California Air Resources Board

Dry Cleaning Notice 2009-2

November 2009

Alternative Solvents Used for Dry Cleaning Operations

The Airborne Toxic Control Measure for Emissions of Perchloroethylene (Perc) from Dry Cleaning Operations (Dry Cleaning ATCM) became law on December 27, 2007. The Dry Cleaning ATCM is a statewide regulation which applies to all Perc dry cleaning facilities. Under the Dry Cleaning ATCM, all existing Perc dry cleaning machines at co-residential facilities and all Perc dry cleaning machines 15 years old are required to be removed from service beginning July 1, 2010. Each year thereafter, Perc machines must be removed from service when they are 15 years old until all Perc machines are removed from service by January 1, 2023.

To assist owners and operators with the upcoming compliance deadlines, we are providing updated information in this notice on the available alternative dry cleaning solvents which are being used in California. Listed below are brief summaries for each of the alternative solvents, potential machine cost information, and information on available financial assistance programs.

This information is not meant to be exhaustive as other solvents may also be available. More information on the alternatives may be found in our March 2008, Fact Sheet titled *Dry Cleaning Alternative Solvents: Health and Environmental Impacts* located at the following website http://www.arb.ca.gov/toxics/dryclean/pub.htm#fact.

Available Alternative Solvents

Water-Based Cleaning

Water-based cleaning systems use water and detergents to clean garments. In general, detergents are approved for disposal into sewer systems by local sanitation districts. Currently, there are three types available: 1) professional wet cleaning systems; 2) cold water cleaning systems; and, 3) Green Jet™ dry-wet cleaning™ systems. Water-based cleaning systems are approved non-toxic and non-smog-forming dry cleaning technologies and qualify for grant money under California's Non-Toxic Dry Cleaning Incentive Program, established by Assembly Bill 998 (AB 998).

Carbon Dioxide (CO_2)

The CO_2 process, developed by commercial and retail dry cleaners, is a high pressure system using liquid CO_2 as the cleaning solvent. CO_2 is a non-flammable, non-toxic, naturally-occurring gas that becomes a liquid solvent when subjected to pressure. There is no expected health risk to the general public from these processes. The CO_2 process is also an approved non-toxic and non-smog forming dry cleaning technology that qualifies for grant money under the California's Non-Toxic Dry Cleaning Incentive Program. The CO_2 used in this process is obtained from large combustion sources, so there is no net increase in greenhouse gas emissions due to this process.

Hydrocarbon Solvents

Currently, the types of hydrocarbon solvent technologies available are: 1) DF-2000™ Fluid; 2) PureDry®; 3) EcoSolv®; 4) Shell Sol 140 HT; and, 5) Stoddard solvent. The machines using hydrocarbon solvents are predominately multi-solvent closed-loop machines equipped with primary controls. Detailed information on each of the hydrocarbons is available in the Air Resources Board staff report available at http://www.arb.ca.gov/regact/2007/perc07/perc07.htm. Hydrocarbon solvents are considered volatile organic compounds (VOC) which contribute to the formation of ozone which is linked to ill-health effects including respiratory irritation, asthma, and premature death. Although there is limited health information on these solvent mixtures, the National Toxicology Program (NTP) conducted a study on the Stoddard solvent that concluded some evidence of carcinogenic activity in male rats. Additionally, the Stoddard solvent can be irritating to the eyes, nose, throat, and can also have effects on the nervous system.

GreenEarth® (Volatile Methyl Siloxane)

Decamethylcyclopentasiloxane (D_5) or volatile methyl siloxane is the ingredient present in the GreenEarth® dry cleaning solvent used in multi-solvent machines. The ARB does not consider D_5 to be a VOC. In 2007, the Office of Environmental Health Hazard Assessment (OEHHA) conducted an evaluation of the available D_5 information and concluded that exposures of D_5 at the highest achievable vapor concentrations cause uterine tumors in rats.

OEHHA is also concerned about the potential non-carcinogenic effects associated with D_5 and its apparent persistence in the environment and animal and human tissues. However, available exposure information indicates that the use of D_5 as an alternative dry cleaning solvent will not pose a risk to the public living near businesses using D_5.

Rynex™ (Rynex 3 or Propylene Glycol Ether)

Rynex™ (Rynex 3) is an organic and biodegradable solvent with low volatility and a high flash point. It is considered a VOC. Rynex 3 can be used in most hydrocarbon multi-solvent machines with some temperature and timing adjustments. Rynex 3 represents the current formulation for Rynex™ and consists of a mixture of glycol ethers. Rynex 3 does not contain propylene glycol t-butyl ether which was an ingredient used in a previous formulation for Rynex but instead contains dipropylene glycol tert-butyl ether (DPTB). Currently, there is limited toxicity data available for DPTB. More detailed information on the toxicological studies for the previous formulation of Rynex™ can be found in the Technical Assessment Report available at http://www.arb.ca.gov/regact/2007/perc07/perc07.htm.

1-Bromopropane (n-propyl bromide)

1-Bromopropane (n-propyl bromide or n-PB or DrySolv) is now being used in California by a small amount of dry cleaning facilities. It is considered a VOC. Although one of the n-PB solvent manufacturers has recently began to market a dry cleaning machine specifically for use with the n-PB solvent, this solvent is also being used in modified Perc dry cleaning machines with secondary control. When using a modified Perc dry cleaning machine, facility owners are learning that n-PB must be used with stabilizers because the chemical is unstable when water is present. This process uses a lot of water and n-PB reacts with the water to form hydrogen bromide, which can be very corrosive. The stabilizer takes up the water and prevents the n-PB from going acid and destroying the dry cleaning machine. This solvent is listed under Proposition 65 as a reproductive toxicant. It causes sterility in both male and female test animals, and harms developing fetuses. It can damage nerves, causing weakness, pain, numbness, and paralysis.

Solvair™ (dipropylene glycol normal butyl ether/ CO_2)

The Solvair dry cleaning technology is fairly new in California. This technology uses a closed loop process in which dipropylene glycol n-butyl ether (DPNB) is used as the base cleaning solvent and liquid CO_2 is used to rinse out the solvent and dry the garments. There is limited toxicity information available for DPNB and there is no expected health risk from the exposure to the CO_2 used in the Solvair technology.

Updated Machine and Installation Cost Comparison

Below is a list of updated installation and typical machine or system cost for the range of available technologies in California.

Machine Type	Installation Cost[1]	Typical Machine or System Cost[1]
Professional Wet Cleaning[2]	$3,500	$38,300
CO_2 (60 lb capacity)	$48,000	$143,000
Multi-Solvent Hydrocarbon (50 lb capacity)[3]	$4,300	$47,000 – 50,000
DrySolv (n-PB)	Included in Machine Cost	$80,000
Solvair (30 lb capacity)	$3,000 – $8,000	$80,000

1. Values are rounded to the nearest hundred.
2. Averages taken from 2009 California Non-Toxic Dry Cleaning Incentive Program data.
3. Closed loop machine designed for high flash point hydrocarbon, GreenEarth & Rynex 3 solvents and include machines that operate with Tonsil™ and without distillation.

Fire Hazard Considerations

The alternative dry cleaning technologies listed in this fact sheet, with the exception of water-based and CO_2 cleaning technologies use solvents that may be regulated by local Certified Unified Program Agencies (CUPA)

because of their flammability and/or combustibility. CUPA contact information may be found on the following website: http://www.calepa.ca.gov/CUPA/Directory/default.aspx.

In addition, the Office of the State Fire Marshal (SFM), along with other state agencies is in the process of revising the 2007 California Fire Code (CFC) to provide an alternative compliance option to existing dry cleaners. Currently, the 2007 CFC requires automatic sprinkler protection for all dry cleaning establishments that use Type II (Stoddard), or Type III (all other solvents, except CO_2 and water-based) dry cleaning systems without exception. The SFM is proposing to allow existing dry cleaning facilities (facilities in operations prior to January 1, 2008) to comply with the provisions of the National Fire Protection Association 32: Standard for Dry Cleaning Plants (NFPA 32). Provisions contained in NFPA 32 offer a viable alternative to the provisions in the 2007 CFC. NFPA 32 will allow dry cleaning operations to convert from Perc to Type II or Type III dry cleaning systems without full building automatic sprinkler protection, provided certain provisions of NFPA 32 are met. These provisions include but are not limited to: 1) solvents are limited in quantity; 2) provisions for 2 and/or 3 hour fire barrier separation; and 3) equipment protection/limitation provisions. For more detailed information and to view the draft Final Statement of Reasons, please visit SFM's website at http://osfm.fire.ca.gov/codedevelopment/codedevelopment_2010codeadoptioncycle.php.

Financial Assistance Programs Available to Assist in the Purchase of an Alternative Dry Cleaning Machine[1]

- ***City & County Programs*** – Some local city and county offices periodically offer financial assistant or grant programs. As a resource, we recommend contacting your local air district for information on any potential financial incentives that are being offered through the local offices. Please visit the following web-site for general contact information for each of the local air districts: http://www.capcoa.org/Districts.htm.

- ***Statewide Non-Toxic Dry Cleaning Incentive Program (Assembly Bill 998***) – Provides a $10,000 grant to California dry cleaners who replace their existing Perc dry cleaning system with non-toxic and non-smog forming systems such as water-based and CO_2. For more information on the program, please visit the Non-Toxic Dry Cleaning Incentive Program website at: http://www.arb.ca.gov/toxics/dryclean/ab998.htm.

- ***Federal and State Small Business Loan Programs*** – Provide assistance in the form of low interest or guaranteed loans or by helping small businesses in financial planning. Below is a brief description of the available programs and contact information:
  - The *Minority Business Development Agency*, part of the United States Department of Commerce, provides assistance to socially or economically disadvantaged groups who own or wish to start or expand their own businesses. More information on the services offered by MBDA can be found at http://www.mbda.gov;
  - The *United States Small Business Administration* offers assistance for small businesses in the form of loan guaranties made by banks and other private lenders. More information can be found at http://www.sba.gov/ca;
  - The *California Small Business Loan Guarantee Program* allows a business to obtain a loan and help in establishing a favorable credit history with a lender. More information on the Small Business Loan Guarantee Program can be found at http://www.calbusiness.ca.gov/cedpgybfasblgp.asp; and,
  - The *California Capital Access Program* helps small businesses obtain financing by encouraging banks and other financial institutions to make loans to small businesses. More information on this program can be found at http://www.treasurer.ca.gov/cpcfa/calcap.asp.

Contacts for More Information

For more information on the Dry Cleaning ATCM requirements, please contact Mei Fong at 916.324.2570 (e-mail: sfong@arb.ca.gov), Sonia Villalobos at 916.327.5983 (e-mail: svillalo@arb.ca.gov), Hafizur Chowdhury at 916.322.2275 (e-mail: hchowdhu@arb.ca.gov), or visit our dry cleaning website at http://www.arb.ca.gov/toxics/dryclean/dryclean.htm. Please contact your local air district for the enforcement of the Dry Cleaning ATCM. If you need this document in an alternate format or language, please contact one of the ARB staff listed above. TTY/TDD/Speech to Speech users may dial 711 for the California Relay Service.

[1]This Notice includes a compilation of some financial assistance programs that are available for dry cleaners and does not represent endorsement by the ARB. Dry cleaners need to consider whether any one of the programs is suitable for their businesses.