United States
Environmental Protection
Agency

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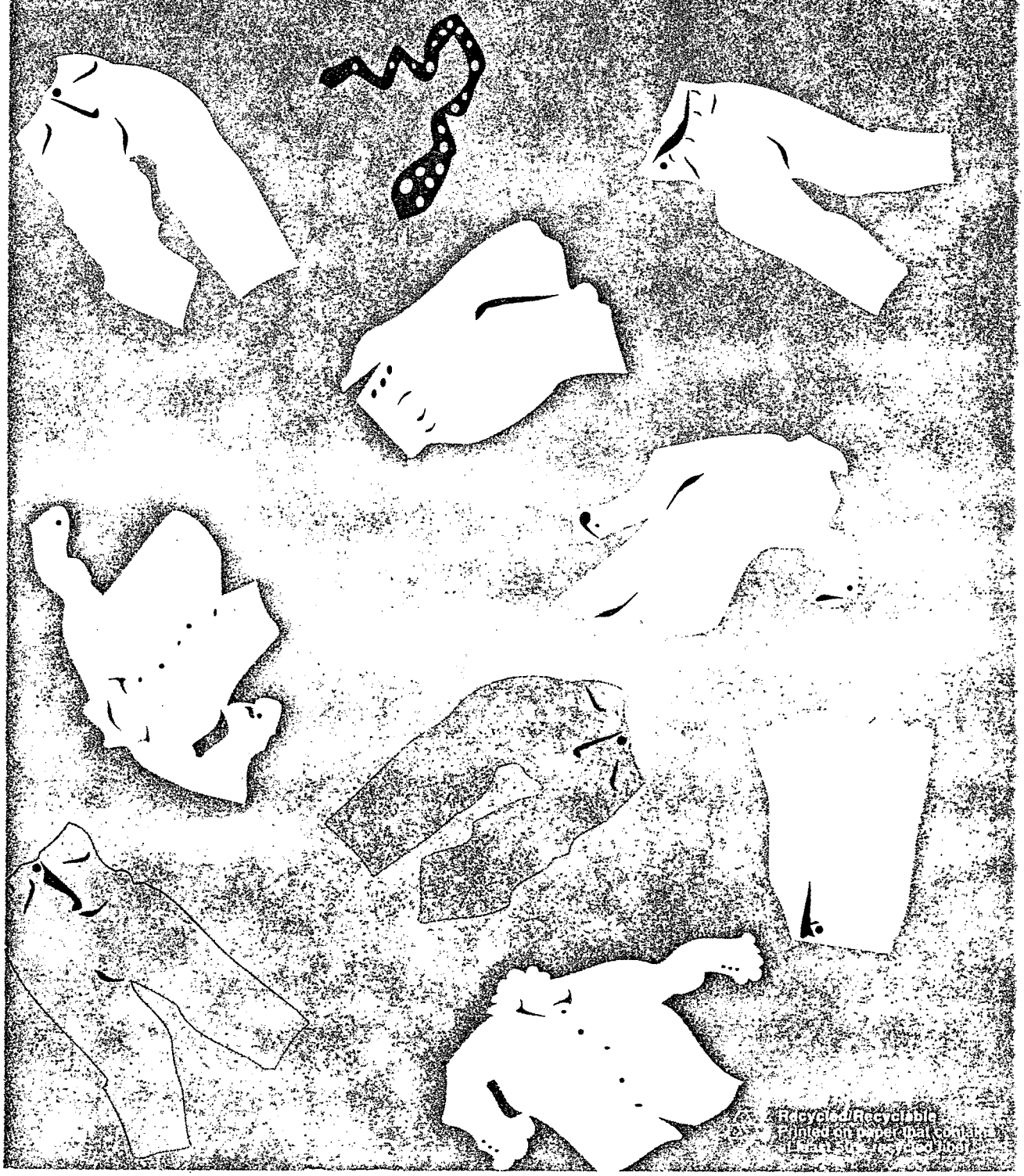
Pollution Prevention and Toxics (7406)

EPA

Summary of a Report on Multiprocess Wet Cleaning



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About This Booklet

To limit individuals' exposure to perchloroethylene, a solvent used in dry cleaning, the U.S. Environmental Protection Agency (EPA), in partnership with the dry cleaning industry and others, is systematically examining alternative technologies and substitute solvents.

In the first of a series of such studies, the Dry Cleaning Partnership examined a technology called "multiprocess wet cleaning." This process principally relies on soap and water to clean clothes. Multiprocess wet cleaning does not use perchloroethylene; however, it may use some solvents for stain and soil removal.

Initial study results indicate that this technology is economically competitive and performs as well, or better, as traditional dry cleaning. Additional research is under way to gauge long-term consumer acceptance, cleaning performance, and commercial viability of the process, as well as to analyze any potential health or environmental risks associated with the process.

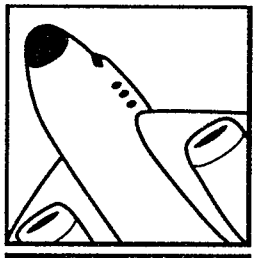
The information contained in this booklet will assist dry cleaners in their mission to be good neighbors and help consumers learn more about how their choices and actions can affect the environment.

This booklet is part of a series of EPA publications on dry cleaning issues and concerns, alternative dry cleaning technologies, and research initiatives. A copy of EPA's full report on multiprocess wet cleaning is available, along with other publications. See the back of this booklet for ordering information.

EPA's Design for the Environment Program

EPA, through its Design for the Environment (DfE) Program, is working with a variety of industries—from dry cleaners to printers to metal platers—to encourage the design of safer processes and products by eliminating or minimizing pollution. DfE conducts collaborative studies and shares research with government agencies, industry groups, public interest groups, universities, and others.

The overall mission of DfE is to cultivate pollution prevention strategies that integrate both environmental and economic objectives. In this way, a critical link can be forged between the need to protect the environment and the need for economic productivity.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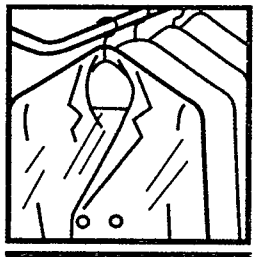
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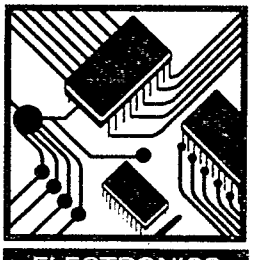
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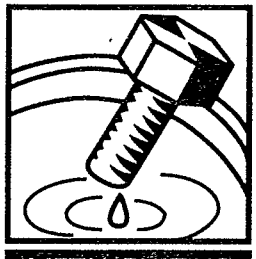
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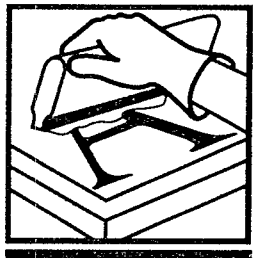
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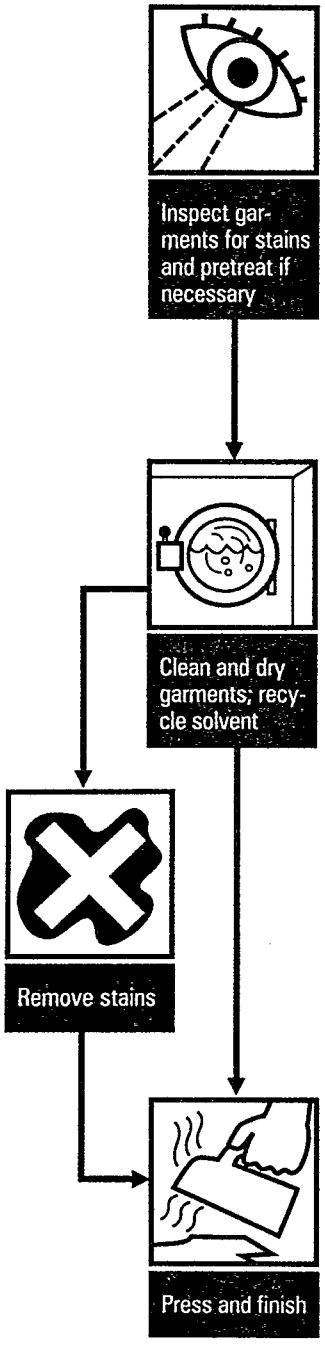
Why Be Concerned About Dry Cleaning?

Dry cleaners use solvents to remove dirt and stains from fabric. Perchloroethylene, commonly known as "perc," is a toxic solvent used by most dry cleaners. Perc is designated as a hazardous air pollutant under the federal Clean Air Act. Because of health and environmental concerns associated with the use of perc, DfE is exploring different technologies that may prove to be viable alternatives for some dry cleaners.

PHOTO: TODD'S YOUR ANSWER, LTD.

How Does Dry Cleaning Work?



Dry cleaning is similar to home laundering except that clothes are washed in solvents instead of soap and water. Dry cleaning avoids saturating fabrics with water. This is significant because certain fabrics (like silk, wool, and rayon) can shrink or be otherwise damaged if immersed in water.

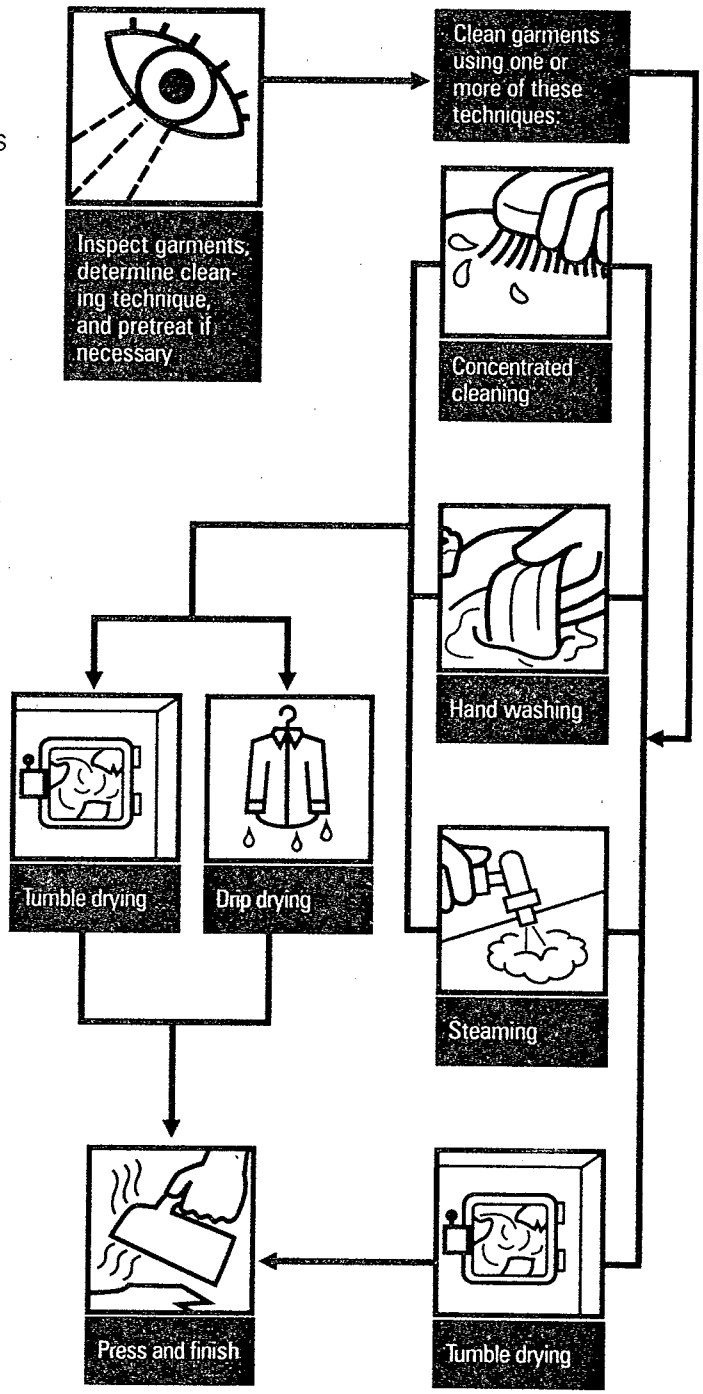
- Before garments are dry cleaned, they are inspected and sorted into dark and light loads. Stained or heavily soiled garments are pretreated.
- The garments are then cleaned in a machine that contains a solvent, a small amount of detergent, and typically a sizing agent. During cleaning, this solution is continuously circulated through a filter. The filter removes any dye that has bled from the garments and any soil that will not dissolve in the solution. The garments are then tumbled in hot air to recover any solvent that remains in the clothing. Dry cleaners recycle spent solvent so that it can be used again in the cleaning process.
- The garments are then removed from the machine and inspected for any remaining stains. If present, these stains are removed.
- Lastly, the garments are "finished" by steaming and pressing.

Used filters and cleaning residues contain solvent and are considered hazardous waste. These should be disposed of according to applicable regulations.

What Is "Multiprocess Wet Cleaning"?

Multiprocess wet cleaning is a method for hand cleaning clothes that uses soaps and a **controlled** application of water. It is called "multiprocess" because a number of different steps can be included in the cleaning process, depending on the type of fabric and the type of spots, stains, or soil to be removed. Unlike dry cleaning, where nearly every garment receives a standard treatment, in multiprocess wet cleaning, the treatment is customized for each garment.

A cleaning technician inspects every incoming garment for dirt and stains. The technician then determines which cleaning techniques should be applied. Typically, a combination of techniques are used to clean a single garment. Depending on the garment, it is then either tumble dried in a machine or hung to dry.



PHOTO, TODD'S YOUR ANSWER, LTD.

The cleaning techniques used in the process can be grouped into four general categories:

- **Concentrated Cleaning.** A concentrated cleaning solution is applied to very soiled garments and heavy clothes (like raincoats and down jackets). A wire brush might be used on difficult stains. The garments are then hung to dry.
- **Steaming.** Garments with difficult stains, odors, or soiling are subjected to extensive steaming, spotting, and tumble drying.
- **Handwashing.** Delicate and washable fabrics (those that will not be damaged by saturation in water) are immersed in soapy water and gently handwashed. These garments are then hung to dry instead of being put in a dryer.
- **Tumble Drying.** Garments that are not stained and simply need to be freshened are run through a tumble dryer. A sheet of scented fabric softener may be used.

After cleaning, all garments are pressed and finished with the same equipment used by dry cleaners.

Does Multiprocess Wet Cleaning Work?

In November and December of 1992, EPA, the Neighborhood Cleaners' Association (NCA), the International Fabricare Institute (IFI), the Massachusetts Toxics Use Reduction Institute, and EcoClean (the commercial vendor of the wet cleaning process) collaborated on a study to measure the performance of the two technologies. *The study indicated that multiprocess wet cleaning performed as well as or better than traditional dry*

cleaning. These promising findings are preliminary, however, since the study was short-term and not designed to collect certain types of data that will help in fully measuring the effectiveness of the two technologies.

Measuring Performance

The Dry Cleaning Partnership conducted tests to measure the effectiveness of multiprocess wet cleaning and traditional dry cleaning:

Customer Satisfaction

In one test, the Partnership cleaned approximately 1,500 garments (belonging to government employees who participated in the study) at the New York School of Dry Cleaning. Approximately half of the garments were randomly chosen to be cleaned by multiprocess wet cleaning. The other half were dry cleaned. Participants completed postcards to express their opinions about the quality of the cleaning job performed on the garment; they did not know which technology had been used to clean their garment. *Garments cleaned with multiprocess wet cleaning scored equal to or better than those that were dry cleaned.*

Performance Wear

In another test, 13 volunteers were given two identical garments. They wore each garment for two days at a time, and then the garment was cleaned using one of the two processes. Each garment was worn and cleaned three times. The volunteers did not know which process had been used to clean their garments. The purpose of the test was to help determine whether wear would affect the performance of the two cleaning processes. After cleaning, the volunteers evaluated the clothes for such factors as cleanliness, press and finish, removal of stains and spots, and change in color of the cleaned clothes. *Volunteers judged the wet cleaned garments to be slightly better than those that were dry cleaned.*

The garments worn by the volunteers also were evaluated for overall appearance, shrinkage, odor, color change, feel, and damage such as stretching or pilling. *The garments that were wet cleaned and dry cleaned generally received similar scores; however, the wet cleaned garments received higher marks for appearance and odor.*

The results of the performance wear evaluation are preliminary due to such factors as the short duration of the study, the limited quantity of data gathered, and the wear and cleaning patterns of the test garments (which may not be typical of normal consumer wear). These issues are being addressed through additional research.

How Much Does Multiprocess Wet Cleaning Cost?

Using information from dry cleaning experts and from the 1992 demonstration project, EPA compared the costs of dry cleaning versus multiprocess wet cleaning. The study was based on a start-up, hypothetical cleaning facility with an annual sales volume of $260,000 ($5,000 per week).

Economic modeling indicated that the total annual costs would be very similar for dedicated dry and wet cleaning facilities. The higher labor costs associated with the multiprocess wet cleaning process would be offset by significantly lower costs for equipment and supplies (see box below). Another benefit of multiprocess wet cleaning is that it does not entail hazardous waste disposal.

Annual Cost Comparison*

	Dry Cleaning	Wet Cleaning
Total Annual Costs	$43,920	$43,880
Labor	5,000	15,500
Equipment	47,200	540

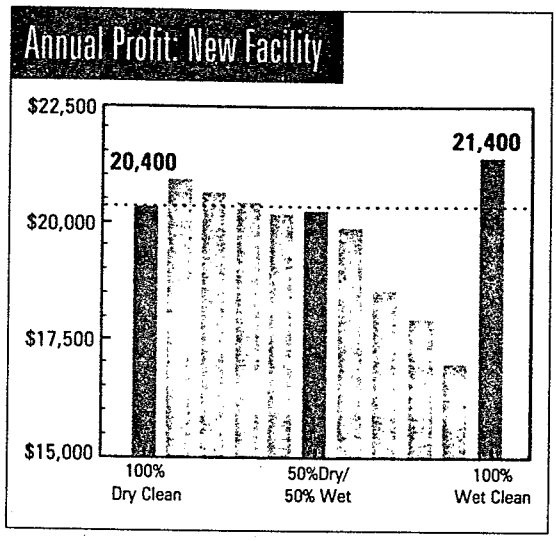
*It should be noted that this table presents only those costs that varied significantly between the two processes; there are other costs associated with both dry and wet cleaning that are not listed above.

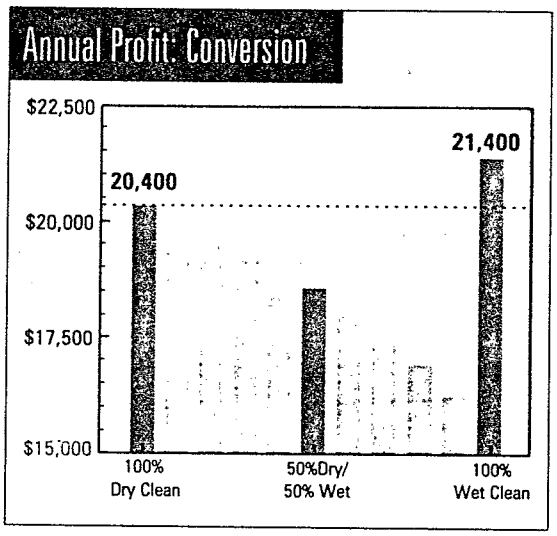
Is Multiprocess Wet Cleaning Profitable?

The model also showed that new, "dedicated" wet cleaning facilities (those that do 100 percent wet cleaning) can realize greater profits and a higher return on investment than dedicated dry cleaners. The return on investment is estimated to be 26.3 percent for multiprocess wet cleaning versus 14.8 percent for dry cleaning.

New facilities that do a mix of wet and dry cleaning can be as profitable as dedicated dry cleaners, so long as wet cleaning does not exceed 50 percent of the cleaning volume. Beyond the 50-percent point, multiprocess wet cleaning is still profitable, but profitability declines because dry cleaning equipment is being underutilized.

For facilities that are considering retrofitting to do a mix of wet and dry cleaning, the profitability scenario is not as attractive. The more multiprocess wet cleaning such facilities do, the more underutilized their dry cleaning equipment will be. If a facility replaces its dry cleaning equipment and converts to dedicated multiprocess wet cleaning, however, it can be as profitable as a new, dedicated multiprocess wet cleaning facility.





What Is the Future of Multiprocess Wet Cleaning?

Multiprocess wet cleaning is a promising technology. Initial studies indicate that it is cost-effective and performs well. Most importantly, the technology has the potential to reduce the need for dry cleaning solvents. More research is needed, however, before any definitive conclusions can be made about the future of multiprocess wet cleaning in this country. These include:

- Multiprocess wet cleaning is more labor-intensive and less automated than dry cleaning.
- Care labeling rules might prevent the widespread use of wet cleaning on garments that are labeled "dry clean only."
- More research is needed to determine whether the process cleans garments to an acceptable level on a long-term basis.
- As with any promising technology, the potential health and environmental risks associated with the process must be analyzed.

EPA is planning a longer-term study to further investigate the viability of multiprocess wet cleaning and several other cleaning technologies. The results of these studies will be published when they become available.

The information being generated by the Dry Cleaning Partnership can help dry cleaners evaluate the health and environmental impacts of their business decisions and consider, where feasible, alternative ways of doing business. This information can be especially important as dry cleaners face the possibility of increased regulation at the federal, state, and local levels. The data the Partnership is gathering can also assist individual consumers as they make everyday decisions about which products to buy and services to use.

PHOTO: NEIGHBORHOOD CLEANERS ASSOCIATION

How Can I Get More Information?

For more information or to obtain a copy of EPA's full report entitled *Multiprocess Wet Cleaning: Cost and Performance Comparison of Conventional Dry Cleaning and an Alternative Process*, write to the Pollution Prevention Information Clearinghouse (PPIC), U.S. Environmental Protection Agency, 401 M Street, SW. (3404), Washington, DC 20460, or call 202-260-1023 and request a copy of document number EPA744-R-93-004.

The document also is available at a cost of $12 from the Government Printing Office (GPO). Call 202-783-3238 and ask for document number EPA 744-R-093-004, or write to GPO, 732 North Capitol Street, NE., Washington, DC 20401.

Contributors to EPA's Research on Pollution Prevention in the Dry Cleaning Industry

The following organizations, companies, and government agencies contributed to EPA's study of pollution prevention in the dry cleaning industry:

Amalgamated Clothing and Textile Workers Union

Center For Neighborhood Technology

The Dow Chemical Company

Dryclean USA, Inc.

Dry Cleaners and Launderers Institute of Ontario

EcoClean International, Inc.

Environment Canada

Fabricare Legislative and Regulatory Educational Organization (FLARE)

Greenpeace

Halogenated Solvents Industry Alliance

The International Fabricare Institute

The Massachusetts Toxics Use Reduction Institute

The Neighborhood Cleaners Association

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