Commercialization of Environmental Technologies in the Garment Care Industry

Final Report
January 31, 2008

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Acknowledgements

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Support for this report was made available through: the United States Environmental Protection Agency, The Bay Area Air Quality Management District, Pacific Gas & Electric, and The California Wellness Foundation.
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Abstract

This report, “Commercialization of Environmental Technologies in the Garment Care Industry” is one in a series of reports by the Pollution Prevention Center at Occidental College designed to address the significant environmental and health impacts associated with the use of perchloroethylene (PCE), the chemical cleaning solvent used by the vast majority of dry cleaners in the United States. To help jump-start the diffusion of professional wet cleaning and CO2 dry cleaning, non-toxic alternatives to dry cleaning, study authors administered a grant program to provide financial and technical assistance to four cleaners in the Bay Area and two cleaners in the San Diego region interested in switching from dry cleaning to professional wet cleaning and/or CO2 cleaning, and in serving as demonstration sites. A successful outreach campaign to recruit applicants to the grant program included: information articles in the regional trade press, direct mail flyers sent to cleaners in the region describing the grant program and announcing workshops and seminars, and workshops and seminars hosted by demonstration site cleaners. As consequences of these outreach efforts, 300 cleaners contacted the project staff for information on the grant program, 199 cleaners attended workshops and seminars, and 20 applications to the grant program were received. The six cleaners selected as demonstration site grantees were converted over an eighteen month period. Of the six cleaners selected, five switched to professional wet cleaning and one was a new CO2/wet cleaning facility. Technical evaluation was conducted on the five facilities who operated a PCE dry cleaning immediately prior to converting to professional wet cleaning. These five demonstration cleaners showed that they were able to maintain their level of service and customer base after switching to professional wet cleaning. Financial analysis revealed lowered operating costs, and the resource evaluation showed lowered electricity use after switching to professional wet cleaning. In regards to owner satisfaction, each of the demonstration site cleaners considered their decision to switch to professional wet cleaning to be a good business decision and would recommend professional wet cleaning to other dry cleaners needing to replace their existing cleaning equipment. The evaluation also revealed that training and the availability of demonstration sites as primary factors facilitating a more rapid transition to this environmental technologies. Implementation of the demonstration project resulted in the development of a regional infrastructure in the Bay Area and San Diego that will support further diffusion. The study concludes with a series of recommendations to further promote the diffusion of professional wet cleaning and CO2 dry cleaning, including education, stakeholder, and policy and program recommendations for the Bay Area region, San Diego region, and beyond.
Executive Summary

Background

This report, “Commercialization of Environmental Technologies in the Garment Care Industry” is one in a series of reports by the Pollution Prevention Center at Occidental College evaluating the prospects for pollution prevention in the garment care industry.

Since the 1950s, 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. 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.

Over the past few years, a number of alternatives to PCE dry cleaning have emerged including professional wet cleaning and CO₂ dry cleaning. Professional wet cleaning is the process of cleaning delicate garments in water using computer-controlled washers and dryers, specially-formulated detergents, and specialized finishing equipment. CO₂ dry cleaning compresses CO₂ into a liquid solvent for cleaning delicate garments.

The diffusion of professional wet cleaning and CO₂ dry cleaning as substitutes for dry cleaning has been slow. For professional wet cleaning, barriers to diffusion include a lack of awareness by garment care professionals about the technology, cleaners’ concerns about technical feasibility and customer reaction, lack of sufficient training and technical support to cleaners converting, lack of sufficient knowledge about professional wet cleaning among other industry stakeholders, and care labeling laws and apparel manufacturing practices that favor dry cleaning. For CO₂ dry cleaning, the biggest barrier is the cost of equipment. CO₂ machines cost twice that of comparably sized PCE dry clean systems.

Since 1995, the Pollution Prevention Center at Occidental College, has been administering a success commercialization for professional wet cleaning in the greater Los Angeles region. This current report is the first study to evaluate a project designed to jump-start professional wet cleaning and CO₂ dry cleaning in the Bay Area and San Diego by recruiting cleaners to operate dedicated professional wet cleaning and/or CO₂ dry cleaning facilities. The study describes the process of recruiting cleaners interested in making a transition from PCE-based dry cleaning and evaluates the success of these transitions. By initiating the first dedicated professional wet cleaners and CO₂ cleaners in the Bay Area and the first dedicated professional wet cleaners in the San Diego area, the Project sought to create a positive model for the garment care industry as well as to establish the infrastructure necessary to begin a larger self-sustaining transition towards environmental garment care methods in these two regions.
Project Goals

To jump-start the diffusion of professional wet cleaning and CO$_2$ dry cleaning in the San Francisco Bay Area and San Diego regions, the primary goals of this project were as follows:

- Develop a grant program to provide financial and technical assistance for four cleaners in the Bay Area region and two in the San Diego region to switch from dry cleaning to professional wet cleaning and/or CO$_2$ dry cleaning and to serve as demonstration sites.
- Conduct an educational outreach campaign to educate dry cleaners about the viability of professional wet cleaning and identify qualified applicants for the grant program.
- Expand educational outreach through tours hosted at the newly created professional wet clean demonstration sites.
- Evaluate the overall viability of demonstration site cleaners before and after their switch to professional wet cleaning.
- Develop recommendations to further commercialization of professional wet cleaning.

Project Development

At the beginning of this commercialization project, a great deal of effort went into planning each major component of the project including: structure of the grant program, educational outreach strategies, providing technical assistance, and project evaluation methods.

Outreach to Cleaners

A general outreach strategy was developed to inform cleaners in the Bay Area and San Diego about the program including publicity in fabricare trade journals, publicity in the general press, outreach to trade associations, direct mail campaigns, and individual visits to cleaners. Outreach materials were designed to raise cleaners’ awareness about the viability of professional wet cleaning and CO$_2$ cleaning, publicize and bring cleaners to demonstration workshops, and recruit cleaners into the grant program.

The regional trade press developed six information articles discussing the grant program. A total of 9 direct mail flyers describing the grant program and announcing workshops were sent to cleaners in the region.

As a consequence of the outreach campaign, a total of 300 cleaners contacted project staff expressing an interest in learning more about professional wet cleaning and the grant program.

Demonstration of Professional Wet Cleaning and CO$_2$ Technology

First-hand observation of professional wet cleaning at dedicated professional wet cleaning facilities and CO$_2$ dry cleaning were seen as essential for dry cleaners to effectively evaluate the technology and to provide sufficient information for them to
make a decision to apply to the grant program. To this end, at the beginning of the project, a number of workshops and individual tours were organized at existing professional wet cleaning and CO₂ facilities in the Los Angeles region where these technologies were already established.

These initial activities proved to be instrumental in identifying the first set of cleaners interested in applying to the grant program and switching to professional wet cleaning and/or CO₂ dry cleaning. A total of 199 cleaners attended workshops sponsored by the project. In addition, 20 cleaners visited a new demonstration facility for individual or group tours.

The workshops proved to be effective at identifying cleaners interested in converting to professional wet cleaning -- 100% of all applicants to the grant program attended at least one workshop.

**Grant Application Process**

A total of 19 applications were received for the grant program. A number of issues were identified that led to fourteen of applicants not receiving a grant. These issues included: lease problems, location of the cleaner, and ability to pay for the remaining cost of equipment.

The six cleaners selected to become demonstration sites were highly diverse in regards to geographic location, household income level of local community, size of cleaning operation, and experience of the cleaner.

**Demonstration Site Conversion Process**

Each grant recipient received technical assistance during the conversion process in order to facilitate a smooth transition to professional wet cleaning. This technical assistance included: equipment selection, plant redesign, identification of qualified installers, consultation during the installation process, and coordination and assistance in technical training.

Most of the demonstration site cleaners chose a very similar configuration of equipment. Equipment installation proved to be relatively manageable for the cleaners selected to be demo sites. Successful training was enhanced by having grantees observe the professional wet cleaning process at another dedicated facility prior to having equipment installed at their facility.

Each successive conversion developed additional resources and social networks for training, installation, vendor education, and interaction among the wet cleaning community. This growing infrastructure made the transition to professional wet cleaning increasingly less difficult.

**Technical Evaluation of Demonstration Sites**

**Methods**

A plant level analysis was undertaken to compare the real world conditions for each cleaner before and after the transition from dry cleaning to professional wet cleaning. A before and after analysis for the CO₂ dry cleaner was not possible because
the site was a new facility. Four key factors were evaluated. A performance evaluation assessed whether a professional wet cleaner could effectively clean the full range of garments normally cleaned in dry cleaning. A financial evaluation measured the one-time cost of equipment and the ongoing operating expenses associated with professional wet cleaning compared to PCE dry cleaning. A resource evaluation quantified electricity, gas, and water use in professional wet cleaning compared to PCE dry cleaning. A transition analysis characterized key factors associated with making a successful transition to professional wet cleaning. An owner satisfaction analysis was used to measure the satisfaction of owners who made the switch. A summary level analysis was then undertaken to compare the experiences of each of the cleaners converting to professional wet cleaning.

Results

*Performance Assessment*: assessed the ability of cleaners to successfully wet clean garments they had previously dry-cleaned.

- For the five cleaners, less than 1% of items brought in by customers were classified as problem garments (i.e. items returned for additional work, ruined, or sent out).
- Problem garments occurred at a similar rate in wet cleaning and dry cleaning.
- Proper washer programming and proper training were seen as key to avoiding problem garments (i.e. items sent out, returned, or ruined).
- Customer retention rates over 99.5% were reported for each cleaner converting to professional wet cleaning.
- All of the cleaners rated the quality of their cleaning service and the level of customer satisfaction to be higher than when they were dry cleaning.
- Negative reactions from customers of cleaners who switched was minimal.

*Financial Assessment*: evaluated process dependent operating costs in professional wet cleaning compared to dry cleaning.

- Monthly process dependent costs were lower for each cleaner, reduced by between $249 and $2,107.
- After switching to professional wet cleaning, each operator no longer paid operating expenses associated with the operation of a PCE dry cleaning machine, including the cost of solvent, filters, hazardous waste, and regulatory fees.
- Costs that were consistently higher when operating a PCE dry cleaning machine included maintenance, water, and electricity. The costs of cleaning agents were higher when operating professional wet cleaning equipment.
- Labor costs were equivalent or lower in professional wet cleaning.

*Resource Assessment*: evaluated electricity, natural gas, and water use in professional wet cleaning compared to dry cleaning.

- Lower electricity use was observed at each facility evaluated.
- Lower water use was observed at each facility evaluated.
- Lower natural gas use was observed for each facility evaluated except one.
Evaluation of Transition to Professional Wet Cleaning: evaluated factors related to making the switch to professional wet cleaning.

- All cleaners felt that learning to do wet cleaning was “not too difficult” or “not at all difficult”.
- Problems with training/technical support and fear of harming garments were also identified as difficulties.
- All cleaners rated training as very important to making a successful transition.

Evaluation of Owner Satisfaction: assessed cleaners’ level of satisfaction after their transition.

- Each cleaner believed that switching to professional wet cleaning was a good business decision.
- Each cleaner would recommend professional wet cleaning to any cleaner needing to purchase new cleaning equipment.

Conclusions and Recommendations

This project successfully identified and converted six cleaners from PCE dry cleaning to professional wet cleaning and CO₂ dry cleaning. A successful outreach strategy was developed and implemented to educate dry cleaners about the viability of professional wet cleaning through workshops and tours of dedicated professional wet clean and CO₂ demonstration sites. Workshops and tours were essential in recruiting applicants to the grant program. Technical assistance and training created a smooth transition for each grantee.

Results from the technical evaluation of cleaners switching to professional wet cleaning indicate that cleaners switching from PCE dry cleaning can maintain their level of service, reduce their operating costs, and avoid having to comply with complex and potentially onerous PCE regulations and liability concerns. In addition, significant energy benefits were identified. The study pointed to training and access to demonstration facilities for observing the cleaning process, as primary factors that can facilitate a transition to this new technology.

The demonstration project illustrated the value of establishing an infrastructure to support the diffusion of professional wet cleaning and CO₂ in a region. This infrastructure includes skilled personnel to provide technical training; experienced installers and repair technicians, knowledgeable vendors; and successful demonstration facilities located throughout the region.

The study concludes by identifying a number of education, stakeholder, and policy and program recommendations.

Education recommendations include: Develop similar demonstration programs in other regions; develop regular educational workshops for dry cleaners; develop regional technical training programs for professional wet cleaning; and develop social marketing strategies for cleaners switching to professional wet cleaning.
Stakeholder recommendations include: Educate realtors and lenders about professional wet cleaning and CO₂ dry cleaning; increase consumer/community organizations’ involvement in information dissemination about clean garment care technology; develop energy rebate programs for professional wet cleaning; and develop an apparel manufacturing project on garment remanufacturing for professional wet cleaning.

Policy and program development recommendations include: Develop a professional wet cleaning certification program; encourage the FTC to require a “Professional Wet Clean” care label; create a pollution prevention garment care information clearinghouse; and designate professional wet cleaning and CO₂ dry cleaning as environmentally preferable pollution prevention technologies.
1. Introduction

1.1 Background of PCE-Based Dry Cleaning

Since the 1950’s, perchloroethylene (or PCE) has been the dominant cleaning agent in the garment care industry -- a solvent that is currently used by 85 percent of the more than 30,000 dry cleaners operating throughout the United States. Due to its low flammability and effective cleaning properties, PCE was largely able to displace previous non-aqueous based solvents used in garment care, notably carbon tetrachloride (which was banned due to significant health risks) and petroleum (which suffered from concerns about potential fire hazards in garment care facilities). During this period, the dry cleaning industry also achieved its name and recognition, in part by widely promoting its ability to substitute a cleaning solvent such as PCE for water. In turn, the “dry clean only” garment care label was established by actions of the Federal Trade Commission for garments that required professional cleaning as opposed to home laundry cleaning or cleaning in water. This care labeling process in particular and the evolution of the dry cleaning business in general occurred in the context of dry cleaning’s ability to clean clothes that broadly met various industry expectations in such areas as dimensional change (shrinkage or stretching), colorfastness (dye bleed), and overall cleaning ability.

Just as dry cleaners became ubiquitous in cities and even small towns, evidence began to emerge in the 1970’s of the adverse health and environmental impacts associated with PCE use in dry cleaning.\(^1\) Effects of chronic exposure to PCE include dizziness, impaired judgment and perception, damage to the liver and kidneys, and respiratory disease.\(^2\) Other risks include neurotoxicity and reproductive and developmental toxicity as well as various forms of cancer such as bladder, stomach, esophageal, intestinal, and pancreatic.\(^3\) PCE has been classified as a probable human carcinogen (a Group 2A carcinogen) by the International Agency for Research on Cancer and as a potential human carcinogen by the National Institute of Occupational Safety & Health (NIOSH).\(^4\)

Knowledge of the adverse effects of PCE came precisely at a time when significant new national environmental and occupational regulations were being developed. Workplace exposure limits were first placed on PCE in 1970 by the Occupational Safety and Health Administration. In the 1980s, the EPA as well as state and regional agencies began establishing standards to regulate PCE as a water, land, and

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\(^4\) Tetrachloroethylene (Group 2A) - Summary of Data Reported and Evaluation, IARC Monograph 63; International Agency for Research on Cancer, 1995.
Following their actions, solid waste and discharge water contaminated with PCE must now be disposed of as hazardous waste. Soil and groundwater contaminated with PCE is subject to Superfund designation and clean-up requirements. Regulatory oversight of PCE as an air contaminant increased substantially with the passage and implementation of the 1990 Clean Air Act Amendments.

The 1990 Amendments classified 189 chemicals (including PCE) as hazardous air pollutants (HAPs), and developed administrative procedures to establish emissions standards, or NESHAPs (National Emissions Standard for Hazardous Air Pollutants), for each classified chemical. PCE dry cleaning was the first NESHAP promulgated by the EPA after the 1990 legislation took effect. Issued in 1993, the rule focused on the use of pollution control (“add on” or “end-of-pipe”) equipment to achieve emissions reductions as well as operator monitoring requirements to assure compliance with emission reduction goals. All new dry clean machines were required to install PCE vapor recovery systems (refrigerated condenser or carbon adsorber), with large facilities required to install vapor recovery for existing machines. Good housekeeping requirements included monitoring, record keeping, reporting, and leak detection and repair.

Initially, implementation of these pollution control regulations appeared to create a relative degree of certainty within the garment care industry that PCE use could remain viable for years to come. But recent revelations concerning lack of regulatory compliance as well as questions regarding population exposure to PCE from dry cleaning (even when facilities are in compliance) have created a crisis both within the regulatory community as well as within the garment care industry. Enforcement evaluation audits in the late 1990s revealed that few cleaners were in compliance with federal, state, or regional rules.

1.2 A Pollution Prevention Approach

The traditional approach to environmental regulation, as discussed above, is costly for government and businesses alike, and often simply transfers pollution from one environmental medium to another. Pollution prevention is an alternative approach that prevents pollution at the source by minimizing or even preemptively eliminating the

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6 Clean Air Act; 1990, 101-549, 112.
7 National Perchloroethylene Air Emissions Standards for Dry Cleaning Facilities; 1993, 40 CFR Part 63, Subpart M.
8 An Evaluation of the Sacramento Metropolitan Air Quality Management District's Air Pollution Control Program, California Air Resources Board, 1997; Fact Sheet: Findings from Dry Cleaner Inspections in South Coast AQMD, California Air Resources Board, An Evaluation of the Bay Area Air Quality Management District's Air Pollution Control Program, California Air Resources Board, 1998; An Evaluation of the Bay Area Air Quality Management District's Air Pollution Control Program, California Air Resources Board, 1998; Drycleaners News 1998, 47; Drycleaners News 1999, 48.
creation of pollution.\textsuperscript{10} One form of pollution prevention is the use of "clean technology," defined as a technology or process that generates less waste or emissions than the norm.\textsuperscript{11} The adoption of a clean technology requires at least two steps: the development of the initial technological innovation followed by the diffusion of the new technology across the relevant industry sector or sectors.\textsuperscript{12}

The potential to integrate a pollution prevention approach into regulation is not only feasible, but also has been written into a number of environmental statutes. For example, the 1990 Clean Air Act Amendments, instruct the USEPA to develop a technology standard for hazardous air pollutants, such as PCE, based on the maximum degree of reduction, including prohibition of such emissions when technologically achievable.\textsuperscript{13}

By 2000, taking a pollution prevention approach in the garment care industry had become feasible. This was because as regulation of PCE dry cleaning intensified in the 1990s, so did interest in the development of alternatives to PCE including reformulated petroleum solvents, silicone-based solvents, liquid carbon dioxide, and professional wet cleaning.

As a consequence of the commercial availability of a number of these alternative technologies to PCE dry cleaning, as well as the low level of compliance with existing rules, and ongoing risks associated with emissions, the South Coast Air Quality Management District in California ruled in December 2002 to phase out PCE dry cleaning for Los Angeles, Orange, Riverside, and San Bernardino Counties.\textsuperscript{14} In January 2007, the California Air Resource Board ruled to phase out PCE dry cleaning in California.\textsuperscript{15}

In October 2003, California enacted a law (AB998) to provide financial incentives to cleaners in the state switching from PCE dry cleaning to non-toxic and non-smog forming technologies, including professional wet cleaning and liquid carbon dioxide.\textsuperscript{16} A fee imposed on the sale of PCE to dry cleaners funds the incentive program.

\subsection*{1.2.1 Alternatives to PCE Dry Cleaning}

A number of alternatives to PCE dry cleaning have emerged since the 1980s in response to increasingly stringent regulations. These technologies present the

\begin{thebibliography}{99}
\bibitem{14} SCAQMD, Rule 1421, December 6, 2002.
\bibitem{15} CARB, Perchloroethylene Dry Cleaning ATCM, December 27, 2007.
\bibitem{16} www.arb.ca.gov/toxics/dryclean/ab998.
\end{thebibliography}
opportunity to reduce environmental risks while maintaining performance standards and financial viability.

*Petroleum Dry Cleaning*: Petroleum solvent (also referred to as ‘hydrocarbon’) is the most widely used alternative to PCE. Equipment costs are slightly higher than PCE dry cleaning machines. Although petroleum solvents are not currently classified as hazardous air pollutants, they do emit smog and greenhouse gas-producing volatile organic compounds (VOCs’) and generate hazardous waste. Government regulations require that petroleum dry clean machines be equipped with solvent-recovering pollution control devices similar to those found on PCE equipment. Petroleum solvents also face regulations regarding flammability. They are classified as Class III-A solvents, meaning they have a flash point between 140 and 170 degrees Fahrenheit. Fire codes often require an automatic sprinkler system throughout the plant as well as the construction of firewalls between the machine and the rest of the facility.

*Silicone Dry Cleaning*: Silicone solvent has become increasingly popular over the past few years, and has been aggressively marketed as a non-toxic alternative to PCE by GreenEarth Cleaning, L.L.C. Equipment costs are slightly higher than PCE dry cleaning machines. The Green Earth solvent, also known as D-5 or decamethylepentacyclosiloxane, is similar to the silicone substance formerly used in breast implants (D-6). Silicone dry clean machines are equipped with solvent recovery devices similar to those found on PCE equipment, and some machines are designed to handle either petroleum or silicone solvents. Although D-5 has been marketed as non-toxic, toxicity testing has not been completed and a recent inhalation study of rats by Dow Corning has raised questions about its safety. Like petroleum solvents, D-5 is a Class III-A solvent and has a flash point of 170 degrees Fahrenheit. Although it has a higher flash point than petroleum solvents, it is subject to the same fire codes and regulations.

*Professional Wet Cleaning*: Professional wet cleaning is a water-based process that uses computer-controlled washers and dryers, specially designed biodegradable detergents to clean sensitive and delicate garments, and specialized tensioning finishing equipment to restore shape and form. Both equipment and operating costs are lower in wet cleaning compared to PCE dry cleaning, and cleaners who have switched to professional wet cleaning have been able to process the full range garments they had previously dry cleaned.

*CO₂ Dry Cleaning*: Liquid CO₂ solvent used in dry cleaning is pressurized carbon dioxide gas, and is non-toxic and non-flammable. Equipment costs of a CO₂ dry cleaning system is substantially higher than a PCE dry clean machine due to the additional steel required to maintain the pressure inside the cleaning vessel during the wash process.

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17 Dow Corning. OPPT Public Docket #42071-A, February 4, 2003
18 Sinsheimer, P; Grout, C; Namkoong, A; Gottlieb, R. Commercialization of Professional Wet Cleaning. Occidental College, October 28, 2002.
Professional wet cleaning and CO$_2$ dry cleaning have emerged as the leading pollution prevention alternatives to PCE dry cleaning.
**Figure 1.1: Professional Wet Cleaning Process**

**Computer-Controlled Washing**
- Microprocessor controls automatic detergent dispensing, drum speed and rotation
- Low water level and temperature
- Water and detergent mixes prior to entering the cleaning drum

**Cleaning Agents**
- Detergents remove stains/soils
- Conditioners add smoothness & softness
- Sizing adds body and helps with finishing
- Automatic dispensing system precisely dispenses cleaning agents to washer

**Moisture Sensor Dryer**
- Precise moisture control
- Moisture levels of garments is continually monitored
- Reverse rotating tumbling
- Automatic shut off at specified residual moisture level

**Finishing Tensioning Equipment**
- Enhances restoration of constructed garments
- Uses steam to relax fibers and tension to reshape garments
- Uses air to dry
- Shortened pressing times
1.3 Barriers to the Commercialization of Professional Wet Cleaning and CO₂ Dry Cleaning

While professional wet cleaning and CO₂ dry cleaning can now be considered as viable alternatives to dry cleaning, significant barriers have limited the diffusion of these pollution prevention alternatives.

Research conducted to date on professional wet cleaning has identified a number of such barriers.¹⁹ These barriers include:

- Lack of awareness by most garment care professionals about the viability of professional wet cleaning as an alternative to dry cleaning.
- Concern by cleaners about technical feasibility of dedicated professional wet cleaning.
- Concern by cleaners about their ability to learn a new cleaning process.
- Concern by cleaners about customer reaction to switching to professional wet cleaning.
- An existing vendor infrastructure that financially benefits more from the sale of dry clean machines than wet clean machines.
- Lack of sufficient training and technical support to enable dry cleaners to convert to professional wet cleaning systems.
- Lack of sufficient knowledge about professional wet cleaning among other industry stakeholders, including government officials, the real estate community, environmental organizations, and consumers.
- Care labeling laws and apparel manufacturing practices that favor dry cleaning.

The greatest barrier to the diffusion of CO₂ dry cleaning is cost – capital equipment cost of CO₂ dry cleaning is twice that of traditional PCE dry cleaning.

1.4 Project Goals: Commercialization of Professional Wet Cleaning and CO₂ Dry Cleaning

To overcome a number of market barriers, an Environmental Garment Care Demonstration Project was designed to help “jump-start” the diffusion of professional wet cleaning and CO₂ dry cleaning by providing financial and technical assistance to

¹⁹Sinsheimer, P., Gottlieb, R. Supporting Pollution Prevention In the Garment Care Industry: An Assessment of Factors Influencing a Switch from Dry Cleaning to Professional Wet Cleaning. Pollution Prevention Education and Research Center, Occidental College, February 29, 2000.
cleaners in the Bay Area and San Diego regions willing to operate dedicated professional wet cleaning and/or CO₂ dry cleaning facilities and to serve as demonstration sites.

These new demonstration sites were intended to provide the marketplace experience that is essential for commercial development as well as to expand the education of dry cleaners about the viability of professional wet cleaning and CO₂ dry cleaning. An extensive educational outreach campaign to the garment care industry in the two regions was organized to identify these new demonstration sites. These new demonstration sites would in turn, serve as new venues for educational outreach.

The specific goals of the project were as follows:

- Develop a grant program to provide financial and technical assistance to cleaners in the Bay Area and San Diego to operate dedicated professional wet cleaning and CO₂ dry cleaning facilities and to serve as demonstration sites.
- Conduct an educational outreach campaign to educate dry cleaners about the viability of each technology and identify qualified applicants for the grant program.
- Expand educational outreach through tours hosted at the new demonstration sites.
- Evaluate the overall viability of demonstration site cleaners before and after facilities switched.
- Develop recommendations for the further commercialization of CO₂ dry cleaning and professional wet cleaning.

1.5 Scope of This Report

This report summarizes the findings from the effort to commercialize professional wet cleaning in the Bay Area and San Diego regions.

Section 2, “Project Development,” summarizes the work entailed in setting up the commercialization project including: development of outreach and educational strategies to promote the demonstration site grant program, development of grant qualifications and the selection process, and development of relationships with manufacturers and vendors of professional wet cleaning equipment and supplies.

Section 3, “Outreach to Cleaners in the Bay Area and San Diego Regions,” describes efforts to provide information about professional wet cleaning to the garment care community. This includes information articles in the trade press direct mailings, and outreach conducted through regional trade associations.

Section 4, “Demonstration of Professional Wet Cleaning and CO₂,” summarizes activity at dedicated professional wet cleaner and CO₂ facilities including workshops and individual tours. This section describes the structure of the workshops, the number of cleaners attending demonstrations, and the relative success of the demonstrations in identifying cleaners interested in professional wet cleaning and CO₂ dry cleaning and to serve as new demonstration sites.
Section 5, “Grant Application Process,” summarizes the process of evaluating and selecting cleaners to serve as demonstration sites. This review characterizes the issues with the applicants not selected as well as the location, size, and experience of cleaners grantees selected to become new demonstration sites.

Section 6, “Demonstration Site Conversion Process,” summarizes technical assistance provided to cleaners converting to professional wet cleaning and CO₂ dry cleaning. This section reviews the issues of equipment selection, plant redesign, identification of equipment installers, and coordination and assistance in technical training.

Section 7, “Technical Evaluation,” summarizes the evaluation of cleaners who switched. Case studies characterized the performance, financial, and resource use impacts of each demonstration facility as well as the owner satisfaction with the conversion process. A summary analysis of the case studies provides an overall technical evaluation.

Section 8, “Total Reductions Achieved,” quantifies the environmental benefits of the project in terms of PCE use and emissions reduced, hazardous waste reduced, and energy saving for all cleaners in the Bay Area and San Diego who switched to CO₂ dry cleaning or professional wet cleaning during the study period.

Section 9, “Discussion and Recommendations,” provides an overall summary of the commercialization project and discusses the prospects for future commercialization. Recommendations are made regarding education and outreach, stakeholder involvement, and policy and program development.
2. Project Development

2.1 Overview

At the beginning of this commercialization project, a great deal of effort went into planning out each major component of the project including: the structure of the grant program, educational outreach, technical assistance, and project evaluation.

2.2 Professional Wet Cleaning Grant Program

The core of the Commercialization Project was the development of a grant program to provide financial and technical assistance to four cleaners in the Bay Area region and two in the San Diego region willing to switch to professional wet cleaning and/or CO\textsubscript{2} dry cleaning become demonstration sites. Site grantees were provided the following:

- $10,000 to be put towards the purchase of professional wet cleaning and CO\textsubscript{2} dry cleaning equipment from the State of California.
- $10,000 from the City of Oakland (for cleaners located in Oakland).
- $10,000 from the City of San Francisco (for cleaners located in San Francisco)
- $5,000 from both BAAQMD and PG&E for Bay Area cleaners located outside of Oakland or San Francisco
- $5,000 from San Diego Gas and Electric for cleaners located in San Diego
- Free technical assistance including: selection of specific equipment; obtaining financing; and identifying qualified installers to remove existing dry clean equipment and install professional wet clean equipment.
- Free comprehensive technical training in operating as a dedicated wet cleaning facility.

2.4 Development of Application Form

An application form was created to assess the qualifications of cleaners interested in receiving demonstration grant funding.\textsuperscript{20} The application form, available in both English and Korean, was designed to elicit the following information about the applicant:

- the experience of the cleaner,
- the current volume of garments cleaned at the facility,
- the age of dry clean equipment,
- an explanation for why the cleaner is interested in becoming a professional wet cleaner,
- the kind of wet clean equipment the cleaner wants to purchase,
- the cleaner’s interest in marketing his or her business as a professional wet cleaner (e.g. interest in changing name, interest in advertising), and
- the financial solvency of the business.

In addition to soliciting information about the cleaner, the application form explained the responsibilities of the cleaner as a grant recipient. These responsibilities included:

\textsuperscript{20} See Appendix A.
before the installation of wet clean equipment, and the willingness to serve as a demonstration site (e.g., to host periodic tours of the facility and to provide information on the performance and financial capacity of the business before and after switching).

### 2.5 Criteria for Selection of Grant Applicants

A series of criteria were developed to help select cleaners to serve as demonstration facilities. These criteria included the following: (1) Willingness of the cleaner to operate as a dedicated CO\(_2\) and/or professional wet cleaning facility -- for an existing cleaner, this would require replacing all dry clean equipment with wet clean and/or CO\(_2\) equipment; (2) Experience of the operator as a professional cleaner – at least three years of experience was preferred, demonstrating that the cleaner had developed substantial knowledge in operating as a professional cleaner; (3) Agreement of cleaner to serve as a demonstration site for the length of the project; (4) Demonstration facilities would be geographically distributed throughout the region in order to maximize the cleaners’ access to demonstration sites.

A site visit would be conducted at each qualified applicant’s facility to develop a ranking of the most qualified applicants. Only facilities that were determined to be likely to make a successful transition to professional wet cleaning would be selected. A Cleaner Contract Agreement would subsequently be drawn up for each grantee specifying the exact grant award as well as the responsibilities of the grant recipient.  

### 2.6 Development of Technical Information Packet

A technical information packet was developed to provide information through brochures, flyers, advertisements, and articles on professional wet cleaning.  

In addition, a number of aspects of the Technical Information Packet were revised. Specifically, an Equipment Report was updated to provide more detailed information on wet cleaning machine models currently available from manufacturers. For wet clean washers, information on each model included the load capacity of the washer, extraction speed, whether it was soft or hard mount, whether it included a detergent injection system, and the retail price. For wet clean dryers, information on each model included load capacity for drying wet cleaned garments, information on the moisture sensing technology, and the retail price. Information on tensioning finishing equipment included the retail price and any specific features that differentiated one set of finishing equipment from another. For CO\(_2\) dry cleaning, the list pricing and distributor information for the two manufacturers distributing equipment in the United States were provided.

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21 See Appendix B, Cleaner Contract  
22 See Appendix C, Information Packet.  
23 See Appendix D, Equipment Report.
3. Outreach to Cleaners in the Bay Area and San Diego Regions

3.1 Overview

A general outreach strategy was developed to inform cleaners in the San Francisco Bay Area and San Diego regions about the demonstration program, including publicity in fabricare trade journals, publicity in the general press, outreach to regional fabricare trade associations, and direct mail campaigns. Outreach material was designed to raise cleaners’ awareness about the viability of these technologies, bring cleaners to demonstration workshops, and recruit cleaners to participate in the grant program.

3.2 Publicity in Regional Trade Journals

Western Cleaner and Launderer is a west coast trade journal for the garment care industry. Published monthly, Western Cleaner and Launderer has a circulation of approximately 15,000. At the beginning of the commercialization project, a meeting was held with Western Cleaner and Launderer staff to discuss the goals of the project and possible topics for stories.

Between March 2006 and October 2007, six articles were published in Western Cleaner and Launderer that focused on the CO₂ dry cleaning and professional wet cleaning grant program. 24 (See Table 3.1) Each of the published articles characterized CO₂ dry cleaning and professional wet cleaning as viable alternatives to dry cleaning, cited examples of successful dedicated cleaners, and provided contact information to find out more about the grant program.

Table 3.1 Trade Journal Articles of Demonstration Program

<table>
<thead>
<tr>
<th>Date</th>
<th>Name of Article</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2006</td>
<td>First Bay Area CO₂ and Professional Wet Cleaning Demonstration Workshop Co-Sponsored by PDCA and KDCANC</td>
</tr>
<tr>
<td>April 2006</td>
<td>Pollution Prevention Center Sponsors First Bay Area Wet Cleaning Workshop</td>
</tr>
<tr>
<td>September 2006</td>
<td>First Bay Area Dry Cleaners Converts to Professional Wet Cleaning</td>
</tr>
<tr>
<td>February 2007</td>
<td>Wet Cleaning Workshops Slated at High-End Cleaners</td>
</tr>
<tr>
<td>August 2007</td>
<td>Bay Area Wet Cleaning Workshop Scheduled for August</td>
</tr>
<tr>
<td>October 2007</td>
<td>Wet Cleaning Demonstration Workshops Scheduled for the San Diego, Northern California and Los Angeles Regions</td>
</tr>
</tbody>
</table>

24 See Appendix E, Western Cleaner and Launderer Articles.
3.3 Direct Mail Campaigns

A direct mail campaign targeting all PCE dry cleaners in the Bay Area and San Diego regions was developed. (See Table 3.2) An informational mailer that described the grant program and advertised upcoming workshops was sent out to dry cleaners in the region. Mailers was developed in both English and Korean, and was sent out a few weeks prior to ten sets of workshop dates. English language versions were sent to every cleaner, while Korean language versions were sent to cleaners with a Korean surname.

Table 3.2 Direct Mailer for Demonstration Program

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Cleaner</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2006</td>
<td>Bay Area</td>
<td>Blue Sky Cleaners</td>
</tr>
<tr>
<td>September 2006</td>
<td>Bay Area</td>
<td>Bob Cleaners</td>
</tr>
<tr>
<td>November 2006</td>
<td>Bay Area</td>
<td>Bob Cleaners</td>
</tr>
<tr>
<td>February 2007</td>
<td>Bay Area</td>
<td>Bob Cleaners</td>
</tr>
<tr>
<td>March 2007</td>
<td>San Diego</td>
<td>Sunny Fresh Cleaners</td>
</tr>
<tr>
<td>May 2007</td>
<td>Bay Area</td>
<td>Hesperian Cleaners</td>
</tr>
<tr>
<td>August 2007</td>
<td>San Diego</td>
<td>Sunny Fresh Cleaners</td>
</tr>
<tr>
<td>August 2007</td>
<td>Bay Area</td>
<td>Bob Cleaners</td>
</tr>
<tr>
<td>October 2007</td>
<td>Bay Area</td>
<td>Hesperian Cleaners</td>
</tr>
<tr>
<td>October 2007</td>
<td>San Diego</td>
<td>Sunny Fresh Cleaners</td>
</tr>
</tbody>
</table>

3.4 Outreach to Trade Associations

3.4.1 Peninsula Dry Cleaners Association and Korean Dry Cleaners Association of Northern California

The first demonstration workshop for this project at Blue Sky Cleaners was co-sponsored by the Peninsula Dry Cleaners Association and Korean Dry Cleaners Association of Northern California. The remaining Bay Area workshops were co-sponsored by the Peninsula Dry Cleaners.

3.4.2 Presentation to the Northern California Chinese Drycleaners and Launderers Association

The May 5, 2006 Bay Area demonstration was co-sponsored by the Northern California Chinese Drycleaners and Launderers Association. A special morning session was created due to the large number of cleaners who wanted to attend.

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25 See Appendix F, Direct Mailers.
3.4.3 2006 California Cleaners Association Trade Show

The California Cleaners Association biennial meeting was held August 18-20, 2006 at the Long Beach Convention Center. Cleaners throughout California commonly attend the convention to look for new cleaning equipment. PPC’s booth at the convention showcased videos of the CO\textsubscript{2} and professional wet cleaning process and listed the dedicated and mixed cleaners using CO\textsubscript{2} and professional wet cleaning throughout California on large banners. Information packets were distributed and cleaners were signed up for workshops scheduled in the San Francisco Bay Area for September 2006.

This effort proved to be successful. The first dedicated professional wet cleaner in the San Francisco Bay Area (Bob’s Cleaners) attended as well as the first dedicated professional wet cleaner in San Diego (Sunny Fresh Cleaners).

3.4.4 2007 Korean Dry Cleaners Association

The national Korean Dry Cleaners Association hosted their convention at the Anaheim Convention Center, March 24-25, 2007. PPC partnered with three professional wet cleaning manufacturers to distribute information about the project – no CO\textsubscript{2} manufacturers attended the convention. PPC met with a San Diego cleaner who subsequently become the second demonstration site cleaner in that region (Nancy’s Cleaners).

3.5 Evaluation of Outreach Efforts

As a consequence of the outreach campaign, a total of 300 cleaners contacted project staff to request additional information about professional wet cleaning, the grant program, or to sign up for a demonstration workshop. All cleaners contacting project staff were strongly encouraged to attend workshops to see the technology first hand and to learn more about the grant program.
4. Demonstration of CO\(_2\) and Professional Wet Cleaning Technology

4.1 Overview

First-hand observation of CO\(_2\) dry cleaning and professional wet cleaning at dedicated facilities was seen as essential for dry cleaners to evaluate these technologies and gain sufficient information to make a decision about applying to the grant program. To this end, at the beginning of the project, project staff coordinated a series of individual site visits for Bay Area and San Diego cleaners to visit demonstration facilities in Los Angeles. After demonstration sites were set up in the Bay Area and San Diego, a series of regional workshops and individual tours were coordinated at the new demonstration facilities. These activities at dedicated professional wet cleaning sites proved to be instrumental in identifying cleaners interested in applying to the grant program.

4.2 Individual Demonstration Tours in Los Angeles

Because there were no dedicated professional wet cleaners and CO\(_2\) dry cleaners in the Bay Area and no dedicated professional wet cleaners in San Diego at the beginning of this project, individual tours of dedicated CO\(_2\) and wet cleaning facilities were arranged from cleaners from the Bay Area and San Diego. The first CO\(_2\)/wet cleaner in the Bay Area (Blue Sky Cleaners), the first two dedicated professional wet cleaners in the Bay Area (Bob’s Cleaners and Hesperian Cleaners), and the first two dedicated professional wet cleaners in San Diego (Sunny Fresh and Alpine) all visited a series of demonstration tours in the Los Angeles region before installing CO\(_2\) or wet cleaning equipment at their own facility.

4.3 Workshops in the Bay Area and San Diego

Throughout 2006 and 2007, a series of workshops were held at demonstration facilities in the Bay Area and San Diego. (Table 4.1) A total of 12 workshops were completed in this period.

Because most cleaners process clothes Monday through Friday, workshops were held on a Saturday or Sunday, generally in the afternoon. Each workshop was publicized through direct mailers sent to dry cleaners in the Northern California region and articles published in the regional trade press (see Section 3).

Each workshop was free of charge and included a demonstration of the wet cleaning process. Performance, financial, and environmental issues were discussed, as well as the parameters of the grant program. Each dry cleaner attending a workshop was provided a technical information packet on professional wet cleaning including an application form for the grant program.
During the course of the workshop, the cleaning process was demonstrated by the host cleaner. Loads of garments labeled “dry clean” or “dry clean only” were pre-spotted, washed, dried, and finished. The host cleaner provides background as to why they decided to switch, the impact on their business, how customers have responded, the difficulty and/or ease in making the transition. Information packets were distributed to each cleaner attending workshops. Information in the packet was discussed by project staff including the different types of equipment on the market as well as the different amounts of incentive funding available.

Table 4.1: Workshops in the Bay Area and San Diego

<table>
<thead>
<tr>
<th>Date</th>
<th>Day of Week</th>
<th>Location</th>
<th>Region</th>
<th>Technology</th>
<th>Number of Attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/19/06</td>
<td>Sunday</td>
<td>Blue Sky Cleaners</td>
<td>Bay Area</td>
<td>CO₂ and wet cleaning</td>
<td>89</td>
</tr>
<tr>
<td>9/30/06</td>
<td>Saturday, a.m.</td>
<td>Bob’s Cleaners</td>
<td>Bay Area</td>
<td>Wet cleaning</td>
<td>5</td>
</tr>
<tr>
<td>9/30/06</td>
<td>Saturday, p.m.</td>
<td>Bob’s Cleaners</td>
<td>Bay Area</td>
<td>Wet cleaning</td>
<td>6</td>
</tr>
<tr>
<td>11/18/06</td>
<td>Saturday</td>
<td>Bob’s Cleaners</td>
<td>Bay Area</td>
<td>Wet cleaning</td>
<td>7</td>
</tr>
<tr>
<td>2/25/07</td>
<td>Sunday</td>
<td>Bob’s Cleaners</td>
<td>Bay Area</td>
<td>Wet cleaning</td>
<td>21</td>
</tr>
<tr>
<td>3/3/07</td>
<td>Saturday</td>
<td>Sunny Fresh Cleaners</td>
<td>San Diego</td>
<td>Wet cleaning</td>
<td>15</td>
</tr>
<tr>
<td>5/6/07</td>
<td>Sunday, a.m.</td>
<td>Hesperian Cleaners</td>
<td>Bay Area</td>
<td>Wet cleaning</td>
<td>12</td>
</tr>
<tr>
<td>5/6/07</td>
<td>Sunday, p.m.</td>
<td>Hesperian Cleaners</td>
<td>Bay Area</td>
<td>Wet cleaning</td>
<td>16</td>
</tr>
<tr>
<td>5/12/07</td>
<td>Saturday</td>
<td>Sunny Fresh Cleaners</td>
<td>San Diego</td>
<td>Wet cleaning</td>
<td>3</td>
</tr>
<tr>
<td>8/19/07</td>
<td>Saturday</td>
<td>Bob’s Cleaners</td>
<td>Bay Area</td>
<td>Wet cleaning</td>
<td>11</td>
</tr>
<tr>
<td>10/21/07</td>
<td>Sunday</td>
<td>Hesperian Cleaners</td>
<td>Bay Area</td>
<td>Wet cleaning</td>
<td>9</td>
</tr>
<tr>
<td>11/3/07</td>
<td>Saturday</td>
<td>Sunny Fresh Cleaners</td>
<td>San Diego</td>
<td>Wet cleaning</td>
<td>5</td>
</tr>
</tbody>
</table>

Each of the Bay Area workshops were co-sponsored by the Peninsula Dry Cleaners Association. The 3/19/06 workshop at Blue Sky Cleaners was also co-

26 See Appendix C.
sponsored by the Korean Dry Cleaners Association of Northern California. The 5/6/07 workshop at Hesperian Cleaners was co-sponsored by the Bay Area Chinese Dry Cleaners Association; a special morning demonstration was organized for this association.

Follow-up interviews with cleaners attending the workshops revealed very positive feedback with the exception of the first workshop held at Blue Sky Cleaners. A number of cleaners voiced concern that the owner of Blue Sky Cleaners was also selling CO2 and wet cleaning equipment and, therefore, they could not necessarily trust the opinion this owner was providing. Project staff recognized this problem as well. Discussion with project sponsors lead to a change in the contract with the demonstration cleaners that precluded them from selling equipment during demonstration contract period. As a consequence of this potential conflict of interest, no further workshops were held at Blue Sky Cleaners. Blue Sky Cleaners was used for individual tours for cleaners specifically interested in CO2 technology.

4.5 Individual Demonstration Tours in the Bay Area and San Diego

As grant recipients to the professional wet cleaning demonstration program were selected and converted, individual and group tours of these new demonstration sites were organized. At Bob’s Cleaners, two of the three cleaners who attended individual tours subsequently converted to professional wet cleaning. At Blue Sky Cleaners, one of the two cleaners attending an individual tour subsequently converted to CO2 dry cleaning. The two individual site visits at Sunny Fresh Cleaners in San Diego both resulted in cleaners converting to professional wet cleaning.

4.6 Evaluation of Technology Demonstration Activities

Workshops, seminars, and tours at real world CO2 and professional wet clean facilities were essential to identifying dry cleaners interested in switching to these pollution prevention technologies. Workshops at Bob’s Cleaners proved to be particularly effective at influencing cleaners to switch to professional wet cleaning. Of the next seven cleaners to switch to professional wet cleaning in the Bay Area, all visited Bob’s cleaners for a workshop or individual tour.

It is also important to note that Bob’s Cleaners conversion to professional wet cleaning as due, in great part to Blue Sky Cleaners demonstration – where the owner of Bob’s cleaners saw professional wet cleaning for the first time.

Visiting more than one dedicated professional wet cleaning facility also proved helpful to dry cleaners interested in applying to the grant program and switching to professional wet cleaning. Of the cleaners switching to dedicated CO2 and/or professional wet cleaning, over three quarters visited more than one demonstration site.27

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27 In the Bay Area and San Diego, eight of the eleven cleaners were identified as switching during the project period visited more than one demonstration site.
5. Grant Application Process

5.1 Overview

This section reviews the process of selecting applicants to serve as demonstration sites, including a characterization of issues associated with applicants who were not selected to serve as demonstration sites, and a profile of the grant recipients.

A total of 19 applications were received. Primary issues related to applicants not receiving grants included: timing (grants already filled or cleaner not ready to convert immediately), access to capital, lease problems, and conflict of interest (cleaner did not want to show potential competitors the process). The profile of cleaners receiving grants shows that demonstration sites were geographically dispersed and economically diverse. The demonstration facilities also varied in terms of size and cleaners’ years of experience in the garment care industry.

5.2 Process of Evaluating Grant Applications

5.2.1 Site Visits

After receiving each grant application, the applicant was contacted by telephone to set up a site visit to his or her facility. The site visit was designed to verify the information provided by the cleaner in the application form, evaluate the location of the facility, and assess the capability of the facility to serve as an effective demonstration site.

5.2.2 Selection Process

Following each site visit, the applicant was evaluated according to selection criteria identified prior to selection process. These criteria included: willingness to operate as a dedicated wet clean facility, experience of the cleaner, agreement to serve as a demonstration site for the length of the project, willingness of the cleaner to participate in evaluation efforts, and the geographic location of facility.

Applicants viewed as highly qualified for the program were immediately selected. Of the 12 applications that were not selected, a series of issues were identified in regards to their de-selection. (See Table 5.1)
Table 5.1: Primary Issues Related to Applicants Not Selected as Grant Recipients

<table>
<thead>
<tr>
<th>Issue</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application reviewed too late</td>
<td>5</td>
</tr>
<tr>
<td>Access to capital</td>
<td>2</td>
</tr>
<tr>
<td>Uncertainty about technology</td>
<td>1</td>
</tr>
<tr>
<td>Location</td>
<td>1</td>
</tr>
<tr>
<td>Not ready</td>
<td>1</td>
</tr>
<tr>
<td>Lease problems</td>
<td>1</td>
</tr>
<tr>
<td>Conflict of interest</td>
<td>1</td>
</tr>
<tr>
<td>Pressure from cleaners association</td>
<td>1</td>
</tr>
</tbody>
</table>

- **Application reviewed too late**: A number of applicants submitted applications after all the grantees had already been selected. In three of these cases, the applicants were able to be selected for demonstration grant through a new statewide demonstration program.
- **Financial**: Lack of ability to pay for equipment was identified for two applicants.
- **Uncertainty of Technology**: In one case, the applicant owned a second PCE dry cleaning shop near the proposed wet cleaning site and was planning on sending the “dry clean only” garments to the PCE location.
- **Not ready**: The applicant did not yet have the lease on the facility.
- **Lease**: In one case, the applicant had lease renewal problems due to contamination associated with PCE.
- **Location**: One cleaner was located too far from where most cleaners in the Bay Area are located.
- **Conflict of interest**: One cleaner did not want to share information on how to successful process items with potential competitors.

### 5.3 Demonstration Site Cleaners Selected

Out of 19 applications received, six cleaners were awarded grants and became dedicated demonstration sites. Below is a list of the grantees and the month and year of conversion. (See Table 5.2)

After each cleaner was selected, the owner was sent a Demonstration Contract to sign and return. The Demonstration Contract specified the contractual arrangement between Occidental College and the grantee. This arrangement specified what the grant program was providing (e.g. grant award and training) and what the grantee was providing to the project (e.g. evaluation of conversion, and demonstration tours for other cleaners).

---

28 See Appendix B, Demonstration Contract
### Table 5.2: Grant Recipients and Conversion Dates

<table>
<thead>
<tr>
<th>Name of Cleaner</th>
<th>City</th>
<th>Region</th>
<th>Conversion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Sky Cleaners</td>
<td>Union City</td>
<td>Bay Area</td>
<td>March 2006</td>
</tr>
<tr>
<td>Bob’s Cleaners</td>
<td>Richmond</td>
<td>Bay Area</td>
<td>July 2006</td>
</tr>
<tr>
<td>Hesperian Cleaners</td>
<td>San Lorenzo</td>
<td>Bay Area</td>
<td>January 2007</td>
</tr>
<tr>
<td>Sunny Fresh Cleaners</td>
<td>La Jolla</td>
<td>San Diego</td>
<td>January 2007</td>
</tr>
<tr>
<td>Alpine Cleaners</td>
<td>Alpine</td>
<td>San Diego</td>
<td>May 2007</td>
</tr>
<tr>
<td>Delight Cleaners</td>
<td>Sunnyvale</td>
<td>Bay Area</td>
<td>September 2007</td>
</tr>
</tbody>
</table>

### 5.4 Grant Recipient Profile

#### 5.4.1 Geographic Location of Demonstration Sites

In the selection of grant recipients, it was a goal to achieve a balanced coverage of demonstration sites throughout the region. This was to ensure that cleaners interested in visiting a demonstration site would not be required to travel long distances and consequently facilitate outreach to the largest possible number of Northern California and San Diego cleaners. A relatively wide distribution of demonstration sites throughout the region was achieved (see Figure 5.1). Of the Bay Area demonstration facilities, one was located in Contra Costa County, two in Alameda County, one in Santa Clara County. Of the two San Diego demonstration sites, one was located in the beach community of La Jolla and the other in the eastern part of the county. (See Table 5.3)

### Table 5.3: Geographic Distribution of Grant Recipients

<table>
<thead>
<tr>
<th>County</th>
<th>Demonstration Site</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contra Costa</td>
<td>Bob’s Cleaners</td>
<td>Richmond</td>
</tr>
<tr>
<td>Alameda</td>
<td>Hesperian Cleaners</td>
<td>San Lorenzo</td>
</tr>
<tr>
<td>Alameda</td>
<td>Blue Sky Cleaners</td>
<td>Union City</td>
</tr>
<tr>
<td>Santa Clara</td>
<td>Delight Cleaners</td>
<td>Sunnyvale</td>
</tr>
<tr>
<td>San Diego</td>
<td>Sunny Fresh Cleaners</td>
<td>La Jolla</td>
</tr>
<tr>
<td>San Diego</td>
<td>Nancy’s Cleaners</td>
<td>Alpine</td>
</tr>
</tbody>
</table>

#### 5.4.2 Economic Demographics of Demonstration Site Locations

Demonstration site cleaners were located in more and less affluent neighborhoods compared to California as a whole. The average median household income for California is $64,562. (See Table 5.4) In the Bay Area, two of the demonstration sites (Bob’s Cleaners and Hesperian Cleaners) were located in communities below this average median income while two were located in communities that were substantially higher than this median average (Blue Sky and Delight Cleaners).
Table 5.4: Average Median Household Income of Communities Adjacent to
Demonstration Site Cleaners

<table>
<thead>
<tr>
<th>Demonstration Sites</th>
<th>Region</th>
<th>City</th>
<th>Median Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Sky Cleaners</td>
<td>Bay Area</td>
<td>Union City</td>
<td>$77,000</td>
</tr>
<tr>
<td>Bob’s Cleaners</td>
<td>Bay Area</td>
<td>Richmond</td>
<td>$50,844</td>
</tr>
<tr>
<td>Hesperian Cleaners</td>
<td>Bay Area</td>
<td>San Lorenzo</td>
<td>$56,170</td>
</tr>
<tr>
<td>Delight Cleaners</td>
<td>Bay Area</td>
<td>Sunnyvale</td>
<td>$74,449</td>
</tr>
<tr>
<td>Sunny Fresh Cleaners</td>
<td>San Diego</td>
<td>La Jolla</td>
<td>$77,544</td>
</tr>
<tr>
<td>Nancy’s Cleaners</td>
<td>San Diego</td>
<td>Alpine</td>
<td>$61,832</td>
</tr>
<tr>
<td>California</td>
<td></td>
<td></td>
<td>$64,562</td>
</tr>
</tbody>
</table>

5.4.3 Garment Volume at Demonstration Sites

The grant recipients processed between 50 and 1,000 garments per day, including laundered items, according to statements made on their applications. (See Table 5.5)

Table 5.5: Garment Volume per Day at Grant Recipients’ Facilities

<table>
<thead>
<tr>
<th>Grant Recipient</th>
<th>Daily Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Sky Cleaners</td>
<td>1,000</td>
</tr>
<tr>
<td>Bob’s Cleaners</td>
<td>50</td>
</tr>
<tr>
<td>Hesperian Cleaners</td>
<td>150</td>
</tr>
<tr>
<td>Delight Cleaners</td>
<td>300</td>
</tr>
<tr>
<td>Sunny Fresh Cleaners</td>
<td>700</td>
</tr>
<tr>
<td>Nancy’s Cleaners</td>
<td>280</td>
</tr>
</tbody>
</table>

5.4.4 Number of Employees at Demonstration Sites

The number of people working at demonstration site cleaners, ranged from two to 12 employees; this includes both part time and full time employees as well as the owner, if they worked at the facility. (See Table 5.6)

According to the California Air Resource Board, over three-quarters (79%) of the dry cleaners in California employ between one to four workers, while an additional 16% employ more than five employees. 30 This data suggests that the sizes of the demonstration site cleaners selected are representative of the cleaners in the region as a whole.

29 http://www.census.gov/hhes/www/income/medincsizeandstate.html
Table 5.6: Number of Employees at Demonstration Site Facilities

<table>
<thead>
<tr>
<th>Grant Recipient</th>
<th>Number of Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full Time</td>
</tr>
<tr>
<td>Blue Sky Cleaners</td>
<td>12</td>
</tr>
<tr>
<td>Bob’s Cleaners</td>
<td>3</td>
</tr>
<tr>
<td>Hesperian Cleaners</td>
<td>1</td>
</tr>
<tr>
<td>Delight Cleaners</td>
<td>2</td>
</tr>
<tr>
<td>Sunny Fresh Cleaners</td>
<td>6</td>
</tr>
<tr>
<td>Nancy’s Cleaners</td>
<td>3</td>
</tr>
</tbody>
</table>

5.4.5 Dry Cleaning Experience of Grant Recipients

Prior dry cleaning experience provides know-how and skill in areas such as spotting, stain removal, pressing, and garment restoration. It was thought that this prior experience as a dry cleaner would assist cleaners in making a switch to CO₂ or professional wet cleaning. Table 5.7 shows that prior experience of cleaners selected as grantees varied substantially, between 2 1/2 and 25 years.

Table 5.7: Dry Cleaning Experience of Grant Recipients

<table>
<thead>
<tr>
<th>Grant Recipient</th>
<th>Years of Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Sky Cleaners</td>
<td>20</td>
</tr>
<tr>
<td>Bob’s Cleaners</td>
<td>2</td>
</tr>
<tr>
<td>Hesperian Cleaners</td>
<td>25</td>
</tr>
<tr>
<td>Delight Cleaners</td>
<td>8</td>
</tr>
<tr>
<td>Sunny Fresh Cleaners</td>
<td>6</td>
</tr>
<tr>
<td>Nancy’s Cleaners</td>
<td>25</td>
</tr>
</tbody>
</table>
6. Demonstration Site Conversion Process

6.1 Overview

Each grant recipient received technical assistance during the conversion process in order to facilitate a smooth transition to professional wet cleaning. This technical assistance included: equipment selection, plant redesign, identification of qualified installers, consultation during installation process, and coordination and assistance in technical training.

The experience of converting the first several demonstration site cleaners created a social infrastructure that smoothed the conversion for subsequent cleaners. The creation of this infrastructure included: working with equipment vendors and installers who had little, if any, previous experience in switching out dry cleaners to dedicated professional wet cleaning facilities; working with a detergent supply company to properly program the wet clean washers; establishing a protocol for verifying proper equipment installation; establishing better training techniques prior to and after equipment installation; and developing cooperative relationships among all of these parties.

6.2 Equipment Selection

Each professional wet cleaning demonstration site grantee was required to install a set of equipment that included a wet clean washer, a wet clean dryer, a detergent dispensing system, a tensioning form finisher, and a tensioning pants topper. The range of available equipment options was discussed with each grantee prior to purchase. An equipment report developed for the project was used to review equipment manufacturers, specifications, and pricing options.

In regards to equipment specifications, project staff recommended that grantees purchase dryers equipped with a garment-sensitive moisture sensor, which measures the specific moisture level of the garments in the drying drum. Such a moisture sensor is specifically designed for professional wet cleaning and guards against over drying that could result in shrinkage. In regards to the size of the wet clean washers and dryer system, the throughput of each facility was evaluated as well as any expected growth.

Blue Sky Cleaners the Alliance CO2 dry cleaning system based on the price and the availability of the equipment. In addition, Blue Sky also purchased a Miele wet clean washer and dryer system, an IPSO wet clean washer, and Hi-Steam tensioning finishing equipment. Four of the other sites (Bob’s, Hesperian, Sunny Fresh, and Delight) all chose the same type of equipment – Miele washer, Miele dryer, and Veit tensioning finishing equipment. Nancy’s Cleaners chose a Maytag wet clean washer, an American Dryer wet clean dryer, and Hi-Steam tensioning equipment. All six purchased a six-pump dispensing system manufactured by Beta Technologies.

31 See Appendix D, Equipment Report.
6.3 Plant Redesign

Technical assistance was provided to assist in determining where new equipment would be physically placed in the facility. Project staff worked closely with the manufacturers and distributors of equipment to identify different placement options for each cleaner. At Blue Sky Cleaners, the facility was completely new and design plans were sent to project staff, who then distributed the plans to a number sales distributors who had experience in installing equipment. In all other cases, the demonstration site were at existing facilities. In most cases, the wet clean wash and dryer system was placed in a different location than where the dry clean machine had been installed – closer to the pressing stations, making the work flow more efficient. In regards to the placement of the tensioning finishing equipment, most cleaners simply removed older non-tensioning presses (e.g. susie’s and pants toppers) and placed the tensioning presses in similar locations.

6.4 Equipment Installation

Few mechanics in the Bay Area and San Diego had experience installing CO₂ and/or professional wet cleaning equipment. Blue Sky Cleaners used the largest distributor of professional cleaning equipment in the Bay Area for the full plant installation. Four of the remaining five cleaners used the Miele distributor for equipment installation. In the sixth case, the equipment distributor used to purchase the equipment was also used for installation. Blue Sky Cleaners experienced some difficulty in installation due to the relative lack of experience of the distributor or in installing this particular set of equipment. In the remaining cases, installation was relatively easy given the prior experience of the installers.

6.5 Coordination and Assistance in Technical Training

Project staff coordinated the implementation of a technical training program for each grant recipient. A number of options and opportunities for technical training were available to each grantee.

<table>
<thead>
<tr>
<th>Table 6.1: Training of Demonstration Site Cleaners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Sky Cleaners</td>
</tr>
<tr>
<td>Bob’s Cleaners</td>
</tr>
<tr>
<td>Hesperian Cleaners</td>
</tr>
<tr>
<td>Delight Cleaners</td>
</tr>
<tr>
<td>Sunny Fresh Cleaners</td>
</tr>
<tr>
<td>Nancy’s Cleaners</td>
</tr>
</tbody>
</table>
Observational Training: Prior to the installation of equipment, grantees were encouraged to visit an established CO₂ and professional wet cleaning facilities for an observation session. At these sessions, grantees were able to do the following: Observe the structure of work at a CO₂ and/or professional wet cleaning facility; Learn spotting, washing, and drying techniques; Learn about the operation of specialized finishing equipment; Observe how staff interacts with customers in regards to the use of CO₂ and/or wet clean technology. These sessions were strongly encouraged for both the cleaner (typically the owner) as well as the pressing staff, and were usually scheduled at the facility owned and operated by the trainer.

On-Site Training: After the equipment was installed, a minimum of a one-day training session was scheduled at each grantee’s facility.

Follow-Up Training: A follow-up training session at each grantee’s facility was recommended within the first month after installation was completed.

Telephone Consultation: Telephone consultation with the trainer was available to each grantee for one year after equipment was installed.

At Blue Sky Cleaners, the owners visited a number of CO₂ and professional wet cleaning facilities prior to installing equipment installation. In regards to on-site training, project staff recommended a specific trainer for CO₂ training with the most experience in assisting CO₂ dry cleaners in the United States. Blue Sky used this trainer which resulted in an effective transition to this technology. Additionally, project staff recommended a specific trainer in the use of tensioning finish who spoke fluent Spanish – the finishing staff at Blue Sky were predominantly native Spanish speakers. Two training session on tension finishing were conducted and the finishing staff at Blue Sky appeared very satisfied with the quality of training soon after the training was complete.

At the remaining professional wet cleaning facilities, each visited at least one other dedicated professional wet cleaning plant before making the switch. At each of these five remaining sites, on-site and follow-up training was conducted by the equipment distributor.
7. Technical Evaluation

7.1 Overview

A technical evaluation was conducted for each facility that switched from PCE dry cleaning during the study period. Because Blue Sky Cleaners was a new facility, and was not a switch out of an existing PCE site, a technical evaluation of this facility was not conducted. The remaining sites were all cleaners who operated PCE dry cleaning machines immediately prior to their switch to professional wet cleaning. This chapter evaluates the degree of success with which the grant recipients were able to switch from PCE dry cleaning to professional wet cleaning, with the purpose of determining whether professional wet cleaning is a viable substitute technology for PCE dry cleaning. The following sections describe the methodology developed to evaluate the grantees’ experiences in switching to professional wet cleaning, and present a summary analysis of the evaluation results.32

7.2 Methodology for Technical Evaluation

7.2.1 Evaluation Criteria

A series of specific criteria were developed (in the form of questions to be answered) to identify the parameters for what constituted professional wet cleaning viability and owner satisfaction.

Transition Criteria
Can dry cleaners switch to professional wet cleaning without a great deal of difficulty?

Performance Criteria
• Can professional wet cleaners process the range and types of garments that are typically serviced by a dry cleaner?
• Can garments be professionally wet cleaned without significant problems?
• Can garments be professionally wet cleaned to the customers’ satisfaction?
• Can a cleaner maintain their customer base after switching to professional wet cleaning?
• Will customers respond negatively to cleaners if they switch from dry cleaning to professional wet cleaning?

32 An individual case study of each grantee is included in the Appendix (see Appendices I through N).
Financial Criteria

- Are capital equipment costs for professional wet cleaning comparable to the costs for dry cleaning equipment?
- Are the costs associated with operating as a professional wet cleaner comparable to the costs associated with operating as a PCE dry cleaner?
- Do the financial risks associated with the cleaning process or other aspects of the business affect future costs of profit potential?
- Are the costs to consumers comparable?

Resource Use Criteria

Are the levels of electricity, natural gas, and water use in professional wet cleaning comparable to dry cleaning?

Owner Satisfaction Criteria

- How satisfied are owners of cleaners who switch from dry cleaning to professional wet cleaning with their decision to convert?
- Have owners or workers experienced any adverse health effects associated with their exposure to cleaning chemicals prior to or after their switch to professional wet cleaning?
- How did switching to professional wet cleaning impact the owners’ levels of satisfaction with their businesses?

7.2.2 Study Design

A study design was developed to assess the specific transition, performance, financial, resource use, and owner satisfaction criteria of evaluation. A fundamental element of the study design was to evaluate each grantee’s operations as a dry cleaner, and use that evaluation as a benchmark for comparison in the evaluation of professional wet cleaning. This was important because operations in the garment care industry vary substantially from one shop to another. The study’s goal was to determine how each grantee’s business was impacted by switching to professional wet cleaning relative to when they were operation as traditional dry cleaners, and to draw conclusions about the viability of professional wet cleaning based on these comparisons.

A number of data sources were used in this assessment, including: data recorded by cleaners, structured interviews with each grantee, personal communications, automatic data loggers installed at grantees’ facilities, and direct observation of cleaning operations. A detailed description of the methods used to assess these criteria are outlined below.
Transition Assessment

To understand the difficulty of converting to professional wet cleaning, a series of questions were posed, including: concerns the cleaner had about converting prior to the actual conversion, the degree of difficulty in actually converting, the biggest difficulties experienced by the cleaner in converting, the degree of difficulty in learning a new cleaning process, and the importance of technical training.

Performance Assessment

The performance assessment sought to evaluate the ability of each cleaner to successfully wet clean customer garments that would have been dry cleaned prior to switching to professional wet cleaning. Four methods were used for assessing performance capability.

A Profile of Problem Garments: An analysis of sent-out garments (garments the cleaner did not feel comfortable cleaning in house), redos (garments that were brought back by customers for additional work), and customer claims (money or store credit for ruined or lost garments) provided a quantitative measurement of the extent and type of garments that pose a problem for each cleaner prior to and after switching to professional wet cleaning. Data collected by cleaners was used in conjunction with structured interview questions to quantify the frequency of problems garments before and after the switch to professional wet cleaning.

Rating of Cleaning Service and Customer Satisfaction: A qualitative assessment rated each owner’s perception of the relative quality of cleaning before and after switching to professional wet cleaning, in addition to each owner’s perception of the relative level of customer satisfaction before and after the switch. These ratings were obtained from a structured interview with the cleaner.

Customer Retention Evaluation: An assessment of the degree to which regular customers continued to use each cleaner after they switched, focused on the extent to which professional wet clean demonstration facilities were able to successfully process the full range of garments they had previously dry cleaned. Questions in the structured interview were used to characterize customer response.

Customer Response: Cleaners were asked a series of questions in a structured interview characterizing the attitudes of their customers to the switch to professional wet cleaning.

Financial Assessment

The financial assessment evaluated the relative profitability of professional wet cleaning compared to PCE dry cleaning. The financial analysis focuses on the five cleaners who were operating dry clean equipment immediately before professional wet clean equipment was installed -- Bob’s Cleaners, Hesperian Cleaners, Delight Cleaners, Sunny Fresh Cleaners, and Nancy’s Cleaners.
Process Dependent Cost Comparison: Process dependent costs were quantified before and after the switch to professional wet cleaning. The purpose of this analysis was to assess the relative profitability of operating each facility as a dry cleaner and as a professional wet cleaner by isolating those costs that vary in the two processes, or the “process dependent costs”. The cost estimates drew from financial records provided by each facility, monthly billing records provided by the cleaners and by the utilities, information from industry sources and reports from regulatory agencies, as well as from structured interviews and follow-up interviews with each cleaner. Costs were standardized by monthly expense (e.g. solvent cost per month = $50). If the volume of garments increased after converting to professional wet cleaning then variable expenses for dry cleaning were increased by the percentage of the volume increase.

Resource Assessment

An assessment of electricity, natural gas, and water use was undertaken to compare the resource demands of professional wet cleaning and dry cleaning.

Electricity and Natural Gas Use: Monthly billing records for natural gas and electricity were evaluated at the five facilities operating dry cleaning machines immediately prior to switching to professional wet cleaning.

Water Use: Monthly billing records for water use were evaluated at three of the five facilities operating dry cleaning machines prior to and after switching to professional wet cleaning. At Nancy’s Cleaners and Sunny Fresh Cleaners water consumption was not metered, as neither facility is directly billed for water.

Resource use was also standardized by monthly expense. If the volume of garments increased after converting to professional wet cleaning then the resources use for dry cleaning were increased by the percentage of the volume increase.

Owner Satisfaction Assessment

An assessment of owner satisfaction with the decision to switch to professional wet cleaning was carried out as part of a structured interview with each cleaner.

Overall Satisfaction: To gauge each cleaner’s level of satisfaction, each cleaner was asked a series of questions including: whether they felt it was a good business decision to switch, whether they would make the same decision again, how strongly they would recommend professional wet cleaning to another cleaner, had they experienced any specific acute health effects they could identify in relation to each cleaning process, and how they would rate their overall level of satisfaction as a professional wet cleaner compared to their level of satisfaction as a dry cleaner.
7.3 Case Study Summary Analysis

This summary analysis compares the experiences of the demonstration site facilities in terms of each evaluation criterion. An individual case study of each demonstration site is included in Appendices I through N. These appendices also include explanations of the figures presented in the summary analysis and individual case studies.

7.3.1 Performance Evaluation of Professional Wet Cleaning

The performance evaluation assessed the ability of demonstration facilities to professionally wet clean “dry clean only” and other delicate garments under normal market conditions. To address this issue, a number of different approaches were undertaken, each providing an important reference point in regards to performance quality.

7.3.1.1 Problem Garments

A problem garment profile was used to evaluate three types of problems encountered by professional cleaners in terms of the processing of garments (see Table 7.1):

*Send Outs*: garments the cleaner did not feel comfortable cleaning on site that were sent to another location for cleaning.

*Re-dos*: garments brought back by customers due to a problem with the quality of cleaning

*Claims*: garments irreversibly damaged during the cleaning process.

<table>
<thead>
<tr>
<th>Table 7.1: Problem Garment Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Send Out Rate</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Bob’s</td>
</tr>
<tr>
<td>Hesperian</td>
</tr>
<tr>
<td>Delight</td>
</tr>
<tr>
<td>Sunny Fresh</td>
</tr>
<tr>
<td>Nancy’s</td>
</tr>
</tbody>
</table>

Send Outs

Virtually all garments at each demonstration site were processed on-site. The only garments regularly sent out by each of the cleaners before and after switching to professional wet cleaning were leather garments. Sunny Fresh sent out the highest percentage of garments, once a day, including some wool and silk items due to labor time...
associated processing these garments or garments with heavy oils stains. It was easier for Sunny Fresh to send out an occasional item because they owned a perc dry cleaning shop five miles away.

**Returned Garments**

At three of five cleaners, the return rate was higher in dry cleaning, all due to problems with removing water-based stains. Each of these cleaners said that it was easier to remove stains in wet cleaning. In one case, Bob’s Cleaners, the return rates was higher in wet cleaning due to spotting and pressing problems.

**Claims**

Claims for ruined garments were paid at a rate of less than 1 per 10,000 garments professionally wet cleaned at each of the demonstration sites in four of the five cases. In the case of Sunny Fresh Cleaners, the higher rate in wet cleaning was due to ruining a series of sweaters immediately after switching when the operator had not been properly trained in processing sweaters. Two of the demonstration sites had not paid any claims as professional wet cleaners.

**Overall Success Rate**

The overall success rate can be calculated by subtracting out the occurrence of problem garments from total garments processed at each facility. Each of the demonstration sites were able to successfully wet clean over 99.5% of the garments brought in by customers.

### 7.3.1.2 Owner’s Overall Rating of Cleaning Service and Customer Satisfaction

Owners were asked to compare the overall quality of their cleaning service since switching from dry cleaning to professional wet cleaning. (Table 7.2) Of the three Bay Area cleaners and two San Diego cleaners who operated as dry cleaners before switching, all five rated the overall quality of their cleaning services as professional wet cleaners to be better than when they were dry cleaners. Owners were also asked to rate their customers’ level of satisfaction with professional wet cleaning compared to dry cleaning.

Of the five cleaners who operated a dry clean machine before switching to professional wet cleaning, each rated the level of customer satisfaction as higher than before switching over.
Table 7.2: Owners’ Ratings of Quality of Cleaning Service and Customer Satisfaction – Professional Wet Cleaning Compared to PCE Dry Cleaning

<table>
<thead>
<tr>
<th></th>
<th>Quality of Cleaning Service</th>
<th>Level of Customers Satisfaction:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower</td>
<td>Equal</td>
</tr>
<tr>
<td>Bob’s</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Hesperian</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Delight</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Sunny Fresh</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nancy’s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7.3.1.5 Customer Retention

The performance capability of professional wet cleaning was also measured by analyzing how customers responded to the cleaning service after the cleaners switched from dry cleaning to professional wet cleaning. Customer response is particularly important in a service sector such as the garment care industry.

Customer Retention Rate: Customer retention was used to assess the proportion of customers that continued to use the cleaner after they switched to professional wet cleaning. To estimate the customer retention rate, cleaners were asked to estimate the size of their customer base, based on the number of customers that come to the shop at least once a month. Cleaners were also asked how many customers they lost due to their switch to professional wet cleaning. The number of customers lost was subtracted out from the number of regular customers to calculate the number of customers retained. 33

Average customer retention measured 99.74%. (See Table 7.3) Two of the cleaners in the Bay Area reported they did not lose any customers after the switchover to professional wet cleaning, and instead, gained many more new customers. Hesperian Cleaners reported they lost two customers after switching over to professional wet cleaning. Sunny Fresh cleaners lost six customers, mostly due to problems with sweater shrinkage.

Customer Awareness: Four of the five cleaners reported that the majority of their customers (60-100%) were aware of their switch to professional wet cleaning. (See Table 7.4) Bob’s Cleaners used signs on hangers to inform customers of the switchover to professional wet cleaning and then talked to customers in person about the new process. Hesperian Cleaners did not verbally engage most customers about the cleaning process until the process was firmly established and all the glitches were worked out. Once the process was established, Hesperian cleaners talked to customers about the benefits of professional wet cleaning and actively promoted green cleaning to customers and to local
media. Delight Cleaners and Nancy’s Cleaners actively informed customers soon after they switched. Sunny Fresh was the only cleaner not to systematically inform customers of the switchover to wet cleaning.

### Table 7.3: Customer Retention at Professional Wet Clean Demonstration Sites

<table>
<thead>
<tr>
<th>Customer Base</th>
<th>Customers Lost Due to Wet Cleaning</th>
<th>Percentage of Customers Lost</th>
<th>Customer Retention Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bob’s Cleaners</td>
<td>200</td>
<td>0%</td>
<td>100.00%</td>
</tr>
<tr>
<td>Hesperian</td>
<td>150</td>
<td>1.33%</td>
<td>98.67%</td>
</tr>
<tr>
<td>Delight Cleaners</td>
<td>900</td>
<td>0%</td>
<td>100.00%</td>
</tr>
<tr>
<td>Sunny Fresh</td>
<td>800</td>
<td>0.75%</td>
<td>99.25%</td>
</tr>
<tr>
<td>Nancy’s</td>
<td>1,000</td>
<td>0%</td>
<td>100.00%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3,050</td>
<td>0.26%</td>
<td>99.74%</td>
</tr>
</tbody>
</table>

### Table 7.4: Customer Awareness and Response to Switch

<table>
<thead>
<tr>
<th>Customer Awareness</th>
<th>Customer Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Bob’s</td>
<td>60-70%</td>
</tr>
<tr>
<td>Hesperian</td>
<td>60-70%</td>
</tr>
<tr>
<td>Delight</td>
<td>90%</td>
</tr>
<tr>
<td>Sunny Fresh</td>
<td>10%</td>
</tr>
<tr>
<td>Nancy’s</td>
<td>90%</td>
</tr>
</tbody>
</table>

#### 7.3.2 Financial Evaluation

The financial evaluation focused on how the ongoing operating expenses in professional wet cleaning compared to dry cleaning. Each of the five cleaners in this study operating a perc dry cleaning machine immediately prior to switching to professional wet cleaning.

##### 7.3.2.1 Total Process Dependent Costs

For each of the cleaners evaluated, operating costs were lower in professional wet cleaning compared to dry cleaning. (See Table 7.5) Bob’s Cleaners experienced the greatest reduction in operating costs per month, followed by Delight, Nancy’s, Sunny Fresh, and Hesperian.

---

34 For the purposes of this study, regular customers are defined as those customers who do business with the shop at least once a month.
7.3.2.2 Costs Greater in Dry Cleaning

*Equipment and Maintenance Costs*: Based on the list price of equipment purchased by cleaners in the case studies, for four of the five cleaners, the expense associated with the professional wet cleaning system was comparable to perc dry cleaning. In these cases, while the capital equipment cost for wet cleaning was higher, the longer lifespan of the wet cleaning system made the operating cost for equipment comparable. In the case of Nancy’s Cleaners, a less expensive professional wet cleaning system was purchased. Coupled with the longer life expectancy of wet cleaning, this drives the expensive association with wet cleaning equipment substantially lower than dry cleaning. Maintenance and repair costs associated with operating dry clean machines are substantially higher than for wet clean equipment. This is due, almost exclusively, to the upkeep and repair of complex pollution control devices on dry clean machines, such as refrigerated condensing systems and distillation units; devices not found on wet clean machines.

### Table 7.5: Process Dependent Costs per Month

<table>
<thead>
<tr>
<th></th>
<th>Bob’s Dry</th>
<th>Bob’s Wet</th>
<th>Hesperian Dry</th>
<th>Hesperian Wet</th>
<th>Delight Dry</th>
<th>Delight Wet</th>
<th>SunnyFresh Dry</th>
<th>SunnyFresh Wet</th>
<th>Nancy’s Dry</th>
<th>Nancy’s Wet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual Labor</td>
<td>$1,432</td>
<td>$0</td>
<td>N/A</td>
<td>N/A</td>
<td>$929</td>
<td>$0</td>
<td>N/A</td>
<td>N/A</td>
<td>$355</td>
<td>$0</td>
</tr>
<tr>
<td>Solvent</td>
<td>$167</td>
<td>$0</td>
<td>$100</td>
<td>$0</td>
<td>$160</td>
<td>$0</td>
<td>$200</td>
<td>$0</td>
<td>$148</td>
<td>$0</td>
</tr>
<tr>
<td>Detergent</td>
<td>$31</td>
<td>$60</td>
<td>$50</td>
<td>$400</td>
<td>$94</td>
<td>$540</td>
<td>$13</td>
<td>$300</td>
<td>$50</td>
<td>$63</td>
</tr>
<tr>
<td>Water</td>
<td>$79</td>
<td>$63</td>
<td>$77</td>
<td>$66</td>
<td>$108</td>
<td>$97</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Electricity</td>
<td>$229</td>
<td>$144</td>
<td>$359</td>
<td>$292</td>
<td>$438</td>
<td>$334</td>
<td>$178</td>
<td>$165</td>
<td>$59</td>
<td>$43</td>
</tr>
<tr>
<td>Gas</td>
<td>$518</td>
<td>$387</td>
<td>$423</td>
<td>$408</td>
<td>$881</td>
<td>$761</td>
<td>$488</td>
<td>$353</td>
<td>$365</td>
<td>$373</td>
</tr>
<tr>
<td>Filter cost</td>
<td>$50</td>
<td>$0</td>
<td>$7</td>
<td>$0</td>
<td>$120</td>
<td>$0</td>
<td>$40</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Haz waste</td>
<td>$125</td>
<td>$0</td>
<td>$50</td>
<td>$0</td>
<td>$190</td>
<td>$0</td>
<td>$117</td>
<td>$0</td>
<td>$35</td>
<td>$0</td>
</tr>
<tr>
<td>Regulatory fees</td>
<td>$48</td>
<td>$0</td>
<td>$65</td>
<td>$0</td>
<td>$70</td>
<td>$0</td>
<td>$74</td>
<td>$0</td>
<td>$91</td>
<td>$0</td>
</tr>
<tr>
<td>Equipment</td>
<td>$375</td>
<td>$379</td>
<td>$375</td>
<td>$179</td>
<td>$375</td>
<td>$379</td>
<td>$375</td>
<td>$379</td>
<td>$375</td>
<td>$193</td>
</tr>
<tr>
<td>Machine Main.</td>
<td>$111</td>
<td>$24</td>
<td>$111</td>
<td>$24</td>
<td>$119</td>
<td>$24</td>
<td>$298</td>
<td>$24</td>
<td>$172</td>
<td>$83</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>$3,165</td>
<td>$1,058</td>
<td>$1,617</td>
<td>$1,368</td>
<td>$3,483</td>
<td>$2,134</td>
<td>$1,783</td>
<td>$1,220</td>
<td>$1,568</td>
<td>$754</td>
</tr>
<tr>
<td>Difference per Month</td>
<td>$2,107</td>
<td>$249</td>
<td>$1,349</td>
<td>$563</td>
<td>$1,568</td>
<td>$754</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Perc and Hazardous Waste*: There are a number of costs paid by dry cleaners associated with the use of the perchloroethylene solvent and the hazardous waste and air emissions it produces. These include the cost of the solvent and filters, regulatory fees, and hazardous waste disposal. These costs are not paid in professional wet cleaning and therefore contribute substantially to the difference in operating cost between dry cleaning and professional wet cleaning.
Energy Use: All five cleaners reduced their consumption of electricity after switching to professional wet cleaning. Four of the five cleaners have also experienced a reduction in natural gas use. The one cleaner experiencing an increase in natural gas use operated an all-electric dry clean machine. The ability for each to reduce energy use will vary depending on how operations were run before and after switching. (For a more detailed analysis of reasons underlying variability of resource use, see Section 7.3.3).

Water: While professional wet cleaners use water as the solvent for cleaning, the amount of water used per load is relatively small. In a dry clean machine, water is used to generate steam for drying, for boiling solvent during distillation, and for cooling solvent in a cooling tower or chiller. Both wet cleaners and dry cleaners use water to create boiler steam for operating the pressing equipment. Water is also used to operate water-inefficient commercial laundry equipment. At the three demonstration site cleaners that paid their own water bills, after adjusting for increases in volume, a decrease in water use resulted. This decrease can be attributed to a shifting of garments from the less water-efficient laundry equipment to the more water-efficient wet clean washers. Water demand for the dry clean machine associated boiler activity for drying and distillation as well as the cooling tower and/or chiller may have also added to the increased water demand in dry cleaning.

Labor: Three of the five cleaners experienced an increase in volume of garments cleaned while the number of hours worked remained the same (Nancy’s and Delight) or were slightly lower (Bob’s). In these cases, labor become more efficient in wet cleaning compared to perc dry cleaning. This increased labor efficiency was attributed to reduced processing time using the tensioning finishing equipment as well as reduced time for spot removal. At the other two demonstration sites, labor and volume remained the same for one (Sunny Fresh) while both labor time and volume increased proportionately (Hesperian) for the other.

7.3.2.3 Costs Greater in Wet Cleaning

Detergent: Dry cleaners use a relatively small amount of detergent as an additive to PCE solvent. Detergent costs were greater in professional wet cleaning for each demonstration cleaner, but to varying degrees. The cost of detergent in professional wet cleaning will depend on the brand of detergent purchased, the type of program used, and the volume of garments cleaned per load.

7.3.3 Resource Use Evaluation

The resource use analysis compared the electricity, natural gas and water use of four of the demonstration facilities when they operated a perc dry cleaners and after they switched to professional wet cleaning (See Table 7.6). At each of the facilities, monthly billing records were obtained from utility companies for a period of time before and after the cleaners switch. At Sunny Fresh and Nancy’s, precise energy use was obtained through one-site testing.
7.3.3.1 Electricity Use

At professional cleaners, electricity runs a number of pieces of equipment including: washers, dryers, air compressors and vacuum pump, and pressing equipment. A dry clean machine requires additional electricity to operate pollution control devices, including: refrigerated condensers, distillation units, and wastewater evaporators.

At each cleaner evaluated, electricity use dropped substantially immediately after the cleaner stopped using a PCE dry clean machine and started using professional wet cleaning equipment.

Previous research conducted by PPC estimated that electricity use would be lower in professional wet cleaning compared to dry cleaning.  

Table 7.6: Resource Use Per Month: Dry Cleaning vs. Professional Wet Cleaning

<table>
<thead>
<tr>
<th></th>
<th>Bob's Dry Clean</th>
<th>Bob's Wet Clean</th>
<th>Hesperian Dry Clean</th>
<th>Hesperian Wet Clean</th>
<th>Delight Dry Clean</th>
<th>Delight Wet Clean</th>
<th>Sunny Fresh Dry Clean</th>
<th>Sunny Fresh Wet Clean</th>
<th>Nancy's Dry Clean</th>
<th>Nancy's Wet Clean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity kWh/month</td>
<td>1,628</td>
<td>963</td>
<td>2,426</td>
<td>1,944</td>
<td>2,920</td>
<td>2,229</td>
<td>4,280</td>
<td>2,160</td>
<td>371</td>
<td>285</td>
</tr>
<tr>
<td>Change</td>
<td>665</td>
<td>482</td>
<td>691</td>
<td>2,120</td>
<td>86</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Change</td>
<td>41%</td>
<td>20%</td>
<td>24%</td>
<td>50%</td>
<td>23%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Natural Gas | Bob's Therms/month | 552 | 387 | 435 | 408 | 882 | 762 | 774 | 605 | 365 | 373 |
| Change | 165 | 27 | 120 |
| % Change | 30% | 6% | 14% | 22% | -2% |

| Water | HCF/month | 33 | 26 | 20 | 17 | 28 | 26 |
| Change | 7 | 4 | 3 |
| % Change | 22% | 18% | 10% |

7.3.3.2 Natural Gas Use

At professional cleaners, natural gas is used by a boiler, which generates steam used by pressing equipment, and a spotting board. Dry clean machines use steam as a source of heat used during the drying cycle. Steam can also be used to generate hot water.

for laundry or wet clean washers as well as to generate heat for laundry or wet clean dryers. More typically, laundry or wet clean washers use a natural gas hot water heater as a source for hot water and dryers are heated directly by a natural gas flame.

After switching to professional wet cleaning, four of the five cleaners experienced a reduction in natural gas used. The cleaner that saw an increase in natural gas (Nancy’s) used an unusual all-electric dry cleaning machine. In this machine, electricity, and not steam from the boiler, was used to evaporate the solvent during the dry cycle and to boil solvent during distillation.

For the four shops that experienced a reduction in natural gas use, the differences are likely due to differences in how each cleaner processed garments in professional wet cleaning. At Bob’s and Sunny Fresh, which had the greatest decrease in natural gas use, most garments are only machine dried for a short period of time (three to five minutes) and allowed to air dry. At Hesperian cleaner, where natural gas use reduction was relatively small, and at Nancy’s, where gas use went up, garments are machine -dried for a relatively long time (15-20 minutes).

Previous research conducted by PPC estimated that natural gas use would be slightly lower in professional wet cleaning compared to dry cleaning. 36

7.3.3.3 Water Use

In professional wet cleaning, water is used as the cleaning solvent. Although dry clean machines do not wash garments in water, they use water in the process of recapturing solvent vapors. Refrigerated condensers are used to re- condense solvent vapors during the dry cycle, and require cooling towers to transfer heat away from the machine. Also, most dry clean facilities process some amount of laundry using domestic or industrial washers that are less water efficient than professional wet clean washers.

Previous research estimated water use at a professional wet cleaning facilities to be slightly higher or slightly lower than dry cleaning. 37 If cleaners do not properly maintain their cooling towers, water use in dry cleaning can be substantially higher than wet cleaning. 38

7.3.4 Evaluation of the Transition to Professional Wet Cleaning

An evaluation of the transition process was conducted to understand issues related to making the transition from dry cleaning to professional wet cleaning. Cleaners were asked about the concerns they had about professional wet cleaning prior to making the

switch and were asked to rate the degree of difficulty in making the transition to professional wet cleaning.

7.3.4.1 Cleaners’ Concerns About Switching to Wet Cleaning Technology

Cleaners were asked to identify the concerns they had about professional wet cleaning prior to making the switch. (Table 7.7)

Table 7.7: Cleaners’ Concerns About Switching to Wet Cleaning Technology

<table>
<thead>
<tr>
<th></th>
<th>Poor Performance</th>
<th>Increased Cost</th>
<th>Customer Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bob’s</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hesperian</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Delight</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunny Fresh</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nancy’s</td>
<td>√</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Concerns About Performance Issues**: All five cleaners interviewed mentioned anxiety about performance quality as their main concern before switching to professional wet cleaning. All also cited fear of shrinkage, with color bleeding and spot removal also noted.

**Concerns Cost**: Increased cost, especially that associated with pressing labor and water use, was noted by two cleaners.

**Concern About Customer Reaction**: Concern about customer reaction was noted by one cleaner.

7.3.4.2 Difficulties Encountered in Making Transition to Professional Wet Cleaning

Demonstration site cleaners differed in how difficult they expected the transition to be to professional wet cleaning to be. (Table 7.8)

In regards to how difficult it actually was to make the transition, all five cleaners stated it was “not difficult at all” or “not too difficult.”

Table 7.8: Difficulty Ratings - Transitioning to Professional Wet Cleaning

<table>
<thead>
<tr>
<th></th>
<th>Not at all Difficult</th>
<th>Not too Difficult</th>
<th>Somewhat Difficult</th>
<th>Very Difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td>How difficult did you expect it would be to make the switch to professional wet cleaning?</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>How difficult did you think it actually was to switch to professional wet cleaning?</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Cleaners were asked to identify the biggest difficulties in making the switch to professional wet cleaning (See Table 7.9). Four cleaners reported that training employees/learning a new technology was challenging. Three of the cleaners mentioned technical issues – sorting or equipment programming. Overcoming the fear of harming garments was mentioned by two cleaners while financial issues were noted by three demonstration site owners.

None of the cleaners that switched over reported difficulty with equipment installation. This issue was noted in prior research. This was likely due to the fact that by the time the cleaners converted, most of the infrastructure needed to provide effective installation, programming and training was already in place and working.

### Table 7.9: Biggest Difficulties in Making the Switch to Professional Wet Cleaning

<table>
<thead>
<tr>
<th></th>
<th>Programming of Equipment</th>
<th>Sorting</th>
<th>Training/ Tech Support</th>
<th>Fear of Harming Garments</th>
<th>Financial Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bob’s</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Hesperian</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Delight</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunny Fresh</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Nancy's</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 7.3.4.3 Importance of Technical Training

All five cleaners interviewed stated that training was very important in making a successful transition to wet cleaning. (See Table 7.10)

### Table 7.10: Grantees’ Ratings of the Importance of Technical Training

<table>
<thead>
<tr>
<th>Importance of training in making a successful transition</th>
<th>Not at all Important</th>
<th>Not too Important</th>
<th>Somewhat Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance of training in making a successful transition</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

---

7.3.5 Owner Satisfaction

Owners were asked about their overall level of satisfaction with switching from dry cleaning to professional wet cleaning (See Table 7.11). All five cleaners considered switching to wet cleaning to be a good decision, and all said they would make the same decision again. When asked whether they would recommend wet cleaning to other cleaners who needed to buy new cleaning equipment, all five grantees said that they would recommend professional wet cleaning.

Table 7.11: Owner Satisfaction

<table>
<thead>
<tr>
<th></th>
<th>Bob’s</th>
<th>Hesperian</th>
<th>Delight</th>
<th>Sunny Fresh</th>
<th>Nancy’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching was good business decision</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Would make same decision again</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Would recommend technology</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Higher level of satisfaction as wet cleaner</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

A number of factors appear to underlie this high level of satisfaction:

**Better Quality:** All five cleaners stated that the quality of their cleaning service was better than the quality of their service as a dry cleaner.

**Customer Satisfaction:** Two cleaners mentioned positive customer satisfaction.

**Better Health:** There are a number of adverse health consequences associated with the exposure to perchloroethylene including headache, dizziness, fatigue, nausea, and nasal irritation. Of the five cleaners who operated a PCE dry cleaning machine prior to converting to professional wet cleaning, all reported either they or their staff had experienced one or more of the symptoms associated with PCE exposure when operating their dry clean machine. (See Table 7.12) Since switching to professional wet cleaning, these symptoms have subsided.

Table 7.12: Symptoms when operating as a PCE dry cleaner

<table>
<thead>
<tr>
<th></th>
<th>Headache</th>
<th>Dizziness</th>
<th>Fatigue</th>
<th>Nausea</th>
<th>Nasal Irritation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bob’s</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hesperian</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Delight</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Sunny Fresh</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Nancy’s</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

40 See Material Data Safety Sheet (MSDS) for perchloroethylene.
Since switching to professional wet cleaning, these adverse health effects had completely disappeared, with the exception of one cleaner, who attributes his nasal irritation to allergies not related to workplace exposure. (See Table 7.13).

Table 7.13: Symptoms when operating as a professional wet cleaner

<table>
<thead>
<tr>
<th></th>
<th>Headache</th>
<th>Dizziness</th>
<th>Fatigue</th>
<th>Nausea</th>
<th>Nasal Irritation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bob’s</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hesperian</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Delight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunny Fresh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nancy’s</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8. Total Reductions Achieved

8.1 Summary of Total Reductions Achieved

As a consequence of this project, a number of cleaners added or switched to CO$_2$ and/or professional wet cleaning. This resulted in substantial environmental improvements. (Table 8.1)

Table 8.1 Annual Reductions

<table>
<thead>
<tr>
<th>Cleaner</th>
<th>PCE reduced (gallons)</th>
<th>PCE emissions reduce (lbs)</th>
<th>Hazardous waste sludge reduced (gallons)</th>
<th>Hazardous waste filters reduced (count)</th>
<th>Electricity reduced (kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alex’s Dry Cleaners</td>
<td>192</td>
<td>1,518</td>
<td>148</td>
<td>20</td>
<td>11,730</td>
</tr>
<tr>
<td>Apex Cleaners</td>
<td>43</td>
<td>380</td>
<td>38</td>
<td>5</td>
<td>2,932</td>
</tr>
<tr>
<td>Blue Sky Cleaners</td>
<td>278</td>
<td>2,277</td>
<td>222</td>
<td>30</td>
<td>11,730</td>
</tr>
<tr>
<td>Bob’s Cleaners</td>
<td>86</td>
<td>759</td>
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<td><strong>964</strong></td>
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<td><strong>70,379</strong></td>
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41 The California Air Resources Board February 2006 document “California Dry Cleaning Industry Technical Assessment Report” Table IV -18 was used as a basis for average PCE reduction, PCE emissions reduction, hazardous waste sludge reduction, and hazardous waste filter reduction. Average values for primary control dry clean machines were used for Bob’s Cleaners and Corte Madera Cleaners. Half the average reductions were used for Poly Cleaner because they replaced their perc machine with both wet cleaning and hydrocarbon. Alex’s Dry Cleaners installed two professional wet cleaning systems and is now processing two-thirds of his volume he used to dry clean in these wet cleaning systems. Blue Sky Cleaners’ volume is three times the typical cleaner, two-thirds of the volume in wet cleaned while one third is cleaned in CO$_2$. In regards to energy use, a PPC evaluation of energy use of different professional cleaning technologies shows that the average electricity use in professional wet cleaning is 8.85 kWh/100 pounds of garments cleaned vs. 22.18 kWh/100 lbs. in perc dry cleaning. CARB’s February 2006 Technical Assessment estimates the average volume of a dry cleaner is 44,000 lb/year. The electricity savings at an average cleaner comes to 5,865 [(22.18 -8.85)/100*44,000].
Annual reductions in PCE used, PCE emitted, hazardous waste sludge reduced, hazardous waste filters reduced, and electricity reduced were calculated based on the number of demonstration sites created and the number of other facilities who have installed professional wet cleaning systems as a result of the demonstration program. (See Table 8.1)
9. **Discussion and Recommendations**

9.1 **Summary of Results**

This section summarizes the activities and findings of a project designed to jump -
start the commercialization of CO₂ and professional wet cleaning through the
establishment of a grant program that created the first CO₂ demonstration site in the Bay
Area, and the first professional wet cleaning sites in the Bay Area and San Diego.

9.1.1 **Outreach to Dry Cleaners in the Region**

Cleaners in the Bay Area and San Diego regions were educated about the
demonstration grant program through a series of information articles in the regional trade
press, a direct mail campaign, and outreach by regional garment care associations.

The regional trade press developed six in formation articles discussing the grant
program. A total of ten direct mail flyers were sent out to cleaners in the region describing
the grant program and announcing workshops. In the Bay Area, the Peninsula Dry
Cleaners Association, the Korean Dry Cleaners Association in Northern California, and the
Bay Area Chinese Dry Cleaners Association all co-sponsored workshops at demonstration
facilities.

As a consequence of the outreach campaign, a total 300 cleaners contacted project
staff expressing an interest in learning more about professional wet cleaning and the grant
program, or to sign up for a workshop.

9.1.2 **Demonstration of Technology**

First-hand education was accomplished through workshops, and individual tours of
demonstration facilities. A total of eleven workshops were held in the Bay Area and San
Diego – eight in the Bay Area and three in San Diego. A total of 199 cleaners attended
workshops sponsored by the project. In addition, 20 cleaners visited one or more of the
new demonstration facilities as part of individual and/or group tours.

The workshops proved to be effective in identifying cleaners interested in
converting to professional wet cleaning. Of the 19 applicants to the demonstration
program, 17 attended workshops.

Visiting more than one demonstration site was also useful for cleaners interested in
applying to the grant program. Of the cleaners applying to the demonstration program,
over two-thirds visited two or more demonstration facilities.
9.1.3 Identification of Qualified Cleaners for New Demonstration Program

A total of 19 applications to the grant program were received. The biggest problems for the applicants who did not receive a grant award was that they applied too late to the program – three of these facilities received demonstration funding through a state-wide program.

The six cleaners selected to become demonstration sites through this program were highly diverse in regards to geographic location, household income level of the local community, size of cleaning operation, and experience of the cleaner.

9.1.4 Demonstration Site Conversion Process

Each cleaner selected as a demonstration site received technical assistance throughout the conversion process. Grantees received guidance in regards to selection of equipment, plant redesign, equipment installation, and technical training.

Besides the CO₂ cleaner in the study, most of the demonstration site cleaners chose a very similar configuration of professional wet cleaning equipment. Training was enhanced by having grantees intensively observe the CO₂ and professional wet cleaning process at another dedicated facilities prior to having equipment installed at their own facilities.

9.1.5 Viability of Technology

Demonstrations sites were evaluated in terms of performance capacity, financial costs, resource impacts, and owner satisfaction. Since the CO₂ facility in the study was a new plant, it was not possible to evaluate the cleaner in regards to the relative viability of technology. Therefore, this study in technical viability focus on the five cleaners who switched from PCE to wet cleaning.

In regards to technical performance, each grantee was able to maintain his or her level of service and customer base. The financial analysis revealed lower operating costs in wet cleaning compared to PCE dry cleaning, while the resource evaluation showed a reduction in electricity use associated with the switch to wet cleaning.

In regards to owner satisfaction, the evaluation indicated that each of the demonstration sites considered their decision to switch to professional wet cleaning as a good business decision and recommended professional wet cleaning to other cleaners. This evaluation also revealed that training and the availability of demonstration sites at which the technology can be observed first hand are primary factors that can facilitate a more rapid transition to this new technology.
9.2 Future Commercialization of Pollution Prevention Technology in the Garment Care Industry

As part of Occidental College’s Pollution Prevention Center 1997 report, *Pollution Prevention in the Garment Care Industry*, and PPC’s 2004 report, Commercialization of Professional Wet Cleaning, a series of recommendations were made stemming from the findings of these reports. Since 2000, there has been significant movement in developing some of these recommendations, including: 1) the development of additional professional wet cleaning demonstration sites, 2) the integration of pollution prevention into air toxic rulemaking, 3) the development of a statewide incentive fund for cleaners converting to clean technologies, and 4) the development of social marketing strategies for cleaners switching to pollution prevention technologies.

This report dealt with a series of ongoing issues related to the diffusion of CO$_2$ and professional wet cleaning in the San Francisco Bay Area and San Diego including: education and outreach to garment care industry stakeholders, technical assistance to cleaners converting to CO$_2$ and professional wet cleaning systems, developing an infrastructure to support the diffusion of these technologies, and evaluating the viability of professional wet cleaning. The evaluation of these issues, as well as a review of ongoing issues identified in previous reports, has resulted in a series of recommendations designed to encourage the diffusion of pollution prevention technology in the garment care industry. These recommendations are listed below.

9.2.1 Education and Outreach to Garment Care Industry

Education recommendations include: develop similar demonstration programs in other regions; develop regular educational workshops for dry cleaners; develop regional technical training programs for professional wet cleaning; and develop social marketing strategies for cleaners switching to professional wet cleaning.

9.2.2 Engagement of Stakeholder Groups

Stakeholder recommendations include: educate realtors and lenders about professional wet cleaning and CO$_2$ dry cleaning; increase consumer/community organizations’ involvement in information dissemination about clean garment care technology; develop energy rebate programs for professional wet cleaning; and develop an apparel manufacturing project on garment remanufacturing for professional wet cleaning.

9.2.3 Policy and Program Development

Policy and program development recommendations include: develop a professional wet cleaning certification program; encourage the FTC to require a “Professional Wet Clean” care label; create a pollution prevention garment care information clearinghouse; and designate professional wet cleaning and CO$_2$ dry cleaning as environmentally preferable pollution prevention technologies.
10. Appendices

Appendix A - Application Forms
Appendix B - Cleaner Contract
Appendix C - Information Packet
Appendix D - Equipment Report
Appendix E - Western Cleaner and Launderer Articles
Appendix F - Direct Mailers
Appendix G - Workshop Protocol
Appendix H - Technical Training Protocol
Appendix I - Bob's Cleaners (Richmond, CA)
Appendix J - Hesperian Cleaners (San Lorenzo, CA)
Appendix K - Delight Cleaners (Sunnyvale, CA)
Appendix L - Sunny Fresh Cleaners (La Jolla, CA)
Appendix M - Nancy’s Cleaners (Alpine, CA)
Appendix A - Application Forms
APPLICATION FORM
$10,000 in cash grant from the city of San Francisco
Priority given to early applicants

Legal Business Name: ____________________________________________________________
Commercial Name (if different): ________________________________________________
Owner(s): ___________________________________________________________________
Contact Person (if different): ___________________________________________________
Street Address: __________________________________________________________________
City and Zip Code: __________________________________________________________________
Telephone: __________________________ Fax: __________________________

Type of business (circle one):
Sole proprietorship  Corporation  Other _________________

Ownership of Facility (circle one):  Owner  Lessee

Years of experience as a dry cleaner _____

Address where equipment will be installed ____________________________________________

How many years remaining on the lease for this facility? _____

Perc machine(s) currently in use: # machines ______ Age of machine(s) ________  ____

Current volume of garments cleaned in perc per day __________. Laundry ____________

Number of employees at facility: _____ Full-time  _____ Part-time  (Count owner(s) if they work in shop)

Equipment to be purchased (circle all that apply):

Wet Cleaning System:
Wet clean washer  Wet clean dryer  Tensioning form fitter  Tensioning pants topper
City of San Francisco Environmental Garment Care Program

Reason(s) for switching to professional wet cleaning (circle all that apply):

Need to replace cleaning equipment
Interested in marketing cleaner as an environmentally friendly business
Eliminates environmental regulations
Eliminates health risks associated with dry cleaning
Avoids problems with property lease
Other __________________________________________

Please note the following:

- Eligibility for grant:
  - Operate as a dedicated professional wet cleaning facility (i.e., removing all dry cleaning equipment)
  - Willing to serve as a professional wet cleaning demonstration site
  - Willing to collect data on technology
  - Participate in project evaluation efforts
- Program funding is limited and application is no guarantee that a grant will be awarded.

Additional information, including in-person or telephone interviews and site visits, may be required.

I certify that the information provided is true and correct to the best of my knowledge.

__________________________________________  ____________________________  ____________
Name                                                   Signature                  Date

Mail application to: Pollution Prevention Center
UEPI, Occidental College
1600 Campus Road, Los Angeles, CA 90041

Fax application to: (323) 259-2734

Assistance completing application: Contact the Pollution Prevention Center at (323) 259-1420
APPLICATION FORM

$5,000 Professional Wet Cleaning Demonstration Program
$10,000 CO2 Dry Cleaning Demonstration Program
Funding from AB 998

Priority given to early applicants

Legal Business Name: __________________________________________________________
Commercial Name (if different): __________________________________________________
Owner(s): ____________________________________________________________________
Contact Person (if different): _____________________________________________________
Street Address: _________________________________________________________________
City and Zip Code: ______________________________________________________________
Telephone: __________________________ Fax: __________________________

Type of business (circle one):

Sole proprietorship  Corporation  Other ___________________

Ownership of Facility (circle one):  Owner  Lessee

Years of experience as a dry cleaner ______

Address where equipment will be installed

How many years remaining on the lease for this facility? ______

Perc machine(s) currently in use:  # machines _____ Age of machine(s) ________  _____

Current volume of garments cleaned in perc per day _________. Laundry __________

Number of employees at facility: _____Full-time _____Part-time  (Count owner(s) if they work in shop)

Equipment to be purchased (circle all that apply):

Wet Cleaning System


5. CO2 Dry Cleaning
Reason(s) for switching to CO2 dry cleaning and/or professional wet cleaning (circle all that apply):

- Need to replace cleaning equipment
- Interested in marketing cleaner as an environmentally friendly business
- Eliminates environmental regulations
- Eliminates health risks associated with dry cleaning
- Avoids problems with property lease
- Other __________________

Please note the following:

- Eligibility for grant:
  - Operate as a dedicated CO2 and/or professional wet cleaning facility (i.e., removing all dry cleaning equipment)
  - Willing to serve as a demonstration site
  - Willing to collect data on technology
  - Participate in project evaluation efforts
- Program funding is limited and application is no guarantee that a grant will be awarded.

Additional information, including in-person or telephone interviews and site visits, may be required.

I certify that the information provided is true and correct to the best of my knowledge.

________________________________________  ____________________________  __________________
Name                                      Signature                                      Date

Mail application to:  
Pollution Prevention Center  
UEPI, Occidental College  
1600 Campus Road, Los Angeles, CA 90041

or

Fax application to:  
(323) 259-2734

Assistance completing application:  Contact the Pollution Prevention Center at (323) 259-1420.
Non-Toxic Dry Cleaning Incentive Program
Grant Application

QUESTIONS AND ASSISTANCE
Thank you for taking the time to complete this grant application. If you have any questions about the grant application or need assistance in completing the application, please feel free to contact:

Hafizur Chowdhury
Phone: (916) 322-2275, E mail: hchowdh@arb.ca.gov

Please return the completed application and mail to:

Attention: SSD Dry Cleaning Incentive Program
California Air Resources Board
P. O. Box 2815
Sacramento, CA 95812

1. COMPANY INFORMATION (do not include personal residential address)

| Facility Owner’s Legal Name |
| Facility Name |
| Facility Address |
| City | County | State | CA | Zip Code |
| Federal Employer Identification Number (FEIN) | Or Social Security Number |
| Contact Person |
| Contact Phone No. ( ) - | Contact Fax No. ( ) - |
| Contact Email Address |

2. EXISTING PERC MACHINE INFORMATION

What other types of dry cleaning machines currently do you have in your facility? ____________________

What year did you purchase your perc machine? ______________ Don’t know [ ]

Did you buy it new or used? New [ ] Used [ ] How many perc machines do you have in your facility? ______

Machine Brand __________________________ Model ______________________ Rated Capacity _______ pounds

Machine Brand __________________________ Model ______________________ Rated Capacity _______ pounds

Local Air District Permit No. __________________________ Expiration Date __________________________

Local Air District Name __________________________

3. REPLACEMENT OF MACHINE INFORMATION

Which one of the following non-toxic and non-smog forming cleaning technologies are you planning to purchase to replace your existing perc machine?

Machine Type: Professional Wet Cleaning System [ ] Green Jet Cleaning System [ ]
Cold Water Cleaning System [ ] Carbon Dioxide (CO2) Cleaning System [ ]

Have you already replaced your perc machine with one of the above? Yes [ ] No [ ] If yes, date ________

I hereby certify that all information contained herein is true and correct and I understand may be subject to release under the California Public Records Act.

Type or print company owner’s name
Owner’s Signature 10-7 Date Signed
APPLICATION FORM
City of Oakland: $10,000 Grant
Professional Wet Cleaning Demonstration Project
Priority given to early applicants

Legal Business Name: _______________________________________________________
Commercial Name (if different) : _____________________________________________
Owner(s): __________________________________________________________________
Contact Person (if different) : _______________________________________________
Street Address: __________________________________________________________________
City and Zip Code: __________________________________________________________________
Telephone: ________________________ Fax: ____________________________

Type of business (circle one):

Sole proprietorship  Corporation  Other__________________

Ownership of Facility (circle one):  Owner  Lessee

Years of experience as a dry cleaner _____

Address where equipment will be installed __________________________________________

How many years remaining on the lease for this facility? ______

Perc machine(s) currently in use: # machines ______ Age of machine(s) _________  _____

Current volume of garments cleaned in perc per day _________. Laundry __________

Number of employees at facility: ____ Full-time  ____ Part-time  (Count owner(s) if they work in shop)

Equipment to be purchased (circle all that apply):

Wet clean washer  Wet clean dryer  Tensioning form fitter

Tensioning pants topper  Other__________________
Environmental Garment Care Program

Reason(s) for switching to professional wet cleaning (circle all that apply):

- Need to replace cleaning equipment
- Interested in marketing cleaner as an environmentally friendly business
- Eliminates environmental regulations
- Eliminates health risks associated with dry cleaning
- Avoids problems with property lease
- Other ____________________

Eligibility for grant:

- Operate as a dedicated professional wet cleaner for the duration of the contract (i.e., removing all dry cleaning equipment from the plant)
- Serve as a professional demonstration site (i.e. open up facility for quarterly workshops, individual demonstration tours, etc.)
- Must be willing to collect data for reports regarding the viability of the technology.
- Participate in the project evaluation efforts: provide financial data, energy usage, customer and worker satisfaction.
- Agree not to become a distributor for any of the wet cleaning equipment during the term of the contract.
- Must be located in the city of Oakland to qualify.
- Three years of experience in the drycleaning industry preferred.

Program funding is limited and application is no guarantee that a grant will be awarded.

Additional information, including in-person or telephone interviews and site visits, may be required.

I certify that the information provided is true and correct to the best of my knowledge.

__________________________________________  __________________________________________  ________________
Name                                           Signature                                      Date

Mail application to:
Pollution Prevention Center
UEPI, Occidental College
1600 Campus Road, Los Angeles, CA 90041

Or

Fax application to: (323) 259-2734

Assistance completing application: Contact the Pollution Prevention Center at (323) 259-1420
Appendix B - Cleaner Contract
This agreement is made by and between Occidental College (hereafter the College), a California non-profit postsecondary institution, located at 1600 Campus Road, Los Angeles, California 90041 and John Doe Cleaners (hereafter the Subgrantee), a California corporation providing cleaning services, located at 1234 Main Street, Anywhere, CA 90000.

The Pollution Prevention Education & Research Center based at the Urban & Environmental Policy Institute shall represent the College in this collaborative agreement.

PURPOSE
The College has been awarded a contract from the Bay Area Air Quality Management District to conduct, “The Environmental Garment Care Demonstration Program G186” which is designed to demonstrate the viability of professional wet cleaning and CO\textsubscript{2} dry cleaning technologies in the San Francisco Bay Area. The College has determined that the Subgrantee is capable of providing assistance to the subject project under the terms and conditions set forth and the Subgrantee has agreed to provide such assistance.

TERM
The term of this agreement is from the date it is fully executed by all parties until December 31, 2007. This agreement may be extended by written agreement between the parties.

COMPENSATION
The Subgrantee, as a study participant, will receive $5,000 from the College after installation of professional wet cleaning technology.

SCOPE OF WORK
A. Within 60 days after the subagreement is signed, Subgrantee shall demonstrate in writing the capacity to finance the remaining portion of equipment purchase.

B. Within 60 days after the subagreement is signed, Subgrantee shall provide written documentation verifying that Subgrantee is the current leaseholder for the facility and stating the end date for the current lease.

C. Within 90 days after the subagreement is signed, Subgrantee shall purchase professional wet cleaning equipment (including wet clean washer, wet clean dryer, tensioning form fitter, and tensioning pants topper).

D. Subgrantee shall operate as a dedicated professional wet cleaning facility for the length of this subagreement.
E. Subgrantee shall use only spotting chemicals designed for water-based cleaning.

F. Subgrantee shall to serve as a demonstration site for the length of this subagreement. As a demonstration site, Subgrantee shall host periodic workshops/seminars (no more than one per month) as well as host individual or small group tours.

G. Subgrantee shall participate in project evaluation efforts for the duration of the subagreement. Subgrantee must be willing to: collect technical performance data (e.g. number of garments cleaned per month, number and type of problem garments); collect financial performance data (e.g. capital equipment cost, monthly detergent expenses, etc.); collect resource use data (e.g. monthly electrical, gas, and water use); sign a Facility Access Agreement with Pacific Gas & Electric; and allow resource metering evaluation of CO$_2$ dry cleaning and professional wet cleaning.

H. Subgrantee shall not be a dealer, distributor, or lessor of wet cleaning technology or provide unsolicited product preferences or recommendations of wet cleaning technology to workshop and seminar participants, members of small groups and individuals directed by the College to Subgrantee’s facility for the length of this subagreement.

**TERMS AND CONDITIONS**

**TERMINATION**

Either the College or the Subgrantee may terminate this agreement by giving 30 days written notice to the other party. In the event that the College terminates this agreement, the Subgrantee shall not be obligated to perform any further work under this agreement after the effective termination date.

**TRANSFERS/ASSIGNMENTS/SUBCONTRACTING**

The Subgrantee agrees that there shall be no transfers, assignment or subcontracting to a third party to this agreement or any part thereof without prior notification and written approval from the College.

**INDEMNIFICATION**

The Subgrantee shall indemnify, save and hold the College, its agents, officers, employees harmless from and against any and all claims, causes of action or liability arising from negligent or omitted acts of the Subgrantee, its employees, agents, or subcontractors, in the performance of this agreement except to the extent that such are caused by the sole fault or negligence of the College.

**INTELLECTUAL PROPERTY**

All publications, patents, copyrights, and inventions developed pursuant to this agreement will be in accordance with the policies of the College.
FAILURE TO PERFORM
In the event the Subgrantee fails to complete the project in a manner that the College considers satisfactory within the period of performance stated, the College shall not be obligated to pay the compensation as specified the Compensation clause.

GOVERNING LAW
This agreement shall be construed and interpreted in accordance with the laws of the State of California. The venue for resolution shall be the County of Los Angeles.

SEVERABILITY
In the event that one or more of the clauses in this agreement shall be held to be unenforceable in any respect by a court of competent jurisdiction, such holding shall not affect any other clauses of this agreement and the agreement shall be then be construed as if such clause are not a part thereof.

MODIFICATION
This agreement constitutes the entire agreement between the parties and may be modified only by formal written amendment agreed to by both parties to this subcontract.

NOTICES
Any notices from either party to the other shall be given in writing to the attention of the persons listed below, or to other such addresses or addressees as may hereafter be designated in writing, for notices by either party to the other. Notice shall be given by certified, express, or registered mail, return receipt requested, and shall be effective as of the date of receipt indicated on the return receipt card.

THE COLLEGE:
Occidental College
1600 Campus Road
Los Angeles, CA 90041 -3314
Attn: Peter Sinsheimer

And

Occidental College
Business Office
1600 Campus Road
Los Angeles, CA 90041 -3314
Attn: Umar A. Hassan

Subgrantee: Mr. John Doe
John Doe Cleaners
1234 Main Street
Anywhere, CA 90000
NON-EFFECT OF WAIVER
The failure of the College and the Subgrantee to insist upon the performance of any or all of the terms, covenants, or conditions of this agreement, or failure to exercise any rights or remedies hereunder, shall not be construed as a waiver or relinquishment of the future performance of any such terms, covenants, or conditions, or of the future exercise of such rights or remedies, unless otherwise provided for herein.

FORCE-MAJUERE
Neither the College or the Subgrantee shall be liable or deemed to be in default for any delay or failure in performance under this agreement or interruption of services resulting, directly or indirectly, from acts of God, civil or military authority, acts of public enemy, war, strikes, labor disputes, shortages of suitable parts, materials, labor or transportation, or any similar cause beyond the reasonable control of the College and the Subgrantee.

ARBITRATION
Any dispute arising out of this agreement shall be exclusively and finally settled by arbitration in accordance with the Rules of the American Arbitration Association (AAA). The place of arbitration shall be Los Angeles, California unless the parties agree otherwise. The arbitrator shall determine the rights and obligations of the parties in accordance with the laws of California. Notice of the demand for arbitration shall be served upon the party against whom the demand is made at the same time that the demand is filed with AAA. In no event shall a demand for arbitration be made or permitted after the date when the claims being asserted in the demand would be barred by the applicable statute of limitations. Each party shall bear the costs of the arbitration proceeding, including attorneys’ fees and expenses. The award shall be in writing and state the reasons upon which it is based. The award shall be final and binding on the parties. Any court having jurisdiction over the person or the property of the person against whom enforcement of the judgment is sought may enter judgment on the award.

INSURANCE
The Subgrantee agrees to maintain commercial general liability insurance at a minimum coverage level of not less than $1 million per occurrence for the term of this Contract.

ENTIRE AGREEMENT
This subagreement represents the entire agreement between the parties hereto related to the Subgrantee providing services to the College and there are no understandings, representations, or warranties of any kind except as expressly set forth herein. No waiver, alteration, or modification of any of the provisions herein shall be binding on any party unless in writing and signed by the party against whom enforcement of such waiver, alteration, or modification is sought.
Appendix C - Information Packet
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<th>Geographic Location</th>
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<th>CARB Funds (Conversion from PERC)</th>
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<tr>
<td>Sacramento Area</td>
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<td>$20,000</td>
</tr>
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For additional information on financial incentives available please call (323) 259-1457
Rebate program for Dry Cleaners

The City of Oakland is launching a demonstration program, in partnership with Occidental College, to promote professional wet cleaning, an environmentally friendly alternative to perchloroethylene dry cleaning. As you may have heard, the California Air Resources Board will be phasing out perc dry cleaning in California.

The Oakland program will work closely with a two dry cleaners currently using perchloroethylene to switch to wet cleaning by providing:

- Partial Rebate toward purchase of wet cleaning equipment ($10,000 per cleaner provided by the City through a grant to Occidental; an additional $10,000 is available from the California Air Resources Board)
- Free Assistance from wet cleaning experts and manufacturers on most suitable equipment
- Hands on technical support to ensure smooth transition
- $2,000 for marketing along with free marketing assistance.

In order to qualify for this demonstration program, garment cleaners must ...

- Switch from perc technology to wet cleaning
- Be willing to practice as a wet cleaning only site
- Agree to the demonstrate technology to other garment cleaners.

If you are interested in participating in this pilot program OR would like more information on this project, including visiting a demonstration site, please contact:

Gabrielle Saveti
Bay Area Outreach Coordinator
Pollution Prevention Center
Occidental College
(415) 415.519-3805
greencln@oxy.edu

Thank you for your consideration.

Sincerely,

Carol Misseldine
Sustainability Director
Office of the Mayor
City of Oakland
FASHIONING A GREENER SHADE OF CLEAN

Commercialization of Professional Wet Cleaning in the Garment Care Industry

Pollution Prevention Education and Research Center
Urban and Environmental Policy Institute
Occidental College

November 19, 2004

Abstract

This report, "Fashioning a Greener Shade Clean: Commercialization of Professional Wet Cleaning in the Garment Care Industry", is one in a series of reports by the Pollution Prevention Education and Research Center at Occidental College designed to address the significant environmental and health impacts associated with the use of perchloroethylene (PCE), the chemical cleaning solvent used by the vast majority of dry cleaners in the United States. To help jump-start the diffusion of professional wet cleaning, a non-toxic alternative to dry cleaning, study authors administered a grant program to provide financial and technical assistance to 8 cleaners in the greater Los Angeles region interested in switching from dry cleaning to professional wet cleaning, and in serving as demonstration sites. A successful outreach campaign to recruit applicants to the grant program included: 9 information articles in the regional trade press, 6 direct mail flyers sent to cleaners in the region describing the grant program and announcing workshops and seminars, and 11 workshops and seminars hosted by dedicated professional wet cleaners. As consequences of these outreach efforts, 140 cleaners contacted the project staff for information on the grant program, 90 cleaners attended workshops and seminars, and 23 applications to the grant program were received. The 8 cleaners selected to receive professional wet cleaning demonstration site grants were converted over a 22-month period. Technical evaluation of the demonstration cleaners showed that each cleaner was able to maintain their level of service and customer base after switching to professional wet cleaning. Financial analysis revealed lowered operating costs, and the resource evaluation showed lowered electricity use after switching to professional wet cleaning. In regards to owner satisfaction, each of the demonstration site cleaners considered their decision to switch to professional wet cleaning to be a good business decision and would recommend professional wet cleaning to other cleaners needing to replace their existing cleaning equipment. The evaluation also revealed that training, proper installation and programming of equipment, and the availability of demonstration sites as primary factors facilitating a more rapid transition to this new technology. Implementation of the demonstration project resulted in the development of a regional infrastructure that will support further diffusion of professional wet cleaning. The study concludes with a series of recommendations to further promote the diffusion of professional wet cleaning and other potential pollution prevention technologies, including education, stakeholder, and policy and program recommendations for the greater Los Angeles region and beyond.
Limited offer!

Customer Advanced Technologies Program
Research Opportunity...Wet Cleaning

For a very limited time, SMUD is offering a unique opportunity for three dry cleaners to receive up to $20,000 each and participate in a research study designed to demonstrate the effectiveness of professional wet cleaning!

<table>
<thead>
<tr>
<th>Participating Dry Cleaners who switch from perchloroethylene (perc) to professional wet cleaning and are willing to serve as a demonstration site will receive:</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ $10,000 research grant from SMUD</td>
</tr>
<tr>
<td>☐ $10,000 from the California Air Resources Board</td>
</tr>
<tr>
<td>☐ Technical Assistance</td>
</tr>
<tr>
<td>☐ Free publicity – participants may be featured in reports and educational seminars.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Here's what the participating Dry Cleaner must agree to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Complete the enclosed grant application form</td>
</tr>
<tr>
<td>☐ Complete a Customer Advanced Technologies program participation agreement</td>
</tr>
<tr>
<td>☐ Operate exclusively with professional wet cleaning equipment during two-year program period</td>
</tr>
<tr>
<td>☐ Select a qualified contractor to install equipment (technical assistance will be provided)</td>
</tr>
<tr>
<td>☐ Pay the contractor for all installation and equipment costs</td>
</tr>
<tr>
<td>☐ Allow monitoring equipment on the test unit and provide access to the equipment for up to two years (no cost to participant)</td>
</tr>
<tr>
<td>☐ Allow SMUD and the Pollution Prevention Center to monitor the equipment, analyze the data, and publish the results</td>
</tr>
<tr>
<td>☐ Host demonstration workshops for fellow dry cleaners evaluating technology</td>
</tr>
<tr>
<td>☐ Authorize public relations and marketing materials on the project. Owner will be provided with drafts of materials for review and edits</td>
</tr>
</tbody>
</table>

Potential Benefits:

| ☐ Energy savings of 20 to 40% compared to traditional dry cleaning |
| ☐ Environmentally friendly alternative to perc dry cleaning |
| ☐ Easier compliance with air quality standards and environmental regulations |
| ☐ Enhanced safety |

Interested? Please contact Mr. Peter Sinsheimer, Director, Pollution Prevention Center at (323) 259-1420 or psinsheir@oxv.edu for an application.

SMUD does not endorse products or manufacturers. Mention of any particular product or manufacturer should not be construed as an implied endorsement.
Outreach & Education Program for Dry Cleaners

In recent years, environmental and human health concerns over perchloroethylene ("perc") usage in the dry cleaning industry have resulted in increasingly restrictive regulations to the industry over its usage. Occidental College’s Pollution Prevention Center (PPC), through a Community to Business Pollution Prevention (CBP2) grant from the City of Los Angeles Environmental Affairs Department, is launching an outreach and education program to promote professional wet cleaning, an environmentally friendly technology. PPC will work closely with City of Los Angeles dry cleaners currently using perc and who are considering switching to and/or adding professional wet cleaning. The program will provide:

- Information on a partial rebate toward purchase of wet cleaning equipment (starting at $10,000 per cleaner from the California Air Resources Board and an additional $10,000 from the South Coast Air Quality Management District);

- Free Assistance on social marketing planning;

- Hands on support from the PPC to ensure smooth transition; and

- Promotion by the City including press releases, case study posted at the Occidental College website.

If you are a dry cleaning professional in the City of Los Angeles and interested in purchasing or switching to professional wet cleaning, or would like more information on this alternative technology to perc-based dry cleaning, please contact PPC at Occidental College at (323) 259-1457.

Sincerely,

[signature]

Angela Namkoong
Outreach Coordinator,
Pollution Prevention Center
Urban & Environmental Policy Institute
Occidental College
anamkoong@oxy.edu
A VIABLE ALTERNATIVE TO TRADITIONAL DRY CLEANING

WHAT IS PROFESSIONAL WET CLEANING?

- Professional wet cleaning is a non-toxic, energy efficient and environmentally friendly alternative to traditional dry cleaning.

- This cleaning process uses computer-controlled washers and dryers, specially formulated biodegradable detergents, and specialized finishing equipment to create a cost effective method for processing a full range of garments that are dry cleaned.

CAN I SUCCESSFULLY SWITCH TO WET CLEANING?

- YES! With proper equipment and training cleaners who have switched have been able to successfully process the same customer garments they previously dry cleaned.

HOW WILL MY CUSTOMERS REACT IF I SWITCH TO PROFESSIONAL WET CLEANING?

- Cleaners who have recently switched have been able to maintain practically all of their customers (over 99%).

- Cleaners who have marketed themselves as environmentally friendly have gained new customers.

WILL IT COST ME MORE TO PROCESS GARMENTS?

- NO! For cleaners who have recently switched, operating costs are lower compared to dry cleaning. No regulatory fees, hazardous waste disposal costs and solvent costs.

- While detergent costs are higher, equipment, maintenance & energy costs are substantially lower.

WILL IT TAKE ME LONGER TO PRESS GARMENTS?

- Pressing labor time is the same for most cleaners who have switched. Reason: New tensioning presses are more efficient than traditional pressing equipment.

The Environmental Garment Care Project Website: www.uepi.oxy.edu/ppc
How does PROFESSIONAL WET CLEANING Work?

- Computer-Controlled Washing
  - Ultra gentle agitation
  - Low water level and low water temperature
  - High extraction speed

- Moisture Sensor Dryer
  - Precise moisture control
  - Detects moisture in garments
  - Prevents over drying

- Tensioning Presses
  - Presses use steam to relax fibers, moving parts to stretch and shape clothes, and hot air to dry

ARE THERE ANY REGULATIONS I NEED TO WORRY ABOUT?

- NO REGULATIONS! Other drycleaning methods including Perc, Hydrocarbon and GreenEarth must comply with air quality rules, fire codes and/or hazardous waste regulations.

WILL SWITCHING TO WET CLEANING BE A GOOD BUSINESS DECISION?

- Cleaners who have made the switch recommend this technology to anybody needing to replace their equipment. Visiting a demonstration site is highly recommended to any cleaner considering professional wet cleaning.

To sign up for an individual tour or find out more about this technology and other financial incentives available call Occidental College at (323) 259-1457 in the Southern California and (415) 519-3803 in Northern California.
Appendix D - Equipment Report
Equipment Report: CO2 and Professional Wet Cleaning Technologies

The California Environmental Garment Care Program

Date: 11/30/07

For more information contact us at:

POLLUTION PREVENTION CENTER
UEPI, Occidental College
1600 Campus Road
Los Angeles, CA 90041-3314
Phone: (323) 259-1457
Fax: (323) 259-2734
www.uepi.oxy.edu/ppc
CO₂ Dry Cleaning Technology

The CO₂ process is a sub-critical carbon dioxide based garment cleaning process that has been developed for use by commercial and retail dry-cleaners. CO₂ is a non-flammable, non-toxic, colorless, tasteless, odorless naturally-occurring gas that, when subjected to pressure, becomes a liquid solvent. The CO₂ used in the garment cleaning process is an industrial by-product from existing operations, such as production of ethanol by fermentation and anhydrous ammonia (fertilizer) production. This process does not produce any new CO₂ and, thus, does not contribute to global

Description: CO₂ Dry Cleaning

The Cleaning Cycle
- The laundry is placed in the washing chamber of the machine. The chamber is emptied of air.
- The pressure in the washing chamber is raised by injecting gaseous CO₂. Then, liquid CO₂ is pumped into the washing chamber.
- Agitation is achieved by jet streams and/or by a rotating basket. The cleaning cycle lasts about 5 to 15 minutes and the whole process takes place at ambient temperature.
- The liquid CO₂ goes into the fibers and dissolves dirt, fats, and oils. During the washing cycle a filter cleans particles from the liquid.
- At the end of the cleaning process, the liquid CO₂ is pumped back into the storage tank.
- The remaining gaseous CO₂ is pumped back into the storage tank lowering the pressure in the cleaning chamber. On its way to the storage vessel the gas is chilled and once again condensed into its liquid form.
- When the pressure is low enough, the remaining CO₂ is vented to the atmosphere.
- The CO₂ is regularly cleaned by distillation.

CO₂ Machines Listing

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>MODEL</th>
<th>CAPACITY</th>
<th>LIST PRICE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alliance</td>
<td>GD30D001</td>
<td>45 lbs</td>
<td>TBA</td>
</tr>
<tr>
<td>Sail Star</td>
<td>Sail Star USA</td>
<td>60 lbs</td>
<td>$143,000</td>
</tr>
</tbody>
</table>

*All Prices are subject to change. See below for contact information.
EQUIPMENT CONTACTS

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>DISTRIBUTOR</th>
<th>CONTACT NAME</th>
<th>PHONE</th>
<th>WEBSITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alliance</td>
<td></td>
<td></td>
<td>(920) 748-3121</td>
<td><a href="http://www.comlaundry.com">www.comlaundry.com</a></td>
</tr>
<tr>
<td>Sail Star</td>
<td></td>
<td></td>
<td>(704) 393-3257</td>
<td><a href="http://www.sailstarusa.com">www.sailstarusa.com</a></td>
</tr>
</tbody>
</table>

Description: Cleaning Agents

As in the case of other technologies, special detergents designed to work with CO₂ solvents must be used during the cleaning process. These products are readily available, and comparably priced with those used in traditional dry cleaning machines.

A number of pre-spotters have been developed for the CO₂ machine. In practice, it has been found that some pre-spotting is necessary. Because of the low operating temperature, stains are not set into the material, and those stains that don't come out during the cleaning process can be removed with a steam gun, or traditional post-spotting methods.

Cleaning Agents Listing

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>DETERGENT</th>
<th>SPOTTING CHEMICALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Krussler</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>Washpoint</td>
<td>Available</td>
<td>Available</td>
</tr>
</tbody>
</table>

DETERGENT MANUFACTURER CONTACTS

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>DISTRIBUTOR</th>
<th>CONTACT NAME</th>
<th>PHONE</th>
<th>WEBSITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Krussler</td>
<td>Kreusser</td>
<td>Rich Fitzpatrick</td>
<td>(603) 721-9478</td>
<td><a href="http://www.kreusslerusa.com">www.kreusslerusa.com</a></td>
</tr>
<tr>
<td>Washpoint</td>
<td>Washpoint</td>
<td></td>
<td></td>
<td><a href="http://www.washpoint.com">www.washpoint.com</a></td>
</tr>
</tbody>
</table>
WET CLEANING TECHNOLOGY

DEFINITION: Professional wet cleaning is a process that uses computer-controlled washers and dryers, specially formulated detergents, and specialized finishing equipment to create a cost-effective alternative to dry cleaning.

- Professional wet clean washers use a computer to control the rotation of the cleaning drum in order to minimize agitation while providing sufficient movement for effective garment cleaning. Wet clean washers are also equipped with a computer programmed detergent injection system, which allow the cleaner to specify the amount and type of wet clean detergent used for each load.
- Biodegradable wet clean detergents have been formulated by detergent manufacturers to maximize cleaning power while minimizing color change and shrinkage.
- Wet clean dryers include computer controls to assure that garments retain a proper amount of moisture after the dry cycle is complete.
- Specialized tensioning pressing machines are used to enhance the restoration of constructed garments, such as suit jackets, suit pants, and tailored items.

Currently, there are a number of companies who manufacture professional wet cleaning washer and dryer systems, tensioning equipment presses, and professional wet cleaning detergents and additives. This report provides an overview of the equipment and detergents that are currently available.

Description: Wet Cleaning Washer and Dryer

While there are a number of manufacturers of professional wet cleaning washer and dryer systems, these machines share many common features. Computer control, programmability and other similar features are the essential components of these machines.

In addition, in each of these systems, washing and drying are done in separate machines, allowing for greater throughput than advanced dry clean machines, which require wash-

Professional wet clean equipment manufacturers have adopted different sales strategies for their equipment. Some offer a full package system of washer and dryer (and also offer the chemicals and finishing equipment) while others sell components and allow the professional cleaner to put together a system tailored to their own needs. Some manufacturers include extensive technical training as part of the purchase price, while others only instruct the cleaner in the basic operating features. Some manufacturers include a detergent injection system as part of their package, while others expect the detergent companies to provide this equipment. The machines span a wide range of sizes, design features, and prices. In general, hard mount washers are less expensive than soft mount machines, but require a custom concrete foundation and are not suitable for upper-floor or above-basement installation.
### Wet Clean Washers Listing

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>MODEL NO</th>
<th>WET CLEAN CAPACITY</th>
<th>LAUNDRY CAPACITY</th>
<th>EXTRACTION SPEED</th>
<th>HARD/SOFT MOUNT</th>
<th>LIST PRICE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aqua Solo</td>
<td>S-150</td>
<td>30 lbs</td>
<td></td>
<td>40/580</td>
<td>Soft</td>
<td>TBA</td>
</tr>
<tr>
<td>Cissell</td>
<td>CHC035</td>
<td>35 lbs</td>
<td>40 lbs</td>
<td>1000 RPM</td>
<td>Soft</td>
<td>$9,883</td>
</tr>
<tr>
<td></td>
<td>CP040H</td>
<td>20 lbs</td>
<td>40 lbs</td>
<td>885 RPM</td>
<td>Hard</td>
<td>$10,994</td>
</tr>
<tr>
<td></td>
<td>CHF055</td>
<td>55 lbs</td>
<td></td>
<td>826 RPM</td>
<td>Soft</td>
<td>$15,250</td>
</tr>
<tr>
<td></td>
<td>CP060H</td>
<td>60 lbs</td>
<td></td>
<td>826 RPM</td>
<td>Hard</td>
<td>$12,328</td>
</tr>
<tr>
<td></td>
<td>CHF075</td>
<td>75 lbs</td>
<td></td>
<td>1000 RPM</td>
<td>Soft</td>
<td>$19,457</td>
</tr>
<tr>
<td></td>
<td>CP080H</td>
<td>80 lbs</td>
<td></td>
<td>756 RPM</td>
<td>Hard</td>
<td>$19,016</td>
</tr>
<tr>
<td>Imesa</td>
<td>ICM 23</td>
<td>50 lbs</td>
<td>80 lbs</td>
<td>363G</td>
<td>Soft</td>
<td>Package includes washer &amp; dryer $27,500</td>
</tr>
<tr>
<td>Ipso</td>
<td>IPH 40H</td>
<td>20 lbs</td>
<td>40 lbs</td>
<td>300G</td>
<td>Hard</td>
<td>$8,690</td>
</tr>
<tr>
<td></td>
<td>IPH 60H</td>
<td>30 lbs</td>
<td>60 lbs</td>
<td>300G</td>
<td>Hard</td>
<td>$9,990</td>
</tr>
<tr>
<td></td>
<td>IPH 80H</td>
<td>40 lbs</td>
<td>80 lbs</td>
<td>300G</td>
<td>Hard</td>
<td>$15,500</td>
</tr>
<tr>
<td></td>
<td>IPH 100H</td>
<td>50 lbs</td>
<td>100 lbs</td>
<td>300G</td>
<td>Hard</td>
<td>$16,200</td>
</tr>
<tr>
<td></td>
<td>IPH 140H</td>
<td>70 lbs</td>
<td>140 lbs</td>
<td>300G</td>
<td>Hard</td>
<td>$21,300</td>
</tr>
<tr>
<td>Maytag</td>
<td>MFS50PM</td>
<td>30 lbs</td>
<td>50 lbs</td>
<td>310 G</td>
<td>Soft</td>
<td>$10,800</td>
</tr>
<tr>
<td></td>
<td>MFS80PM</td>
<td>50 lbs</td>
<td>80 lbs</td>
<td>310 G</td>
<td>Soft</td>
<td>$17,215</td>
</tr>
<tr>
<td>Miele*</td>
<td>Pkg 1:</td>
<td>29 lbs</td>
<td>42 lbs</td>
<td>460G</td>
<td>Soft</td>
<td>Total package $65,000</td>
</tr>
<tr>
<td></td>
<td>WS5191 washer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pkg 2:</td>
<td>29 lbs</td>
<td>42 lbs</td>
<td>460 G</td>
<td>Soft</td>
<td>Total package $72,000</td>
</tr>
<tr>
<td></td>
<td>WS5191 washer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wascomat</td>
<td>EX 630 CA</td>
<td>18 lbs</td>
<td>30 lbs</td>
<td>350G</td>
<td>Soft</td>
<td>$10,891</td>
</tr>
<tr>
<td></td>
<td>EX 640 CA</td>
<td>25 lbs</td>
<td>40 lbs</td>
<td>350G</td>
<td>Soft</td>
<td>$12,502</td>
</tr>
<tr>
<td></td>
<td>EX 655 CA</td>
<td>35 lbs</td>
<td>55 lbs</td>
<td>350G</td>
<td>Soft</td>
<td>$14,721</td>
</tr>
<tr>
<td></td>
<td>EXSM 230 CA</td>
<td>40 lbs</td>
<td>65 lbs</td>
<td>220G</td>
<td>Hard</td>
<td>$11,825</td>
</tr>
<tr>
<td></td>
<td>EXSM 350 CA</td>
<td>50 lbs</td>
<td>80 lbs</td>
<td>220G</td>
<td>Hard</td>
<td>$18,883</td>
</tr>
<tr>
<td></td>
<td>EXSM 6135 CA</td>
<td>85 lbs</td>
<td>135 lbs</td>
<td>220G</td>
<td>Hard</td>
<td>$24,458</td>
</tr>
</tbody>
</table>

*Package includes washer, dryer, Veit tensioning equipment, Krussler detergents and on site training. See Dryer and Tensioning sections for additional details. Package 1 includes 24kg of soap & conditioner. Package 2 includes 40kg of soap & conditioner.

*All Prices are subject to change. See back for contact information.
Professional Wet Clean Dryers Listing

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>MODEL</th>
<th>CAPACITY</th>
<th>HEATING</th>
<th>RESIDUAL MOISTURE SENSOR</th>
<th>LIST PRICE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Dryer Corp</td>
<td>SL-50</td>
<td>50 lbs</td>
<td>Gas/Steam/Electric</td>
<td>Sensor in drum</td>
<td>Gas: $4,300</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Gas/Steam/Electric</td>
<td></td>
<td>Electric: $4,500</td>
</tr>
<tr>
<td></td>
<td>SL-75</td>
<td>75 lbs</td>
<td></td>
<td></td>
<td>Steam: $5,130</td>
</tr>
<tr>
<td>Imesa</td>
<td>IMC170</td>
<td>75 lb</td>
<td>Gas/Steam/Electric</td>
<td>Sensor in drum</td>
<td>Washer+dryer $27,500</td>
</tr>
<tr>
<td>Miele</td>
<td>Pkg 1: T6551</td>
<td>54 lbs</td>
<td>Steam/Electric</td>
<td>Sensor in drum</td>
<td>See pg 5</td>
</tr>
<tr>
<td></td>
<td>Pkg 2: T6551</td>
<td>54 lbs</td>
<td>Steam/Electric</td>
<td>Sensor in drum</td>
<td>See pg 5</td>
</tr>
<tr>
<td>Wascomat</td>
<td>TD 30 RMC</td>
<td>30 lbs</td>
<td>Gas/Steam/Electric</td>
<td>Sensor in drum</td>
<td>$4,012</td>
</tr>
<tr>
<td></td>
<td>TD 50 RMC</td>
<td>50 lbs</td>
<td>Gas/Steam/Electric</td>
<td>Sensor in drum</td>
<td>$4,700</td>
</tr>
<tr>
<td></td>
<td>TD 75 RMC</td>
<td>75 lbs</td>
<td>Gas/Steam/Electric</td>
<td>Sensor in drum</td>
<td>$5,065</td>
</tr>
</tbody>
</table>

*All Prices are subject to change. See below for contact information.

EQUIPMENT CONTACTS

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>DISTRIBUTOR</th>
<th>CONTACT NAME</th>
<th>PHONE</th>
<th>WEBSITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aqua Solo</td>
<td></td>
<td>Young Kim</td>
<td>(908) 370-9883</td>
<td><a href="http://www.wetcleanaqua.com">www.wetcleanaqua.com</a></td>
</tr>
<tr>
<td>American Dryer</td>
<td></td>
<td>Zion Orpaz</td>
<td>(508) 678-9000</td>
<td>(714) 943-3261 <a href="http://www.amdry.com">www.amdry.com</a></td>
</tr>
<tr>
<td>Imesa</td>
<td></td>
<td></td>
<td>(562) 942-9700</td>
<td><a href="http://www.imesa.it">www.imesa.it</a></td>
</tr>
<tr>
<td>Ipso</td>
<td></td>
<td></td>
<td>(920) 748-3121</td>
<td><a href="http://www.ipsousa.com">www.ipsousa.com</a></td>
</tr>
<tr>
<td>Maytag</td>
<td></td>
<td>Zion Orpaz</td>
<td>(800) 662-3587</td>
<td>(714) 689-0068 <a href="http://www.maytagcommerciallyan.com">www.maytagcommerciallyan.com</a></td>
</tr>
<tr>
<td>Miele</td>
<td>BOGO</td>
<td>Hans Kim</td>
<td>(909) 921-2256</td>
<td><a href="http://www.wetcleaning.com">www.wetcleaning.com</a></td>
</tr>
<tr>
<td>Natura</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wascomat</td>
<td>Justin Ha</td>
<td>LA Area only</td>
<td>(800) 465-8300</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Taylor Houseman</td>
<td>Bay Area only</td>
<td>(800) 464-6866</td>
<td><a href="http://www.wascomat.com">www.wascomat.com</a></td>
</tr>
</tbody>
</table>
Description: Tensioning Equipment

Wet cleaned garments can be finished using either conventional pressing equipment or specialized tensioning finishing equipment. Tensioning presses are designed to reverse or prevent shrinkage and/or seam crumpling and creasing of garments by applying widthwise and lengthwise tension on garments during the pressing process. Tensioning finishing equipment is increasingly recognized as an essential component of professional wet cleaning. Performance tests have shown that professional wet cleaning is effective in the actual cleaning of clothes, but that dimensional change (shrinking and stretching) can sometimes be a problem if the cleaner does not use finishing equipment has been shown to reduce the pressing labor time professional wet cleaning facilities.

There are two main types of tensioning equipment, form finishers and pants toppers. Both pieces of equipment function by using steam to relax fibers, moving parts to stretch and shape clothes and hot air to dry.

Tensioning Equipment Listing

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>EQUIPMENT TYPE</th>
<th>MODEL</th>
<th>TYPES OF GARMENTS</th>
<th>LIST PRICE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean Concepts</td>
<td>Tensioning Form Finisher</td>
<td>314</td>
<td>Coats, jackets, blouses &amp; dresses</td>
<td>$17,900</td>
</tr>
<tr>
<td></td>
<td>Tensioning Form Finisher</td>
<td>375</td>
<td>Pants</td>
<td>$10,900</td>
</tr>
<tr>
<td></td>
<td>Tensioning Form Finisher</td>
<td>376</td>
<td>Coats, dresses, various garments</td>
<td>$12,900</td>
</tr>
<tr>
<td>Forenta</td>
<td>Tensioning Pants Topper</td>
<td>TPT-503</td>
<td>Pants</td>
<td>$9,500</td>
</tr>
<tr>
<td></td>
<td>Tensioning Form Finisher</td>
<td>TFF-507</td>
<td>Pants</td>
<td>$11,500</td>
</tr>
</tbody>
</table>
## Tensioning Equipment Listing

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>EQUIPMENT TYPE</th>
<th>MODEL</th>
<th>TYPES OF GARMENTS</th>
<th>LIST PRICE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi-Steam</td>
<td>Tensioning Form Finisher</td>
<td>JAM510</td>
<td>Jackets, overcoats, dresses, blouses, and skirts</td>
<td>$12,299</td>
</tr>
<tr>
<td></td>
<td>Tensioning Form Finisher</td>
<td>JAM510</td>
<td>Jackets, overcoats, dresses, blouses, and skirts</td>
<td>$12,950</td>
</tr>
<tr>
<td></td>
<td>Tensioning Pants Topper</td>
<td>PAM510</td>
<td>Pants</td>
<td>$10,725</td>
</tr>
<tr>
<td></td>
<td>Tensioning Pants Topper</td>
<td>PAM510 with Pleat Paddles</td>
<td>Pants</td>
<td>$12,299</td>
</tr>
<tr>
<td>Hoffman/</td>
<td>Tensioning Pants Finisher</td>
<td>Topmaster II-PP</td>
<td>Khakis, dress pants, uniform rentals, pleated pants and jeans</td>
<td>$11,200</td>
</tr>
<tr>
<td>NewYorker</td>
<td>Tensioning Form Finisher</td>
<td>JUDI II</td>
<td>Jackets, blouses, coats, sweaters and outerwear</td>
<td>$10,500</td>
</tr>
<tr>
<td>Trevil</td>
<td></td>
<td>Model 5120</td>
<td>Jackets, overcoats, dresses, golf shirts</td>
<td>$12,995</td>
</tr>
<tr>
<td></td>
<td>Tensioning Pants Topper</td>
<td>Model 5304</td>
<td>Pants</td>
<td>$11,000</td>
</tr>
<tr>
<td>Itsumi</td>
<td>Tensioning Form Finisher</td>
<td>GF-3 Mini Former</td>
<td>Jackets, overcoats, dresses, blouses, and skirts</td>
<td>$9,250</td>
</tr>
<tr>
<td></td>
<td>Tensioning Pants Topper</td>
<td>TO-322A</td>
<td>Pants</td>
<td>$8,000</td>
</tr>
<tr>
<td>Unipress</td>
<td>Tensioning Form Finisher</td>
<td>TUF-P</td>
<td>Coats, jackets, blouses, dresses, skirts</td>
<td>$11,400</td>
</tr>
<tr>
<td></td>
<td>Tensioning Pants Topper</td>
<td>TPF</td>
<td>Pants</td>
<td>$9,800</td>
</tr>
<tr>
<td>Veit</td>
<td>Multiform Finisher</td>
<td>8356</td>
<td>Coats, jackets, blouses, dresses, skirts</td>
<td>$12,108</td>
</tr>
<tr>
<td></td>
<td>Multiform Finisher</td>
<td>8362</td>
<td>Additional vacuum to assist positioning</td>
<td>$19,277</td>
</tr>
<tr>
<td></td>
<td>Tensioning Pants Topper</td>
<td>8741</td>
<td>Pants</td>
<td>$11,410</td>
</tr>
<tr>
<td></td>
<td>Miele Packages</td>
<td></td>
<td></td>
<td>See pg 4</td>
</tr>
<tr>
<td></td>
<td>1 &amp; 2 include:</td>
<td></td>
<td></td>
<td>See pg 4</td>
</tr>
</tbody>
</table>

*All Prices are subject to change. See next page for contact information.
## Equipment Contacts

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>DISTRIBUTOR</th>
<th>CONTACT NAME</th>
<th>PHONE</th>
<th>WEBSITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forenta</td>
<td>Laundry &amp; Dry Cleaning Equipment</td>
<td></td>
<td>(650) 588-8800</td>
<td><a href="http://www.forentausa.com">www.forentausa.com</a></td>
</tr>
<tr>
<td></td>
<td>Equiptech Services</td>
<td></td>
<td>(510) 639-7409</td>
<td></td>
</tr>
<tr>
<td>Hi-Steam</td>
<td></td>
<td>Taylor Houseman</td>
<td>(888) 460-9292</td>
<td><a href="http://www.hiesteam.com">www.hiesteam.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(800) 464-6866</td>
<td></td>
</tr>
<tr>
<td>Hoffman/New Yorker</td>
<td>Hoffman New Yorker</td>
<td>Scott Blackwell</td>
<td>(928) 855-3306/</td>
<td><a href="http://www.hoffman-newyorker.com">www.hoffman-newyorker.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(909) 851-4581</td>
<td></td>
</tr>
<tr>
<td>Trevil</td>
<td></td>
<td></td>
<td>(877) 873-8451</td>
<td><a href="http://www.trevil.com">www.trevil.com</a></td>
</tr>
<tr>
<td>Itsumi</td>
<td>Western Multitex</td>
<td>J. Anthony Kim</td>
<td>(714) 871-8890</td>
<td><a href="http://www.kelleherequipment.com/">www.kelleherequipment.com/</a></td>
</tr>
<tr>
<td></td>
<td>Kellerher Equipment</td>
<td></td>
<td>(800) 894-1555</td>
<td>TBA</td>
</tr>
<tr>
<td></td>
<td>JKE Equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unipress</td>
<td></td>
<td></td>
<td>(813) 623-3731</td>
<td><a href="http://www.unipresscorp.com">www.unipresscorp.com</a></td>
</tr>
<tr>
<td>Veit</td>
<td>DK Equipment</td>
<td>Unis Griffin</td>
<td>(510) 293-8964</td>
<td><a href="http://www.veit.de/en">www.veit.de/en</a></td>
</tr>
</tbody>
</table>
### Description: Detergent Dispensing System

The detergent dispensing system comes with a computer program that injects the detergent into the washer, allowing the operator to specify the amount and type of wet clean detergent to be used for each load. This is an essential part of the wet cleaning system, as it maximizes the effectiveness and performance of wet cleaning detergents.

### Dispensing Systems Listing

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>SYSTEM DESCRIPTION</th>
<th>MODEL</th>
<th>LIST PRICE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta Technology</td>
<td>Summit, 6 pump dispenser w/</td>
<td>MF-4804RC &amp;</td>
<td>$757.50</td>
</tr>
<tr>
<td></td>
<td>internal trigger</td>
<td>KP-8120AX</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Summit programmer</td>
<td></td>
<td>$42.00 each</td>
</tr>
<tr>
<td></td>
<td>Low level alarm lances</td>
<td></td>
<td>(6 per order)</td>
</tr>
<tr>
<td>Knight</td>
<td>4 Pump Dispenser w/Remote Control, with</td>
<td>MF-4805RC &amp;</td>
<td>$1,213</td>
</tr>
<tr>
<td></td>
<td>Pumps 23 oz/min*</td>
<td>KP-8120AX</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 Pump Dispenser w/Remote Control with</td>
<td>MF-4806RC &amp;</td>
<td>$1,686</td>
</tr>
<tr>
<td></td>
<td>Pumps 23 oz/min*</td>
<td>KP-8120AX</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Pump Dispenser w/Remote Control with</td>
<td>MF-4806RC &amp;</td>
<td>$1,911</td>
</tr>
<tr>
<td></td>
<td>Pumps 23 oz/min*</td>
<td>KP-8120AX</td>
<td></td>
</tr>
</tbody>
</table>

*All Prices are subject to change. See next page for contact information.
EQUIPMENT CONTACTS

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>DISTRIBUTOR</th>
<th>CONTACT NAME</th>
<th>PHONE</th>
<th>WEBSITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta Technologies</td>
<td>Beta Technology Inc</td>
<td>Douglas Bragdon</td>
<td>800-858-2382</td>
<td><a href="http://www.beta-technology.com">www.beta-technology.com</a></td>
</tr>
<tr>
<td>Knight</td>
<td>Knight Systems</td>
<td>Chris March</td>
<td>800-854-3764</td>
<td><a href="http://www.knightequip.com">www.knightequip.com</a></td>
</tr>
</tbody>
</table>

Description: Cleaning Agents

A wide range of specially designed detergents, conditioners, and sizing agents have been developed for professional wet cleaning. The computer controls on wet clean washers are designed to maximize the effectiveness of these cleaning agents.

Detergents: Specialized wet cleaning detergents are formulated with additives to minimize shrinkage and color loss.

Conditioners: Wet cleaning conditioners smooth and soften garments, and coating fibers to minimize shrinkage.

Sizing Agents: Wet cleaning sizing agents add body to garments and improve creases which helps with finishing.

Combinations: Some chemical manufacturers offer a conditioner and sizing agent in one or a detergent, conditioner, and sizing agent in one.

Spotting Agents: In addition to cleaning chemicals, specially formulated biodegradable pre-spotting agents for professional wet cleaning have been developed, since waste water from wet cleaning machines are disposed through municipal sewer drains.

Specific Information on Chemical Manufacturers: Information on type and price of cleaning agents was developed for this report (see table on next page). Additional information from chemical manufacturers includes: availability and prices of detergent dispenser pumps, cost of shipping, refund policies, and support services.

*Peristaltic pumps with 23 oz/min capacity are available for Knight Inc at $103.00 each. In addition, peristaltic pumps with 10 oz/min capacity are also available at $90.00 each.
# Cleaning Agents Listing

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>DETERGENT ($/GALLON)</th>
<th>CONDITIONER ($/GALLON)</th>
<th>SIZING ($/GALLON)</th>
<th>CONDITIONER &amp; SIZING ($/GALLON)</th>
<th>DETERGENT, CONDITIONER, SIZING ($/GALLON)</th>
<th>SPOTTING AGENTS</th>
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</thead>
<tbody>
<tr>
<td>Adco</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>A.L. Wilson</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Bufa</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Fiber Tech</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gurtler</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Kleerwite Chemicals</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
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<tr>
<td>Krussler</td>
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<td>X</td>
<td></td>
<td></td>
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<tr>
<td>Laidlaw</td>
<td>X</td>
<td>X</td>
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<td></td>
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<td>MEGS</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
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<tr>
<td>Pariser Industries, Inc</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>R.R. Street</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
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<tr>
<td>Sanitone</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<td>X</td>
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<tr>
<td>Seitz</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Stamformd</td>
<td>X</td>
<td></td>
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See next page for contact information and pricing.
## EQUIPMENT CONTACTS

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>CONTACT NAME</th>
<th>PHONE</th>
<th>WEBSITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adco</td>
<td></td>
<td>(660) 826-3300</td>
<td><a href="http://www.adco-inc.com">www.adco-inc.com</a></td>
</tr>
<tr>
<td>A.L. Wilson</td>
<td></td>
<td>(800) 526-1188</td>
<td><a href="http://www.alwilson.com">www.alwilson.com</a></td>
</tr>
<tr>
<td>Fiber Tech</td>
<td></td>
<td>(888) 833-6181</td>
<td></td>
</tr>
<tr>
<td>Gurtler</td>
<td>Tom Yahn</td>
<td>(800) 638-7300 or (708) 331-2550</td>
<td><a href="http://www.gurlter.com">www.gurlter.com</a></td>
</tr>
<tr>
<td>Keerwite</td>
<td>Mike Levine</td>
<td>(703) 625-9879 or (877) 553-3794</td>
<td><a href="http://www.dry-clean.com">www.dry-clean.com</a></td>
</tr>
<tr>
<td>Krussler</td>
<td></td>
<td>(813) 884-1499</td>
<td><a href="http://www.kreussler-chemie.de">www.kreussler-chemie.de</a></td>
</tr>
<tr>
<td>Laidlaw</td>
<td>Mike Achin</td>
<td>(508) 699-5521 or (508) 878-8739</td>
<td><a href="http://www.laidlawcorp.com">www.laidlawcorp.com</a></td>
</tr>
<tr>
<td>MEGS Enviro Tech</td>
<td>Zion Orpaz</td>
<td>(714) 689-0068</td>
<td><a href="http://www.megswetcleaning.com">www.megswetcleaning.com</a></td>
</tr>
<tr>
<td>Pariser</td>
<td></td>
<td>(973) 569-9090</td>
<td><a href="http://www.pariserchem.com">www.pariserchem.com</a></td>
</tr>
<tr>
<td>RR Street</td>
<td>Tim Racette</td>
<td>(630) 416-4244</td>
<td><a href="http://www.4streets.com">www.4streets.com</a></td>
</tr>
<tr>
<td>Sanitone</td>
<td></td>
<td>(800) 543-0406</td>
<td><a href="http://www.sanitone.com">www.sanitone.com</a></td>
</tr>
<tr>
<td>Seitz</td>
<td>Kurt Wickiser</td>
<td>(813) 886-2700</td>
<td><a href="http://www.seitz24.com">www.seitz24.com</a></td>
</tr>
</tbody>
</table>
Appendix E - Western Cleaner and Launderer Articles
Co-Sponsored by PDCA and KDCANC

First Bay Area Co² and Professional
Wet Cleaning Demonstration Workshop

March 2006

Launderer & Cleaner
California Bans Dry-Cleaning Chemical

- By SAMANTHA YOUNG, Associated Press Writer
Friday, January 26, 2007

(01-26) 02:13 PST Sacramento, Calif. (AP) —

When a soil test revealed a potentially carcinogenic chemical had seeped into the ground beneath his dry-cleaning store, the cleanup set Thomas De Pippo back $200,000.

After that, De Pippo began using an environment-friendly "wet cleaning" system instead of using the toxic solvent perchloroethylene. On Thursday, the market for such "green" technologies got a boost when California enacted the nation's first statewide ban of perchloroethylene by 2023.

"It cost me my entire life savings, my marriage," De Pippo recalled of the cleanup at his Orange County store, "Julie's Cleaners."

De Pippo is among thousands of dry cleaners across the country who are turning to such environmentally friendly options.

The regulation by the California Air Resources Board begins to phase out the use of perchloroethylene next year, banning dry cleaners from buying machines that rely on the solvent that state officials have said causes a variety of cancers.

The state's 3,400 dry cleaners who now use it must get rid of machines that are 15 years or older by July 2010.

"That's the wave of the future — nontoxic, non-smog forming" said Annette Kondo, spokeswoman for the Coalition for Clean Air, a California environmental group. "We think this is going to ripple down to other states across the country."

Environmental and health advocates embraced the new rule, though they had urged the air board to accelerate the ban because of the chemical's health effects as a potential carcinogen. The solvent has contaminated one in 10 wells in California.

But cleaners say the ban threatens to drive some of them out of business because alternative methods are unproven and more costly. An estimated 70 percent of the state's dry cleaners use the solvent.

"It could shut down some mom-and-pop operations — the little guys that can't afford it," said Bob Blackburn, president of the California Cleaners Association.
Clearing the air: New technology eliminates dry cleaning toxins
Pollution Prevention Center Sponsors First Bay Area Wet Cleaning Workshop

By: Liz Church

Since its inception in 1995, the Pollution Prevention Education and Research Center (PPERC) at Occidental College in Los Angeles, California has been involved in the commercialization of professional wet cleaning. Today with 20 demonstration sites located throughout the greater Los Angeles region, in northern and southern Orange County including Marina Del Rey, Van Nuys and Eagle Rock, the organization sponsored the first workshop at Blue Sky Cleaners on March 19th and established the facility as the first Bay Area wet cleaning demonstration site.

"These professional wet cleaning workshops are great," pointed out Peter Sinsheimer, project director at Occidental. "They allow cleaners to see the process first hand, talk with cleaners who have made the switch, and learn how to take advantage of equipment incentive programs." Funding from the State of California is helping to expand professional wet cleaning throughout the state by offering grants for any California perc user converting to approved water-based or CO₂-based technology.

Right now in the state there are currently 40 cleaners exclusively using professional wet cleaning and 50 operators who have added the technology. Professional wet cleaning is a non-toxic, zero-emission, energy-efficient, cost-effective water-based technology which cleans a full range of delicate garments that are otherwise dry cleaners. The technology uses computer-controlled...
The workshop was designed to educate and engage the audience on the importance of wet cleaning in maintaining high-quality, clean indoor environments. The session focused on the benefits of wet cleaning, its applications, and best practices.

Consultation with industry experts highlighted the latest advancements in wet cleaning technology and the role of wet cleaning in improving indoor air quality. Participants were provided with practical tips and strategies to implement wet cleaning practices effectively.

The day concluded with a Q&A session, where attendees had the opportunity to interact with the speakers and engage in discussions on various aspects of wet cleaning.

The workshop proved to be a significant event, fostering knowledge exchange and networking opportunities within the industry.
August

Scheduled For
Bay Area Wet Cleaning Workshop

August 2007

Laundrerc

Cleaner x

Western
We started the day with an informative session on the importance of proper cleaning techniques, followed by a hands-on demonstration of wet cleaning methods. The demonstration was led by industry experts who shared their knowledge and practical tips on how to effectively use cleaning solutions and equipment.

During the workshop, we discussed the latest trends in cleaning technology and the benefits of using eco-friendly products. The attendees were also given the opportunity to try out new cleaning tools and equipment, which were generously provided by our sponsors.

The day concluded with a panel discussion on the future of the cleaning industry, with speakers from various segments sharing their insights and predictions.

We ended the day with a round of networking and professional development opportunities, where attendees had the chance to connect with other professionals in the field.

The event was a great success, and we are already looking forward to the next year's event. Thank you to all who participated and made this day a memorable one!
February 2007

Laundrettes

CleaneR

Western
February 4th - 1 to 4 pm

The date of the workshops are:

February 2nd - 1 to 4 pm

March 9th - 1 to 4 pm

April 6th - 1 to 4 pm

May 3rd - 1 to 4 pm

Western Cleaner & Laundrette

February 2007
Bob's Cleaners will host a wet cleaning workshop on September 20th.

Bob's Cleaners received a $10,000 grant to become a demonstration site for the Professional Equipment and Training Program for Metallic Finishers. This program provides hands-on training for metallic finishers to learn the latest wet cleaning equipment and techniques. The grant was awarded to Bob's Cleaners as part of the California Energy Commission's Pollution Prevention Program.

First Bay Area Dry Cleaner Converts to Professional Wet Cleaning

September 2006
October College

The Heart Professional wet cleaning workshop at Bob's Cleaners will be held on September 10.

The Heart Professional wet cleaning workshop will be held at Bob's Cleaners on September 10.

Air Quality Management Director is providing an additional $5,000 to cleaners who register by September 10.

City of Omaha will clean a new area of city, excluding areas in the old area.

Because professional wet cleaning is a new technology and very-efficient, many customers are switching to cleaners who offer professional wet cleaning.

In the greater Los Angeles region, where the detergent pollution can be seen clearly in the sky, professional wet cleaning is a new environmental alternative to keep in clean.

Continued from Page 36

We Cleaning Workshop

Continued from Page 36

and seven CO₃ dry cleaners. Almost all of the dedicated professional wet cleaners are in California. There are currently over 40 dedicated professional wet cleaners professional wet cleaning.

The detergent pollution is expected to be higher with the conversion to professional wet cleaning.

City of Omaha will clean the whole of Omaha, excluding areas in the old city.

City of Omaha will clean a new area, excluding areas in the old city.

Because professional wet cleaning is a new technology and very-efficient, many customers are switching to cleaners who offer professional wet cleaning.

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Continued from Page 36

We Cleaning Workshop

Continued from Page 36

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Because professional wet cleaning is a new technology and very-efficient, many customers are switching to cleaners who offer professional wet cleaning.

In the greater Los Angeles region, where the detergent pollution can be seen clearly in the sky, professional wet cleaning is a new environmental alternative to keep in clean.
California and Los Angeles Region
Scheduled for The San Diego, Northern Workshops

October 2007
Appendix F - Direct Mailers
BAY AREA PROFESSIONAL WET CLEANING WORSHOP

NOVEMBER 18, 2006
ARE YOU READY FOR THE PERC PHASE OUT?

DATE
SATURDAY, NOV 18TH

TIME
1:00 PM—4:00 PM

WHERE
BOB’S CLEANERS
777 23RD STREET
RICHMOND, CA 94804

COST
FREE

TO REGISTER CALL OCCIDENTAL COLLEGE
(323) 259-1457

LEARN MORE ABOUT PROFESSIONAL WET CLEANING, A LEADING NON-TOXIC ALTERNATIVE TO PERC DRY CLEANING!

DEMONSTRATION & WORKSHOP

- Live demonstration by skilled operation using state-of-the-art cleaning equipment
- Instruction on processing “Dry Clean Only” garments
- Information on labor-saving finishing techniques
- Techniques on efficient spot removal
- Q&A with experienced professional wet cleaners

Cash Incentives Available!

- $10,000 from State of California incentive program (AB998)
- $10,000 for city of San Francisco cleaners
- $10,000 for city of Oakland cleaners
- $5,000 for all other Bay Area cleaners

Co-Sponsored By
Learn more about professional wet cleaning, a leading non-toxic alternative to PERC DRY CLEANING!

- Demonstration & Workshop
- Live demonstration by skilled operation using state-of-the-art cleaning equipment
- Instruction on processing “Dry Clean Only” garments
- Information on labor-saving finishing techniques
- Techniques on efficient spot removal
- Q&A with experienced professional wet cleaners

$20,000 in cash incentives available!
- $10,000 from State of California incentive program (AB998)
- $10,000 for city of San Francisco cleaners

Bob’s Cleaners
777 23rd St, Richmond, CA 94804
To RSVP for a seminar or for grant information contact Occidental College: (323) 259-1457

Bob’s Cleaners
777 23rd St, Richmond, CA 94804
COME TO THE FIRST REGIONAL PROFESSIONAL WET CLEANING & CO₂ DRYCLEANING SEMINAR IN THE BAY AREA!

DATE
Sunday, March 19

TIME
Noon-4 p.m.-Workshop

WHERE
Blue Sky Cleaners
32920 Alvarado Niles Rd, #200
Union City, CA 94587

COST
Free

TO REGISTER CALL
(323) 259-1457

THE CALIFORNIA ENVIRONMENTAL GARMENT CARE PROJECT IS SPONSORING THE FIRST REGIONAL SEMINAR FOR PROFESSIONAL WET CLEANING & CO₂ CLEANING

Buffet lunch and demonstrations begin at noon

- Live demonstration by skilled operation using state-of-the-art cleaning equipment
- Instruction on processing “Dry Clean Only” garments
- Information on labor-saving finishing techniques
- Techniques on efficient spot removal
- Q&A with experienced professional cleaners for both technologies

Cash Incentives Available!

- $10,000 from State of California incentive program (AB998) for cleaners switching to either professional wet cleaning and/or CO₂ dry cleaning
- $5,000 for Bay Area Cleaners or $10,000 for city of San Francisco cleaners switching from Perc to wet cleaning

Co-Sponsored By
제1회 해외 지역 전문 천사팀 및 CO2 프리 액 알코올 클리닝 전시회
2006년 3월 19일
자세한 정보 내부 참조...
베타 지역에서 개최되는 제1회 지역 전문 물세탁 및 CO₂ 드라이 클리닝 세미나에 참석하십시오!

날짜
3월 19일, 일요일

시간
정오-오후 4시-워크샵

장소
Blue Sky Cleaners
32920 Alvarado Niles Rd, #200
Union City, CA 94587

참가비
무료

등록 전화
(323) 259-1457

캘리포니아 환경 의류 관리 프로젝트에서 제1회 지역 전문 물세탁 및 CO₂ 클리닝 세미나를 후원합니다.

정오에 부채 점심 식사와 전시회 시작

- 청판 세탁 시설을 사용하는 전문 업체의 현장 시연회
- "드라이 클리닝 전용" 의류 처리 방법
- 노동력을 절약하는 마무리 기술 정보
- 효율적인 얼룩 제거 기술
- 두 가지 기술에 대한 세탁 전문가와의 질문 및 답변

현금 보상금 제공!

- 베타 지역 세탁소가 전문 물세탁 또는 CO₂ 드라이 클리닝으로 전환할 경우에 캘리포니아주 보상 프로그램(AB998)에서 10,000달러를 제공하고, Perc 드라이 클리닝에서 물세탁으로 전환할 경우, 베타 지역 세탁소에는 5,000달러, 샌프란시스코 시내 세탁소에는 10,000달러 제공

공동 후원

PDCA
Peninsula Dry Cleaners Association

KDANC

Bay Area Air Quality Management District

United States Environmental Protection Agency

Pacific Gas and Electric Company

TAYLOR HOUSEMAN
Sunday, May 6th

FREE Wet Cleaning Workshop
Time: 1-4 PM
Place: Hesperian Cleaners
15848 Hesperian Blvd
San Lorenzo, CA 94580
To RSVP for a Seminar
or for Grant Information Contact
Occidental College: (323) 259-1457

Up to $20,000 Cash Grant for wet cleaning equipment!

Sponsored By:

Pacific Gas and Electric Company
Bay Area Air Quality Management District
Urban & Environmental Policy Institute
Occidental College
PDCA
Peninsula Dry Cleaners Association

Sunday, May 6th

FREE Wet Cleaning Workshop
Time: 1-4 PM
Place: Hesperian Cleaners
15848 Hesperian Blvd
San Lorenzo, CA 94580
To RSVP for a Seminar
or for Grant Information Contact
Occidental College: (323) 259-1457

Up to $20,000 Cash Grant for wet cleaning equipment!

Sponsored By:
Are you ready for the **phase-out**?
Appendix G - Workshop Protocol
I. INTRODUCTION (10 minutes)

- Background on Professional Wet Cleaning Grant Program
  - Co-sponsors of Program
  - Grant Program Overview

- Distribution of Technical Information Packet

- History of Host Professional Wet Cleaner
  - Experience as a professional cleaner
  - Why cleaner switched to professional wet cleaning
  - Explanation of transition process

II. OVERVIEW OF PROFESSIONAL WET CLEANING (10 minutes)

- Comparison to process: dry cleaning to professional wet cleaning
  - Similarities: spot, sort, wash, dry, process
  - Differences: spotting, sorting, washing, drying, processing

- Comparison to performance
  - Overcoming programs of shrinkage and color change
    - Mechanical action
    - Specialized detergents
    - Specialized drying
    - Specialized pressing

- Comparison of financial trade-offs

- Comparison of environmental impact

III. SPECIFIC CLEANING PROCESS (45 minutes)

A. Counter/Customer Education
  - Printed materials explaining professional wet cleaning process
  - Verbal explanation to customers
    - how wet cleaning differs from dry cleaning
    - how wet cleaning can safely clean garments
    - assurance that customers guaranteed complete satisfaction
– Problem garments
  • Garments rejected (during transition, after transition)
  • Returned garments (during transition, after transition)
  • Claims (during transition, after transition)

B. Measuring Garments
  – Importance of measuring
  – Change in percent of garments measured over time
  – Standardizing measuring process between counter, cleaner, and presser
  – Types of garments needing measurement
  – Demonstration of measuring different garments

C. Sorting
  – By fabric
  – By Color

D. Test for color fastness
  – Types of garments tested
  – Technique for cleaning program garments
  – Demonstration

E. Stain Removal (pre and post spotting)
  – Explain difference between wet cleaning and dry cleaning
  – Types of stains pre spotted
  – Types of stains post spotted
  – Demonstration

F. Professional wet clean washing
  – Explain washing process
  – Explain differences in wet cleaning washing machines
  – Explain wet clean detergents
  – Demonstration

G. Drying process in professional wet cleaning
  – Machine drying vs. hang drying
  – Demonstration

H. Pressing in professional wet cleaning
  – Difference between dry cleaning and professional wet cleaning
  – Need for tensioning equipment
  – Pressing time differences between dry cleaning and wet cleaning by garment type
  – Technique for pressing jackets
  – Demonstration
IV.  EQUIPMENT COMPARISON (10 minutes)

- Professional wet cleaning washers
  - Differences in mechanical action
  - Degree of computer control of water level, detergent injection, etc.
  - Differences in extraction
  - Differences in cost

- Professional wet cleaning dryers
  - Size of dryer relative to washer
  - Differences in mechanical action
  - Differences in moisture control technology
  - Differences in cost

- Finishing equipment
  - Differences in tensioning equipment
  - Differences in cost

V.  CAPITAL AND PROCESS-DEPENDENT COSTS (10 minutes)

- Capital cost differences between wet cleaning and dry cleaning

- Process-dependent cost difference trade-off
  - Costs higher in wet cleaning
  - Costs higher in dry cleaning

VI.  SOCIAL MARKETING (10 minutes)

- Comparative advantage of professional wet cleaning over dry cleaning

- Overview of developing social marketing strategy

- Examples of social marketing materials

VII. DISCUSSION OF GRANT PROGRAM (10 minutes)

- What is included in grant program

- Minimum requirements

- Application form

VIII. Q and A (15 minutes)
Appendix H - Technical Training Protocol
Hands-On Technical Training for Professional Wet Cleaners

I. Introduction

II. Sorting in Professional Wet Cleaning

III. Wet Clean Washing

IV. Stain Removal

V. Drying in Professional Wet Cleaning

VI. Finishing Garments in Professional Wet Cleaning

VII. Front Counter Issues in Professional Wet Cleaning
1. Introduction

A. Discussion Points

1. Components of Technical Training Program
   a. Observation by trainee personnel at trainer’s facility
   b. On-site training at trainees facility
   c. Follow-up on-site training
   d. Telephone consultation

2. Making the Switch to Professional Wet Cleaning
   a. Experience of trainers in making the transition
   b. Experience of other cleaners making the transition

3. Keys to Success as a Professional Wet Cleaner
   a. Proper installation and programming of equipment
   b. Proper training
   c. Openness to learning new cleaning method
   d. Openness with customers about new cleaning method

4. Components of On-Site Training
   a. Sorting
   b. Washing
   c. Spotting
   d. Drying
   e. Finishing
   f. Counter

B. Notes
II. Sorting

A. Discussion Points

1. Fiber

2. Color

3. Knits (use of mesh bags)

4. Garment type (clean suit pieces in same load)

5. Type of program

6. Load size: half and full loads

7. Identification of garments for specialized handling
   a. Jackets (inside-out washing and drying)
   b. Sweaters
   c. Ties
   d. Leather
   e. Acetate

B. Practice Session

C. Notes
III. Washing in Professional Wet Cleaning

A. DISCUSSION POINTS

1. General Operation in Professional Wet Clean Washer
   a. Water always mixed with cleaning agents
   b. Low water level
   c. Gentle agitation

2. Specialized Cleaning Agents
   a. Detergents -- removes stains/soils
   b. Conditioner/softener -- add smoothness and softness.
   c. Sizing -- adds body and helps with finishing.

3. Computer Control Washing
   a. Steps in Computer Program
      • Prewash 1: Detergent pumped to washer
      • Mainwash 1: Water mixes with detergent; garments agitated
      • Drain 1: Water, detergent and soils drained
      • Prewash 2: Softener and/or sizing pumped to washer
      • Rinse 1: Water mixes with cleaning agents; garments agitated
      • Drain 2: Water and cleaning agents drained
      • Extract 1: Water extracted from garments
   b. Programs installed for professional wet cleaning
      • Wool: Prg 1: Full load; Prg 2: 1/2 load; Prg 3: Full load delicate; Prg 4: 1/2 load delicate; Prg 5: Full load mixed
      • Silk/Rayon: Prg 6: Full load; Program 7: ½ load
      • Cotton: Prg 8: Full load; Program 9: ½ load
      • Wedding Gowns: Program 13: Wedding Gowns
      • Down: Program 15: Down

4. Loading Garment for Washing
   a. Assessing load size and type
   b. Matching program to load type and size
   c. Program choice for mixed fiber loads

5. Post Washing Processing
   a. Immediate removal of items into basket upon completion of cycle
   b. Remove items for hand drying
   c. Load items individually into dryer
6. Specific Garment Processing
   • Sweaters
   • Jackets
   • Knits
   • Down

7. Redos – restoring length
   • Measure length and width of customer to assess length to restore
   • Soak item in bucket with softener for 5 minutes
   • Wring out excess water
   • Stretch out by hand to appropriate length
   • Hang dry

B. PRACTICE SESSION

C. NOTES
III. Stain Removal

A. Discussion Points

1. Pre-spotting and professional wet cleaning
   a. Most stains are water soluble
   b. Only wet-side spotting agents effective for prespotting in professional wet cleaning

2. Type of stains and soils to pre-spot

3. Testing color fastness

4. Type of pre-spotting agents used in professional wet cleaning
   a. Laundry Wetspo (Laidlaw)
   b. Mulsoiite (Streets)
   c. Logos Fabricare (W.KD) or PowerBrite (Laidlaw)
   d. Tanning
   e. Ammonia
   f. Mixture

5. Type of fiber
   a. Wool: chlorine bleach must be time controlled
   b. Silk: chlorine bleach must be time controlled
   c. Rayon: chlorine bleach must be time controlled
   d. Cotton/Linen: chlorine bleach must be time controlled and monitored
   e. Polyester: highly resistant to stain removal; no hot steam
   f. Nylon: chlorine bleach must be time controlled; no strong acids
   g. Modacrylic: chlorine bleach must be time controlled
   h. Acrylic: highly resistant; no hot steam
   i. Acetate: resistant to oxidizing bleach; no strong acids

6. Principles of pre-spotting

B. Practice Session

C. Notes
VI. Drying

A. DISCUSSION POINTS

1. Operation of Dryer
   – Automatic (residual moisture control) vs. timed
   – Temperature setting choices – low, medium, high
   – Setting residual moisture control
   – Reverse tumbling

2. Same Day vs. Next Day Service
   – Next day: allow small amount of residual moisture to remain
   – Same day: remove most residual moisture in dryer

3. Proper amount of residual moisture
   – By garment type (e.g. jackets, pants)
   – By fiber (e.g. wool, rayon)
   – By fabric (e.g. knit, woven)

4. Identification of garments to machine dry vs. hang dry

5. Testing for residual moisture
   – When to check
   – How often to check
   – Check by garment type
     • Pants: waistline
     • Jackets: shoulder pads

6. Post Drying Procedures
   – Take clothes out immediately after drying
   – By garment type
     • Jackets – On hangers
     • Pants – On cart vs. hanger
     • Loose weave sweaters – dry flat

B. PRACTICE SESSION

C. NOTES
VII. Finishing

A. DISCUSSION POINTS

1. Preparing Garments of Finishing
   – Check moisture content of garments

2. Operation of tensioning finishing equipment
   – Mechanical controls
     • Placing garments on tensioner
     • Operation of foot peddles
     • Adjusting degree of tension on pants topper
   – Steam and air functions

3. Processing garments on tensioning equipment

4. Use of conventional and tensioning presses

5. Timing of finishing
   – By garment type
     • Jackets – after overnight drying
     • Pants – immediately after drying
     • Etc.

6. Specific garment/fabric/fiber type
   – Velvet
   – Heavy wool coats
   – Brush suede

7. Quality Control
   – Hand feel of garments
   – Pressing quality
   – Look of garment
   – Communication with cleaner and counter person

B. PRACTICE SESSION

C. NOTES
VIII. Counter Work

A. DISCUSSION POINTS

1. Identification of garments for specialized handling

2. Communication with customers

3. Quality Control
   - Hand feel of garments
   - Pressing quality
   - Look of garment
   - Communication with presser and cleaner

B. NOTES
Appendix I - Bob's Cleaners
(Richmond, CA)
Bob’s Cleaners Case Study

<table>
<thead>
<tr>
<th>Bob’s Cleaners</th>
<th>Owner: Sergio Rios</th>
</tr>
</thead>
<tbody>
<tr>
<td>777 23rd Street, Richmond, CA 94804</td>
<td>Switch Date: 07/09/06</td>
</tr>
</tbody>
</table>

- Wet Clean Washer: Miele, 36 lb
- Wet Clean Dryer: Miele, 36 lb
- Tensioning Pants Topper: Veit, Model 8741
- Tensioning Shirt Finisher: Veit, Model 8356
- Detergent: Krussler
- Daily Volume: 150-200 garments
- Staff: 1 pressers, 1 operator (owner), 1 counter (owner’s wife)

1. Background

Bob’s Cleaners of Richmond, California is owned and operated by Sergio Rios, a first generation Mexican immigrant. Mr. Rios became a dry cleaner just two years ago as part of a career change decision. Although he had no previous experience in the industry, he was a knowledgeable computer programmer and therefore felt confident that he could be successful as a cleaner. Mr. Rios bought Bob’s Cleaners on June 10, 2005 at a time he was looking for a place to open a computer store. He noticed that Bob’s Cleaners was for sale and after doing some research, Mr. Rios decided there was an opportunity to be had in the dry cleaning business. The previous owners offered three months of free training. Mr. Rios bought the business, and after one year of operation, he began to consider alternatives to PCE solvent due to concerns about possible health effects from exposure to the chemical. Mr. Rios worked with his family and did not want his wife Maria or children exposed to toxic chemicals. He was also uncomfortable working with old perc equipment that seemed to always need repairing, and didn’t like the fact perc cleaning was so time-consuming.

Mr. Rios heard about the wet cleaning grant after receiving a mailer from the project and attending a workshop at Blue Sky Cleaners in Union City in early 2006. In a follow-up interview with cleaners attending the workshop, Mr. Rios expressed an interest in switching to professional wet cleaning. Mr. Rios started pricing wet cleaning machines on the internet and researching the wet cleaning process. Mr. Rios come down to Los Angeles to visit a number of professional wet cleaning facilities in Spring of 2006 and, soon after, made the decision to switch.

At the end of June 2006, Mr. Rios’s dry cleaning equipment was removed from his facility. Professional wet cleaning equipment was installed at Bob’s on July 9, and on-site technical training was completed July 23. Mr. Rios began processing all of his
customers’ garments in the professional wet cleaning system the day after he completed his training.

2. **Transition Process Evaluation**

   Mr. Rios was not overly concerned about making to transition to professional wet cleaning and thought the switch would be “not too difficult.” His main concerns were shrinkage and he feared that spotting would be more difficult.

   The installation process began on July 1, 2006 and was completed by July 9. Mr. Rios had visited in early July for pre-installation training. After on-site training was completed, Mr. Rios was in daily contact with the Los Angeles trainer for a week following the training. Mr. Rios received three follow-up training session through Fall 2006.

   Mr. Rios found learning a new cleaning process and making the transition to professional wet cleaning to be “not at all difficult,” primarily because the training he received was so good. The biggest difficulty was financial – getting the money together and financing to buy the new equipment. Mr. Rios believes the training was extremely important in his success as a wet cleaner and that there was nothing that could have been done to make his training easier. Mr. Rios stayed in contact with the program trainers for the first two to three months after the switchover.

3. **Performance Analysis**

   Immediately prior to converting to professional wet cleaning, Bob’s Cleaners was processing 150 garment per day. At the time of the interview, seventeen months after converting, Bob’s cleaners was processing approximately 200 garments per day – a 33.3% increase.

   Mr. Rios rates the overall quality of his cleaning service as a wet cleaner to be the same as or much better than the quality of his cleaning service as a dry cleaner. He believes the switch to professional cleaning was a good decision because the results are much better and the process much faster. He reports that clothes smell better and he is happy to be working in a clean, green and non-toxic environment. The percentage of garments Mr. Rios is successfully processing as a wet cleaner is slightly higher than that of garments that were successfully processed when operating as a dry cleaner.

   **Performance Evaluation: Bob’s Cleaners**

<table>
<thead>
<tr>
<th>Problem Garments</th>
<th>Dry Cleaning</th>
<th>Wet Cleaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sent Out</td>
<td>0.004%</td>
<td>0.003%</td>
</tr>
<tr>
<td>Returned</td>
<td>0.004%</td>
<td>0.008%</td>
</tr>
<tr>
<td>Claims</td>
<td>0.004%</td>
<td>0.008%</td>
</tr>
<tr>
<td><strong>Overall Success Rate</strong></td>
<td><strong>99.988%</strong></td>
<td><strong>99.981%</strong></td>
</tr>
</tbody>
</table>
Problem Garment Analysis

*Garments Returned*: As a dry cleaner, an average of one garment every six months was returned, usually because of spot removal or accidents with garments. As a wet cleaner, only one or two garments are returned per year because of spotting or pressing problems.

*Garments Sent Out*: Mr. Rios is currently sending out the same garments as a wet cleaner as he did when operating as a dry cleaner -- leather garments, approximately two a year.

*Claims*: As a dry cleaner, Mr. Rios paid an average of one claim every six months, usually for problems with dye bleeding or shrinkage. In his first 5 months Rios paid 5 claims. Since then his claims rate has been 2 per year.

*Overall Success Rate*: Since switching to wet cleaning, Mr. Rios has successfully wet cleaned 99.981% of garments brought in by customers, a rate comparable to a success rate of 99.988% as a dry cleaner.

4. Customer Response to Wet Cleaning

Mr. Rios has actively informed his customers about his use of professional wet cleaning. Initially, he used signs on hangers to inform customers of the switchover to professional wet cleaning. Now, he tells everyone about it. Some people require greater explanation, so Mr. Rios takes them back into his shop and shows them the wet cleaning machines and equipment when necessary. Mr. Rios estimates that about 70% of his customers are aware of the use of wet cleaning and have been positive about the experience. Other customers do not care about what process has been used as long as their clothes were cleaned well and came back in the same condition.

Mr. Rios does not believe he has lost any customers because of his switch to wet cleaning – there are times that customers have changed cleaners but that is the result of better prices elsewhere. Mr. Rios has not changed his prices since switching over to wet cleaning.

5. Financial Impact

Mr. Rios’s overall process-dependent costs have dropped since switching to professional wet cleaning. Costs related to PCE solvent, hazardous waste, equipment, maintenance, and energy consumption have all been lowered or eliminated entirely. Labor costs have decreased, and the only increased costs have been for water (CK) and detergent.
### Process Dependent Costs per Month at Bob’s Cleaners

<table>
<thead>
<tr>
<th></th>
<th>Dry Clean</th>
<th>Wet Clean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual Labor</td>
<td>$1,431.90</td>
<td>$0.00</td>
</tr>
<tr>
<td>Solvent</td>
<td>$133.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Detergent</td>
<td>$5.00</td>
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<tr>
<td>Water</td>
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<tr>
<td>Electricity</td>
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<td>Gas</td>
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<tr>
<td>Filter cost</td>
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<td>Haz waste</td>
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<tr>
<td>Equipment</td>
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<tr>
<td>Machine Main.</td>
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<tr>
<td>Regulatory fees</td>
<td>$48.33</td>
<td>$0.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$3,070.32</strong></td>
<td><strong>$1,057.74</strong></td>
</tr>
</tbody>
</table>

**PCE and Hazardous Waste**: As a dry cleaner Mr. Rios faced a number of costs associated with the use of PCE solvent and the hazardous waste and air emissions it produces. He purchased 80 gallons of perc per year for $1,200, and estimated that he spent $1,200 disposing of the hazardous waste he produced every year. Additionally, Mr. Rios was required by law to pay fees and purchase permits from regulatory agencies because of the on site storage and production of hazardous waste and the emission of hazardous air pollutants. These permits and fees total ed to $580 in costs per year.

**Equipment and Maintenance Costs**: The total list price of the equipment purchased by Mr. Rios in order to switch to professional wet cleaning totaled to $65,000. This included a 36 lb wet clean washer, a 36 lb wet clean dryer, a tensioning pants topper, and a tensioning for finisher. If Mr. Rios had purchased a new PCE dry cleaning machines instead of the professional wet cleaning equipment, the estimated cost was $50,000. While the capital equipment cost were estimated to be higher for wet cleaning, the life expectancy of professional wet cleaning equipment was estimated to be 20 years compared to a maximum of 15 years for dry cleaning machines. Maintenance costs are also lower in wet cleaning. The wet clean equipment is simpler mechanically, and the potential for breakdowns as well as the cost of repairs is significantly reduced.

**Resource Use**: While electricity use has been reduced by 36% since switching to wet cleaning, and natural gas has decreased by $134.96 or 25% respectively. Monthly

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42 CARB, December 2006, ISOR.
water consumption has remained virtually identical while the number of garments cleaned at the facility has increased 25%.

**Labor:** The number of hours process garments at Bob’s Cleaners has decreased by twelve hours per week while total volume has increased by 33%. Mr. Rios reported that he spends the same amount of time in the shop, but enjoys his work more as a wet cleaner because the machines do the work much faster and he can finish his work earlier than before.

6. **Owner Satisfaction Evaluation**

Mr. Rios believes the decision to switch to wet cleaning was a good business decision, and would make the same decision over again. He emphasizes operational cost savings, time savings and freedom from contamination as the biggest benefits. He said he would recommend wet cleaning to another cleaner who needed to replace their dry cleaning machine. He would recommend the Miele brand because he thinks it is a good brand. He doesn’t know much about other systems.

Mr. Rios rated his level of satisfaction as a wet cleaner to be much higher than that of a dry cleaner because he feels healthier. Regarding acute health effects, Mr. Rios does not recall having any dizziness, nausea, fatigue or a runny nose. He did experience headaches but does not attribute it to perc exposure. He does not feel any acute health affects from professional wet cleaning.
Bob’s Cleaners Case Study: Key to Figures

7. Garment Volume

Garment volume figures are based on conversations and interviews with the cleaner, Sergio Rios. Between 12/1/2007 and 12/25/2007. An average of 150 -200 garments per day were dry cleaned based on conversations with Mr. Rios.

Calculation of volume figures: Dry Cleaning
- Days of operation: 6 days per week (Monday – Saturday)
- Average volume professionally cleaned per day: 150 garments
- Average volume professionally cleaned per month: 150 garments * 6 days per week * 4.3 weeks per month * 12 months/year = 46,440 garments per year

Calculation of volume figures: Wet Cleaning
- Days of operation: 6 days per week (Monday – Saturday)
- Average volume professionally cleaned per day: 200 garments
- Average volume professionally cleaned per month: 200 garments * 6 days per week * 4.3 weeks per month * 12 months/year = 61,920 garments per year

8. Performance Calculations

In determining the return, sent out, claims, and overall success rates, only the volume of professionally wet cleaned garments is used in the calculation – laundered garments are excluded from these calculations. The values used to calculate these rates are based on responses to interview questions by Mr. Rios, and the volume figures calculated above.

Return Rate

Returned garments are those that are brought back to the shop by customers for additional work. As a dry cleaner, an average of 1 garment per month was returned, usually because of spot removal. As a wet cleaner, 3 to 4 garments are returned per month because of spotting or pressing problems.

- Dry cleaning return rate: 2 return / 46,440 professionally cleaned garments per month = 0.004%
- Wet cleaning return rate: 4 returns / 61,920 professionally cleaned garments per year = 0.006%

Sent Out

44 Interview 12/18/07
Sent out garments are those that the cleaner sends to another facility because he or she doesn’t feel comfortable processing them in-house. Mr. Rios reported that he has sent out the same garments as both a wet cleaner and a dry cleaner. Some leather garments and rugs are sent out for cleaning – an average of 2 in the winter and 1 in the summer.

- Dry cleaning send out rate: 2 sent out / 43,200 professionally cleaned garments per month = 0.004%

- Wet cleaning send out rate: 2 sent out / 61,920 professionally cleaned garments per month = 0.03%

Claims Rate

Claims (including store credit) result from garments being damaged by the cleaner to the extent that the cleaner offers the customer reimbursement or store credit. As a dry cleaner, Mr. Rios paid an average of two claims per year, usually for problems with dye bleeding. In his first five months in operation as a wet cleaner Mr. Rios paid five claims, but said that in the year after he had 2 claims, comparable to when he was dry cleaning.

- Dry cleaning claims rate: 2 claims / (46,440 garments) = 0.004%

- Wet cleaning claims rate: 7 claims / (5,160 garments/month*17 months) = 0.008%

Overall Success Rate

The overall success rate is calculated by subtracting the return, send-out, and claims rates from 100%. The overall success rate of professional wet cleaning was greater than that of professional dry cleaning at Bob’s Cleaners.

- Dry Cleaning success rate: 100% - [0.004% returned + 0.004% sent out + 0.004% claims] = 99.988%

- Wet Cleaning success rate: 100% - [0.008% returned + 0.003% sent out + 0.008% claimed] = 99.981%

Garment Profile

Garment profile figures are based on a data collected at the shop up to 12/18/07. All garments were processed in the wet clean washer using professional wet clean programs (as opposed to laundry programs).

9. Financial Calculations for Bob’s Cleaners

The financial figures calculated in this section are only those considered to be process dependent. Aspects of operations not affected by the switch from PCE dry cleaning to professionally wet cleaning (e.g. rent and advertising) are not considered. All cost figures are put into terms of “dollars per month.” Because garment volume has
increase 33% since Bob’s Cleaners converted to professional wet cleaning, the variable costs associated with dry cleaning – such as utility use, solvent use, hazardous waste – need to be increased to match the production level in professional wet cleaning. While Bob’s Cleaners volume has increased 33% when the survey was conducted, most of this increased occurred in the first eight months after switching. The average increase in volume of garments cleaned over the entire seventeen month period since converting was 25%.\textsuperscript{45}

**Process Dependent Costs per Month at Bob’s Cleaners**

<table>
<thead>
<tr>
<th></th>
<th>Dry Clean</th>
<th>Wet Clean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual Labor</td>
<td>$1,431.90</td>
<td>$0.00</td>
</tr>
<tr>
<td>Equipment</td>
<td>$375.00</td>
<td>$379.16</td>
</tr>
<tr>
<td>Machine Main.</td>
<td>$110.88</td>
<td>$23.71</td>
</tr>
<tr>
<td>Electricity</td>
<td>$228.94</td>
<td>$144.45</td>
</tr>
<tr>
<td>Detergent</td>
<td>$30.83</td>
<td>$60.00</td>
</tr>
<tr>
<td>Solvent</td>
<td>$166.67</td>
<td>$0.00</td>
</tr>
<tr>
<td>Water</td>
<td>79.27</td>
<td>$63.42</td>
</tr>
<tr>
<td>Gas</td>
<td>$518.00</td>
<td>$387.00</td>
</tr>
<tr>
<td>Filter cost</td>
<td>$50.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Haz waste</td>
<td>$125.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Regulatory fees</td>
<td>$48.33</td>
<td>$0.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$2,998.15</td>
<td>$1,057.74</td>
</tr>
</tbody>
</table>

**Water Consumption and Cost**

Bob’s Cleaners is billed for water every two months. The billing period of July through August 2007 overlapped with when the cleaner was dry cleaning and when the cleaner was wet cleaning, so that data was not included in this analysis. Consumption figures for dry cleaning are based on two-month usage records from April through June 2006. Consumption figures for wet cleaning are based on two-month usage records from October/December 2006. Consumption is measured in units of hundred cubic feet (HCF). One HCF is equivalent to 748 gallons. An average cost of $3.80 per HCF was used as the basis for water use cost. Water used in dry cleaning per month was adjusted up by 25% to reflect the increase in volume in professional wet cleaning.

\textsuperscript{45} Increasing volume at Bob’s cleaners by an average of 6.25 garments per day over the first eight months after conversion and assuming a steady volume of 200 pieces per day thereafter creates an average volume over the entire seventeen month period of 187 pieces per day. This represents a 25% increase from the starting volume – 187-150/150 = 24.6%
<table>
<thead>
<tr>
<th>Process</th>
<th>Date</th>
<th>Billing Record Use (HCF)</th>
<th>Total Days</th>
<th>Water Use per Day (HCF)</th>
<th>Use per Month (HCF)</th>
<th>Adjusted Use Based on 25% increase in Volume</th>
<th>Cost (At $3.80 HCF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Cleaning</td>
<td>8/06-6/06</td>
<td>280</td>
<td>484</td>
<td>0.58</td>
<td>17.35</td>
<td>20.86</td>
<td>$ 79.27</td>
</tr>
<tr>
<td>Wet Cleaning</td>
<td>10/06-12/07</td>
<td>212</td>
<td>381</td>
<td>0.56</td>
<td>16.69</td>
<td>16.69</td>
<td>$ 63.42</td>
</tr>
</tbody>
</table>

**Electricity**

**Consumption and Cost**

Consumption figures are based on Pacific Gas and Electric billing records from 12 months before (August 2005 to June 2006) and 16 months after (August 2006 to December 2007) the switch to wet cleaning. Average daily consumption was provided by PG&E based on the total use in each billing period and the number of days per billing period. Electricity used in dry cleaning per month was adjusted up by 25% to reflect the increase in volume in professional wet cleaning.

<table>
<thead>
<tr>
<th>Process</th>
<th>Date</th>
<th>Average daily use (kWh)</th>
<th>Use per Month (kWh)</th>
<th>Adjusted Use Based on 25% increase in volume (Therms)</th>
<th>Cost ($0.15/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Cleaning</td>
<td>8/22/05 – 6/22/06</td>
<td>40.7</td>
<td>1,221</td>
<td>1,526.25</td>
<td>$ 228.94</td>
</tr>
<tr>
<td>Wet Cleaning</td>
<td>8/21/06-12/19/07</td>
<td>32.1</td>
<td>963</td>
<td>963</td>
<td>$144.45</td>
</tr>
</tbody>
</table>
Natural Gas

Consumption and Cost

Consumption figures are based on Pacific Gas and Electric billing records from 12 months before (August 2005 to June 2006) and 16 months after (August 2006 to December 2007) the switch to wet cleaning. Average daily consumption was provided by PG&E based on the total use in each billing period and the number of days per billing period. Natural gas used in dry cleaning per month was adjusted up by 25% to reflect the increase in volume in professional wet cleaning.

<table>
<thead>
<tr>
<th>Process</th>
<th>Date</th>
<th>Average daily use (Therms)</th>
<th>Use per Month (Therms)</th>
<th>Adjusted Use Based on 25% increase in volume (Therms)</th>
<th>Cost ($1.00/Therm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Cleaning</td>
<td>8/22/05 – 6/22/06</td>
<td>13.8</td>
<td>414</td>
<td>518</td>
<td>$518</td>
</tr>
<tr>
<td>Wet Cleaning</td>
<td>8/21/06-12/19/07</td>
<td>12.9</td>
<td>387</td>
<td>387</td>
<td>$387</td>
</tr>
</tbody>
</table>

Labor

Mr. Rios reported that he and his wife work one less hour each day since switching to professional wet cleaning while their volume has increased a substantial 33% since the switchover – from 150 to 200 garments per day. Mr. Rios is much happier since the switchover because he does not have to run his machines as long and he has more free time than while doing dry cleaning.

Total number of additional garments per month with no additional labor cost = 50*6*4.3 = 1,367 garments.

Dry Cleaning:
150*6*4.3 = 3,870 pieces/month
132.5 hours/week = 570 hours/month
Total cost = 570 hours*$8/hour = $4,560 per month
Cost/piece = $1.17

Wet Cleaning:
200*6*4.3 = 5,160 pieces/month
120.5 hours/week = 518 hours/month
Total cost = 518 hours*$8/hour = $4,144 per month
Cost/piece = $0.80

46 Interview 12/18/07.
Cost saving = $0.37 piece.

Labor cost: 3,870*$0.37 = $1,431.9

**Solvent**

*Dry Clean*: Mr. Rios estimated that he used 60 gallons of perchloroethylene dry cleaning solvent during the year he was a perc dry cleaner at a cost of $20.00 a gallon.
- Annual Cost: $1,200
- Monthly Cost: $133.33
  - Adjusted monthly (25%) = 166.67 ($133.33*1.25)

*Wet Clean*: Water is used as a solvent in wet cleaning, the cost and consumption of which is addressed above.

**Detergent**

*Dry Clean*: As a dry cleaner, 40 gallon container of dry cleaning detergent at $296 per container.
- Monthly cost: $24.67
- Adjusted monthly (25%) = $30.83 ($24.67*1.25)

*Wet Clean*: Wet Clean: Mr. Rios reported purchasing a container of detergent four times a year for $180, and another container of conditioner four times a year for $180.00.
- Monthly cost: $60.00

**Filter Cost**

*Dry Clean*: Mr. Rios replaced 16 filters a year at a cost of $30 each.
- Annual Cost: $30 * 16 filters = $480
- Monthly cost: $40.00
  - Adjusted monthly (25%) = $50 ($40*1.25)

*Wet Clean*: No filters are used in professional wet cleaning.

**Hazardous Waste Disposal**

*Dry Clean*: Mr. Rios stated that he paid $400 every three months in disposal costs.
- Annual cost: $1,200
- Monthly cost: $100.00
- Adjusted monthly (25%) = $125 ($100*1.25)

Wet Clean: No hazardous waste costs are associated with professional wet cleaning.

Regulatory Fees

Dry Clean: As a Bay Area Dry cleaner, Mr. Rios had to pay the following annual fees:

<table>
<thead>
<tr>
<th>Regulation</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous Waste</td>
<td>$200.00</td>
</tr>
<tr>
<td>BAAQMD Operating Fee</td>
<td>$350.00</td>
</tr>
<tr>
<td>CARB Training Renewal</td>
<td>$30.00</td>
</tr>
<tr>
<td>Annual Cost</td>
<td>$580.00</td>
</tr>
<tr>
<td>Monthly Cost</td>
<td>$48.33</td>
</tr>
</tbody>
</table>

Wet Clean: Mr. Rios is not subject to any environmental permits or fees associated with the use of professional wet cleaning.

Equipment Costs

Dry Cleaning

Mr. Rios dry clean machine was fifteen years old when he made the decision to replace it with a wet cleaning system. If Mr. Rios had replaced his old PCE machine with a new PCE machine, a comparably sized PCE dry clean machine cost would have cost $50,000. For the purpose of this analysis, a life span of 15 years is assumed for the PCE dry cleaning machine, which is based on longest expected lifespan estimates for a dry clean machine.

Capital Recovery Factor \( = \frac{R}{1 - (1+R)^T} \) \( = \frac{0.04}{1 - (1.04)^{-15}} = 0.09 \)

Where:
- \( R = \text{Interest rate} \)
- \( T = \text{Period of time equipment is used} \)

Annual Capital Recovery Charge \( = [(PP - SV) \times CRF] - (SV \times R) \)

---

47 CARB ISOR, January 2007.
48 Pollution Prevention in the Garment Care Industry Pollution Prevention Education and Research Center (PPERC), UCLA, 1997.
Where:

- Annual equipment cost: $4,500
- Monthly equipment cost: $375

Wet Cleaning

The list price for the wet clean system (washer and dryer) and the detergent pump system totaled $65,000. Pants and jacket toppers were included as part of this list price. A life span of 20 years is assumed for the wet clean equipment based on discussions with a distributor of the equipment.\(^{49}\)

Capital Recovery Factor

\[
CRF = \frac{R}{1 - (1+R)^{-T}} = \frac{0.04}{1 - (1.04)^{-20}} = 0.07
\]

Where:

- \(R = \text{Interest rate}\)
- \(T = \text{Period of time equipment is used}\)

Annual Capital Recovery Charge

\[
\text{Annual Capital Recovery Charge} = [(PP - SV) \times CRF] + (SV \times R)
\]

\[
= [($65,000 - $0) \times 0.07] + ($0 \times 0.07)
\]

\[
= \$4,550
\]

Where:

- Annual equipment cost: $4,550
- Monthly equipment cost: $379.16

\(^{49}\) Pollution Prevention in the Garment Care Industry.
Machine Maintenance

Dry Clean
Based on the low range industry estimates, a dry cleaner can expect to spend 1.76% of revenue on maintenance, with 50% of that going towards the maintenance of the dry clean machine. Assuming an annual volume of 43,200 garments at Bob’s Cleaners (based on a daily volume of 150 garments) and average revenue of $3.50 per garment, annual revenue would be approximately $151,200. Annual maintenance costs for the dry clean machine would be (1.76% * $151,200) * 50% = $1,330.56.

- Annual maintenance cost: $1,330.56.
- Monthly maintenance cost: $110.88

Mr. Rios reported spent approximately $800 on machine repair during the year he owned his dry cleaning machine. This did not labor time by operator to check for leaks, clean lint filter, distill solvent tanks, etc.

Wet Clean
Expected maintenance of the professional wet clean washer and dryer system over its lifetime were estimated at $5,690. It is assumed that a wet clean system will last for 20 years, so these costs are amortized over that time period.

- Annual maintenance cost: $284.5
- Monthly maintenance cost: $23.71

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50 Pollution Prevention in the Garment Care Industry.
51 Pollution Prevention in the Garment Care Industry.
52 See Equipment Cost section above for discussion of expected life span of wet clean equipment.
Structured Interview 1

WET CLEAN SURVEY

Cleaner: Bob’s Cleaners
Date: 11/19/07

Shop and Cleaner History

1. How long have you been a cleaner? 2.5 yrs

2. How long have you owned your current shop? 2.5 yrs

3. How many regular customers do you have? Average of about 200?

4. What was your experience cleaning before owning this shop? Yes, I was dry cleaning for a year.

5. What motivated your decision to switch to professional wet cleaning?
   A. The machine was old and had to change.
   B. I found out it (PCE) was dangerous for my health, and I don’t want my kids exposed to chem.
   C. Disposal was very expensive.
   D. Tired of working with toxics.

Performance Questions

1. Have you notified customers of your switch to professional wet cleaning? Yes
   How? At the beginning, we used signs on the hangers. Now I let them know about wet cleaning. Some people you have to explain more. Show them the machine and pressing equipment.
   When? From the first day. And customers notice the difference.
   Why not?

2. What % of your customers do you think are aware of your switch to another cleaning process for delicate garments labeled dry clean or dry clean only? 60-70%

3. How do you think they became aware of your switch? I told them about it. Some know because there is no chemical smell.
4. Why are some of your customers not aware of your switch? They don’t care. They just want good results.

5. Of the customers that are aware, what percentage responded. Customers recommend us to other people. They’ve seen the web and advertisement on green business pages.
   Positively 25% Negatively Don’t Care 75%

6. Have you lost any customers because of your switch to wet cleaning?
   Not that I know of. Most keep coming back. There is times when people go somewhere else because of better deals. We keep the same prices as before.
   How many?
   What %?
   Why?

7. Have you gained any customers because of your switch to wet cleaning?
   How many? About 50?
   What %? 25%?
   Why? Because they find out I’m a green business and I don’t have chemicals - cancer.

8. What is your current volume of garments cleaned per day? About 200.
   Has your volume changed since your switch? 50 pieces.

9. When you were dry cleaning, how often did customers bring garments back because of problems with the quality of cleaning? Two.


11. Would you attribute any re-dos to the wet cleaning process? Two.

12. When you were dry cleaning, approximately how often did you pay claims or give store credit to customers?

13. Currently, approximately how often do you pay claims or give store credit to customers? Twice a year
   Reasons: Same. Color transfer.

15. Has the rate changed since you first switched? Same prices. I wanted to increase the prices because the equipment is expensive, but the economy is not good right.

16. When you were dry cleaning, how often did you send out garments. (including leather)?

<table>
<thead>
<tr>
<th>Garments</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twice a year</td>
<td>Just to see if others could do it better.</td>
</tr>
</tbody>
</table>

17. Currently, how often do you send out garments (including leather)?

<table>
<thead>
<tr>
<th>Garments</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>None (I don’t do carpets)</td>
<td>I don’t want to send them out-they don’t do a good job</td>
</tr>
</tbody>
</table>

18. Overall, How would you rate the quality of your cleaning service as a wet cleaner in comparison to the quality of your cleaning service when you were a dry cleaner? Much better.

19. Overall, how do you rate your customers’ level of satisfaction compared to when you were dry cleaning?

- Much lower
- Lower
- Equal
- Higher
- Much higher

20. On average, how many garments did you spot per day in dry cleaning? I had a machine that made stains when it mixed clothes with water and pce. 15 per day.
21. How many garments are you spotting per day in wet cleaning? About 5-6 per day for grease or ink. Hard to take out.

22. For spot removal, is it more or less difficult in wet cleaning vs. dry cleaning? Less difficult with wet cleaning. If you have PCE, I had to use PCE chem. to remove. Now I can use detergent and regular water.

23. Overall, do you spend more or less time in spot removal since switching to professional wet cleaning? Less time.

**Transition and Training**

1. Before you switched, what concerns did you have about switching to professional wet cleaning? (list and rank)
   Mostly the shrinkage and that the spotting won’t come out as easy.

2. How difficult did you think it would be to make the switch to professional wet cleaning?
   - not at all difficult
   - not too difficult
   - Why?: 25% was already wet cleaning.
   - somewhat difficult
   - very difficult

3. How difficult do you think it actually was to switch to professional wet cleaning?
   - not at all difficult
   - not too difficult because the training was good
   - somewhat difficult
   - very difficult

4. What were the biggest difficulties in making the switch to wet cleaning? (list and rank). Money was the biggest problem.

5. Did you have concerns about having to learn a new cleaning process?
   What Concerns? Repetitive.
   Not really. We tested stuff in water so I knew it wouldn’t shrink. 15 -20% of the clothes came out better in soap and water. The perc machine was good to certain point but not after that.

6. How difficult would say it was to learn to do wet cleaning?
   - not at all difficult Why?: Training
   - not too difficult
- somewhat difficult
- very difficult

7. **How important would you say the training was to making a successful transition to wet cleaning?**
   - not at all important
   - not too important
   - somewhat important
   - very important

8. Would you have liked the training to be different in any way? How so? **No. I think it’s the same.**

9. Was there anything that could have made your training easier? **No.**

10. Since switching to wet cleaning, have you contacted any of the following people to discuss issues related to the cleaning process?
    - Chemical supplier
    - Program Trainer-Contact. Only at the beginning. 2-3 months.
    - Other wet cleaners
    - Other dry cleaners
    - Equipment manufacturer/distributor--
    - Other__________

**Owner Satisfaction**

1. Do you feel your decision to switch to wet cleaning was a good business decision? **Good decision.**

2. Given the opportunity, would you make the same decision to do wet cleaning over again? **Yes.**

3. How strongly would you recommend wet cleaning to another cleaner who needed to replace their dry cleaning machine?
   - not recommend
   - **recommend—I can only recommend the Miele because I know only this brand. I don’t know too much about the other systems.**
   - strongly recommend
   - Why?:

4. How would you rate your level of satisfaction as a wet cleaner in comparison to when you were a dry cleaner?
   - much lower
   - lower
   - equal
- higher
- much higher

Why? Faster and better results. They smell better. Perc doesn’t take other smells out, like smoking.

5. When you were dry cleaning, did you experience any of the following conditions?
   - dizziness
   - nausea
   - headache
   - fatigue
   - runny nose
   - Chronic illness:____________________

6. When you were dry cleaning, did any of your employees experience any of the following conditions? **No.**
   - dizziness
   - nausea
   - headache
   - fatigue
   - runny nose
   - Chronic illness:____________________

7. Since your switch to wet cleaning have you experienced any of the following conditions? **No**
   - Dizziness
   - nausea
   - headache
   - fatigue
   - runny nose
   - Chronic illness:____________________

**Financial**

1. Has there been any change in the number hours worked by your employees since switching to wet cleaning? **Machines do less time and do it faster now. Finish earlier than before. About 2 hrs earlier for washing. Pressing is a little bit faster. Saving an hour and half, 2 hours.**

<table>
<thead>
<tr>
<th>Employee</th>
<th>Job</th>
<th>Hours/day</th>
<th>Hours/week</th>
<th>Any Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wife/</td>
<td>Pressing/counter/operator</td>
<td>10</td>
<td>60</td>
<td>-1 hour/day</td>
</tr>
<tr>
<td>Owner</td>
<td>Pressing/counter/operator</td>
<td>10</td>
<td>60</td>
<td>-1 hour/day</td>
</tr>
<tr>
<td>Niece</td>
<td>Pressing</td>
<td>2.5 hrs / 2.5</td>
<td>12.5</td>
<td>Same</td>
</tr>
</tbody>
</table>
2. Describe how you were processing a garment when you were dry cleaning
   Wash and press the same day.

3. Describe how you are processing a garment now
   Same as before.

4. What % of your garments are same day service?
   Same day service. 1 hr. service.

5. Compared to when you were dry cleaning, do you feel that you and/or your
   employees now have to put more or less effort into running your shop? Less
   effort-I have more time because I don’t have to distill, training, don’t have to
   worry about the chemicals.

6. In the year prior to switching, what maintenance did you perform on equipment at
   your plant? Yeah, it was about 3 times for little things for about $200 each
   time. $800 for the whole year.

7. Since switching to wet cleaning, how much maintenance have you had to perform
   on equipment at your plant? None.

8. Did you ever have to make any major repairs to your dry cleaning Machine? One
   time there was a leak, and I just had the business for about two months.
   Fixed that the same day. Called the inspector and passed inspection but the
   fine was 500 dollar.

9. What were your average yearly disposal costs?
   $100 a month for disposal of toxic waste.

10. Who was your waste hauler (contact info)? Can’t remember the name of the
    company… Technicam (800-652-5455). They are in Emeryville.

11. What fees were you required to pay as a dry cleaner, and to whom?
    1. BAAQMD -- $350.00
    2. Contra Costa Public Health -- $200.00
    3. CARB Training Renewal -- $180/2 years or $90.00 year

12. Utility providers_________ CADL#________
    Electric_____PGE__________________ Account#_____________
    Gas______PGE____________________ Account#_____________
    Water______EBMUD______________ Account#_____________

13. How often do you buy detergents? Buy it every three months.
14. How much do you buy each time?  **$180 detergent, $180 conditioner (3 x per year).**

   - Detergent (5 gallons) -- $180.00
   - Conditioner (5 gallons) -- $180.00

   Liquid Tide for spotting.  Also, the spotting chems from training.
Resource Use Data

Bob’s Cleaners: Water Billing Records – East Bay Municipal Utility District

<table>
<thead>
<tr>
<th>PERIOD END</th>
<th>DAYS</th>
<th>CONSUMPTION</th>
<th>GALLONS PER DAY</th>
<th>WATER</th>
<th>SEWAGE</th>
<th>CITY AGENCY FEE</th>
<th>TOTAL</th>
<th>OTHER CHARGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/21/07</td>
<td>58</td>
<td>39</td>
<td>0502</td>
<td>149.11</td>
<td>.00</td>
<td>.00</td>
<td>149.11</td>
<td></td>
</tr>
<tr>
<td>10/24/07</td>
<td>64</td>
<td>37</td>
<td>0432</td>
<td>144.17</td>
<td>.00</td>
<td>.00</td>
<td>144.17</td>
<td></td>
</tr>
<tr>
<td>08/21/07</td>
<td>61</td>
<td>28</td>
<td>0343</td>
<td>116.34</td>
<td>.00</td>
<td>.00</td>
<td>116.34</td>
<td></td>
</tr>
<tr>
<td>06/21/07</td>
<td>57</td>
<td>32</td>
<td>0419</td>
<td>125.78</td>
<td>.00</td>
<td>.00</td>
<td>125.78</td>
<td></td>
</tr>
<tr>
<td>04/25/07</td>
<td>61</td>
<td>33</td>
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<td>128.14</td>
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Bob’s Cleaners: Electricity and Natural Gas Use – Pacific Gas and Electric

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Appendix J - Hesperian Cleaners
(San Lorenzo, CA)
Hesperian Cleaners Case Study

<table>
<thead>
<tr>
<th>Hesperian Cleaners</th>
<th>Owner: Sung Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>15848 Hesperian Boulevard, San Lorenzo, CA 94580</td>
<td>Switch Date: 3/16/07</td>
</tr>
<tr>
<td>Wet Clean Washer</td>
<td>Miele, 36 lb.</td>
</tr>
<tr>
<td>Wet Clean Dryer</td>
<td>Miele, 36 lb.</td>
</tr>
<tr>
<td>Tensioning Pants Topper</td>
<td>Veit, Model 8741</td>
</tr>
<tr>
<td>Tensioning Shirt Finisher</td>
<td>Veit, Model 8356</td>
</tr>
<tr>
<td>Detergent</td>
<td>Krussler</td>
</tr>
<tr>
<td>Daily Volume</td>
<td>150 garments</td>
</tr>
<tr>
<td>Staff</td>
<td>2 pressers 1 operator (owner)</td>
</tr>
</tbody>
</table>

1. **Background**

Hesperian Cleaners of San Lorenzo, California is owned and operated by Sung Lee, a “1.5” generation Korean immigrant. Mr. Lee became a dry cleaner 25 years ago when he realized he couldn’t make a living as a classical guitarist and decided to pursue a career in dry cleaning. Mr. Lee opened Hesperian Cleaners on March 17, 1982.

About 15 years ago, saw that the State of California would likely phase out PCE in dry cleaning and began looking for alternatives. In 2000, as the laws regarding perc tightened, Mr. Lee narrowed his search to Rynex – a glycol ether-based solvent. Mr. Lee says Rynex sounded really great as an alternative to PCE. At the time, Rynex was still in the developmental stage. In 2006, had made the decision to switch to Rynex and intended to meet Rynex representatives at the California Cleaners Association convention in Long Beach. Yet, nobody from Rynex showed up. Mr. Lee was disappointed, but kept walking around the convention center and say a live wet cleaning demonstration put on by Miele – one of the wet cleaning manufacturers.

At that Long Beach convention, Mr. Lee signed up for the demonstration at Bob’s Cleaners – the first 100% professional wet cleaning demonstration site in the Bay Area. Mr. Lee attended this demonstration with his wife. Mr. Lee brought a fill load of ‘dry cleaning only’ labeled garments to clean at the workshop. Soon after this demonstration, Mr. Lee and his wife traveled to Los Angeles to attend a demonstration at Plaza Cleaners – a demonstration site in Ventura County.

Soon after, Mr. Lee made the decision to switch and began installing professional wet cleaning equipment in January 2007. On March 15, 2007, Mr. Lee removed his perc machine from his facility. The following day, he installed his wet cleaning washer and dryer system machines.
2. Transition Process Evaluation

Prior to installing wet cleaning, Mr. Lee and his employees received two days of training at Bob’s Cleaners in Richmond. The first day, Mr. Lee brought his employees with him, taking 100 lbs. of dry clean only garments and 100 lbs. of machine-wash garments. There, he cleaned and tensioned all of the garments. The second time, Mr. Lee washed the clothes at Bob’s and then pressed and tensioned everything at his shop. Mr. Lee believes it was extremely important to bring his employees with him so that they could gain hands-on experience throughout the whole process. It made the whole transition easier. Mr. Lee was scheduled to have more in-person training, but things went better than expected, so he only needed phone training.

Mr. Lee thought it was going to be very difficult to transition to professional wet cleaning. His main concerns were shrinkage, water consumption and customer reaction to the new process. Mr. Lee had some resistance to changing over, primarily due to the fact that he felt wet cleaning had a bad reputation, but once he saw how well the wet cleaning process worked, he became “convinced” that he was doing the right thing.

Mr. Lee found the switchover to wet cleaning to be “not too difficult.” The biggest problems were learning a new process and finding the money to buy the new equipment. Mr. Lee feared there would not be enough information available — he had previously done research on the Internet and could not find much on wet cleaning. The training he received helped him overcome his concerns with wet cleaning process. Like other cleaners in the demo program, Mr. Lee believes good training is “very, very important” in making a successful transition to dry cleaning. Mr. Lee believes the training he was received was “perfect” and does not need to be changed in any way. The only thing that could have made the training easier was if the trainers were geographically closer by, although Mr. Lee believes he made faster progress since there was nobody available to help him on some occasions and he had to figure some things out quickly on his own.

3. Performance Analysis

Approximately 150 garments were professionally dry cleaned per day at Hesperian Cleaners, while 160 garments are currently wet cleaned, including a full range of delicate garments.

Mr. Lee rates the overall quality of his cleaning service as a wet cleaner to be much better than that as a dry cleaner. He believes the switch to professional cleaning was the best decision he ever made because all around, everything in the wet cleaning process is cleaner, healthier, and safer. Mr. Lee reports that clothes smell better and he is happy to be working in a clean, green and non-toxic environment. The percentage of garments Mr. Lee is successfully processing as a wet cleaner is comparable to the percentage of garments that were successfully processed when operating as a dry cleaner.
Performance Evaluation: Hesperian Cleaners

<table>
<thead>
<tr>
<th>Problem Garments</th>
<th>Dry Cleaning</th>
<th>Wet Cleaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sent Out</td>
<td>0.15%</td>
<td>0.01%</td>
</tr>
<tr>
<td>Returned</td>
<td>0.78%</td>
<td>0.024%</td>
</tr>
<tr>
<td>Claims</td>
<td>0.01%</td>
<td>0.005%</td>
</tr>
<tr>
<td>Overall Success Rate</td>
<td><strong>99.06%</strong></td>
<td><strong>99.961%</strong></td>
</tr>
</tbody>
</table>

Problem Garment Analysis

Garments Returned: As a dry cleaner, an average of seven garments were returned per week. As a wet cleaner, only one garment per month is currently being returned. According to Mr. Lee, that is primarily because most stains are water-soluble and with wet cleaning, stains come out much easier.

Garments Sent Out: Mr. Lee is currently sending out significantly fewer garments as a wet cleaner than he did as a dry cleaner. When he was dry cleaning, Mr. Lee used to send out leather garments when they came in—approximately 70 garments per year. Now processes most of this leather, sending out only approximately one garment every other month.

Claims: As a dry cleaner, Mr. Lee paid approximately five claims per year, usually for damage to garments or for lost garments. Since he started operating as a wet cleaner, Mr. Lee has paid only one claim.

Overall Success Rate: Since switching to wet cleaning, Mr. Lee has successfully wet cleaned 99.75% of garments brought in by customers, a rate comparable to a success rate of 99.06% as a dry cleaner.

4. Customer Response to Wet Cleaning

When Mr. Lee first made the switch to wet cleaning, he did not notify customers of the change. During the first three months (July -October 2007), he watched customers’ reactions. He finally told people about the change after an article appeared in a local newspaper profiling Mr. Lee and the wet cleaning business. Mr. Lee believes 60 to 70% of his customers are now aware that he is doing wet cleaning. He also believes that most became aware of the switch because after noticing the freshness and bright colors of the wet-cleaned garments. Some customers don’t seem to notice a change at all, and according to Mr. Lee, they are happy as long as they get their clothes back on time with no change or damage.

Mr. Lee believes he has lost only one or two customers (2% of his total customers) because of the switch. Mr. Lee estimates he currently has 100 customers but lost some clients primarily because when he first started, he hadn’t yet refined his skills as a wet cleaner and made some mistakes. Mr. Lee has seen his customer base grow steadily since the switch to wet cleaning—he reports five to 10 new customers each week. According to Mr. Lee, the new customers come to Hesperian Cleaners because of
the quality of the cleaning and the fact that they care about environmental issues. Mr. Lee has recently been certified as a green business in Alameda County, which has also helped him grow his business, and he is currently looking into other ways to help promote and grow his business.

5. Financial Impact

Mr. Lee’s overall process dependent costs have dropped since switching to professional wet cleaning. Costs related to PCE solvent, hazardous waste, equipment, maintenance, and energy consumption have all decreased or been eliminated entirely. Labor costs have not changed, and the only increased costs have been for natural gas and detergent.

### Process Dependent Costs per Month at Hesperian Cleaners

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<th></th>
<th>Dry Clean</th>
<th>Wet Clean</th>
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<td>n.a.</td>
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<tr>
<td>Solvent</td>
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<td>$0.00</td>
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<td>Detergent</td>
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<td>Water</td>
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<td>Gas</td>
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<td>Filter cost</td>
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<td>Hazardous waste disposal</td>
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<td>Machine Maintenance</td>
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<td>Regulatory fees</td>
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<td>Equipment</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>$1,616.99</td>
<td>$1,368.47</td>
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**PCE and Hazardous Waste**: As a dry cleaner Mr. Lee had a number of costs associated with the use of PCE solvent and the hazardous waste and air emissions it produces. He purchased 57.6 gallons of perc per year for $1,350, and estimated that he spent $600 disposing of the hazardous waste he produced every year. Additionally, Mr. Lee was required by law to pay fees and purchase permits from regulatory agencies because of the on site storage and production of hazardous waste and the emission of hazardous air pollutants. These permits and fees totaled $783.33.

**Equipment and Maintenance Costs**: The total list price of the equipment purchased by Mr. Lee in order to switch to professional wet cleaning totaled to $65,000. This included a 36 lb. wet clean washer, a 36 lb. wet clean dryer, a tensioning pants topper, and a tensioning for finisher. The estimated cost of Mr. Lee’s dry clean machine was $50,000. In addition to the initial cost of the equipment being lower in wet cleaning, the expected life span of wet cleaning equipment is longer (20 years) than dry cleaning.
Maintenance costs are also lower in wet cleaning. The wet clean equipment is simpler mechanically, and the potential for breakdowns as well as the cost of repairs is significantly reduced. Mr. Lee paid $2,000 for a new refrigeration unit to his machine, and another $500 to replace gaskets.

**Resource Use:** Electricity use has decreased 19% switching to wet cleaning and water decreased 14%, natural gas only decreased slightly (3.5%).

**Labor:** The number of hours worked by employees at Hesperian Cleaners is now slightly higher than before the switch to wet cleaning. Mr. Lee believes that the increased pressing labor is due to the increased volume. Volume increase from 150 to 160 pieces per day since the switchover to wet cleaning. Analysis of cost per garment shows that the increased volume accounts for the increase in labor cost.

**Natural Gas:** Based on daily meter readings taken before and after the switch, natural gas consumption at Hesperian Cleaners has dropped significantly. Gas bills for the three month period before and after the switch to wet cleaning dropped from an average of $152.57 to $134.36.

**6. Owner Satisfaction Evaluation**

Mr. Lee believes that the decision to switch to wet cleaning was the best decision he ever made, and if he had to, he would make the same decision over again. He believes that everything about his new wet cleaning business is better – it’s cleaner, healthier, safer, and there are less accidents in the cleaning process. Mr. Lee would “strongly recommend” wet cleaning to another cleaner who needed to replace their dry cleaning machine.

Mr. Lee rated his level of satisfaction as a wet cleaner to be much higher compared to when he was a dry cleaner. When he was doing dry cleaning, Mr. Lee experienced a wide range of health problems: dizziness, nausea, headache, fatigue, and a runny nose. His employees experienced the same problems. Since the switchover to wet cleaning, Mr. Lee’s health issues, except for the runny nose problem, have completely disappeared (he attributes the runny nose to allergies). His employees are no longer suffering from health issues since the switchover.
Hesperian Cleaners Case Study: Key to Figures

- **Garment Volume**
  Garment volume figures are based on conversations and interviews with the cleaner, Sung Lee between 12/1/2007 and 12/25/2007. An average of 150 garments per day were dry cleaned and are wet cleaned based on conversations with Mr. Lee.

  **Calculation of volume figures: Dry Cleaning**
  - Days of operation: 6 days per week (Monday – Saturday)
  - Average volume professionally cleaned per day: 150 garments
  - Average volume professionally cleaned per month: 150 garments * 6 days per week * 4.3 weeks per month = 46,440 garments per year

  **Calculation of volume figures: Wet Cleaning**
  - Days of operation: 6 days per week (Monday – Saturday)
  - Average volume professionally cleaned per day: 160 garments
  - Average volume professionally cleaned per month: 160 garments * 6 days per week * 4.3 weeks per month = 49,536 garments per year

- **Performance Calculations**
  In determining the return, sent out, claims, and overall success rates, only the volume of professionally wet cleaned garments is used in the calculation – laundered garments are excluded from these calculations. The values used to calculate these rates are based on responses to interview questions by Mr. Lee, and the volume figures calculated above.

  **Return Rate**
  Returned garments are those that are brought back to the shop by customers for additional work. As a dry cleaner, due to staining in the garments. As a wet cleaner, one per every 100 garments are returned because of spotting or pressing problems.

  - Dry cleaning return rate: 7 returns per week * 4.3 weeks per year * 12 months per year/ 46,440 professionally cleaned garments per year = .78%
  - Wet cleaning return rate: 1 returns per month * 12 months per year/ 49,536 professionally cleaned garments per year = .024%

  **Sent Out**
  Sent out garments are those that the cleaner sends to another facility because he or she doesn’t feel comfortable processing them in-house. Mr. Lee reported that he has sent out more garments as a dry cleaner than as a wet cleaner. Historically, he has only sent out a small number of garments each year – generally, leather pieces. As a dry cleaner, he sent out approximately 70 garments each year. As a wet cleaner, he does most of the leather goods himself. He currently only sends out about one leather piece every other month.

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54 Interview 12/18/07
when the driver who used to pick-up all the leather, shows up, and he feels obliged to give him something.

- Dry cleaning send out rate: 70 garments per year sent out / 46,440 professionally cleaned garments per year = .15%

- Wet cleaning send out rate: 5 garments sent out / 49,536 professionally cleaned garments per year = .01%

Claims Rate

Claims (including store credit) result from garments being damaged by the cleaner to the extent that the cleaner offers the customer reimbursement or store credit. As a dry cleaner, Mr. Lee paid an average of 10 claims per year, usually for damage to garments or lost garments. In his first ten months in operation as a wet cleaner Mr. Lee has paid only one claim.

- Dry cleaning claims rate: 5 claims per year / 46,440 garments = .001%

- Wet cleaning claims rate: 2 claim per year / (4,128 garment/month*10 months) = .005%

Overall Success Rate

The overall success rate is calculated by subtracting the return, send-out, and claims rates from 100%.

- Dry Cleaning success rate: 100% - [.78% returned + .15% sent out + .01% claims] = 99.06%

- Wet Cleaning success rate: 100% - [.024% returned + .01% sent out + .005% claimed] = 99.961%

- Financial Calculations for Hesperian Cleaners

  The financial figures calculated in this section are only those considered to be process dependent. Aspects of operations not affected by the switch from PCE dry cleaning to professionally wet cleaning (e.g. rent and advertising) are not considered. All cost figures are put into terms of “dollars per month.”

  Water Consumption and Cost

  Hesperian Cleaners is billed for water every two months. The billing periods of January-March 2007 overlapped with when the cleaner was dry cleaning and when the cleaner was wet cleaning, so that data was not included in this analysis. Consumption figures for dry cleaning are based on two-month usage records from January-November 2006. Consumption figures for wet cleaning are based on two-month usage records from May-November 2007. Consumption is measured in units of hundred cubic feet (HCF).
One HCF is equivalent to 748 gallons. An average cost of $3.80 per HCF was used as the basis for water use cost. The water used in dry cleaning per month was adjusted given that the volume of garments cleaned in wet cleaning increased substantially since the cleaner switched. While the volume increase 6.7% by the end study period, the average volume increase 3.5%.

<table>
<thead>
<tr>
<th>Process</th>
<th>Date</th>
<th>Billing Record Use (HCF)</th>
<th>Total Days</th>
<th>Water Use per Day (HCF)</th>
<th>Use per Month (HCF)</th>
<th>Adjusted Use Based on 3.5% increase in Volume</th>
<th>Cost (At $3.80 HCF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Cleaning</td>
<td>1/06-11/06</td>
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<td>239</td>
<td>0.65</td>
<td>19.5</td>
<td>20.2</td>
<td>$76.76</td>
</tr>
<tr>
<td>Wet Cleaning</td>
<td>5/06-11/07</td>
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<td>139</td>
<td>0.58</td>
<td>17.4</td>
<td>17.4</td>
<td>$66.12</td>
</tr>
</tbody>
</table>

**Electricity**

**Consumption and Cost**

Consumption figures are based on Pacific Gas and Electric billing records from 18 months before (June 2005 to December 2006) and 8 months after (April 2007 to December 2007) the switch to wet cleaning. Average daily consumption was provided by PG&E based on the total use in each billing period and the number of days per billing period. The electricity used in dry cleaning per month was adjusted given that the volume of garments cleaned in wet cleaning increased substantially since the cleaner switched. While the volume increase 6.7% by the end study period, the average volume increase 3.5%.

<table>
<thead>
<tr>
<th>Process</th>
<th>Date</th>
<th>Average daily use (kWh)</th>
<th>Use per Month (kWh)</th>
<th>Adjusted Use Based on 3.5% increase in volume (kWh)</th>
<th>Cost ($0.15/kWh)</th>
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</thead>
<tbody>
<tr>
<td>Dry Cleaning</td>
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<td>77.04</td>
<td>2,311</td>
<td>2,392</td>
<td>$358.8</td>
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<tr>
<td>Wet Cleaning</td>
<td>4/17/07– 12/17/07</td>
<td>64.81</td>
<td>1,944</td>
<td>1,944</td>
<td>$291.6</td>
</tr>
</tbody>
</table>
Natural Gas

Consumption and Cost

Consumption figures are based on Pacific Gas and Electric billing records from 18 months before (August 2005 to June 2006) and 8 months after (August 2006 to December 2007) the switch to wet cleaning. Average daily consumption was provided by PG&E based on the total use in each billing period and the number of days per billing period. While the volume increased 33.3% since Bob’s Cleaners converted, the volume increased steadily from the August 2006 to April 2007 and has remained steady since. The average increase in volume over entire 17 month period is 25%.

<table>
<thead>
<tr>
<th>Process</th>
<th>Date</th>
<th>Average daily use (Therms)</th>
<th>Use per Month (Therms)</th>
<th>Adjusted Use Based on 3.4% increase in volume (Therms)</th>
<th>Cost ($1.00/Therm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Cleaning</td>
<td>6/18/05 – 12/18/06</td>
<td>13.64</td>
<td>409</td>
<td>423</td>
<td>$423</td>
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<tr>
<td>Wet Cleaning</td>
<td>4/17/07-12/17/07</td>
<td>13.58</td>
<td>408</td>
<td>408</td>
<td>$408</td>
</tr>
</tbody>
</table>

Labor

Mr. Lee reported that his employees work slightly more now than they did before the switch to wet cleaning. At first, they worked longer hours because the cleaning process took longer, but with time, things have settled down and employees are back to their normal pace. Mr. Lee reports that his presser worked an additional five hours per week now doing wet cleaning. Volume has increased by approximately ten garments per day in the shop, or 6.7% and Mr. Lee believes that the increased volume is responsible for his increased labor costs. Analysis of the cost per piece suggests that the increased volume almost precisely accounted for the increase in labor cost (see below).

Dry Cleaning:
150*6*4.3 = 3,870 pieces/month
98 hours/week = 421 hours/month
Total cost = 421 hours*$8/hour = $3,368 per month
Cost/piece = $0.87

Wet Cleaning:
160*6*4.3 = 4,128 pieces/month
103 hours/week = 443 hours/month
Total cost = 443 hours*$8/hour = $3,544 per month
Cost/piece = $0.86

55 Interview 12/15/07
Solvent

Dry Clean: Mr. Lee estimated that he used to buy 19.2 gallons of perchloroethylene dry cleaning solvent every four months when he was a perc dry cleaner at a cost of $450 per 19.2 gallons.
- Annual Cost: $1,200
- Monthly Cost: $100

Wet Clean: Water is used as a solvent in wet cleaning, the cost and consumption of which is addressed above.

Detergent

Dry Clean: As a dry cleaner, Mr. Lee ordered approximately $600 per year worth of detergent for his perc machine.
- Annual cost: $600.00
- Monthly cost: $50.00

Wet Clean: As a wet cleaner, Mr. Lee orders approximately $400 per month worth of wet cleaning detergent.
- Annual cost: $4,800
- Monthly cost: $400.00

Filter Cost

Dry Clean: Mr. Lee replaced one spin disk filter in 11 years at the cost of $400.
- Annual Cost: $12.00* 80 filters/11 years = $87.28
- Monthly cost: $7.28

Wet Clean: No filters are used in professional wet cleaning.

Hazardous Waste Disposal

Dry Clean: Mr. Lee stated that he paid $600 every year in disposal costs.
- Annual cost: $600.00
- Monthly cost: $50.00

Wet Clean: No hazardous waste costs are associated with professional wet cleaning.

Regulatory Fees

Dry Clean: As a Bay Area Dry cleaner, Mr. Lee had to pay the following annual fees: 56

56 See Appendix F

10-109
### Table: Regulation Costs

<table>
<thead>
<tr>
<th>Regulation</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous Waste</td>
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<tr>
<td>Public Health</td>
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<tr>
<td>BAAQMD Operating Fee</td>
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<tr>
<td>CARB Training Renewal</td>
<td>$33.33</td>
</tr>
<tr>
<td>Annual Cost</td>
<td>$783.33</td>
</tr>
<tr>
<td>Monthly Cost</td>
<td>$65.28</td>
</tr>
</tbody>
</table>

**Wet Clean:** Mr. Lee is not subject to any environmental permits or fees associated with the use of professional wet cleaning.

**Equipment Costs**

**Dry Cleaning**

Mr. Lee’s dry clean machine was twelve years old when he made the decision to replace it with a wet cleaning system. If Mr. Lee had replaced his old PCE machine with a new PCE machine, a comparably sized PCE dry clean machine cost would have cost $50,000. For the purpose of this analysis, a life span of 15 years is assumed for the PCE dry cleaning machine, which is based on longest expected lifespan estimates for a dry clean machine.

\[
\text{Annual Capital Recovery Charge} = (PP - SV) \times CRF - (SV \times R)
\]

\[
= [($50,000 - $0) \times 0.09] + ($0 \times 0.09)
\]

\[
= 4,500
\]

Where:

- **PP** = Purchase price
- **SV** = Salvage value
- **CRF** = Capital recovery factor
- **R** = Interest rate

- Annual equipment cost: $4,500
- Monthly equipment cost: $375

---

57 CARB ISOR, January 2007.
58 *Pollution Prevention in the Garment Care Industry* Pollution Prevention Education and Research Center (PPERC), UCLA, 1997.
Wet Cleaning
The list price for the wet clean system (washer and dryer) and the detergent pump system totaled $65,000. Pants and jacket toppers were included as part of this list price. A life span of 20 years is assumed for the wet clean equipment based on discussions with a distributor of the equipment.59

Capital Recovery Factor \[ R \quad 1 - (1+R)^{-T} = \quad \frac{0.04}{1 - (1.04)^{-20}} = \quad 0.07 \]

Where:
- \( R \) = Interest rate
- \( T \) = Period of time equipment is used

Annual Capital Recovery Charge \[ [(PP - SV) \times CRF] + (SV \times R) \]
\[ \quad [($65,000 - $0) \times 0.07] + (0 \times 0.07) \]
\[ \quad = \quad $4,550 \]

Where:
- \( PP \) = Purchase price
- \( SV \) = Salvage value
- \( CRF \) = Capital recovery factor
- \( R \) = Interest rate

- Annual equipment cost: $4,550
- Monthly equipment cost: $379.16

Machine Maintenance
Dry Clean
Based on the low range industry estimates, a dry cleaner can expect to spend 1.76% of revenue on maintenance, with 50% of that going towards the maintenance of the dry clean machine.60 Assuming an annual volume of 43,200 garments at Hesperian Cleaners (based on a daily volume of 150 garments) and average revenue of $3.50 per garment, annual revenue would be approximately $151,200. Annual maintenance costs for the dry clean machine would be (1.76% * $151,200) * 50% = $1,330.56.

- Annual maintenance cost: $1,330.56.
- Monthly maintenance cost: $110.88

59 Pollution Prevention in the Garment Care Industry.
60 Pollution Prevention in the Garment Care Industry.
Mr. Lee reported spent approximately $3,000 on machine repair during the year prior to removing his dry cleaning machine. This did not labor time by operator to check for leaks, clean lint filter, distill solvent tanks, etc.

*Wet Clean*

Expected maintenance of the professional wet clean washer and dryer system over its lifetime were estimated at $5,690. It is assumed that a wet clean system will last for 20 years, so these costs are amortized over that time period.
- Annual maintenance cost: $284.5
- Monthly maintenance cost: $23.71

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61 *Pollution Prevention in the Garment Care Industry*.
62 See Equipment Cost section above for discussion of expected life span of wet clean equipment.
Structured Interview 1

WET CLEAN SURVEY

Cleaner: Hesperian Cleaners
Date: 12/20/07

Shop and Cleaner History

1. How long have you been a cleaner? **Since 1982.**
2. How long have you owned your current shop? **25 years.**
3. How many regular customers do you have? **Average of about 150.**
4. What was your experience cleaning before owning this shop? Classical guitar music student. Then got into the dry cleaning business.
5. What motivated your decision to switch to professional wet cleaning?
   A. Environmental issues – concern about the environment.
   B. Government regulation.
   C. Sustainability and business competition – switching over was the only way to gain leverage to compete.
   D. Longevity of business.

Performance Questions

1. Have you notified customers of your switch to professional wet cleaning? **Yes**
2. How? In the beginning, we made no mention of the fact we switched over. We watched how customers reacted. The majority of our customers did not notice the difference.
3. When? 7/07, 9/07, 10/07. There were articles published in local newspapers and then we told people.
4. Why not?
5. What % of your customers do you think are aware of your switch to another cleaning process for delicate garments labeled dry clean or dry clean only? **60-70%**
6. How do you think they became aware of your switch?
   1. Freshness of the garments
   2. Color of the garments.
7. Why are some of your customers not aware of your switch? For many, as long as they got their clothes back on time, they didn’t care. They trust me with whatever I want to do.

8. Of the customers that are aware, what percentage responded?

9. Positively 99%     Negatively___     Don’t Care___

10. Have you lost any customers because of your switch to wet cleaning? Yes.
11. How many? Less than 1 or 2.
12. What %? Less than 1%.
13. Why? I wasn’t doing it properly. There was a lack of refinement in my wet cleaning skills.

15. Have you gained any customers because of your switch to wet cleaning? Yes.
17. What %? 5%

19. What is your current volume of garments cleaned per day? 150.
20. Has your volume changed since your switch? 10 garments per week.

21. When you were dry cleaning, how often did customers bring garments back because of problems with the quality of cleaning? Quite a bit. Seven per week.


23. Would you attribute any re-dos to the wet cleaning process? Yes.

24. When you were dry cleaning, approximately how often did you pay claims or give store credit to customers?
25. About five per year. Reasons: 1) damage; 2) most lost.

26. Currently, approximately how often do you pay claims or give store credit to customers? One every six months.
27. Reasons:

29. Has the rate changed since you first switched? It has gone down.

30. When you were dry cleaning, how often did you send out garments? (including leather)?
31. Garments ____________________________ Reasons __________________
32. Only leather. Couldn’t process it.

33. Currently, how often do you send out garments (including leather)?
34. Garments ____________________________ Reasons ____________________________

35. Hardly any. Just leather – every other month when the old driver shows up, to help him out.

38. Overall, How would you rate the quality of your cleaning service as a wet cleaner in comparison to the quality of your cleaning service when you were a dry cleaner? 200% better.

39. Overall, how do you rate your customers’ level of satisfaction compared to when you were dry cleaning?

40. Much lower
41. Lower
42. Equal
43. Higher
44. Much higher

45. On average, how many garments did you spot per day in dry cleaning? 30%.

46. How many garments are you spotting per day in wet cleaning? 50%

47. For spot removal, is it more or less difficult in wet cleaning vs. dry cleaning? It’s a hell of a lot easier.

48. Overall, do you spend more or less time in spot removal since switching to professional wet cleaning? More time.

Transition and Training

1. Before you switched, what concerns did you have about switching to professional wet cleaning? (list and rank)
   1. Shrinkage
   2. Water consumption
   3. Customer reaction

2. How difficult did you think it be to make the switch to professional wet cleaning?
   - not at all difficult
   - not too difficult
   - somewhat difficult
   - very difficult
Why? It was a new thing. There was resistance to change. Wet cleaning had a bad reputation – the Wascomat system failed five years earlier. There was a false belief that there was a conspiracy from the dry cleaning companies. That with water consumption, the permit fee would be exorbitantly expensive.

3. How difficult do you think it actually was to switch to professional wet cleaning?
   - not at all difficult
   - **not too difficult**
   - somewhat difficult
   - very difficult

4. What were the biggest difficulties in making the switch to wet cleaning? (list and rank).
   1. Learning curve
   2. Money

5. Did you have concerns about having to learn a new cleaning process? **Yes.**
   What concerns?
   1. Proper financing
   2. Better information – that there wouldn’t be enough information available. There was no info on the Internet regarding wet cleaning (detailing).

6. How difficult would say it was to learn to do wet cleaning?
   - not at all difficult
   - **not too difficult**
   - somewhat difficult
   - very difficult
   Why? **Because we had a really good trainer – Mrs. Sung Park.**

7. **How important would you say the training was to making a successful transition to wet cleaning?**
   - not at all important
   - not too important
   - somewhat important
   - **very important**

8. Would you have liked the training to be different in any way?
   How so? **It is perfect as it is.**

9. Was there anything that could have made your training easier? **It would have been better if the trainers had been closer by. Because Hans wasn’t around, I made progress a lot faster since they weren’t around.**

10. Since switching to wet cleaning, have you contacted any of the following people to discuss issues related to the cleaning process?
Owner Satisfaction

1. Do you feel your decision to switch to wet cleaning was a good business decision? **The best decision I ever made.**

2. Given the opportunity, would you make the same decision to do wet cleaning over again? **Yes.**

3. How strongly would you recommend wet cleaning to another cleaner who needed to replace their dry cleaning machine?
   - not recommend
   - recommend
   - **strongly recommend**
   - Why? **This is the way to go.**

4. How would you rate your level of satisfaction as a wet cleaner in comparison to when you were a dry cleaner?
   - much lower
   - lower
   - equal
   - higher
   - **much higher**
   Why? **All the way around, it’s cleaner, healthier, safer, and there are fewer accidents.**

5. When you were dry cleaning, did you experience any of the following conditions? **Yes.**
   - dizziness
   - nausea
   - headache
   - fatigue
   - runny nose
   - Chronic illness: **No.**

6. When you were dry cleaning, did any of your employees experience any of the following conditions? **Yes.**
   - dizziness
- nausea
- headache
- fatigue
- runny nose
- Chronic illness: No.

7. Since your switch to wet cleaning have you experienced any of the following conditions? No
   - Dizziness
   - nausea
   - headache
   - fatigue
   - runny nose – yes, but much better (possible allergies).
   - Chronic illness: No.

Financial

1. Has there been any change in the number hours worked by your employees since switching to wet cleaning? Hours got a little longer – in the beginning, a lot longer. In the last six month, it has been getting better and better.

<table>
<thead>
<tr>
<th>Employee</th>
<th>Job</th>
<th>Hours/day</th>
<th>Hours/week</th>
<th>Any Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presser/counter</td>
<td>Presser</td>
<td>6</td>
<td>30/35 hours</td>
<td>5 hours +</td>
</tr>
<tr>
<td>Owner/operator</td>
<td>Pressing/counter/operator</td>
<td>8</td>
<td>48</td>
<td>Same</td>
</tr>
<tr>
<td>Inspections</td>
<td>Assembly</td>
<td>4</td>
<td>20 hours</td>
<td>Same</td>
</tr>
</tbody>
</table>

2. Describe how you were processing a garment when you were dry cleaning. Pre-spot; Sort; Clean; Post-spot; Inspection; Reject; Maybe re-clean.

3. Describe how you are processing a garment now. Sort; Pre-spot, Clean; Press; Spotting (much less post-spotting); Inspection; Reject

4. What % of your garments are same day service? Less than one percent.

5. Compared to when you were dry cleaning, do you feel that you and/or your employees now have to put more or less effort into running your shop? More – 10 hours per week for me. Employees – two pressers, each +1 hour per person) or 10+ hours per week more.
6. In the year prior to switching, what maintenance did you perform on equipment at your plant? **Constant maintenance. Gasket $50-100 (4-5 times per year) = $500. Refrigeration: $2-3K last year ($2,500).**

7. Since switching to wet cleaning, how much maintenance have you had to perform on equipment at your plant? **None.**

8. Did you ever have to make any major repairs to your dry cleaning Machine? **Refrigeration unit, gaskets, heating coils (every so often); change spin disk filter every other year, open bottom tank (clean it out once a year).**

9. What were your average yearly disposal costs? **$600.**

10. Who was your waste hauler (contact info)? **Technicam (800-652-5455). 4245 Halleck Street, Emeryville, CA 90608.**

11. What fees were you required to pay as a dry cleaner, and to whom?  
   1. **BAAQMD – permit fee: $250/year**
   2. Alameda county health Agency: $500/year
   3. **CARB: $100/per three years ($33.33/mos.)**

12. Utility Providers: **East Bay Municipal Utility District, Pacific Gas & Electric**


14. How much do you buy each time?  
   **Detergent: $200 detergent.**  
   **Conditioner: $200 conditioner.**  
   **Liquid Tide for spotting: $100.**

15. How much perc/solvent did you buy each time? How often did you buy them?  
   **19.2 gallons every four months @ $450/19.2 gallons = $1,200/year**
### Resource Use Data

<table>
<thead>
<tr>
<th>Month</th>
<th>Consumption (HCF)</th>
</tr>
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<tbody>
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<td>1/23/06</td>
<td>37</td>
</tr>
<tr>
<td>3/24/06</td>
<td>39</td>
</tr>
<tr>
<td>5/24/06</td>
<td>40</td>
</tr>
<tr>
<td>07/25/06</td>
<td>36</td>
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<tr>
<td>09/22/06</td>
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<td>07/19/07</td>
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</tr>
<tr>
<td>09/20/07</td>
<td>34</td>
</tr>
<tr>
<td>11/19/07</td>
<td>33</td>
</tr>
</tbody>
</table>
### Hesperian Cleaners: Electricity and Natural Gas Use – Pacific Gas and Electric

<table>
<thead>
<tr>
<th>Read Date</th>
<th>Days</th>
<th>Therms Delivered</th>
<th>KWH</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/19/05</td>
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</tr>
<tr>
<td>6/18/05</td>
<td>30</td>
<td>441</td>
<td>2,430</td>
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<tr>
<td>7/20/05</td>
<td>32</td>
<td>466</td>
<td>2,620</td>
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<tr>
<td>8/17/05</td>
<td>28</td>
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<td>2,280</td>
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<td>484</td>
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<td>1,970</td>
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<td>9/17/07</td>
<td>31</td>
<td>368</td>
<td>1,920</td>
</tr>
<tr>
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<td>30</td>
<td>455</td>
<td>2,110</td>
</tr>
<tr>
<td>11/14/07</td>
<td>28</td>
<td>424</td>
<td>1,930</td>
</tr>
<tr>
<td>12/17/07</td>
<td>33</td>
<td>430</td>
<td>1,980</td>
</tr>
</tbody>
</table>
Appendix K - Delight Cleaners
(Sunnyvale, CA)
Delight Cleaners Case Study

<table>
<thead>
<tr>
<th>Delight Cleaners</th>
<th>Owner: Peter Xu</th>
</tr>
</thead>
<tbody>
<tr>
<td>1281 W. El Camino Real, Sunnyvale, CA 94087</td>
<td>Switch Date: 9/15/07</td>
</tr>
<tr>
<td>Wet Clean Washer</td>
<td>Miele, 36 lb.</td>
</tr>
<tr>
<td>Wet Clean Dryer</td>
<td>Miele, 36 lb.</td>
</tr>
<tr>
<td>Tensioning Pants Topper</td>
<td>Veit, Model 8741</td>
</tr>
<tr>
<td>Tensioning Shirt Finisher</td>
<td>Veit, Model 8356</td>
</tr>
<tr>
<td>Detergent</td>
<td>Krussler</td>
</tr>
<tr>
<td>Daily Volume</td>
<td>150 garments</td>
</tr>
<tr>
<td>Staff</td>
<td>1 presser</td>
</tr>
<tr>
<td>1 operator (owner)</td>
<td></td>
</tr>
<tr>
<td>1 counterperson (wife)</td>
<td></td>
</tr>
</tbody>
</table>

1 Background

Delight Cleaners of Sunnyvale, California is owned and operated by Peter Xu, a first-generation Chinese immigrant. Before getting into the garment cleaning business, Mr. Xu worked in a Chinese restaurant in the Sunnyvale area. He first learned about the garment cleaning business from a friend who owned a dry cleaning shop. After talking to his friend and studying the business, Mr. Xu saw an opportunity to make some money in the dry cleaning business and in November 1999, purchased Delight Cleaners.

From the very beginning, Mr. Xu did not like working with toxic dry cleaning chemicals. He reports that one day he opened the dry cleaning machine’s door between cycles and it smelled “really, really bad.” For Mr. Xu, the dry cleaning chemicals were “always no good.” He also felt that the garments that were cleaned using PCE were never really cleaned very well. “Sometimes you couldn’t see the stains, but you could feel them, and I knew perc didn’t clean well,” Mr. Xu said.

In 2000, Mr. Xu heard about wet cleaning for the first time. He was interested in the process and started to do extensive research into wet cleaning. At that time, he had heard that wet cleaning machines were not very good and did not work well.

In 2005, Mr. Xu heard about a wet cleaning demonstration at Blue Sky Cleaners in Union City, CA and decided to attend. He had a lot of questions but was frustrated when nobody at the demonstration site could answer them. A few months later, Mr. Xu attended a second wet cleaning demonstration at Bob’s Cleaners in Richmond, CA. At that demonstration, Mr. Xu met Hans Kim, who proceeded to answer all of Xu’s questions. Mr. Xu was intrigued by what he saw. Mr. Kim subsequently invited Xu to Los Angeles to take a closer look at cleaners who did 100 percent dedicated wet cleaning.
in the area. Mr. Xu was extremely impressed by what he saw, and after L.A., decided to switch to wet cleaning because he knew, finally, that it worked.

In August 2007, Mr. Xu headed down to Southern California for a day of training in Los Angeles and then he came back to Sunnyvale and was ready for the machine. After purchasing a full-wet cleaning package, his machine was installed on September 15, 2007. Mr. Xu had no more training after his first visit down to Los Angeles. When he had questions or problems, he calls the trainer.

2. Transition Process Evaluation

Mr. Xu thought it was going to be “somewhat difficult” to transition to professional wet cleaning. His main concerns were quality of cleaning -- he wanted to make sure the wet cleaning process worked and that there would be no damage to garments, color bleeding, or shrinkage.

Mr. Xu found the switchover to wet cleaning to be “not too difficult.” The biggest problems were financial (getting the money to pay for the machines), teaching employees how to press garments properly using the new wet cleaning process, and the time factor – pressing and tensioning took longer.

Once he made the switch to wet cleaning, Mr. Xu found the process to be “not at all difficult.” Before he actually switched over from dry cleaning, Mr. Xu tested out wet cleaning at different cleaners (including the demo workshops), and by the time he bought his wet cleaning equipment, he was confident the process worked.

Mr. Xu believes the training was “very important” in helping him succeed as a wet cleaner. He would have liked to have more training with leather garments, but other than that, Mr. Xu was happy with the training he received. He believes one day of training was enough time for him to learn what he needed to do as a wet cleaner. Since he has switched over to wet cleaning, he spoke to the trainer as well as another cleaner in the Bay Area who switched out from perc to wet cleaning.

3. Performance Analysis

Delight Cleaners currently wet cleans approximately 150 garments per day, including a full range of delicate garments.

Mr. Xu rates the overall quality of his cleaning service as a wet cleaner to be much better than that as a dry cleaner. He believes the switch to professional cleaning was a good decision because he no longer has to be around toxic chemicals. As a dry cleaner, Mr. Xu says he smelled chemicals, and felt the chemicals. Now, he feels better than before, the clothes feel better, and the colors of the clothes are much brighter. Spot removal is easier and takes less time, which saves Mr. Xu and his employees time. And most importantly, Mr. Xu doesn’t have to smell toxic chemicals anymore. He believes his
customers’ level of satisfaction is “much higher” now than before, when he was a dry cleaner.

Mr. Xu does not recommend wet cleaning for everybody, however, because he does not believe everybody can do it. Mr. Xu says it is easy to damage clothing if wet cleaning is not done properly, and that cleaners need to learn “a lot” before they can do it right. He adds that it is imperative that cleaners learn to control shrinkage and bleeding.

Problem Garment Analysis

*Garments Returned:* As a dry cleaner, one garment was returned every two months, or approximately six per year, because of problems with the quality of cleaning. As a wet cleaner, no garments have been returned since switching over to wet cleaning. (See Table 1)

*Garments Sent Out:* Mr. Xu is currently sending out approximately one piece a month (primarily leather garments) as a wet cleaner -- the same amount as he did as a dry cleaner.

*Claims:* As a dry cleaner, Mr. Xu paid only three to four claims in a span of a few years, or approximately one a year. As a wet cleaner, he has paid no claims since he started three months ago.

*Overall Success Rate:* Since switching to wet cleaning, Mr. Xu has successfully wet cleaned 100% of garments brought in by customers, a rate higher than a success rate of 99.98% as a dry cleaner.

### Performance Evaluation: Delight Cleaners

<table>
<thead>
<tr>
<th>Problem Garments</th>
<th>Dry Cleaning</th>
<th>Wet Cleaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sent Out</td>
<td>0.03%</td>
<td>0.002%</td>
</tr>
<tr>
<td>Returned</td>
<td>0.014%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Claims</td>
<td>0.002%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Overall Success Rate</td>
<td>99.954%</td>
<td>99.998%</td>
</tr>
</tbody>
</table>

### 4. Customer Response to Wet Cleaning

When Mr. Xu first made the switch to wet cleaning, he notified his customers after about two weeks. He told them that he was using no chemicals, that the cleaning was “all-natural” and that the clothes would smell much better.

Mr. Xu believes 90% of his customers are now aware that he has switched over to wet cleaning. He reports that many customers became aware that the quality of the cleaning was better and that the clothes smelled better. Mr. Xu also reports that all of his customers, and his employees, have responded positively to the change. His employees were also extremely happy about the change. Mr. Xu has not lost any customers because of the switch to wet cleaning. In fact, he says the experience has been so positive that he is adding a new customer every day to his business. The word is spreading in his area.
and so far, Mr. Xu believes he has gained 50 new customers because of the switch to wet cleaning.

Mr. Xu has recently been certified as a green business in Santa Clara County, which is also helping him grow his business further.

5. Financial Impact

Mr. Xu’s overall process dependent costs have dropped since switching to professional wet cleaning. Costs related to PCE solvent, hazardous waste, equipment, maintenance, and energy consumption have all decreased or been eliminated entirely. Labor costs have not changed, and the only increased costs have been for natural gas and detergent. (Table 2).

### Process Dependent Costs per Month at Delight Cleaners

<table>
<thead>
<tr>
<th></th>
<th>Dry Clean</th>
<th>Wet Clean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual Labor Cost</td>
<td>$929.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Solvent</td>
<td>$160.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Detergent</td>
<td>$94.00</td>
<td>$540.00</td>
</tr>
<tr>
<td>Water</td>
<td>$107.92</td>
<td>$96.90</td>
</tr>
<tr>
<td>Electricity</td>
<td>$437.51</td>
<td>$334.28</td>
</tr>
<tr>
<td>Gas</td>
<td>$880.87</td>
<td>$760.50</td>
</tr>
<tr>
<td>Filter cost</td>
<td>$120.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Hazardous waste disposal</td>
<td>$190</td>
<td>$0.00</td>
</tr>
<tr>
<td>Machine Maintenance.</td>
<td>$119.20</td>
<td>$23.71</td>
</tr>
<tr>
<td>Regulatory fees</td>
<td>$69.58</td>
<td>$0.00</td>
</tr>
<tr>
<td>Equipment</td>
<td>$375.00</td>
<td>$379.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$3,483.08</strong></td>
<td><strong>$2,134.39</strong></td>
</tr>
</tbody>
</table>

_PCE and Hazardous Waste:_ As a dry cleaner Mr. Xu had a number of costs associated with the use of PCE solvent and the hazardous waste and air emissions it produces. He purchased four 19.5 gallon drums of perc per year for $400 per drum (total cost $1600 per year). Additionally, Mr. Xu was required by law to pay fees and purchase permits from regulatory agencies because of the on site storage and production of hazardous waste and the emission of hazardous air pollutants. These permits and fees totaled to $835.00 per year.

_Equipment and Maintenance Costs:_ The total list price of the equipment purchased by Mr. Xu in order to switch to professional wet cleaning totaled to $82,000. This included a 36 lb. wet clean washer, a 36 lb. wet clean dryer, a tensioning pants topper, and a tensioning for finisher. The cost of Mr. Xu’s dry clean machine was $60,000, which he bought along with his store. In addition to the initial cost of the
equipment being lower in wet cleaning, the expected life span of wet cleaning equipment is longer (20 years) than dry cleaning equipment (15 years). Maintenance costs are also lower in wet cleaning. The wet clean equipment is simpler mechanically, and the potential for breakdowns as well as the cost of repairs is significantly reduced.

**Resource Use:** While electricity and natural gas consumption have been reduced by 60.7% and 0.17% respectively since switching to wet cleaning, water usage has increased by 7.3%. The net impact on monthly costs has been TK of $TK per month.

**Labor:** The number of hours worked by employees at Delight Cleaners is now the same as before the switch to wet cleaning, but volume has increased from approximately 150 to 180 pieces per week.

### 7. **Owner Satisfaction Evaluation**

Mr. Xu believes that the decision to switch to wet cleaning was a good business decision, and given the opportunity, he would make the same decision over again. He would recommend wet cleaning to other cleaners who needed to replace their wet cleaning machines, but he does not believe everybody can do wet cleaning. Mr. Xu believes that knowledge and training is extremely important to make it work, and that not everybody will understand how to do the process. He says it is easy to damage garments, and cleaners must learn how to control shrinkage and bleeding.

Mr. Xu rated his level of satisfaction as a wet cleaner to be much higher compared to when he was a dry cleaner because he feels it’s easier and faster to do spotting, the color comes out great, and there is no bleeding. He is also thrilled that he no longer has to breathe toxic fumes while working.

When he was doing dry cleaning, Mr. Xu experienced a runny nose and cough, but none of the more dramatic conditions like dizziness, nausea, headache, fatigue or chronic illness. Since switching over to wet cleaning, Mr. Xu has experienced no negative health conditions. He does not know if any of his employees suffered any health conditions while working in the dry cleaning shop since he never asked them, and does not believe any suffer from any health issues at this time.
Delight Cleaners Case Study: Key to Figures

7. Garment Volume

Garment volume figures are based on conversations and interviews with the cleaner, Sung Xu between 12/1/2007 and 12/25/2007. An average of 150 garments per day were dry cleaned and approximately 160-200 (average 180) are currently wet cleaned based on conversations with Mr. Xu. His volume increased 20% since the switchover.

Calculation of volume figures: Dry Cleaning

- Days of operation: 6 days per week (Monday – Saturday)
- Average volume professionally cleaned per day: 150 garments
- Average volume professionally cleaned per month: 150 garments * 6 days per week * 4.3 weeks per month = 46,440 garments per year

Calculation of volume figures: Wet Cleaning

- Days of operation: 6 days per week (Monday – Saturday)
- Average volume professionally cleaned per day: 180 garments
- Average volume professionally cleaned per month: 150 garments * 6 days per week * 4 weeks per month = 51,840 garments per year

8. Performance Calculations

In determining the return, sent out, claims, and overall success rates, only the volume of professionally wet cleaned garments is used in the calculation – laundered garments are excluded from these calculations. The values used to calculate these rates are based on responses to interview questions by Mr. Xu, and the volume figures calculated above.

Return Rate

Returned garments are those that are brought back to the shop by customers for additional work. As a dry cleaner, an average of one garment every two months, or approximately six garments per year, were returned, due to staining or other cleaning problems. As a wet cleaner, no returns have been made since switching over to wet cleaning.

- Dry cleaning return rate: 6 return / 46,440 professionally cleaned garments per year = .013%
- Wet cleaning return rate: 0 returns / 51,840 professionally cleaned garments per year = 0.00%

Sent Out

64 Interview 12/18/07
Sent out garments are those that the cleaner sends to another facility because he or she doesn’t feel comfortable processing them in-house. Mr. Xu reported that he has sent out approximately the same amount of garments (primarily leather) as a wet cleaner.

- Dry cleaning send out rate: 12 sent out / 46,440 professionally cleaned garments per year = .026%

- Wet cleaning send out rate: 12 sent out / 51,840 professionally cleaned garments per month = .023%

Claims Rate

Claims (including store credit) result from garments being damaged by the cleaner to the extent that the cleaner offers the customer reimbursement or store credit. As a dry cleaner, Mr. Xu paid an average of approximately one claim per year. In his first three months of operation as a wet cleaner Mr. Xu has paid no claims.

- Dry cleaning claims rate: 1 claims / (46,440 garments) = .002%

- Wet cleaning claims rate: 0 claims / (51,840 garments) = 0.00%

Overall Success Rate

The overall success rate is calculated by subtracting the return, send-out, and claims rates from 100%.

- Dry Cleaning success rate: 100% - [.014% returned + .03% sent out + .002% claims] = 99.98%

- Wet Cleaning success rate: 100% - [0% returned + .002% sent out + 0% claimed] = 100%

Garment Profile

Garment profile figures are based on data collected at the shop up to December 2007. All garments that were processed in the wet clean washer using professional wet clean programs (as opposed to laundry programs).

9. Financial Calculations for Delight Cleaners

The financial figures calculated in this section are only those considered to be process dependent. Aspects of operations not affected by the switch from PCE dry cleaning to professionally wet cleaning (e.g. rent and advertising) are not considered. All cost figures are put into terms of “dollars per month”.

Water Consumption and Cost

Delight Cleaners is billed for water every two months. The billing periods of August-October 2007 overlapped with when the cleaner was dry cleaning and when the cleaner was wet cleaning, so that data was not included in this analysis. Consumption
figures for dry cleaning are based on two-month usage records from February-August 2006. Consumption figures for wet cleaning are based on two-month usage records from October-December 2007. Consumption is measured in units of hundred cubic feet (HCF). One HCF is equivalent to 748 gallons. An average cost of $3.80 per HCF was used as the basis for water use cost. The water used in dry cleaning per month was adjusted given that the volume of garments cleaned in wet cleaning increased substantially since the cleaner switched. The volume increased 20% in the two months since Delight Cleaners switched to professional wet cleaning.

<table>
<thead>
<tr>
<th>Process</th>
<th>Date</th>
<th>Billing Record Use (HCF)</th>
<th>Total Days</th>
<th>Water Use per Day (HCF)</th>
<th>Use per Month (HCF)</th>
<th>Adjusted Use Based on 20% increase in Volume</th>
<th>Cost (At $3.80 HCF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Cleaning</td>
<td>2/07-8/07</td>
<td>142</td>
<td>180</td>
<td>0.79</td>
<td>23.7</td>
<td>28.4</td>
<td>$107.92</td>
</tr>
<tr>
<td>Wet Cleaning</td>
<td>10/09-12/07</td>
<td>51</td>
<td>60</td>
<td>0.85</td>
<td>25.5</td>
<td>25.5</td>
<td>$96.90</td>
</tr>
</tbody>
</table>

**Electricity**

**Consumption and Cost**

Consumption figures are based on Pacific Gas and Electric billing records from 21 months before (January 2006 to August 2007) and 2 months after (October 2007 to December 2007) the switch to wet cleaning. Average daily consumption was provided by PG&E based on the total use in each billing period and the number of days per billing period. The electricity used in dry cleaning per month was adjusted given that the volume of garments cleaned in wet cleaning increased substantially since the cleaner switched. Volume at Delight has increased 20% in the two months since the cleaner switched to professional wet cleaning.

<table>
<thead>
<tr>
<th>Process</th>
<th>Date</th>
<th>Average daily use (kWh)</th>
<th>Use per Month (kWh)</th>
<th>Adjusted Use Based on 20% increase in volume (kWh)</th>
<th>Cost ($0.15/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Cleaning</td>
<td>1/06-8/07</td>
<td>81.02</td>
<td>2,430.6</td>
<td>2916.72</td>
<td>$437.51</td>
</tr>
<tr>
<td>Wet Cleaning</td>
<td>10/07-12/07</td>
<td>74.28</td>
<td>2,228.5</td>
<td>2,228.5</td>
<td>$334.28</td>
</tr>
</tbody>
</table>

**Natural Gas**

**Consumption and Cost**
Consumption figures are based on Pacific Gas and Electric billing records from 21 months before (January 2006 to August 2007) and 2 months after (October 2007 to December 2007) the switch to wet cleaning. Average daily consumption was provided by PG&E based on the total use in each billing period and the number of days per billing period. The volume increase 20% since Delight Cleaners converted.

<table>
<thead>
<tr>
<th>Process</th>
<th>Date</th>
<th>Average daily use (Therms)</th>
<th>Use per Month (Therms)</th>
<th>Adjusted Use Based on 20% increase in volume (Therms)</th>
<th>Cost ($1.00/Therm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Cleaning</td>
<td>1/06-8/07</td>
<td>24.47</td>
<td>734.06</td>
<td>880.87</td>
<td>$880.87</td>
</tr>
<tr>
<td>Wet Cleaning</td>
<td>10/07-12/07</td>
<td>25.35</td>
<td>760.50</td>
<td>760.50</td>
<td>$760.50</td>
</tr>
</tbody>
</table>

**Labor**

Mr. Xu reported that his employees work about the same amount of time as they did before the switch to wet cleaning. While the labor costs have remained constant, volume has increased in the shop from 150 pieces per week to an average of 180 pieces per week.

Hours = 136/week

The cost per piece in processing garments in dry cleaning was $0.20 per piece more in dry cleaning than wet cleaning -- $1.21 vs. $1.01 per piece. (see below).

Additional labor cost in dry cleaning per month = **$928.8** ($0.20*4,644 piece/month).

Cost/dry clean piece:
- 3,870 pieces per month (150 pieces/day)(6 days/week)(4.3 weeks/month)
- 585 hrs/month (136 hrs/week)(4.3 weeks/month)
- Total cost = $4,680 (585 hrs/month * $8/hr)
- Cost/piece = $1.21 ($6,264/5,590)

Cost/wet clean piece:
- 4,644 pieces per month (180 pieces/day)(6 days/week)(4.3 weeks/month)
- 585 hrs/month (136 hrs/week)(4.3 weeks/month)
- Total cost = $4,680 (585 hrs/month * $8/hr)
- Cost/piece = $1.01 ($6,264/5,913)

**Solvent**

---

65 Interview 12/15/07
**Dry Clean:** Mr. Xu estimated that he used to buy 19.5 gallons of perchloroethylene dry cleaning solvent every four months when he was a perc dry cleaner at a cost of $400 per 19.5 gallons.
- Annual Cost: $1,600.00
- Monthly Cost: $133.33
- Adjusted monthly cost: $160.00 ($133.33*1.2)

**Wet Clean:** Water is used as a solvent in wet cleaning, the cost and consumption of which is addressed above.

**Detergent**

**Dry Clean:** As a dry cleaner, Mr. Xu ordered 25 gallons of detergent four times a year at a cost of $185.00 per 25 gallon order in addition to a $200 drum of Customer Care.
- Annual cost: $940.00
- Monthly cost: $78.33
- Adjusted monthly cost: $94.00 ($78.33*1.20)

**Wet Clean:** As a dry cleaner, Mr. Xu orders two pails of detergent at $180 per pail each month.
- Monthly cost: $360

**3.2.1 Filter Cost**

**Dry Clean:** Mr. Xu replaced ten filters four times a year at a cost of $30 each.
- Annual Cost: $30 * 40 filters = $1,200.00
- Monthly cost: $100.00
- Adjusted monthly cost: $120.00 ($100.00*1.20)

**Wet Clean:** No filters are used in professional wet cleaning.

**Hazardous Waste Disposal**

**Dry Clean:** Mr. Xu stated that he paid $1,900.00 every year in disposal costs.
- Annual cost: $1,900
- Monthly cost: $158.33
- Adjusted monthly cost: $190 ($158.33*1.2)

**Wet Clean:** No hazardous waste costs are associated with professional wet cleaning.

**Regulatory Fees**

**Dry Clean:** As a Bay Area Dry cleaner, Mr. Xu had to pay the following annual fees:
<table>
<thead>
<tr>
<th>Regulation</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous Waste</td>
<td>$500.00</td>
</tr>
<tr>
<td>BAAQMD Operating Fee</td>
<td>$300.00</td>
</tr>
<tr>
<td>CARB Training Renewal</td>
<td>$35.00</td>
</tr>
<tr>
<td>Annual Cost</td>
<td>$835.00</td>
</tr>
<tr>
<td>Monthly Cost</td>
<td>$69.58</td>
</tr>
</tbody>
</table>

*Wet Clean:* Mr. Xu is not subject to any environmental permits or fees associated with the use of professional wet cleaning.

**Equipment Costs**

*Dry Cleaning*

Mr. Xu dry clean machine was fifteen years old when he made the decision to replace it with a wet cleaning system. If Mr. Xu had replaced his old PCE machine with a new PCE machine, a comparably sized PCE dry clean machine cost would have cost $50,000. For the purpose of this analysis, a life span of 15 years is assumed for the PCE dry cleaning machine, which is based on longest expected lifespan estimates for a dry clean machine.

Capital Recovery Factor = \( \frac{R}{1 - (1+R)^{-T}} = \frac{0.04}{1 - (1.04)^{-15}} = 0.09 \)

Where:
- \( R \) = Interest rate
- \( T \) = Period of time equipment is used

Annual Capital Recovery Charge = \([PP - SV] \times CRF\) - \((SV \times R)\)

= \[\($50,000 - $0\) \times 0.09\] + ($0 \times 0.04)

= **$4,500**

Where:
- \( PP \) = Purchase price
- \( SV \) = Salvage value
- \( CRF \) = Capital recovery factor
- \( R \) = Interest rate

- Annual equipment cost: $4,500

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67 *Pollution Prevention in the Garment Care Industry* Pollution Prevention Education and Research Center (PPERC), UCLA, 1997.
- Monthly equipment cost: $375

**Wet Cleaning**

The list price for the wet clean system (washer and dryer), including the steel base for the washer and the detergent pump system, along with pants and jacket toppers totaled $82,000. The total cost of equipment was $65,000. A life span of 20 years is assumed for the wet clean equipment based on discussions with a distributor of the equipment.\(^{68}\)

\[
\text{Capital Recovery Factor} = \frac{R}{1-(1+R)^{-T}} = \frac{0.04}{1-(0.04)^{20}} = 0.07
\]

Where:
- \(R\) = Interest rate
- \(T\) = Period of time equipment is used

Annual Capital Recovery Charge = \( [(PP - SV) \times CRF] + (SV \times R) \)

\[
= [($65,000 - $0) \times 0.07] + ($0.0 \times 0.04)
\]

\[
= $4,550
\]

Where:
- \(PP\) = Purchase price
- \(SV\) = Salvage value
- \(CRF\) = Capital recovery factor
- \(R\) = Interest rate

- Annual equipment cost: $4,500
- Monthly equipment cost: $379

**Machine Maintenance**

**Dry Clean**

Based on the low range industry estimates, a dry cleaner can expect to spend 1.76\% of revenue on maintenance, with 50\% of that going towards the maintenance of the dry clean machine.\(^{69}\) Assuming an annual volume of 46,440 garments at Delight Cleaners (based on a daily volume of 150 garments) and average revenue of $3.5 per garment, annual revenue would be approximately $162,540. Annual maintenance costs for the dry clean machine would be 1.76\% \times $162,540 \times 50\% = $1,430.35

- Annual maintenance cost: $1,430.35
- Monthly maintenance cost: $119.20

---

\(^{68}\) *Pollution Prevention in the Garment Care Industry*.

\(^{69}\) *Pollution Prevention in the Garment Care Industry*.
Mr. Xu estimated repair maintenance on the dry cleaning machine amounted to approximately $100 per month, as Mr. Xu usually fixed the machine by himself. This does include labor maintenance associated with leak checks, cooling tower, link trap, etc.

*Wet Clean*

Expected maintenance of the professional wet clean washer and dryer system over its lifetime were estimated at $5,690.\(^{70}\) It is assumed that a wet clean system will last for 20 years,\(^{71}\) so these costs are amortized over that time period.

- Annual maintenance cost: $284.5
- Monthly maintenance cost: $23.71

---

\(^{70}\) *Pollution Prevention in the Garment Care Industry*.

\(^{71}\) See Equipment Cost section above for discussion of expected life span of wet clean equipment.
Structured Interview 1

WET CLEAN SURVEY

Cleaner: Delight Cleaners
Date: 12/20/07

Shop and Cleaner History
1. How long have you been a cleaner? Since 1999 – so eight years.
2. How long have you owned your current shop? Eight years.
3. How many regular customers do you have? 800-1000.
4. What was your experience cleaning before owning this shop? Worked at a dry cleaner's shop. Prior to that, owned a Chinese restaurant.
5. What motivated your decision to switch to professional wet cleaning?
   A. Friend owned cleaner.
   B. It seemed like something that would be easy to control.

Performance Questions
1. Have you notified customers of your switch to professional wet cleaning? Yes. How? Told customers that traditional cleaning smelled bad and that it was not clean. I told them that in wet cleaning, there were no chemicals, that it was all-natural. When? Two weeks after the switchover. Why not?
2. What % of your customers do you think are aware of your switch to another cleaning process for delicate garments labeled dry clean or dry clean only? 90 percent.
3. How do you think they became aware of your switch? I told them. The quality was much better. The employees were really happy.
4. Why are some of your customers not aware of your switch? Everyone knows.
5. Of the customers that are aware, what percentage responded?
   Positively 100%  Negatively ___  Don’t Care ___
6. Have you lost any customers because of your switch to wet cleaning? **No.**
   How many? **0.**
   What %? **0%**
   Why?

7. Have you gained any customers because of your switch to wet cleaning? **Yes.**
   How many? **At least 50. Almost every day there is a new customer.**
   What %? **Four percent.**
   Why? **Word of mouth. New people have moved into the area.**

8. What is your current volume of garments cleaned per day? **180.**
   Has your volume changed since your switch? Slightly higher (no marketing).

9. When you were dry cleaning, how often did customers bring garments back because of problems with the quality of cleaning? **Very rarely. Once every two months.**

10. How often do your customers bring back garments because of problems with the quality of cleaning? **Never.**

11. Would you attribute any re-dos to the wet cleaning process? **No.**

12. When you were dry cleaning, approximately how often did you pay claims or give store credit to customers? **Three to four times in a few years. One time there was a pen in a pocket. Another time there was a spotting issue, the color faded.**

13. Currently, approximately how often do you pay claims or give store credit to customers? **Never.**
   Reasons:

14. Would you attribute any claims to the wet cleaning process? **None in three months since switching over.**
   Reasons:

15. Has the rate changed since you first switched? **3-4 times (1 per year).**

16. When you were dry cleaning, how often did you send out garments? (including leather)?
   Garments Reasons
   Only leather, once a month. Couldn't process it.

17. Currently, how often do you send out garments (including leather)?
   Garments Reasons
   Leather, once a month.
18. Overall, How would you rate the quality of your cleaning service as a wet cleaner in comparison to the quality of your cleaning service when you were a dry cleaner? **Much better. There are no chemicals now. Before I’d open the dry cleaning machine door and I smelled chemicals. I felt the chemicals. It was the same with the employees. Now, it feels better. The colors are brighter. There’s no smell. It’s just much better.**

19. Overall, how do you rate your customers’ level of satisfaction compared to when you were dry cleaning?

- Much lower
- Lower
- Equal
- Higher
- Much higher

20. On average, how many garments did you spot per day in dry cleaning? **It depended on the garment.**

21. How many garments are you spotting per day in wet cleaning? **It depended on the garment.**

22. For spot removal, is it more or less difficult in wet cleaning vs. dry cleaning? **It’s much easier.**

23. Overall, do you spend more or less time in spot removal since switching to professional wet cleaning? **Less time. The person who does spotting loves it because it saves time.**

**Transition and Training**

1. Before you switched, what concerns did you have about switching to professional wet cleaning? (list and rank)
   4. Quality (cost is not important) – I wanted to make sure wet cleaning worked.
   5. I wanted to make sure there was no damage.
   7. Shrinkage.

2. How difficult did you think would it be to make the switch to professional wet cleaning?
   - not at all difficult
   - not too difficult
   - somewhat difficult
   - very difficult
Why? I didn’t understand wet cleaning. I needed to know everything about it before I would feel comfortable. After you practice, you know everything.

3. How difficult do you think it actually was to switch to professional wet cleaning?
   - not at all difficult
   - not too difficult
   - somewhat difficult
   - very difficult

   I went to the L.A. show and saw that wet cleaning worked.

4. What were the biggest difficulties in making the switch to wet cleaning? (list and rank).
   1. Financial
   2. Teaching employees how to press
   3. Pressing took longer/tensioning took longer.

5. Did you have concerns about having to learn a new cleaning process? Yes.
   What concerns?
   3. Shrinkage
   4. Bleeding
   5. Time it took to press.

6. How difficult would say it was to learn to do wet cleaning?
   - not at all difficult
   - not too difficult
   - somewhat difficult
   - very difficult

   Why? Before I switched, I tried it out. I knew it was working.

7. How important would you say the training was to making a successful transition to wet cleaning?
   - not at all important
   - not too important
   - somewhat important
   - very important

8. Would you have liked the training to be different in any way?
   How so? I would have liked more leather training.

9. Was there anything that could have made your training easier? No. One day of training was enough.

10. Since switching to wet cleaning, have you contacted any of the following people to discuss issues related to the cleaning process?
Chemical supplier

Program Trainer: Hans Kim, Mrs. Park

Other wet cleaners: Sung Lee, Hans Kim, Karl Huie

Other dry cleaners: Sung Lee, Hans Kim, Karl Huie

Equipment manufacturer/distributor

Other:

Owner Satisfaction

1. Do you feel your decision to switch to wet cleaning was a good business decision? Yes.

2. Given the opportunity, would you make the same decision to do wet cleaning over again? Yes.

3. How strongly would you recommend wet cleaning to another cleaner who needed to replace their dry cleaning machine?
   - not recommend
   - recommend
   - strongly recommend

Why? Not everybody can do wet cleaning. You need to learn a lot – knowledge is very important. Not everyone can understand it. It is easy to damage garments. Cleaners must know how to control shrinkage and bleeding.

4. How would you rate your level of satisfaction as a wet cleaner in comparison to when you were a dry cleaner?
   - much lower
   - lower
   - equal
   - higher
   - much higher

Why? Because it’s easier to do spotting. It saves time. Colors come out very good (like brand new). There is no bleeding.

5. When you were dry cleaning, did you experience any of the following conditions? Yes.
   - dizziness
   - nausea
   - headache
   - fatigue
   - runny nose (allergy?)
   - Chronic illness: No.

6. When you were dry cleaning, did any of your employees experience any of the following conditions?
- dizziness
- nausea
- headache
- fatigue
- runny nose
- Chronic illness:

7. Since your switch to wet cleaning have you experienced any of the following conditions? **No**
   - Dizziness
   - nausea
   - headache
   - fatigue
   - runny nose – yes, but much better (possible allergies).
   - Chronic illness: No.

**Financial**

1. Has there been any change in the number hours worked by your employees since switching to wet cleaning? **Pressing time a little more. Cleaning time a little less. Total hours, about the same.**

<table>
<thead>
<tr>
<th>Employee</th>
<th>Job</th>
<th>Hours/day</th>
<th>Hours/week</th>
<th>Any Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presser/counter</td>
<td>Presser</td>
<td>8</td>
<td>40</td>
<td>Same</td>
</tr>
<tr>
<td>Owner/operator</td>
<td>Pressing/counter/operator</td>
<td>8</td>
<td>48</td>
<td>Same</td>
</tr>
<tr>
<td>Owner’s wife</td>
<td>Counter</td>
<td>8</td>
<td>48</td>
<td>Same</td>
</tr>
</tbody>
</table>

2. Describe how you were processing a garment when you were dry cleaning **Pre-spotting, wash in dry clean machine, steam garments, then press.**

3. Describe how you are processing a garment now **Same. Slightly more time pressing using wet cleaning.**

4. What % of your garments are same day service? **Not much. One percent.**

5. Compared to when you were dry cleaning, do you feel that you and/or your employees now have to put more or less effort into running your shop? **For the presser, slightly more. For me, less.**

6. In the year prior to switching, what maintenance did you perform on equipment at your plant? **Leaking door, gasket, had to take doors out and put gasket back. Every month, I had to fix something and buy parts.**
7. Since switching to wet cleaning, how much maintenance have you had to perform on equipment at your plant? The machines are brand new. I haven’t had to fix them yet.

8. Did you ever have to make any major repairs to your dry cleaning Machine? Door gasket that resulted in leakage.

9. What were your average yearly disposal costs? $1,900.

10. Who was your waste hauler (contact info)? Technicam (800-652-5455), in Emeryville.

11. What fees were you required to pay as a dry cleaner, and to whom?
   1. Hazardous Waste -- $1,900 (w/filter removal)
   2. City of Sunnyvale Waste Disposal Fee -- $500.00
   3. BAAQMD Operating Fee: $300.00
   4. CARB Training Renewal - $75.00 per two years or $35.00 per year

12. Utility Providers: City of Sunnyvale (water); Pacific Gas & Electric

15. How often do you buy detergents? How much in dry cleaning? How much in wet cleaning?
   Dry Cleaning: One 25 gallon pail - $185.00 (lasts three months) x 4 times per year = $740.00 + $200 drum Custom Care = $940.00
   Wet Cleaning: $180 x 3 = $540.00 per month.

16. How much do you buy each time?
   Detergent: $740.00
   Conditioner: $200.00
   Liquid Tide for spotting: $20/month

15. How much perc/solvent did you buy each time? How often did you buy them?
   $400 drum four times per year or $1600 per year.
Resource Data

<table>
<thead>
<tr>
<th>Delight Cleaners</th>
<th>Water Billing Records Billing Records</th>
<th>City of Sunnyvale Water District</th>
<th>Consumption (HCF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/07-4/07</td>
<td></td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>4/07-6/07</td>
<td></td>
<td></td>
<td>49</td>
</tr>
<tr>
<td>6/07-8/07</td>
<td></td>
<td></td>
<td>49</td>
</tr>
<tr>
<td>10/07-12/07</td>
<td></td>
<td></td>
<td>51</td>
</tr>
</tbody>
</table>
Delight Cleaners: Electricity and Natural Gas Use – Pacific Gas and Electric

<table>
<thead>
<tr>
<th>Read Date</th>
<th>Days</th>
<th>Therms Delivered</th>
<th>KWH</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/2/05</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1/3/06</td>
<td>32</td>
<td>809</td>
<td>2,583</td>
</tr>
<tr>
<td>2/2/06</td>
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<tr>
<td>3/3/06</td>
<td>29</td>
<td>763</td>
<td>2,291</td>
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<td>31</td>
<td>839</td>
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<tr>
<td>1/2/07</td>
<td>32</td>
<td>660</td>
<td>2,239</td>
</tr>
<tr>
<td>1/31/07</td>
<td>29</td>
<td>685</td>
<td>2,687</td>
</tr>
<tr>
<td>3/2/07</td>
<td>30</td>
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<tr>
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<td>31</td>
<td>696</td>
<td>2,634</td>
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<tr>
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<td>722</td>
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<td>10/1/07</td>
<td>32</td>
<td>759</td>
<td>2,527</td>
</tr>
<tr>
<td>10/30/07</td>
<td>29</td>
<td>745</td>
<td>2,193</td>
</tr>
<tr>
<td>11/30/07</td>
<td>31</td>
<td>776</td>
<td>2,264</td>
</tr>
</tbody>
</table>
Appendix L - Sunny Fresh Cleaners
(La Jolla, CA)
1 Background

SunnyFresh Cleaners of La Jolla, California is owned and operated by Hwa Lee, a first generation Korean immigrant. Mr. Lee became a dry cleaner six years before switching to professional wet cleaning. Mr. Lee owns two cleaners — one in La Jolla and one in Scripps Ranch, five miles to the east.

Mr. Lee heard about wet cleaning through an announcement in the regional trade process and attended a workshop in professional wet cleaning in 2006. After this workshop, Mr. Lee visited a number of professional wet cleaning businesses and made the decision to switch out his La Jolla cleaners.

In the Fall 2006, Mr. Lee installed professional wet cleaning equipment and operating this along with his perc dry cleaning machines until January 2007, when he removed the dry cleaning machine. Mr. Lee received training immediately after installing his professional wet cleaning machine and received two follow-up training sessions.

2. Transition Process Evaluation

Mr. Lee was not particularly concerned about making to transition to professional wet cleaning and thought the switch would be “not too difficult.” His main concern was shrinkage.

The installation process was completed November 2006 and the perc dry cleaning machine was removed in January 2007. Mr. Lee came to Los Angeles in October 2006 to train with his instructor before his equipment was installed. After on-site training was
completed, Mr. Lee received two follow-up training sessions after the perc machine was removed.

Mr. Lee found learning a new cleaning process and making the transition to professional wet cleaning to be “not at all difficult.” The biggest difficulty learning to process sweaters for which he needed the additional follow-up training.

3. Performance Analysis

Approximately 350-400 garments are professionally wet cleaned per day at SunnyFresh Cleaners, including a full range of delicate garment types. In addition, 200 pieces per day of shirt laundry are sent out cleaning.

Mr. Lee rates the overall quality of his cleaning service as a wet cleaner to be the same as or much better than the quality of his cleaning service as a dry cleaner because the colors are cleaner and there is no smell. The percentage of garments Mr. Lee successfully processed as a wet cleaner was comparable to the percentage of garments that were successfully processed when operating as a dry cleaner.

### Problem Garment Analysis

**Garments Returned:** As a dry cleaner, an average of 2 to 3 garments ever month were returned, usually because problems with stain removal. As a wet cleaner, 2 to 3 garments were returned primarily due to grease stain removal problems.

**Garments Sent Out:** As a dry cleaner, Mr. Lee sent out garments 2-3 times a week – all leather and all rugs. As a wet cleaner, Sunny Fresh sends out, on average, 5 garment per week -- large rugs (small rugs are done on site) and same lamb wool, certain silks that shrink and heavy oil stains pieces. Mr. Lee noted that it was easy for him to send out because he owned a perc dry cleaning machine store close by.

**Claims:** As a dry cleaner, Mr. Rios paid an average of one two claims per year. Mr. Lee had 25 claims in the year since switching to professional wet cleaning. All but one of these claims was for sweater. Mr. Lee attributes this to a lack of training in processing sweaters. After receiving training, he only had one claim.

**Overall Success Rate:** Since switching to wet cleaning, Mr. Rios has successfully wet cleaned over 99% of garments brought in by customers, a rate comparable to a success rate as a dry cleaner.

<table>
<thead>
<tr>
<th>Problem Garments</th>
<th>Dry Cleaning</th>
<th>Wet Cleaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sent Out</td>
<td>0.114%</td>
<td>0.226%</td>
</tr>
<tr>
<td>Returned</td>
<td>0.026%</td>
<td>0.026%</td>
</tr>
<tr>
<td>Claims</td>
<td>0.002%</td>
<td>0.021%</td>
</tr>
<tr>
<td>Overall Success Rate</td>
<td><strong>99.855%</strong></td>
<td><strong>99.726%</strong></td>
</tr>
</tbody>
</table>
4. **Customer Response to Wet Cleaning**

Mr. Lee has not actively informed his customers about his use of professional wet cleaning. He said that 10% of his customers were aware of the switch because of a lack of odor, which the customers perceived as a good thing.

Mr. Lee believes he has lost 5-6 customers because of his switch to wet cleaning due to his initial problems with sweaters. One customer was lost due to a problem with color fading.

5. **Financial Impact**

Mr. Lee’s overall process-dependent costs have dropped since switching to professional wet cleaning. Costs related to PCE solvent, hazardous waste, equipment, maintenance, and energy consumption have all been lowered or eliminated entirely. Labor costs have not changed, and the only increased costs have been for and detergent.

**PCE and Hazardous Waste:** As a dry cleaner Mr. Lee faced a number of costs associated with the use of PCE solvent and the hazardous waste and air emissions it produces. He purchased 120 gallons of perc per year for $2,400, and estimated that he spent $1,400 disposing of the hazardous waste he produced every year. Additionally, Mr. Lee was required by law to pay fees and purchase permits from regulatory agencies because of the on site storage and production of hazardous waste and the emission of hazardous air pollutants. These permits and fees totaled to $890 per year.

**Equipment and Maintenance Costs:** The total list price of the equipment purchased by Mr. Lee in order to switch to professional wet cleaning totaled to $75,000. This included a 50 lb wet clean washer, a 50 lb wet clean dryer, a tensioning pants topper, and a tensioning for finisher. If Mr. Lee had purchased a new PCE dry cleaning machines instead of the professional wet cleaning equipment, the estimated cost was $50,000. While the capital equipment cost were estimated to be higher for wet cleaning, the life expectancy of professional wet cleaning equipment was estimated to be 20 years compared to a maximum of 15 years for dry cleaning machines. Maintenance costs are also lower in wet cleaning. The wet clean equipment is simpler mechanically, and the potential for breakdowns as well as the cost of repairs is significantly reduced.

**Resource Use:** Based on months were volume of garments were comparable, November 2006 and April 2007, both electricity and natural gas use were substantially lower in professional wet cleaning compared to dry cleaning. Water use was not measured due to the fact that the cleaner did not pay for their water use.

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72 CARB, December 2006, ISOR.
7. **Owner Satisfaction Evaluation**

Mr. Lee believes the decision to switch to wet cleaning was a good business decision, would make the same decision over again, and would strongly recommend the process to a fellow cleaners. He emphasized easier spotting and positive customer satisfaction, or a lack of customer dissatisfaction, as the biggest benefits to professional wet cleaning.

Mr. Lee rated his level of satisfaction as a wet cleaner to be much higher compared to when he was a dry cleaner. Regarding acute health effects, as a dry cleaner he and his employees experienced dizziness, nausea, and headaches which he attributed to PCE exposure. After switching to professional wet cleaning these adverse health effects went away.
SunnyFresh Cleaners Case Study: Key to Figures

10. Garment Volume

Garment volume figures are based on conversations and interviews with the cleaner, Mr. Lee. An average of 350-400 garments per day were wet cleaned per day which was comparable to when the cleaner was using PCE.

Calculation of volume figures
- Days of operation: 6 days per week (Monday – Saturday)
- Average volume professionally cleaned per day: 375 garments
- Average volume professionally cleaned per month: 375 garments * 6 days per week * 4.3 weeks per month = 9,675 garments per month.
- Average yearly volume = 116,100 per year.

11. Performance Calculations

In determining the return, sent out, claims, and overall success rates, only the volume of professionally wet cleaned garments is used in the calculation – laundered garments are excluded from these calculations. The values used to calculate these rates are based on responses to interview questions by Mr. Lee,74 and the volume figures calculated above.

Return Rate

Returned garments are those that are brought back to the shop by customers for additional work.
- Dry cleaning return rate: 2.5 return / 9,675 professionally cleaned garments per month = 0.026%
- Wet cleaning return rate: 2.5 returns / 9,675 professionally cleaned garments per year = 0.026%.

Sent Out

Sent out garments are those that the cleaner sends to another facility because he or she doesn’t feel comfortable processing them in-house. As a dry cleaner, Mr. Lee sent out all leather and all rugs. As a wet clean, he processes small rug but send out leather, large rugs, certain lamb wool garments, certain silk garments, and heavy oil stained garments.
- Dry cleaning send out rate: 2-3/week = 2.5*4.3 weeks/month = 11 per month. 11 per month/9,675 professionally cleaned garments = 0.114%.
- Wet cleaning send out rate: 5/week = 5*4.3 weeks/month = 22 per month. 22 per month/9,675 professionally cleaned garments = 0.227%.

74 Interview 1/19/08.
Claims Rate

Claims (including store credit) result from garments being damaged by the cleaner to the extent that the cleaner offers the customer reimbursement or store credit. As a dry cleaner, Mr. Lee paid an average of 1-2 claims per year. Usually this was from problems with dye bleeding. In his first nine months in operation as a wet cleaner Mr. Lee paid 25 claims, almost all due to wool sweater shrinkage – most of these were in the first few months. Sweater shrinkage was due to the operator putting sweaters in the dryer. Standard practice in wet cleaning is to hang dry sweaters after they have been washed. SunnyFresh Cleaners finally changed to hanging sweaters. In the 3+ months prior to the interview, Mr. Lee only paid one claim
- Dry cleaning claims rate: 2 claims / 116,100 garments = 0.002%
- Wet cleaning claims rate: 26 claims / (9,675 garments/month*13 months) = 0.021%

Overall Success Rate

The overall success rate is calculated by subtracting the return, send-out, and claims rates from 100%. The overall success rate of professional wet cleaning was greater than that of professional dry cleaning at Bob’s Cleaners.
- Dry Cleaning success rate: 100% - [0.026% returned + 0.114% sent out + 0.002% claims] = 99.858%
- Wet Cleaning success rate: 100% - [0.026% returned + 0.227% sent out + 0.021% claimed] = 99.726%

12. Financial Calculations for SunnyFresh Cleaners

The financial figures calculated in this section are only those considered to be process dependent. Aspects of operations not affected by the switch from PCE dry cleaning to professionally wet cleaning (e.g. rent and advertising) are not considered. All cost figures are put into terms of “dollars per month”.

Water

SunnyFresh does not pay for water use.

Electricity

Consumption and price

Electricity use was based on billing records at the plant for months where the volume of garments cleaned were comparable – November 2006 and April 2007.
<table>
<thead>
<tr>
<th>Process</th>
<th>Date</th>
<th>Billing Record Use</th>
<th>Cost (at $0.15 per kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Cleaning</td>
<td>November 2006</td>
<td>4,280 kWh</td>
<td>$642.00</td>
</tr>
<tr>
<td>Wet Cleaning</td>
<td>April 2007</td>
<td>2,160 kWh</td>
<td>$324.00</td>
</tr>
</tbody>
</table>

**Natural Gas Consumption**

Natural gas use was based on billing records at the plant for months where the volume of garments cleaned were comparable – November 2006 and April 2007.

<table>
<thead>
<tr>
<th>Process</th>
<th>Date</th>
<th>Billing Record Use</th>
<th>Cost (at $1 per therm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Cleaning</td>
<td>November 2006</td>
<td>774 therms</td>
<td>$774</td>
</tr>
<tr>
<td>Wet Cleaning</td>
<td>April 2007</td>
<td>605 therms</td>
<td>$605</td>
</tr>
</tbody>
</table>

**Labor**

Mr. Lee reported that he and his employees work about the same amount of time as they did before the switch to wet cleaning.

**Solvent**

**Dry Clean:** Mr. Lee estimated that he used 120 gallons of perchloroethylene dry cleaning solvent during the year he was a perc dry cleaner at a cost of $20.00 a gallon.
- Annual Cost: $2,400
- Monthly Cost: $200

**Wet Clean:** Water is used as a solvent in wet cleaning.

**Detergent**

**Dry Clean:** As a dry cleaner, Mr. Lee ordered 20 gallons of detergent once a year at $8 per gallon.
- Monthly cost: $13.00

**Wet Clean:** Mr. Lee reported purchasing a container of detergent and a container of conditioner each month at a cost of $150 per container.
- Monthly cost: $300

**Filter Cost**

**Dry Clean:** Mr. Lee replaced 16 filters a year at a cost of $30 each.
- Annual Cost: $30 * 16 filters = $480
- Monthly cost: $40.00

**Wet Clean:** No filters are used in professional wet cleaning.

### Hazardous Waste Disposal

**Dry Clean:** Mr. Lee stated that he paid $350 every three months in disposal costs.

- Annual cost: $1,400
- Monthly cost: $116.67

**Wet Clean:** No hazardous waste costs are associated with professional wet cleaning.

### Regulatory Fees

**Dry Clean:** Mr. Lee paid the following annual regulatory fees:

<table>
<thead>
<tr>
<th>Regulation</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous Waste</td>
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<tr>
<td>SD APCD Operating Fee</td>
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</tr>
<tr>
<td>CARB Training Renewal</td>
<td>$90.00</td>
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</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Annual Cost</td>
<td>$890.00</td>
</tr>
<tr>
<td>Monthly Cost</td>
<td>$74.16</td>
</tr>
</tbody>
</table>

**Wet Clean:** Mr. Lee is not subject to any environmental permits or fees associated with the use of professional wet cleaning.

### Equipment Costs

**Dry Cleaning**

Mr. Lee’s dry clean machine was five years old when he purchased SunnyFresh Cleaners in La Jolla in 2006. As a condition for lease renewal, the landlord required Mr. Lee to replace the PCE dry clean machine with a non-toxic alternatives. If Mr. Lee had replaced his old PCE machine with a new PCE machine, a comparably sized PCE dry clean machine cost would have cost $50,000. For the purpose of this analysis, a life span of 15 years is assumed for the PCE dry cleaning machine, which is based on longest expected lifespan estimates for a dry clean machine.

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75 CARB ISOR, January 2007.
76 Pollution Prevention in the Garment Care Industry  Pollution Prevention Education and Research Center (PPERC), UCLA, 1997.
Capital Recovery Factor \[ = \frac{R}{1 - (1+R)^{-T}} = \frac{0.04}{1 - (0.04)^{-15}} = 0.09 \]

Where:
- \( R = \text{Interest rate} \)
- \( T = \text{Period of time equipment is used} \)

Annual Capital Recovery Charge \[ = (PP - SV) \times CRF - (SV \times R) \]
\[ = \[(50,000 - 0) \times 0.09\] + (0 \times 0.04) \]
\[ = \$4,500 \]

Where:
- \( PP = \text{Purchase price} \)
- \( SV = \text{Salvage value} \)
- \( CRF = \text{Capital recovery factor} \)
- \( R = \text{Interest rate} \)
- Annual equipment cost: $4,500
- Monthly equipment cost: $375

**Wet Cleaning**

The list price for the wet clean system (washer and dryer), including the steel base for the washer and the detergent pump system totaled $75,000. Pants and jacket toppers were included as part of this list price. A life span of 20 years is assumed for the wet clean equipment based on discussions with a distributor of the equipment.  

Capital Recovery Factor \[ = \frac{R}{1 - (1+R)^{-T}} = \frac{0.04}{1 - (0.04)^{-20}} = 0.07 \]

Where:
- \( R = \text{Interest rate} \)
- \( T = \text{Period of time equipment is used} \)

Annual Capital Recovery Charge \[ = (PP - SV) \times CRF + (SV \times R) \]
\[ = \[(75,000 - 0) \times 0.07\] + (0 \times 0.04) \]
\[ = \$5,250 \]

Where:
- \( PP = \text{Purchase price} \)
- \( SV = \text{Salvage value} \)

---

77 *Pollution Prevention in the Garment Care Industry.*
CRF = Capital recovery factor  
R = Interest rate

- Annual equipment cost: $5,250  
- Monthly equipment cost: $438

**Machine Maintenance

Dry Clean**

Based on the low range industry estimates, a dry cleaner can expect to spend 1.76% of revenue on maintenance, with 50% of that going towards the maintenance of the dry clean machine.\(^{78}\) Assuming an annual volume of 116,100 garments at Bob’s Cleaners (based on a daily volume of 375 garments) and average revenue of $3.50 per garment, annual revenue would be approximately $406,350. Annual maintenance costs for the dry clean machine would be \((1.76\% \times 406,350) \times 50\% = 3,575.88\).  
- Annual maintenance cost: $3,575.88.  
- Monthly maintenance cost: $297.99

**Wet Clean**

Expected maintenance of the professional wet clean washer and dryer system over its lifetime were estimated at $5,690.\(^{79}\) It is assumed that a wet clean system will last for 20 years,\(^{80}\) so these costs are amortized over that time period.  
- Annual maintenance cost: $284.5  
- Monthly maintenance cost: $23.71

**Summary of Costs**

**Sunny Fresh Cleaners Process Dependent Costs per Month**

<table>
<thead>
<tr>
<th></th>
<th>Dry Clean</th>
<th>Wet Clean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor(^{81})</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Solvent</td>
<td>$200.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Detergent</td>
<td>$13.00</td>
<td>$300.00</td>
</tr>
<tr>
<td>Electricity</td>
<td>$178.22</td>
<td>$164.50</td>
</tr>
<tr>
<td>Gas</td>
<td>$487.70</td>
<td>$352.74</td>
</tr>
<tr>
<td>Filter cost</td>
<td>$40.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Hazardous waste disposal</td>
<td>$116.67</td>
<td>$0.00</td>
</tr>
<tr>
<td>Machine Maintenance.</td>
<td>$298.00</td>
<td>$23.71</td>
</tr>
<tr>
<td>Regulatory fees</td>
<td>$74.16</td>
<td>$0.00</td>
</tr>
<tr>
<td>Equipment</td>
<td>$375</td>
<td>$439</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>$1,782.75</td>
<td>$1,279.95</td>
</tr>
</tbody>
</table>

\(^{78}\) Pollution Prevention in the Garment Care Industry.  
\(^{79}\) Pollution Prevention in the Garment Care Industry.  
\(^{80}\) See Equipment Cost section above for discussion of expected life span of wet clean equipment.  
\(^{81}\) Mr. Lee stated that his overall volume was comparable to when he was dry cleaning and his labor cost had not changed.
Structured Interview 1

WET CLEAN SURVEY

Cleaner: SunnyFresh Cleaners
Date: 1/19/08

Shop and Cleaner History

1. How long have you been a cleaner? 7 years
2. How long have you owned your current shop? 1 year
3. How many regular customers do you have? 800
4. What was your experience cleaning before owning this shop? 6 years
5. What motivated your decision to switch to professional wet cleaning?
   A. Site visits to demonstration sites
   B. Energy savings
   C. Recommended by regulatory agencies
   D. Easy

Performance Questions

1. Have you notified customers of your switch to professional wet cleaning? No
   Tell some customers it is organic. When?

   Why not? Would like some sort of certification for wet cleaning from the government. In dry cleaning, there is a certification program.

2. What % of your customers do you think are aware of your switch to another cleaning process for delicate garments labeled dry clean or dry clean only? 10%

3. How do you think they became aware of your switch?
   A. Some customers say can’t smell chemical.
   B. Color clearer

4. Why are some of your customers not aware of your switch?
5. Of the customers that are aware, what percentage responded: 

Positively 100%  Negatively  Don’t Care

6. Have you lost any customers because of your switch to wet cleaning?

How many? 5-6

What %?

Why? 4: Sweater shrinkage. 1: color loss

7. Have you gained any customers because of your switch to wet cleaning?

No. In the area there is a lot of change in customers because there is a high turnover of renters and 30% of our customers are business people and students.

How many?

What %?

8. What is your current volume of garments cleaned per day? 350-400 per day + 200 shirt laundry. 375 was used as the average for the purpose of this study.

Has your volume changed since your switch? No. Given the that economy is not good, we are happy about this.

9. When you were dry cleaning, how often did customers bring garments back because of problems with the quality of cleaning? 2-3/month

Why? Stain removal. This has to do with technical skill of the spotter.


Why? Grease stains.

11. Would you attribute any re-dos to the wet cleaning process?

12. When you were dry cleaning, approximately how often did you pay claims or give store credit to customers? 1-2/yr.

Why: Color change.
13. Currently, approximately how often do you pay claims or give store credit to customers?

- 9/07-1/08 = 1 claim.  
  | Sweater.  

- 12/06-8/07 = 25.  
  | Sweater shrinkage (All 100% lamb wool + 1 jacket shrinkage.  Hadn’t learned proper technique for processing sweaters.

Reasons:

14. Would you attribute any claims to the wet cleaning process?  Reasons:

15. Has the rate changed since you first switched?

16. When you were dry cleaning, how often did you send out garments.  (including leather)?

  2-3/week – leather and rugs (large and small)

<table>
<thead>
<tr>
<th>Garments</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. Currently, how often do you send out garments (including leather)?

  1 per day – leather, large rugs, lamb wool and certain silk, heavy oil stains.

<table>
<thead>
<tr>
<th>Garments</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18. Overall, How would you rate the quality of your cleaning service as a wet cleaner in comparison to the quality of your cleaning service when you were a dry cleaner?
Wet cleaning much better because color is cleaner and no smell.

19. Overall, how do you rate your customers’ level of satisfaction compared to when you were dry cleaning?

- Much lower
- Lower
- Equal
- **Higher  Only 10% know.**
- Much higher

20. On average, how many garments did you spot per day in dry cleaning?

200/day. **Pre-spot all light color. Dark color search by eye.**

21. How many garments are you spotting per day in wet cleaning?

200/day. **Pre-spot all light color. Dark color search by eye.**

22. For spot removal, is it more or less difficult in wet cleaning vs. dry cleaning?

Easier to wet cleaning. In dry cleaning 5-6 chemicals used and need removal call chemical from item before putting into machine. In wet cleaning, usually only 1, and at most 3, chemicals used and don’t need to remove all chemicals before washing.

23. Overall, do you spend more or less time in spot removal since switching to professional wet cleaning?

20% less time in wet cleaning.

**Transition and Training**

1. Before you switched, what concerns did you have about switching to professional wet cleaning? (list and rank)

   **Shrinkage.**

2. How difficult did you think would it be to make the switch to professional wet cleaning?

   - **not at all difficult**
   - not too difficult
   - Why?: 25% was already wet cleaning.
   - somewhat difficult
   - very difficult
3. How difficult do you think it actually was to switch to professional wet cleaning?
   - not at all difficult
   - not too difficult - because the training was good
   - somewhat difficult
   - very difficult

4. What were the biggest difficulties in making the switch to wet cleaning? (list and rank).

   Sweater. Needed additional training. Now, hang dry sweaters after wash.

5. Did you have concerns about having to learn a new cleaning process? None

6. How difficult would say it was to learn to do wet cleaning?
   - not at all difficult
   - not too difficult
   - somewhat difficult
   - very difficult

7. **How important would you say the training was to making a successful transition to wet cleaning?**
   - not at all important
   - not too important
   - somewhat important
   - very important

   Why: (1) Divide fabric items (2) correct temperature on fabric (3) king of spotting techniques.

8. Would you have liked the training to be different in any way? Yes
   How so? Learned to be sweaters at initial training.

9. Was there anything that could have made your training easier?

10. Since switching to wet cleaning, have you contacted any of the following people to discuss issues related to the cleaning process?

    - Chemical supplier
    - Program Trainer
    - Other wet cleaners
    - Other dry cleaners
    - Equipment manufacturer/distributor --
Owner Satisfaction

1. Do you feel your decision to switch to wet cleaning was a good business decision?

   Yes

2. Given the opportunity, would you make the same decision to do wet cleaning over again?

   Yes

3. How strongly would you recommend wet cleaning to another cleaner who needed to replace their dry cleaning machine?
   - not recommend
   - recommend
   - strongly recommend

   Why?:
   o Easier to spot
   o High customer satisfaction

4. How would you rate your level of satisfaction as a wet cleaner in comparison to when you were a dry cleaner?
   - much lower
   - lower
   - equal
   - higher
   - much higher

   Why?
   o Easier to spot
   o High customer satisfaction

5. When you were dry cleaning, did you experience any of the following conditions?
   - dizziness
   - nausea
   - headache
   - fatigue
   - runny nose
- Chronic illness:____________________

6. When you were dry cleaning, did any of your employees experience any of the following conditions?
   - dizziness
   - nausea
   - headache
   - fatigue
   - runny nose
   - Chronic illness:____________________

7. Since your switch to wet cleaning have you experienced any of the following conditions?
   - Dizziness
   - nausea
   - headache
   - fatigue
   - runny nose
   - Chronic illness:____________________

Financial

1. Has there been any change in the number hours worked by your employees since switching to wet cleaning?  *Spotter, five pressers, and one counter person arrive and leave at same time – they take the same van.*

<table>
<thead>
<tr>
<th>Employee</th>
<th>Job</th>
<th>Hours/day</th>
<th>Hours/week</th>
<th>Any Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>Counter</td>
<td>40</td>
<td>Same</td>
<td></td>
</tr>
<tr>
<td>Spotter</td>
<td>Spotter</td>
<td>7 am-3 pm</td>
<td>40</td>
<td>Same</td>
</tr>
<tr>
<td>Counter</td>
<td>Counter</td>
<td>7 am-3 pm</td>
<td>40</td>
<td>Same</td>
</tr>
<tr>
<td>Counter</td>
<td>Counter</td>
<td>1 pm-7 pm</td>
<td>30</td>
<td>Same</td>
</tr>
<tr>
<td>Pressing</td>
<td>Pressing</td>
<td>7 am-3 pm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressing</td>
<td>Pressing</td>
<td>7 am-3 pm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressing</td>
<td>Pressing</td>
<td>7 am-3 pm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Describe how you were processing a garment when you were dry cleaning.  *Put all garments in dry clean machine.  Went in and came out dry.*

3. Describe how you are processing a garment now.  *Take out garments when they are a little wet.  Some things don’t put in dryer – sweater.  Some silk, only dry a little bit in dryer.*

4. What % of your garments are same day service?  *All.*
5. Compared to when you were dry cleaning, do you feel that you and/or your employees now have to put more or less effort into running your shop? For 10-15% of items, pressing more difficult in wet cleaning because of wrinkling – must make sure items completely dry or it will wrinkle back. And items with pleats – need to put back in with wet cleaning.

6. In the year prior to switching, what maintenance did you perform on equipment at your plant?
   - Water cooler
   - PCE chiller
   - PCE sludge

   → Mechanic 6-7 times a year. Average cost -- $200 per visit. $1,300 per year.

7. Since switching to wet cleaning, how much maintenance have you had to perform on equipment at your plant? None.

8. Did you ever have to make any major repairs to your dry cleaning Machine? Machine door didn’t open and PCE leaks from machine.

9. What were your average yearly disposal costs?
   - 4 times per year at $350 per visit -- $1,400 per year.

10. Who was your waste hauler (contact info)?

11. What fees were you required to pay as a dry cleaner, and to whom?
    - 4. San Diego Air Pollution Contol -- $400.00
    - 5. Hazardous waste -- $400
    - 6. CARB Training Renewal -- $180/2 years or $90 year

12. Utility providers
    - SDG&E for gas and electricity. Water paid by landlord.

13. How often do you buy detergents?
    - Wet cleaning: Once per month
    - Dry cleaning: Twice a year

14. How much do you buy each time?
    - Wet cleaning: $150 detergent, $150 conditioner.
    - Dry cleaning: 20 gallons @ $8 per gallon.

15. How much perc solvent did you buy each year?
    - 2 time a year at 60 gallons each time. $20 per gallon. $2,400 per year.
Appendix M - Nancy’s Cleaners
(Alpine, CA)
Nancy’s Cleaners Case Study

Nancy’s Cleaners
8849 Villa La Jolla Drive, La Jolla, CA 92037

Owner: Ri Van Lam
Switch Date: May 2007

<table>
<thead>
<tr>
<th>Wet Clean Washer</th>
<th>Maytag, 60 lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet Clean Dryer</td>
<td>American Dryer, 75 lb</td>
</tr>
<tr>
<td>Tensioning Pants Topper</td>
<td>Hi-Steam</td>
</tr>
<tr>
<td>Tensioning Shirt Finisher</td>
<td>Hi-Steam</td>
</tr>
<tr>
<td>Detergent</td>
<td>Megs</td>
</tr>
<tr>
<td>Daily Volume</td>
<td>275 garments</td>
</tr>
<tr>
<td>Staff</td>
<td>1 operator (owner)</td>
</tr>
<tr>
<td></td>
<td>2 counter</td>
</tr>
<tr>
<td></td>
<td>2 pressers</td>
</tr>
</tbody>
</table>

1 Background

Nancy’s Cleaners in Alpine, California is owned and operated by Ri Van Lam, a first generation immigrant from Viet Nam. Mr. Lam became a dry cleaner twenty years ago, working for another cleaner for one year before purchasing current shop. Mr. Lam needed to replace is old PCE dry cleaning machine. He attend the March 2007 demonstration workshop on professional wet cleaning at SunnyFresh Cleaners. In April 2007 he attended a regional trade show and later visited a wet clean distributor in Los Angeles.

At the end of May 2007, Mr. Lam’s dry cleaning equipment was removed from his facility. Professional wet cleaning equipment was installed at Nancy’s on May 5, and on-site technical training was completed May 6, 2007. Mr. Lam began processing all of his customers’ garments in the professional wet cleaning system the day after he completed his training.

2. Transition Process Evaluation

Mr. Lam was concerned about shrinkage while making the transition to professional wet cleaning, but expected the transition would be “not too difficult.”

Prior to making the switch to professional wet cleaning, Mr. Lam as well as his two pressers completed a full day training session at the trainer’s facility in Los Angeles. After on-site training was completed the day after wet cleaning equipment was installed, Mr. Lam received a follow up training as well as telephone consultation.

Mr. Lam found learning a new cleaning process and making the transition to professional wet cleaning to be “not at all difficult,” primarily because the training he
received was so good. The biggest difficulty was learning to properly sort garments. Mr. Lam believes the training was extremely important in his success as a wet cleaner and that there was nothing that could have been done to make his training easier.

3. Performance Analysis

Approximately 275 garments are professionally cleaned per day at Nancy’s Cleaners, including a full range of delicate garment types. Business has increased approximately 5% since switching – up from 260 garments per day.

Mr. Lam rates the overall quality of his cleaning service as a wet cleaner to be much better than the quality of his cleaning service as a dry cleaners, stating that the garments are cleaner and fresher since and switch.

Problem Garment Analysis

Performance Evaluation: Nancy’s Cleaners

<table>
<thead>
<tr>
<th>Problem Garments</th>
<th>Dry Cleaning</th>
<th>Wet Cleaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sent Out</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Returned</td>
<td>0.009%</td>
<td>0.001%</td>
</tr>
<tr>
<td>Claims</td>
<td>0.002%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Overall Success Rate</td>
<td>99.989%</td>
<td>99.999%</td>
</tr>
</tbody>
</table>

Garments Returned: As a dry cleaner, an average of one garment every two months was returned, usually because of spot removal problems. As a wet cleaner, only two garments have been returned due to problems with pressing.

Garments Sent Out: Nancy’s Cleaners does not do leather cleaning and rejects these garments.

Claims: As a dry cleaner, Nancy’s Cleaners would pay claims approximately twice a year due to problems with stain removal – they spotting chemicals would take out the color. As a wet cleaner, Nancy’s had not paid a claim in the 8 months since they switched.

Overall Success Rate: Since switching to wet cleaning, Mr. Lam has successfully wet cleaned 99.999% of garments brought in by customers, a rate comparable to a success rate of 99.989% as a dry cleaner.

4. Customer Response to Wet Cleaning

Mr. Lam has actively informed his customers about his use of professional wet cleaning. Mr. Lam estimates that about 90% of his customers are aware of the use of wet cleaning, with 75% responding positively and 25% not caring one way are another.

Mr. Lam does not believe he has lost any customers because of his switch to wet cleaning and has experienced a 5% increase in business which he attributes to his switch.
5. Financial Impact

Mr. Lam’s overall process-dependent costs have dropped since switching to professional wet cleaning. Costs related to PCE solvent, hazardous waste, equipment, maintenance, labor, and energy consumption have all been lowered or eliminated entirely. Only increased costs have been for detergent.

### Process Dependent Costs per Month at Nancy’s Cleaners

<table>
<thead>
<tr>
<th></th>
<th>Dry Clean</th>
<th>Wet Clean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual Labor</td>
<td>$354.78</td>
<td>$0.00</td>
</tr>
<tr>
<td>Solvent</td>
<td>$65.63</td>
<td>$0.00</td>
</tr>
<tr>
<td>Detergent</td>
<td>$50.40</td>
<td>$62.50</td>
</tr>
<tr>
<td>Electricity</td>
<td>$58.71</td>
<td>$42.77</td>
</tr>
<tr>
<td>Gas</td>
<td>$365</td>
<td>$372.74</td>
</tr>
<tr>
<td>Hazardous waste disposal</td>
<td>$35.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Regulatory fees</td>
<td>$91.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Machine Maintenance</td>
<td>$172.00</td>
<td>$83.00</td>
</tr>
<tr>
<td>Equipment</td>
<td>$375.00</td>
<td>$193.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$1,567.52</strong></td>
<td><strong>$754.01</strong></td>
</tr>
</tbody>
</table>

**PCE and Hazardous Waste:** As a dry cleaner Mr. Lam faced a number of costs associated with the use of PCE solvent and the hazardous waste and air emissions it produces. He purchased 50 gallons of perc per year for $750, and estimated that he spent $400 disposing of the hazardous waste he produced every year. Additionally, Mr. Lam was required by law to pay fees and purchase permits from regulatory agencies because of the on site storage and production of hazardous waste and the emission of hazardous air pollutants. These permits and fees totaled to $1,100 in costs per year.

**Equipment and Maintenance Costs:** The total list price of the equipment purchased by Mr. Lam in order to switch to professional wet cleaning totaled to $33,000. This included a 60 lb wet clean washer, a 75 lb wet clean dryer, a tensioning pants topper, and a tensioning for finisher. If Mr. Lam had replaced his old perc machine with a new perc machine, was estimated to cost $50,000. The cost of the dry clean machines amortized over 15 years (the useful life of the equipment) compared to 20 years for wet clean equipment. Monthly equipment cost were substantially lower in wet cleaning -- $375 vs. $193. Maintenance costs are also lower in wet cleaning. The wet clean equipment is simpler mechanically, and the potential for breakdowns as well as the cost of repairs is significantly reduced.
**Resource Use:** While electricity use was slightly higher in dry cleaning, natural gas use was slightly higher in wet cleaning. It is important to note that the dry clean machine used at Nancy’s was an all electric unit – typical dry clean machines use steam drying while create a greater natural gas demand.

**Labor:** The number of hours worked by employees at Nancy’s Cleaners has remained the same while volume at the shop increased by five percent – from 260 to 275 garments per day.

7. **Owner Satisfaction Evaluation**

Mr. Lam believes the decision to switch to wet cleaning was a good business decision, and would make the same decision over again. He stated that he was already recommended professional wet cleaning to his competitor across the street as was willing to show him the process. He rates his level of satisfaction as a wet cleaning much higher than as a dry cleaning. He lists a number of factors as contributing to this including: environmental concerns, customers liking the new smell, the employees liking the lack of smell.

Regarding acute health effects, Mr. Lam noted that both he and his employees frequently experience dizziness, headaches, and fatigue when they were a perc dry cleaning. These adverse health effects went away after switching to wet cleaning.
Nancy’s Cleaners Case Study: Key to Figures

13. Garment Volume

Garment volume figures are based on conversations and interviews with the cleaner, Mr. Lam, 1/19/2008. An average of 275 garments per day since switching to wet cleaning and 260 garments per day in dry cleaning.

Calculation of volume figures

- **Dry cleaning**
  - Days of operation: 5 days per week (Monday – Friday)
  - Average volume professionally cleaned per day: 260 garments
  - Average volume professionally cleaned per month: 260 garments * 5 days per week * 4.3 weeks per month = 5,590 garments per month.
  - Average yearly volume = 67,080 year (5,590*12)

- **Wet cleaning**
  - Days of operation: 5 days per week (Monday – Friday)
  - Average volume professionally cleaned per day: 275 garments
  - Average volume professionally cleaned per month: 275 garments * 5 days per week * 4.3 weeks per month = 5,913 garments per month.
  - Average yearly volume = 70,956

14. Performance Calculations

In determining the return, sent out, claims, and overall success rates, only the volume of professionally wet cleaned garments is used in the calculation – laundered garments are excluded from these calculations. The values used to calculate these rates are based on responses to interview questions by Mr. Lam, and the volume figures calculated above.

**Return Rate**

Returned garments are those that are brought back to the shop by customers for additional work. As a dry cleaner, an average of 1 garment per two month was returned, usually because of spot removal. As a wet cleaner, only two garments in seven month have been returned per due to pressing problems.

- Dry cleaning return rate: 0.5 return / 5,590 professionally cleaned garments per month = 0.009%

- Wet cleaning return rate: 2 returns / 47,371 professionally cleaned garments (5,913*7) = 0.004%

**Sent Out**

- The only garments sent out at Nancy’s Cleaners, either as a wet cleaner or as a dry cleaner are leather.

---

83 Interview 12/18/07
Claims Rate

Claims (including store credit) result from garments being damaged by the cleaner to the extent that the cleaner offers the customer reimbursement or store credit. As a dry cleaner, Mr. Lam paid an average of two claims per year, usually for problems with dye bleeding. In his first 17 months in operation as a wet cleaner Mr. Lam paid five claims, but said that he has had fewer claims in recent months compared to right after he switched.

- Dry cleaning claims rate: 2 claims / (67,080 garments) = 0.003%
- Wet cleaning claims rate: 0 claims / (70,956 garments) = 0.0%

Overall Success Rate

The overall success rate is calculated by subtracting the return, send-out, and claims rates from 100%. The overall success rate of professional wet cleaning was greater than that of professional dry cleaning at Nancy’s Cleaners.

- Dry Cleaning success rate: 100% - [0.009% returned + 0.00% sent out + 0.003% claims] = 99.988%.
- Wet Cleaning success rate: 100% - [0.004% returned + 0.00% sent out + 0.004% claimed] = 99.996%.

15. Financial Calculations for Nancy’s Cleaners

The financial figures calculated in this section are only those considered to be process dependent. Aspects of operations not affected by the switch from PCE dry cleaning to professionally wet cleaning (e.g. rent and advertising) are not considered. All cost figures are put into terms of “dollars per month”.

Electricity

Consumption and Cost

Consumption figures are based on San Diego Gas and Electric billing records from 15 months before (January 2006 to April 2007) and 7 months after (July 2007 to January 2008) the switch to wet cleaning. Average daily consumption was provided by SDG&E based on the total use in each billing period and the number of days per billing period. Electricity used in dry cleaning per month was adjusted up by 5% to reflect the increase in volume in professional wet cleaning.

<table>
<thead>
<tr>
<th>Process</th>
<th>Date</th>
<th>Average daily use (kWh)</th>
<th>Use per Month (kWh)</th>
<th>Adjusted Use Based on 5% increase in volume (kWh)</th>
<th>Cost ($0.15/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Cleaning</td>
<td>1/6/06 – 4/5/07</td>
<td>12.4</td>
<td>372.7</td>
<td>391.4</td>
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<td>7/5/07 – 1/7/08</td>
<td>9.5</td>
<td>285.1</td>
<td>285.1</td>
<td>$42.77</td>
</tr>
</tbody>
</table>
Natural Gas

Consumption and Cost

Consumption figures are based on San Diego Gas and Electric billing records from 15 months before (January 2006 to April 2007) and 7 months after (July 2007 to January 2008) the switch to wet cleaning. Average daily consumption was provided by SDG&E based on the total use in each billing period and the number of days per billing period. Natural gas used in dry cleaning per month was adjusted up by 5% to reflect the increase in volume in professional wet cleaning.

<table>
<thead>
<tr>
<th>Process</th>
<th>Date</th>
<th>Average daily use (Therms)</th>
<th>Use per Month (Therms)</th>
<th>Adjusted Use Based on 5% increase in volume (Therms)</th>
<th>Cost ($1.00/Therm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Cleaning</td>
<td>1/6/06 – 4/5/07</td>
<td>11.59</td>
<td>347.6</td>
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<td>Wet Cleaning</td>
<td>7/5/07 – 1/7/08</td>
<td>12.42</td>
<td>372.74</td>
<td>372.74</td>
<td>$372.74</td>
</tr>
</tbody>
</table>

Labor

Mr. Lam reported that his employees worked the same amount of time as they did before the switch to wet cleaning while his volume has increased 5% since the switch, from 260 garments per day to 275 garment per day. The cost per piece in processing garments in dry cleaning was $0.06 per piece more in dry cleaning than wet cleaning -- $1.12 vs. $1.06 per piece. (see below).

Additional labor cost in dry cleaning per month = $354.78 ($0.06*5,913 piece/month).

Cost/dry clean piece:
- 5,590 pieces per month (260 pieces/day)(5 days/week)(4.3 weeks/month)
- 783 hrs/month (182 hrs/week)(4.3 weeks/month)
- Total cost = $6,264 (783 hrs/month * $8/hr)
- Cost/piece = $1.12 ($6,264/5,590)

Cost/wet clean piece:
- 5,913 pieces per month (275 pieces/day)(5 days/week)(4.3 weeks/month)
- 783 hrs/month (182 hrs/week)(4.3 weeks/month)
- Total cost = $6,264 (783 hrs/month * $8/hr)
- Cost/piece = $1.06 ($6,264/5,913)

84 Interview 1/19/08
s translates to an additional 323 garments per month (15 garments*5 days/week*4.3 weeks/month).

**Solvent**

*Dry Clean:* Mr. Lam estimated that he used 50 gallons of perchloroethylene dry cleaning solvent during the year he was a perc dry cleaner at a cost of $15.00 a gallon.
- Annual Cost: $750
- Monthly Cost: $62.50
- Adjusted Monthly (based on 5% greater volume) = $65.63

*Wet Clean:* Water is used as a solvent in wet cleaning, the cost and consumption of which is addressed above.

**Detergent**

*Dry Clean:* As a dry cleaner, Mr. Lam reported spending $48 per month on dry cleaning detergent. Adjusted detergent cost (based on 5% greater volume) = $50.40.

*Wet Clean:* Nancy’s cleaners reported spending between $50-75 per month. Average monthly detergent cost were taken as $62.50

**3.2.1 Filter Cost**

*Dry Clean:* Mr. Lam did not use filters in his dry cleaning machine.

*Wet Clean:* No filters are used in professional wet cleaning.

**Hazardous Waste Disposal**

*Dry Clean:* Mr. Lam stated that he paid $400 one a year in disposal costs.
- Annual cost: $400
- Monthly cost: $33.33
- Adjusted Monthly (assuming 5% greater volume): $35.00

*Wet Clean:* No hazardous waste costs are associated with professional wet cleaning.

**Regulatory Fees**

*Dry Clean:* As a Bay Area Dry cleaner, Mr. Lam had to pay the following annual fees:
### Regulation Costs

<table>
<thead>
<tr>
<th>Regulation</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Hazardous Waste</td>
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<tr>
<td>SD Air Pollution Control</td>
<td>$650.00</td>
</tr>
<tr>
<td>Annual Cost</td>
<td>$1,100.00</td>
</tr>
<tr>
<td>Monthly Cost</td>
<td>$91.00</td>
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</tbody>
</table>

*Wet Clean:* Mr. Lam is not subject to any environmental permits or fees associated with the use of professional wet cleaning.

### Equipment Costs

#### Dry Cleaning

Mr. Lam’s dry clean machine was fifteen years old when he made the decision to replace it with a wet cleaning system. If Mr. Lam had replaced his old PCE machine with a new PCE machine, a comparably sized PCE dry clean machine cost would have cost $50,000. For the purpose of this analysis, a life span of 15 years is assumed for the PCE dry cleaning machine, which is based on longest expected lifespan estimates for a dry clean machine.

\[
\text{Capital Recovery Factor} = \frac{R}{1 - (1+R)^{-T}} = \frac{0.04}{1 - (1.04)^{-15}} = 0.09
\]

Where:

- **R** = Interest rate
- **T** = Period of time equipment is used

**Annual Capital Recovery Charge** = \[(PP - SV) \times CRF\] - (SV \times R)

\[
= [($50,000 - $0) \times 0.09] + ($0 \times 0.04)
\]

= **$4,500**

Where:

- **PP** = Purchase price
- **SV** = Salvage value
- **CRF** = Capital recovery factor
- **R** = Interest rate

- Annual equipment cost: $4,500
- Monthly equipment cost: $375

*Wet Cleaning*

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85 CARB ISOR, January 2007.

86 *Pollution Prevention in the Garment Care Industry* Pollution Prevention Education and Research Center (PPERC), UCLA, 1997.
The list price for the wet clean system (washer and dryer), including the steel base for the washer and the detergent pump system totaled $33,000. Pants and jacket toppers were included as part of this list price. A life span of 20 years is assumed for the wet clean equipment based on discussions with a distributor of the equipment.  

Capital Recovery Factor \[ = \frac{R}{1-(1+R)^{-T}} = \frac{0.04}{1-(1.04)^{-20}} = 0.07 \]

Where:
- \( R = \) Interest rate
- \( T = \) Period of time equipment is used

Annual Capital Recovery Charge \[ = \left( PP - SV \right) \cdot CRF + SV \cdot R \]
\[ = \left( ($33,000 - $0) \cdot 0.07 \right) + ($0 \cdot 0.07) \]
\[ = $2,310 \]

Where:
- \( PP = \) Purchase price
- \( SV = \) Salvage value
- \( CRF = \) Capital recovery factor
- \( R = \) Interest rate

- Annual equipment cost: $2,310
- Monthly equipment cost: $193

Machine Maintenance

Dry Clean

Based on the low range industry estimates, a dry cleaner can expect to spend 1.76% of revenue on maintenance, with 50% of that going towards the maintenance of the dry clean machine. Assuming an annual volume of 67,080 garments at Nancy’s Cleaners (based on a daily volume of 275 garments) and average revenue of $3.50 per garment, annual revenue would be approximately $234,780. Annual maintenance costs for the dry clean machine would be \( (1.76\% \times $234,780) \times 50\% = $2,066. \)

- Annual maintenance cost: $2,066
- Monthly maintenance cost: $172

Nancy’s Cleaners reported spending approximately $500 per year on machine repair cost, excluding ongoing machine maintenance, such as leak checking, lint cleaning, maintenance of the cooling tower.

Wet Clean

\[ ^{87} \text{Pollution Prevention in the Garment Care Industry} \]
\[ ^{88} \text{Pollution Prevention in the Garment Care Industry} \]
Expected maintenance of the professional wet clean washer and dryer system over its lifetime were estimated at $5,690.\textsuperscript{89} It is assumed that a wet clean system will last for 20 years,\textsuperscript{90} so these costs are amortized over that time period.

- Annual maintenance cost: $285
- Monthly maintenance cost: $83.

Mr. Lam stated that he had not spent any money on maintenance of his wet cleaning equipment.

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\textsuperscript{89} Pollution Prevention in the Garment Care Industry.
\textsuperscript{90} See Equipment Cost section above for discussion of expected life span of wet clean equipment.
Structured Interview 1  

WET CLEAN SURVEY  

Cleaner: Nancy’s Cleaners  
Date: 1/19/08  

Shop and Cleaner History  

1. How long have you been a cleaner? **22 years**  
2. How long have you owned your current shop? **21 year**  
3. How many regular customers do you have? **1,000**  
4. What was your experience cleaning before owning this shop? **1 year prior to owning current shop.**  
5. What motivated your decision to switch to professional wet cleaning? **__________**  
   a. Like to do work myself and don’t like working with chemicals. Wet cleaning was the best choice compared to all the other dry cleaning technologies.  

Performance Questions  

1. Have you notified customers of your switch to professional wet cleaning? **Yes.** Tell regular customers it is non-toxic and “non chemical.” When?  
2. Why not?  
3. What % of your customers do you think are aware of your switch to another cleaning process for delicate garments labeled dry clean or dry clean only? **90%**  
4. How do you think they became aware of your switch?  
5. **Told them.**  
6. Why are some of your customers not aware of your switch?  
7. Of the customers that are aware, what percentage responded .  
8. Positively **75%** Negatively ___ Don’t Care **25%**  
9. Small community. Because no bad smell, customers say it is like going to a garden.
10. Have you lost any customers because of your switch to wet cleaning? **No**

11. How many?

12. What %?

13. Why?

14. Have you gained any customers because of your switch to wet cleaning?

15. **Yes.**

16. How many?

17. What %? **5%**

18. Why: **Because no smell**

19. What is your current volume of garments cleaned per day? **Total: 275 -- 180 dry clean + 95 shirt laundry**

20. Has your volume changed since your switch? **5% higher -- 250 before and 275 now.**

21. Monthly Volume:
22. Dry cleaning = 5,375 (250*5*4.3)
23. Wet cleaning = 5,912 (275*5*4.3)

24. When you were dry cleaning, how often did customers bring garments back because of problems with the quality of cleaning? **1/2 months**

25. Why? **Spot removal problems.**

26. How often do your customers bring back garments because of problems with the quality of cleaning? **1/3 months**

27. Why? **pressing.**

28. Would you attribute any re-dos to the wet cleaning process?

29. When you were dry cleaning, approximately how often did you pay claims or give store credit to customers? **2 times year.**
30. Why: **Problems with stain removal -- took color out.**

31. Currently, approximately how often do you pay claims or give store credit to customers?

32. **None**

33. Reasons:

34. Would you attribute any claims to the wet cleaning process? Reasons:

35. Has the rate changed since you first switched?

36. When you were dry cleaning, how often did you send out garments. (including leather)?

37. **Rejected leather**

38. Garments ___________________________ Reasons ___________________________

39. ___________________________ ___________________________
40. ___________________________ ___________________________
41. ___________________________ ___________________________
42. ___________________________ ___________________________

43. Currently, how often do you send out garments (including leather)?

44. **Rejected leather**

45. Garments ___________________________ Reasons ___________________________

46. ___________________________ ___________________________
47. ___________________________ ___________________________
48. ___________________________ ___________________________
49. ___________________________ ___________________________

50. Overall, How would you rate the quality of your cleaning service as a wet cleaner in comparison to the quality of your cleaning service when you were a dry cleaner?

51. **Wet cleaning much better.**

52. **Looks fresher and cleaner – gained a lot of police officers**

53. **Smell much better.**
54. Overall, how do you rate your customers’ level of satisfaction compared to when you were dry cleaning?

55. Much lower
56. Lower
57. Equal
58. Higher Only 60% more and 40% don’t care.
59. Much higher

60. On average, how many garments did you spot per day in dry cleaning?

61. How many garments are you spotting per day in wet cleaning?

62. For spot removal, is it more or less difficult in wet cleaning vs. dry cleaning?

63. Wet cleaning much easier to spot than dry cleaning. Don’t have to wait until spotting agent is dry before washing.

64. Overall, do you spend more or less time in spot removal since switching to professional wet cleaning?

65. 50% less time. In dry cleaning: 3 hrs per day. In wet cleaning 1 ½ hrs per day.

Transition and Training

1. Before you switched, what concerns did you have about switching to professional wet cleaning? (list and rank)

2. Shrinkage.

3. How difficult did you think would it be to make the switch to professional wet cleaning?
   a. not at all difficult
   b. not too difficult
   c. somewhat difficult
   d. very difficult

   e. Why: Because before switching, learned from seminars, from a friend, distributors, internet.

4. How difficult do you think it actually was to switch to professional wet cleaning?
   a. not at all difficult
   b. not too difficult—because the training was good
   c. somewhat difficult
d. very difficult

5. What were the biggest difficulties in making the switch to wet cleaning? (list and rank).

6. Sort very carefully.

7. Did you have concerns about having to learn a new cleaning process? **None**

8. What Concerns?

9. How difficult would say it was to learn to do wet cleaning?
   a. **not at all difficult**
   b. not too difficult
   c. somewhat difficult
   d. very difficult

10. Why?: **Because if you get training beforehand it makes transition easier. Also, created own way that is easier than trainer.**

11. **How important would you say the training was to making a successful transition to wet cleaning?**
   a. not at all important
   b. not too important
   c. somewhat important
   d. very important

12. Would you have liked the training to be different in any way? **No**

13. How so?

14. Was there anything that could have made your training easier?

15. Since switching to wet cleaning, have you contacted any of the following people to discuss issues related to the cleaning process? **Yes**

16. - Chemical supplier
17. - Program Trainer
18. - Other wet cleaners
19. - Other dry cleaners
20. - Equipment manufacturer/distributor --
21. - Other____________

**Owner Satisfaction**

1. Do you feel your decision to switch to wet cleaning was a good business decision?
Yes

2. Given the opportunity, would you make the same decision to do wet cleaning over again?

   Yes

3. How strongly would you recommend wet cleaning to another cleaner who needed to replace their dry cleaning machine?
   - not recommend
   - recommend
   - strongly recommend

   Why?:
   o Recommended to competitor.

4. How would you rate your level of satisfaction as a wet cleaner in comparison to when you were a dry cleaner?
   - much lower
   - lower
   - equal
   - higher
   - much higher

   Why?
   o Environmental concerns
   o Customer like not smelling chemicals
   o Employees like not smelling chemicals
   o “Everybody happy, we happy.”

5. When you were dry cleaning, did you experience any of the following conditions?
   - dizziness
   - nausea
   - headache
   - fatigue
   - runny nose
   - Chronic illness:____________________

6. When you were dry cleaning, did any of your employees experience any of the following conditions?
   - dizziness
   - nausea
   - headache
7. Since your switch to wet cleaning have you experienced any of the following conditions?

None

- Dizziness
- nausea
- headache
- fatigue
- runny nose
- Chronic illness:____________________

Financial

1. Has there been any change in the number hours worked by your employees since switching to wet cleaning?

<table>
<thead>
<tr>
<th>Employee</th>
<th>Job</th>
<th>Hours/day</th>
<th>Hours/week</th>
<th>Any Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>Spotter</td>
<td>4</td>
<td>24</td>
<td>Same</td>
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<tr>
<td>Wife</td>
<td>Counter</td>
<td>3</td>
<td>18</td>
<td>Same</td>
</tr>
<tr>
<td>Daughter</td>
<td>Counter</td>
<td>3</td>
<td>30</td>
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<td></td>
<td>Counter</td>
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<td>Same</td>
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<tr>
<td>Pressing</td>
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<td>40</td>
<td>40</td>
<td>Same</td>
</tr>
<tr>
<td>Pressing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Describe how you were processing a garment when you were dry cleaning

3. Describe how you are processing a garment now
   - Sorting same
   - Wash – 19 minutes
   - Dry – 15 minutes
   - Hang – 5-10 minutes
   - Tensioning – 30 seconds

4. What % of your garments are same day service?
   All.

5. Compared to when you were dry cleaning, do you feel that you and/or your employees now have to put more or less effort into running your shop?
   Easier. Less spotting times. Tensioning unit gets wrinkles out in less time. Less time to get garments straight.
6. In the year prior to switching, what maintenance did you perform on equipment at your plant?
   - Required leak checking, lint cleaning, cooling tower, etc. all the time
   - $500 per year average repair cost

7. Since switching to wet cleaning, how much maintenance have you had to perform on equipment at your plant? No maintenance.

8. Did you ever have to make any major repairs to your dry cleaning machine?
   - Pump break → $1,000.

9. What were your average yearly disposal costs?
   - 1 per year. $400. Owner bypassed the filters and cooked PCE more often.

10. Who was your waste hauler (contact info)?

11. What fees were you required to pay as a dry cleaner, and to whom?
    7. San Diego Air Pollution Control -- $650.00 including training.
    8. Hazardous waste -- $450

12. Utility providers
    - SDG&E for gas and electricity. Water paid by landlord.

13. How often do you buy detergents?
    - Wet cleaning: $50-75 per month
    - Dry cleaning: $48 per month

14. How much do you buy each time?
    - Wet cleaning:
    - Dry cleaning:

15. How much perc solvent did you buy each year?
    - 50 gallons per year at $15 per gallon -- $750 per year.
<table>
<thead>
<tr>
<th>Date</th>
<th>Therms</th>
<th>kWh</th>
<th>Days</th>
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<tbody>
<tr>
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<td>441</td>
<td>286</td>
<td>33</td>
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<tr>
<td>12/5/2007</td>
<td>464</td>
<td>347</td>
<td>33</td>
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<tr>
<td>11/2/2007</td>
<td>366</td>
<td>252</td>
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