

## Dry Cleaning & Air Quality Requirements In Spokane County

Dry cleaners are located throughout Spokane County, typically near residential areas for customer convenience. Solvents used in dry cleaning processes often contain hazardous substances that may be released to the air. To reduce public exposure, dry cleaning activities are monitored for compliance with air quality requirements by inspectors from the Spokane Regional Clean Air Agency (Spokane Clean Air.)

### Dry Cleaning Solvents

Most of the air pollution from dry cleaning is from the evaporation of solvents used in the cleaning process. Perchloroethylene (PCE) is the most commonly used dry cleaning solvent. Petroleum solvents are also used, such as Stoddard solvent, and less volatile, petroleum hydrocarbon cleaning solvents, such as DF2000.

PCE is a hazardous air pollutant and a suspected cancer-causing chemical. Petroleum and petroleum-derived hydrocarbon solvents contain volatile organic compounds (VOCs) and are highly flammable.

Dry cleaning machines use these solvents for cleaning garments. Solvent is removed from the cleaned garments during the drying cycle, where heated air is passed through the garments to evaporate the solvent. At the end of the drying cycle, residual solvent contained in the heated drying air, is routed through a refrigerated condenser, where it is reclaimed.

The solvent is then collected, filtered and returned to the work tanks.

With the use of refrigerated condensers, the emissions from dry cleaning operations have decreased significantly. However, emissions can still occur if the refrigerated condenser is not operating properly, when the machine doors are opened to remove clothing, when filters are changed, when clothing is removed prematurely and not fully dried, through leaks or spills from the machine, and when solvent containing materials are left in open containers.

### Air Quality Requirements

Dry cleaning operations are subject to state air quality regulations; Washington Administrative Code (WAC) 173-400-075(8) PCE dry cleaners and 173-400-040(3) fugitive

emissions, administered in Spokane County by Spokane Clean Air. Regulations focus on equipment, operations, and practices that affect emissions, such as temperature monitoring of refrigerated condensers, leak checks, repairs, maintenance, and record-keeping activities. Below is a summary of the key requirements for PCE dry cleaning operations.

- ◆ **Operation:** Dry cleaning system must be properly operated and maintained according to the manufacturer's specifications and recommendations. A copy of the design specifications and operating and maintenance manuals must be kept on site, and available for review at all times.
- ◆ **Temperature Checks:** Inlet and outlet temperatures for the refrigerated condenser (RC) must be recorded during the cool down phase of the dry cleaning cycle weekly, to monitor the effectiveness of recovering the cleaning solvents from the dryer exhaust.
- ◆ **Leak Checks:** The dry cleaning system must be checked for leaks while the machine is operating. *Weekly checks must be done for perceptible leaks* (using sight, smell, touch) from hose and pipe connections, fittings, couplings, and valves; door gaskets and seatings; filter gaskets and seatings; pumps; solvent tanks and containers; water separators; muck cookers; stills; exhaust dampers; diverter valves; and cartridge filter housings. *Once a month the leak check must be performed with a hydrocarbon detector or PCE gas analyzer* (see back page for equipment info.)
- ◆ **Repair:** Perceptible leaks must be repaired within 24 hours of detection. If repair parts are not available, parts must be ordered within two days of detection and installed within five days of receipt.
- ◆ **Separator Water:** The collection bucket for separator water must be covered to prevent evaporation. The lid may have a small hole just large enough for the drain hose.

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- ◆ **Dangerous Waste:** All waste that may come into contact with PCE must be treated as dangerous waste and stored in a closed container with no leaks. Dangerous waste from dry cleaning may include, lint, items from button trap, still bottoms, cartridge filters, water from water separator, spin disk filter, used gaskets, couplings, valves, etc. Cartridge filters must be drained for 24-hours before discarding in dangerous waste container.
- ◆ **Records:** All records must be kept up-to-date and on-site for five years. Records must be available for review at all times. PCE receipts and purchases records must be updated by the 1st of the following month and include a 12-month rolling total. Other records are required for: perceptible leak and leak detector checks, refrigerated condenser temperature monitoring, maintenance and repair, pollution prevention activity, and dangerous waste disposal.

## Compliance Inspections

During a typical on-site visit, inspectors will review:

### Operations

- ◆ Is the equipment properly maintained and operated according to the manufacturer's recommendations? Is the machine door kept closed except when transferring articles to and from the machine? How is separator water stored and treated?
- ◆ Are there any leaks with the dry cleaning machine, solvent and dangerous waste containers, the surrounding space and tools? Inspectors may use the senses of smell, sight, and touch, or a detector, to find leaks.
- ◆ If leaks are detected, have repairs been made within 24 hours of detection? If repair parts were not available, were parts ordered within two days of detection and installed within five days of receipt?
- ◆ Do monitored RC inlet and outlet temperatures indicate adequate condensation of solvents and removal from the exhaust vapor stream during the "cool down" cycle? Is the RC outlet temperature always 45° F (7° C) or less during the "cool down" cycle? Is the difference between the RC inlet and outlet temperatures 20° F (11° C) or more?
- ◆ Are PCE and related dangerous wastes stored in closed containers with no perceptible leaks?

### Records

- ◆ Are PCE receipts kept, including monthly and rolling 12-month totals?
- ◆ Are leak check records adequate?
- ◆ Have repairs occurred within 24 hours of detection?

- ◆ Have weekly temperatures been recorded to demonstrate proper operation of the RC?
- ◆ Have pollution prevention activities been documented?
- ◆ Are dangerous waste manifests maintained?
- ◆ Is a copy of the manufacturer's operation and maintenance manual on-site for review?

**Other** - Your facility may have additional requirements you must comply with per the Notice of Construction (NOC) permit conditions issued by Spokane Clean Air. A copy of your NOC is required to be kept on-site and available for review.

## Pollution Prevention

Washington state requires dry cleaners who use PCE to keep track of pollution prevention (P2) activities that they have implemented at the facility. Examples include: secondary containment for solvent and dangerous waste storage, PCE spotting alternatives (see pg. 3), and alternative dry cleaning solvents (see pg. 3).

Benefits of P2 activities may include reduced emissions, paperwork, and regulation requirements, as well as potential savings in dangerous waste disposal costs. As a business owner/operator, it is important to research what P2 options may work best for your facility.

## Compliance Assistance

Spokane Clean Air has developed compliance assistance materials in an effort to help local dry cleaners stay in compliance with dry cleaner regulations. Materials include: Record Keeping Calendar and a 12-Month PCE Rolling Total Excel Spreadsheet. Visit [www.spokanecleanair.org](http://www.spokanecleanair.org) to download these materials.

Perchloroethylene (PCE) is Toxic!	
Parts Per Million	Typical Inhalation Response to PCE
50	Odor threshold to unacclimatized persons
100	Faint odor definitely apparent to unacclimatized persons
200	Moderate to faint odor. Faint to moderate eye irritation, light-head- edness. Eye irritation threshold – 100-200 ppm.
400	Strong, unpleasant odor. Slight nose irritation, definite eye irritation, lack of coordination, (2 hours exposure)
600	Strong odor, very unpleasant but tolerable. Definite eye and nose irritation. Dizziness, loss of inhibitions (10 minutes exposure)
1,000	Very strong, intense, and irritating odor, irritation to eyes and respi- ratory tract. Considerable dizziness, (2 minutes exposure)
1,500	Intolerable odor, irritation to eyes and nose, gagging. Complete lack of coordination in minutes, unconsciousness within 30 minutes.

**Alternatives to PCE Spotting** - Change from traditional spotting chemicals to a PCE-free or TCE-free spotting agent. The Institute for Research and Technical Assistance performed field tests on spotting agents and found two safer alternatives: Cold Plus, and Nature's Choice. The alternatives generally sell for \$10-\$20 less per gallon than traditional spotting agents.

## Alternatives to PCE Solvent

Type of Solvent or Process	Benefits	Concerns
Hydrocarbon - a solvent, (i.e. DF2000, EcoSolve)	Most widely used solvent alternative, not high in toxicity, higher flash point than traditional petroleum solvents, cleans delicates better than PCE, better feel than PCE, can retrofit some PCE machines for this solvent	Has regulatory requirements, machines generally have nitrogen to prevent fire, longer cycle time, not as aggressive of cleaner as PCE, bacteria growth in solvent must keep water in machine clean, may not be able to retrofit all PCE machines to use this solvent
Tonsil - a special filter to put in hydrocarbon machine, spin filter contains Tonsil and diatomaceous earth	Prevents bleeding of garments in machine, can avoid distillation process, don't need to use detergent in machine, absorbs water eliminating bacteria growth problem	Filter needs proper care or all benefits could be reversed, may have regulatory requirements
Pure Dry - a solvent variation of hydrocarbon with PFC and HFC	Same benefits as listed with hydrocarbon solvent	Same listed with hydrocarbon solvent, regulatory and health concerns with the additives
D5 (decamethylcyclopentasiloxane) - a solvent, (i.e. Green Earth)	Higher flash point than hydrocarbons, can run in hydrocarbon machines, good on delicates, good feel, currently no known regulatory requirements	Longer cycle time than PCE or hydrocarbon, caused cancer in lab animals
Glycol Ether - a solvent, (i.e. Rynex, Solvair)	Very aggressive cleaner, no need to spot clothes prior to cleaning	Cycle time is long, water separation is difficult, a VOC has some regulatory requirements, toxicity not clear, expensive equipment
Carbon Dioxide - a solvent, uses carbon dioxide and detergent for cleaning, (i.e. Micell)	Short cycle time, currently no known environmental regulations	Special stainless steel and pressurized equipment required (~\$120K vs. ~\$40K for a PCE machine)
Traditional Wet Cleaning - a process, use water and detergent to clean garments	No known environmental regulations, aggressive cleaning method	Need humidity controlled dryer and tensioning equipment
Icy Water - a process, similar to wet cleaning except garments are washed in cold water and dried with cold air	Same benefits as listed in wet cleaning, lower agitation, can use traditional finishing equipment, garments easy to finish	Need a washer with refrigerated condenser
Green Jet - a process, spray water and detergent rather than immersion	Finishing much easier than wet cleaning, currently no known regulatory requirements	Non-aggressive cleaning, may be better as supplementary technology

Information from a Dry Cleaning Alternatives webinar instructed by The Institute for Research and Technical Assistance (IRTA) in California. The list is informational and not an endorsement of solvents or processes.

## Leak Detectors

State regulations require dry cleaners to conduct monthly inspections for PCE vapor leaks using a halogenated hydrocarbon (HH) detector or PCE gas analyzer, such as a photo ionization detector (PID).

When using the leak detectors:

- ◆ Perform a leak check with the detector at least once per month,
- ◆ Place the probe inlet at the surface of each component where leaks could occur, and move the probe slowly around each component (see below diagram for components to check for leaks),
- ◆ Record the date and result of each leak inspection at the time of the inspection.

The chart to the right provides information on detectors.

**Leak Detectors** - PCE dry cleaners may use any brand of leak detectors as long as it meets requirements: detects vapor concentrations of PCE of 25 parts per million (ppm) and indicates a concentration of 25 ppm or greater by emitting an audible or visual signal that varies as concentration changes.

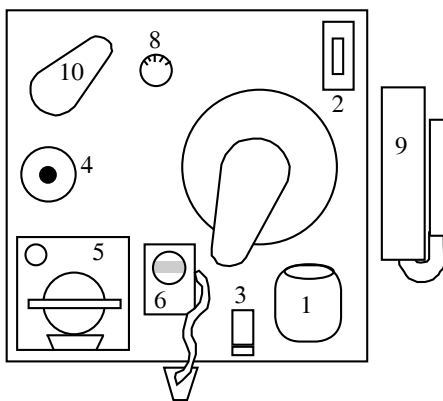
The detectors listed below are based on information provided by leak detector manufacturers and tests conducted by other states or groups. The following units are expected to meet requirements. **This is not an endorsement. This is not an extensive list. Further research is recommended to find the best detector for your facility. Prices subject to change.**

Manufacturer	Type	Model	Sensitivity	Price
Nova Systems Products	HH	BOLO Green	5 ppm	\$110.00
Inficon Inc.	HH	Tek-Mate	<25 ppm	\$130.00
Inficon Inc.	HH	The Compass	<25 ppm	\$290.00
Aeroqual	HH	Aeroqual 200	1 ppm	\$780.00
RAE Systems	PID	MiniRAE Lite	0 - 5,000 ppm	\$1,900.00
Photo Vac 2020	PID	Cambo Pro Sale	0.1 - 10,000 ppm	\$2,500.00
Ion Science	PID	PhoCheck 1000	0.1 - 4,000 ppm	\$3,000.00
RAE Systems	PID	MiniRAE 3000	0 - 15,000 ppm	\$3,500.00

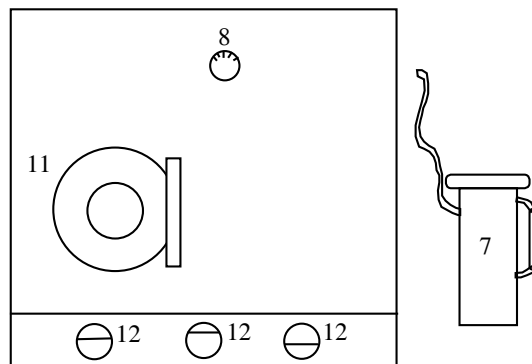
## Dry Cleaning & Solvent Leaks

Dry cleaners using the solvent PCE are required to check for leaks. The dry cleaning system must be checked (using sight, smell, touch) weekly for perceptible leaks, and once per month using a leak detector. Leak check results must be recorded. The basic diagram below highlights the main components of a typical PCE dry cleaning machine and where to look for possible leaks.\*

Rear Illustration of Machine



Front Illustration of Machine



1. Button Trap (during wash cycle)
2. Lint Trap (during dry cycle)
3. Pump (during wash cycle)
4. Cartridge Filter (during wash cycle)
5. Still (during distillation cycle)
6. Water Separator (during dry/distillation cycles)
7. Wastewater Evaporator

8. Refrigerated Condenser Outlet Temperature Gauge & Pressure Gauge (during cool down)
9. Vapor Adsorber (during dry cycle)
10. Spin Disk Filter (during wash cycle)
11. Loading Door Gasket & Seating (during wash/dry cycle)
12. Storage Tanks

\*Other areas to inspect not shown on illustration: hose connections, unions, couplings, valves, air and exhaust duct work, solvent container, and dangerous waste container.