

*Important Note: The following text is excerpted directly from the New York State Department of Environmental Conservation's publication, Environmental Compliance, Pollution Prevention, and Self Assessment Guide for the Marina Industry. New York State Department of Environmental Conservation Pollution Prevention Unit. March 2003. The only changes that have been made are the addition of links to pertinent resources or regulations and Editor's Notes, where appropriate.*

## **PARTS CLEANING AND DEGREASING**

### **Regulatory Requirements**

Spent solvents are dangerous to workers because they are toxic and emit harmful vapors. If your facility still uses a parts washing system that contains a hazardous solvent, you may be generating wastes that have EPA Hazardous Waste Codes F001- F005. Also, many solvents may be hazardous because of ignitability, which have an EPA Hazardous Waste Code of D001.

When using hazardous solvents in your parts washing system, you are required to keep track of the amount of spent solvent generated each month and must dispose of the spent solvent as hazardous waste. The following are some of the common spent halogenated and nonhalogenated solvents used in degreasing operations which are considered hazardous:

\*Tetrachloroethylene (Perchloroethylene)

Methyl isobutyl ketone (MIBK)

Methyl ethyl ketone (MEK)

Chlorinated fluorocarbons

Trichlorofluoromethane

Carbon tetrachloride

Ortho-dichlorobenzene

\*Methylene chloride

1,1,1-trichloroethane

Methanol

Isobutanol

Toluene

Acetone

Xylene

Benzene

\*Methylene chloride and perchloroethylene are not VOCs and they have strict emission standards because of their **toxic** emissions.

If your facility uses any of the above parts washing solvents or degreasers, or any other hazardous solvent not listed above, you should make every effort to look for a reliable substitute that is non hazardous or less hazardous. If you do choose to use a hazardous solvent, you must following the hazardous waste regulations.

## **Types Of Parts Washers**

There are many opportunities available to minimize or eliminate your generation of hazardous solvents. One of your first choices should be to use a nonhazardous or less hazardous parts cleaning system. Here are some tips you should follow before purchasing or leasing your parts washer:

- Buy a parts washer with a lid rather than an open bucket or pan. This reduces evaporation and spillage of solvent.
- Instead of leasing, purchase your own parts washer. Service agreements tend to change your solvents more often, which generates more waste. Also, if you are a conditionally exempt small quantity generator, you can transport your spent solvent and sludge to an approved facility.
- Talk to other facilities to find out which system works best. This will save you time and money trying to decide which system is best for you.
- When a supplier or vendor demonstrates a parts washer, make sure you specify that he take away the whole unit, including any still-useable solvent, if you decide not to buy it.
- Buy a parts washer with a drain shelf that fits inside the basin. This allows solvent to drain from parts prior to removing them from the washer.
- Buy a parts washer with a filtering unit that will extend the life of the solvent by filtering out contaminants. Remember, when discarding the filters, a hazardous waste determination must be made prior to disposal.
- Parts washers that are heated seem to work better than unheated units.

Marinas can choose from several different cleaning options including halogenated solvents, aqueous cleaners, ultrasonic cleaners, and electrocleaning. The following is a brief description of some types of cleaning systems.

### **Solvent Cleaners**

Considered one of the best parts cleaners, chlorinated solvent vapor degreasers have strict air emissions standards because of VOC emissions. The main advantage of chlorinated solvents, such as trichloroethylene, perchloroethylene, or methylene chloride is their cleaning effectiveness, especially in vapor degreasers. Handling or disposal of hazardous solvents is more involved and expensive than other cleaners. Because of these costs, marinas are investigating

alternative cleaning methods. More than likely, your marina will not be using a vapor degreaser. If you do choose to use this degreasing process, below is a list of some methods to improve the efficiency:

- Install refrigeration coils in addition to water coils. Coils can help reduce vapors by approximately 40%.
- Cover the degreasing unit whenever possible. The best type of cover is a motor-controlled cover that closes automatically.
- Keep the tip of the spray wand below the vapor level during spraying operations.
- Remove parts from the degreaser slowly. Also, raise and lower the basket of soiled parts gently.
- Rack the parts so that the solvent drains out of the holes, joints, and crevices.

## **Aqueous Cleaners**

Aqueous cleaning refers to the use of water, detergents, acids, and alkaline compounds rather than organic solvents. These cleaners are also made up of builders, surfactants, inhibitors, and chelators.

**Builders** are a basic ingredient of aqueous cleaners. The most common builders are sodium hydroxide, potassium hydroxide, and sodium silicates. These are all alkalines and are difficult to rinse.

**Surfactants**, also known as wetting agents, are used to reduce the surface tension of the cleaning solution. **Emulsifiers** take oils into the solution and keep them from recontaminating the workpiece. Unfortunately, most surfactants are also emulsifiers. Aqueous cleaners work by breaking down the organic soils with builders and solubilizing them with emulsifiers. This tends to leave a large amount of spent wastewater. Weak emulsifiers, however, tend to keep the oils in suspension as long as the solution is agitated, but the emulsion breaks when the agitation stops. The soils can be removed and the solution can be reused.

**Inhibitors** reduce the effect of highly alkaline or acidic cleaners on sensitive substrates. Inhibitors prevent rusting or oxidation of parts after cleaning. Chromates and silicates are common pH inhibitors, but chromates have environmental disadvantages. Also, inhibitors can make rinsing more difficult and adversely affect subsequent plating operations.

**Chelating agents** are designed to keep the metal ions in solution. This, however, can cause problems with wastewater treatment. Aqueous cleaners are among the most popular for degreasing parts and offer a good alternative to petroleum-based and halogenated solvents. The most common aqueous processes are: immersion with ultrasonic agitation, immersion with mechanical agitation, or spray washing.

Aqueous cleaners can generally be used instead of solvent cleaners to remove soils and particulate matter. However, when soils and greases are part of the contamination, other steps might be needed to provide adequate cleaning. Rinsing and drying are of great concern because water can remain on the parts and cause rust. Therefore, aqueous systems require more elaborate rinsing and drying process.

In many cases, wastewater from aqueous cleaners or semi-aqueous processes may need to be treated before discharging to a publicly owned treatment works (POTW). Contaminants include organic matter (oil and grease), metals, and alkaline cleaners that may raise the pH to unacceptable levels. Pretreatment technologies include gravity separators, ultrafiltration, chemical treatment, precipitation, and carbon adsorption. If your facility is treating wastewater from aqueous or semi-aqueous processes, see “[Can You Treat Or Recycle Your Wastewater?](http://www.seagrant.sunysb.edu/marinabmp/pdfs/Water_regs_compliance.pdf)” ([http://www.seagrant.sunysb.edu/marinabmp/pdfs/Water\\_regs\\_compliance.pdf](http://www.seagrant.sunysb.edu/marinabmp/pdfs/Water_regs_compliance.pdf)).

Some benefits of aqueous cleaners include:

- Less risk of hazardous exposure for workers and more environmentally friendly.
- Not flammable or explosive.
- Oils and greases can be removed more effectively.
- Potential savings in disposal costs.

The sludge from oil, grease, dirt and other contaminants should be cleaned out frequently. Prior to disposal, you must make a hazardous waste determination need link on the sludge. [Eds Note: To learn more about making [Hazardous waste determinations New York](http://www.seagrant.sunysb.edu/marinabmp/pdfs/Hazardous_Waste_Regulations_DEC_Compliance.pdf), ([http://www.seagrant.sunysb.edu/marinabmp/pdfs/Hazardous Waste Regulations DEC Compliance.pdf](http://www.seagrant.sunysb.edu/marinabmp/pdfs/Hazardous_Waste_Regulations_DEC_Compliance.pdf))

Nonhazardous sludge can be hauled by a septic tank company or, if dry, taken to a landfill. If you are a [conditionally exempt small quantity generator](http://www.seagrant.sunysb.edu/marinabmp/pdfs/Hazardous_Waste_Regulations_DEC_Compliance.pdf) [Eds Note: For more information on [New York Hazardous waste classifications](http://www.seagrant.sunysb.edu/marinabmp/pdfs/Hazardous_Waste_Regulations_DEC_Compliance.pdf), ([http://www.seagrant.sunysb.edu/marinabmp/pdfs/Hazardous Waste Regulations DEC Compliance.pdf](http://www.seagrant.sunysb.edu/marinabmp/pdfs/Hazardous_Waste_Regulations_DEC_Compliance.pdf)), dried sludge that is considered hazardous can be taken to an approved DEC facility as long as you get prior approval from the facility operator. Check with your local landfill operator for requirements.

### **Semi-Aqueous Cleaners**

These cleaners are also called: less-toxic solvents, less-hazardous solvents, nonhalogenated solvents, petroleum-based solvents or terpene solvents.

Semi-aqueous cleaners can be dissolved in water or applied in a concentrated form. They are called semi-aqueous because they can be applied either way. Terpenes are hydrocarbons derived from wood or citrus fruits, usually orange or lemon peel oils. Most of the semi-aqueous cleaners are not ozone depleters, but they are highly toxic to aquatic life, and they may still be a hazardous waste when spent. A hazardous waste determination should be made prior to disposal.

### **Ultrasonic Cleaners**

This method uses high frequency sound waves to improve the cleaning efficiency of aqueous or semi-aqueous cleaners. The sound waves create microscopic sound bubbles that implode when the sound wave moves and the zone changes from negative to positive pressure. This process exerts enormous pressure (approximately 10,000 psi) and temperatures that loosen the contaminants and actually scrub the workpiece. Ultrasonic cleaning allows nonchlorinated degreasing to be practiced in applications where solvents had formerly been the only effective degreasing tool. Ultrasonic cleaning can be used on ceramics, glass, aluminum, and plastic, as well as electronic parts, wire, cables, rods, and detailed items that might be difficult to clean by other processes.

### **Electrocleaning**

Electrocleaners are basically heavy-duty alkaline cleaners that are used with an electric current, either reverse, direct, or periodic reverse. These systems are designed for soil removal and metal activation where the work is immersed in the solution and current is applied. The objective of electrocleaning is to remove all the soils and activate the metals surface. The gas scrubbing of the oxygen assists in the removal of soils, while the reverse current aids in soil removal and prevents the deposition of any metallic film or non-adherent metal particles. A dilute mineral acid dip usually follows the final cleaner to neutralize the alkaline film on the metal surface.

### **Solvent Distillation**

If hazardous solvents must be used at your facility, consider purchasing a solvent distillation unit to recycle your solvents. For example, if your facility generates five gallons of solvent waste, you may be able to reclaim four and a half gallons of solvent. This would leave you with only one half gallon of sludge to dispose of as hazardous waste. This sludge is called "still bottoms." Solvent is reclaimed by heating spent solvent to its boiling point in a "still", and then cooled, which produces nearly pure liquid solvent that can be reused. Spent solvent need only be counted the first time it is generated in a calendar month if it is reclaimed and reused on site. If spent solvents are counted, then still bottoms don't need to be counted for the purpose of determining generator category, but do need to be managed as a hazardous waste. **If, however, the solvent is recycled without prior storage or accumulation, then you don't have to count that quantity, but you must count the sludge for determining generator category.**