

**LOW-VOC, LOW TOXICITY CLEANUP SOLVENTS FOR SCREEN  
PRINTING: SAFER ALTERNATIVES**

Prepared for:  
South Coast Air Quality Management District  
Under Contract # 03133

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May 2006

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## **ACKNOWLEDGMENTS**

This analysis benefited considerably from the efforts of many persons within and outside the Institute for Research and Technical Assistance (IRTA). We would particularly like to acknowledge the valuable contributions made by the South Coast Air Quality Management District staff. We are especially grateful to the companies that agreed to test alternative cleaning agents for this project and to the vendors who provided the alternative cleaning agents for testing. Finally, we appreciate the efforts of Amy Blume of IRTA in helping to prepare the document.

## EXECUTIVE SUMMARY

There are more than 16,000 screen printers in the U.S. and almost 2,000 of them are in California. The vast majority of screen printers are small businesses with fewer than 20 employees. Screen printers use various types of inks to print on a variety of substrates including fabric, paper, metal, glass, wood, ceramics and plastics. Some small screen printers print by hand but most commercial screen printers use automated presses.

During printing, screen printers use cleanup solvents to clean the excess ink from the screens. All screen printers remove the ink from the screens after printing when the screens are saved for the next run or recycled for reuse. The cleaners that are used today may contain toxic materials that pose a risk to workers and community members and virtually all of them are classified as VOCs that contribute to smog.

The South Coast Air Quality Management District (SCAQMD) regulates VOC emissions in four counties in southern California. One of the SCAQMD regulations specifies VOC limits for cleanup solvents used in screen printing. The VOC limit is presently set at 500 grams per liter. On July 1, 2006, the limit will be reduced to 100 grams per liter. Companies in Southern California must find alternatives that meet the much lower VOC level.

The Institute for Research and Technical Assistance (IRTA) is a nonprofit organization that assists companies and whole industries in finding safer alternatives in cleaning, adhesive, coating, dry cleaning and paint stripping applications. The South Coast Air Quality Management District (SCAQMD) contracted with IRTA to work with three screen printers to identify, test, develop and demonstrate alternative low toxicity, low-VOC cleanup materials. In an earlier project, sponsored by Cal/EPA's Department of Toxic Substances Control and U.S. EPA, IRTA worked with nine screen printers to demonstrate alternatives. In the SCAQMD project, IRTA worked with three textile printers, including Totally Ink, Applied Pressure and Powerhouse. The printers that participated in the two projects used a range of different inks and printed on a variety of different substrates. This report summarizes the results of both projects.

The low toxicity, low-VOC alternatives that were tested were of three types. First, water-based cleaners were tested in several facilities and found to be effective. Second, vegetable based cleaners composed of soy performed well for cleaning certain types of inks. Third, acetone, a chemical not classified as a VOC and low in toxicity, was blended with other materials and found to effectively clean traditional solventborne inks.

Table E-1 shows the 12 facilities that participated in the project. It also presents a description of the type of printing the facility does and the type(s) of inks used by each facility. Finally, it summarizes the alternative(s) that performed effectively in each of the participating facilities. Three of the companies, Owens-Illinois, Texollini and Powerhouse, elected to convert to the alternatives that were tested in the course of the project.

**Table E-1  
Participating Company Description and  
Successful Safer and Low-VOC Alternatives**

Company	Printing Description	Ink Type	Successful Alternatives
Owens-Illinois	Prints on plastic cosmetic Bottles	UV	Soy Based Cleaner
Southern California Screen Printing	Prints on paper and plastic	UV	Water-Based Cleaner, Soy Based Cleaner
Com-Graf	Prints on variety of different substrates	Solventborne	Soy/Acetone/Mineral Spirits Blend
Serendipity	Prints on variety of different substrates	Solvent and Waterborne	Acetone/Mineral Spirits Blend
Oberthur	Prints on plastic credit cards	Solvent and Waterborne	Acetone/Ethyl 3-ethoxy propionate Blend
Texollini	Prints on fabric	Waterborne	Water-Based Cleaner
Hino Designs	Prints on textiles	Plastisol	Water-Based Cleaner, Soy Based Cleaner
Quickdraw	Prints on textiles	Plastisol	Soy Based Cleaner, White Oil/Acetone/Mineral Spirits Blend
LCA Promotions	Prints on textiles	Plastisol	Soy Based Cleaner, Water-Based Cleaner, White Oil/Acetone/Mineral Spirits Blend
Totally Ink	Prints on textiles	Plastisol	Soy Based Cleaner, Water-Based Cleaners
Applied Pressure	Prints on textiles	Plastisol	Water-Based Cleaner
Powerhouse	Prints on textiles	Plastisol	Water-Based Cleaner

IRTA analyzed and compared the costs of the alternatives and the cleaners that are currently used by the facilities. In nine cases, the cost of using an alternative was lower or about the same as the cost of using the current cleaner. In three cases, the cost of using the alternative cleaner was higher than the cost of using the current cleaner.

The results of the project indicate that low-VOC, low toxicity alternatives are available and cost effective for screen printing facilities in California. Water-based cleaners, soy based cleaners and acetone blends which are lower in toxicity and low in VOC content perform well in removing the different types of ink used by the screen printing industry today.