



PACE
PARTNERS FOR A
CLEAN ENVIRONMENT

Air Pollution *Volatile Organic Compounds*

Spring 2009

What is PACE?

PACE provides education outreach, technical assistance, and recognition for environmental achievement. The program is available at no cost to businesses in Boulder County. PACE offers:

- Assessments to identify opportunities for waste reduction, water conservation, and energy-efficiency
- Information and assistance to meet your business needs
- Compliance education
- Public recognition for your environmental efforts

Why Participate?

Compliance – Our free, non-regulatory consultations help you comply with environmental laws and ordinances and reduce your liability.

Cost Savings - Less waste means lower disposal and operating costs. Efficient use of water, energy, and materials saves money.

Public Image - Environmental practices impact your image with customers, the community, and regulatory agencies.

Public Recognition!

PACE publicly recognizes certified businesses through **free advertising**. This includes Internet listings and advertising in newspapers, magazines, utility bill inserts, and radio spots.

Certified businesses receive a PACE window decal and framed certificate. PACE encourages the public to support businesses that contribute to the community through environmentally sound operating practices.

What Is A Volatile Organic Compound?

Volatile Organic Compound's (VOCs) are gases emitted from certain solids or liquids. VOCs contribute to the formation of lower-level ozone by reacting with nitrogen oxides (NOx) in the presence of sunlight. When this mixes with dust in the atmosphere it forms smog. Upper-level ozone is needed, but in the lower atmosphere it can create health problems for plants, animals, and the environment.

In print shops these gases are emitted from photographic chemicals, inks, fountain solutions, cleaning solvents, and coating solutions. Concentrations of many VOCs are consistently higher indoors (up to ten times higher) than outdoors.

Vapor Pressure and Control Technique Guidelines (CTG)

Vapor Pressure (VP) measures a products ability to evaporate. VP of a VOC is measured with a barometer and is recorded in millimeters of Mercury (mmHg). If the product has a VP of 10 mmHg or less at 20°C, it is considered a low-VOC product. Control Technique Guidelines (CTG) are industry standards created by the EPA and the printing industry to reduce VOC emissions. Because the industry found the products with a low-VOC content to be unsuitable for producing a good quality print, CTG were accepted allowing printing products that have a VP of 10 mmHg or less to be equivalent to low-VOC (less than 30% VOC content) products. Vapor Pressure and VOC content information can be found on the MSDS sheet for each product.

Do I Need To Know What My VOC Emissions Total?

The easy part of this answer is: YES, you do need to know what your VOC emissions total for the year. If you generate more than 1 tons per year, you need to file an Air Pollution Emissions Notice (APEN) and if you generate more than 3 tons per year you need to obtain a permit. These are filed with the Colorado Department of Public Health and the Environment.

Helpful Conversions and Formulas

1 ton = 2000 pounds (short ton) 1 liter= 0.264 gallons 1 pound = 454 grams

$$1. \text{ VOC emissions } \left(\frac{\text{pounds}}{\text{year}} \right) = \text{VOC content } \left(\frac{\text{pounds}}{\text{gallon}} \right) \times \text{Quantity used } \left(\frac{\text{gallons}}{\text{year}} \right)$$

$$2. \text{ Weight of product } \left(\frac{\text{pounds}}{\text{gallon}} \right) = \text{Specific gravity} \times 8.34$$

$$3. \text{ VOC emissions } \left(\frac{\text{pounds}}{\text{year}} \right) = \frac{\% \text{ Wt. of VOC}}{100} \times \text{Weight of product } \left(\frac{\text{pounds}}{\text{gallon}} \right) \times \text{Quantity used } \left(\frac{\text{gallons}}{\text{year}} \right)$$

How to Calculate VOC Emissions?

PACE has developed a spreadsheet to help calculate VOC emissions, which can be downloaded from our website at www.ci.boulder.co.us/www/pace/printing/documents/VOC_EmissionInventoryWorksheet.xls

1. Compile a list of all the products used in the print shop. Be sure you have an MSDS sheet for each product. If one is missing contact the manufacturer and request one or look it up on the web (see the list of resources below for MSDS search websites). Put this in Column A of the spreadsheet.
2. Find out how much of each product was purchased, then calculate how much was actually used. It may be useful to do this month-by-month. Record this information in Column C of the spreadsheet.
3. Use the MSDS to determine:
 - a. Record VOC Density (lbs/gallon) in the yellow column (D) OR
 - b. Record Specific Gravity and % VOC in blue columns (G and I)
 - c. The red columns are formatted to do the calculations, so do not enter data in these columns
4. The spreadsheet is designed to calculate the Net Weight of VOCs (lbs) for each product, total the pounds for all the products, and convert the pounds to tons.

To calculate without the spreadsheet use the formulas below. If your MSDS sheet lists the VOC content in lbs/gallon, all you need to use is formula 1. If it is listed in liters per gram, you will need to convert the liters to gallons. Formula 2 converts Specific Gravity to pounds per gallon, then use formula 3 to get pounds of VOC.

Example calculation for Varn Metering Roller Cleaner

SECTION 3 - PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING RANGE/POINT: 247°F - 356°F
VAPOR DENSITY: Heavier than air.
EVAPORATION RATE: Faster than n-Butyl Acetate.
V.O.C. (EPA METHOD 24): 6.36 lb/gal
VAPOR PRESSURE (MM Hg @ 20°C): 9.65
SOLUBILITY IN WATER: Negligible
APPEARANCE AND ODOR: Clear Liquid - Petroleum Odor

SPECIFIC GRAVITY (H₂O=1): .76

Figure 1. Section 3 of the MSDS sheet gives most of the information needed to calculate

Net Weight of VOCs (formula 1)

$6.36 \text{ (lbs/gal)} \times 55 \text{ gal} = 349.8 \text{ lbs VOC emission}$

Weight of Product (formula 2)

$0.76 \times 8.34 = 6.34 \text{ lbs}$

Net weight of VOC (formula 3)

$100\% \div 100 \times 6.34 \text{ lbs} \times 55 \text{ gal} = 347.65 \text{ lbs VOC emission}$

* This can be calculated using the weight of the product minus the VOC lbs/gal. This case it is rounded to 100%.

Helpful Resources

See the PACE website for a list of helpful resource sheets

www.pacepartners.com

PACE VOC Spreadsheet

www.ci.boulder.co.us/www/pace/printing/documents/VOC_EmissionInventoryWorksheet.xls

MSDS Search

<http://www.msds.com/>
<http://www.msdssearch.com/msdssearch.htm>

Colorado Department of Public Health and Environment Sites

Air Pollution Control Division
<http://www.cdph.state.co.us/ap/index.html>

Small Business Assistance Program
<http://www.cdph.state.co.us/ap/sbap/index.html>

VOCs and HAPs Calculating Guide
<http://www.cdph.state.co.us/ap/down/sbapvoccalcs.pdf>



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