Garment Care Fact Sheet

Green Cleaning

What is Green Cleaning?

Green Cleaning refers to fabric cleaning processes that are environmentally preferable to the use of perchloroethylene (perc), a probable carcinogen that also may harm liver and kidneys via inhalation. Petroleum solvents were first used in dry cleaning but lost ground to the use of perc because perc is less of a fire hazard. However, there has been considerable interest in alternatives to perc due to concerns over toxicity, and regulatory and liability burdens associated with it, as many dry cleaning plants are located in residential neighborhoods. The U.S. EPA Design for the Environment, in partnership with the garment cleaning industry and others, has encouraged a number of alternative technologies. This fact sheet describes wet cleaning, which is the most promising environmentally preferable process alternative. Other alternatives to dry cleaning are also identified. Environmental impacts and legal requirements for alternative technologies are also listed.

Why Use Green Cleaning Technologies?

Background

Conventional dry cleaning cleans garments with either perchloroethylene, commonly referred to as perc, or petroleum or hydrocarbon solvents. Perc is the solvent used in 80% of dry cleaning facilities. Petroleum or hydrocarbon solvents, which include Stoddard solvent, DF-2000 and 140 degrees F solvent are used in the remaining 20% of facilities. The primary drawback to dry cleaning is that perc and/or petroleum solvents are hazardous substances. Perc is a chlorinated solvent and is listed as a probable carcinogen. Newer processes, from professional wet cleaning, to non-chlorinated solvents, and liquid carbon dioxide, may help the professional cleaning industry avoid liability and minimize costly regulation.

Wet Cleaning

Machine wet cleaning is a commercially available cleaning process to replace dry cleaning. Wet cleaning refers to garment cleaning that uses water as the primary solvent following essentially the same steps as dry cleaning. Wet cleaning utilizes spot removers, a solvent (water) in computer-controlled washing machines, with specialized detergents. It also uses dryers and skilled technicians to effectively and safely clean a wide variety of textiles. Studies show that wet cleaning can effectively remove a wide variety of soils from textiles with reduced environmental and health and safety concerns.

Machine wet cleaning eliminates the use of perc and the air emissions and regulatory requirements associated with use of it. The wet cleaning process uses detergents, stain removers and finishes that are generally non-toxic and not hazardous, although water use and wastewater discharges may increase. Water from the wet cleaning process is considered domestic sewage and may be discharged to the sewage treatment plant. Some stain removers may generate hazardous waste (see Appendix A).

Emerging Technologies

Carbon dioxide: A carbon dioxide (CO_2) process that uses CO_2 in a liquid state is being developed for fabric cleaning. CO_2 eliminates the use of toxic chemicals and the management of waste and emissions but presents safety and management challenges due to the high pressure required in the cleaning machine.

Organic hydrocarbon solvent: New non-chlorinated petroleum solvents are being formulated that are less of a fire hazard (having flash points lower than 140 degrees F). Liquid wastes from using these substances may be hazardous, but their air emissions may not be. Higher flash point organic hydrocarbon solvents have been developed and are in use under proprietary technologies such as Rynex™.

Ozone; Ultrasonic: Other garment cleaning methods being researched include ozonated water and ultrasonic cleaning. Aqueous-based ultrasonic cleaning which has been used in industrial cleaning applications is now being researched for garment cleaning.

For More Information on Wet Cleaning

1. Training Curriculum for Alternative Clothes Cleaning. Published by the Massachusetts Toxics Use Reduction Institute. PDF version: www.epa.gov/opptintr/dfe/pubs/garment/tech_rep/clothes.pdf
2. Wetcleaning Equipment Report, A report on washers, dryers, finishing equipment, and detergents for machine-based professional wetcleaning. By Anthony Star and Cindy Vasquez. Published by the Center for Neighborhood Technology, Chicago, IL. PDF version: http://www.cnt.org/wetcleaning/final-report/
3. CT has one garment cleaning shop that lists a wetcleaning option, Pure Elegance, in Westport, CT. Owner is Mike Wizell, (203) 221-7448.
4. Pollution Prevention Products for Illinois Dry Cleaners: Testing and Recommendations of Chemicals for Drycleaning, A Report of the Center for Neighborhood Technology, Chicago, IL, April 2004. Website PDF: http://www.wmrc.uiuc.edu/main_sections/info_services/library_docs/RR/RR-106.pdf
5. Commercialization of Professional Wet Cleaning: An Evaluation of the Opportunities and Factors involved in Switching to a Pollution Prevention Technology in the Garment Care Industry. *Pollution Prevention Education and Research Center: Occidental College*. October 28, 2002 (.pdf file, 947 KB, 145 pp.) Website PDF: http://departments.oxy.edu/uepi/pperc/publications.htm
6. EPA Design for the Environment Garment and Textile Care Partnership Publications http://www.epa.gov/opptintr/dfe/pubs#garm