Resource for Greening Dry Cleaning and Laundry Services
Pollution Prevention Information

Version 1.0
December 2010

Greening Dry Cleaning and Laundry Services

Toronto's ChemTRAC program includes an Environmental Reporting and Disclosure Bylaw (Municipal Code Chapter 423) that requires local businesses to track and report their use and release of 25 priority substances. The ChemTRAC program provides an opportunity for you to identify strategies for improving your environmental performance. Strategies include those that reduce the use and release of the 25 priority substances. Strategies may also reduce the use and release of other chemicals that may have a health and/or an environmental impact. This Greening Resource for Dry Cleaning and Laundry Services will help you understand the chemicals that you are using and find ways to reduce or eliminate their use. For additional resources, including a Guide to Reporting, visit http://www.toronto.ca/chemtrac/.

Dry Cleaning and Laundry Services

This business sector provides dry cleaning services (excluding coin-operated services), laundering services (except coin-operated services or linen and uniform supply), and/or specialty cleaning services for specific types of items (such as fur, leather, or suede garments; wedding gowns; hats; draperies; and pillows).

Priority Substances and Other Chemicals of Concern

Toronto Public Health has identified 25 substances of priority health concern that are commonly used and released by businesses in the City of Toronto. As part of ChemTRAC, the Environmental Reporting and Disclosure Bylaw requires businesses and facilities to track and report on any of the listed priority substances that a facility manufactures, uses or releases to the environment if the amounts are equal to or above the reporting limits. In addition to the priority substances, industrial processes commonly use and release other chemicals of concern that may have a health and/or an environmental impact that are not subject to the by-law.

The Dry Cleaning and Laundry Services sector may use and produce some of these priority substances and other chemicals of concern. Each of these chemicals may have an impact on human health and/or the environment. Below are the substances that may be used or produced by your dry cleaning facility and its operation. This is not an exhaustive list.

Substances that may be used or produced by your dry cleaning and laundry facility and its general operations

Chemical Sources	Priority Substances Tracked by ChemTRAC	Other Chemicals of Concern*
Soiled items may contain:	• Heavy metals: - Chromium - Lead - Cadmium - Nickel - Mercury • Volatile Organic Compounds[1] (VOCs) (from towels/wipes soaked in solvent, oils and lubricants) • 1,4-Dichlorobenzene (from dyes or moth-proofing materials)	
Laundering chemicals may contain:	• Acrolein (as a 'builder') • 1,4-Dichlorobenzene (in laundering chemicals) • Trichloroethylene (pre-cleaning agent) • VOCs (in soaps and sizing agents)	• Biocides (to eliminate odours) • Bleaches (primarily sodium hypochlorite) • Detergents (surfactants, acids, alkalines)
Dry cleaning chemicals may contain:	• Tetrachloroethylene (Perchloroethylene or PERC) (a VOC) • Trichloroethylene (pre-cleaning agent) (a VOC) • Vinyl chloride (a by-product of PERC, but not a major release from dry cleaning) • Other VOCs (pre-cleaning agents)	• Bleaches (primarily sodium hypochlorite) • Hydrocarbon solvents (i.e., petroleum solvents) • Antioxidants / microbials • Hydrocarbon resins (sizing agents)
Processing items (drying, pressing) may produce:	• VOCs • Particulate Matter[2] $PM_{2.5}$ • NOx	
Equipment cleaning and maintenance operations may use or produce:	• VOCs • Trichloroethylene	

Notes:

* Chemicals that may have a health and/or an environmental impact.

1. VOCs are emitted as gases from certain solids or liquids. Smog forms when VOCs are combined with nitrous oxides (NOx) in sunlight.
2. Particulate matter (PM) consists of airborne particles in solid or liquid form (e.g., dust). $PM_{2.5}$ is airborne particulate matter with a mass median diameter less than 2.5 micrometre.

Understanding Your Company's Impacts: Dry Cleaning and Laundry Services

In dry cleaning and laundering, there are several activities or processes that contribute to the use and release of priority substances and other chemicals of concern. The use and release of chemicals depends on the type of process, as well as the equipment and chemicals that are used.

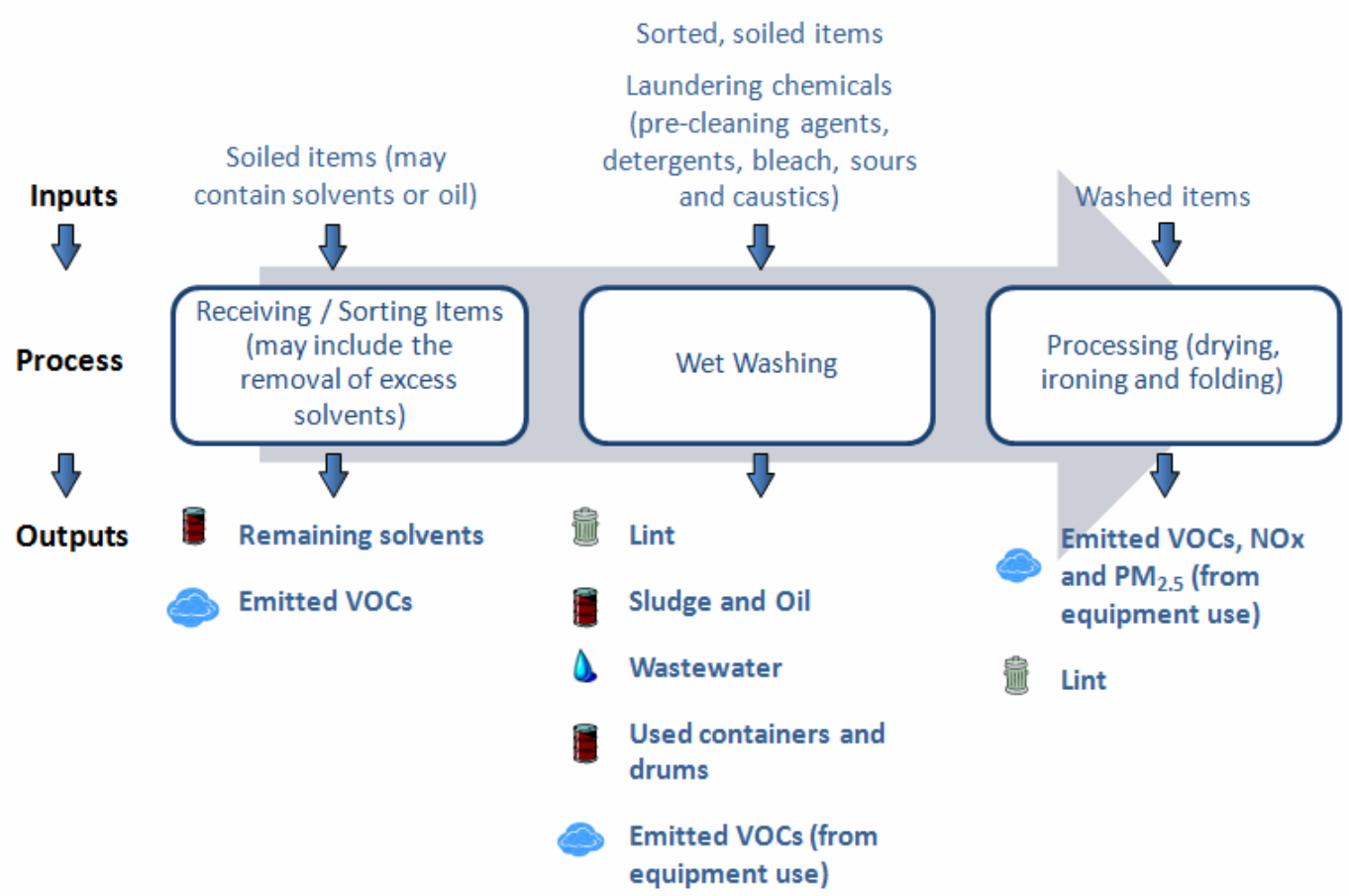
Priority substances may be found in the soiled items of customers. Some facilities accept heavily soiled items, like shop towels, that may be soaked in solvent.

The typical processes used by this sector are wet cleaning and dry cleaning. Wet washing uses detergents, bleach and other chemicals, such as sours and caustics. Facilities that use wet cleaning processes need to rid the items of 'free liquids' before washing.

Dry cleaning processes can use detergents and other chemicals for pre-washing, while the cleaning process uses a chemical solvent to remove soil and stains. Traditional dry cleaning solvents include tetrachloroethylene (perchloroethylene or 'PERC') and petroleum-based solvents. More modern methods of dry cleaning use glycol ethers, liquid silicone, and liquid carbon dioxide (CO_2).

The following diagrams show the raw materials that may go into each process and the pollution that comes out of each process. Symbols show whether the wastes typically go to air, landfill, sewer systems and/or treatment facilities (as liquid or hazardous wastes).

Figure 1: Wet Washing



Symbols used in the flow diagram

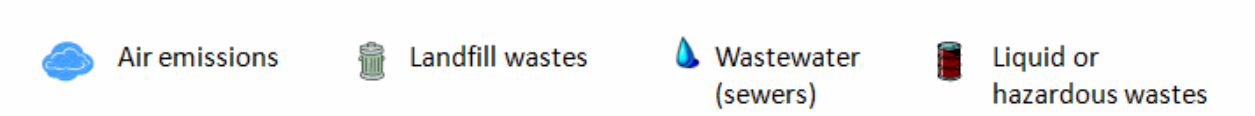
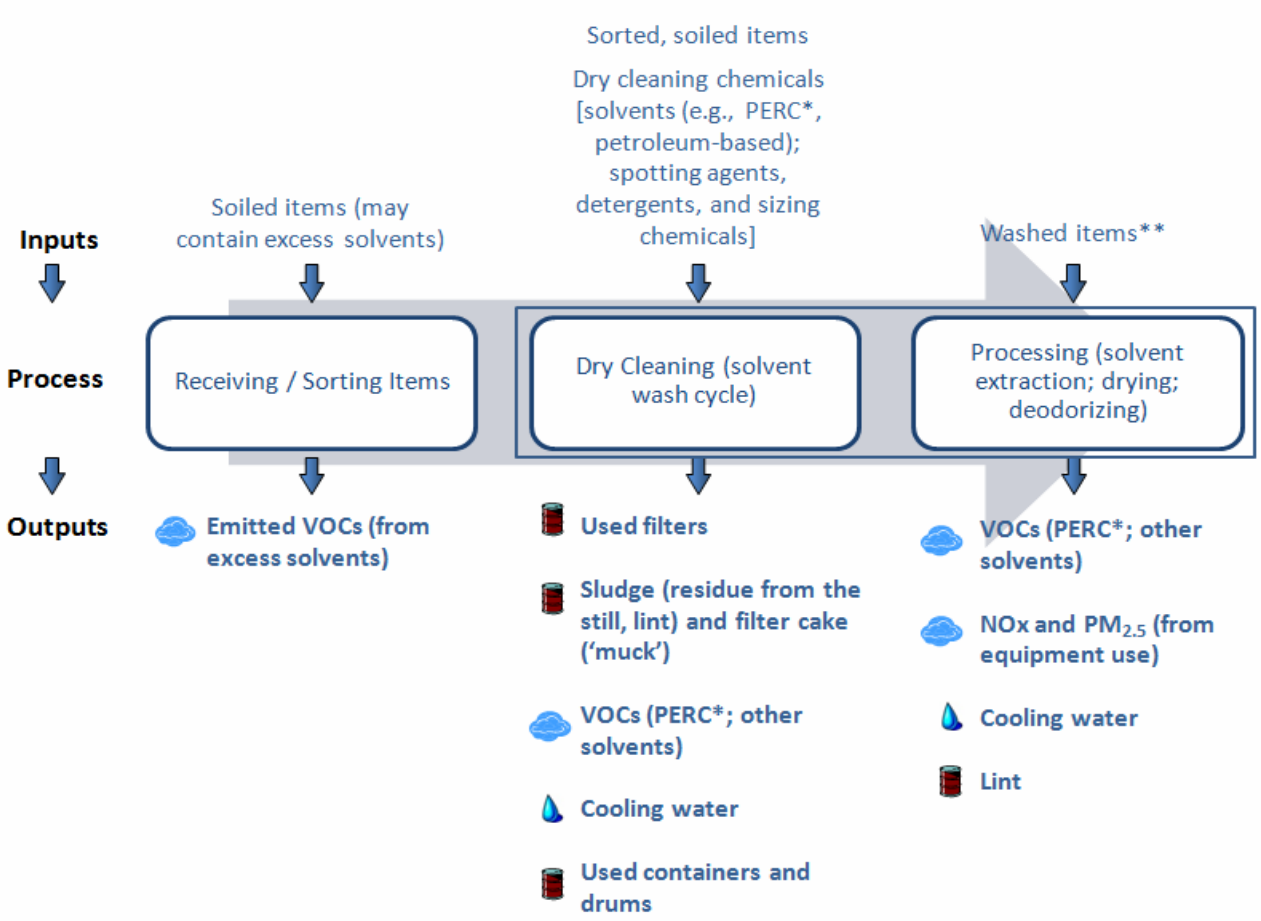
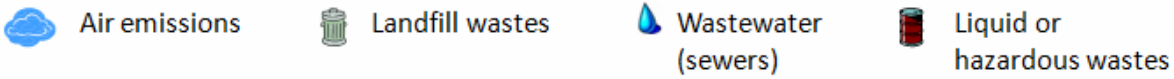


Figure 2: Dry Cleaning



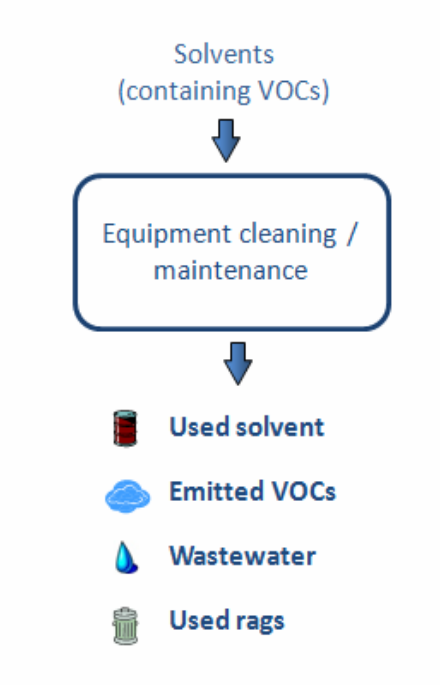
Symbols used in the flow diagram



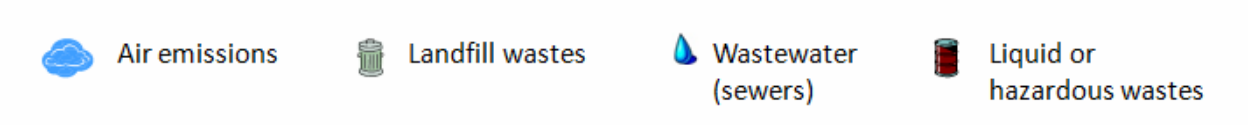
* The amount of emitted VOCs from the dry cleaning process depends on the age of your facility's machine(s), the solvent used, and the level of equipment maintenance/upkeep. Under Canadian law [*Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations, SOR/2003-79*], dry cleaning facilities that use tetrachloroethylene (PERC) are required to use machines that have a single drum for the washing, extraction, drying and deodorizing cycles (i.e., transfer machines are no longer permitted). In addition, machines must have a refrigerated condenser and an integral tetrachloroethylene-water separator that recovers the PERC from the waste water. Even with these regulatory measures in place, small amounts of PERC may still be released from spills and leaks, as well as vapour from processed items.

** Transfer machines that use PERC are no longer permitted under Canadian law (Tetrachloroethylene Regulations).

Figure 3: Equipment Cleaning and Maintenance



Symbols used in the flow diagrams



Pollution Prevention Steps You Can Take

This resource identifies steps you can take to reduce or eliminate your use of the priority substances and other chemicals that may have a health and/or an environmental impact, and to prevent pollution in the Dry Cleaning and Laundry Services sector.

The pollution prevention measures identified in this information sheet can reduce costs and/or increase profits.

Pollution Prevention Assessments – A Good First Step

Before you go too far with any given measure, you may want to do a Pollution Prevention Assessment of your business. You may need an outside expert to help. A typical Pollution Prevention Assessment will include mapping process flows, reviewing equipment uses, evaluating the way you use and store chemicals, evaluating the way you use energy, as well as reviewing waste handling practices and discharges. This assessment helps you to identify many pollution prevention opportunities (and any regulatory compliance issues) and decide which steps to take first.

Pollution Prevention - A Key to Good Management

Good management of your chemical purchases, chemical use and waste disposal is very important. You can improve your environmental performance through Pollution Prevention by:

- identifying how you are using the priority substances and other chemicals of concern that may have a health and/or an environmental impact
- figuring out how much you are using of each chemical and estimating the related emissions (see the earlier description for more information on how to estimate chemical use and emissions)
- discussing the options to reduce or to eliminate these chemicals and, where feasible, taking action. Actions could include:
    - using a different product
    - changing how you apply or clean up the chemical product/waste
    - training staff on how best to apply and clean up the chemical product/waste, or
    - installing new technology
    - maintaining equipment to ensure that leaks and general efficiencies are managed
- tracking the amount of chemicals you use and see if it goes down over time, and
- reviewing progress and identifying whether or not you need to make changes to the company's practices and procedures.

Changes you could make in your dry cleaning facility

The following table lists many options to help you reduce or stop using the priority substances and other chemicals of concern in your facility. Some measures will cost more than others, and some will be easier to implement than others. Operators can implement certain measures by making minor changes in their day-to-day approaches; while others will require management to invest in new technologies.

The table provides a quick and simple way to take stock of what measures your business has already put into place and those measures that your business could apply. In completing the table, you are encouraged to prioritize the actions you would take. While it is not exhaustive, the table identifies many pollution prevention opportunities for the Dry Cleaning and Laundry Services sector. When assessing the options, please consider your facility-specific conditions and how each option might affect pollution releases to the air, land and water.

The table identifies three general types of options and distinguishes each with a symbol:

Low-cost, good operating procedures – These measures involve operational and managerial changes that can reduce chemical use. They include simple changes to normal practices, process improvements, as well as training and good housekeeping opportunities. This measure does not need new technology purchases.

Choosing an alternative chemical – These measures involve replacing traditional products (such as solvents and cleaning products) with products that have less harmful properties. The ease and cost of these measures depends on the product and the process used.

New technology or system – These measures involve the installation of a new system, machine or process. The cost varies depending on the technology / system.

See **More Resources** for a list of helpful resources related to pollution prevention in the dry cleaning and laundry services sector.

Pollution Prevention Opportunities	Type of Activity	Is the opportunity in place? Yes	No	N/A	If `No`, indicate the level of priority for action (High, Medium or Low)		
Receiving / Sorting Items							
Educate customers to reduce the amount of solvents in materials sent to your facility and on the proper management of textiles.		☐	☐	☐	H	M	L
Train salespeople / customer representatives to work with customers to reduce the amount of solvents sent to your facility.		☐	☐	☐	H	M	L
Apply in-house procedures for the safe receipt, handling and processing of soiled shop towels.		☐	☐	☐	H	M	L
Invest in a pre-treatment technology to remove excess solvents from soiled items. Options include: • a centrifugation unit • dry-clean before water washing • steam / air strip items • press solvent soaked items		☐	☐	☐	H	M	L
Laundering (wet washing)							
Replace harmful laundering chemicals with less harmful products (e.g., use phosphate-free products and non-chlorinated bleaches)		☐	☐	☐	H	M	L
Reduce water consumption and associated wastewater releases by: • Educating and involving employees in water conservation • Locating all water use sources (bathrooms, wash sinks, hoses, dish machines, HVAC, cooling water, etc.) in the facility and identifying and implementing water conservation options, such as those outlined below.		☐	☐	☐	H	M	L
Water conservation options: • Instruct maintenance personnel to routinely inspect and repair any leaking water or steam lines as well as pumps and valves • Use lower water levels for smaller loads • Install continuous batch washers with counter-current flow • Install automated liquid injection wash systems or retrofit existing equipment where possible	   	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐	H H H H	M M M M	L L L L
Dry cleaning							
Size garment loads correctly. Overloading may reduce the effectiveness of solvent recovery equipment, while under loading is less efficient.		☐	☐	☐	H	M	L
Use water-based or less hazardous pre-spotters instead of those containing harmful solvents.		☐	☐	☐	H	M	L

 Low-cost, good operating procedures	 Choosing an alternative chemical	 New technology or system

R indicates a requirement under the *Canadian Environmental Protection Act* (CEPA) Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations, SOR/2003-79

Pollution Prevention Opportunities	Type of Activity	Is the opportunity in place? Yes	No	N/A	If `No`, indicate the level of priority for action (High, Medium or Low)		
Replace machines with a dry-to-dry closed-loop, non-vented machine that contains an integral refrigerated condenser. (*R*)		☐	☐	☐	H	M	L
Use solvents and techniques that have been developed as alternatives to PERC, including silicon-based products, glycol ether products, liquid carbon dioxide cleaning or ultrasonic cleaning.		☐	☐	☐	H	M	L
Add a wet cleaning operation for a portion of the cleaning.		☐	☐	☐	H	M	L
Monitor for solvent vapour losses with a leak detector.		☐	☐	☐	H	M	L
Establish a weekly maintenance (including leak) inspection program for: • dry-cleaning components, such as hoses and pipe connections, door and filter gaskets, pumps, solvent tanks, water separators, and the still • refrigerated condenser / adsorber • solvent and waste container		☐	☐	☐	H	M	L
Ensure that dry-cleaning equipment and stills are protected from sewer drainage areas to prevent solvents or sludges from entering the sewers. • Introduce a secondary containment system encompassing at least the entire surface under each dry cleaning machine, tank or container containing PERC, wastewater or residue **(*R*)**		☐	☐	☐	H	M	L
If solvents cannot be reused, find a way to recycle them. Purchase solvents from a company that will pick up and recycle the spent solvent.		☐	☐	☐	H	M	L
Reduce water consumption and associated wastewater releases by introducing a closed-loop system to cool your dry cleaning machines (such as a chiller or cooling tower) or reuse the cooling water using a water recovery system [a water recovery system allows you to take the cooling water from your dry cleaning machine and use it for your laundry or other systems that do not require potable water (e.g., toilet, boiler feed water)].		☐	☐	☐	H	M	L
Processes (drying, pressing)							
Monitor your energy usage.		☐	☐	☐	H	M	L

 Low-cost, good operating procedures	 Choosing an alternative chemical	 New technology or system

R indicates a requirement under the *Canadian Environmental Protection Act* (CEPA) Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations, SOR/2003-79

Pollution Prevention Opportunities	Type of Activity	Is the opportunity in place? Yes	No	N/A	If `No`, indicate the level of priority for action (High, Medium or Low)		
Close equipment steam supply when not in use.		☐	☐	☐	H	M	L
Repair leaks and insulate hot surfaces, such as the buck and head of the dry cleaning press.		☐	☐	☐	H	M	L
Consider new equipment that may use less energy to operate.		☐	☐	☐	H	M	L
Waste, Wastewater and Residue							
Keep wastes separate. Mixing wastes may make recycling impossible.		☐	☐	☐	H	M	L
If your shop uses PERC, have wastewater and residue transported to a waste management facility no less than once every 12 months. (*R*)		☐	☐	☐	H	M	L
If your shop uses PERC, have an on-site wastewater treatment system that contains the equipment specified under section 8 of the federal Tetrachloroethylene Regulations. (*R*)		☐	☐	☐	H	M	L
If your facility has a direct sewage discharge, apply an appropriate pre-treatment method (e.g., solids/oil/water separator or DAF unit). Ensure compliance with the City of Toronto's Sewer Use Bylaw if applicable.		☐	☐	☐	H	M	L
Regularly check operation of these units and remove collected contaminants. Dispose collected contaminants at an approved waste management facility.		☐	☐	☐	H	M	L
Maintenance, Management and Good Housekeeping							
Check combustion of boiler regularly to ensure highest efficiency and lowest consumption of energy.		☐	☐	☐	H	M	L
Check all steam traps on a regular basis and replace as needed.		☐	☐	☐	H	M	L
Keep your shop clean and your floors dry. Sweep floors and use dry or damp clean-up techniques.		☐	☐	☐	H	M	L
Review chemical suppliers' products regularly to look for the most environmentally-responsible products.		☐	☐	☐	H	M	L
Store chemicals according to manufacturer's recommendations and keep chemical storage away from drains.		☐	☐	☐	H	M	L
Provide appropriate spill containment in chemical storage and transfer areas.		☐	☐	☐	H	M	L

 Low-cost, good operating procedures	 Choosing an alternative chemical	 New technology or system

R indicates a requirement under the *Canadian Environmental Protection Act* (CEPA) Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations, SOR/2003-79

Pollution Prevention Opportunities	Type of Activity	Is the opportunity in place? Yes	No	N/A	If `No`, indicate the level of priority for action (High, Medium or Low)		
Keep an accurate inventory of products used (including chemical name, manufacturer, and MSDS sheet).		☐	☐	☐	H	M	L
Store chemicals according to need, with minimum inventory kept on hand.		☐	☐	☐	H	M	L
Keep lids on containers at all times when not in use to prevent loss of chemicals through evaporation and spills. (*R*)		☐	☐	☐	H	M	L
Order detergents / solvents in containers sized for minimum storage time to reduce waste from expired products.		☐	☐	☐	H	M	L
Date containers when opened to ensure you use them before they expire to reduce waste from expired products.		☐	☐	☐	H	M	L
Use spigots and pumps when dispensing new materials and funnels when transferring wastes to storage containers to reduce spillage.		☐	☐	☐	H	M	L
For facility cleaning, substitute less harmful products, such as water-based biodegradable cleaners (no-VOC or low-VOC) or use recyclable solvents.		☐	☐	☐	H	M	L
Mark all containers to identify the contents to avoid improper handling or disposal.		☐	☐	☐	H	M	L
Train workers to follow the standard work procedures (such as set-up, cleaning, and spill response), good housekeeping, and correct material handling methods to make sure all operators follow the same steps to reduce chemical use and waste.		☐	☐	☐	H	M	L
Develop and post a spill response plan so that it is available for all employees.		☐	☐	☐	H	M	L
Make spill kits available at the chemical storage rooms or racks for easy access.		☐	☐	☐	H	M	L
Ask employees for pollution prevention suggestions.		☐	☐	☐	H	M	L

Contact us to provide your feedback on this resource or to suggest any additional pollution prevention resources (email chemtrac@toronto.ca or call 416-338-7600).

 Low-cost, good operating procedures	 Choosing an alternative chemical	 New technology or system

R indicates a requirement under the *Canadian Environmental Protection Act* (CEPA) Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations, SOR/2003-79

More Resources

California Environmental Protection Agency: Air Resources Board. 2009. Dry Cleaning Program – Publications.
http://www.arb.ca.gov/toxics/dryclean/pub.htm#fact

- A website with helpful links to resources related to pollution prevention for the dry cleaning industry. Publications include:
    - Dry Cleaning Notice 2009-2: Alternative Solvents Used for Dry Cleaning Operations
    - Dry Cleaning Industry Self-Inspection Handbook For Dry Cleaning Operations Personnel

Canadian Centre for Pollution Prevention. 2010. Green Dry Cleaner.
http://www.c2p2online.com/main/ns/140/doc/295

- A website with helpful links to best management practices for dry cleaning facilities, training opportunities, and environmental success stories. It also lists the Canadian Dry Cleaning facilities that are 'Green Dry Cleaners', and provides a survey for dry cleaners who want to become Green Dry Cleaners.

Environment Canada. 2005. Checklist for Dry Cleaners Using PERC.
http://www.ec.gc.ca/regs-tetra/AEA942DC-412E-4D1A-BA12-24AFED5788B7/Checklist_for_Dry_Cleaners_Using_PERC_English_100114.pdf

- A checklist for dry cleaning facilities using Tetrachloroethylene or Perchloroethylene (PERC) in the cleaning process. This checklist helps facilities understand and comply with the Tetrachloroethylene Regulations. The checklist targets:
    - Dry-cleaning facilities
    - Dry-cleaning machines
    - Secondary containment systems
    - Waste Water and Residue
    - Documentation

New Mexico Environment Department. Green Zia Environmental Excellence Program - Dry Cleaning.
http://www.nmenv.state.nm.us/green_zia_website/

- A guidance document to help dry cleaning facilities establish pollution prevention programs. The Dry Cleaning 'packet' is an activity workbook that also includes pollution prevention ideas organized by:
    - Process (e.g., Replace all valve seals and door gaskets regularly; Check and repair hoses and exhaust ducts)
    - New technologies (e.g., wet cleaning instead of dry cleaning), and
    - Management principles (e.g., build quality into the workplace)

North Carolina Department of Environment and Natural Resources. 2002. Water Conservation Checklist: Industrial Laundering Operations – Every Drop Counts!
http://www.p2pays.org/ref/23/22005.pdf

- A brief document that lists possible short-term and long-term water conservation options and pollution prevention techniques for launderers and dry cleaners. Some of these options include:
    - Employee education
    - Routine inspection of equipment and repair leaks, pumps, and valves
    - Appropriate use of water fill levels for each cycle
    - Installation of continuous batch washers with counter-current flow to save water
    - Install automated liquid injection wash systems to minimize water usage

Ohio Office of Compliance Assistance and Pollution Prevention. 2010. Environmental Compliance Calendar for Dry Cleaners.
http://www.epa.ohio.gov/portals/41/sb/publications/2010DryCleanCalendar.pdf

- This document includes compliance monitoring logs to track regular equipment inspections. Pollution prevention techniques and technologies are also discussed, such as:

- Using an appropriate leak detector device
- Tracking and documenting equipment repair and maintenance

Ontario Laundry Task Force. 1996. Environmental Code of Management Practice for Laundry Operations. http://www.p2pays.org/ref/15/14249.pdf

- A comprehensive document that provides laundries with information and tools to implement a Code of Management Practice (CMP). The CMP was developed by the Ontario Laundry Task Force in conjunction with the Ontario Ministry of Environment and Energy (MOEE) to create environmental requirements for all organizations of the laundry industry. Although this is a dated document, there are useful pollution prevention techniques under the following categories:
  - Chemical storage / inventories (e.g., develop a chemical inventory listing chemicals stored or used on-site)
  - Maintenance shop (e.g., separately store chlorinated and non-chlorinated solvents)
  - Motor vehicle service (e.g., keep waste oils separate from other wastes)
  - Waste disposal (e.g., appropriately label hazardous waste containers)
  - Dry-cleaning equipment and stills (e.g., ensure equipment has been segregated to prevent access to solvents to the sewers)
  - Incoming soiled goods (e.g., inspect goods for excess solvents and identify customers)

Pinellas County Department of Environmental Management. 2003. Pollution Prevention Dry Cleaning Operations - Waste Reduction Assistance. http://www.pinellascounty.org/environment/pagesHTML/pollutionPrevent/p2r2PDFs/mangmentPDFIndustry/DrycleanBooklet.pdf

- A manual designed to assist dry cleaners reduce operational waste and improve economic viability. This guide offers ways to reduce chemical use, air and fugitive emissions, solvent use and waste, wastewater contamination, and others. A list of resources is offered.

U.S. Environmental Protection Agency (EPA). 2005. Owner/Operator Information Sheet - Reducing Air Pollution from: Dry Cleaning Operations. http://www.epa.gov/air/community/guide/drycleaners_oo_sheet.pdf

- A short list of actions that can be taken to help dry cleaning facilities reduce air pollution from dry cleaning operations. Reasons for reducing air pollution from dry cleaning operations are given, and a list of resources to consult is provided, such as:
  - EPA Dry Cleaning Industry Sector Notebook
  - EPA Air Toxics Website
  - International Dry Cleaners Congress

U.S. EPA. 1995. EPA Office of Compliance Sector Notebook Project - Profile of the Dry Cleaning Industry. http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/dryclng.pdf

- A comprehensive document providing background information on the size, geographic distribution, employment, production, sales and economic condition of the dry cleaning industry in the United States. Descriptions of the dry cleaning process are also provided, along with pollution prevention opportunities in the areas of:
  - Improved operating practices
  - Equipment maintenance
  - Equipment modification
  - Chemical substitutions
  - Technological innovations