ADEQ Arizona Department of Environmental Quality

RESOURCE SUMMARY

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Pollution Prevention (P2) for Dry Cleaners

One of the major solvents used in the dry cleaning industry is perchloroethylene (PCE), also known as tetrachloroethylene. PCE is a heavily regulated and widely used chemical which makes managing and properly disposing of it costly. Preventing its waste or eliminating its usage can help protect the environment, reduce worker exposure, and save money for dry cleaner owners and operators.[1]

Pollution Prevention Practices

There are several pollution prevention practices to employ while still using PCE to dry clean. The four main categories relate to machine maintenance, auxiliary equipment, control devices, and general housekeeping. Given that PCE is a hazardous air pollutant under the Clean Air Act, effectively managing the amount of PCE in a dry cleaning system can reduce the overall impact to air quality. As indicated by 40 CFR 63.322 (j-n), be sure to perform routine leak checks on a regular and frequent schedule and know how to use the correct tools to do so.[A] Additionally, county regulations may require a permit.[B] For example, halogenated hydrocarbon detectors or PCE analyzers can be used for detection of weak leakages.[1] Installing refrigerated condensers and carbon adsorption units will greatly enhance capture of PCE during changeovers and opening doors when a dry to dry system is not implemented.[1] Training of employees is very important as there is danger of PCE leaking out into the surroundings during transfer of clothes, maintenance of machines, etc., if not handled carefully.[1]

More information on the practices of pollution prevention can be found here as provided by the Minnesota Technical Assistance Program. Federal regulation related to handling and disposal of PCE can be found on EPA's website.[2]

Alternatives to PCE

The best way to prevent pollution and reduce waste at the source is to eliminate PCE from dry-cleaning processes altogether. Several PCE alternatives exist in the dry cleaning industry. PCE is regulated by the National Emission Standard for Hazardous Air Pollutants (NESHAP), thus avoiding the use of it altogether will reduce the regulatory burden placed on a dry cleaning facility.[1] Listed in order from most environmentally conscious to least:

Wet or aqueous cleaning provides an opportunity to eliminate the use of PCE and with properly trained employees, the quality of the cleaned garments is comparable to PCE systems. The waste from these systems is no longer considered hazardous and the savings from this change can offset the cost of switching to a wet cleaning system. In addition to the waste savings, this system poses a significant energy savings opportunity in conjunction with reduced water consumption as there is no longer a need for condensing and solvent recovery systems.[3] [4]

Carbon Dioxide (CO2) -based systems use nonpolar liquid CO2 to clean garments. CO2 systems reduce fading and wear on clothing, and in general are gentler on clothing due to the system not requiring heat to clean garments. The process does not produce a hazardous waste which alleviates potential waste management and disposal problems. Due to the use of high pressure equipment, implementing a CO2 system may be cost prohibitive for some smaller facilities. However, after installation and initial set up, the costs turn out to be relatively similar to wet cleaning systems.[3]

Petroleum-based cleaner is a good alternative for facilities already using a petroleum-based cleaning system. While load times for these systems have been longer than PCE-based systems, advancements are being made to rectify this in new machines. Hydrocarbons used in dry cleaning have high flash points and may not be characteristic hazardous waste, though careful waste determination must be made based on state regulations. The assessment report on the performance and handling of these alternatives is found on the website of the Toxic Use Reduction Institute (TURI) of University of Massachusetts, Lowell.[3]

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Energy Conservation

Non-vented dry-to-dry machines run in a closed loop, hence residual solvents are not vented out in the air. Most modern machines are built in this style. It is also required for some facilities by regulation to not vent out chemicals, especially PCE.[1]

Using Energy Star rated boilers can cut down consumption of energy. Also, using Variable Frequency Drives (VFDs) for pumps and motors will further reduce energy use. Recovered heat can be used to pre-heat boiler water.

Changing from a PCE-based system to a wet or aqueous cleaning system can show up to a 44 percent reduction in electricity use as a result of removing PCE dry clean machines and water-cooling towers, both of which are particularly energy intensive in the dry cleaning process.[4] Additionally, almost 80 percent of "dry-clean only" labeled garments can be cleaned using an aqueous cleaning method with proper controls, moisture monitoring, and tensioners.[1] This cleaning method reduces agitation during washing and can increase water extraction prior to drying.

General Practices

Cost of solvent purchase and disposal can be reduced by recovering spent solvent from filters efficiently. Vapor loss can be minimized by reducing the time for which machine doors are opened. Replace cartridge filters with spin-disk filters as these can be cleaned without opening.[5]

Provide secondary containment in areas where PCE is stored. Avoid overloading garments since this lessens the efficiency of solvents used to clean as well as recovering solvents. Optimum loads achieve superior cleaning with the least amount of solvent used.[6] Buy chemicals from companies that will pick up spent solvent from your facility or find a solvent-recycling facility.

Alternative cleaning techniques like ultrasonic cleaning[7] can help reduce the use of chemicals. In this technique, ultrasonic waves are used to agitate and free stain molecules from clothes.

References

[1] University of Minnesota. Minnesota Technical Assistance Program. *Pollution Prevention in Dry Cleaning Facilities.*
[2] EPA. *Regulatory Information. Dry Cleaning Sector (NAICS 8123).*
[3] TURI. *Dry Cleaning.*
[4] Sinsheimer, Peter, et al. Air & Waste Management Association. *The Viability of Professional Wet Cleaning as a Pollution Prevention Alternative to Perchloroethylene Dry Cleaning.*
[5] University of Minnesota. Minnesota Technical Assistance Program. *Resources & Associations for Dry Cleaners.*
[6] Colorado Department of Public Health and Environment. Pollution Prevention Program. *Fact Sheet - Pollution Prevention for Dry Cleaning.*
[7] DuVal, Dean, et al. United State Patent, 2006. *Enhanced ultrasonic cleaning devices.*

1 - http://www.mntap.umn.edu/wp-admin/admin-ajax.php?juwpfisadmin=false&action=wpfd&task=file.download&wpfd_category_id=165&wpfd_file_id=11848&token=1e31c301aade96106c83663b2e26e4b5&preview=1

A - https://www.gpo.gov/fdsys/pkg/CFR-2017-title40-vol11/pdf/CFR-2017-title40-vol11-sec63-322.pdf

B - https://www.maricopa.gov/DocumentCenter/View/16986/Dry-Cleaner-General-Permit-PDF

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