

SOURCE INVENTORY
CATEGORIES # 1241 – 1245
SOLVENT CLEANING OPERATIONS

1999 EMISSIONS

Introduction

The categories reported here are emissions resulting from the uses of solvent in Cold Cleaning, Vapor Degreasing, and Other Handwiping operations. Categories 1241 and 1242 consist of point and area source emissions from Cold Cleaning operations, respectively; Categories 1243 and 1244 consist of point and area source emissions from Vapor Degreasing operations, respectively; and Category 1245 consists of both point and area source emissions from Other Handwiping activities.

Cold Cleaners

The two basic types of cold cleaners are maintenance cleaners and manufacturing cleaners. The maintenance cold cleaners are usually simpler, less expensive and smaller. They are designed principally for automotive and general plant maintenance cleaning. Solvents used in maintenance cleaners are mainly aliphatic petroleum solvents such as mineral spirits and stoddard solvents.

Manufacturing cold cleaners usually perform a higher quality of cleaning than maintenance cleaners and are therefore more specialized. Manufacturing cold cleaning is generally used in metalworking production. A wide variety of solvents are used in this type of cold cleaner. Manufacturing cold cleaners are fewer in number than maintenance cleaners, but tend to emit more solvent per unit because of the larger size and workload.

Cold cleaning operations include spraying, brushing, flushing and immersion. The designs for material handling in cold cleaning systems are generally divided into manual and batch loaded conveyORIZED systems. Manual loading is used for the simple, small-scale cleaning operations while batch loaded conveyORIZED systems are used for the more complex, larger-scale cleaning operations.

Vapor Degreasers

Vapor degreasers clean through the condensation of hot solvent vapor on colder parts. Solvent vapors condense on the parts to be cleaned until the temperature of the parts approaches the boiling point of the solvent. The condensing solvent

dissolves the oils and provides the washing action. There are two types of vapor degreasers, open top and conveyORIZED. Open top degreasers are batch loaded (cleaning only one load at a time) and are normally located near the work that is to be cleaned. ConveyORIZED solvent degreasers generally are located at central cleaning stations, which require transport of parts for cleaning.

A typical vapor degreaser is a tank designed to produce and contain solvent vapor. At least one section of the tank is equipped with a heating element that uses steam, electricity, or fuel combustion to boil the solvent. As the solvent boils, dense solvent vapors displace the air within the equipment. Condenser coils located on the sidewalls of the degreaser control the upper level of this pure vapor. These coils (which are supplied with a coolant such as water) are generally located around the inner surface of the degreaser and must be placed below the top edge of the degreaser. This is to protect the solvent vapor zone from disturbance caused by air movement around the equipment.

The distance from the top of the vapor zone to the top of the degreaser tank is called the freeboard and is generally established by the location of the condenser coils. The freeboard is 50% – 60% of the width of the degreaser for solvents with higher boiling points (perchloroethylene, trichloroethylene, and 1,1,1-trichloroethane). The freeboard is at least 75% of the width of the degreaser for solvents with lower boiling points (trichlorotrifluoroethane and ethylene chloride).

Most degreasers are equipped with a water separator. The condensed solvent and moisture are collected in a trough below the condenser coils and directed to the water separator. The water separator is a simple container, which allows the water to separate and decant from the system while the solvent flows from the bottom of the chamber back into the vapor degreaser.

Handwiping

Handwiping, or wipe cleaning, includes solvent cleaning done by hand or by means of equipment other than cold cleaners or vapor degreasers. Emissions from handwiping activities are widespread and occur from solvent usage in manufacturing and maintenance activities. Manufacturing usage refers to any activity (other than in cold cleaners or vapor degreasers) where solvent is used to clean products during the manufacturing process. This includes final wipe cleaning prior to packaging and shipping. Maintenance usage refers to any activity (other than in cold cleaners or vapor degreasers) where solvent is used to clean machinery, tools or other equipment not incorporated into the product. To illustrate this, handwiping may involve wipe-cleaning a small electronic component with alcohol or large manufacturing equipment with a solvent.

Methodologies

Cold Cleaners and Vapor Degreasers

Emissions from Cold Cleaning and Vapor Degreasing Categories (Categories 1241 – 1244) were estimated using the District’s July 1998 “Staff Report on Solvent Cleaning Operations for Regulation 8, Rule 16.” In this report, the 1996 cold cleaning emissions were estimated with the assumption that this represented approximately 65% of the total emissions from solvent cleaning operations (including conveyORIZED). The remaining 35% of the total emissions came from vapor degreasers. Using these ratios, the 1996 vapor degreasing emissions was also calculated. The 1999 emissions from cold cleaners and vapor degreasers were based on these 1996 figures and adjusted using growth factors (discussed under Growth Profile section).

Cold cleaning and vapor degreasing operations consist of both point and area source emissions. Point sources are covered under the District’s permit system. Emissions are calculated by using solvent throughput of each source reported by companies in the District’s Data Bank system. Emission factors were based on solvent composition. Cold cleaning and vapor degreasing area source emissions were calculated by subtracting their respective total emissions from their respective point source emissions. As mentioned previously, the total emissions from cold cleaning and vapor degreasing operations were estimated from the District’s staff report.

Other Handwiping

The total District handwiping emissions were based on the 1996 California Air Resources Board’s (CARB) report on “Solvent Cleaning/Degreasing Source Category Emission Inventory”. One aspect of this report dealt with handwiping emissions in each air basin within California for 1993. The District’s 1999 emissions were based on this 1993 value and adjusted using a growth factor (discussed under the Growth Profile section).

Additionally, there are handwiping emissions that can be found in other District categories (both point and area sources). Since these sources are subject to various other rules (i.e. graphic printing operations, polyester resin operations, various industrial/commercial coatings rules, etc.), the emissions will remain in these specific categories. To prevent “double-counting”, the organic emissions from these categories will be subtracted from the growth adjusted CARB total handwiping value. This new emission value is known as other (or remaining) handwiping emissions.

Listed below are the categories that contain handwiping emissions to be subtracted from the total value:

Category	Description
23	Coatings and Ink (point source)
24	Resins (point source)
45	Fiberglass Products Manufacturing (point source)
108	Gravure Printing (point source)
109	Flexographic Printing (point source)
110	Letterpress Printing (point source)
112	Lithographic Printing (point and area sources)
115	Silkscreen Printing (point and area sources)
116	Small In-house Printing (point and area sources)
253, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281	various Industrial/Commercial Coatings (point and area sources) ¹
282	Other Organics Evaporation (point source)

In 1999, the total TOG handwiping emissions from the categories listed above amounted to 6.58 tons/day. As mentioned previously, this value is subtracted from growth adjusted CARB total handwiping estimate to obtain the Other (or remaining) Handwiping emissions for Category 1245.

Other Handwiping emissions consist of both point source and area source emissions. Point source emissions are covered under the District's permit system. Area source emissions were estimated by subtracting the other (or remaining) handwiping emissions from the point source emissions.

The current Other Handwiping emissions (TOG and ROG) have been reduced from previous estimates due to:

- An adjustment in the growth profile reflecting actual point source growth between 1993 – 1999;
- On further review, it was estimated that most of the emissions from the Industrial/Commercial clean-up solvent categories (as listed above) were from handwiping. This resulted in lower emissions in Category #1245 (Other Handwiping);

¹ Note: spray gun cleaning is not considered a part of handwiping activities from the various industrial/commercial coatings categories. It is assumed 20% of the emissions from these categories were from gun cleaning, and, therefore, not considered a part of handwiping activities.

- The ROG factor was lowered based on CARB's value.

Monthly Variation

The monthly distribution was estimated based on the point source's weighted average of reported quarterly seasonal percent throughput data.

County Distribution

Emissions distributed into the nine Bay Area counties are based on the county fractions as determined from CARB's report on "Solvent Cleaning/Degreasing Source Category Emission Inventory".

TRENDS

History

The growth profiles for the cold cleaning, vapor degreasing, and handwiping categories all followed the Association of Bay Area Government's (ABAG) 2000 Manufacturing Employment profile for the years prior to 1993. Between the years 1993 – 1999, the growth profiles were modified to reflect the estimated emissions (point and area source) calculated for the years of 1993, 1996, 1998, and 1999.

Growth

The growth profile for cold cleaning operations after 1999 was also based on ABAG's 2000 Manufacturing Employment profile. In the vapor degreasing and handwiping operations, a downward trend in solvent usage from the mid-1990's was observed. Using this trend, assume the solvent usage in vapor degreasing operations decrease 31% during the period of 1999 – 2030. For handwiping operations, assume the solvent usage in vapor degreasing operations decrease approximately 25% during the period of 1999 – 2030.

Control

District Regulation 8, Rule 16, regarding Solvent Cleaning Operations, set operating and equipment standards for cold cleaners and vapor degreasers. Handwiping activity was only subject to the Monitoring and Records section. Originally adopted in 1979, there have been several amendments to this rule, with the latest being September 1998. It is estimated the current overall control efficiency for cold cleaners is 57%. For vapor degreasers, the overall control efficiency is currently estimated at 51%.