



PROCESS DESCRIPTION

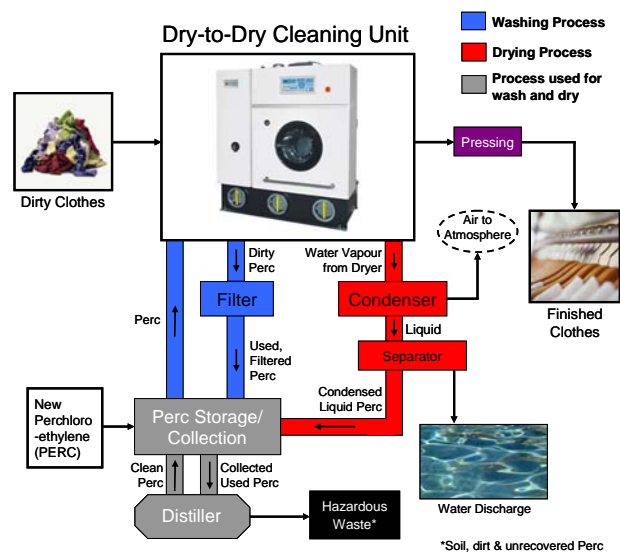
In the context of these guidelines, dry cleaners are taken to be small to medium sized enterprises that have the capacity to clean clothes and textiles using an organic solvent rather than water. Dry cleaning techniques are generally used to avoid water and detergent damage to clothes.

Environmental and social issues arising in the context of dry cleaning are largely associated with the use of volatile chlorinated solvents, commonly used in the cleaning process. There are two basic types of dry cleaning systems: transfer and dry-to-dry. The first generation dry cleaning machines were known as transfer systems, where garments are immersed in a non-aqueous solvent and then transferred by the operator to a separate drying machine. The more commonly found, later generations of dry cleaning machines use the dry-to-dry cleaning process, where garments are immersed in a non-aqueous solvent, the solvent is then extracted and the garment is dried all in one machine.

A dry cleaning machine using the dry-to-dry system is a motor driven washer/extractor/dryer that holds between 10kg and 40kg of clothes in a rotating, perforated stainless steel cage. The pump and filter systems then spray a continual flow of cleaning solvent into the clothing chamber. The immersion of clothes in the solvent and the gentle, dropping and pounding against the cage wall as it rotates allows the cleaning of garments without the use of water and detergents. To remove persistent stains/marks a dry cleaner may also inject solvent based soaps dependent on the types of fabrics being cleaned.

The dry cleaning machine is also used for other applications such as reproofing, stain resistant treatment, deodorising and flame retardant

treatment. This final phase of dry cleaning includes finishing, pressing, steaming and ironing.



Tetrachloroethene (otherwise known as perchloroethylene or PCE) and 1, 1, 1 - trichloroethane (1,1,1-TCA) are the main cleaning agents used by dry cleaners.

Perchloroethylene ("perc") is a clear, non-flammable liquid that is not biodegradable under standard test conditions, and may be resistant to breakdown in the presence of oxygen (aerobic conditions). Studies of these chemical solutions have shown that perc is mobile in sediment and soil and can potentially leach into groundwater.

Although perchloroethylene is the most commonly used solvent and has been since the 1940's, newer solvents/techniques are beginning to be used by dry cleaners in more developed countries as a result of growing health concerns over the use of perc. These include:

- **Glycol ethers** – which are water soluble solutions that behave as a single substance, resulting in an improved defined separation at a lower boiling point. This then facilitates



a more effective reclamation (99% or greater) and also enhances purification using conventional distillation techniques. Research into glycol ethers has shown they have a lower environmental impact and are proven to be more effective at removing dirt/marks than perchloroethylene.

- **Hydrocarbon solvents** such as Exxon-Mobil's DF-2000 and Chevron Phillips' EcoSolv. These are less effective than perchloroethylene and need a longer cleaning cycle. These solvents are also flammable, resulting in an increased fire risk.
- **Liquid Silica** – which produces a non-toxic, non-hazardous waste, as it degrades within days in the environment to silica and trace amounts of water and carbon dioxide. It is gentler on fabrics and does not cause colour loss but is less effective than perchloroethylene.
- **Liquid CO₂** immerses clothes in liquid CO₂ to remove dirt/marks. This process does not require heat to dry clothes, meaning that stains not removed during the washing cycle do not set and clothing is less likely to shrink. Nevertheless, these machines are more expensive than perchloroethylene machines and according to many studies are not as effective at removing dirt/marks.

KEY ENVIRONMENTAL, HEALTH AND SAFETY RISKS/LIABILITY FACTORS

Soil and Groundwater Contamination

Soil and groundwater contamination typically results from spillage, overfilling, sewer leakage, or the illegal disposal into septic systems and

drywells¹ at dry cleaning facilities. The mobility of perchloroethylene in groundwater makes it particularly problematic and expensive to remediate when compared to cleanups of oil spills due to its toxicity at low concentration levels, and because it is also a dense non-aqueous phase liquid (which causes it to sink below the water table).

Occupational Health and Safety Impacts

Occupational health and safety impacts relate most significantly to chemical and physical hazards. Common chemical impacts are associated with the use of volatile organic solvents and associated emissions of volatile organic compounds (VOCs). The International Agency for Research on Cancer has classified tetrachloroethene as a Group 2A carcinogen, which means that it probably causes cancer in humans.

- **Inhalation hazards** – Perchloroethylene will evaporate fairly rapidly into the atmosphere due to its high vapour pressure. Inhaling these vapours (particularly in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and even death. These risks can be minimised through the selection of less hazardous cleaning solutions. Equally, VOC dispersion in work areas can be minimised with the installation of extraction fans and other ventilation outlets.
- **Skin contact hazards** – Direct skin contact with chemicals. Studies have shown that repeated or extended skin contact with tetrachloroethene may dissolve fats from the

¹ A drywell is an underground structure used to dissipate unwanted water, typically stormwater runoff into the ground.



skin, resulting in severe skin irritation. These risks can be readily mitigated through the use of gloves, eye protection and protective clothing to keep chemicals off the skin.

- **Physical hazards** – These are typically more common and less serious hazards and include trips and falls, manual handling, cuts from scissors when altering clothes and steam burns from ironing.

Solid Wastes

The distillation process separates the used solvent by heating, vaporizing and then condensing the contaminated solvent into a solvent/water mixture, which after separation yields a pure solvent that can be reused. This process leaves behind two distinct types of contaminants, commonly referred to as cooked powder residue and sludge:

- **Cooked Powder Residue** – a hazardous waste containing solvent, powdered filter material (diatomite), carbon, non-volatile residues, dyes, lint, soils, grease, and water.
- **Sludge** – which is usually designated as hazardous and contains solvent, water, soils, carbon and other non-volatile residues.

Hazardous waste storage and transfer arrangements should be checked to ensure the use of adequate containers that are correctly labelled and sited. A dry cleaner should only use a licensed hazardous waste contractor to dispose of such waste and all waste consignment records should be checked and appropriately stored.

Materials Storage and Handling

In many cases, proper storage of solvents and solvent waste is not heavily enforced and the

potential often exists for spillages to enter into stormwater drains or municipal sewer systems. Poor labelling of materials and inadequate segregation of incompatible materials may also represent a fire hazard, and/or a hazard to human health and the environment.

OTHER ENVIRONMENTAL, HEALTH AND SAFETY RISK/LIABILITY ISSUES

Wastewater

Wastewater generated during the cleaning of the plant has the potential to be contaminated with chlorinated solvents and may therefore require specialist treatment or disposal measures. The detergents used in wet cleaning machines can contain surfactants to remove non-water soluble material. The local water authority may impose limits to discharge wastewater containing surfactants, oils or grease.

Nuisance

In rare cases odour problems may be an issue if the facility is located in close proximity to residential areas. If this is the case consideration should be given to odour reduction equipment e.g. installation of activated carbon filters.

KEY SOCIAL, LABOUR AND COMMUNITY RISK/LIABILITY ISSUES

Labour standards

Labour standards are rules that govern working conditions and industrial relations. They may be formal, such as national level regulation and international agreements, or informal, expressed through norms and values. In general, developed countries have more robust labour standards than developing countries where the associated risks are higher. The commonly accepted rights and principles enshrined in the International



Labour Organization conventions are the right to collective bargaining, elimination of forced or compulsory labour, abolition of child labour and elimination of all forms of discrimination. In addition, fair wages and working hours and acceptable working conditions should be expected.

Labour standards should apply to the company's own employees as well as to all contractors and sub-contractors engaged. In addition, labour standards should be expected to be enforced by key suppliers.

Community Risks

Neighbouring community land and water resources may be at risk of contamination from the misuse and inappropriate storage, handling and disposal of chlorinated organic solvents. This can have a negative impact on the health of local members of the community. This, in turn, may expose the company to significant liability risk.

OTHER SOCIAL, LABOUR AND COMMUNITY RISK/LIABILITY ISSUES

Supply Chain

The supply chain impacts of a dry cleaner might appear to be relatively minor. Nevertheless, the dry cleaner should ensure that its suppliers of chlorinated organic solvents are considering their environmental and social impacts when producing these chemicals and are complying with national level regulation and international agreements. Where their suppliers do not incorporate environmental and social risks into their operations, they may be unable to effectively conduct business. Examples include business disruptions from labour issues and loss of licence due to environmental damage.

FINANCIAL IMPLICATIONS

The principal financial implications of environmental and social issues associated with dry cleaners are as follows:

- Cost of obtaining permits for chemical storage;
- Cost of obtaining waste disposal permits and related charges;
- Fines and prohibitions arising from failure to meet the conditions imposed under the permits or other emission limits;
- Remedial costs associated with environmental impacts such as soil contamination or unplanned discharge of chlorinated organic solvents into surface water bodies;
- Installation of extraction fans to reduce occupational exposure to chlorinated organic vapours in the dry cleaning process; and
- Installation of abatement plant to reduce emissions to the environment.
- If a chemical spill or discharge affects the local environment and/or public health, this could result in civil liabilities and damage to public perception of the operating company with potentially serious financial implications.

IMPROVEMENTS

Companies can implement improvements to better manage the environmental and social aspects of their business. Examples of such improvements are given below.

Environment

- Reduce the use of hazardous chlorinated organic solvents such as perc by switching to other less environmental damaging solvents such as glycol ethers and liquid silica. However, this would require all cleaning machines to be replaced at potentially significant cost. Operators may also consider switching to new wet technologies, which do not use chlorinated organic solvents during the cleaning process. However, these technologies cannot be used on all fabrics and also require new cleaning machines.
- Integrity test sewer system to identify leaks and then ensure any damaged sections are repaired.

Health and Safety

- Develop a written health and safety policy, and keep written records of health and safety management including risk assessments and training provision;
- Provide adequate ventilation where chlorinated organic solvents are used and stored;
- Reduce risks of dermatitis by providing warning posters, as well as hand cream, gloves and training on proper chemical use.
- Reduce injuries due to slips and falls by ensuring walkways are kept clear and providing adequate training to spot potential trip hazards;
- Communicate to all employees that eating, drinking and smoking are not permitted in areas where chemicals are used;

Social, Labour and Community

- Implement a formal code of business conduct, which outlines the principles by which individual employees and the organization must conduct themselves;
- Ensure fair wages, fair working hours, and minimum age of workers in line with national law and sector standards average.

GUIDE TO INITIAL DUE DILIGENCE SITE VISITS

The issues and risks associated with a site will vary depending on factors including the type and size of the operation, site location, and the quality of management. However, due diligence visits should consist of a tour of the entire site.

When visiting the sites of existing or potential borrowers, financial intermediaries may wish to use the following suggestions to guide the initial due diligence process. However, note that this does not represent an exhaustive list of issues for consideration.

During the initial site visit, it will be important to assess the following:

Environmental, Health and Safety

- Determine the dry cleaning process used on site and the type of solvent employed;
- Determine how solid wastes, including cooked powder residue and sludge are disposed of or recycled;
- Check the status of environmental permits at the site, to include discharges to air and water, disposal of waste and noise;



- Check whether the site has any outstanding fines, or a record of poor relationships with environmental regulators or the community in which it operates;
- Check for signs of ground contamination from chemicals stored and used at the site, for example looking for stained earth/concrete, dead vegetation near storage containers and production areas, and the integrity, condition and age of storage tanks;
- What is the standard of housekeeping on site? Look for evidence that the walking and working surfaces are kept clean and dry;
- Check whether general health and safety precautions are being followed. Do employees wear protective equipment in handling chemicals? Is there appropriate signage and instruction regarding chemical use and disposal? Have staff been trained in chemical use and dry cleaning operations?

Labour Issues

- Check that labour standards, contracting and remuneration are in line with national law and are consistent with the average for the sector;
- Check that hours worked, including overtime, are recorded and that staff receive written details of hours worked and payment received;
- Has the Company received inspections from the local labour inspectorate in the previous three years? Have these resulted in any penalties, fines, major recommendations or corrective action plans?

- Does the organization have a grievance mechanism which allows employees to raise workplace concerns?
- Are employees free to form, or join, a workers' organization of their choosing?

Community engagement

- Is there a policy and process for regular consultation with local community representatives?
- Is there a policy to prioritise community concerns and integrate into management decisions?

ACTION PLANS

Any lending or investment should take place within the context of Environmental and Social Action Plans, which should have clear timescales and roles and responsibilities established for each action point. Typically, plans may include:

Environment

- Implement a programme to monitor and reduce environmental impacts associated with dust, odour, and water and chemical use;
- Set environmental performance targets to meet regulatory standards and industry best practice;
- Implement a waste management plan incorporating a waste reduction programme to reduce solid waste generation and improve waste disposal, materials storage, materials handling and emergency response procedures;



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Sub-sectoral Environmental and Social Guidelines: Dry Cleaning

- Develop a training plan for company staff to ensure proper chemical handling, storage, and disposal, and;
- Establish a schedule and procedure for review and updating of the environmental action plan.
- Develop Key Performance Indicators (KPIs) for Health and Safety measures with monitoring, reporting and target setting;
- Encourage a culture of 'safety first' through communication from the top.

Health and Safety

- Develop a formal Health and Safety policy;
- Maintain a schedule to track training given to workers and managers on safety policy and procedures;

Social, Labour and Community

- Design and communicate an appropriate code of business conduct that considers concerns of key stakeholders (shareholders, employees, government bodies, NGOs);
- Implement best-practice labour standards (in line with ILO principles).



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Sub-sectoral Environmental and Social Guidelines: Dry Cleaning

REFERENCES AND ADDITIONAL SOURCES

Issue/Body	Link
Dry Cleaning & Laundry Institute	http://www.ifi.org/
Environmental Protection Agency	http://www.epa.gov/dfe/pubs/garment/ctsa/factsheet/ctsafaq.htm#2
International Labour Organization declaration	http://www.ilo.org/declaration/thedeclaration/lang--en/index.htm
National Institute of Occupation Safety & Health (NIOSH)	http://www.cdc.gov/niosh/hc18.html