	.04	291

SUMMARY OF PERFORMANCE DETAIL TESTS

PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000790160	BUTYL	014	118	.08	2,037.40	25.	.04	288
				.22	3,306.60	23.	.04	227
			UNK	.08	2,044.08	23.	.04	100
	CPE	070	UNK	.20		23.	.05	004
	NATURAL RUBBER	001	210	.10	1,262.52	23.		080
		017	100	.03	9,418.80	25.	.03	222
			120	.01	> 16,699.98	25.	.02	222
			502	.05	7,615.20	25.	.05	222
			504	.05	6,813.60	25.	.05	222
				.08	5,310.60	25.	.06	222
			UNK	< .02	> 656.31	23.	.02	291
				< .02	> 656.31	23.	.02	291
	NEOP+NAT RUBBER	026	102	.05	7,314.60	25.	.05	222
	NEOP/NAT RUBBER	008	114	.08	5,911.80	25.	.05	222
	NEOPRENE	002	100	.03	1,903.80	25.	.08	222
			120	.03	1,803.60	25.	.07	222
			210	.13	1,160.32	23.		080
			UNK	.23		23.	.05	186
		010	100	.08	2,187.70	25.	.05	288
		018	100	.05	> 566.13	23.	.04	291
				< .07	> 566.13	23.	.04	291
			118	.38	1,302.60	25.	.08	222
			120	.14	2,304.60	25.	.05	222
				.25	2,104.20	25.	.07	222
				.20	1,903.80	25.	.05	222
				.06	4,208.40	25.	.03	222
			UNK	.78	2,194.38	23.	.05	100
		031	UNK	.17 - .25	53.11	22.	.08	078
		125	103		823.64	23.		045
	NITRILE	005	210	.33	1,106.21	23.		080
		019	100	.15	2,004.00	25.	.04	222
				.43	901.80	25.	.06	222
				.16	2,104.20	25.	.04	222
			103		1,791.58	23.		045
			118	.07	1,701.40	23.	.04	323
				.13	1,701.40	23.	.04	227
			503	.13	1,603.20	25.	.03	222
			UNK	.16	1,647.29	23.	.03	100
		020	100	.16	1,646.62	25.	.03	288
			503	< .25	> 826.65	23.	.04	291
				.18	> 826.65	23.	.04	291
		033	UNK	.17 - .25	60.12	22.	.09	078
	NITRILE+PVC	057	210	.50	1,244.48	23.		080
		058	100	.05	901.80 - 9,018.00	23.		107
	PE	006	100	< .02	> 657.31	23.	.01	291
				< .02	> 657.31	23.	.01	291
				.01	1,503.00	25.	.01	222
				< .02	1,394.45	25.	.01	288
			UNK		1,394.78	23.	.01	100
		076	100	.08	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	.50	< .90	23.		107
		035	UNK	< .25	8.02	22.	.01	078
		102	100	> 16.00		23.	.04	323

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000790160	PV ALCOHOL	102	100	24.00		23.	.05	291
				24.00		23.	.05	291
				24.00		10.	.05	291
				24.00		10.	.05	291
				24.00		45.	.05	291
				24.00		45.	.05	291
				> 6.00		25.	.05	288
			UNK	> 8.00		23.	.05	100
	PVC	003	118	< .02	1,015.36	25.	.01	288
			120	.01	11,022.00	25.	.01	222
				.01	9,018.00	25.	.01	222
				.05	3,807.60	25.	.03	222
				.01	8,216.40	25.	.02	222
			500	.01	13,026.00	25.	.01	222
			501	.01	13,026.00	25.	.01	222
				.01	6,212.40	25.	.02	222
			UNK	< .02	1,016.03	23.	.01	100
		007	103		901.80	23.		045
			210	.33	1,256.51	23.		080
			UNK	.16		23.	.07	186
				.08		23.	.05	186
		077	100	.07	90.18 - 901.80	23.		107
				.05	901.80 - 9,018.00	23.		107
	SARANEX	061	127	< .02	> 310.62	23.	.02	291
				< .02	> 290.58	23.	.02	291
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	TEFLON	036	214	> 24.00		23.	.01	291
				> 24.00		23.	.01	291
		069	510	2.38	.03	23.	.05	303
				2.43	.03	23.	.05	303
				2.60	.03	23.	.05	303
	VITON	009	118	7.35	1.44	23.	.03	323
				> 24.00		10.	.02	291
				> 24.00		10.	.02	291
				.80	23.05	45.	.02	291
				.80	21.04	45.	.02	291
				7.40	1.40	23.	.02	227
				10.00	> 1.60	23.	.02	291
				12.00	> 1.70	23.	.02	291
				> 6.00		25.	.02	288
			UNK	> 8.00		23.	.02	100
1,2,3-Trichloropropane								
000961840	BUTYL	014	118	> 8.00	< .02	23.	.06	323
	NITRILE	019	100	.35	20.04	23.	.04	323
	PV ALCOHOL	004	100	> 8.00	< .02	23.	.03	323
	VITON	009	118	> 8.00	< .02	23.	.03	323
Tricresyl Phosphate (Tritolyl Phosphate)								
013307850	BUTYL	012	118	> 8.00		23.	.07	323
	NATURAL RUBBER	017	100	.75	< .90	23.	.05	107
	NEOPRENE	002	100	> 6.00	< .90	23.		107
		018	100	> 6.00	< .90	23.	.04	107

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS		PERMEATION RATE UG/CM**2/MIN		TEMP DEG C	THICKNESS CM	REF NUM
013307850	NITRILE	019	100	>	6.00	<	.90	23.	.06	107
	NITRILE+PVC	058	100	>	6.00			23.		107
	PE	076	100	>	6.00			23.		107
	PV ALCOHOL	004	100	>	6.00	<	.90	23.		107
				>	8.00			23.	.08	323
	PVC	003	100	>	8.00			23.	.02	323
		007	100	>	6.00	<	.90	23.		107
		077	100	>	6.00			23.		107
				>	6.00			23.		107
	VITON	009	118	>	8.00			23.	.04	323
Triethanolamine										
001027160	NITRILE+PVC	058	100	>	6.00			23.		107
	PE	076	100	>	6.00			23.		107
	PVC	077	100	>	6.00			23.		107
				>	6.00			23.		107
Triethanolamine, >70%										
001027163	NATURAL RUBBER	017	100		1.00	<	.90	23.	.05	107
	NEOPRENE	002	100	>	6.00	<	.90	23.		107
		018	100	>	6.00	<	.90	23.	.04	107
	NITRILE	019	100	>	6.00	<	.90	23.	.06	107
	PV ALCOHOL	004	100	>	6.00	<	.90	23.		107
	PVC	007	100	>	6.00	<	.90	23.		107
Triethylamine										
001214480	CPE	070	UNK	>	3.00			23.	.05	004
	NEOPRENE	018	100		.62		811.62	20.	.05	323
	NITRILE	019	118	>	8.00	<	.02	19.	.04	323
		020	216	>	4.00			23.	.04	123
	PVC	007	100		.07		290.58	20.	.02	323
	VITON	009	118	>	8.00	<	.02	24.	.03	323
Triethylenetetraamine										
001122430	BUTYL	014	118	>	8.00	<	.02	20.	.06	323
	NEOPRENE	018	100	>	8.00	<	.02	19.	.05	323
	NITRILE	019	100	>	8.00	<	.02	16.	.04	323
	VITON	009	118	>	8.00	<	.02	20.	.03	323
Trifluoroethanol										
000758980	NATURAL RUBBER	017	100	>	1.00	<	4.01	25.	.03	222
			120	>	1.10	<	4.01	25.	.02	222
			502	>	1.33	<	4.01	25.	.05	222
			504	>	1.07	<	4.01	25.	.05	222
				>	1.65	<	4.01	25.	.06	222
	NEOP+NAT RUBBER	026	102	>	1.65	<	4.01	25.	.05	222
	NEOP/NAT RUBBER	008	114	>	1.02	<	4.01	25.	.05	222
	NEOPRENE	002	100	>	1.00	<	4.01	25.	.08	222
			120	>	1.00	<	4.01	25.	.07	222
		018	118	>	1.00	<	4.01	25.	.08	222
			120	>	1.00	<	4.01	25.	.05	222
				>	1.00	<	4.01	25.	.07	222
				>	1.00	<	4.01	25.	.05	222

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000758980	NEOPRENE	018	120	> 1.00	< 4.01	25.	.03	222
	NITRILE	019	100	.33	1,903.80	25.	.04	222
				.97	1,102.20	25.	.06	222
				.28	2,304.60	25.	.04	222
			503	.12	3,106.20	25.	.03	222
	PE	006	100	> 1.00	< 4.01	25.	.01	222
			505	> 1.00	< 4.01	25.	.01	222
		076	127	> 8.00	< .02	23.		104
	PVC	003	120	.08	1,202.40	25.	.01	222
				.12	1,903.80	25.	.01	222
				.25	1,302.60	25.	.03	222
				.11	1,102.20	25.	.02	222
			500	.04	1,002.00	25.	.01	222
			501	.07	300.60	25.	.01	222
				.05	901.80	25.	.02	222
Tri-n-propylamine								
001026920	NEOPRENE	018	100	> 8.00		23.	.05	323
	NITRILE	019	100	> 8.00		23.	.04	323
	PV ALCOHOL	102	100	> 8.00		23.	.06	323
	VITON	009	118	> 8.00		23.	.04	323
Turpentine								
080066420	NEOP+NAT RUBBER	026	121	.07	264.53	23.	.05	237
	NITRILE	019	100	.50	< .90	23.	.06	107
	PV ALCOHOL	004	100	6.00	< .90	23.		107
	TEFLON	069	510	> 3.60	< .02	23.	.05	303
Valeronitrile								
001105980	BUTYL	014	118	> 8.00	< .02	23.	.07	323
	NATURAL RUBBER	017	506	.03	126.25	23.	.02	323
	NEOPRENE	018	100	.68	126.25	23.	.05	323
	PV ALCOHOL	004	100	> 8.00	< .02	23.	.07	323
Vinyl Acetate								
001080540	TEFLON	069	510	1.23	.05	23.	.05	303
				2.28	.05	23.	.05	303
Vinyl Chloride (Chloroethene)								
000750140	CPE	070	UNK	> 3.00		23.	.05	004
	NITRILE	019	103		.02	23.		045
			118	5.70	.84	23.	.04	227
	SILVER SHIELD	122	118	> 6.00		23.	.01	227
	VITON	009	118	4.40	.58	23.	.04	227
4-Vinyl-1-cyclohexane								
001004030	BUTYL	012	118	.52	354.71	23.	.07	323
	NITRILE	019	100	6.53	1.20	23.	.04	323
	PV ALCOHOL	004	100	.90		23.	.09	323
	VITON	009	118	> 8.00		23.	.04	323
Vinylidene Fluoride								
000753870	BUTYL	014	UNK	> 8.00		23.	.07	323

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS	PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
000753870	NATURAL RUBBER	001	250	< .02	6.01	23.	.02	323
	NEOPRENE	018	100	> 5.00		23.	.05	323
				< .02	.37	23.	.05	323
	PVC	003	100	< .02	1.80	23.	.02	323
	VITON	009	118	> 8.00		23.	.04	323
Xylene								
001332070	NATURAL RUBBER	001	210	.12	444.89	23.		080
		017	100	.04	3,406.80	25.	.03	222
			120	.02	5,811.60	25.	.02	222
			502	.08	3,707.40	25.	.05	222
			504	.08	2,805.60	25.	.05	222
				.13	2,404.80	25.	.06	222
	NEOP+NAT RUBBER	026	102	.07	30.06	23.	.06	026
				.07	30.06	23.	.05	026
	NEOP/NAT RUBBER	008	102	.07	30.06	23.		026
			114	.12	2,505.00	25.	.05	222
	NEOPRENE	002	100	.06	501.00	25.	.08	222
			120	.05	601.20	25.	.07	222
			210	.13	408.82	23.		080
		018	118	.73	701.40	25.	.08	222
			120	.23	1,302.60	25.	.05	222
				.30	1,402.80	25.	.07	222
				.38	801.60	25.	.05	222
				.09	3,406.80	25.	.03	222
		031	511	.27	492.98	23.		323
		125	103		30.06	23.		045
	NITRILE	005	210	1.67	300.60	23.		080
		019	100	.80	100.20	25.	.04	222
				1.25	90.18 - 901.80	23.	.06	107
				> 1.00	< 50.10	25.	.06	222
				.95	100.20	25.	.04	222
				.45	168.34	23.	.05	323
			103		84.17	23.		045
			503	.47	300.60	25.	.03	222
	NITRILE+PVC	057	210	.75	330.66	23.		080
		058	100	> .05	9.02 - 90.18	23.		107
	PE	006	505	.07	100.20	25.	.01	222
		076	100	.08	9.02 - 90.18	23.		107
	PV ALCOHOL	004	100	> 6.00	< .90	23.		107
		102	100	> 8.00		23.	.09	323
	PVC	003	100	.02	192.38	23.	.02	323
			120	.03	3,006.00	25.	.01	222
				.02	3,507.00	25.	.01	222
				.08	1,703.40	25.	.02	222
			500	.01	4,509.00	25.	.01	222
			501	.01	3,507.00	25.	.01	222
				.03	2,104.20	25.	.02	222
		007	103		72.14	23.		045
			210	.66	389.11	23.		080
	TEFLON	069	510	> 3.00	< .02	23.	.05	303
	VITON	009	118	> 8.00		23.	.04	323

SUMMARY OF PERFORMANCE DETAIL TESTS
PERMEATION TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	BREAKTHROUGH TIME HOURS		PERMEATION RATE UG/CM**2/MIN	TEMP DEG C	THICKNESS CM	REF NUM
m-Xylene									
001083830	BUTYL	014	118		.65	87.78	23.	.06	323
					.17	228.79	23.	.05	086
	NEOPRENE	018	100		.23	198.55	23.	.06	086
	NITRILE	019	100		1.03	188.78	23.	.04	323
					1.62	72.14	23.	.06	086
			118		.27	396.79	23.	.04	086
			120		.65	198.73	23.	.05	086
		020	503		.55	180.36	23.	.04	086
	PV ALCOHOL	102	100	>	12.67		23.	.03	323
	VITON	009	118	>	16.00		23.	.03	323
					8.00		23.	.04	086
o-Xylene									
000954760	BUTYL	014	118		.87	116.63	23.	.07	323
	CPE	060	113		1.20		23.	.05	204
					1.05	186.37	23.	.05	204
	NITRILE	019	100		.20	179.76	23.	.04	323
	PV ALCOHOL	102	100	>	12.67		23.	.03	323
	VITON	009	118	>	8.00		23.	.03	323
p-Xylene									
001064230	BUTYL	014	118		.45	90.78	23.	.07	323
	NITRILE	019	100		.87	85.97	23.	.04	323
	PV ALCOHOL	102	100	>	14.00		23.	.03	323
	PVC	003	100	<	.01	185.17	23.	.02	323
	VITON	009	118	>	16.00		23.	.03	323

APPENDIX B

WEIGHT CHANGE DATA

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
076644171	PE	041	UNK	< .01	8,760.00	23.		305
		042	UNK	< .01	8,760.00	23.		305
		048	UNK	< .01	8,760.00	23.		305
Acetic Acid								
000641970	CPE	060	113	27.00	24.00	23.	.05	204
				28.00	24.00	23.	.05	204
				31.00	24.00	23.	.05	204
	NATURAL RUBBER	001	UNK	-1.00	1.00	25.		208
	NEOPRENE	002	UNK	4.00	1.00	25.		208
	NITRILE	005	UNK	-2.00	1.00	25.		208
Acetic Acid, <30%								
000641971	PE	041	UNK	.90	8,760.00	23.		305
		042	UNK	.80	8,760.00	23.		305
		048	UNK	.80	8,760.00	23.		305
Acetic Acid, 30-70%								
000641972	NATURAL RUBBER	001	120	1.00	.50	23.	.05	236
				< .01	.08	23.	.05	236
				1.00	1.00	23.	.05	236
				8.00	4.00	23.	.05	236
	NEOPRENE	010	120	< .01	.08	23.	.06	236
				2.00	.50	23.	.06	236
				< .01	1.00	23.	.06	236
				2.00	4.00	23.	.06	236
	NITRILE	005	120	1.00	.08	23.	.06	236
				3.00	.50	23.	.06	236
				4.00	1.00	23.	.06	236
				10.00	4.00	23.	.06	236
	PVC	003	120	3.00	4.00	23.	.08	236
				1.00	1.00	23.	.08	236
				< .01	.50	23.	.08	236
				1.00	.08	23.	.08	236
Acetic Anhydride								
001082470	BUTYL	014	118	1.00	8.00	23.	.09	323
	CPE	060	113	6.10	24.00	23.	.05	204
				2.70	24.00	23.	.05	204
				8.20	24.00	23.	.05	204
	NATURAL RUBBER	001	250	4.00	8.00	20.	.02	323
	NEOPRENE	018	100	16.00	8.00	20.	.05	323
	PVC	007	100	-12.00	8.00	20.	.02	323
Acetone								
000676410	BUTYL	014	UNK	.90	24.00	22.		201
	CPE	060	113	50.00	.58	23.	.05	204
				58.00	.25	23.	.05	204
				64.00	.25	23.	.05	204
	NATURAL RUBBER	001	120	3.00	.08	23.	.05	236
				4.00	.50	23.	.05	236

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
000676410	NATURAL RUBBER	001	120	4.00	1.00	23.	.05	236
				3.00	4.00	23.	.05	236
			UNK	-2.00	1.00	25.		208
		017	UNK	-2.00	24.00	22.		201
	NEOPRENE	002	UNK	-3.00	1.00	25.		208
		010	120	1.00	.08	23.	.06	236
				7.00	.50	23.	.06	236
				8.00	1.00	23.	.06	236
				4.00	4.00	23.	.06	236
		018	UNK	-1.40	24.00	22.		201
				-.30	24.00	22.		201
				-8.00	24.00	22.		201
				-.70	24.00	22.		201
	NITRILE	005	120	9.00	4.00	23.	.06	236
				55.00	1.00	23.	.06	236
				32.00	.50	23.	.06	236
				17.00	.08	23.	.06	236
			UNK	-3.00	1.00	25.		208
		020	UNK	2.70	24.00	22.		201
	PE	041	UNK	1.00	8,760.00	23.		305
		042	UNK	1.20	8,760.00	23.		305
		048	UNK	1.20	8,760.00	23.		305
	PV ALCOHOL	102	UNK	-15.70	24.00	22.		201
	PVC	003	120	2.00	4.00	23.	.08	236
				29.00	1.00	23.	.08	236
				30.00	.50	23.	.08	236
				14.00	.08	23.	.08	236
			UNK	-16.10	24.00	22.		201
Acetonitrile								
000750580	NEOPRENE	010	120	< .01	.08	23.	.06	236
				1.00	.50	23.	.06	236
				< .01	1.00	23.	.06	236
				1.00	4.00	23.	.06	236
Allylamine								
001071190	BUTYL	014	118	15.00	8.00	20.	.06	323
	NATURAL RUBBER	001	250	34.00	8.00	20.	.01	323
	PV ALCOHOL	102	100	14.00	8.00	23.	.07	323
	PVC	007	100	-6.00	8.00	20.	.02	323
Allyl Glycidyl Ether								
001069230	BUTYL	014	UNK	1.00	24.00	22.		201
	NATURAL RUBBER	017	UNK	7.00	24.00	22.		201
	NEOP/NAT RUBBER	008	UNK	9.40	24.00	22.		201
	NEOPRENE	018	UNK	1.40	24.00	22.		201
				12.90	24.00	22.		201
				-.50 .50	24.00	22.		201
	NITRILE	020	UNK	3.20	24.00	22.		201
	PV ALCOHOL	102	UNK	5.20	24.00	22.		201
	PVC	003	UNK	6.40	24.00	22.		201

Ammonium Hydroxide, <30%

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
013362161	NATURAL RUBBER	001	120	1.00	4.00	23.	.05	236
				1.00	1.00	23.	.05	236
				< .01	.50	23.	.05	236
				< .01	.08	23.	.05	236
	NEOPRENE	010	120	1.00	.08	23.	.06	236
				< .01	.50	23.	.06	236
				1.00	1.00	23.	.06	236
				1.00	4.00	23.	.06	236
	NITRILE	005	120	2.00	4.00	23.	.06	236
				2.00	1.00	23.	.06	236
				1.00	.50	23.	.06	236
				1.00	.08	23.	.06	236
	PVC	003	120	< .01	.08	23.	.08	236
				1.00	.50	23.	.08	236
				1.00	1.00	23.	.08	236
				1.00	4.00	23.	.08	236
Ammonium Hydroxide, 30-70%								
013362162	NATURAL RUBBER	001	UNK	-1.00	1.00	25.		208
	NEOPRENE	002	UNK	< .01	1.00	25.		208
	NITRILE	005	UNK	< .01	1.00	25.		208
Amyl Acetate (Pentyl Acetate)								
006286370	NATURAL RUBBER	001	UNK	-2.00	1.00	25.		208
	NEOPRENE	002	UNK	-4.00	1.00	25.		208
	NITRILE	005	UNK	-1.00	1.00	25.		208
Amyl Alcohol (Pentanol)								
000714100	BUTYL	014	118	.40	8.00	23.	.07	323
	NEOPRENE	018	100	4.00	8.00	23.	.05	323
	NITRILE	019	100	9.00	8.00	23.	.04	323
	VITON	009	118	4.00	8.00	23.	.05	323
Aniline (Benzamine)								
000625330	NATURAL RUBBER	001	120	2.00	.50	23.	.05	236
				3.00	1.00	23.	.05	236
				5.00	4.00	23.	.05	236
				2.00	.08	23.	.05	236
	NEOPRENE	010	120	9.00	4.00	23.	.06	236
				5.00	1.00	23.	.06	236
				4.00	.50	23.	.06	236
				5.00	.08	23.	.06	236
	NITRILE	005	120	38.00	1.00	23.	.06	236
				126.00	4.00	23.	.06	236
				24.00	.50	23.	.06	236
				15.00	.08	23.	.06	236
	PVC	003	120	4.00	.08	23.	.08	236
				12.00	1.00	23.	.08	236
				20.00	4.00	23.	.08	236
				10.00	.50	23.	.08	236
Benzene								
000714320	BUTYL	014	118	117.00	168.00	23.		327

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
000714320	BUTYL	034	UNK	60.00	168.00	22.		078
				12.00	3.00	25.		126
		064	UNK	55.50	168.00	23.		327
	EVA	074	100	254.00	168.00	23.		327
	NATURAL RUBBER	017	100	309.00	168.00	23.		327
				310.00	168.00	23.		327
			214	286.00	168.00	23.		327
			508	320.00	168.00	22.		078
			UNK	362.00	168.00	23.		327
				351.00	168.00	23.		327
				346.00	168.00	23.		327
	NEOP/NAT RUBBER	008	114	280.00	168.00	22.		078
	NEOPRENE	018	100	262.00	168.00	23.		327
			120	190.00	168.00	23.		327
			UNK	176.00	168.00	23.		327
		031	UNK	90.00	168.00	22.		078
	NITRILE	019	100	161.00	168.00	23.		327
			120	150.00	168.00	23.		327
			166	165.00	168.00	23.		327
		020	UNK	104.00	168.00	23.		327
				104.00	168.00	23.		327
		033	UNK	110.00	168.00	22.		078
	NONWOVEN PE	071	100	218.00	168.00	23.		327
			UNK	162.00	168.00	23.		327
	PE	006	209	30.00	168.00	22.		078
		042	100	32.70	168.00	23.		327
				113.00	168.00	23.		327
		075	100	257.00	168.00	23.		327
	POLYURETHANE	050	178	60.00	168.00	22.		078
	PV ALCOHOL	004	100	3.00	168.00	22.		078
	PVC	003	100	-15.10	168.00	23.		327
			120	-8.00	168.00	23.		327
				-12.40	168.00	23.		327
				-8.10	168.00	23.		327
			214	-.50	168.00	23.		327
	SARANEX	061	200	93.00	168.00	23.		327
	TEFLON	036	214	4.90	168.00	23.		327
	VITON	009	118	20.00	168.00	23.		327
		032	UNK	4.00	168.00	22.		078
Boric Acid								
100433530	BUTYL	014	118	2.00	8.00	20.	.07	323
	NEOPRENE	018	100	2.00	8.00	19.	.05	323
	NITRILE	019	100	2.00	8.00	21.	.04	323
	VITON	009	118	.20	8.00	20.	.03	323
2-Bromoethanol								
005405120	BUTYL	014	118	.20	8.00	23.	.09	323
	NATURAL RUBBER	001	250	2.00	8.00	23.	.02	323
	PVC	003	100	-.20	8.00	23.	.02	323
	VITON	009	118	.60	8.00	23.	.05	323
Butyl Acetate								

SUMMARY OF PERFORMANCE DETAIL TESTS

IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
001238640	PE	041	UNK	3.40	8,760.00	23.		305
		042	UNK	3.40	8,760.00	23.		305
		048	UNK	4.10	8,760.00	23.		305
Butylamine								
001097390	BUTYL	014	118	62.00	8.00	15.	.10	323
	NATURAL RUBBER	001	250	148.00	8.00	20.	.02	323
	NEOPRENE	018	100	166.00	8.00	18.	.05	323
	PVC	007	100	62.00	8.00	18.	.02	323
iso-Butylamine (Methylpropylamine, 2-)								
000788190	BUTYL	014	118	37.00	8.00	28.	.09	323
	NEOPRENE	018	100	50.00	8.00	26.	.05	323
	PV ALCOHOL	102	100	-8.00	8.00	23.	.07	323
	PVC	007	100	13.00	8.00	28.	.02	323
sec-Butylamine								
139528460	BUTYL	014	118	83.00	8.00	21.	.09	323
	NEOPRENE	018	100	122.00	8.00	25.	.05	323
	NITRILE	019	100	108.00	8.00	14.	.04	323
	PVC	007	100	-4.00	8.00	24.	.02	323
tert-Butylamine								
000756490	BUTYL	014	118	23.00	8.00	15.	.09	323
	NEOPRENE	018	100	55.00	8.00	23.	.05	323
	NITRILE	019	100	69.00	8.00	21.	.04	323
	PVC	007	100	-20.00	8.00	20.	.02	323
n-Butyl Chloride (Chlorobutane,1-)								
001096930	NITRILE	019	100	100.00	8.00	23.	.05	323
	PV ALCOHOL	004	100	-5.00	8.00	23.	.80	323
	PVC	003	100	-11.00	8.00	23.	.20	323
	VITON	009	118	6.00	8.00	23.	.05	323
Butyraldehyde								
001237280	BUTYL	034	UNK	7.70	3.00	25.		126
				12.50	20.00	25.		126
Carbon Disulfide (Carbon Bisulfide)								
000751500	BUTYL	034	UNK	74.00	3.00	25.		126
	NITRILE	005	120	7.00	4.00	23.	.06	236
				21.00	1.00	23.	.06	236
				16.00	.50	23.	.06	236
				8.00	.08	23.	.06	236
	PE	041	UNK	12.90	8,760.00	23.		305
		042	UNK	21.40	8,760.00	23.		305
		048	UNK	36.80	8,760.00	23.		305
Carbon Tetrachloride (Tetrachloromethane)								
000562350	CPE	060	113	107.00	1.83	23.	.05	204
				116.00	1.83	23.	.05	204
				106.00	1.83	23.	.05	204
	NEOPRENE	010	120	38.00	1.00	23.	.06	236

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
000562350	NEOPRENE	010	120	28.00	.50	23.	.06	236
				13.00	.08	23.	.06	236
				18.00	4.00	23.	.06	236
	NITRILE	005	120	21.00	4.00	23.	.06	236
				11.00	1.00	23.	.06	236
				5.00	.50	23.	.06	236
				3.00	.08	23.	.06	236
	PE	041	UNK	16.30	8,760.00	23.		305
		042	UNK	22.80	8,760.00	23.		305
		048	UNK	37.90	8,760.00	23.		305
Chlorobenzene								
001089070	BUTYL	014	118	169.00	8.00	23.	.07	323
	PV ALCOHOL	102	100	-4.00	8.00	23.	.08	323
	PVC	007	100	101.00	8.00	23.	.02	323
	VITON	009	118	2.00	8.00	23.	.03	323
Chlorodibromomethane								
001244810	BUTYL	012	118	382.00	8.00	23.	.10	323
	PV ALCOHOL	004	100	-.30	8.00	23.	.07	323
	PVC	003	100	385.00	8.00	23.	.02	323
	VITON	009	118	1.00	8.00	23.	.04	323
Chloroform (Trichloromethane)								
000676630	BUTYL	034	UNK	9.00	3.00	25.		126
	NEOPRENE	010	120	23.00	.08	23.	.06	236
				39.00	.50	23.	.06	236
				110.00	1.00	23.	.06	236
				35.00	4.00	23.	.06	236
	PE	041	UNK	12.00	8,760.00	23.		305
		042	UNK	16.20	8,760.00	23.		305
		048	UNK	25.10	8,760.00	23.		305
3-Chloro-2-methylpropene								
005634730	BUTYL	014	118	142.00	8.00	23.	.06	323
	PV ALCOHOL	004	100	28.00	8.00	23.	.04	323
	PVC	007	100	2.00	8.00	23.	.02	323
	VITON	009	118	7.00	8.00	23.	.03	323
2-Chloro-2-nitropropane								
005947180	BUTYL	012	118	2.00	8.00	23.	.09	323
	NATURAL RUBBER	017	506	94.00	8.00	23.	.02	323
	PV ALCOHOL	004	100	-.80	8.00	23.	.07	323
	VITON	009	118	70.00	8.00	23.	.04	323
Chromic Acid, 30-70%								
111157452	NITRILE	005	120	< .01	.08	23.	.06	236
				4.00	.50	23.	.06	236
				3.00	1.00	23.	.06	236
				4.00	4.00	23.	.06	236
	PVC	003	120	18.00	4.00	23.	.08	236
				1.00	1.00	23.	.08	236
				< .01	.50	23.	.08	236

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE		IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
111157452	PVC	003	120	<	.01	.08	23.	.08	236
Citric Acid, <30%									
000779291	PE	041	UNK	<	.01	8,760.00	23.		305
		042	UNK	<	.01	8,760.00	23.		305
		048	UNK	<	.01	8,760.00	23.		305
Cyclohexylamine									
001089180	BUTYL	014	118		95.00	8.00	20.	.06	323
	NATURAL RUBBER	001	250		299.00	8.00	20.	.02	323
	NEOPRENE	018	100		294.00	8.00	22.	.05	323
	NITRILE	019	100		247.00	8.00	24.	.04	323
Diallyamine									
001240270	BUTYL	014	118		44.00	8.00	21.	.09	323
	PV ALCOHOL	004	100		-20.00	8.00	23.	.08	323
	PVC	007	100		-26.00	8.00	22.	.02	323
	VITON	009	118		4.00	8.00	19.	.03	323
1,3-Diaminopropane									
001097620	BUTYL	014	118		30.00	8.00	22.	.06	323
	NATURAL RUBBER	001	250		18.00	8.00	25.	.02	323
	NEOPRENE	018	100		22.00	8.00	23.	.05	323
	PVC	007	100		24.00	8.00	21.	.02	323
Di-n-amylamine									
020509220	NEOPRENE	018	100		74.00	8.00	16.	.05	323
	NITRILE	019	100		2.00	8.00	20.	.04	323
	PVC	007	100		-23.00	8.00	13.	.02	323
	VITON	009	118		.20	8.00	16.	.03	323
Dichloroacetyl Chloride									
000793670	BUTYL	014	118		164.00	8.00	23.	.09	323
	PV ALCOHOL	102	100		-8.00	8.00	23.	.07	323
	PVC	003	100		230.00	8.00	23.	.02	323
	VITON	009	118		-9.00	8.00	23.	.03	323
Dichlorobromomethane									
000752740	BUTYL	014	118		347.00	8.00	23.	.07	323
	PVC	007	100		328.00	8.00	23.	.02	323
	VITON	009	118		2.00	8.00	23.	.03	323
	VITON/BUTYL	100	102		-2.00	8.00	23.	.08	323
1,4-Dichloro-2-butene									
001105760	BUTYL	034	UNK		19.00	20.00	25.		126
					17.00	3.00	25.		126
cis-Dichloroethylene									
001565920	BUTYL	014	118		198.00	8.00	23.	.07	323
	PV ALCOHOL	004	100		358.00	8.00	23.	.05	323
	VITON	009	118		9.00	8.00	23.	.03	323
1,2-Dichloroethylene									

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
005405900	NITRILE	019	100	265.00	8.00	29.	.04	323
	PV ALCOHOL	004	100	-29.00	8.00	23.	.04	323
	PVC	007	100	.50	8.00	23.	.02	323
	VITON	009	118	9.00	8.00	23.	.03	323
trans-1,2-Dichloroethylene								
001566050	BUTYL	014	118	3.00	8.00	23.	.06	323
	PV ALCOHOL	004	100	-30.00	8.00	23.	.09	323
	PVC	007	100	-7.00	8.00	23.	.02	323
	VITON	009	118	8.00	8.00	23.	.03	323
2,2'-Dichloroethyl Ether								
001114440	BUTYL	034	UNK	11.00	20.00	25.		126
				3.80	3.00	25.		126
	CPE	060	113	129.00	.83	23.	.05	204
				125.00	.83	23.	.05	204
				123.00	.83	23.	.05	204
2,3-Dichloro-1-propene								
000788860	BUTYL	014	118	66.00	8.00	23.	.09	323
	PV ALCOHOL	102	100	2.00	8.00	23.	.09	323
	PVC	007	100	76.00	8.00	23.	.02	323
	VITON	009	118	4.00	8.00	23.	.03	323
1,3-Dichloropropene								
005427560	BUTYL	014	118	65.00	8.00	23.	.07	323
	PV ALCOHOL	102	100	-2.00	8.00	23.	.07	323
	PVC	007	100	199.00	8.00	23.	.02	323
	VITON	009	118	3.00	8.00	23.	.03	323
Diethanolamine								
001114220	BUTYL	014	118	2.00	8.00	24.	.09	323
	NEOPRENE	018	100	5.00	8.00	22.	.05	323
	NITRILE	019	100	14.00	8.00	26.	.04	323
	VITON	009	118	3.00	8.00	27.	.03	323
Diethylamine								
001098970	BUTYL	014	118	88.00	8.00	23.	.09	323
	NITRILE	019	100	55.00	8.00	24.	.04	323
	PVC	007	100	-26.00	8.00	24.	.02	323
	VITON	009	118	83.00	8.00	20.	.03	323
Diethylaminoethanol								
001003780	BUTYL	014	118	2.00	8.00	22.	.07	323
	NITRILE	019	118	12.00	8.00	22.	.04	323
	PV ALCOHOL	102	100	-19.00	8.00	23.	.09	323
	VITON	009	118	5.00	8.00	22.	.03	323
Diethylenetriamine								
001114000	BUTYL	014	118	8.00	8.00	24.	.08	323
	NEOPRENE	018	100	12.00	8.00	22.	.05	323
	PVC	007	100	19.00	8.00	22.	.02	323
	VITON	009	118	8.00	8.00	23.	.03	323

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
Diisobutylamine								
001109630	NEOPRENE	018	100	57.00	8.00	22.	.05	323
	NITRILE	019	100	-1.00	8.00	20.	.04	323
	PV ALCOHOL	102	100	4.00	8.00	23.	.08	323
	VITON	009	118	-2.00	8.00	22.	.02	323
Diisopropylamine								
001081890	NEOPRENE	018	100	51.00	8.00	12.	.05	323
	NITRILE	019	100	6.00	8.00	10.	.04	323
	PVC	007	100	-23.00	8.00	11.	.02	323
	VITON	009	118	1.00	8.00	12.	.03	323
N,N-Dimethylacetamide								
001271950	NATURAL RUBBER	001	120	18.00	4.00	23.	.05	236
				15.00	1.00	23.	.05	236
				21.00	.50	23.	.05	236
				32.00	.08	23.	.05	236
	NEOPRENE	010	120	36.00	4.00	23.	.06	236
				12.00	1.00	23.	.06	236
				12.00	.50	23.	.06	236
				5.00	.08	23.	.06	236
	NITRILE	005	120	18.00	.08	23.	.06	236
				53.00	.50	23.	.06	236
				21.00	1.00	23.	.06	236
				186.00	4.00	23.	.06	236
Dimethylamine								
001244030	BUTYL	014	118	.80	8.00	22.	.06	323
	NATURAL RUBBER	001	250	10.00	8.00	20.	.02	323
	NEOPRENE	018	100	12.00	8.00	22.	.05	323
	PV ALCOHOL	102	100	-6.00	8.00	23.	.07	323
	PVC	007	100	3.00	8.00	20.	.02	323
Dimethylaminopropylamine								
001095570	BUTYL	014	118	22.00	8.00	16.	.09	323
	NATURAL RUBBER	001	250	114.00	8.00	16.	.02	323
	NEOPRENE	018	100	184.00	8.00	20.	.05	323
	PVC	077	100	126.00	8.00	20.	.02	323
Dimethylbutylamine								
001080980	BUTYL	014	118	67.00	8.00	24.	.06	323
	NITRILE	019	100	76.00	8.00	19.	.04	323
	PV ALCOHOL	102	100	-22.00	8.00	23.	.08	323
	PVC	007	100	-3.00	8.00	21.	.02	323
Dimethylethanolamine								
001080100	BUTYL	014	118	.80	8.00	12.	.09	323
	NATURAL RUBBER	001	250	17.00	8.00	19.	.02	323
	NEOPRENE	018	100	57.00	8.00	21.	.05	323
	NITRILE	019	100	34.00	8.00	9.	.04	323
Dimethylformamide								

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
000681220	NATURAL RUBBER	001	120	1.00	.08	23.	.05	236
				2.00	.50	23.	.05	236
				4.00	1.00	23.	.05	236
				4.00	4.00	23.	.05	236
	NEOPRENE	010	120	2.00	.08	23.	.06	236
				7.00	.50	23.	.06	236
				9.00	1.00	23.	.06	236
				9.00	4.00	23.	.06	236
1,1-Dimethylhydrazine (Dimethylhydrazine,unsym-)								
000571470	BUTYL	034	UNK	10.00	168.00	22.		078
	NEOPRENE	031	UNK	30.00	168.00	22.		078
	NITRILE	033	UNK	38.00	168.00	22.		078
	PVC	077	168	35.00	168.00	22.		078
Dimethyl Sulfoxide								
000676850	NATURAL RUBBER	001	120	2.00	4.00	23.	.05	236
				2.00	.08	23.	.05	236
				2.00	.50	23.	.05	236
				3.00	1.00	23.	.05	236
	NEOPRENE	010	120	1.00	.08	23.	.06	236
				1.00	.50	23.	.06	236
				1.00	1.00	23.	.06	236
				3.00	4.00	23.	.06	236
	NITRILE	005	120	39.00	4.00	23.	.06	236
				19.00	1.00	23.	.06	236
				9.00	.50	23.	.06	236
				4.00	.08	23.	.06	236
	PVC	003	120	14.00	4.00	23.	.08	236
				12.00	1.00	23.	.08	236
				9.00	.50	23.	.08	236
				8.00	.08	23.	.08	236
Dimethylvinylchloride								
005133710	NITRILE	019	100	100.00	8.00	23.	.05	323
	PV ALCOHOL	004	100	-10.00	8.00	23.	.08	323
	PVC	003	100	-23.00	8.00	23.	.02	323
	VITON	009	118	8.00	8.00	23.	.04	323
Dipropylamine								
001428470	BUTYL	034	UNK	61.00	3.00	25.		126
	POLYCARBONATE	098	UNK	-.10	3.00	25.		126
Epichlorohydrin								
001068980	BUTYL	014	118	3.00	24.00	23.	.04	291
				1.00	8.00	23.	.07	323
				1.00	8.00	23.	.07	323
		034	UNK	5.00	168.00	22.		078
	NATURAL RUBBER	001	250	13.00	8.00	23.	.02	323
				13.00	8.00	23.	.02	323
		017	UNK	30.00	24.00	23.	.02	291
	NEOPRENE	018	100	100.00	24.00	23.	.04	291
		031	UNK	44.00	168.00	22.		078

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
001068980	NITRILE	020	503	340.00	24.00	23.	.04	291
		033	UNK	28.00	168.00	22.		078
	PE	006	100	< .01	24.00	23.	.01	291
			209	12.00	168.00	22.		078
	POLYURETHANE	050	178	270.00	168.00	22.		078
	PV ALCOHOL	035	UNK	< 1.00	168.00	22.		078
		102	100	-7.00	24.00	23.	.05	291
				-3.00	8.00	23.	.07	323
				-3.00	8.00	23.	.07	323
	PVC	077	168	103.00	168.00	22.		078
	TEFLON	036	214	< .01	24.00	23.	.01	291
	VITON	009	118	20.00	24.00	23.	.02	291
				16.00	8.00	23.	.03	323
				16.00	8.00	23.	.03	323
		032	UNK	42.00	168.00	22.		078
1,2-Epoxybutane								
001068870	BUTYL	014	118	50.00	8.00	23.	.06	323
	NEOPRENE	018	100	150.00	8.00	23.	.05	323
	PV ALCOHOL	004	100	-3.00	8.00	23.	.04	323
	VITON	009	118	94.00	8.00	23.	.03	323
Ethanol, 30-70%								
000641752	PE	041	UNK	.10	8,760.00	23.		305
		042	UNK	.10	8,760.00	23.		305
		048	UNK	.10	8,760.00	23.		305
Ethanol, >70%								
000641753	PE	041	UNK	.20	8,760.00	23.		305
		042	UNK	.20	8,760.00	23.		305
		048	UNK	< .01	8,760.00	23.		305
Ethanolamine (Aminoethanol,2)								
001414350	BUTYL	014	118	2.00	8.00	26.	.07	323
	NEOPRENE	018	100	7.00	8.00	20.	.05	323
	PVC	007	100	12.00	8.00	25.	.02	323
	VITON	009	118	6.00	8.00	22.	.05	323
2-Ethoxyethyl Acetate (Cellosolve Acetate)								
001111590	NATURAL RUBBER	001	120	12.00	4.00	23.	.05	236
				11.00	1.00	23.	.05	236
				6.00	.50	23.	.05	236
				5.00	.08	23.	.05	236
	NEOPRENE	010	120	17.00	4.00	23.	.06	236
				12.00	1.00	23.	.06	236
				4.00	.50	23.	.06	236
				3.00	.08	23.	.06	236
	NITRILE	005	120	10.00	.08	23.	.06	236
				16.00	.50	23.	.06	236
				23.00	1.00	23.	.06	236
				36.00	4.00	23.	.06	236
Ethyl Acetate								

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR		PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
001417860	NEOPRENE	010	120		11.00	4.00	23.	.06	236
					16.00	1.00	23.	.06	236
					13.00	.50	23.	.06	236
					3.00	.08	23.	.06	236
	PE	041	UNK		2.50	8,760.00	23.		305
		042	UNK		2.50	8,760.00	23.		305
		048	UNK		2.80	8,760.00	23.		305
Ethyl Cellosolve (Ethoxyethanol, 2)									
001108050	BUTYL	014	118		.70	8.00	23.	.08	323
	NATURAL RUBBER	001	250		17.00	8.00	23.	.02	323
	PV ALCOHOL	102	100		-19.00	8.00	23.	.08	323
	PVC	007	100		17.00	8.00	23.	.02	323
Ethyl Acrylate									
001408850		250	250		67.00	8.00	23.	.02	323
	BUTYL	014	118		13.00	8.00	23.	.09	323
	PV ALCOHOL	102	100		-9.00	8.00	23.	.08	323
	PVC	003	100		74.00	8.00	23.	.02	323
Ethyl Alcohol (Ethanol)									
000641750	NATURAL RUBBER	001	120		1.00	.08	23.	.05	236
				<	.01	.50	23.	.05	236
					1.00	1.00	23.	.05	236
					1.00	4.00	23.	.05	236
	NEOPRENE	010	120		1.00	4.00	23.	.06	236
				<	.01	1.00	23.	.06	236
				<	.01	.50	23.	.06	236
				<	.01	.08	23.	.06	236
	NITRILE	005	120		2.00	.08	23.	.06	236
					4.00	4.00	23.	.06	236
					8.00	1.00	23.	.06	236
					3.00	.50	23.	.06	236
	PVC	003	120		1.00	.08	23.	.08	236
				<	.01	.50	23.	.08	236
					1.00	1.00	23.	.08	236
					1.00	4.00	23.	.08	236
Ethyl Benzene									
001004140	PV ALCOHOL	102	100		.40	8.00	23.	.08	323
Ethyl Bromide									
000749640	NEOPRENE	018	100		231.00	8.00	23.	.04	323
	PV ALCOHOL	102	100		-14.00	8.00	23.	.08	323
	PVC	003	100		132.00	8.00	23.	.02	323
	VITON	009	118		13.00	8.00	23.	.04	323
Ethyl-n-butylamine									
133606390	NITRILE	019	100		36.00	8.00	24.	.04	323
	PV ALCOHOL	102	100		-24.00	8.00	23.	.09	323
	PVC	007	100		-31.00	8.00	24.	.02	323
	VITON	009	118		17.00	8.00	23.	.03	323

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE		PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
Ethylene Chlorohydrin (Chloroethanol)									
001070730	BUTYL	014	118		.10	8.00	23.	.06	323
	NEOPRENE	018	100		6.00	8.00	23.	.05	323
	PV ALCOHOL	102	100		-7.00	8.00	23.	.09	323
	VITON	009	118		.60	8.00	23.	.05	323
Ethylenediamine (Diaminoethane,1,2)									
001071530	BUTYL	014	118		2.00	8.00	18.	.07	323
	CPE	060	113		-5.00	24.00	23.	.05	204
					13.00	24.00	23.	.05	204
					-6.40	24.00	23.	.05	204
	NATURAL RUBBER	001	250		9.00	8.00	20.	.01	323
	NEOPRENE	018	100		9.00	8.00	18.	.05	323
	PVC	007	100		.80	8.00	16.	.02	323
Ethylene Dibromide (Dibromoethane,1,2)									
001069340	BUTYL	014	118		65.00	24.00	23.	.04	291
					59.00	8.00	23.	.07	323
	NATURAL RUBBER	017	UNK		480.00	24.00	23.	.02	291
	NEOPRENE	018	100		500.00	24.00	23.	.04	291
	NITRILE	020	503		580.00	24.00	23.	.04	291
	PE	006	100		20.00	24.00	23.	.01	291
	PV ALCOHOL	102	100		4.00	24.00	23.	.05	291
					.80	8.00	23.	.08	323
	PVC	007	100		258.00	8.00	23.	.02	323
	TEFLON	036	214		2.00	24.00	23.	.01	291
	VITON	009	118		3.00	24.00	23.	.02	291
					2.00	8.00	23.	.03	323
Ethylene Dichloride (Dichloroethane,1,2)									
001070620	BUTYL	014	118		36.00	8.00	23.	.06	323
			UNK		34.00	24.00	23.		326
					34.00	168.00	23.		326
		064	UNK		24.00	24.00	23.		326
					27.00	168.00	23.		326
	NATURAL RUBBER	001	250		213.00	8.00	23.	.02	323
		017	UNK		226.00	168.00	23.		326
					211.00	24.00	23.		326
	NEOPRENE	018	UNK		190.00	168.00	23.		326
					182.00	24.00	23.		326
	NITRILE	019	UNK		655.00	24.00	23.		326
				>	1,000.00	168.00	23.		326
		020	UNK		440.00	168.00	23.		326
					340.00	24.00	23.		326
	PE	041	UNK		5.00	8,760.00	23.		305
		042	UNK		16.00	168.00	23.		326
					.20	24.00	23.		326
					5.40	8,760.00	23.		305
		048	UNK		6.90	8,760.00	23.		305
		076	UNK		74.00	24.00	23.		326
					100.00	168.00	23.		326
	POLYURETHANE	050	UNK		26.00	24.00	23.		326

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
001070620	POLYURETHANE	050	UNK	86.00	168.00	23.		326
	PV ALCOHOL	004	100	.40	8.00	23.	.03	323
		102	UNK	.30	24.00	23.		326
				.40	168.00	23.		326
	PVC	077	UNK	265.00	168.00	23.		326
				251.00	24.00	23.		326
	TEFLON	036	UNK	1.00	168.00	23.		326
				.20	24.00	23.		326
	VITON	009	118	5.00	8.00	23.	.03	323
			UNK	6.00	168.00	23.		326
				6.00	24.00	23.		326
Ethylene Glycol								
001072110	NATURAL RUBBER	001	120	1.00	.50	23.	.05	236
				1.00	.08	23.	.05	236
				2.00	1.00	23.	.05	236
				< .01	4.00	23.	.05	236
	NEOPRENE	010	120	18.00	4.00	23.	.06	236
				< .01	1.00	23.	.06	236
				6.00	.50	23.	.06	236
				< .01	.08	23.	.06	236
	NITRILE	005	120	2.00	4.00	23.	.06	236
				1.00	1.00	23.	.06	236
				1.00	.50	23.	.06	236
				1.00	.08	23.	.06	236
	PE	041	UNK	< .01	8,760.00	23.		305
		042	UNK	< .01	8,760.00	23.		305
		048	UNK	< .01	8,760.00	23.		305
	PVC	003	120	3.00	4.00	23.	.08	236
				2.00	1.00	23.	.08	236
				8.00	.50	23.	.08	236
				< .01	.08	23.	.08	236
Ethylenimine (Aziridine)								
001515640	BUTYL	034	UNK	14.00	168.00	22.		078
	NATURAL RUBBER	017	508	15.00	168.00	22.		078
2-Ethyl-1-Hexanol								
001047670	BUTYL	014	118	4.00	8.00	23.	.07	323
	NEOPRENE	018	100	3.00	8.00	23.	.05	323
	PV ALCOHOL	102	100	-.30	8.00	23.	.09	323
	VITON	009	118	3.00	8.00	23.	.03	323
Ethylidene Dichloride (Dichloroethane,1,1)								
000753430	BUTYL	012	118	66.00	8.00	23.	.09	323
	PV ALCOHOL	004	100	-5.00	8.00	23.	.08	323
	PVC	003	100	65.00	8.00	23.	.02	323
				3.00	8.00	23.	.02	323
	VITON	009	118	12.00	8.00	23.	.04	323
Ethyl Methacrylate								
000976320	BUTYL	014	118	33.00	8.00	23.	.09	323
	NITRILE	019	100	109.00	8.00	23.	.05	323

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR		PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
000976320	PV ALCOHOL	102	100		-4.00	8.00	23.	.06	323
	PVC	003	100		115.00	8.00	23.	.02	323
Formaldehyde, <37% (Formalin)									
000500000	NATURAL RUBBER	001	120		2.00	4.00	23.	.05	236
					1.00	1.00	23.	.05	236
					1.00	.50	23.	.05	236
				<	.01	.08	23.	.05	236
	NEOPRENE	010	120		2.00	.08	23.	.06	236
					2.00	.50	23.	.06	236
					2.00	1.00	23.	.06	236
					1.00	4.00	23.	.06	236
	NITRILE	005	120		2.00	1.00	23.	.06	236
					2.00	.50	23.	.06	236
					1.00	.08	23.	.06	236
					2.00	4.00	23.	.06	236
	PE	048	UNK		.10	8,760.00	23.		305
	PVC	003	120	<	.01	.50	23.	.08	236
					17.00	.08	23.	.08	236
					1.00	1.00	23.	.08	236
					2.00	4.00	23.	.08	236
Freon TF									
000761310	NEOPRENE	010	120		4.00	4.00	23.	.06	236
					1.00	1.00	23.	.06	236
				<	.01	.08	23.	.06	236
					1.00	.50	23.	.06	236
	NITRILE	005	120		1.00	4.00	23.	.06	236
					1.00	1.00	23.	.06	236
				<	.01	.50	23.	.06	236
					1.00	.08	23.	.06	236
Furan (Furfuran)									
001100090	BUTYL	014	118		46.00	8.00	23.	.09	323
	PV ALCOHOL	102	100		-22.00	8.00	23.	.09	323
	PVC	003	100		-49.00	8.00	23.	.02	323
	VITON	009	118		17.00	8.00	23.	.05	323
Gasoline									
080066190	NEOPRENE	010	120		2.00	.08	23.	.06	236
					8.00	.50	23.	.06	236
					7.00	1.00	23.	.06	236
					9.00	4.00	23.	.06	236
	NITRILE	005	120		1.00	.08	23.	.06	236
					2.00	.50	23.	.06	236
					2.00	1.00	23.	.06	236
					4.00	4.00	23.	.06	236
	PE	041	UNK		6.70	8,760.00	23.		305
		042	UNK		8.80	8,760.00	23.		305
		048	UNK		13.50	8,760.00	23.		305
Glutaraldehyde									
001113080	BUTYL	014	118		1.00	8.00	23.	.09	323

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
001113080	NEOPRENE	018	100	4.00	8.00	23.	.05	323
	PVC	003	100	7.00	8.00	23.	.02	323
	VITON	009	118	4.00	8.00	23.	.04	323
Halothane								
001516770	BUTYL	014	118	210.00	8.00	23.	.09	323
	PV ALCOHOL	102	100	-22.00	8.00	23.	.07	323
	PVC	007	100	-35.00	8.00	23.	.02	323
	VITON	009	118	81.00	8.00	23.	.05	323
Heptane								
001428250	PE	041	UNK	.70	8,760.00	23.		305
		042	UNK	6.90	8,760.00	23.		305
		048	UNK	10.00	8,760.00	23.		305
Hexachlorocyclopentadiene								
000774740	BUTYL	014	118	26.00	8.00	23.	.06	323
	NITRILE	019	100	19.00	8.00	23.	.04	323
	PV ALCOHOL	102	100	2.00	8.00	23.	.08	323
	VITON	009	118	2.00	8.00	23.	.03	323
Hexamethylphosphoamide								
006803190	BUTYL	034	UNK	8.00	168.00	22.		078
	NEOPRENE	031	UNK	272.00	168.00	22.		078
	NITRILE	033	UNK	78.00	168.00	22.		078
	PE	006	209	22.00	168.00	22.		078
	POLYURETHANE	050	178	242.00	168.00	22.		078
	VITON	032	UNK	250.00	168.00	22.		078
Hexane								
001105430	NEOPRENE	010	120	4.00	4.00	23.	.06	236
				28.00	1.00	23.	.06	236
				1.00	.50	23.	.06	236
				1.00	.08	23.	.06	236
	NITRILE	005	120	1.00	.08	23.	.06	236
				< .01	.50	23.	.06	236
				< .01	1.00	23.	.06	236
				1.00	4.00	23.	.06	236
Hydrochloric Acid								
076470100	BUTYL	034	UNK	11.00	20.00	25.		126
				.90	3.00	25.		126
	POLYCARBONATE	098	UNK	< .01	3.00	25.		126
				< .01	20.00	25.		126
Hydrochloric Acid, <30%								
076470101	PE	041	UNK	< .01	8,760.00	23.		305
		042	UNK	< .01	8,760.00	23.		305
		048	UNK	-.20	8,760.00	23.		305
Hydrochloric Acid, 30-70%								
076470102	NATURAL RUBBER	001	120	1.00	.08	23.	.05	236
				2.00	.50	23.	.05	236

SUMMARY OF PERFORMANCE DETAIL TESTS

IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
076470102	NATURAL RUBBER	001	120	3.00	1.00	23.	.05	236
				5.00	4.00	23.	.05	236
	NEOPRENE	010	120	1.00	.08	23.	.06	236
				1.00	.50	23.	.06	236
				1.00	1.00	23.	.06	236
				2.00	4.00	23.	.06	236
	NITRILE	005	120	1.00	.08	23.	.06	236
				2.00	.50	23.	.06	236
				2.00	1.00	23.	.06	236
				3.00	4.00	23.	.06	236
	PVC	003	120	< .01	.08	23.	.08	236
				1.00	.50	23.	.08	236
				1.00	1.00	23.	.08	236
				2.00	4.00	23.	.08	236
Hydrofluoric Acid (Hydrogen Fluoride)								
076643930	BUTYL	034	UNK	123.00	3.00	25.		126
	POLYCARBONATE	098	UNK	.30	3.00	25.		126
				1.00	20.00	25.		126
Hydrofluoric Acid, 30-70%								
076643932	NATURAL RUBBER	001	120	< .01	4.00	23.	.05	236
				< .01	1.00	23.	.05	236
				1.00	.50	23.	.05	236
				1.00	.08	23.	.05	236
	NEOPRENE	010	120	2.00	.08	23.	.06	236
				4.00	.50	23.	.06	236
				4.00	1.00	23.	.06	236
				8.00	4.00	23.	.06	236
	NITRILE	005	120	2.00	.08	23.	.06	236
				6.00	.50	23.	.06	236
				7.00	1.00	23.	.06	236
				11.00	4.00	23.	.06	236
	PVC	003	120	1.00	.08	23.	.08	236
				2.00	.50	23.	.08	236
				2.00	1.00	23.	.08	236
				2.00	4.00	23.	.08	236
Hydrogen Peroxide, 30-70%								
077228412	PE	041	UNK	< .01	8,760.00	23.		305
		042	UNK	.10	8,760.00	23.		305
		048	UNK	< .01	8,760.00	23.		305
Iminobispropylamine								
000561880	BUTYL	014	118	4.00	8.00	28.	.09	323
	NATURAL RUBBER	001	250	21.00	8.00	26.	.02	323
	NEOPRENE	018	100	24.00	8.00	27.	.05	323
	VITON	009	118	3.00	8.00	27.	.04	323
Isobutyl Acrylate								
001066380	BUTYL	014	118	16.00	8.00	23.	.09	323
	NITRILE	019	100	103.00	8.00	23.	.05	323
	PV ALCOHOL	102	100	-2.00	8.00	23.	.08	323

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
001066380	PVC	003	100	94.00	8.00	23.	.02	323
Isobutyl Alcohol								
000788310	BUTYL	014	118	.06	8.00	23.	.07	323
	NEOPRENE	018	100	-3.00	8.00	23.	.05	323
	NITRILE	019	118	7.00	8.00	23.	.05	323
	VITON	009	118	.02	8.00	23.	.05	323
Isobutyl Nitrite								
005425630	BUTYL	014	118	81.00	8.00	23.	.04	323
	NITRILE	019	100	38.00	8.00	23.	.06	323
	PVC	003	100	-31.00	8.00	23.	.02	323
	VITON	009	118	50.00	8.00	23.	.04	323
Isopropyl Alcohol (Propanol, 2-)								
000676300	CPE	060	113	3.10	24.00	23.	.05	204
				3.70	24.00	23.	.05	204
				3.50	24.00	23.	.05	204
	NATURAL RUBBER	001	120	1.00	.08	23.	.05	236
				1.00	.50	23.	.05	236
				1.00	1.00	23.	.05	236
				1.00	4.00	23.	.05	236
	NEOPRENE	010	120	< .01	.08	23.	.06	236
				1.00	.50	23.	.06	236
				< .01	1.00	23.	.06	236
				< .01	4.00	23.	.06	236
	NITRILE	005	120	2.00	4.00	23.	.06	236
				2.00	1.00	23.	.06	236
				2.00	.50	23.	.06	236
				1.00	.08	23.	.06	236
	PVC	003	120	< .01	4.00	23.	.08	236
				< .01	1.00	23.	.08	236
				1.00	.50	23.	.08	236
				< .01	.08	23.	.08	236
Isopropylamine								
000753100	BUTYL	014	118	28.00	8.00	24.	.09	323
	NEOPRENE	018	100	60.00	8.00	21.	.05	323
	PVC	007	100	-18.00	8.00	18.	.02	323
	VITON	009	118	67.00	8.00	26.	.04	323
Isopropylmethacrylate								
046553490	BUTYL	014	118	36.00	8.00	23.	.09	323
	NITRILE	019	100	69.00	8.00	23.	.05	323
	PV ALCOHOL	102	100	-3.00	8.00	23.	.09	323
	PVC	003	100	63.00	8.00	23.	.02	323
Kerosene								
080082060	NEOPRENE	010	120	1.00	.08	23.	.06	236
				1.00	.50	23.	.06	236
				1.00	1.00	23.	.06	236
				3.00	4.00	23.	.06	236
	NITRILE	005	120	1.00	.08	23.	.06	236

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
080082060	NITRILE	005	120	1.00	.50	23.	.06	236
				1.00	1.00	23.	.06	236
				2.00	4.00	23.	.06	236
Methacrylonitrile								
001269870	BUTYL	014	118	-1.00	8.00	23.	.09	323
	NATURAL RUBBER	001	250	7.00	8.00	23.	.02	323
	PV ALCOHOL	102	100	-6.00	8.00	23.	.06	323
	PVC	003	100	10.00	8.00	23.	.02	323
Methanol (Methyl Alcohol)								
000675610	NATURAL RUBBER	001	120	1.00	.08	23.	.05	236
				2.00	1.00	23.	.05	236
				2.00	4.00	23.	.05	236
				1.00	.50	23.	.05	236
	NEOPRENE	010	120	< .01	.08	23.	.06	236
				< .01	.50	23.	.06	236
				1.00	1.00	23.	.06	236
				1.00	4.00	23.	.06	236
	NITRILE	005	120	7.00	4.00	23.	.06	236
				6.00	1.00	23.	.06	236
				3.00	.50	23.	.06	236
				3.00	.08	23.	.06	236
Methanol, <30%								
000675611	PE	041	UNK	.10	8,760.00	23.		305
		042	UNK	< .01	8,760.00	23.		305
		048	UNK	< .01	8,760.00	23.		305
Methanol, >70%								
000675613	PE	041	UNK	.10	8,760.00	23.		305
		042	UNK	.10	8,760.00	23.		305
		048	UNK	< .01	8,760.00	23.		305
Methyl Acetate								
000792090	BUTYL	014	118	1.00	8.00	23.	.09	323
	NATURAL RUBBER	001	250	-20.00	8.00	23.	.02	323
	PV ALCOHOL	102	100	-25.00	8.00	23.	.07	323
	PVC	003	100	12.00	8.00	23.	.02	323
Methyl Acrylate								
000963330	BUTYL	014	118	5.00	8.00	23.	.09	323
	NATURAL RUBBER	001	250	54.00	8.00	23.	.02	323
	NEOPRENE	018	100	50.00	8.00	23.	.05	323
	PV ALCOHOL	102	100	-4.00	8.00	23.	.07	323
3-Methylaminopropylamine								
062918450	BUTYL	014	118	5.00	8.00	20.	.07	323
	NATURAL RUBBER	001	250	30.00	8.00	16.	.02	323
	NEOPRENE	018	100	70.00	8.00	16.	.05	323
	PVC	007	100	45.00	8.00	14.	.02	323
Methyl Chloroform (Trichloroethane,1,1,1)								

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
000715560	BUTYL	014	UNK	80.00	168.00	25.		326
				80.00	24.00	25.		326
				5.50	24.00	22.		201
		064	UNK	47.00	24.00	25.		326
				49.00	168.00	25.		326
	NATURAL RUBBER	017	UNK	464.00	24.00	25.		326
				.30	24.00	22.		201
				473.00	168.00	25.		326
	NEOP/NAT RUBBER	008	UNK	-.30 - .30	24.00	22.		201
	NEOPRENE	010	120	21.00	.08	23.	.06	236
				78.00	.50	23.	.06	236
				86.00	1.00	23.	.06	236
				92.00	4.00	23.	.06	236
		018	UNK	291.00	168.00	25.		326
				290.00	24.00	25.		326
				15.50	24.00	22.		201
				-.50 - .50	24.00	22.		201
				2.80	24.00	22.		201
	NITRILE	005	120	36.00	4.00	23.	.06	236
				82.00	1.00	23.	.06	236
				62.00	.50	23.	.06	236
				25.00	.08	23.	.06	236
		019	UNK	> 1,000.00	24.00	25.		326
		020	UNK	2.50	24.00	22.		201
	PE	042	UNK	16.00	168.00	25.		326
				5.00	24.00	25.		326
		076	UNK	131.00	24.00	25.		326
				147.00	168.00	25.		326
	POLYURETHANE	050	UNK	58.00	24.00	25.		326
				79.00	168.00	25.		326
	PV ALCOHOL	102	UNK	.80	24.00	25.		326
				6.90	24.00	22.		201
				.90	168.00	25.		326
	PVC	003	UNK	-2.50	24.00	22.		201
		077	UNK	227.00	24.00	25.		326
				273.00	168.00	25.		326
	TEFLON	036	UNK	.30	24.00	25.		326
				.40	168.00	25.		326
	VITON	009	UNK	4.00	24.00	25.		326
				5.00	168.00	25.		326
Methyl Chloroformate								
000792210	BUTYL	034	UNK	13.00	20.00	25.		126
				11.00	3.00	25.		126
Methylene Chloride (Dichloromethane)								
000750920	NATURAL RUBBER	001	UNK	-3.00	1.00	25.		208
	NEOPRENE	002	UNK	-3.00	1.00	25.		208
		010	120	17.00	.08	23.	.06	236
				25.00	.50	23.	.06	236
				20.00	1.00	23.	.06	236
				4.00	4.00	23.	.06	236
	NITRILE	005	UNK	-3.00	1.00	25.		208

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
n-Methylethanolamine								
001098310	BUTYL	014	118	2.00	8.00	19.	.07	323
	CELLULOSE ACETATE	099	118	9.00	8.00	20.	.03	323
	NATURAL RUBBER	001	250	8.00	8.00	20.	.02	323
	NEOPRENE	018	100	4.00	8.00	20.	.06	323
Methyl Ethyl Ketone (Butanone,2)								
000789330	BUTYL	014	118	6.00	8.00	23.	.06	323
	NATURAL RUBBER	001	120	10.00	.50	23.	.05	236
				6.00	4.00	23.	.05	236
				8.00	.08	23.	.05	236
				12.00	1.00	23.	.05	236
			250	37.00	8.00	23.	.01	323
			UNK	-2.00	1.00	25.		208
	NEOPRENE	002	UNK	-3.00	1.00	25.		208
		010	120	8.00	4.00	23.	.06	236
				16.00	1.00	23.	.06	236
				14.00	.50	23.	.06	236
				5.00	.08	23.	.06	236
		018	100	88.00	8.00	23.	.05	323
	NITRILE	005	UNK	-2.00	1.00	25.		208
	PV ALCOHOL	102	100	-14.00	8.00	23.	.07	323
Methylhydrazine								
000603440	BUTYL	034	UNK	6.70	20.00	25.		126
				3.40	3.00	25.		126
Methyl Iodide								
000748840	BUTYL	014	118	208.00	8.00	23.	.09	323
	NEOPRENE	018	100	511.00	8.00	23.	.05	323
	PV ALCOHOL	102	100	-18.00	8.00	23.	.07	323
	VITON	009	118	4.00	8.00	23.	.04	323
Methyl Isocyanate								
006248390	BUTYL	014	118	32.00	8.00	13.	.06	323
				32.00	8.00	23.	.07	323
	NATURAL RUBBER	001	250	49.00	8.00	20.	.02	323
				49.00	8.00	23.	.01	323
	NEOPRENE	018	100	90.00	8.00	20.	.05	323
	PV ALCOHOL	004	100	6.00	8.00	23.	.03	323
	VITON	009	118	74.00	8.00	21.	.03	323
				74.00	8.00	23.	.03	323
Methyl Methacrylate								
000806260	BUTYL	014	118	23.00	8.00	23.	.09	323
	NATURAL RUBBER	001	250	112.00	8.00	23.	.02	323
	PV ALCOHOL	102	100	-7.00	8.00	23.	.06	323
	PVC	003	100	102.00	8.00	23.	.02	323
Monoisopropanolamine								
000789660	BUTYL	014	118	2.00	8.00	25.	.07	323
	NEOPRENE	018	100	6.00	8.00	24.	.05	323

SUMMARY OF PERFORMANCE DETAIL TESTS

IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
000789660	PVC	007	100	6.00	8.00	25.	.02	323
	VITON	009	118	7.00	8.00	25.	.04	323
Nitric Acid, >70%								
076973723	NATURAL RUBBER	001	120	6.00	.50	23.	.05	236
				3.00	.08	23.	.05	236
				8.00	1.00	23.	.05	236
				12.00	4.00	23.	.05	236
	NEOPRENE	010	120	1.00	.08	23.	.06	236
				2.00	.50	23.	.06	236
				3.00	1.00	23.	.06	236
				7.00	4.00	23.	.06	236
	NITRILE	005	120	9.00	.08	23.	.06	236
				17.00	.50	23.	.06	236
				20.00	1.00	23.	.06	236
				34.00	4.00	23.	.06	236
	PE	041	UNK	1.40	8,760.00	23.		305
		042	UNK	1.90	8,760.00	23.		305
		048	UNK	4.80	8,760.00	23.		305
				4.80	8,760.00	23.		305
	PVC	003	120	2.00	.08	23.	.08	236
				3.00	.50	23.	.08	236
				4.00	1.00	23.	.08	236
				5.00	4.00	23.	.08	236
Nitrobenzene								
000989530	BUTYL	034	UNK	15.00	20.00	25.		126
				4.20	3.00	25.		126
Nitroethane								
000792430	BUTYL	014	118	.30	8.00	23.	.09	323
	NATURAL RUBBER	001	250	2.00	8.00	23.	.02	323
	NEOPRENE	018	100	23.00	8.00	23.	.04	323
	PV ALCOHOL	102	100	-1.00	8.00	23.	.07	323
Nitromethane								
000755250	BUTYL	014	118	-.50	8.00	23.	.09	323
	NATURAL RUBBER	001	250	-4.00	8.00	23.	.02	323
	NEOPRENE	018	100	4.00	8.00	23.	.05	323
	PV ALCOHOL	102	100	-2.00	8.00	23.	.07	323
Nitropropane								
253220140	BUTYL	034	UNK	2.00	168.00	22.		078
	NEOPRENE	031	UNK	23.00	168.00	22.		078
	NITRILE	033	UNK	72.00	168.00	22.		078
	PE	006	209	7.00	168.00	22.		078
	POLYURETHANE	050	178	99.00	168.00	22.		078
	PV ALCOHOL	035	UNK	< 1.00	168.00	22.		078
	PVC	077	168	42.00	168.00	22.		078
	VITON	032	UNK	107.00	168.00	22.		078
2-Nitropropane								
000794690	BUTYL	014	118	-.50	8.00	23.	.08	323

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
000794690	NATURAL RUBBER	001	250	18.00	8.00	23.	.02	323
	NEOPRENE	018	100	53.00	8.00	23.	.04	323
	PV ALCOHOL	102	100	-2.00	8.00	23.	.06	323
n-Nitrosodimethylamine								
000551850	CPE	060	113	115.00	.83	23.	.05	204
				112.00	.83	23.	.05	204
				109.00	.33	23.	.05	204
o-Nitrotoluene								
000887220	BUTYL	034	UNK	15.20	20.00	25.		126
				9.90	3.00	25.		126
p-Nitrotoluene								
000999900	BUTYL	034	UNK	.10	3.00	25.		126
				.20	20.00	25.		126
	POLYCARBONATE	098	UNK	.20	3.00	25.		126
				2.00	20.00	25.		126
Oleic Acid								
001128010	PE	041	UNK	1.40	8,760.00	23.		305
		042	UNK	1.70	8,760.00	23.		305
		048	UNK	2.40	8,760.00	23.		305
Oxalic Acid								
001446270	BUTYL	014	118	1.00	8.00	19.	.07	323
	NEOPRENE	018	100	3.00	8.00	19.	.05	323
	NITRILE	019	100	2.00	8.00	19.	.04	323
	VITON	009	118	.90	8.00	20.	.03	323
Phenol (Carbolic Acid)								
001089520	CPE	060	113	9.10	24.00	23.	.05	204
				68.00	24.00	23.	.05	204
				25.00	24.00	23.	.05	204
	NATURAL RUBBER	001	120	12.00	4.00	23.	.05	236
				2.00	1.00	23.	.05	236
				3.00	.50	23.	.05	236
				2.00	.08	23.	.05	236
	NEOPRENE	010	120	5.00	4.00	23.	.06	236
				1.00	1.00	23.	.06	236
				2.00	.50	23.	.06	236
				2.00	.08	23.	.06	236
Phenol, <30%								
001089521	PE	041	UNK	.20	8,760.00	23.		305
		042	UNK	.10	8,760.00	23.		305
		048	UNK	.20	8,760.00	23.		305
Phenyl Glycidyl Ether								
001226010	BUTYL	014	UNK	.40	24.00	22.		201
	NATURAL RUBBER	017	UNK	6.00	24.00	22.		201
	NEOP/NAT RUBBER	008	UNK	30.00	24.00	22.		201
	NEOPRENE	018	UNK	37.70	24.00	22.		201

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
001226010	NEOPRENE	018	UNK	23.00	24.00	22.		201
				33.10	24.00	22.		201
	NITRILE	020	UNK	103.50	24.00	22.		201
	PV ALCOHOL	102	UNK	3.80	24.00	22.		201
	PVC	003	UNK	41.40	24.00	22.		201
Phosphoric Acid, >70%								
076643823	NATURAL RUBBER	001	120	3.00	4.00	23.	.05	236
				3.00	1.00	23.	.05	236
				2.00	.50	23.	.05	236
				1.00	.08	23.	.05	236
	NEOPRENE	010	120	< .01	.08	23.	.06	236
				< .01	.50	23.	.06	236
				< .01	1.00	23.	.06	236
				< .01	4.00	23.	.06	236
	NITRILE	005	120	< .01	.08	23.	.06	236
				1.00	.50	23.	.06	236
				4.00	1.00	23.	.06	236
				5.00	4.00	23.	.06	236
	PVC	003	120	1.00	.08	23.	.08	236
				2.00	.50	23.	.08	236
				2.00	1.00	23.	.08	236
				2.00	4.00	23.	.08	236
Potassium Hydroxide, 30-70%								
013105832	NATURAL RUBBER	001	120	2.00	4.00	23.	.05	236
				2.00	1.00	23.	.05	236
				2.00	.50	23.	.05	236
				1.00 - .01	.08	23.	.05	236
	NEOPRENE	010	120	< .01	4.00	23.	.06	236
				< .01	1.00	23.	.06	236
				< .01	.50	23.	.06	236
				< .01	.08	23.	.06	236
	NITRILE	005	120	1.00	.08	23.	.06	236
				1.00	.50	23.	.06	236
				1.00	1.00	23.	.06	236
				< .01	4.00	23.	.06	236
	PVC	003	120	1.00	4.00	23.	.08	236
				< .01	1.00	23.	.08	236
				1.00	.50	23.	.08	236
				1.00	.08	23.	.08	236
beta-Propiolactone								
000575780	BUTYL	034	UNK	1.00	168.00	22.		078
	NATURAL RUBBER	017	508	9.00	168.00	22.		078
	NEOPRENE	031	UNK	31.00	168.00	22.		078
	NITRILE	033	UNK	29.00	168.00	22.		078
	PE	006	209	18.00	168.00	22.		078
	POLYURETHANE	050	178	185.00	168.00	22.		078
	PVC	077	168	15.00	168.00	22.		078
	VITON	032	UNK	69.00	168.00	22.		078
n-Propylamine								

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR		PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
001071080	BUTYL	034	UNK		17.00	20.00	25.		126
					14.00	3.00	25.		126
Propylenediamine									
000789000	BUTYL	014	118		-3.00	8.00	17.	.07	323
	NEOPRENE	018	100		1.00	8.00	24.	.05	323
	PVC	007	100		5.00	8.00	17.	.02	323
	VITON	009	118		8.00	8.00	25.	.02	323
Propylene Dichloride (Dichloropropane 1,2)									
000788750	BUTYL	014	118		70.00	8.00	23.	.08	323
	PV ALCOHOL	102	100		-2.00	8.00	23.	.07	323
	PVC	007	100		105.00	8.00	23.	.02	323
	VITON	009	118		7.00	8.00	23.	.03	323
1,3-Propylene Oxide									
005033000	BUTYL	014	118		21.00	8.00	23.	.07	323
	NATURAL RUBBER	001	250		58.00	8.00	23.	.02	323
	PV ALCOHOL	004	100		-9.00	8.00	23.	.03	323
	VITON	009	118		94.00	8.00	23.	.03	323
Propylmethacrylate									
022102880	BUTYL	014	118		38.00	8.00	23.	.08	323
	NITRILE	019	100		152.00	8.00	23.	.04	323
	PV ALCOHOL	004	100		-.60	8.00	23.	.07	323
	PVC	003	100		106.00	8.00	23.	.02	323
Sodium Hydroxide, <30%									
013107321	PE	041	UNK		.10	8,760.00	23.		305
					.10	8,760.00	23.		305
		042	UNK	<	.01	8,760.00	23.		305
				<	.01	8,760.00	23.		305
		048	UNK	<	.01	8,760.00	23.		305
					.10	8,760.00	23.		305
Sodium Hydroxide, 30-70%									
013107322	NATURAL RUBBER	001	120		2.00	4.00	23.	.05	236
					1.00	1.00	23.	.05	236
					2.00	.50	23.	.05	236
					2.00	.08	23.	.05	236
			UNK		-1.00	1.00	25.		208
	NEOPRENE	002	UNK		-1.00	1.00	25.		208
		010	120		2.00	4.00	23.	.06	236
					4.00	1.00	23.	.06	236
					3.00	.50	23.	.06	236
					1.00	.08	23.	.06	236
	NITRILE	005	120		2.00	.08	23.	.06	236
					7.00	.50	23.	.06	236
					3.00	1.00	23.	.06	236
					3.00	4.00	23.	.06	236
			UNK		1.00	1.00	25.		208
	PVC	003	120		8.00	.08	23.	.08	236
					6.00	.50	23.	.08	236

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE		PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
013107322	PVC	003	120		7.00	1.00	23.	.08	236
					3.00	4.00	23.	.08	236
Sulfuric Acid, <30%									
076649391	PE	041	UNK		.10	8,760.00	23.		305
		042	UNK	<	.01	8,760.00	23.		305
		048	UNK	<	.01	8,760.00	23.		305
Sulfuric Acid, 30-70%									
076649392	NATURAL RUBBER	001	120		2.00	4.00	23.	.05	236
					1.00	1.00	23.	.05	236
					2.00	.50	23.	.05	236
					1.00	.08	23.	.05	236
	NEOPRENE	010	120		2.00	.08	23.	.06	236
					3.00	.50	23.	.06	236
					1.00	1.00	23.	.06	236
					1.00	4.00	23.	.06	236
	NITRILE	005	120		1.00	.08	23.	.06	236
					2.00	.50	23.	.06	236
				<	.01	1.00	23.	.06	236
					1.00	4.00	23.	.06	236
	PE	041	UNK	<	.01	8,760.00	23.		305
		042	UNK	<	.01	8,760.00	23.		305
		048	UNK	<	.01	8,760.00	23.		305
	PVC	003	120		1.00	.08	23.	.08	236
				<	.01	.50	23.	.08	236
					1.00	1.00	23.	.08	236
					1.00	4.00	23.	.08	236
Tannic Acid, >70%									
014015543	NATURAL RUBBER	001	UNK		10.00	1.00	25.		208
	NEOPRENE	002	UNK		7.00	1.00	25.		208
	NITRILE	005	UNK		56.00	1.00	25.		208
1,1,1,2-Tetrachloroethane									
006302060	BUTYL	014	118		128.00	8.00	23.	.07	323
	PV ALCOHOL	102	100		-3.00	8.00	23.	.08	323
	PVC	007	100		83.00	8.00	23.	.02	323
	VITON	009	118		2.00	8.00	23.	.03	323
1,1,2,2-Tetrachloroethane									
000793450	BUTYL	014	118		167.00	8.00	23.	.07	323
	PV ALCOHOL	004	100		.10	8.00	23.	.04	323
	PVC	007	100		247.00	8.00	23.	.02	323
	VITON	009	118		.80	8.00	23.	.03	323
Tetrachloroethylene (Perchloroethylene)									
001271840	BUTYL	014	118		510.00	24.00	23.	.04	291
	NATURAL RUBBER	017	UNK		770.00	24.00	23.	.02	291
	NEOPRENE	018	100		360.00	24.00	23.	.04	291
	NITRILE	005	120		8.00	.08	23.	.06	236
					11.00	.50	23.	.06	236
					11.00	1.00	23.	.06	236

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
001271840	NITRILE	005	120	22.00	4.00	23.	.06	236
		020	191	95.00	24.00	23.	.04	291
	PE	006	100	15.00	24.00	23.	.01	291
	PV ALCOHOL	102	100	-6.00	24.00	23.	.05	291
	TEFLON	036	214	< .01	24.00	23.	.01	291
	VITON	009	118	4.00	24.00	23.	.02	291
Tetraethylenepentamine								
001125720	BUTYL	012	118	3.00	8.00	25.	.09	323
	NATURAL RUBBER	017	506	17.00	8.00	28.	.02	323
	NEOPRENE	018	100	11.00	8.00	27.	.05	323
	VITON	009	118	3.00	8.00	23.	.04	323
N,N,N',N'-Tetramethylenediamine								
001101890	BUTYL	012	118	156.00	8.00	20.	.07	323
		014	118	156.00	8.00	23.	.07	323
	NITRILE	019	100	37.00	8.00	23.	.05	323
				37.00	8.00	24.	.05	323
	PVC	003	100	3.00	8.00	23.	.02	323
	VITON	009	118	31.00	8.00	23.	.04	323
				31.00	8.00	24.	.04	323
Toluene								
001088830	BUTYL	014	UNK	2.00	24.00	22.		201
	NATURAL RUBBER	001	UNK	-2.00	1.00	25.		208
		017	UNK	.04	24.00	22.		201
	NEOP/NAT RUBBER	008	UNK	-.04	24.00	22.		201
	NEOPRENE	002	UNK	-3.00	1.00	25.		208
		018	UNK	.50	24.00	22.		201
				-.50 - .50	24.00	22.		201
				.80	24.00	22.		201
	NITRILE	005	120	25.00	1.00	23.	.06	236
				33.00	.50	23.	.06	236
				17.00	.08	23.	.06	236
				27.00	4.00	23.	.06	236
			UNK	-1.00	1.00	25.		208
		020	UNK	2.50	24.00	22.		201
	PE	041	UNK	7.50	8,760.00	23.		305
		042	UNK	9.80	8,760.00	23.		305
		048	UNK	15.10	8,760.00	23.		305
	PV ALCOHOL	102	UNK	10.50	24.00	22.		201
	PVC	003	UNK	-29.00	24.00	22.		201
Toluene Diisocyanate								
264716250	NATURAL RUBBER	001	120	25.00	4.00	23.	.05	236
				15.00	1.00	23.	.05	236
				9.00	.50	23.	.05	236
				4.00	.08	23.	.05	236
	PVC	003	120	32.00	4.00	23.	.08	236
				26.00	1.00	23.	.08	236
				14.00	.50	23.	.08	236
				6.00	.08	23.	.08	236

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
Triallylamine								
001027050	NEOPRENE	018	100	31.00	8.00	19.	.05	323
	NITRILE	019	100	4.00	8.00	22.	.04	323
	PVC	007	100	-20.00	8.00	20.	.02	323
	VITON	009	118	1.00	8.00	17.	.03	323
Trichloroacetaldehyde (Chloral)								
000758760	BUTYL	014	118	105.00	8.00	23.	.07	323
	PV ALCOHOL	102	100	-.30	8.00	23.	.08	323
	PVC	007	100	125.00	8.00	23.	.02	323
	VITON	009	118	19.00	8.00	23.	.03	323
1,1,2-Trichloroethane								
000790050	BUTYL	014	118	80.00	8.00	23.	.09	323
			UNK	80.00	24.00	23.		326
				80.00	168.00	23.		326
		064	UNK	49.00	168.00	23.		326
				47.00	24.00	23.		326
	NATURAL RUBBER	001	UNK	-2.00	1.00	25.		208
		017	UNK	473.00	168.00	23.		326
				464.00	24.00	23.		326
	NEOPRENE	002	UNK	-3.00	1.00	25.		208
		018	UNK	290.00	24.00	23.		326
				291.00	168.00	23.		326
	NITRILE	005	UNK	-3.00	1.00	25.		208
		019	UNK	> 1,000.00	168.00	23.		326
				> 1,000.00	24.00	23.		326
	PE	042	UNK	5.00	24.00	23.		326
				16.00	168.00	23.		326
		076	UNK	131.00	24.00	23.		326
				147.00	168.00	23.		326
	POLYURETHANE	050	UNK	79.00	168.00	23.		326
				58.00	24.00	23.		326
	PV ALCOHOL	102	100	-2.00	8.00	23.	.07	323
			UNK	.80	24.00	23.		326
				.90	168.00	23.		326
	PVC	003	118	238.00	8.00	23.	.02	323
		077	UNK	227.00	24.00	23.		326
				273.00	168.00	23.		326
	TEFLON	036	UNK	.40	168.00	23.		326
				.30	24.00	23.		326
	VITON	009	118	3.00	8.00	23.	.05	323
			UNK	5.00	168.00	23.		326
				4.00	24.00	23.		326
Trichloroethylene (Trichloroethene)								
000790160	BUTYL	014	118	440.00	24.00	23.	.04	291
		034	UNK	148.00	168.00	22.		078
	NATURAL RUBBER	001	UNK	-3.00	1.00	25.		208
		017	UNK	700.00	24.00	23.	.02	291
	NEOPRENE	002	UNK	-3.00	1.00	25.		208
		018	100	400.00	24.00	23.	.04	291

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
000790160	NEOPRENE	031	UNK	118.00	168.00	22.		078
	NITRILE	005	120	29.00	4.00	23.	.06	236
				51.00	1.00	23.	.06	236
				58.00	.50	23.	.06	236
				40.00	.08	23.	.06	236
			UNK	-1.00	1.00	25.		208
		020	503	310.00	24.00	23.	.04	291
		033	UNK	217.00	168.00	22.		078
	PE	006	100	20.00	24.00	23.	.01	291
			209	6.00	168.00	22.		078
	POLYURETHANE	050	178	115.00	168.00	22.		078
	PV ALCOHOL	035	UNK	3.00	168.00	22.		078
		102	100	-2.00	24.00	23.	.05	291
	PVC	077	168	14.00	168.00	22.		078
	TEFLON	036	214	< .01	24.00	23.	.01	291
	VITON	009	118	8.00	24.00	23.	.02	291
		032	UNK	2.00	168.00	22.		078
1,2,3-Trichloropropane								
000961840	BUTYL	014	118	19.00	8.00	23.	.06	323
	NITRILE	019	100	182.00	8.00	23.	.04	323
	PV ALCOHOL	004	100	4.00	8.00	23.	.03	323
	VITON	009	118	.50	8.00	23.	.03	323
Tricresyl Phosphate (Tritolyl Phosphate)								
013307850	BUTYL	012	118	1.00	8.00	23.	.07	323
	PVC	003	100	.40	8.00	23.	.02	323
	VITON	009	118	2.00	8.00	23.	.04	323
Triethylamine								
001214480	NEOPRENE	018	100	70.00	8.00	20.	.05	323
	NITRILE	019	118	6.20	8.00	19.	.04	323
	PVC	007	100	-28.00	8.00	20.	.02	323
	VITON	009	118	2.00	8.00	24.	.03	323
Triethylenetetraamine								
001122430	BUTYL	014	118	3.00	8.00	20.	.06	323
	NEOPRENE	018	100	6.00	8.00	19.	.05	323
	NITRILE	019	100	23.00	8.00	16.	.04	323
	VITON	009	118	6.00	8.00	20.	.03	323
Tri-n-propylamine								
001026920	NEOPRENE	018	100	15.00	8.00	23.	.05	323
	NITRILE	019	100	.70	8.00	23.	.04	323
	PV ALCOHOL	102	100	-14.00	8.00	23.	.06	323
	VITON	009	118	-1.00	8.00	23.	.04	323
Turpentine								
080066420	NEOPRENE	010	120	1.00	.08	23.	.06	236
				3.00	.50	23.	.06	236
				4.00	1.00	23.	.06	236
				10.00	4.00	23.	.06	236
	NITRILE	005	120	< .01	.08	23.	.06	236

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION WEIGHT CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT WEIGHT CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
080066420	NITRILE	005	120	1.00	.50	23.	.06	236
				1.00	1.00	23.	.06	236
				1.00	4.00	23.	.06	236
	PE	041	UNK	7.20	8,760.00	23.		305
		042	UNK	9.10	8,760.00	23.		305
		048	UNK	14.50	8,760.00	23.		305
Valeronitrile								
001105980	BUTYL	014	118	.70	8.00	23.	.07	323
	NATURAL RUBBER	017	506	32.00	8.00	23.	.02	323
	NEOPRENE	018	100	58.00	8.00	23.	.05	323
	PV ALCOHOL	004	100	-4.00	8.00	23.	.07	323
4-Vinyl-1-cyclohexane								
001004030	BUTYL	012	118	102.00	8.00	23.	.07	323
	NITRILE	019	100	21.00	8.00	23.	.04	323
	PV ALCOHOL	004	100	-1.00	8.00	23.	.09	323
	VITON	009	118	.60	8.00	23.	.04	323
Xylene								
001332070	NITRILE	005	120	10.00	.08	23.	.06	236
				19.00	.50	23.	.06	236
				27.00	1.00	23.	.06	236
				35.00	4.00	23.	.06	236
		019	100	82.00	8.00	23.	.05	323
	PE	041	UNK	7.90	8,760.00	23.		305
		042	UNK	10.30	8,760.00	23.		305
		048	UNK	15.40	8,760.00	23.		305
	PV ALCOHOL	102	100	-4.00	8.00	23.	.09	323
	PVC	003	100	-7.00	8.00	23.	.02	323
	VITON	009	118	1.00	8.00	23.	.04	323
o-Xylene								
000954760	CPE	060	113	116.00	.60	23.	.05	204
				112.00	.60	23.	.05	204
				109.00	.73	23.	.05	204

APPENDIX C

SWELLING DATA

SUMMARY OF PERFORMANCE DETAIL TESTS

IMMERSION SWELLING TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	SWELL (PERCENT VOLUME)	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
Benzene								
000714320	BUTYL	014	UNK	124.00	24.00	23.		327
		064	UNK	82.00	24.00	23.		327
	NATURAL RUBBER	017	UNK	377.00	24.00	23.		327
				383.00	24.00	23.		327
	NEOPRENE	018	UNK	284.00	24.00	23.		327
	NITRILE	019	UNK	182.00	24.00	23.		327
	NONWOVEN PE	071	UNK	166.00	24.00	23.		327
	PE	042	UNK	37.00	24.00	23.		327
		076	UNK	14.00	24.00	23.		327
	PVC	003	UNK	-18.00	24.00	23.		327
	SARANEX	061	UNK	71.00	24.00	23.		327
	TEFLON	036	UNK	6.40	24.00	23.		327
	VITON	009	UNK	18.00	24.00	23.		327
Dibutylamine								
001119220	NITRILE	019	100	28.00	8.00	24.	.04	323
	PV ALCOHOL	102	100	-26.00	8.00	23.	.08	323
	PVC	007	100	-26.00	8.00	20.	.02	323
	VITON	009	118	.40	8.00	20.	.03	323
Epichlorohydrin								
001068980	BUTYL	014	118	< .01	24.00	23.	.04	291
	NATURAL RUBBER	017	UNK	30.00	24.00	23.	.02	291
	NEOPRENE	018	100	120.00	24.00	23.	.04	291
	NITRILE	020	503	240.00	24.00	23.	.04	291
	PE	006	100	15.00	24.00	23.	.01	291
	PV ALCOHOL	102	100	-7.00	24.00	23.	.05	291
	TEFLON	036	214	< .01	24.00	23.	.01	291
	VITON	009	118	35.00	24.00	23.	.02	291
Ethylene Dibromide (Dibromoethane,1,2)								
001069340	BUTYL	014	118	30.00	24.00	23.	.04	291
	NATURAL RUBBER	017	UNK	240.00	24.00	23.	.02	291
	NEOPRENE	018	100	> 1,000.00	24.00	23.	.04	291
	NITRILE	020	503	230.00	24.00	23.	.04	291
	PE	006	100	35.00	24.00	23.	.01	291
	PV ALCOHOL	102	100	< .01	24.00	23.	.05	291
	TEFLON	036	214	< .01	24.00	23.	.01	291
	VITON	009	118	< .01	24.00	23.	.02	291
Ethylene Dichloride (Dichloroethane,1,2)								
001070620	BUTYL	014	UNK	19.00	24.00	23.		326
				19.00	4.00	23.		326
				19.00	1.00	23.		326
		064	UNK	25.00	24.00	23.		326
				25.00	4.00	23.		326
				25.00	1.00	23.		326
	NATURAL RUBBER	017	UNK	118.00	1.00	23.		326
				124.00	24.00	23.		326
				118.00	4.00	23.		326
	NEOPRENE	018	UNK	141.00	4.00	23.		326

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION SWELLING TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	SWELL (PERCENT VOLUME)	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
001070620	NEOPRENE	018	UNK	142.00	24.00	23.		326
				123.00	1.00	23.		326
	NITRILE	019	UNK	275.00	4.00	23.		326
				286.00	24.00	23.		326
				259.00	1.00	23.		326
		020	UNK	252.00	1.00	23.		326
				254.00	24.00	23.		326
				252.00	4.00	23.		326
	PE	042	UNK	8.00	1.00	23.		326
				20.00	24.00	23.		326
				20.00	4.00	23.		326
		076	UNK	4.30	1.00	23.		326
				9.00	4.00	23.		326
				9.00	24.00	23.		326
	POLYURETHANE	050	UNK	< .01	24.00	23.		326
				1.50	4.00	23.		326
				.30	1.00	23.		326
	PV ALCOHOL	102	UNK	.30	1.00	23.		326
				1.50	4.00	23.		326
				1.00	24.00	23.		326
	PVC	077	UNK	> 1,000.00	1.00	23.		326
	TEFLON	036	UNK	< .01	24.00	23.		326
				< .01	1.00	23.		326
				< .01	4.00	23.		326
	VITON	009	UNK	9.00	4.00	23.		326
				< .01	1.00	23.		326
				11.00	24.00	23.		326
Methyl Chloroform (Trichloroethane,1,1,1)								
000715560	BUTYL	014	UNK	249.00	1.00	25.		326
				260.00	4.00	25.		326
				263.00	24.00	25.		326
		064	UNK	11.00	1.00	25.		326
				153.00	4.00	25.		326
				181.00	24.00	25.		326
	NATURAL RUBBER	017	UNK	334.00	1.00	25.		326
				429.00	4.00	25.		326
				425.00	24.00	25.		326
	NEOPRENE	018	UNK	213.00	1.00	25.		326
				239.00	4.00	25.		326
				246.00	24.00	25.		326
	NITRILE	019	UNK	182.00	1.00	25.		326
				208.00	4.00	25.		326
				214.00	24.00	25.		326
	PE	042	UNK	9.60	1.00	25.		326
				9.60	4.00	25.		326
				9.60	24.00	25.		326
		076	UNK	-5.00	1.00	25.		326
				13.30	4.00	25.		326
				12.30	24.00	25.		326
	POLYURETHANE	050	UNK	14.30	1.00	25.		326
				15.70	4.00	25.		326
				13.70	24.00	25.		326

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION SWELLING TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	SWELL (PERCENT VOLUME)	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
000715560	PV ALCOHOL	102	UNK	< .01	1.00	25.		326
				3.00	4.00	25.		326
				4.00	24.00	25.		326
	PVC	077	UNK	< .01	1.00	25.		326
				< .01	4.00	25.		326
				22.00	24.00	25.		326
	TEFLON	036	UNK	< .01	1.00	25.		326
				< .01	4.00	25.		326
				< .01	24.00	25.		326
	VITON	009	UNK	< .01	1.00	25.		326
				8.60	4.00	25.		326
				20.50	24.00	25.		326
Polychlorinated Biphenyls (PCBs) (Aroclor)								
013363630	BUTYL	014	118	14.00	24.00	23.		290
	NATURAL RUBBER	017	UNK	200.00	24.00	23.		290
	NEOPRENE	018	100	10.00	24.00	23.		290
	PE	006	100	35.00	24.00	23.		290
	PV ALCOHOL	102	100	4.00	24.00	23.		290
Tetrachloroethylene (Perchloroethylene)								
001271840	BUTYL	014	118	280.00	24.00	23.	.04	291
	NATURAL RUBBER	017	UNK	530.00	24.00	23.	.02	291
	NEOPRENE	018	100	320.00	24.00	23.	.04	291
	NITRILE	020	191	60.00	24.00	23.	.04	291
	PE	006	100	85.00	24.00	23.	.01	291
	PV ALCOHOL	102	100	-12.00	24.00	23.	.05	291
	TEFLON	036	214	< .01	24.00	23.	.01	291
	VITON	009	118	< .01	24.00	23.	.02	291
1,1,2-Trichloroethane								
000790050	BUTYL	014	UNK	-1.00	24.00	23.		326
				10.00	1.00	23.		326
				7.00	4.00	23.		326
		064	UNK	44.00	24.00	23.		326
				44.00	4.00	23.		326
				42.00	1.00	23.		326
	NATURAL RUBBER	017	UNK	146.00	1.00	23.		326
				154.00	24.00	23.		326
				154.00	4.00	23.		326
	NEOPRENE	018	UNK	158.00	1.00	23.		326
				140.00	4.00	23.		326
				158.00	24.00	23.		326
	NITRILE	019	UNK	355.00	24.00	23.		326
				339.00	4.00	23.		326
				277.00	1.00	23.		326
	PE	042	UNK	-16.00	4.00	23.		326
				-23.00	1.00	23.		326
				-20.00	24.00	23.		326
		076	UNK	-1.00	24.00	23.		326
				4.00	4.00	23.		326
				14.00	1.00	23.		326
	POLYURETHANE	050	UNK	-5.00	4.00	23.		326

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION SWELLING TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	SWELL (PERCENT VOLUME)	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
000790050	POLYURETHANE	050	UNK	-5.00	1.00	23.		326
				-5.00	24.00	23.		326
	PV ALCOHOL	102	UNK	5.00	24.00	23.		326
				5.00	4.00	23.		326
				< .01	1.00	23.		326
	PVC	077	UNK	> 1,000.00	1.00	23.		326
	TEFLON	036	UNK	< .01	1.00	23.		326
				< .01	4.00	23.		326
				< .01	24.00	23.		326
	VITON	009	UNK	16.00	4.00	23.		326
				16.00	1.00	23.		326
				19.00	24.00	23.		326
Trichloroethylene (Trichloroethene)								
000790160	BUTYL	014	118	320.00	24.00	23.	.04	291
	NATURAL RUBBER	017	UNK	580.00	24.00	23.	.02	291
	NEOPRENE	018	100	410.00	24.00	23.	.04	291
	NITRILE	020	503	220.00	24.00	23.	.04	291
	PE	006	100	70.00	24.00	23.	.01	291
	PV ALCOHOL	102	100	-10.00	24.00	23.	.05	291
	TEFLON	036	214	.01	24.00	23.	.01	291
	VITON	009	118	20.00	24.00	23.	.02	291

APPENDIX D

DIFFUSION COEFFICIENTS

SUMMARY OF PERFORMANCE DETAIL TESTS

DIFFUSION COEFFICIENTS

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	DIFFUSION COEFFICIENT CM**2/SEC a	b	TEMP DEG C	THICKNESS CM	REF NUM
Acetone								
000676410	PV ACETATE	124	UNK	1.30	-11.00	40.		178
Allyl Chloride								
001070510	PV ACETATE	124	UNK	1.30	-11.00	40.		178
Benzene								
000714320	BUTYL	014	UNK	4.33	-8.00	23.		327
		064	UNK	5.30	-7.00	23.		327
	EVA	074	UNK	1.90	-6.00	23.		327
	NATURAL RUBBER	017	UNK	1.45	-6.00	23.		327
				1.60	-5.00	23.		327
		045	UNK	1.50	-7.00	25.		225
	NEOPRENE	018	UNK	5.70	-7.00	23.		327
	NITRILE	019	UNK	3.50	-7.00	23.		327
	NONWOVEN PE	071	UNK	1.13	-6.00	23.		327
	PE	042	UNK	8.33	-9.00	23.		327
		048	UNK	1.90	-9.00	0.		253
		076	UNK	8.80	-7.00	23.		327
	PV ACETATE	124	UNK	4.80	-13.00	40.		178
	PV ALCOHOL	004	UNK	7.30	-7.00	23.		327
	PVC	003	UNK	4.50	-7.00	23.		327
	SARANEX	061	UNK	1.67	-8.00	23.		327
	TEFLON	036	UNK	6.77	-9.00	23.		327
	VITON	009	UNK	6.00	-8.00	23.		327
Butyl Cellosolve (Butoxyethanol, 2)								
001117620	NITRILE	019	100	3.45	-7.00	37.	.06	107
				2.57	-7.00	37.	.06	107
	PVC	007	129	7.00	-7.00	22.		122
Carbon Tetrachloride (Tetrachloromethane)								
000562350	PV ACETATE	124	UNK	3.00	-16.00	40.		178
Chlorobenzene								
001089070	NEOPRENE	002	UNK	6.61	-5.00	23.		186
	PVC	007	UNK	7.36	-5.00	23.		186
Dimethyl Sulfoxide								
000676850	NEOPRENE	002	UNK	6.60	-4.00	23.		186
Ethane								
000748400	PE	048	UNK	8.15	-8.00	25.		193
Ethylene Dichloride (Dichloroethane,1,2)								
001070620	BUTYL	014	UNK	6.23	-8.00	23.		326
		064	UNK	5.83	-8.00	23.		326
	NATURAL RUBBER	017	UNK	7.50	-7.00	23.		326
	NEOPRENE	018	UNK	4.67	-7.00	23.		326
	NITRILE	019	UNK	4.50	-7.00	23.		326
		020	UNK	1.00	-6.00	23.		326
	PE	042	UNK	3.33	-8.00	23.		326

SUMMARY OF PERFORMANCE DETAIL TESTS
DIFFUSION COEFFICIENTS

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	DIFFUSION COEFFICIENT CM**2/SEC a		b	TEMP DEG C	THICKNESS CM	REF NUM
001070620	PV ALCOHOL	102	UNK		1.83	-7.00	23.		326
	TEFLON	036	UNK	<	5.00	-8.00	23.		326
		044	UNK		8.33	-10.00	23.		326
	VITON	009	UNK	<	8.33	-11.00	23.		326
Hexane									
001105430	NEOPRENE	002	UNK		1.35	-5.00	23.		186
	PE	041	UNK		7.50	-11.00	0.		253
		042	UNK		1.50	-10.00	0.		253
		048	UNK		1.20	-9.00	0.		253
					2.50	-8.00	30.		253
	PVC	007	UNK		3.68	-5.00	23.		186
Isobutylene (Isobutene)									
001151170	PE	048	UNK		4.70	-8.00	30.		253
					3.10	-9.00	0.		253
					1.25	-9.00	-8.		253
Isopropylamine									
000753100	PV ACETATE	124	UNK		1.70	-12.00	40.		178
Methane									
000748280	PE	048	UNK		1.96	-7.00	25.		193
Methanol (Methyl Alcohol)									
000675610	PV ACETATE	124	UNK		1.40	-9.00	40.		178
	PVC	007	UNK		1.51	-5.00	23.		186
Methyl Bromide (Bromomethane)									
000748390	PE	041	UNK		1.40	-9.00	0.		253
		042	UNK		2.90	-8.00	0.		253
		048	UNK	7.30 -	10.00	-9.00	0.		253
					8.30	-8.00	30.		253
Methyl Chloroform (Trichloroethane,1,1,1)									
000715560	BUTYL	014	UNK		1.45	-7.00	25.		326
		064	UNK		1.67	-7.00	25.		326
	NATURAL RUBBER	017	UNK		2.78	-7.00	25.		326
	NEOPRENE	018	UNK		2.08	-7.00	25.		326
	NITRILE	019	UNK		3.67	-8.00	25.		326
	PE	042	UNK		2.33	-8.00	25.		326
		076	UNK		3.83	-8.00	25.		326
	POLYURETHANE	050	UNK		1.38	-7.00	25.		326
	PVC	077	UNK		6.33	-7.00	25.		326
	VITON	009	UNK	<	1.17	-9.00	25.		326
Propane									
000749860	PE	048	UNK		2.00	-8.00	25.		193
Propyl Alcohol (Propanol)									
000712380	PV ACETATE	124	UNK		1.10	-12.00	40.		178
n-Propylamine									

SUMMARY OF PERFORMANCE DETAIL TESTS
DIFFUSION COEFFICIENTS

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	DIFFUSION COEFFICIENT CM**2/SEC a	b	TEMP DEG C	THICKNESS CM	REF NUM
001071080	PV ACETATE	124	UNK	5.10	-12.00	40.		178
Propyl Chloride (Chloropropane, 1)								
005405450	PV ACETATE	124	UNK	1.30	-12.00	40.		178
Toluene								
001088830	BUTYL	014	118	3.67	-7.00	22.		122
			216	1.02	-6.00	37.		122
	NEOPRENE	002	UNK	5.56	-5.00	23.		186
		018	509	6.17	-7.00	22.		122
	NITRILE	019	100	3.45	-7.00	37.	.06	122
				2.57	-7.00	37.	.06	122
				1.50	-7.00	22.		122
				2.95	-7.00	37.	.04	122
			118	1.17	-7.00	22.		122
				4.15	-7.00	37.		122
				1.67	-7.00	22.		122
			509	2.67	-7.00	22.		122
		020	216	3.50	-7.00	22.		122
				6.95	-7.00	37.		122
				5.17	-7.00	22.		122
	PVC	003	215	5.50	-7.00	22.		122
		007	129	3.33	-7.00	22.		122
				3.27	-7.00	37.		122
			UNK	8.10	-5.00	23.		186
	VITON	009	118	2.33	-8.00	37.		122
	VITON/NEOPRENE	022	216	3.33	-8.00	22.		122
				5.17	-8.00	37.		122
1,1,2-Trichloroethane								
000790050	BUTYL	014	UNK	1.67	-7.00	23.		326
		064	UNK	8.33	-8.00	23.		326
	NATURAL RUBBER	017	UNK	1.47	-6.00	23.		326
	NEOPRENE	018	UNK	1.35	-6.00	23.		326
	NITRILE	019	UNK	5.50	-7.00	23.		326
	PE	042	UNK	2.00	-8.00	23.		326
	POLYURETHANE	050	UNK	> 2.83	-7.00	23.		326
	PV ALCOHOL	102	UNK	2.67	-7.00	23.		326
	TEFLON	036	UNK	< 4.83	-11.00	23.		326
		044	UNK	4.00	-10.00	23.		326
	VITON	009	UNK	< 1.20	-9.00	23.		326
Trichloroethylene (Trichloroethene)								
000790160	NEOPRENE	002	UNK	5.03	-5.00	23.		186
	PVC	007	UNK	1.45	-6.00	23.		186

APPENDIX E

TENSILE DATA

SUMMARY OF PERFORMANCE DETAIL TESTS

IMMERSION TENSILE STRENGTH CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	PERCENT TENSILE CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
1,1-Dimethylhydrazine (Dimethylhydrazine,unsym-)								
000571470	BUTYL	064	113	< .01	.08	23.		321
		085	211	-13.64	.08	23.		321
	CHLOROBUTYL	052	205	< .01	.08	23.		321
	CPE	060	113	-20.63	.08	23.		321
		070	113	-10.00	.08	23.		321
	PVC	053	126	29.03	.08	23.		321
	TEFLON	055	210	85.19	.08	23.		321
Freon TMC								
577623190	BUTYL	064	113	6.82	.08	23.		321
		085	211	2.27	.08	23.		321
	CHLOROBUTYL	052	205	8.38	.08	23.		321
	CPE	060	113	-12.70	.08	23.		321
		070	113	-20.00	.08	23.		321
	PVC	053	126	16.13	.08	23.		321
	TEFLON	055	210	48.15	.08	23.		321
Hydrazine (Diamine)								
003020120	BUTYL	064	113	-25.00	.08	23.		321
		085	211	-15.91	.08	23.		321
	CHLOROBUTYL	052	205	-2.78	.08	23.		321
	CPE	060	113	< .01	.08	23.		321
		070	113	-15.00	.08	23.		321
	PVC	053	126	9.68	.08	23.		321
	TEFLON	055	210	166.67	.08	23.		321
Hydrochloric Acid								
076470100	BUTYL	064	113	15.91	.08	23.		321
		085	211	-4.55	.08	23.		321
	CHLOROBUTYL	052	205	-13.89	.08	23.		321
	CPE	060	113	-11.11	.08	23.		321
		070	113	-62.50	.08	23.		321
	PVC	053	126	35.48	.08	23.		321
	TEFLON	055	210	174.07	.08	23.		321
Hydrogen Peroxide								
077228410	BUTYL	064	113	36.36	.08	23.		321
		085	211	-4.55	.08	23.		321
	CPE	060	113	-9.52	.08	23.		321
		070	113	-45.00	.08	23.		321
	PVC	053	126	35.48	.08	23.		321
	TEFLON	055	210	29.63	.08	23.		321
Hydrogen Peroxide, <30%								
077228411	CHLOROBUTYL	052	205	2.78	.08	23.		321
Isopropyl Alcohol (Propanol, 2-)								
000676300	BUTYL	064	113	-2.27	.08	23.		321
		085	211	< .01	.08	23.		321
	CHLOROBUTYL	052	205	-6.94	.08	23.		321
	CPE	060	113	-1.59	.08	23.		321

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION TENSILE STRENGTH CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC CODE	VENDOR	PERCENT TENSILE CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
000676300	CPE	070	113	-10.00	.08	23.		321
	PVC	053	126	12.90	.08	23.		321
	TEFLON	055	210	129.63	.08	23.		321
Methyl Ethyl Ketone (Butanone,2)								
000789330	BUTYL	064	113	6.82	.08	23.		321
		085	211	-4.55	.08	23.		321
	CHLOROBUTYL	052	205	5.56	.08	23.		321
	CPE	060	113	-4.76	.08	23.		321
		070	113	-20.00	.08	23.		321
	PVC	053	126	-67.74	.08	23.		321
	TEFLON	055	210	159.26	.08	23.		321
Methylhydrazine								
000603440	BUTYL	064	113	-4.55	.08	23.		321
		085	211	-4.55	.08	23.		321
	CHLOROBUTYL	052	205	-11.11	.08	23.		321
	CPE	060	113	-7.94	.08	23.		321
		070	113	-12.50	.08	23.		321
	PVC	053	126	-22.58	.08	23.		321
	TEFLON	055	210	85.19	.08	23.		321
Nitric Acid								
076973720	BUTYL	064	113	2.27	.08	23.		321
		085	211	4.55	.08	23.		321
	CHLOROBUTYL	052	205	-27.78	.08	23.		321
	CPE	060	113	1.59	.08	23.		321
		070	113	-40.00	.08	23.		321
	PVC	053	126	-16.13	.08	23.		321
	TEFLON	055	210	133.33	.08	23.		321
Nitric Acid, Fuming Red								
080075870	BUTYL	064	113	25.00	.08	23.		321
		085	211	-6.82	.08	23.		321
	CHLOROBUTYL	052	205	-19.44	.08	23.		321
	CPE	060	113	3.17	.08	23.		321
		070	113	-62.50	.08	23.		321
	PVC	053	126	16.13	.08	23.		321
	TEFLON	055	210	44.44	.08	23.		321
Nitrogen Tetroxide								
105447260	BUTYL	064	113	36.36	.08	23.		321
		085	211	-20.45	.08	23.		321
	CHLOROBUTYL	052	205	-47.22	.08	23.		321
	CPE	060	113	-26.98	.08	23.		321
		070	113	-52.50	.08	23.		321
	PVC	053	126	-19.35	.08	23.		321
	TEFLON	055	210	207.41	.08	23.		321
Sulfuric Acid								
076649390	BUTYL	064	113	2.27	.08	23.		321
		085	211	-9.09	.08	23.		321
	CHLOROBUTYL	052	205	-5.56	.08	23.		321

SUMMARY OF PERFORMANCE DETAIL TESTS
IMMERSION TENSILE STRENGTH CHANGE TEST

CHEMICAL NAME/ CASNO	RESISTANT MATERIAL	PRODUCT DESC	VENDOR CODE	PERCENT TENSILE CHANGE	IMMERSION TIME HOURS	TEMP DEG C	THICKNESS CM	REF NUM
076649390	CPE	060	113	6.35	.08	23.		321
		070	113	-22.50	.08	23.		321
	PVC	053	126	< .01	.08	23.		321
	TEFLON	055	210	92.59	.08	23.		321

APPENDIX F

PERMEATION DATA FOR MULTI-COMPONENT LIQUIDS

CROSS-REFERENCE OF CHEMICALS IN MIXTURES

COMPONENT	MIXTURE
Acetone	
000676410	000400029
	000400079
	000400169
	000400179
	000400189
	000400199
	000400209
	000400219
	000400229
Acetonitrile	
000750580	000400059
Atlox 3403F	
000300060	000400389
	000400399
Atlox 3404F	
000300070	000400389
	000400399
Butadiene	
001069900	000400059
Butyl Acetate	
001238640	000400089
	000400109
Butyl Alcohol	
000713630	000400089
	000400109
Cyclohexanol	
001089300	000400359
	000400369
	000400379
Diesel Oil	
000300020	000400149
Epoxy Resin	
000300010	000400079
	000400099
Ethyl Acetate	
001417860	000400019
	000400029
	000400109

CROSS-REFERENCE OF CHEMICALS IN MIXTURES

COMPONENT	MIXTURE
Ethyl Alcohol	
000641750	000400019
	000400029
	000400039
	000400089
	000400299
	000400309
	000400319
	000400329
	000400339
	000400349
	000400359
	000400369
	000400379
Ethylene Glycol Monoacetate	
005245960	000400069
Hexane	
001105430	000400169
	000400179
	000400189
	000400199
	000400209
	000400219
	000400229
	000400239
Isobutyl Alcohol	
000788310	000400049
Isopropyl Alcohol	
000676300	000400049
	000400059
	000400069
Methanol	
000675610	000400029
	000400109
Methyl Acetate	
000792090	000400039
Methyl Cellosolve	
001098640	000400079
Methylene Chloride	
000750920	000400139
	000400239
	000400249

CROSS-REFERENCE OF CHEMICALS IN MIXTURES

COMPONENT	MIXTURE
Methyl Ethyl Ketone	
000789330	000400059
	000400069
	000400089
Methyl Isobutyl Ketone	
001081010	000400049
	000400059
	000400069
	000400099
	000400119
	000400129
Methyl Parathion	
002980000	000400389
	000400399
Nitrobenzene	
000989530	000400329
	000400339
	000400349
Organophosphate	
000300030	000400159
Pentachlorophenol	
000878650	000400149
Phenol	
001089520	000400139
Polyamide	
000300000	000400049
Propylene Glycol	
000575560	000400159
Sodium Hydroxide	
013107320	000400289
Sodium Pentachlorophenate	
001315220	000400289
Tenneco 500-100	
000300050	000400389
	000400399

CROSS-REFERENCE OF CHEMICALS IN MIXTURES

COMPONENT	MIXTURE
Toluene	
001088830	000400049
	000400089
	000400099
	000400109
	000400119
	000400249
Water	
077321850	000400389
Xylene	
001332070	000400089
	000400099
	000400129
	000400299
	000400309
	000400319

SUMMARY OF PERFORMANCE DETAIL FOR MIXTURE COMPONENTS

MIXTURE: 000400019 REFERENCE: 124

001417860	> 70% by vol	Ethyl Acetate
000641750		Ethyl Alcohol

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
BUTYL					
000400019	014	21.00	> 4.00		.07
PV ALCOHOL					
000400019	004	21.00	> 4.00		
PVC					
000400019	003	21.00	.03	1,102.20	.05
VITON/NEOPRENE					
000400019	022	21.00	.13	280.56	.05

MIXTURE: 000400029 REFERENCE: 124

001417860	> 70% by vol	Ethyl Acetate
000676410		Acetone
000641750		Ethyl Alcohol
000675610		Methanol

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
BUTYL					
000400029	014	21.00	> 4.00		.07
PV ALCOHOL					
000400029	004	21.00	> 4.00		

MIXTURE: 000400039 REFERENCE: 124

000792090	50% by vol	Methyl Acetate
000641750	50% by vol	Ethyl Alcohol

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
BUTYL					
000400039	014	21.00	> 4.00		.04
NITRILE					
000400039	019	21.00	.12	105.21	.03
VITON					
000400039	009	21.00	.07	62.29	.03

SUMMARY OF PERFORMANCE DETAIL FOR MIXTURE COMPONENTS

MIXTURE: 000400049 REFERENCE: 124

000788310	30 - 70% by vol	Isobutyl Alcohol
000676300	< 30% by vol	Isopropyl Alcohol
001081010	< 30% by vol	Methyl Isobutyl Ketone
001088830	< 30% by vol	Toluene
000300000		Polyamide

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
PV ALCOHOL					
000400049	004	21.00	> 4.00		

MIXTURE: 000400059 REFERENCE: 124

000789330	30 - 70% by vol	Methyl Ethyl Ketone
001081010	< 30% by vol	Methyl Isobutyl Ketone
000676300	< 30% by vol	Isopropyl Alcohol
001069900		Butadiene
000750580		Acetonitrile

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
BUTYL					
000400059	014	21.00	> 4.00		
NITRILE					
000400059	019	21.00	.32	260.52	.04
PVC					
000400059	003	21.00	.15		

MIXTURE: 000400069 REFERENCE: 124

000789330	30 - 70% by vol	Methyl Ethyl Ketone
005245960	30 - 70% by vol	Ethylene Glycol Monoacetate
001081010	< 30% by vol	Methyl Isobutyl Ketone
000676300	< 30% by vol	Isopropyl Alcohol

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
BUTYL					
000400069	014	21.00	> 4.00		.07
NATURAL RUBBER					
000400069	017	21.00	.33	24.05	.05

SUMMARY OF PERFORMANCE DETAIL FOR MIXTURE COMPONENTS

MIXTURE: 000400079 REFERENCE: 124

000676410	< 30% by vol	Acetone
001098640	30% by vol	Methyl Cellosolve
000300010		Epoxy Resin

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
BUTYL					
000400079	014	21.00	> 4.00		.07
PV ALCOHOL					
000400079	004	21.00	> 4.00		
PVC					
000400079	003	21.00	.02	1,490.98	.05

MIXTURE: 000400089 REFERENCE: 124

001088830	5 - 20% by vol	Toluene
000713630	5 - 20% by vol	Butyl Alcohol
001238640	5 - 20% by vol	Butyl Acetate
000641750	5 - 20% by vol	Ethyl Alcohol
000789330	5 - 20% by vol	Methyl Ethyl Ketone
001332070	5 - 20% by vol	Xylene

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
BUTYL					
000400089	014	21.00	2.65	6.61	.04
NITRILE					
000400089	019	21.00	.10	916.83	.04
000400089	020	21.00	.23	842.68	.04
PE/EVOH/PE					
000400089	109	21.00	.43	410.82	.06
PV ALCOHOL					
000400089	004	21.00	> 4.00		
PVC					
000400089	003	21.00	.07	855.71	.06
VITON					
000400089	009	21.00	.08	671.34	.03

SUMMARY OF PERFORMANCE DETAIL FOR MIXTURE COMPONENTS

MIXTURE: 000400099 REFERENCE: 124

001088830	30 - 70% by vol	Toluene
001081010	< 30% by vol	Methyl Isobutyl Ketone
001332070	< 30% by vol	Xylene
000300010		Epoxy Resin

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
PV ALCOHOL					
000400099	004	21.00	> 4.00		

MIXTURE: 000400109 REFERENCE: 124

001088830	30 - 70% by vol	Toluene
000713630		Butyl Alcohol
001238640		Butyl Acetate
001417860		Ethyl Acetate
000675610		Methanol

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
PV ALCOHOL					
000400109	004	21.00	.43	42.08	
VITON/NEOPRENE					
000400109	022	21.00	.27	300.60	.05

MIXTURE: 000400119 REFERENCE: 124

001088830	50% by vol	Toluene
001081010	50% by vol	Methyl Isobutyl Ketone

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
PV ALCOHOL					
000400119	004	21.00	> 4.00		

SUMMARY OF PERFORMANCE DETAIL FOR MIXTURE COMPONENTS

MIXTURE: 000400129 REFERENCE: 124

001332070	50% by vol	Xylene
001081010	50% by vol	Methyl Isobutyl Ketone

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
NITRILE					
000400129	019	21.00	.20	2,705.40	.03
VITON					
000400129	009	21.00	.33	3,006.00	.03

MIXTURE: 000400139 REFERENCE: 124

000750920	> 70% by vol	Methylene Chloride
001089520		Phenol

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
NEOPRENE					
000400139	018	21.00	.30	1.34	.11
PV ALCOHOL					
000400139	004	21.00	> 4.00		

MIXTURE: 000400149 REFERENCE: 278

000878650	4% by vol	Pentachlorophenol
000300020		Diesel Oil

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
NATURAL RUBBER					
000400149	001	23.00	.01	.02	.16
NEOPRENE					
000400149	018	23.00	1.00	1.35	.04
NITRILE					
000400149	019	23.00	> 8.00		.06
PVC					
000400149	003	23.00	.01	.27	.02

SUMMARY OF PERFORMANCE DETAIL FOR MIXTURE COMPONENTS

MIXTURE: 000400169 REFERENCE: 302

000676410	95% by vol	Acetone
001105430	5% by vol	Hexane

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
VITON/CHLOROBUTYL					
000676410	112	25.00	.08		.04
001105430	112	25.00	.08		.04

MIXTURE: 000400179 REFERENCE: 302

000676410	86% by vol	Acetone
001105430	14% by vol	Hexane

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
VITON/CHLOROBUTYL					
000676410	112	25.00	.10		.04
001105430	112	25.00	.10 - .18		.04

MIXTURE: 000400189 REFERENCE: 302

000676410	50% by vol	Acetone
001105430	50% by vol	Hexane

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
VITON/CHLOROBUTYL					
000676410	112	25.00	.03 - .10		.04
001105430	112	25.00	.03 - .10		.04

SUMMARY OF PERFORMANCE DETAIL FOR MIXTURE COMPONENTS

MIXTURE: 000400199 REFERENCE: 302

000676410	35% by vol	Acetone
001105430	65% by vol	Hexane

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
VITON/CHLOROBUTYL					
000676410	112	25.00	.10		.04
001105430	112	25.00	.10		.04

MIXTURE: 000400209 REFERENCE: 302

000676410	15% by vol	Acetone
001105430	85% by vol	Hexane

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
VITON/CHLOROBUTYL					
000676410	112	25.00	.10 - .18		.04
001105430	112	25.00	.10 - .18		.04

MIXTURE: 000400219 REFERENCE: 302

000676410	5% by vol	Acetone
001105430	95% by vol	Hexane

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
VITON/CHLOROBUTYL					
000676410	112	25.00	.08		.04
001105430	112	25.00	.08		.04

SUMMARY OF PERFORMANCE DETAIL FOR MIXTURE COMPONENTS

MIXTURE: 000400229 REFERENCE: 302

000676410	1% by vol	Acetone
001105430	99% by vol	Hexane

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
VITON/CHLOROBUTYL					
000676410	112	25.00	.08		.04
001105430	112	25.00	.08		.04

MIXTURE: 000400239 REFERENCE: 302

001105430	50% by vol	Hexane
000750920	50% by vol	Methylene Chloride

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
VITON/CHLOROBUTYL					
000750920	112	25.00	.70 - .78		.04
001105430	112	25.00	.95 - 1.03		.04

MIXTURE: 000400249 REFERENCE: 302

000750920	50% by vol	Methylene Chloride
001088830	50% by vol	Toluene

	PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
VITON/CHLOROBUTYL					
000750920	112	25.00	.75 - .92		.04
001088830	112	25.00	.97 - 1.10		.04

SUMMARY OF PERFORMANCE DETAIL FOR MIXTURE COMPONENTS

MIXTURE: 000400289 REFERENCE: 278

001315220	4% by vol	Sodium Pentachlorophenate
013107320		Sodium Hydroxide

		PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
NATURAL RUBBER						
	000400289	001	23.00	.01	.02	.16
NEOPRENE						
	000400289	018	23.00	> 7.50		.04
NITRILE						
	000400289	019	23.00	> 15.50		.06
PVC						
	000400289	003	23.00	> 5.00		.02
	000400289	007	23.00	> 15.50		.11

MIXTURE: 000400389 REFERENCE: 104

002980000	10% by wt	Methyl Parathion
000300050	6% by wt	Tenneco 500-100
000300060		Atlox 3403F
000300070		Atlox 3404F
077321850	83% by wt	Water

		PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
NONWOVEN PE						
	002980000	071	23.00	< .08	20.04 - 60.12	
PE						
	002980000	076	23.00	.50 - .75	.20	

MIXTURE: 000400399 REFERENCE: 104

002980000	57% by wt	Methyl Parathion
000300050	36% by wt	Tenneco 500-100
000300060	5% by wt	Atlox 3403F
000300070	2% by wt	Atlox 3404F

		PROD CODE	TEMP (C)	BREAKTHROUGH (HOURS)	PERMEATION RATE (UG/CM^2/MIN)	THICK (CM)
PE						
	002980000	076	23.00	.25	.08	
SARANEX						
	002980000	061	23.00	2.00 - 3.00	.02	

APPENDIX G

VENDOR CODES FOR USE WITH DATA SUMMARIES IN APPENDICES A THROUGH E

VENDOR CODES FOUND IN APPENDICES A THROUGH E

VENDOR CODE	VENDOR NAME
100	Edmont Div. Becton, Dickinson & Co.
101	Granet
102	Ansell Industrial Products
103	Best Manufacturing Company
104	Boss Manufacturing Company
106	Disposables Inc.
107	Durafab Disposables, Inc.
108	Keystone Protection Corp.
110	Glover Latex, Inc.
112	Greene Rubber Co., Inc.
113	ILC Dover
114	International Playtex, Inc.
115	Major Safety Service, Inc.
116	Melco, Inc.
117	Mine Safety Appliances Co.
118	North Hand Protection
119	OKI Supply Co.
120	Pioneer Industrial Products Co.
121	Plastex Protective Products, Inc.
122	PPG Industries, Inc.
123	Protexall Company
124	Safety First Industries
125	SGL Homalite Industries
126	Wheeler Protective Apparel, Inc.
127	E.I. du Pont de Nemours & Co., Inc.
128	Jordan David Safety Products
129	KID AB
140	Allied Glove & Safety Products Corp.
141	The Sager Corporation
142	American Scientific Products
144	Arbill Inc.
145	Body-Guard
146	Cesco Safety Products
147	Charkate
150	Dayton Flexible Products
151	Defense Apparel
153	Direct Safety Company
155	Eastco Industrial Safety Corp.
156	Encon Manufacturing Co.
157	Fairway Products
158	General Scientific Safety Equipment Company
159	Frommelt Industries, Inc.
160	Goodyear Rubber Products Corp.
162	Holcomb Safety Garment Co.
164	Industrial Products Co., Inc.
165	Industrial Safety and Security Co.
166	Interex Corp.
168	Jomac Products Inc.
169	Kappler Disposables, Inc.
170	Kimberly-Clark Corp.
172	Lehigh Safety Shoe Co.

VENDOR CODES FOUND IN APPENDICES A THROUGH E

VENDOR CODE	VENDOR NAME
173	Magid Glove and Safety Mfg. Co.
174	Neese Industries Inc.
175	Pendergast Safety Equipment Co.
176	Plastimayd Corp.
177	Pulmosan Safety Equipment Corp.
178	Rainfair, Inc.
179	Ranger
180	Record Industrial Co.
181	Renco Corp
185	W.H. Salisbury & Co.
187	Singer Safety Co.
188	Standard Glove & Safety Equip. Corp.
189	Standard Safety Equipment Co.
191	LRC Safety Products Co.
192	H. Texier Glove Company Inc.
193	Tingley Rubber Corp.
194	The Tracies Co.
196	United States Safety Service Co.
197	Angelica Uniform Group
198	Vidaro Corp.
201	Falcon Industries, Inc.
202	Oak Medical Supply Co.
203	Colonial Glove & Garment Inc.
204	Monte Glove Company
205	Arrowhead Products
206	Hub Safety Equipment, Inc.
207	Miller Products Co., Inc.
208	Robar Protective Products
209	Fisher Scientific Company
210	Comasec
211	Barry Manufacturing Co. Ltd.
212	Rich Industries
214	Clean Room Products, Inc.
215	Vinylprodukter
216	Erista
220	National Draeger, Inc.
223	Bel-Art Products
225	Coyne Safety Equipment, Inc.
227	Halprin Supply Co.
229	Inco Safety Products Co.
231	Keller Glove Mfg. Co.
232	Latex Glove Co., Inc
233	Leonard Safety Epuipment, Inc.
234	Lion Uniform, Inc.
235	Mar-Mac Manufacturing Co., Inc.
236	National Safety Wear, Inc.
238	Rockford Medical & Safety Co.
239	Safety Engineering & Supply Co.
242	3M Company
244	Intermarket Latex, Inc.
245	Protech Safety Equipment Inc.

VENDOR CODES FOUND IN APPENDICES A THROUGH E

VENDOR CODE	VENDOR NAME
246	Broner Glove Co.
247	Trelleborg, Inc.
248	Masterman's
249	Goodall Rubber Company
500	Oak Technical, Inc.
501	Bard Parker
502	Seiberling
503	Surety-Sure Seal
504	California Safety
505	Handgards Inc.
506	Ackwell
507	Converse Inc.
508	Pharmaseal Laboratories Inc.
509	Nolato
510	Chemical Fabrics Corporation
511	Dow Chemical Company
512	Lab Safety Supply Company
513	Andover Industries, Inc.
514	Acme Mills Company
515	E.D. Bullard Company
516	Cofish International, Inc.
517	Dorsey Safety Products Co.
518	Elliott Glove Company, Inc.
519	Exxon Chemical Company
520	Fyrepel Products Inc.
521	Hy-Test Safety Shoes
522	Iron Age Protective Company
523	La Crosse Footwear, Inc.
524	Panelgraphic Corporation
525	Shelby-Wolverine Glove Company
526	Steele & Associates, Inc.
527	Steel Grip Safety Apparel Co., Inc.
529	United States Plastic Corp.
531	Superior Surgical Mfg. Co., Inc.
532	Willson Safety Products
534	Daffin Disposables, Inc.
535	Aramsco
536	Alliance Supply, Inc.
537	Holland Safety Supply Co.
538	Memphis Glove Company
539	Jones Safety Supply, Inc.
540	Ronco Textile Products, Inc.
541	Safeco Inc.
542	Armin Corporation
543	IPESCo., Inc.
544	Marathon Rubber
545	Stauffer Manufacturing Company
547	Sawyer-Tower
548	E.I. du Pont de Nemours & Company

APPENDIX H

RATIONALE FOR RECOMMENDATIONS IN MATRIX A

1. Overview

CPC chemical resistance information was formed into two data bases:

- Test data including breakthrough times, permeation rates, percent swell, percent elongation, percent weight change and calculated diffusion coefficients from the technical literature and CPC vendors.

- Qualitative ratings (e.g., "excellent," "good," etc.) from CPC vendors, raw materials suppliers and a variety of publications.

There was a separate field for each test and each qualitative rating for each chemical/material pair. The total number of fields was about 10,000.

Algorithms were developed to analyze the information in each data base separately. The results of the analyses were then combined by means of another algorithm to produce the recommendations in Matrix A. The algorithms for each analysis are summarized in the following paragraphs.

2. Test Data

Five types of data were considered: breakthrough time, % swell (volume), % change in elongation, % change in weight due to immersion, and diffusion coefficient. The data were scanned and classified as follows:

Breakthrough Time	Good >1 hour Fair 0.2-1 hour Poor <0.2 hour
% Swell (Volume)	Good <10% Poor >10%
% Elongation Change	Good <20% Poor >20%
% Weight Change	Good <10% Poor >10%
Diffusion Coefficient	Good $<10^{-10}$ cm^2/sec Poor $>10^{-10}$ cm^2/sec
Tensile Strength	Good <10% Poor >10%

On a resistant material by resistant material basis for each chemical, the number of individual products in each classification was totaled. (See Appendix E of Volume I for a listing of the resistant materials.)

The totals in each classification were compared and the resistant material put into one of the following four groups:

I. Significant number of test data indicating excellent resistance to the particular chemical.

II. Relatively few test data showing excellent resistant, or many data indicating good resistance.

III. Many data indicating fair resistance, or a few data indicating poor resistance.

IV. Significant number of test data indicating poor resistance.

The criteria for Group I were at least two tests with breakthrough times greater than 1 hour; no breakthrough times less than 1 hour and no data indicating "poor" resistance in either swelling, weight change, elongation, or diffusion coefficient.

The criterion for Group II was one or more "good" and no "fair" or "poor" in any of the five tests. Alternatively, the material would be put in Group II if there were two breakthrough times greater than 1 hour (with none less than 1 hour) and two or less "poor" in the other four tests.

The criterion for Group III was one or more "fair" or "poor" test results.

The criteria for Group IV were one or more breakthrough times less than 0.2 hour or two breakthrough times less than 1 hour.

3. Qualitative Information

As described in Volume I, Chapter 7, Part 4, qualitative information was normalized to a four grade scale: A, B, C, D. "A" represented excellent resistance and "D" represented poor resistance. Similar to the test data base, the qualitative information was analyzed on a resistant material by resistant material basis for each chemical. The number of ratings in each grade were tabulated and compared in order to assign each chemical/material pair to one of four groups with descriptions analogous to these given above for the test data. In this case, however, qualitative rather than quantitative information is of concern.

The criteria for Group II were less than three A or B ratings and no C or D ratings. Alternatively, Group II conditions would be met by a total of three or more A or B or C ratings, the number of A plus B ratings greater than the number of C ratings, and no D ratings.

The criteria for Group III were less than a total of three C or D ratings or, alternatively, a total of three or more B, C or D ratings with the number of C plus D ratings greater than the number of B ratings.

The criterion for Group IV was a total of three or more C and D ratings.

4. Matrix A Recommendations

The results of the activities described in the two preceding sections were combined to yield the overall recommendations listed in Matrix A of Volume I. The rationale for the combination is described in Volume I, Chapter 7, Part B.

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