

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

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

Prepared by:
Mike Morris and Katy Wolf
Institute for Research and Technical Assistance

May 2006

TABLE OF CONTENTS

Disclaimer.....	i
Acknowledgements	ii
Executive Summary	iii
I. Introduction and Background	1
Project Structure	1
Lithographic Printing	2
Participating Facilities.....	3
Project Approach.....	5
Current Cleanup Solvents	7
Alternative Cleanup Materials	8
Water-Based Cleaners.....	8
Exempt Solvents	9
Methyl Esters	10
Other Formulations	10
Compatibility.....	10
Cleaner Performance.....	11
Cost Analysis.....	11
Company Approval	12
Timing of Tests and Analysis	12
Report Organization	12
II. Analysis and Testing of the Alternative Cleaning Agents	13
Tests of Alternative Blanket and Roller Washes at Individual Facilities	13
Los Angeles Times.	13
San Bernardino Sun	15
J.S. Paluch Co., Inc.	17

Nelson Nameplate.....	18
PIP Printing.....	20
South Coastst Air Quality Management District Print Shop.....	22
City of Santa Monica Print Shop.....	23
Presslink.....	24
Vertis, Inc.....	26
R.R. Donnelley & Sons Co.....	27
Fanfare Media Works.....	28
The Castle Press.....	30
Print 2000.....	32
Western Metal Decorating.....	34
The Dot Printer.....	35
Lithographix.....	37
Anderson Lithograph.....	38
The Printery.....	39
Tedco.....	43
Oburthur Card Systems.....	44
Huhtamaki.....	47
Cleaning of Other On-Press Components.....	50
Extended Testing Results.....	51
Performance Evaluation.....	52
Compatibility.....	52
Toxicity Evaluation and Comparison.....	54
High VOC Products.....	54
Low-VOC Products.....	55
Conclusions About Toxicity.....	56
Other Considerations.....	57

III. Analysis of Results and Conclusions.....	58
Analysis of Alternatives Testing Results.....	58
Analysis of Costs.....	60
Toxicity Evaluation.....	62
Summary of Project Results.....	62
Appendix A	
MSDSs for Cleaners Used and Tested at Participating Facilities.....	64
High VOC Cleaners Used at Participating Facilities	65
Low-VOC Cleaners Used and Tested at Participating Facilities.....	155
Appendix B	
Letter from Frank Barnett at Anderson Lithograph to IRTA	242

LIST OF FIGURES

Figure 1-1: Blanket on Lithographic Printing Press	6
Figure 1-2: Rollers on Small Lithographic Press	7
Figure 2-1: Press at Los Angeles Times.....	13
Figure 2-2: Press at San Bernardino Sun.....	15
Figure 2-3: Press at J.S. Paluch Co.....	17
Figure 2-4: Press at Nelson Nameplate	19
Figure 2-5: Press at PIP Printing	20
Figure 2-6: Press at SCAQMD Print Shop	22
Figure 2-7: Small Press at Presslink.....	25
Figure 2-8: Larger Press at Presslink.....	25
Figure 2-9: Conventional Ink Press at Fanfare Media Works	29
Figure 2-10: UV Curable Ink Press at Fanfare Media Works	29
Figure 2-11: Press at The Castle Press	31
Figure 2-12: Press at Print 2000	32
Figure 2-13: Press at The Dot Printer.....	35
Figure 2-14: Six Color Press at The Printery	39
Figure 2-15: Two Color Press at The Printery	40
Figure 2-16: Small Crestline Press at The Printery.....	40
Figure 2-17: Drip (Circled) at The Printery	41
Figure 2-18: Press at Tedco	43
Figure 2-19: Press at Oberthur Card Systems	45
Figure 2-20: Press at Huhtamaki	47

LIST OF TABLES

Table E-1:	Project Testing Results	iv
Table 1-1:	VOC Limits for Cleanup Solvents Used in Lithographic Printing	1
Table 1-2:	Facilities Participating in DTSC and SCAQMD Projects.....	4
Table 2-1:	Annualized Cost Comparison for the Los Angeles Times	14
Table 2-2:	Annualized Cost Comparison for On-Press Cleaning for the San Bernardino Sun.....	16
Table 2-3:	Annualized Cost Comparison for Off-Press Cleaning for the San Bernardino Sun	17
Table 2-4:	Annualized Cost Comparison for J.S. Paluch.....	18
Table 2-5:	Annualized Costs Comparison for Nelson Nameplate	20
Table 2-6:	Annualized Cost Comparison for PIP Printing.....	21
Table 2-7:	Annualized Cost Comparison for SCAQMD Print Shop.....	23
Table 2-8:	Annualized Cost Comparison for City of Santa Monica.....	24
Table 2-9:	Annualized Cost Comparison for Presslink.....	26
Table 2-10:	Annualized Cost Comparison for Vertis.....	27
Table 2-11:	Annualized Cost Comparison for R.R. Donnelley & Sons	28
Table 2-12:	Annualized Cost Comparison for Fanfare Media Works	30
Table 2-13:	Annualized Cost Comparison for The Castle Press.....	32
Table 2-14:	Annualized Cost Comparison for Print 2000.....	34
Table 2-15:	Annualized Cost Comparison for Western Metal Decorating	35
Table 2-16:	Annualized Cost Comparison for The Dot Printer	36
Table 2-17:	Annualized Cost Comparison for Lithographix.....	38
Table 2-18:	Annualized Cost Comparison for The Printery	43
Table 2-19:	Annualized Cost Comparison for Tedco.....	44
Table 2-20:	Annualized Cost Comparison for Conventional Presses for Oberthur	46
Table 2-21:	Annualized Cost Comparison for UV Presses for Oburthur	47
Table 2-22:	Annualized Cost Comparison for Huhtamaki Magic UV Roller Cleaner ...	49

Table 2-23:	Annualized Cost Comparison for Huhtamaki Magic UV/Acetone Roller Cleaner.....	49
Table 3-1:	Project Testing Results	59
Table 3-2:	Cost Comparison for Original and Alternative Cleaners.....	61