ASSESSMENT, DEVELOPMENT AND DEMONSTRATION OF LOW-VOC MATERIALS FOR CLEANING OF LITHOGRAPHIC PRINTING INK APPLICATION EQUIPMENT

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EXECUTIVE SUMMARY

Emissions of VOC solvents used in cleanup applications in lithographic printing amount to about four tons per day in the South Coast Basin, which is located in southern California. The South Coast Air Quality Management District (SCAQMD) has established an interim VOC limit and a future final VOC limit on these solvents. For on-press blanket and roller cleaning, the VOC content of the cleaners was reduced from 800 or 600 grams per liter to 500 grams per liter in July of 2005. In July of 2006, the limit is scheduled to be reduced further, to 100 grams per liter VOC.

In two four year projects, the Institute for Research and Technical Assistance (IRTA), a nonprofit technical organization, worked with 21 lithographic printing facilities in the South Coast Basin to identify, test and demonstrate alternative low-VOC, low toxicity on-press cleaners. The projects were sponsored by SCAQMD, Cal/EPA's Department of Toxic Substances Control (DTSC) and U.S. EPA. This document reports the results of the projects.

The Printing Industries Association of Southern California assisted IRTA in identifying facilities that would be willing to participate in the project. A range of facilities was selected so the test results would be applicable to the industry as a whole. IRTA conducted preliminary testing to screen alternative cleaners that might be appropriate for field testing. IRTA initially performed tests on one or more printing presses, generally a number of times, to identify potential effective cleaners. When effective cleaners were found, IRTA provided a week's supply of the alternatives for testing. Extended testing was conducted in seven of the facilities to observe longer-term effects of the alternative cleaners. For these facilities, IRTA provided at least three months of the alternative cleaners for testing. IRTA performed cost analysis and comparison of the alternative cleaners and the current cleaners used by the facilities. In some cases, the printers decided to convert to the new cleaners.

Table E-1 summarizes the results of the project. For each of the 21 participating facilities, the table shows the type of press, the type of ink and the substrate or substrates used by the facility. The table also shows the alternatives that were found to be effective at each of the facilities for cleaning blankets and/or rollers. The VOC content of these alternatives is listed in parenthesis in the table. Finally, the table indicates the status of the facility—whether the facility converted to the alternative and whether the facility participated in the extended testing.

Seven of the facilities converted to or are converting to alternatives that meet the 100 gram per liter VOC limit. The two newspapers participating in the project, the Los Angeles Times and the San Bernardino Sun, converted to cleaners that meet the lower limit several years ago. Nelson Nameplate, another project participant, is converting to the alternatives tested during the project. The SCAQMD Print Shop and the City of Santa Monica Print Shop also converted to alternatives that were tested in the course of the project. Vertis converted a few years ago to a low-VOC cleaner. Finally, The

Table E-1
Project Testing Results

Company	Press Type	Ink Type	Substrate(s)	Blanket Wash (VOC in g/l)	Roller Wash (VOC in g/l)	Status
L.A. Times	Coldset Web	Soy	Newsprint	water-based cleaner (90)	N/A	converted
San Bernardino Sun	Coldset Web	Soy	Newsprint	water-based cleaner (37)	N/A	converted
J.S. Paluch Co., Inc.	Coldset Web	Soy	Newsprint	soy (<20)	soy (<20)	_
Nelson Nameplate	Sheet Fed	Soy	Metal, Plastic	acetone/mineral spirits (100)	acetone/water/ mineral spirits (100)	converting, E
PIP Printing	Sheet Fed	Solventborne	Coated & Uncoated Paper	N/A	soy (<20)	_
SCAQMD Print Shop	Sheet Fed	Solventborne	Coated & Uncoated Paper	acetone/mineral spirits (100)	acetone/water/ mineral spirits (100)	converted, E
City of Santa Monica Print Shop	Sheet Fed	Soy	Coated & Uncoated Paper	water-based cleaner (75)	soy (<20)	converted
Presslink	Sheet Fed	Solventborne	Coated & Uncoated Paper	soy (<20)	soy (<20)	_
Vertis, Inc.	Heat Set Web (Automated)	Solventborne	Coated & Uncoated Paper	Anchor XP (72)	Anchor XP (72)	converted, E
R.R. Donnelley & Sons Co.	Heat Set Web	Solventborne	Coated & Uncoated Paper	soy (<20)	N/A	_
Fanfare Media Works	Sheet Fed	Solventborne	Coated & Uncoated Paper	soy (18)	soy(18)	E
Fanfare Media Works	Web	UV	Uncoated Paper	soy (18)	soy(18)	E
The Castle Press	Sheet Fed	Solventborne	Coated & Uncoated Paper	soy/acetone (<10)	soy (50)	_
Print 2000 Graphics	Sheet Fed	Solventborne	Coated & Uncoated Paper	acetone/mineral spirits (100)	soy (18)	E
Western Metal Decorating	Heat Set Sheet Fed	Solventborne	Metal	soy/acetone/current cleaner (100)	soy/acetone/current cleaner (100)	_
The Dot Printer	Sheet Fed	Solventborne	Coated & Uncoated Paper	acetone/soy (<2)	soy (50)	_
Lithographix	Sheet Fed	UV	Coated & Uncoated Paper	acetone/glycol ether (100)	Water-based cleaner (90)	_
Anderson Lithograph	Heat Set Web	Solventborne	Coated & Uncoated Paper	_	_	did not complete testing
Anderson Lithograph	Sheet Fed	UV	Coated & Uncoated Paper	_	_	did not complete testing
Anderson Lithograph	Sheet Fed	Solventborne	Coated & Uncoated Paper	_	_	did not complete testing
The Printery	Sheet Fed (Automated)	Soy	Coated & Uncoated Paper	soy (<20), acetone/glycol ether (100)	soy (<20)	converting, E
The Printery	Sheet Fed	Soy	Coated & Uncoated Paper	acetone/glycol ether (100)	soy (<20)	converting, E
The Printery	Sheet Fed	Soy	Coated & Uncoated Paper	acetone/glycol ether (100)	soy (<20)	converting, E
Tedco Printing Company	Sheet Fed	UV (non-white)	Plastic, Coated & Uncoated Paper	water-based cleaner /acetone/IPA (100)	water-based cleaner /acetone/IPA (100)	E
Tedco Printing Company	Sheet Fed	UV (white)	Plastic	soy/glycol ether (200)	soy/glycol ether (200)	_
Oberthur Card Systems	Sheet Fed	Solventborne	Plastic	acetone/water/mineral spirits (100)	acetone/water/ mineral spirits (200)	_
Oberthur Card Systems	Sheet Fed	UV	Plastic	acetone/glycol ether (100)	Water-based cleaner/acetone (90)	_
Huhtamaki	Web	EB	Coated Paper	acetone/water-based cleaner (8)	Water-based cleaner (90)	_

E = Extended Testing

Printery is in the process of converting to the low-VOC alternatives tested in the project. IRTA tested the alternative blanket and roller washes that are identified in Table E-1 at the remaining facilities.

In all except two cases, IRTA identified and tested alternative blanket and roller cleaners that had a VOC content of 100 grams per liter or less. The alternatives that were tested and found to be most effective include water-based cleaners, soy based cleaners and acetone, blends of the three categories of cleaners and blends of the cleaners with small amounts of VOC solvents. Acetone is not classified as a VOC and is low in toxicity. At Oberthur Card Systems, IRTA could not find a 100 gram per liter VOC roller wash alternative for the two color sheet fed press that uses conventional ink and prints on plastic. As indicated in the table, this press required a 200 gram per liter VOC roller wash. At Tedco, IRTA could not find a roller and blanket wash with 100 grams per liter VOC or less for cleaning white UV curable ink that prints on plastic. Tedco's white ink was deliberately formulated to be especially durable. Again, in this case, a 200 gram per liter formulation is required as indicated in the table.

Cost analysis was performed for 20 of the facilities where testing was conducted. The results demonstrate that 13 of the facilities would increase their cleaning cost by converting to the alternatives. The results also show that five of the facilties would reduce their cleaning cost by converting to the alternatives. One facility would have the same cleaning cost by converting to the alternatives. The change in cost for one facility could not be determined because this facility had no record of the cost of the higher VOC cleaners.

IRTA also conducted limited testing of low-VOC alternative cleaners for other on-press components including plates, dampening rollers and metering rollers. The results of the testing indicated that cleaners for these components that meet the 100 gram per liter VOC limit are effective.

During the extended testing, IRTA tested some cleaners that were thought to be incompatible with the rubber compounds used for the rollers and the blankets. No problems with compatibility were observed for these facilities.

The California Department of Health Services Hazard Evaluation System & Information Service conducted an assessment of the toxicity of some of the high VOC products used by the participating facilities and the low-VOC alternatives tested by IRTA. This assessment was based on a review of the MSDSs. In general, the low-VOC alternatives are less toxic than the high VOC materials.