

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 Bernadino 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 • katywolfirta@gmail.com

www.irta.us/index.html

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) 111-76-2

Ethylene glycol monopropyl 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 MSDSs.

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 VC®

Hydro Clean®

Low VOC 1.68 Blanket Wash®

Bay International Chemical Products Division Blanket Wash®

Allied Hydrowash®

Anchor Envirowash 220

Shell Mineral Spirits 146 HT®

Varn Products: Wash A-230®, Wash V-120®, Type Wash®, V-1106 Rejuvenator Plus®, Color Wash Step-1®

Base-Line, Inc. Mr. Murphy's Maticlean®

Anchor Lithkemko Metering Roller CL-NC®

Morado Super Cleaner, Zep Manufacturing Co.

These are examples of products with solvents listed on the MSDSs. 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.

How Cleanup Solvents Are Used in Lithographic Printing

Cleanup solvents are used in lithographic printing to clean the blankets and rollers. Press operators commonly apply the solvent to a wipe cloth and wipe across the blanket to remove the ink. Some printing companies have automated blanket wash systems where the solvent is applied to the blankets with a spray bar. It is generally necessary with these automated systems to periodically also clean the blankets by hand since they are not cleaned adequately with the automated systems. Press operators commonly clean the ink roller train by standing above the rollers and dispensing the cleaner from a squeeze bottle across the length of the top roller. Pressure is applied to the rollers with a squeegee and an ink tray is placed at the bottom of the roller train to catch the solvent/ink combination after it passes through the train.

How You Are Exposed to Cleanup Solvents

Solvents in products used to clean rollers and blankets in lithographic printing can enter your body when you breathe vapors of the solvents or droplets of spray in the air. Some solvents can enter your body when they touch your intact skin. Your risk of health effects depends on which solvents are in the cleanup product and the amount of the solvent that enters your body. The amount (the concentration) of the solvent in the air, the amount of solvent that comes into contact with your skin, and how long you are exposed determines how much enters your body.

Are There Any Tests for Health Effects and Exposure?

If you are experiencing symptoms such as memory loss, confusion, and mood changes and have been exposed to lithographic cleanup solvents for a long time, ask your doctor about neuropsychological testing. There are tests that can determine the amount of some solvents (like toluene, ethylbenzene, and xylene) in your body. However, these tests are not generally recommended or required. Their usefulness depends on how each solvent is eliminated from the body. These tests can be difficult to conduct and interpret for mixtures of solvents, which often are present in lithographic cleanup products.

HOW CLEANUP SOLVENTS USED IN LITHOGRAPHIC PRINTING CAN AFFECT YOUR HEALTH

Central Nervous System (Brain). Lithographic cleanup solvents can affect your brain the same way drinking alcohol does. Overexposure for a short time causes headache, nausea, dizziness, clumsiness, drowsiness and other effects like those of being drunk. Drinking alcohol within a few hours of exposure increases these effects and makes them last longer, because the effects of alcohol and solvents add together. The symptoms of short-term exposure usually clear up within hours after exposure stops. These short-term effects on your health occur more quickly and become more noticeable and serious as the amount of solvent and the time you're exposed increases. These effects can increase your chances of being injured. Repeated, frequent overexposure to cleanup solvents over months or years can have long-lasting and possibly permanent effects on the nervous system. The symptoms of these long-term effects include fatigue, sleeplessness, poor coordination, difficulty in concentrating, loss of short-term memory, and personality changes such as depression, anxiety, and irritability.

Skin. Solvents can dissolve your skin's natural protective oils. Frequent or prolonged contact can cause irritation and dermatitis (skin rash), with dryness, redness, flaking, and cracking of the skin—allowing solvents to easily enter your body.

Eyes, Nose, Throat and Lungs. Solvent vapors from cleaners can irritate your eyes, nose, throat, and lungs. Symptoms include stinging or burning of the eyes, burning or soreness of the nose and throat, hoarseness, coughing, chest tightness, and shortness of breath. 1,2,4-Trimethylbenzene can pose additional risks of asthmatic bronchitis. Cleanup products may also contain corrosive chemicals such as sodium hydroxide that can cause serious eye and respiratory irritation.

Cancer. Some solvents like Ethylbenzene, Methylene chloride, and Propylene glycol t-butyl ether cause cancer in animals. Solvents that cause cancer in animals can also cause cancer in humans. Avoid exposure to products containing solvents that cause cancer whenever possible, or keep exposures to a minimum.

Hematopoietic (blood) system. Ethylene glycol monobutyl ether and ethylene glycol monopropyl ether can damage red blood cells and cause anemia. Mineral spirits contain trace quantities of benzene. Benzene causes leukemia and other blood disorders. 1,2,4-Trimethylbenzene can also cause diseases of the blood and cancer due to benzene contamination.

Pregnancy and Reproduction. Solvents can reach the developing fetus when inhaled by pregnant workers; solvents can also contaminate breast milk. Therefore, pregnant or breastfeeding women should minimize their exposure to solvents. Some solvents cause specific toxic effects on the developing fetus and on reproduction. Low-level exposure to some glycol ether solvents causes birth defects in test animals. Certain glycol ether solvents damaged the testicles of test animals, and reduced the sperm counts in studies of exposed men.

Peripheral Nervous System. Overexposure to cleanup solvents containing n-Hexane can damage the nerves in the feet, legs, hands, and arms. The damage can last a long time and may become permanent. The symptoms include numbness, tingling, weakness (sometimes even paralysis), and reduced ability to feel touch, pain, vibration, and temperature.

How To Reduce Exposure to Solvent-based Cleaners in Lithographic Printing.

By law, employers must provide a safe and healthy workplace. Here are some ways employers and employees can work together to reduce exposure to lithographic cleanup solvents.

Use safer alternatives to toxic cleanup solvents.

- Clean blankets and rollers with soy-based or water-based cleanup products.
- Use products with less toxic solvents such as acetone, instead of solvents that cause cancer and other chronic health damage. For example, although overexposure to acetone affects the nervous system and causes skin and respiratory irritation, acetone is less toxic than mineral spirits and many other solvents used in lithographic cleanup tasks.
- Use products with the lowest concentration of hazardous solvents. All cleanup solvents can harm your health. The degree of hazard depends on the amounts of the hazardous substances in the product.
- Avoid using products for which you do not have MSDSs and information on health hazards. Get MSDSs for all cleaning products and make sure you understand the health hazard information.

ALWAYS protect your skin from contact with lithographic cleanup products.

- Wear protective gloves when using cleanup products. In general, safer alternatives to hazardous cleanup solvents are much less likely to get into the air you breathe, but they can still contain hazardous chemicals that can enter your body through your skin.
- Check manufacturers' specifications to make sure gloves resist penetration by the mixture of solvents in the cleanup product you use. Soy and water-based products may be compatible with nitrile gloves. Thin, low-cost, disposable nitrile gloves are available.
- Inspect and replace gloves often to prevent leaks.
- Be aware of products containing glycol ethers that can penetrate intact skin.
- Do not use latex gloves when working with solvent-based cleaners. They are not protective. They also can cause allergic skin rash and wheezing, shortness of breath, coughing, and other symptoms of asthma.
- Use chemical protective clothing such as aprons or sleeves if skin contact occurs at areas other than your hands.
- Employers are required to supply gloves or any other necessary protective equipment under California regulation [Title 8, CCR, Sections 3383 and 3384].

Make sure there is good ventilation if you use toxic cleanup solvents.

- Local exhaust ventilation is most effective. It captures solvent vapors at the source before workers breathe them.
- General ventilation, using a fan-powered system to bring fresh air into the work area, is the next best way to ventilate print shops.
- Do not rely on open doors and windows, or indoor fans that blow contaminated air around without removing it from your work area. They are not effective methods of reducing worker exposure to hazardous chemicals.

Use respirators only if ventilation and other control methods are not effective and feasible.

- A "dust mask" does not remove solvent vapors from the air and will not protect you.
- A half-face respirator with organic vapor cartridge can reduce exposure to solvents. Employers must comply with the Cal/OSHA Respiratory Protection Standard [Title 8, California Code of Regulations (CCR), Section 5144]. Requirements include making sure respirators fit properly and that you are medically fit to wear a respirator. See www.dir.ca.gov/title8/5144.html.

REGULATIONS THAT HELP PROTECT WORKERS

Legal Exposure limits. The Cal/OSHA Standards Board sets Permissible Exposure Limits (PELs) for the amounts of solvents and other chemicals in workplace air. PELs are intended to protect the health of most workers who are exposed every day over a working lifetime [Title 8, CCR, Section 5155]. See www.dir.ca.gov/title8/5155.html.

Hazard Communication Standard. Under Title 8, CCR, Section 5194, your employer must tell you if any hazardous substances are used in your work area, must train you to use them safely, and must make MSDSs available. See www.dir.ca.gov/title8/5194.html.

Injury and Illness Prevention Program. Under Title 8, CCR, Section 3203, every employer must have an effective, written Injury and Illness Prevention Program (IIPP) that includes: (1) methods for identifying and quickly correcting workplace hazards; (2) health and safety training; (3) a system for communicating clearly with all employees about health and safety matters and (4) record-keeping. See www.dir.ca.gov/title8/3203.html.

How to Obtain Your Copy of *Protecting the Health of Lithographic Printers: Safer Alternatives to Toxic Cleanup Solvents*

Protecting the Health of Lithographic Printers: Safer Alternatives to Toxic Cleanup Solvents is a project of the University of California, Berkeley, School of Public Health (UCB). The project is being conducted by the Public Health Institute, Oakland, CA under a contract with the UCB. The project was conceived of and funded by the California Department of Health Services, Hazard Evaluation System & Information Service (HESIS). For more information about the project, please contact Patrice Sutton, M.P.H., Research Project Director, Public Health Institute at (415) 407-0259 or by email at psutton@phi.org.

A copy of the final report will be posted on the California Department of Health Services Hazard Evaluation and Information System web site at www.cdph.ca.gov/HESIS

Or contact HESIS:

850 Marina Bay Parkway, Building P, 3rd Floor
Richmond, CA 94804
(866) 627-1586

Additional Resources

- California Division of Occupational Safety and Health (Cal/OSHA) investigates workers' complaints and makes enforcement inspections. Complainants' identities are kept confidential. Call the nearest Cal/OSHA district office to your workplace or see www.dir.ca.gov/DOSH/districtoffices.htm.
- Cal/OSHA Consultation Service helps employers who want free, non-enforcement help to evaluate the workplace and improve the health and safety conditions. Employers can call (800) 963-9424.
- Occupational health services can be found at:
 - University of California (UC)
San Francisco: (415) 885-7580
 - UC Davis: (530) 754-7635
 - UC Irvine: (949) 824-8641
 - UC San Diego: (619) 471-9210
- The Western Sustainability and Pollution Prevention Network is an alliance involving local, state, federal and tribal pollution prevention programs throughout EPA Region 9. wsppn.org/
- Other resources for employees may include your supervisor, your union, your company health and safety officer, your doctor, or your company doctor.

HOW TO LEARN MORE ABOUT THE HEALTH IMPACTS OF THE LITHOGRAPHIC CLEANUP PRODUCTS YOU USE AT WORK

The California Department of Health Services Hazard Evaluation System and Information Service (HESIS) program answers questions about chemicals and other workplace hazards and has many free publications. For information on lithographic cleanup products or other workplace hazards call (866) 282-5516. For HESIS Publications: (866) 627-1586 or visit HESIS online at www.cdph.ca.gov/hesis.

The following HESIS publications are relevant to n-Hexane exposures encountered in lithographic printing cleanup products:

- **n-Hexane Use in Vehicle Repair.** A HESIS Health Advisory prompted by cases of nerve damage among workers exposed to n-Hexane. (www.cdph.ca.gov/Programs/CCDPHP/DEODC/OHB/HESIS/CDPH%20Document%20Library/nmp.pdf)
- **n-Hexane Medical Guidelines.** Diagnostic and treatment guidelines for occupational exposure to n-Hexane. (www.cdph.ca.gov/Programs/CCDPHP/DEODC/OHB/HESIS/CDPH%20Document%20Library/nhexane_med-guide.pdf)