

Linking Environmental Regulations to the Prevention of Chronic Health Damage Among Lithographic Printers

Patrice Sutton, M.P.H.

(Former) Research Project Director, Public Health Institute

Katy Wolf, Ph.D.

Executive Director, Institute for Research and Technical Assistance

Julia Quint, Ph.D.

(Former) Chief, Hazard Evaluation System and Information Service,
Occupational Health Branch, California Department of Public Health

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 - U.S. Environmental Protection Agency, Region 9
 - California Department of Toxic Substances Control
 - Bay Area Air Quality Management District
 - City and County of San Francisco, Department of Public Health
 - City and County of San Francisco, Department of the Environment
 - Alameda County Green Business Program
 - Northern California Media Workers Union, Local 39521, CWA.
 - Conducted by the University of California Berkeley, School of Public Health
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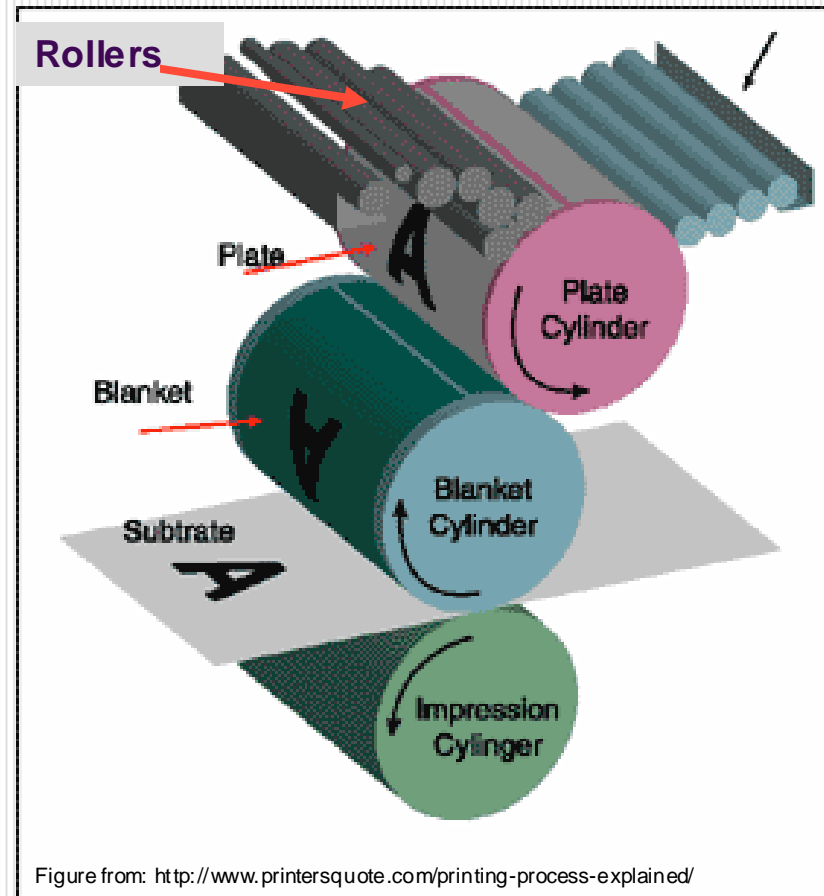
Introduction

Lithographic (offset) printing

- Printed and non-printed areas separated utilizing the fact that oil and water do not mix
- Printers use **volatile organic compounds (VOCs)** to clean ink off rollers and blankets



Plate with image to be printed

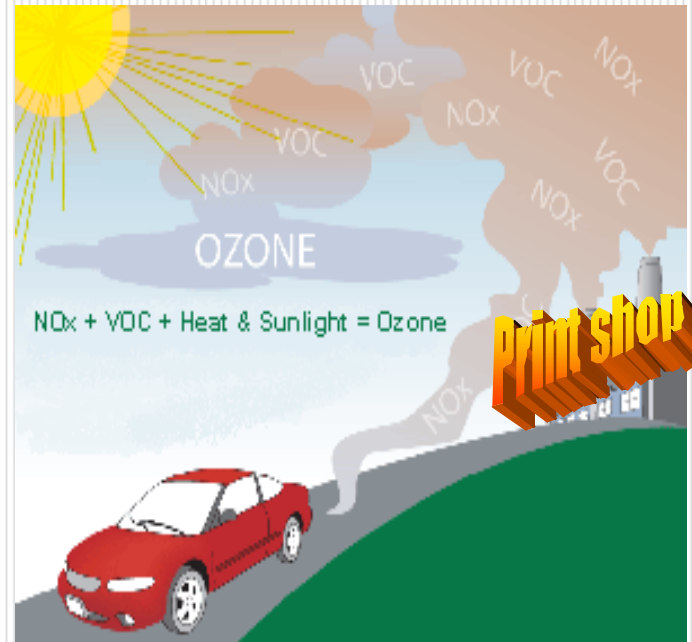


Introduction

Use of VOCs in lithographic cleanup is a worker and environmental hazard



Worker exposure to solvents



Population exposure to ozone

Introduction

California environmental regulations limit VOC content of lithographic cleanup products

- South Coast Air Quality Management District (SCAQMD) Rule 1171
- 100 grams per liter or less by January 1, 2008
- Regulation spurred development of safer alternatives by the Institute for Research and Technical Assistance (IRTA)
- Health benefits of alternatives not generalized to areas outside of SCAQMD's purview



Purpose

Promote implementation of safer alternatives to toxic cleanup solvents in the San Francisco Bay Area



Photo Credit: Oakland Smog, joshua aaron <http://www.flickr.com/photos/38324365@N00/314894944/>

Objectives

- **Identify** lithographic printers potentially at risk for solvent-related health problems
- **Evaluate** printer solvent use
- **Elucidate** opportunities and barriers to using safer alternatives



Methods

- **Constructed** a convenience sample of printers, employers, union, industry, and government representatives
- **Observed** the use of VOC cleanup solvents at print shops
- **Listened** to participants via focus group and interviews
- **Disseminated** information about safer alternatives via fact sheet and workshop

Protecting the Health of Lithographic Printers *Safer Alternatives to Toxic Cleanup Solvents*

Exposure to toxic cleanup solvents used in lithographic printing can harm the health of workers who use these chemicals. Safer alternatives to these solvents have been developed in response to improved environmental regulations in Southern California. The use of less harmful soy and water-based cleanup products in place of hazardous solvents can help protect worker health and the environment.

How to Know if You Are Working with Solvent-based Cleaners

If you are a lithographic printer, the cleanup products you are using probably contain solvents. Ask to see the product's Material Safety Data Sheet (MSDS). The MSDS must identify the solvent in Section 2 by the Chemical Abstract Service (CAS) number. Under Cal/OSHA's Hazard Communication Standard (see page 4), your employer must tell you if you are using a cleanup product that contains hazardous solvents, and must train you to use the cleaner safely.

How to Find Safer Alternatives for Cleanup Solvents Used in Lithographic Printing

Lithographic cleanup products that are safer for workers have been identified in response to environmental regulations that limit the "Volatile Organic Compound" (VOC) emissions of cleanup solvents for lithographic printers. Specifically, these regulations apply in areas of Southern California, where the South Coast Air Quality Management District Rule 1171 "Solvent Cleaning Operations" will regulate the amount of VOCs in products used in lithographic printing cleanup operations to 100 grams per liter or less by January 2008.

The Institute for Research and Technical Assistance (IRTA) is a nonprofit research organization that works with companies to test and demonstrate alternatives to toxic solvents. IRTA has worked with 21 lithographic printers in Southern California to find, develop, test, and demonstrate alternative on-press, low-VOC, low toxicity roller and blanket cleaners. Safer cleanup solvents are already in use, for example, the *Los Angeles Times* and the *San Bernardino Sun* converted to alternative water-based cleanup products a number of years ago. You can read the complete results of IRTA's project at www.irta.us/Litho06.pdf.

IRTA can assist employers and workers identify safer alternatives to hazardous cleanup solvents:
IRTA, 230 N. Maryland Avenue, Suite 103, Glendale, CA 91206
(818) 244-0300 • irta@earthlink.net
<http://home.earthlink.net/~irta/>

AUGUST 2006

SOLVENTS FREQUENTLY FOUND IN LITHOGRAPHIC PRINTING CLEANUP PRODUCTS

Solvent CAS #
Aromatic hydrocarbon 64742-95-6
Aliphatic hydrocarbon or mineral spirits 64742-88-7
Xylene 1330-20-7
Toluene 108-88-3
Methylene chloride 75-09-2
Methyl ethyl ketone 78-93-3
1,2,4-trimethyl benzene 95-63-6
1,3,5-trimethyl benzene 108-67-8
Isopropylbenzene (Cumene) 98-82-8
Ethylene glycol monobutyl ether (2-butoxy ethanol) 111-75-2
Ethylene glycol monoethyl ether 2807-30-9
n-Hexane 111-54-3
Propylene glycol t-butyl ether 57018-52-7

The concentration of solvents can vary and most products contain more than one solvent. Check Section 2 of your current MSDS.

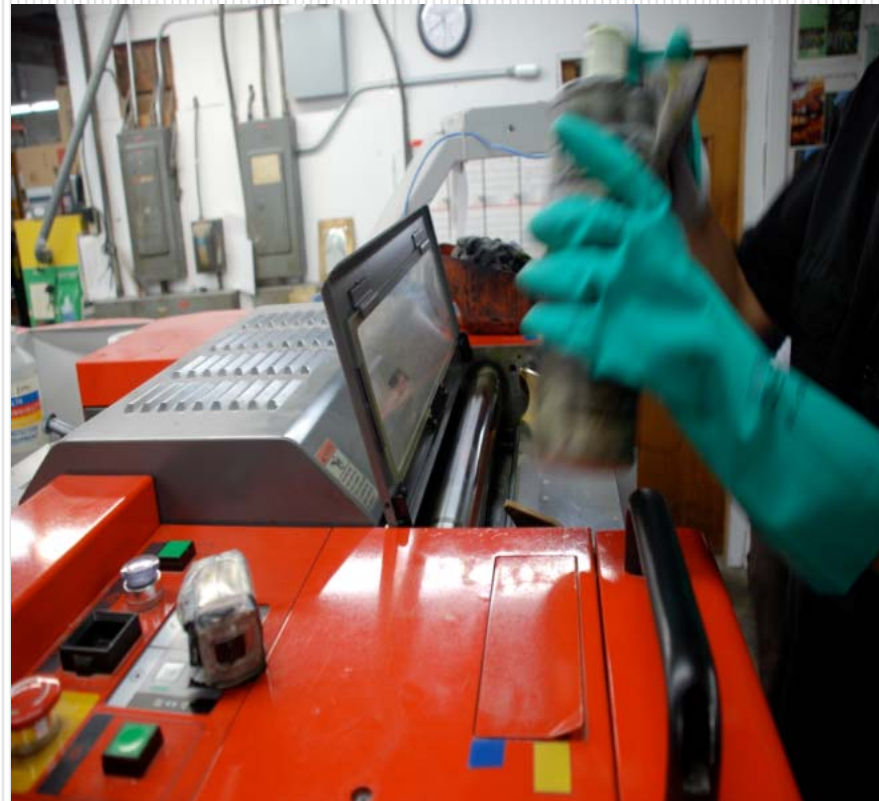
SOME LITHOGRAPHIC PRINTING CLEANUP PRODUCTS THAT CONTAIN SOLVENTS

Pressroom Solutions Blanket & Roller Wash®
IC ALL PRO®
LC-1700 Press Wash®
AQ 1301 Roller Wash No. 1®
AQ 1302 Roller Wash No. 2®
PowerKlene VOC®
Hydro Clean®
Low VOC 1.66 Blanket Wash®
Bay International Chemical Products Division Blanket Wash®
Allied Hydrowash®
Anchor Envelopewash 220
Shell Mineral Spirits 146 HT®
Vam Products Wash A-230®, Wash V-120®, Type Wash®, V-1106 Rejuvenator Plus®, Coater Wash Step-1®
Base-Line, Inc. Mr. Murphy's Masticant®
Anchor Lithemko Metering Roller CL-NC®
Merado Super Cleaner, Zap Manufacturing Co.

These are examples of products with solvents listed on the MSDS. Most lithographic cleanup products contain solvents. This is not a complete list. Be sure to check the MSDS for the ingredients of the cleanup product you are using.

Results: Participation

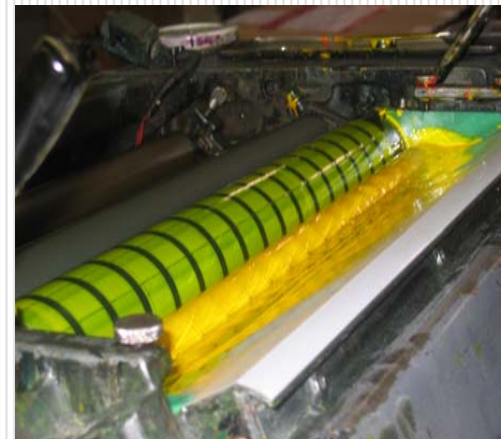
- Overall:
 - 66 individuals
 - 15 print shops
 - 10 government agencies
 - 1 union
 - 1 printing industry rep.
- 5 Workplace Walkthroughs
- 1 Focus Group
(5 printers from 3 shops and 1 union rep)
- 12 Key Informant Interviews
- 1 Workshop
(48 participants)



Results: Workplace Observations

(N=5 print shops)

- 6 to 157 printers/shop
- Blankets and rollers cleaned by hand at all shops
- Printers used cleanup products from 0.5 to 2 hours/day/printer (N=3 shops)



Results: Workplace Observations

(N=5 print shops)

- Shops used 0.7 to 36 gallons of cleanup products/day (N=3 shops)



Results: Workplace Observations

(N=5 print shops)

- All shops had nitrile gloves available
- Cleaning rollers and blankets w/o gloves observed at one shop and reported at another
- *“The boss said gloves were used for cosmetic reasons”*



Results: Workplace Observations

(N=5 print shops)

- No shops routinely used local exhaust ventilation, respiratory, or eye protection while handling cleanup solvents
- No mechanical dilution ventilation at 2 shops

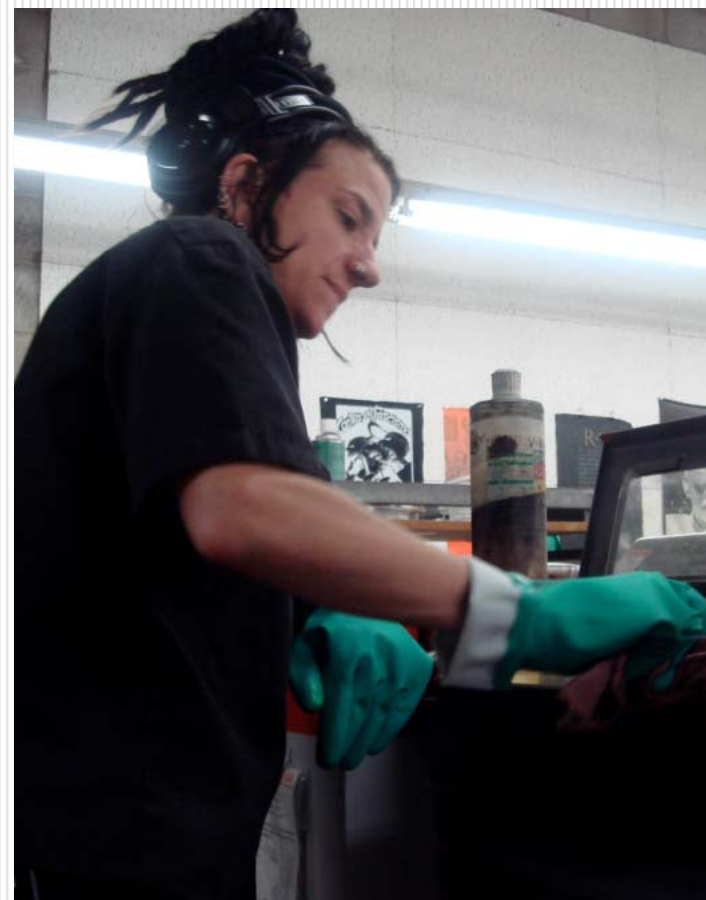


Results: Cleanup products in use

(N=5 print shops)

N = 20 product Material Safety Data Sheets (MSDSs) reviewed

- 19 formulated from organic solvents
- 1 formulated from d-limonene
- 7 contained ≥ 1 chemical with “additional” chronic health impacts ie., cancer, blood abnormalities, asthmatic bronchitis, peripheral nerve damage, repro/developmental effects
- 10 contained chemicals with skin notations



Results:

Low VOC alternative products

N = 14 product MSDSs reviewed

- 4 no hazardous ingredients listed
- 4 formulated from fatty acid esters and/or surfactants
- 6 formulated from organic solvents
- 2 contained chemicals with skin notations
- 1 contained 3-4% of a surfactant that is an endocrine disruptor

Results: Opportunities and barriers

Regulations

- Less hazardous products a direct result of SCAQMD regulation and related R&D
- Opposed by some members of the printing industry
- Required a significant amount of time to implement
- Not implemented statewide
- At least five other CA Air Districts planning to amend their rules to the 100 g/L limit on lithographic roller and blanket wash



Results:

Opportunities and barriers

Printers

- Concerned about their health and safety
- Had received health and safety training but lacked specific information about the health hazards of cleanup solvents they used
- Did not know that less toxic alternatives were available



Results:

Opportunities and barriers

Employers

- Some had a demonstrated commitment to “greening” their business
- Prior experience and success with making changes to comply with environmental regulations
- Lacked technical expertise to evaluate health impacts of alternatives
- Support for change competed with fast-paced production schedules
- Some supervisors were resistant to change



Results:

Opportunities and barriers

Supply Chain

- Suppliers a source of information and assistance in purchasing cleanup chemicals
- Chemical companies and suppliers generally not engaged in the identification and distribution of safer alternatives prior to the regulation
- Factors unrelated to occupational and environmental health, cost, or efficacy, such as “perks” and personal relationships, influenced printer cleanup solvent purchasing choices



Results:

Opportunities and barriers

Chemical Hazard Information

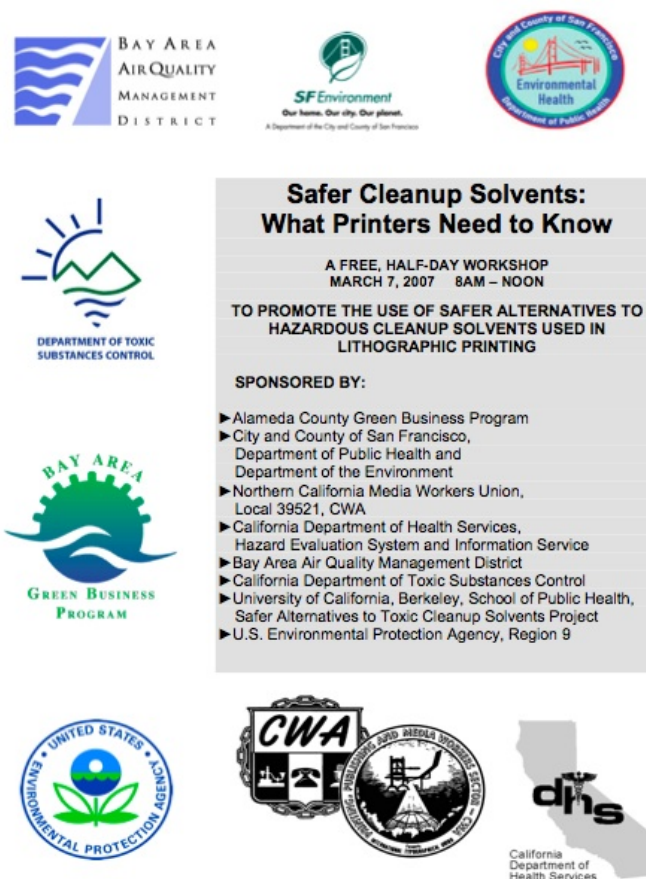
- MSDSs for 7 of 34 (20.5%) total cleanup products evaluated lacked essential information
- Toxicity from skin contact of fatty acid esters not fully characterized
- Hard to find readily available, specific, accurate information about endocrine disruptors



Results: Opportunities and barriers

Linkages between occupational and environmental health

- Essential to preventing unintended consequences
- Circumvents inadequacies of worker regulations
- Supported by government agencies
- A shortage of on-going, institutional, inter-disciplinary mechanisms to leverage the benefits



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Environmental Health
Department of Public Health

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

BAY AREA GREEN BUSINESS PROGRAM

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

CWA

California Department of Health Services

**Safer Cleanup Solvents:
What Printers Need to Know**

A FREE, HALF-DAY WORKSHOP
MARCH 7, 2007 8AM – NOON

TO PROMOTE THE USE OF SAFER ALTERNATIVES TO
HAZARDOUS CLEANUP SOLVENTS USED IN
LITHOGRAPHIC PRINTING

SPONSORED BY:

- ▶ Alameda County Green Business Program
- ▶ City and County of San Francisco, Department of Public Health and Department of the Environment
- ▶ Northern California Media Workers Union, Local 39521, CWA
- ▶ California Department of Health Services, Hazard Evaluation System and Information Service
- ▶ Bay Area Air Quality Management District
- ▶ California Department of Toxic Substances Control
- ▶ University of California, Berkeley, School of Public Health, Safer Alternatives to Toxic Cleanup Solvents Project
- ▶ U.S. Environmental Protection Agency, Region 9

Limitations

**Small convenience sample
may not be representative**

- Workplace observations consistent with other studies
- Participant support for alternatives subject to strong selection bias

This is California!



Summary

Low VOC cleanup products evaluated:

- Mitigate printer inhalation exposure and environmental emissions
 - Were formulated from chemicals either less toxic to human health than high VOC organic solvents and/or contained a lower concentration of toxic VOC solvents than the higher VOC products
 - Do not mitigate the potential for printer dermal exposure and some may increase slipping and ergonomic hazards
 - Are not all the same but reflect a variety of trade-offs between occupational and environmental health and the need to clean rollers and blankets under a variety of circumstances
-

Summary

- Manufacturers and vendors were key to printer decision-making and could play an important role in the promotion of alternatives but market incentives are lacking
- The lack of accurate, complete, and comprehensible information about the toxicity of chemicals was an impediment to evaluating safer cleanup products

Recommendations

Lithographic printers should:

- Implement low-VOC, low-toxicity cleanup products identified by IRTA
- Always use proper gloves
- Train printers when change is made
- Conduct product-specific evaluation of health hazards --- all low VOC products are not all the same. Avoid products formulated with chemicals that: (1) are designated with skin notations; (2) cause respiratory irritation or other acute health effects at low-levels of exposure; (3) are linked to chronic health impacts such as cancer, reproductive and developmental effects, irritant and allergic skin reactions, and neurotoxicity; and/or (4) are endocrine disruptors
- Purchase only products having a complete MSDS

Recommendations

Regulatory agencies, Green Business programs and other government and non-governmental organizations should:

- Require and promote the use of safer lithographic cleanup products
 - Conduct research to describe and address manufacturer and vendor-related supply chain issues
 - Establish and maintain institutional, interdisciplinary mechanisms to leverage the benefits of linking occupational and environmental health
 - Evaluate the impacts of pollution prevention measures in an on-going manner
-

Recommendations

Occupational and environmental health professionals and advocates should:

- Integrate their efforts to improve worker health and environmental protection, and avoid unintended shifting of risks between workplaces and the communities



Further Information

- ***Linking Environmental Regulations to the Prevention of Chronic Health Damage Among Lithographic Printers*** (available ~ Jan. 2008):

Hazard Evaluation System and Information Service (HESIS)

California Dept. of Public Health
850 Marina Bay Parkway, Building P, 3rd Floor
Richmond, CA 94804 (510) 620-5757
<http://www.dhs.ca.gov/ohb/HESIS/>

- **General information on workplace hazards:**
HESIS Workplace Hazard Helpline (866) 282-5516
 - **The Institute for Research and Technical Assistance (IRTA)**
230 N. Maryland Ave., Suite 103 Glendale, CA 91206
(818)244-0300 <http://www.irta.us/>
 - ***Assessment, Development and Demonstration of Low-voc Materials for Cleaning of Lithographic Printing Ink Application Equipment***, IRTA, 2006
<http://www.irta.us/Litho06.pdf>
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