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EPA Solutions for Lithographic Printers

An Evaluation of Substitute Blanket Washes



DOCUMENTS FROM THE DfE LITHOGRAPHY PROJECT

The following documents from the DfE Lithography Project are available free of charge from the Pollution Prevention Information Clearinghouse (PPIC):

- DfE Lithography Project Fact Sheet: EPA 744-F-95-005
- Final Cleaner Technology Substitutes Assessment:
Lithographic Blanket Washes: EPA-744-R-96-001, 447 pages
- Solutions for Lithographic Printers: An Evaluation of Substitute
Blanket Washes: EPA 744-F-96-009, 30 pages
- Managing Solvents and Wipes, Case Study #1: EPA 744-K-93-001, 4 pages
- Pollution Prevention at Custom Print, Case Study #2: EPA 744-F-96-001, 4 pages
- Substitute Blanket Washes: Making them Work, Bulletin #1: EPA 744-F-96-002, 4 pages
- Workplace Practices Make the Difference, Bulletin #2: EPA 744-F-96-008, 4 pages
- Vegetable Ester Blanket Washes, Bulletin #3: EPA 744-F-96-014, 4 pages
- A Worksheet to Help You Choose a Better Wash, Bulletin #4: EPA 744-F-96-015, 6 pages
- Printing Industry & Use Cluster Profile: EPA 744-R-94-003, 183 pages
- Federal Environmental Regulations Potentially Affecting the
Commercial Printing Industry: EPA 744-B-94-001, 71 pages
- DfE Focus Group Discussions with the Printing Industry: EPA 742-R-94-004, 89 pages
- Environmental Cost Accounting Video (245 minutes): EPA 744-B-96-001
- Environmental Cost Accounting Video (165 minutes): EPA 744-B-96-002

For more information about the Design for the Environment Program,
to view some of these documents online, to order documents, or to learn
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Evaluating Blanket Washes:

A Guide for Printers

Purpose of this Booklet

This booklet is designed to help printers evaluate their current blanket wash and compare it to substitute blanket washes. How safe are they to use? How do they perform? How much do they cost to use? What are their environmental risks?


THE DESIGN FOR THE ENVIRONMENT (DfE) LITHOGRAPHY PROJECT tested a variety of different blanket washes to answer these questions. The Project evaluated 37 blanket washes in laboratory testing. Of these washes, 22 were sent out for field demonstrations at printing facilities. The full technical report of these product trials is called the **Cleaner Technologies Substitutes Assessment: Lithographic Blanket Washes (CTSA)**. Recognizing that not all printers have the time to read the larger CTSA, the DfE Project has produced this smaller reference booklet to answer printers' questions in a simple and clear format.

THE WASHES PRESENTED IN THE CTSA AND IN THIS BOOKLET have been grouped into five chemical categories based on their basic chemical formulations. While the specific formulations of some of the products may have changed since the tests were conducted, new formulations typically fall into these five basic categories.

Using this Booklet

Using a Question & Answer format, this booklet describes the results of the blanket wash evaluations. If substitute blanket washes are new to you, you may want to start with Question 1 and read through to the end. You can also use this booklet as a reference for your specific area of interest.

WHILE THIS BOOKLET EXAMINES SUBSTITUTE BLANKET WASHES SPECIFICALLY, the steps taken to evaluate substitutes can easily be applied to other chemicals in your print shop. By doing so, you will likely find other areas of the operation where substitutes can improve working conditions, reduce environmental impact, and possibly save money at the same time.

- *Throughout the document you will find references to other DfE documents where you can find additional information. These references are symbolized by a .*
- *Use this booklet as a reference as you search for the best substitute blanket wash for your facility.*

DfE Lithography Project Facts

- The DfE Lithography Project conducted field tests of 22 blanket washes.
- Each wash was tested in 2 print shops for 1 week. A total of 17 volunteer facilities participated.
- Substitutes were compared to a baseline wash.
- Performance, cost, and health and environmental benefits of the substitutes were evaluated.
- This is the first time that the wash performance information has been coupled with an evaluation of risks and cost, and presented together in one document.

The questions

Whether you are just learning about substitute blanket washes or are trying to supplement what you already know, the answers to your questions can be found in this booklet.

- 1** Why should I switch to a substitute blanket wash?
 - Improvements in worker health and safety
 - Reduced environmental concerns
- 2** How can I identify different types of substitute blanket washes?
 - Chemical categories of blanket washes
 - Federal regulations that apply to the chemicals
- 3** How do blanket washes affect worker health and the environment?
 - How chemicals can affect worker health
 - Environmental risks associated with washes
- 4** What kind of performance can I expect from a substitute blanket wash?
 - How application methods affect performance
 - Summary of substitute wash performance
- 5** How will substitute blanket washes affect my costs?
 - Summary cost results for each category of substitute wash
 - Hidden costs of using a blanket wash
- 6** What were the overall results of the substitute wash evaluations?
 - Fold-out table combining performance, risk, cost results for all wash categories.
- 7** What steps do I need to take to switch to a substitute blanket wash?
 - How to evaluate a substitute wash in your shop
- 8** What questions should I ask my blanket wash supplier?
- 9** What else can I do to prevent pollution in my facility?
 - Work practice changes for wash conservation
 - Blanket wash recycling opportunities
- 10** Where can I find more information about pollution prevention in printing?
 - Sources for more information

For the answers

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Question 1

Why should I switch to a substitute blanket wash?

Improving work conditions is one of the main reasons why so many printers today are replacing their rapidly evaporating solvent-based blanket washes with safer substitutes. Traditional blanket washes are petroleum-based solvents with a high volatile organic compound (VOC) content and high vapor pressure. These types of washes are a cause of concern for both worker health and the environment. The potential advantages of replacing a traditional wash with a substitute product include:

- Improved worker health
- Improved safety
- Reduced environmental impact
- Reduced regulatory requirements
- Reduced losses to evaporation

Improved worker health

MANY TRADITIONAL BLANKET WASHES HAVE A HIGH VOLATILE ORGANIC COMPOUND (VOC) CONTENT. These VOCs help blanket washes cut ink and dry quickly. However, it is just this quick-drying capability that is cause for concern. Some traditional washes may completely evaporate. This means that more of the chemicals get into the air where they may be inhaled by workers or released to the outside air. The more chemicals inhaled, the greater the potential for risk to worker health. In addition to VOCs, some blanket washes may also contain hazardous chemical additives that can be harmful to worker health.

SUBSTITUTE BLANKET WASHES HAVE A LOWER VOC CONTENT. By using substitute blanket washes containing fewer VOCs, lower vapor pressure, and fewer hazardous chemicals, you can significantly reduce the impacts that your printing operations have on your workers' health and the environment.

Improved safety

Traditional washes may present fire and explosion risks because of their low flashpoints. Flashpoint is the temperature at which a chemical will sustain a flame. In general, as the flashpoint increases, so does safety. A wash with a flashpoint below 100°F presents safety concerns, as it is considered flammable. Washes with flashpoints below 140°F are also a cause for concern, because they are considered "ignitable" and, therefore, are a hazardous waste under RCRA. Substitute washes with higher flashpoints have a reduced fire hazard.

Traditional blanket washes can contain up to 100% VOCs and have a high vapor pressure, which poses a potential concern for worker health and the environment.

A wash with a low flashpoint causes concern for fire and explosion risk.

VOCs can also be harmful to the environment. For example, they have been found to contribute to the formation of ground-level ozone, a component of smog.

By switching to a wash with a reduced VOC content and less hazardous chemicals, you may reduce your regulatory burden, now or in the future.

Reduced environmental impact

JUST AS THEY CAN BE HARMFUL TO EMPLOYEE HEALTH, VOCs CAN ALSO BE HARMFUL TO THE ENVIRONMENT. As they evaporate, VOCs are released to the air outside your facility where they can become a risk to people in the community. VOCs help to produce ozone, a component of smog, which is a health hazard — especially for children, the elderly, and people with respiratory problems. Ozone also damages crops and forests. By using a low-VOC blanket wash, you can reduce the impact of your business on the surrounding environment and community.

Reduced regulatory requirements

VOCS FROM BLANKET WASHES ARE ALREADY THE TARGET OF INCREASINGLY STRINGENT ENVIRONMENTAL REGULATIONS. Many states have implemented regulations aimed at reducing VOC emissions, and some have specifically focussed on printing operations. Several states have based their VOC regulations on the EPA's draft Control Techniques Guidelines (CTG) and Alternative Control Techniques Guideline for offset lithography. Under the current draft CTG, blanket washes cannot contain more than 30% VOCs by weight, or the composite VOC vapor pressure can not exceed 10 mm Hg at 68°F. Other states may also adopt these stricter guidelines.

If your facility is located in a part of the country with air quality problems, you may be in what is called a “non-attainment” area under the Clean Air Act. In non-attainment areas, more stringent permitting and regulatory requirements apply to facilities emitting VOCs. For printers, this applies to all VOCs in your shop, including those in your blanket wash. In the long-run, these extra requirements for your VOC releases could be very costly for your business. Using a low-VOC blanket wash may allow you to reduce your regulatory burden in some cases by avoiding permitting requirements.

Reduced losses to evaporation

LOSSES TO EVAPORATION TRANSLATE DIRECTLY INTO ECONOMIC LOSSES. If your wash has a high VOC content or a high vapor pressure, you may be losing it before using it. Some of the wash will evaporate from the towels and containers before it can be used. As it evaporates, so does the money you spent to buy that wash.

Question 2

How can I identify different types of substitute blanket washes?

A blanket wash can be classified by its primary chemical components. In the DfE Lithography Project, printers tried out substitute blanket washes from five different categories of chemicals and compared them to the performance of the baseline wash. The baseline wash chosen was VM&P naphtha. Explanations of the five categories are listed below.

Blanket wash chemical categories

Description of the **Petroleum** category:

- This category includes petroleum washes and petroleum/water blends.
- Although traditional high-VOC blanket washes are often petroleum-based, some substitute washes also contain petroleum products. The substitute formulations, however, may be mixed with water or other chemicals to reduce the overall VOC content of the wash.
- Because the DfE evaluations did not exclude any products, some high-VOC washes in the category were tested in the field demonstrations.
- When you review a Material Safety Data Sheet (MSDS), some of the chemicals you may find in petroleum-based washes include:
 - *mineral spirits*
 - *stoddard solvent*
 - *solvent naphtha*
 - *naphtha*
 - *VM&P naphtha*
 - *1,2,4-trimethyl-benzene*
 - *aromatic 150*
 - *dimethylbenzene*
 - *cumene*
 - *xylene*

Suggestions:

- If you evaluate substitute washes that contain petroleum-based chemicals and water, check the MSDSs to see what percentage of petroleum they contain. Choose a wash that has a higher percentage of water to reduce potential health risks and the VOC content.
- Avoid washes that have regulated chemicals listed on the MSDS. Some of the petroleum-based washes tested by the DfE Project contained regulated chemicals. Also, check with your supplier and make sure the substitute wash does not contain HAPs - certain chemicals that are listed as Hazardous Air Pollutants under the Clean Air Act.

Description of the **Vegetable Ester** category:

- Vegetable esters are fatty acid derivatives produced from agricultural sources such as soybean, cotton, or coconut oil.

Substitute blanket washes may be made from:

- *vegetable oils and/or their fatty acid esters*
- *terpenes*
- *less volatile petroleum component*
- *mixtures of these*

When evaluating a blend, look for a high vegetable ester content and a low petroleum content.

- This category includes blends containing glycol ethers.
- When you review an MSDS, some of the chemicals you may find in vegetable ester-based washes include:

- *fatty acids*
- *soybean oil*
- *sorbitan mono-9-octadecanoate*
- *methyl esters*
- *compounds with diethanolamine*

Suggestions:

- Check out the VOC content of these washes – all of the washes tested in this category had a VOC content of less than 30% and had a very low risk of flammability.

*Description of the **Petroleum/Vegetable Ester Blends** category:*

- The washes tested in this category contain between 20% and 70% petroleum products with the balance being primarily vegetable esters.

Suggestions:

- When choosing a substitute in this category, look for one with a higher percentage of vegetable esters than of petroleum to reduce VOC content and potential health risks.
- Avoid washes that have regulated chemicals listed on the MSDS. Some washes tested in this category contained regulated chemicals.

*Description of the **Vegetable Ester/Water Blends** category:*

- These washes are produced primarily from vegetable esters and water. Because the performance and risk characteristics of these washes differ from those washes that are not blended with water, they have been classified as a separate category.

Suggestions:

- Check out the VOC content of these washes – all of the washes tested in this category had a VOC content of less than 30% and had a very low risk of flammability.

*Description of the **Terpenes** category:*

- Terpene washes are formulated chemicals derived from citrus or wood products, often giving them a citrus odor. When you review an MSDS, some of the chemicals you may find in terpene-based washes include:

- *d-limonene*
- *linalool*
- *nerol*
- *α-terpineolcyclopentanol*
- *2-pinanol*
- *pinols*
- *terpinolene*

Suggestions:

- Terpenes themselves are not regulated at the Federal level, however, the washes in the product trials were blended with some regulated chemicals. So, as always, be sure to check your MSDS and ask questions of your supplier.

FEDERAL REGULATION OF SOME BLANKET WASH CHEMICALS

Some blanket washes contain chemicals that are subject to federal environmental or occupational safety regulations. The table below lists the chemicals regulated at the federal level that were found in some of the blanket washes tested in this project. When trying out substitute washes, try to find a wash without regulated chemicals to help ease your regulatory requirements and protect the environment. The MSDS lists OSHA regulated chemicals in the wash, although it may not mention all chemicals that are subject to environmental regulations. Ask your supplier what chemicals are in the wash, and check with your state and local regulatory assistance agencies for information on applicable state and local regulations.

CHEMICAL	CAS#	CWA 311 RQ (lbs)	CAA 112B HAP	CERCLA RQ (lbs)	SARA 313 (TRI)	OSHA PEL (ppm)	RCRA
Benzene, 1,2,4-trimethyl	95-63-6				X		
Cumene	98-82-8		X	5,000	X	50	U055
Diethanolamine	111-42-2		X		X		
Ethylene glycol ethers	see below ^a		X		X	100 ^b	
Dodecylbenzene sulfonic acid	27176-87-0	1,000		1,000			
N-Methylpyrrolidone	872-50-4				X		
Sodium bis(ethylhexyl) sulfosuccinate	577-11-7					2 ^c	
Sodium hydroxide	1310-73-2	1,000		1,000		2 ^c	
Stoddard solvent	8052-41-3					100	
Xylene	1330-20-7	1,000	X	1,000	X	100	U239

^a The generic chemical category Glycol ethers is listed as a CAA 112B Hazardous Air Pollutant (HAP) and on SARA 313 TRI. The only glycol ether found in these blanket washes that is considered a HAP is diethylene glycol monobutyl ether (CAS No. 112-34-5). The propylene glycol ethers are not included in the glycol ether category under this law and are not considered HAPs.

^b Dipropylene glycol methyl ether has a PEL of 100 ppm.

^c OSHA ceiling value.

Explanation of Regulatory Terminology

CWA 311 RQ	CLEAN WATER ACT, SECTION 311, REPORTABLE QUANTITY. Facilities that experience an accidental release of a chemical in excess of the specified CWA RQ must notify various state and federal agencies.
CERCLA RQ	COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT REPORTABLE QUANTITY. Facilities that experience an accidental release of a chemical in an amount equal to or in excess of the specified CERCLA RQ must notify the National Response Center at (800) 424-8802.
CAA 112B HAP	CLEAN AIR ACT AMENDMENTS (CAAA), SECTION 112B, HAZARDOUS AIR POLLUTANT. Air emissions of these chemicals are restricted according to this section of the CAAA.
SARA 313 TRI	SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT, TOXIC RELEASE INVENTORY. Release of chemicals in excess of release thresholds (10,000 or 25,000 lbs., depending on chemical use) must be reported each calendar year to EPA or the applicable state agency.
RCRA	RESOURCE CONSERVATION AND RECOVERY ACT; U-LIST OF HAZARDOUS CHEMICAL WASTE. Generators of U-listed hazardous waste are subject to management and disposal requirements based on the quantity they generate per month.
OSHA PEL	OCCUPATIONAL SAFETY AND HEALTH ACT; PERMISSIBLE EXPOSURE LIMIT. PELs are legally enforceable exposure limits for workplace chemicals; they are based on an 8-hour weighted average concentration.

Question 3

How do blanket washes affect worker health and the environment?

One significant step you can take toward protecting workers and the environment is to find a substitute wash with a reduced volatile organic compound (VOC) content and without chemicals that affect human health and the environment. Through the Design for the Environment Lithography Project, 37 substitute washes were evaluated by EPA for their risk to human health and the environment. The three different components of risk that were evaluated are:

- worker health risk
- safety risk
- ecological risk

Worker health risk

THE CHEMICALS FOUND IN SOME BLANKET WASHES MAY CAUSE EMPLOYEE HEALTH PROBLEMS during routine cleaning. Health can be affected by breathing in the chemical as it evaporates (*inhalation exposure*). Inhalation of the chemicals in some blanket washes may result in eye, skin, and nose irritation. To reduce these harmful effects, find a wash with a reduced VOC content and without known health effects. For example, washes in the *vegetable ester/water blends* category had *no concern for inhalation risks*. The washes in all of the other categories were found to present some concern.

BLANKET WASH CHEMICALS MAY ALSO ENTER THE BODY THROUGH THE SKIN IF GLOVES ARE NOT WORN. Some washes may have a harmful effect on worker health when they are absorbed through the skin (*dermal exposure*). Each of the 37 washes evaluated in laboratory testing was evaluated for its effect on worker health if it entered the body through the skin. *Washes in the vegetable ester/water category were found to have a very low concern for dermal risk.* Washes in all of the other categories were found to present a somewhat greater concern for dermal risk. However, the assessment assumes that no gloves or barrier creams are used by workers when cleaning a blanket. If appropriate gloves are worn, the dermal risks associated with any of the blanket washes tested, even the solvent-based washes, are minimal.

Worker Safety Issues

SOME BLANKET WASHES MAY PRESENT FIRE AND EXPLOSION RISKS because of certain chemicals they contain. The flashpoint of a chemical is one measure of its flammability. The National Fire Protection Association, OSHA, and the Department of Transportation define a flammable liquid as one with a flashpoint of less than 100° F. EPA defines RCRA ignitable wastes (40 CFR 261.21) as having a flashpoint of 140° F or less. Be sure to check the wash's flashpoint listed on the MSDS. The higher the flashpoint, the better.

Chemicals found in some solvent-based blanket washes may cause employee health problems such as eye irritation, headaches, nausea, and asthma attacks.

If appropriate gloves are worn, dermal risks for all 37 products tested are minimal.

All of the washes in both the vegetable ester category and the vegetable ester/water blends presented a low fire hazard risk.

Avoid washes containing amine salts of alkylbenzene sulfonates or ethoxylated nonphenols.

Ecological risk

SOME WASHES MAY PRESENT A RISK TO AQUATIC SPECIES. Risks to aquatic species were assessed for the blanket washes tested. A "high concern" indicates that the blanket wash may present an ecological risk. Some of the traditional washes, as well as some of the substitute washes, were found to contain chemicals that present a high concern for chronic effects to aquatic species when shop towels are laundered. In most cases, the chemicals of concern are ***amine salts of an alkylbenzene sulfonate or ethoxylated nonylphenols***. The assessment also found that hydrotreated heavy naphtha and medium aliphatic naphtha could adversely affect aquatic species.

These chemicals are found in several different categories of washes. Some of the washes in the petroleum, petroleum/vegetable ester, and terpene categories were found to contain these chemicals that presented a risk to aquatic species. **None of the washes in the vegetable ester or the vegetable ester/water blend categories presented risks to aquatic species.**

To avoid washes with these chemicals, check your MSDS and ask your supplier. Like most chemicals, these chemicals can be listed under many different names. The table below lists some of these synonyms and their CAS # to help you evaluate your wash.

Name	CAS #
Alkylbenzene sulfonates may also be called:	
Benzenesulfonic acid, dodecyl-	27176-87-0
DDBSA	27176-87-0
Benzenesulfonic acid, C10 - C16-alkyl derivatives, compounds with 2-propanamine	68584-24-7
Benzenesulfonic acid, C10 - C16-alkyl derivatives, compounds with isopropylamine	68584-24-7
Benzenesulfonic acid, dodecyl-, (tetrapropenyl)-, compounds with 2-propanamine	157966-96-6
Isopropylamine salt of (tetrapropenyl) benzenesulfonic acid	157966-96-6
Benzenesulfonic acid, dodecyl-, compounds with 2-propanamine	26264-05-1
Isopropylamine salt of dodecylbenzenesulfonic acid	26264-05-1
Ethoxylated nonylphenols may also be called:	
nonylphenol ethoxylate	9016-45-9
Ukanil SO	9016-45-9
Alcohol Ethoxylate	9016-45-9
Nonionic Surfactant	9016-45-9
polyethylene glycol mono (nonylphenol) ether	9016-45-9
α -(nonylphenol)- ω -hydroxy-branched and unbranched isomers	N/A
Antarox	9002-93-1
NP-6	26027-38-3
NP-9	68412-54-4
Hydrotreated heavy naphtha and medium aliphatic naphtha may also be called:	
Naphtha (petroleum), hydrotreated heavy	64742-48-9
Solvent naphtha (petroleum), medium aliphatic	64742-88-7

Question 4

What kind of performance can I expect from a substitute blanket wash?

As part of this study, 37 blanket washes were evaluated in laboratory testing. Of those washes, 22 were sent out for field demonstrations at volunteer printing facilities. Each wash was tested at two different print shops. During the test, the press operator first cleaned the blanket with the baseline wash, VM&P naphtha. After another print run, the press operator cleaned the blanket with the test wash. In both cases, the volume of wash used and time required were recorded, along with more subjective observations such as level of effort required and the cleanliness of the blanket. The operator continued to use the wash and record data for one week. The performance results that follow are based on these tests. Overall opinion from the participating printers on the performance of the substitute blanket washes tested was varied but generally favorable.

The range in opinions is due to many factors, including: differences in equipment, ink types, ink coverage, blanket conditions, length of run prior to blanket cleaning, different requirements of blanket cleanliness, method of application, and the operator's willingness to make changes to use an alternative product.

Application Method Affects Performance

PRINTERS NOTED THAT THEY USED MORE EFFORT TO GET THE BLANKET CLEAN when using some of the substitute washes. There was variation in their opinions, however, regarding effort: for some operators, even minimal extra effort was seen as an unacceptable burden. Others accepted that some changes in their procedures and even some extra effort may be needed in order to effectively clean the blanket with alternative products.


PRINTERS FOUND THAT BY MODIFYING THEIR APPLICATION METHOD, MANY OF THE SUBSTITUTE WASHES COULD WORK WELL. Modifications such as wiping the blanket after cleaning with a dry or water-dampened wipe to remove the oily film left behind, or letting the wash sit on the blanket before wiping, seemed to improve performance.

MOST IMPORTANT, IF AT FIRST YOU DON'T SUCCEED, TRY, TRY, AGAIN. Not every wash will work for every printer. Try a variety of formulations and avoid dismissing all substitute washes based on the performance of one product.

A SUMMARY OF PERFORMANCE RESULTS IS LISTED ON THE NEXT PAGE. From each category of substitute blanket washes, one to seven different washes were tested at volunteer printing facilities. Almost every category had washes that performed well and others that did not. These results demonstrate that most substitute washes have the potential to work well when matched with the right facility.

You must determine for yourself what works best in your shop.

A willingness to modify your application method may improve your success with substitute blanket washes.

 For more information on application method changes, see DfE Bulletin 1, *Substitute Blanket Washes: Making Them Work*.

Try a variety of formulations to find the one that works best for you — not every wash will work for every printer.

Performance Rating Scale

based on printers' evaluations

- 1** poor
- 2** fair
- 3** good

Performance Results

PETROLEUM CATEGORY

AVERAGE RATING = 2.6

Washes in this category were all rated as good or fair. In some cases, press operators preferred the substitute wash to their standard wash and to the baseline wash, naphtha. Others noted that while it cut the ink well, it took extra effort to remove the oily residue from the blanket. In some cases, printers commented that the thick consistency was difficult to work with, since the wash would not readily soak into the shop towel.

PETROLEUM/ESTER CATEGORY

AVERAGE RATING = 2.3

All printers evaluated washes in this category as good or fair, with most rating the washes as fair. These washes cut the ink well, but some facilities found that extra effort, sometimes an unacceptable amount, was needed to clean the blanket when there was heavy ink coverage. Some of the washes in this category left a light oily residue that was easily removed. For other washes in the category, the oily residue was heavier and press operators found it difficult to remove.

VEGETABLE ESTER CATEGORY

AVERAGE RATING = 2.6

Printers rated the washes in this category as good or fair. Several of the washes in this category were unanimously rated as good, but other washes had mixed results. The washes cut ink well, however, some received a lower rating because they required extra effort to remove oily residue, to clean heavy ink coverage, and to get the thick wash to soak into the shop towel.

ESTER/WATER CATEGORY

AVERAGE RATING = 1.0

Printers rated the performance of the washes in this category as poor. They felt it took an unacceptably high level of effort to remove the ink from the blanket. They also noted that they had difficulty getting the wash to soak into the shop towel.

TERPENE

AVERAGE RATING = 2.0

Printers found that this wash cut the ink well, but left an oily residue that increased the number of prints required to return to print quality. The thick consistency of the wash prevented it from soaking into the towel, which increased the overall effort needed to clean the blankets.

Question 5

How will substitute blanket washes affect my costs?

A cost analysis was conducted for each of the 22 blanket washes tested in the DfE field demonstrations. The results showed that:

- substitute washes can be less costly to use than traditional, solvent-based washes
- it is important to consider all costs, beyond just purchase price and labor costs, to get the most accurate comparison among washes
- the cost to use a blanket wash can vary greatly depending on the conditions in the facility where it is used

Uncover Cost Savings with Substitute Washes

When using a traditional, solvent-based wash, there are a lot of "hidden costs" that you're paying for every time you use that wash. You can reduce these hidden costs and uncover savings by switching to an appropriate substitute wash.

Savings may be found through:

- **REDUCED WASTE.** Reduce the amount of wash lost to evaporation by using a lower VOC wash. If you're losing less wash, you'll be buying less wash.
- **REDUCED REGULATORY COSTS.** Reduce or eliminate the need for costly permitting, reporting, or control technologies.
- **IMPROVED WORKER HEALTH.** Reduce work-related illness, sick days, medical costs, and worker's compensation liability.
- **IMPROVED SAFETY.** Reduce liability, eliminate special storage requirements, and possibly reduce your insurance cost for fire protection.

Labor Costs, Not Purchase Price, Most Influence Total Costs

While many substitute washes have a higher price per gallon than solvent-based washes, these price differences do not necessarily lead to a higher overall cost per cleaning. It's the labor costs that really make the difference. For example, using one of the lowest priced washes in the study (\$2.85/gallon), it cost the facility \$1.31 per blanket cleaning when labor costs were included. The same press operator also tested one of the more expensive substitute washes (\$15.00/gallon). For this wash, it cost the facility only \$0.89 per blanket cleaning. This shows that labor costs are a primary driver in the total cost to use the wash. By working with your supplier and training press operators on the most effective way to apply substitute washes, you can reduce your labor costs, and therefore reduce the total cost of using the blanket wash.

When comparing the cost of a substitute wash to your current wash, look beyond the purchase price.

See DfE Bulletin #4 for information on the “hidden Costs” of using a blanket wash.

The cost estimates did not include the savings from improved worker health and safety, or from reduced waste and regulatory requirements. If you include these savings, the cost per wash estimate would be likely to favor many more of the substitute washes.

The cost to use the substitute washes varied, even within the same category.

A Baseline was Used for Comparison

At every facility, the operator first cleaned several blankets with VM&P naphtha during normal production runs to establish a baseline for comparison. Later in the day, the same operator started using one of the substitute washes to clean the same blanket. The operator continued to use the substitute wash for several days, recording the quantity used and the time it took to clean the blanket. This comparison was done in two different facilities for all washes. For each wash, the difference in cost between using the baseline wash and the substitute wash was calculated. The “Cost to Use” calculation included labor costs, purchase price, and materials cost, such as shop towels, but did not account for “hidden costs.” To compare costs among substitute washes, the cost analysis looks at the *change* in cost of using the substitute wash as compared to the baseline wash. Results are shown in the table below.

Cost Estimate Results

SUBSTITUTE WASH CHEMICAL CATEGORY	PURCHASE PRICE (\$ per gallon)	COST TO USE*
Petroleum <i>(based on 7 washes in this category)</i>	\$2.85 - \$16.40	-19% to +179% <i>(based on cleaning 205 blankets)</i>
Vegetable Ester <i>(based on 5 washes in this category)</i>	\$9.55 - \$18.00	-4% to +120% <i>(based on cleaning 151 blankets)</i>
Petroleum/Vegetable Ester <i>(based on 7 washes in this category)</i>	\$10.08 - \$19.00	+4% to +159% <i>(based on cleaning 235 blankets)</i>
Vegetable Ester/Water <i>(based on 2 washes in this category)</i>	\$9.55 - \$10.26	-6% to +168% <i>(based on cleaning 33 blankets)</i>
Terpene <i>(based on 1 wash in this category)</i>	\$17.85	+47% to +115% <i>(based on cleaning 32 blankets)</i>
Baseline	\$5.88	NA

*A negative number indicates a decrease in cost compared to the baseline wash, VM&P naphtha. The COST TO USE included labor costs, purchase price, and materials cost.

Reducing Costs with Substitute Washes

Washes from three different chemical categories (vegetable ester, petroleum, and petroleum/vegetable ester blend), showed lower costs in at least one facility. These cost savings indicate that most substitute wash categories have the potential to be a cost-effective replacement. Other washes showed increased costs – by up to 179% – when compared to the baseline. Most of the increase in cost was due to increased labor time to clean the blanket. As press operators become more familiar with the substitute washes, the total cost to use is likely to decrease considerably.

Costs Vary Within Categories

You'll also notice that there is quite a range of costs within each chemical category. This variation shows that the different washes work differently depending on the specific operating conditions of the facility. *This stresses the importance of testing different washes in your own facility to find the one that is right for you.* These cost variations may be due to differences in:

- operator’s opinion of blanket cleanliness
- application method
- operator’s past experience with substitute washes

Question **6**

What were the overall results of the substitute wash evaluations?

THE FOLD-OUT TABLE ON THE FOLLOWING PAGE SUMMARIZES the performance, risk, and cost results of the DfE evaluations for each chemical category. The information presented in this table is the result of efforts of the many participants of the DfE Lithography Project. The Project team included members of trade associations, suppliers, printers, and EPA. The Project collected data on 22 different blanket washes by conducting performance demonstrations at 17 different printing facilities who donated their time and their presses to this project.

For more details on the methodology and results for each of the categories listed in the chart, refer to the other questions in this booklet:

For More Information On:	Go To
Chemical Categories	QUESTION 2
Worker Health and Safety	QUESTION 3
Environmental Risk	QUESTION 3
Performance	QUESTION 4
Regulatory Concerns	QUESTION 2
Cost	QUESTION 5

Chemical Categories <i>see pages 7-8</i>	Worker Health Risk <i>see pages 11-12</i>		Safety <i>see pages 11-12</i>	Environmental <i>see pages 11-12</i>
	<i>Concern for Dermal Risk</i>	<i>Concern for Inhalation Risk</i>	Flammability <i>based on flashpoint</i>	% VOCs
Petroleum <i>including petroleum/water mixtures</i>	Concern	Low concern	Moderate risk	7 - 99% <i>increases as % petroleum in the blend increases</i>
Petroleum/Vegetable Ester Blends <i>including ester/ petroleum/ water mixtures</i>	Concern	Very low concern	Moderate risk	2 - 65% <i>increases as % petroleum in the blend increases</i>
Vegetable Ester <i>including blends with ester/glycol ether</i>	Low concern	Low concern	Low risk	12 - 30%
Vegetable Ester/Water Blends	Very low concern	No concern	Low risk	2 - 10%
Terpenes	Concern	Very low concern	Moderate risk	19%

KEY:
 A rating of:
 "concern" presents a greater risk than
 "low concern" which presents a greater risk
 than "very low concern" which presents a
 greater risk than "no concern."
 • Based on average risk of the washes
 tested within each given chemical category.

KEY:
 Low risk= flashpoint ≥ 150°F
 Moderate risk= 100°F ≤ flashpoint < 150°F
 High risk= flashpoint < 100°F
 • Based on average flashpoint of the
 washes tested within given chemical
 category

Concerns	Performance <i>see pages 13-14</i>	Regulatory Concerns <i>see pages 9</i>	Cost <i>see pages 15-16</i>
Aquatic Risk <i>as indicator of ecological risk</i>	Product performance as evaluated by printers during performance demonstrations	The regulated chemicals listed in this column are found in at least 1 formulation in this category. These chemicals may trigger the Federal environmental regulations listed below.	Cost to use (including purchase cost, labor, wipes) as compared to baseline, VM&P naphtha
Washes in this category that contain alkyl benzene sulfonates or ethoxylated nonylphenols were found to present a risk to aquatic species.	Fair to Good. Press operators reported that these washes cut ink well. In several cases, printers noted there was an oily residue left on the blanket after cleaning that took some extra effort to remove.	Some Petroleum-based washes tested contained: Aromatic Hydrocarbons CWA, CAA, CERCLA, SARA 313, RCRA, OSHA Alkyl benzene sulfonates CWA, CERCLA Alkanolamine CAA, CERCLA, SARA 313, OSHA Ethylene glycol ethers CAA, SARA 313	Decreased at some facilities and Increased at others
Washes in this category that contain alkyl benzene sulfonates or ethoxylated nonylphenols were found to present a risk to aquatic species.	Fair to Good. Printers found that these washes cut the ink well, but often left a thick, oily residue on the blanket that required extra time and effort to remove.	Some Petroleum/Vegetable Ester blends tested contained: Aromatic Hydrocarbons CWA, CAA, CERCLA, SARA 313, RCRA, OSHA Alkyl benzene sulfonates CWA, CERCLA	Decreased at some facilities and Increased at others
None	Fair to Good. Press operators found that this type of wash cut the ink well. In some cases, extra effort was needed to remove the oily residue with a dry wipe.	None of the vegetable ester-based washes tested contained Federally regulated chemicals.	Decreased at some facilities and Increased at others
Washes in this category that contain ethoxylated nonylphenols were found to present a risk to aquatic species	Poor. The effort required to remove the ink using these washes was considered excessive by the demonstration facilities. They also noted that the wash was of a thick consistency and did not soak into the shop towel.	None of the vegetable ester/water blends tested contained Federally regulated chemicals.	Increased at all facilities where this type of wash was demonstrated
Washes in this category that contain ethoxylated nonylphenols were found to present a risk to aquatic species	Fair. This wash cleaned the blanket well, but left a slight oily residue that had to be removed with a dry wipe.	Some Terpene-based washes tested contained: Alkali/salts CWA, CERCLA Alkyl benzene sulfonates CWA, CERCLA Ethylene glycol ethers CAA, SARA 313	Increased at all facilities where this type of wash was demonstrated

KEY:
CWA = Clean Water Act

CAA = Clean Air Act, Section 112B, Hazardous Air Pollutants

CERCLA = Comprehensive Environmental Response Compensation & Liability Act

SARA 313 = Superfund Amendments and Reauthorization Act, Section 313

RCRA = Resource Conservation and Recovery Act

OSHA = Occupational Safety and Health Act

Question 7


What steps do I need to take to switch to a substitute wash?

Printers are discovering that switching to one of the new substitute blanket washes can be a good business decision that is also safer for workers and for the environment. To find the blanket wash that best suits your facility, follow the steps outlined here. In all these steps, be sure to include press operators so that they understand how and why the evaluation is taking place.

1 > Evaluate your current wash

- Read product labels
- Read the Material Safety Data Sheets (MSDSs)
- Ask your supplier the questions listed in Question 8 of this booklet for your current wash. Find out:
 - > **the chemicals it contains**
 - > **its VOC content**
 - > **the health and environmental risks**
 - > **regulatory issues associated with the use of the wash**


Evaluate the cost of your wash by considering all the cost factors listed in Question 5 of this booklet.

 To conduct your own analysis, follow the step-by-step instructions in the DfE Lithography Bulletin 4, *A Worksheet to Help You Choose a Better Wash*.

2 > Identify possible substitute washes

Review the performance, cost, and risk information presented in this booklet to familiarize yourself with the different types of washes available.

Talk with your suppliers about the substitute washes they have available. Ask them the same questions about the risk and regulatory requirements that you asked about your current wash. Use the questions listed in Question 8 of this booklet to guide you.

 Also refer to some of the other DfE publications, such as DfE Lithography Bulletin 3, *Vegetable Ester Blanket Washes*, which gives more detailed information on this chemical category.

Select several washes to test at your facility.

For a list of common chemical names as they may appear on an MSDS or product label, see pages 7 and 8.

Work with your suppliers to select possible substitute washes for your facility.

Expect a learning curve as you gain experience using substitute blanket washes.

Compare your current wash and the substitute wash on all factors: cost, health risk, performance, environmental risk, and regulatory requirements.


3 > Try out substitute blanket washes in your facility

Set aside an adequate trial period.

Include the press operators in testing new washes because they'll be the ones using the new wash every day.

Follow suppliers' suggestions on how to use substitutes properly. When you first try out a wash, ask the supplier to demonstrate its use — substitute washes may require a change in your application method.


Be aware that it may take some time to become familiar with new washing techniques to use the wash most effectively. When press operators learn how to use these new washes, the substitutes can work as well as the standard blanket washes.

 To find out what kinds of changes in washing technique may be required, see DfE Lithography Bulletin 1, *Substitute Blanket Washes: Making Them Work*.

4 > Compare the cost, performance, and risk of your current wash and the substitute wash

After testing a few washes, compare them to your current wash. Be sure to consider more than performance and the price of the product — look at the risk and all the hidden costs of using the substitute and your current wash.

Remember that cost and performance can improve as you work to optimize your techniques for using a wash.

 Follow the step-by-step instructions in the DfE Lithography Bulletin 4, *A Worksheet to Help You Choose a Better Wash*, to find the best wash for your facility.

Question 8

What questions should I ask my blanket wash supplier?

Your supplier can be a valuable source of information for evaluating both the wash you use now and any substitute wash. Ask your supplier the questions listed below to gain important health and environmental information about the blanket wash you are currently using or a substitute blanket wash you may consider testing.

- 1 > What chemicals are in the blanket wash?**
 - Send me a copy of the MSDS.
 - What chemicals are in this wash that are not listed on the MSDS?

- 2 > Which regulations might be triggered when using this product?**
 - Are there any HAPs (Hazardous Air Pollutants under the Clean Air Act) in this wash?
 - How do you suggest I comply with the applicable regulations?

- 3 > What is the volatile organic compound (VOC) content and vapor pressure of the wash?**


- 4 > What health risks are associated with the use of the blanket wash?**
 - What types of short-term symptoms, such as dizziness, headache or nausea, might I experience by using these products on a daily basis?
 - Does this product contain any chemicals with adverse long-term health effects?
 - When using this product on a daily basis, what type of ventilation do I need?

- 5 > Do I need to be concerned if workers get this wash on their hands or skin?**

- 6 > What are the best ways to use the wash to minimize both the health risk and waste generated?**

For a list of common chemical names as they would appear on an MSDS or product label, see pages 7 and 8.

The lower the VOC content, the better. The lower the vapor pressure, the better.

 See DfE Lithography Bulletin 2, *Workplace Practices Make the Difference*, for more tips on how to minimize the health risks and waste generated when using substitute washes.

- 7** > Do I need to change the way I currently use blanket wash to make this product work best?
- 8** > What is the proper method for disposing of the used blanket wash and towels?
 - > Will my used shop towels or used blanket wash be considered hazardous waste under RCRA?
 - > Once the wash is mixed with other chemicals, such as inks or fountain solutions, what is the proper disposal method?
- 9** > Do I need to take any special precautions when laundering used towels?
- 10** > Do any of the chemicals in this product present a risk to aquatic species?

Question 9

What else can I do to prevent pollution in my facility?

Pollution prevention can save money, benefit the environment, and result in a safer workplace. By replacing a high-VOC blanket wash with a substitute low in VOCs and vapor pressure, you are preventing pollution, meaning you are reducing (or eliminating) pollution at the source. If you look around, you'll find opportunities for preventing pollution throughout your print shop. Many lithographers, mostly small and medium-sized facilities, currently use low-cost pollution prevention practices to reduce overall chemical usage in their shops. Some of their ideas are presented here. Following these ideas is a description of blanket wash recycling opportunities. For printers who continue to use solvent-based washes, several options for solvent recovery are described at the end of this section.

1 > Conduct a process evaluation to find ways to prevent pollution

One of the best ways to find new pollution prevention opportunities methods is to conduct a process evaluation. A process evaluation is a step-by-step review of your printing process.

- Look at each step of the printing process, from purchasing raw materials to shipping finished product. For every step of the process, write down every point where materials are used and wastes are generated.
- Don't forget to include the steps in your operation that are not directly part of the production process (such as chemical storage, waste disposal and electricity use).
- Where wastes are generated, estimate the cost associated with the lost raw material, and with collecting, tracking, and disposing of that waste.
- Take a closer look at the points in your process where wastes are produced. There may be ways to reduce each of these wastes.

2 > Improve materials management and inventory control

- Manage inventory on a "first-in first-out" basis.
- Minimize the amount of chemicals on the press floor.
- Store chemicals in closed, clearly marked containers.
- Use a pump to transfer chemical products from large to small containers.

3 > Improve the way you handle chemicals

Many printers have modified the way they handle blanket wash and other chemicals to prevent pollution, including:

- Using squeeze bottles or plunger cans to apply a specified amount of blanket wash to shop towels.
- Storing used towels in closed containers to reduce solvent evaporation.
- Diluting the wash with water.

Pollution prevention means finding ways to reduce or eliminate the *sources* of pollution in your facility.

Take a closer look at the points in your process where wastes are produced. There may be ways to reduce each of these wastes.

Remember, wastes indicate lost profit as well as possible environmental problems.

Improvements in the way you handle chemicals in daily operations can reduce waste.


Encourage all employees to play an active role in pollution prevention to improve your facility.

Solvent-laden shop towels can be volatile, flammable, and may be toxic to ecosystem life when the effluent from industrial laundries is discharged to sewer systems.

Reducing the solvent in towels reduces laundry costs and reduces potential for releases to the environment.

4 > Make pollution prevention part of your daily activities

The most effective method to prevent pollution throughout your shop is to get everyone involved and thinking about improvements they can make in their area of the facility. But to make pollution prevention a priority with everyone, it is essential that your shop's definition of work excellence includes environmental awareness.

- Conduct regular evaluations and work as a team with employees and chemical suppliers to prevent pollution.
- Encourage employee suggestions through a merit program or some other type of incentive.
- Make it clear that management will support employees as changes are made and will commit the resources necessary to succeed.
-  See DfE Lithography Bulletin 2, *Workplace Practices Make the Difference*, for more tips on how to minimize the health risks and waste generated when using substitute washes.

BLANKET WASH RECYCLING OPPORTUNITIES

If you must use a solvent-based wash, there are technologies that allow you to recover your used solvent. Solvent recovery can reduce operating costs and waste management expenses. Several solvent recovery options are described below.

Extraction of blanket wash from press wipes

Solvent remaining in shop towels can be extracted and then reused directly for non-critical cleaning such as parts washing. Extraction can be done using any of the following methods:

HAND-OPERATED WRINGER. These cost less than \$1,000 and may be a viable option for small printers. Verify that the squeeze rollers of the wringer are made of a material that is resistant to the type of solvent in your wipes.

EXPLOSION-PROOF CENTRIFUGE. The centrifuge is most appropriate for large printing facilities that generate significant quantities of shop towels. The units may cost between \$21,000 and \$30,000, processing from 35 to 130 pounds of towels per load. The typical load size is 225 wipes. Be sure to check with your local regulatory agency to determine if any restrictions exist in your area for operating a centrifuge.

MOBILE CENTRIFUGE SERVICE. Since the purchase of a centrifuge may not be viable for smaller printers, they can contract with a mobile service that transports an explosion-proof centrifuge to printing facilities for on-site solvent extraction. Pricing for extraction services varies regionally, but may be around \$65/hour, during which time it is possible to process around 1,500 towels.

Distillation of solvents

While extraction can recover solvent for reuse for imprecise cleaning, distillation of used solvent produces near-virgin quality blanket wash. Distillation units cost \$12,000 to \$15,000, depending on capacity and features. Safety, however, is a significant consideration for printers contemplating the purchase of a distillation unit. Be sure to check with your local regulatory agency, since some states require additional permitting for solvent distillation units.

Question **10**

Where can I find more information about pollution prevention in printing?

There are many resources available to printers for more information on choosing and using a substitute blanket wash, as well as for information on pollution prevention practices in printing. Many states have technical assistance offices, and some states even have pollution prevention handbooks geared specifically toward printers. Another good place to go for information is your local trade association. They may be able to put you in contact with suppliers of substitute products, as well as other printers who have implemented improvements at their facilities.

Listed below are a few resources to get you started. This is by no means a comprehensive list, but is intended to show what types of resources may be available in your area.

TRADE ASSOCIATIONS AND OTHER ORGANIZATIONS

GRAPHIC ARTS EDUCATION AND RESEARCH FOUNDATION (GAERF)

1899 Preston White Drive
Reston, VA 22091
phone: 703-264-7200

GRAPHIC ARTS TECHNICAL FOUNDATION (GATF)

200 Deer Run Road
Sewickley, PA 15143
phone: 412-741-6860 fax: 412-741-2311
email: info@gatf.lm.com
<http://www.gatf.lm.com/>

NATIONAL ASSOCIATION OF PRINTERS AND LITHOGRAPHERS (NAPL)

780 Paliside Avenue
Teaneck, NJ 07666
phone: 800-642-NAPL or 201-342-0700
fax: 201-692-0286
email: infor@napl.org
<http://www.napl.org/>

PRINTERS NATIONAL ENVIRONMENTAL ASSISTANCE CENTER (PNEAC)

Virtual center representing trade associations and local government to facilitate information exchange and guidance for printers.

<http://www.inhs.uiuc.edu/pneac/pneac.html>

PRINTING INDUSTRIES OF AMERICA (PIA)

100 Daingerfield Road
Alexandria, VA 22314-2888
phone: 703-519-8100 fax: 703-548-3227
<http://www.printing.org/>

CONTACT



NEWMOA
617-367-8558x302
email: nepr@tiac.net

Iowa Waste
Reduction Center
University of
Northern Iowa
Cedar Falls, IA 50614
319-273-2079

Michigan Great Printers
Project Environmental
Assistance Division,
Michigan DEQ
P.O. Box 30457
Lansing, MI 48909-7957
1-800-662-9278
Fax: 517-335-4729

New Jersey Department
of Environmental
Protection
401 East St., CNO28,
5th Floor
Trenton, NJ 08625
609-292-8341
<http://es.inel.gov/techinfo/facts/jersey/njprint.html>

POLLUTION PREVENTION INFORMATION FOR PRINTERS

This section lists some of the many resources on pollution prevention developed specifically for printers. This list is not exhaustive, so be sure to check with your state technical assistance office to see what other resources are available.

Fact Sheets for Printers

These fact sheets include information on a demo at MA Toxics Use Reduction Institute at UMass/Lowell of “Near-Zero VOC Lithographic Ink and Blanket Wash Systems,” as well as open houses in print shops in New England held to demonstrate environmentally friendly printing technologies.

Pollution Prevention Manual for Lithographic Printers

An 80-page handbook outlining specific pollution prevention procedures and ideas for each step of the printing process. One section details pollution prevention options for press cleaning, including a section on product substitution.

Understanding Hazardous Waste Generation and Responsibilities: An Introductory Guide for Lithographic Printers

The Great Printers Project brings together representatives from government, industry and trade groups to make pollution prevention the primary choice of the Great Lakes states lithographic printing industry. In doing so, the project is developing information products such as the fact sheets and booklets for lithographers listed above.

Info at <http://www.deq.state.mi.us/>

Fact Sheet: Waste Reduction for the Commercial Printing Industry

This six-page fact sheet outlines a checklist of pollution prevention alternatives for each process step in lithography. It includes contact information for New Jersey regarding information on alternative blanket washes. California and Virginia also have a similar fact sheet for printers.

Info at <http://es.inel.gov/techinfo/facts/jersey/njprntng.html>

Pollution Prevention for Printers

This 70-page manual gives tips on how to reduce wastes and operating costs, and ensure environmental compliance. One of the appendices lists suppliers for alternative cleaning agents, washing equipment and distillation units.

EnviroPrint: A Self-Help Guide to Environmentally Sound Printing Operations by the Printing Industries of Ohio.

This three-ring manual includes worksheets and regulatory information as well as pollution prevention tips for printers.

Info at <http://www.epa.ohio.gov/opp/prntp2x.html>

Industrial Solvents: Pollution Prevention Handbook

Contact: Center for Hazardous Materials Research. This handbook includes a section on solvent substitution for industrial cleaning, which includes categories of possible alternatives to traditional chemicals. Another section lists suppliers of alternative solvents and solvent recovery equipment.

Environmental Management and Pollution Prevention: A Guide for Lithographic Printers

This 36-page handbook describes pollution prevention tips for handling various waste streams and processes for lithography. It includes a section on “DOs and DON'Ts” for press washes, as well as a list of solvent vendor and recycler contacts for Washington State.

Info at <http://www.wa.gov/ecology/>

Compliance Plus Guide

This manual, “Compliance+” (plus pollution prevention) shows lithographic printers step-by-step how to bring their companies into compliance and beyond. This is a general reference for all lithographic printers, although the document targets Illinois-specific regulations.

Fit to Print: An Environmental Manual for New England Lithographers

This 92-page manual gives printers basic, essential information on the most significant federal and state environmental compliance requirements, and lists environment assistance resources for New England's printers. The manual uses illustrations, charts, and checklists in helping printers develop corporate environmental strategies, improve business operations (like quality control), and enhance functional operations such as production scheduling.

CONTACT



County of Erie, DEP
Office of Pollution
Prevention
95 Franklin Street
Rm 1077
Buffalo, NY 14202
716-858-6370

Send a \$5 check to:
Printing Industries
of Ohio
P.O. Box 819
Westerville, OH 43806
614-794-2300

University of Pittsburgh
320 William Pitt Way
Pittsburgh, PA 15238
412-826-5320

Washington State
Department of Ecology
P.O.Box 47600
Olympia, WA 98504-7600
360-407-7472
fax: 360-407-6989
ecypub@ecy.wa.gov

Illinois Great Printers
Project
312-580-3041

U.S EPA-Region 1
JFK Federal Building
Boston, MA 02203
800-906-3328

OTHER RESOURCES

SUBSPRINT (SUBSTITUTION OF ORGANIC SOLVENTS IN THE PRINTING INDUSTRY NEWSLETTER)

SUBSPRINT has conducted extensive research into the use of vegetable-based press washes (vegetable cleaning agents). They also have produced a video on using these cleaners.

CONTACT:

The Danish Working Environment Fund
Vermundsgade 38
2100 Copenhagen Denmark 0
Tel: 31 20 55 33

GREEN AND PROFITABLE PRINTING VIDEO

This four-part video series addresses waste reduction opportunities for small and medium lithographic print shops. It emphasizes the linkages between quality, process control, and waste prevention. Each video is approximately 15 minutes.

CONTACT:

Solid and Hazardous Waste Education Center
529 Lowell Hall
610 Langdon Street
Madison, WI 53703
Tel: 608-262-0385

MSDS ONLINE

Material Safety Data Sheets for industrial chemicals are online! Use any Web browser and type the following:

CONTACT:

<http://www.chem.utah.edu/MSDS/msds.html>

SAGE (SOLVENT ALTERNATIVES GUIDE)

A comprehensive guide to provide P2 information on solvent and process alternatives for industrial cleaning. Also includes downloadable software.
<http://clean.rti.org/>

