

Pollution Prevention in the Garment Care Industry:

Assessing the Viability of Professional Wet Cleaning

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Dedication

This Report is dedicated to the late Julie Roque. Through her passionate pursuit of the ideals and goals of pollution prevention, which she understood were embedded in the complexities of analysis and the details of evaluation, she was always available to work with and assist those seeking to identify pollution prevention solutions. We continue to miss her.

Disclaimer

The statements and conclusions in this report are those of the Pollution Prevention Education and Research Center and not necessarily those of any institution that has funded this work. The mention of commercial products, their source, or their use in connection with material reported herein is not to be construed as actual or implied endorsements of such products.

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Abstract

The report analyzes the viability of Cleaner by Nature, a 100% professional wet cleaner, and whether professional wet cleaning represents a viable pollution prevention approach in eliminating perchloroethylene (PCE), a chemical solvent used in dry cleaning. PCE, which has been identified as a toxic air contaminant and probable human carcinogen, is heavily regulated in terms of its use in dry cleaning. The analysis includes a comprehensive plant level case study, and comparative performance, financial, and environmental assessments of wet cleaning and PCE-based dry cleaning. The major issues associated with the viability analyses were identified and specific information was collected in relation to how the clothes were cleaned (a customer garment profile, a problem garment analysis, a technical evaluation or repeat clean test, a wearer survey, and customer satisfaction surveys); how wet cleaning did financially (a start-up cost analysis and a profit/loss analysis); what environmental impacts were identified (water, energy, and chemical inputs and outputs); and what contributing factors (technology changes, garment manufacturing and labeling, and regulatory or legislative actions) influence the viability of professional wet cleaning.

Executive Summary

Background

For more than forty years, the vast majority of dry cleaners have relied on perchloroethylene (PCE) as the solvent used to clean clothes as part of the dry cleaning process. This use has made dry cleaners the single largest market for PCE. In recent years, however, a wide array of scientific studies and federal, state, and local regulatory actions have focused on PCE's health and environmental risks. Costly regulatory and liability actions have created significant economic burdens for cleaners, most of whom are small businesses. These pressures have prompted a search for alternative cleaning processes.

The Research Question

In the past few years, computer-controlled washers and dryers have been developed to facilitate the professional cleaning of delicate clothes in water rather than with PCE. Though still a small segment of the garment care industry, the entry of this wet cleaning process has triggered a widespread debate about its viability and whether it represents an alternative to PCE-based dry cleaning. To answer the question of wet cleaning viability, the Pollution Prevention Education and Research Center (PPEREC) undertook a 12-month case study evaluation of a fully operational, privately-owned, professional wet clean facility. This facility, called Cleaner by Nature, was the first 100% wet clean facility in its region (that is, it accepted and professionally wet cleaned the garments that would be cleaned by a typical dry cleaner).

Methods

This report, "Pollution Prevention in the Garment Care Industry: Assessing the Viability of Professional Wet Cleaning," analyzes whether Cleaner by Nature has become a viable business. It also seeks to analyze whether professional wet cleaning, in comparison to dry cleaning, represents a viable potential pollution prevention approach. The assessment of viability is based on a plant level case study and a comparative analysis of professional wet cleaning and dry cleaning in three key arenas: *performance* (evaluating how clothes were cleaned and customers responded), *financial* (evaluating start-up costs, cash flow, and profit and loss), and *environmental* (identifying and measuring various environmental inputs and outputs). Additional contributing factors, such as the risks, liabilities, and uncertainties of both processes, have also been discussed. This evaluation of professional wet cleaning was based on facilities that seek to clean all garments brought in for cleaning rather than "mixed use" facilities where both dry clean and wet clean machines are utilized on site. Such an assessment of a mixed use facility would require a different set of methods and data points and would pose different research questions.

Results

Performance Assessment: In terms of customer satisfaction and technical performance, Cleaner by Nature's cleaning capability was broadly comparable to that of dry cleaning.

During its first year of operation, Cleaner by Nature cleaned the full range of garments that are typically taken to a dry cleaner, rejecting less than two-tenths of one percent of the 34,950 customer garments. Cleaner by Nature reported few problems in terms of claims or garments returned for additional work. Garments for which Cleaner by Nature compensated customers either with cash or store credit accounted for less than one half of one tenth of one percent of customer garments. Problems diminished over time as the wet cleaner gained experience. Comparison data on garments returned for additional work showed that Cleaner by Nature's performance was comparable to dry cleaning. Shrinkage and pressing posed relatively more of a problem for Cleaner by Nature, while stain removal was identified as more of a problem for the dry cleaner.

A technical performance evaluation compared how wet cleaning and dry cleaning performed on 40 sets of identical garments after repeated cleaning and wear. Color consistency and color migration were the areas where slightly greater problems for wet cleaning were most noted, although overall changes in color for both wet cleaned and dry cleaned garments were seen as comparable. There was slightly greater dimensional change in the length (but not in the width) for wet cleaning, although the difference in average length measurement between the two processes (less than one third of one percent) was not statistically significant. There were also slightly greater problems in the areas of pressing and general appearance in wet cleaning, while there were slightly greater problems for dry cleaning in damage to the fabric or buttons. Substantially more evaluators identified a chemical or "dry cleaning" odor for the dry cleaned garments, although all garments had an acceptable odor. Volunteers wearing the test garments indicated greater overall satisfaction with the wet cleaned garments, with slightly greater detection of shrinkage for wet cleaning and of stretching for dry cleaning, and slightly greater problems for dry cleaning in stain removal and damage to fabrics or buttons. Comparative data on dimensional change from two similar studies showed that, for woven garments, there was a slightly greater amount of change in the length for wet cleaned garments, while the widthwise change was comparable among the wet cleaned and dry cleaned garments. For knit garments, while there was a substantially greater amount of dimensional change compared to woven garments, regardless of the cleaning method, this change was barely detectable by volunteer wearers.

Customer satisfaction is an important measure of performance in a service industry. More than 90% of customers surveyed rated Cleaner by Nature as good or excellent and more than 90% said they would recommend the business to a friend. A parallel survey was conducted of dry cleaning customers. A comparison of the results showed that customers rated Cleaner by Nature as equal to or better than dry cleaning in nearly all the performance areas, with significantly greater satisfaction for wet cleaning in

terms of color, feel, smell, and lack of damage to buttons or decorations. There was also continuing growth of new customers for Cleaner by Nature during the year. More than three-quarters of customers surveyed who used Cleaner by Nature at least once still considered themselves customers.

Financial Assessment: In terms of financial viability, Cleaner by Nature became profitable by the fourth quarter of its first year of operation while overall costs were comparable between wet cleaning and dry cleaning.

Cleaner by Nature built a loyal customer base and significantly increased its revenues during its first year of operation. While losses were recorded during its first year, Cleaner by Nature succeeded in making a profit of 3% by its fourth quarter. By taking into account the fact that Cleaner by Nature has been operating both a plant and a drop-off store as part of its future expansion plans, a model plant analysis was developed to evaluate Cleaner by Nature as if it were a typical cleaner operating at a single location. This analysis indicated that Cleaner by Nature would have achieved a 10% profit in its fourth quarter. Revenues have continued to increase since the demonstration period, with profits for the second year projected to be more than 17%.

The comparative cost analysis of wet cleaning and dry cleaning revealed that Cleaner by Nature's equipment costs (both purchase price and maintenance) were lower than those of a similarly configured dry cleaner. The purchase costs for the wet cleaning systems, including less expensive wet clean machines and more expensive pressing equipment, were 9% lower than for the dry cleaning systems. Yearly equipment expenses (including use, installation and maintenance) were 31% less for wet cleaning than dry cleaning. However, costs for soaps and labor were higher for wet cleaning than for dry cleaning. The higher labor costs for wet cleaning were due to the additional time needed for pressing garments. A range of studies, including a PPERC pressing time evaluation, have identified pressing as more time-consuming for wet cleaning than for dry cleaning. Although pressing labor has been identified as a challenge in wet cleaning, Cleaner by Nature's fourth quarter pressing wages as a percentage of revenue (11%) were nevertheless close to industry expectations for a profitable cleaner (10%). The tradeoff between higher equipment costs for dry cleaning and higher labor costs for wet cleaning meant that overall operating costs for wet cleaning and dry cleaning were similar. However, dry cleaning expenses would be greater for dry cleaners in those states where dry cleaner-supported liability reduction measures have been enacted and when liability insurance is purchased.

Environmental Assessment: In terms of the environmental assessment, no substantial environmental concerns were raised by the environmental evaluation of wet cleaning, while dry cleaning's environmental impacts, though reduced with new control technologies, are still considerable.

An increase in regional water use has been identified as a possible negative environmental consequence of a switch to professional wet cleaning. However, this study

indicates that, with conservative assumptions, regional water demands would increase by only 0.021% (equivalent to a population increase in Southern California of 3,036 people) if every dry clean facility in the region was converted to professional wet cleaning. Such a scenario did not generate concern among regional water planners. In addition, the Los Angeles Bureau of Sanitation's wastewater analysis of Cleaner by Nature indicates that wet cleaning effluent meets all regulatory standards and generates few environmental impacts. These findings are confirmed by three prior studies of wet cleaning effluent. While regulations and equipment have been developed to reduce the risk of groundwater contamination from PCE dry cleaners, the risk of spills or illegal handling of PCE-contaminated material cannot be eliminated. The loss of one small production well from groundwater contamination due to PCE would offset any increases in water use if all dry cleaners in the region converted to professional wet cleaning.

Energy use data gathered at Cleaner by Nature and modeled for dry cleaning indicates that energy use is comparable for both processes. Wet cleaning uses more natural gas than dry cleaning and less electricity. Since natural gas generation produces relatively fewer pollutants than electricity generation, wet cleaning's lower electricity use offsets its greater use of natural gas.

New dry cleaning equipment has improved efficiencies in chemical use and reduced chemical outputs. However, air emissions of PCE from dry cleaning cannot be eliminated entirely, even with the newest technology. At the regional level, PCE emissions are projected to be 4.2 tons per day for 1998, assuming full regulatory compliance. The generation of hazardous waste is also substantially greater in dry cleaning as a consequence of PCE use. Because it eliminates the use of PCE in the garment care process, wet cleaning can be considered an environmentally preferable pollution prevention alternative.

Finally, contributing factors, such as technology changes, garment manufacturing and care labeling, regulatory, legal, and legislative processes also have significance in terms of the future viability of wet cleaning and dry cleaning. Technology innovation and technology costs, changes in garment manufacturing and care labeling, and marketing factors may have the most influence on wet cleaning, while regulatory and liability factors would have the most significant impacts for dry cleaning.

Conclusion and Recommendations

In conclusion, pollution prevention approaches can help identify viable technologies or processes which eliminate or reduce negative environmental impacts for the community and in the workplace. The case study of Cleaner by Nature demonstrates that a professional wet cleaner could make a profit by successfully cleaning customer garments that would have otherwise been dry cleaned. While case studies focus on one particular case, by systematically comparing wet cleaning and dry cleaning through a model plant analysis and an analysis that scales these results to the regional level, and by also undertaking a comparison of the results to other case studies of wet cleaning, it is

possible to make a judgment about the overall viability of wet cleaning as a business. While there remain challenges in cleaning garments for both wet cleaning and dry cleaning (e.g., shrinkage and color migration in wet cleaning and stretching and spotting in dry cleaning) and while there are financial tradeoffs for both businesses (e.g., higher labor and detergent costs for wet cleaning and higher equipment and liability costs for dry cleaning), these performance and financial differences remain small. On the other hand, environmental impacts are significantly greater for dry cleaning, due to PCE use as the cleaning solvent in dry cleaning. Based on this comparative analysis, the study concludes that professional wet cleaning constitutes a viable pollution prevention approach for the garment care industry.

The study then identifies a number of policy recommendations. These include providing information and technical assistance to cleaners about wet cleaning, economic incentives to facilitate a transition to wet cleaning, and regulatory action, including the designation of wet cleaning as best available control technology.