

Solvent Cleaning

This category encompasses a wide variety of industries engaged in cleaning a product, or a component of a product, with the aid of a surfactant, an emulsifier or a solvent other than water. There are many cleaning processes available including low pressure and high pressure sprays, power washers, immersion cleaning, wiping and vapor degreasing.

This category potentially includes over 6800 facilities, and fall into a wide range of SIC codes as shown in Table 1. This number is an estimate based on a 1992 Department of Employment Security publication.

Table 1. Number of Facilities That May Engage in Solvent Cleaning by SIC in Washington State¹

SIC Code	Industry Classification	Number
3471	Electroplating, polishing, anodizing and coloring	46
7629	Electrical and electronic repair shops	236
3479	Coating, engraving and allied services	37
3993	Signs and advertising displays	65
3498	Fabricated pipe and pipe fittings	10
3441	Fabricated structural metal	60
7500	Automotive repair and refinishing	3382
2500	Furniture and fixtures	218
3900	Miscellaneous Manufacturing Industries	374
3600	Electronic Equipment	303
3700	Transportation Equipment	645
3800	Instruments and related products	249
3500	Industrial Machinery and Computer Equipment	856
	Estimated total number of facilities	6855

Table 2 contains information about the most commonly used cleaning compounds that also present adverse impacts on air quality. It is not an exhaustive list, but the compounds of greatest concern are included in the table. Other substances of little or no impact on air quality are also

¹ Information from Employment and Payrolls in Washington State by County and Industry, 1992 Annual Averages. Washington State Employment Security Department.

used such as the higher molecular weight naphthas, soaps and detergents. The Halogenated Solvent Cleaning Maximum Achievable Control Technology (MACT) standards were predicted to reduce the emissions of chlorinated organic solvents by 63% nationwide by 1997 (FR 94-28974).

Table 2. Most Commonly Used Cleaning Compounds with Known Adverse Air Quality Impact

Compound	Reason for Concern
Methylene chloride	carcinogen
1,1,1 trichloroethane	stratospheric ozone depletion potential
Perchloroethylene	carcinogen
Trichlorofluoromethane (CFC-11)	stratospheric ozone depletion potential
CFC-113	stratospheric ozone depletion potential
Lower molecular weight hydrocarbon mixtures	reactive VOCs --participate in tropospheric ozone formation
Trichloroethylene	carcinogen
Methyl ethyl ketone and methyl isobutyl ketone	classified as Class B Toxic Air Pollutants in WAC-173-460

Due to Title 6 of the federal Clean Air Act Amendments, 1,1,1-trichloroethane, CFC-11 and CFC-113 were phased out of production on January 1, 1996. For this reason the industry is currently in an interim period of using hydrofluorocarbon compounds (HCFCs) which will be phased out in January 1, 2020. It is expected that in the long term, newer technologies such as supercritical CO₂, plasma cleaning and laser ablation will replace HCFCs. SAGE (Selecting Alternatives Guide) is an EPA program available for downloading from the CTC directory on the TTNWeb Home Page (<http://www.epa.gov/ttn/>) that offers the user a range of alternative cleaners and processes specific to the job requirements.

Methods of Determining Emissions

Due to the variability of processes, cleaning agents and facilities described above, the only adequate method of obtaining emission estimates is through a registration process. Through the registration process, each facility would submit the following information, and perform a gross material balance: total weight (mass) of solvents purchased per year, and stored or left over from the previous year, total weight of those materials disposed of as solid or hazardous wastes or in the wastewater, the total amount of materials currently in storage. The difference would be an approximation of the amount emitted into the atmosphere per year.

It is important to note that this method of material accounting can be time consuming both for the registered source as well as for the regulatory agency. Nevertheless, it is the only way of obtaining a meaningful approximation of the types of substances and materials emitted into the air, assessing the extent of material substitution, and providing technical assistance.

References

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U.S. Environmental Protection Agency, *Compilation of Air Pollutant Emissions Factors Volume I: Stationary Point and Area Sources*, Fifth Edition with Supplements, January 1995, Document No. AP-42. (Section 4.6, Solvent Degreasing, April 1984)
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U.S. Environmental Protection Agency, *National Emission Standards for Hazardous Air Pollutants: Halogenated Solvent Cleaning- Background Information Document*, EPA-453/R-93-054.

U.S. Environmental Protection Agency, *Technology Transfer Network*, TTNWeb Home Page, <http://www.epa.gov/ttn/>.

Washington State Employment Security Department, *Employment and Payrolls in Washington State by County and Industry, 1992 Annual Averages*.