

III. ANALYSIS OF RESULTS AND CONCLUSIONS

ANALYSIS OF ALTERNATIVES TESTING RESULTS

During this project, IRTA tested alternative on-press low-VOC, low toxicity roller and blanket cleaners with 21 participating lithographic printing facilities. Seven of the facilities converted or are converting to alternatives that meet the 100 gram per liter future VOC limit. The first facility, the Los Angeles Times, converted to an alternative a number of years ago. IRTA tested other alternatives with the Times but the facility decided to continue using the water-based cleaner they had adopted. The second facility, the San Bernardino Sun, also converted to a water-based cleaner that meets the future rule requirements for blanket cleaning several years ago. IRTA tested other alternatives with the San Bernardino Sun and the company adopted one of them for pipe roller cleaning. IRTA tested alternatives with a third facility, Nelson Nameplate; this facility is in the process of converting to alternatives with a VOC content of 100 grams per liter. A fourth facility, the SCAQMD print shop, converted to the alternatives they tested with IRTA more than a year ago. A fifth facility, the City of Santa Monica Print Shop, converted to alternatives more than a two years ago after the testing with IRTA was completed. A sixth facility, Vertis, converted a few years ago to an alternative similar to the alternative they tested with IRTA. The Printery, the seventh facility, is in the process of converting to the alternatives IRTA tested. Four of these facilities, Nelson Nameplate, the SCAQMD Print Shop, Vertis and The Printery, participated in the extended testing. IRTA identified and tested alternative blanket and roller wash cleaners with the remaining 14 facilities. The scaled-up testing for these facilities was conducted for at least a week.

Table 3-1 summarizes the results of the scaled-up or extended testing for each of the facilities. The first column lists the companies that participated in the testing. The second, third and fourth columns summarize the press type, the ink type and the substrate(s) respectively for each company. The fifth column identifies the alternative low-VOC, low toxicity blanket wash that was found to be most effective at each facility. The VOC content of the cleaner in grams per liter is also shown in this column in parenthesis. The sixth column of Table 3-1 identifies the alternative roller wash that cleaned most effectively at each facility. Again, the VOC content of each of these cleaners is shown in parenthesis. Finally, the seventh column indicates the status of the facility in terms of conversion and whether or not the facility participated in extended testing.

In all cases, IRTA identified and tested alternative blanket and roller washes that had a VOC content of 100 grams per liter or less with two exceptions. Many of the cleaners had a VOC content that was well below the 100 gram per liter VOC cutoff level specified in Rule 1171. For the Los Angeles Times, the San Bernardino Sun and R. R. Donnelley, IRTA did not test alternative roller washes. The two newspapers use roller wash infrequently and they use materials that comply with the 100 gram per liter VOC limit

Table 3-1
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	Solventborne	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	—
Fantare Media Works	Sheet Fed	Solventborne	Coated & Uncoated Paper	soy (18)	soy(18)	E
Fantare 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

scheduled to become effective in July 2007. R. R. Donnelley & Sons did not elect to perform roller wash testing. IRTA did not test blanket wash alternatives with PIP; the company performs blanket cleaning infrequently. Anderson Lithograph ended their participation in the project before alternative products were proven.

The two newspapers involved in the project found water-based cleaners to be suitable as alternatives. IRTA also tested a dilute soy based cleaner at the Los Angeles Times and it cleaned very well. For four other facilities that use UV or EB curable ink, Lithographix, Tedco, Oberthur Card Systems and Huhtamaki, water-based cleaners or water-based cleaners combined with other materials were found to be effective. For three facilities, Nelson, the SCAQMD Print Shop and Oberthur, an emulsion of water and mineral spirits combined with acetone was effective. Soy based cleaners were found to perform well at the rest of the facilities. In some cases, facilities that used soy based cleaners as a roller wash used a faster evaporating acetone formulation as a blanket wash.

IRTA did not find effective 100 gram per liter VOC content cleaners in two cases. First, on a two color sheet fed press that used conventional ink for printing on plastic at Oberthur Card Systems, IRTA could not find a 100 gram per liter VOC roller wash. IRTA did find a 100 gram per liter VOC content blanket wash that performed acceptably. For the roller wash, IRTA identified an acceptable 200 gram per liter VOC roller wash. Second, at Tedco, IRTA could not find a 100 gram per liter VOC blanket or roller wash for cleaning Tedco's UV curable white ink that was specially formulated for the company for printing on plastic. IRTA did find an acceptable 200 gram per liter VOC cleaner that performed acceptably.

IRTA conducted more limited testing of alternative low-VOC plate, dampening roller and metering roller cleaners during the project. The results of this testing indicate that alternative cleaners for these on-press components are viable. In the course of the testing, IRTA developed a metering roller cleaner that several printers liked.

IRTA conducted extended testing with seven of the facilities that participated in the project. The results indicated that in cases where soy based cleaners are used, the fountain solution may require changeout more frequently. The results also indicated that use of the soy based cleaners in automated systems in sheet fed presses may increase the waste paper that is generated. The extended testing did not reveal any compatibility problems even though very high concentrations of acetone were used on nitrile rubber.

ANALYSIS OF COSTS

Table 3-2 summarizes the cost information for each of the facilities involved in the testing program. The first column of this table lists the participating company. The second and third columns provide the annualized cost of the original cleaning process and the alternative cleaning process respectively.

The values of Table 3-2 show that six of the facilities that participated in the project reduced or would reduce their cleaning costs through adoption of the alternatives. The

values also show that 13 of the facilities increased or would increase their cleaning cost through adoption of the alternatives. The cost increases range from seven percent to 94 percent. One of the facilities in Table 3-2 would have the same cost if the low VOC alternatives were adopted. Finally, one facility, Anderson Lithograph, ended their participation in the project so costs of the alternatives and original cleaners could not be determined.

**Table 3-2
Cost Comparison for Original and Alternative Cleaners**

Company	Original Cleaning Cost	Alternative Cleaning Cost	Percent Change
Los Angeles Times (a)	Unknown	\$29,187	-
San Bernardino Sun	\$16,200	\$17,339	+7
J.S. Paluch Co., Inc.	\$1,280	\$640	-50
Nelson Nameplate	\$1,681	\$1,419	-16
PIP Printing	\$1,655	\$1,790	+8
SCAQMD Print Shop	\$1,581	\$2,164	+37
City of Santa Monica Print Shop (b)	\$288	\$491	+70
Presslink	\$1,178	\$2,160	+83
Vertis, Inc.	\$220,596	\$179,700	-19
R.R. Donnelley & Sons Co.	\$62,688	\$103,800	+66
Fanfare Media Works	\$4,159	\$4,159	0
The Castle Press	\$10,129	\$11,520	+14
Print 2000 Graphics	\$6,303	\$4,587	-27
Western Metal Decorating	\$0	\$2,865	N/A
The Dot Printer	\$11,050	\$21,424	+94
Lithographix	\$5,999	\$7,690	+28
The Printery	\$33,350	\$38,668	+16
Tedco Printing Co.	\$1,761	\$2,072	+18
Oberthur Card Systems	\$9,723	\$9,206	-6
Huhtamaki	\$33,627	\$38,928	+16

N/A is not applicable.

(a) The Los Angeles Times has no records to determine the cleaning costs of their original cleaner.

(b) Costs include one quart per year of plate cleaner.

Many of the companies that would increase their cost through adoption of the alternatives used mineral spirits of various types as their original cleaners. Mineral spirits are very low cost materials and virtually all other cleaners with either high VOC or low VOC content are more costly. Thus any printer that has relied heavily on mineral spirits cleaners which have high VOC content would likely experience a cost increase in adopting low VOC alternatives.

The costs that were evaluated did not include any savings in emissions fees through reduced VOC emissions. The SCAQMD charges a fee on VOC emissions if a facility emits more than four tons per year of VOCs. The fee amounts to \$388.49 per ton of emissions when companies emit between four and 25 tons of VOC per year. The fee is higher, \$630.75 per ton, if companies emit between 25 and 75 tons of VOC per year. The fee applies only to the VOC emissions above four tons per year. Some of the facilities that participated in the project have VOC emissions above four tons per year. The facilities in Table 3-2 that may have emissions above four tons per year include the Los Angeles Times, the San Bernardino Sun, The Dot Printer, R. R. Donnelley & Sons, Western Metal Decorating, Lithographix, Oberthur, Huhtamaki and Vertis. R.R. Donnelley & Sons and Lithographix may have emissions that exceed 25 tons per year. These companies could realize additional savings by converting to the low-VOC alternatives because their emission fees would be reduced.

As an example, consider the San Bernardino Sun. The company's VOC emissions related to cleaning with high VOC materials were 10.7 tons per year. When the Sun converted to the low-VOC cleaners, the emissions related to cleaning were reduced to 0.5 tons per year and the cleaning VOC emissions were reduced by 10.2 tons per year. The fee that could be avoided from this emission reduction amounts to \$2,409 annually. The alternative cleaning cost in Table 3-2 would be reduced from \$17,339 to \$14,930. The San Bernardino Sun would reduce their annual cost for cleaning by eight percent rather than increasing the annual cost for cleaning by seven percent. Other facilities would also reduce their annual cost for using the alternatives in the same manner.

TOXICITY EVALUATION

HESIS 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.

SUMMARY OF PROJECT RESULTS

During this project, IRTA tested low-VOC, low toxicity alternative cleanup materials with 21 lithographic printing facilities in the South Coast Basin. IRTA identified effective alternatives that have 100 grams per liter VOC or less for all but two narrow cleaning tasks which involve printing on plastic. In these narrow cases, 200 gram per liter VOC content cleaners were identified. IRTA conducted extended testing with seven of the facilities for three months. No compatibility problems were observed during this

testing. More than one-third of the facilities participating in the project would reduce the cost of cleaning or experience no cost increase in cleaning if they converted to the low-VOC alternatives. IRTA's limited analysis of low-VOC alternatives for cleaning plates, dampening and metering rollers indicated that 100 gram per liter VOC alternatives were suitable. Based on an MSDS evaluation, HESIS concluded that the toxicity of the alternative low-VOC alternatives is low.