

Cleaner Technology Demonstration Site Case Study

Utopia Cleaners, Arlington, MA

Garment Wet Cleaning

Summary

Perchloroethylene, or perc, is the cleaning agent used by over 80% of U.S. dry cleaners. More than 30,000 dry cleaning machines nationwide used 270 million pounds of perc in 1991, two thirds of which was lost to the atmosphere.⁽¹⁾ Though emission control technologies have helped to reduce the volume of perc that is lost, large amounts of perc are still used by the dry cleaning industry. In recent years studies have identified ecological and human health hazards associated with perc usage,⁽²⁾ prompting users and consumers to seek alternative processes. One garment cleaning alternative that has emerged uses water and biodegradable detergents to remove soils. Utopia Cleaners of Arlington, Massachusetts has purchased a DaeWoo wet cleaning machine which replaced its perc dry cleaning machine, making Utopia a perc-free garment cleaning facility.

Background

There are two basic types of dry cleaning systems: transfer and dry-to-dry. In transfer systems garments are immersed in perc and then transferred by the operator to a separate drying machine. Prior to adopting wet cleaning, Utopia operated a dry-to-dry machine in which garments are immersed in perc,

extracted and dried in the same machine. Perc is an effective cleaning agent because it is able to penetrate fibers and dissolve lipophilic (non-water soluble) soils such as oils, greases and fats with minimal damage to garments.

There is ongoing debate about the carcinogenicity of perc, with varying positions being taken by different agencies. For example, while the U.S. Environmental Protection Agency (EPA) considers perc a suspect carcinogen, the National Institute for Occupational Safety and Health (NIOSH) recommends that perc be handled as a human carcinogen, and the International Agency for Research on Cancer (IARC) classified perc as a probable carcinogen in 1995.

Garment Wet Cleaning

Garment wet cleaning is an effective way to reduce significantly or eliminate the need for perc dry cleaning of fabrics. Two types of garment wet cleaning are currently in use: multiprocess wet cleaning and machine wet cleaning. In multiprocess wet cleaning each garment is handled individually and cleaned using a combination of steaming, spotting, gentle hand washing, scrubbing, tumbling, and/or hang drying. Machine wet cleaning allows the operator to program the cleaning time, the amount of mechanical action, the temperature, and the degree of water extraction specific to the type of garments being washed. A special dryer may be used to monitor the amount of moisture remaining in the garments, thereby avoiding shrinkage caused by over drying.

Utopia initially used wet cleaning as a supplement to its perc system and as it became more familiar with the benefits, chose to replace its perc system with wet cleaning machines. The DaeWoo system purchased by Utopia is a relatively simple, moderately priced cleaning machine with less programming flexibility

than more costly models. The detergents used in machine wet cleaning contain surfactants to remove lipophilic stains and enzymes to remove food stains. These cleaning agents are pH neutral and biodegradable. Garments cleaned in wet cleaning systems are often more wrinkled than those cleaned in perc. In order to maintain the high quality of its service, Utopia has purchased state-of-the-art pressing equipment and has slightly increased the time spent finishing each garment.

Toxics Use Reduction Assessment

- Before changing to wet cleaning, Utopia used 150 to 175 gallons (2025 to 2363 pounds) of perc annually. Approximately 3,600 pounds of perc contaminated waste was removed by a hazardous waste handler annually, including still bottoms and filters.
- Utopia currently generates no hazardous waste and is no longer regulated under the Clean Air Act.
- The operators and customers of Utopia are no longer exposed to perc in the air.
- The owner of Utopia posted information about wet cleaning during his transition period and some customers now request that their garments be cleaned using wet cleaning only.

Economic Assessment

- The cost of replacing the existing perc system at Utopia, which was at the end of its useful life, would have been approximately \$40,000. The DaeWoo wet cleaning machine used at Utopia can be purchased for approximately \$1,000, and has approximately one-quarter the capacity of the previously used dry cleaning machine.
- The cost of disposing of spent perc is approximately \$100 per twelve gallon drum. By using aqueous cleaners Utopia saves approximately \$1,800 in disposal costs annually. Additional savings occur through reduced liability for any damages associated with the disposal of perc-contaminated wastes.
- With the cost of one gallon of perc at approximately \$5.50, Utopia saves between \$825 and \$963 in procurement costs annually.

- According to a study done by Environment Canada, the utility costs of wet cleaning are only \$0.02 per day more than dry cleaning based on one hundred pieces per day. This may vary depending on the region and the systems being compared. The two systems compared by Environment Canada were a fifty pound IPSO wet cleaning system, with programmable wash cycles and a frequency controlled motor, and a 55 pound Lindus closed-loop, refrigerated, dry-to-dry perc system.

Transferability

Although the capabilities of this system are not fully understood at this time, Utopia expects to process 80% of the garments they handle in the wet system and send out the remaining 20% to a conventional perc dry cleaner under the same ownership. However, there are a growing number of facilities in the United States and countless abroad that process all garments in wet cleaning machines. The low capital cost of the system installed by Utopia makes wet cleaning an attractive alternative or supplement to dry cleaning when examining the increasing regulation and associated costs of perc dry cleaning.

This case study is part of the Toxics Use Reduction Institute's Cleaner Technology Demonstration Sites Program.

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