ALTERNATIVE LOW-VOC, LOW TOXICITY CLEANUP SOLVENTS FOR THE LITHOGRAPHIC PRINTING INDUSTRY

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EXECUTIVE SUMMARY

Emissions of VOC solvents used in cleanup applications in lithographic printing amount to about four tons per day in the South Coast Basin, which is located in southern California. The South Coast Air Quality Management District (SCAQMD) established VOC limits on these solvents that become effective in July of 2005. For on-press blanket and roller cleaning, the VOC content of the cleaners will be reduced from 800 or 600 grams per liter to 100 grams per liter or less if feasible.

In a three year project, the Institute for Research and Technical Assistance (IRTA), a non profit technical organization, worked with 10 lithographic printing facilities in the South Coast Basin to identify, test and demonstrate alternative low-VOC, low toxicity on-press cleaners. The project was sponsored by Cal/EPA's Department of Toxic Substances Control (DTSC), U.S. EPA and the SCAQMD. This document reports the results of the project. Another related project sponsored by SCAQMD is still underway and, when it is completed, the results of the two projects will be integrated. The SCAQMD project involves working with an additional 10 lithographic printing facilities.

The Printing Industries Association of Southern California assisted IRTA in identifying facilities that would be willing to participate in the project. A range of facilities was selected so the test results would be more applicable to the industry as a whole. IRTA conducted preliminary testing to screen alternative cleaners that might be appropriate for field testing. IRTA initially performed tests on one or more printing presses, generally a number of times, to identify potential effective cleaners. When effective cleaners were found, IRTA provided a week's supply of the alternatives for testing. In some cases, the printers decided to convert to the new cleaner. IRTA also conducted cost analysis and comparison of the alternative cleaners and the current cleaners used by the facilities.

Table E-1 summarizes the results of the project. For each of the 10 participating facilities, the table shows the type of press, the type of ink and the substrate or substrates used by the facility. The table also shows the alternatives that were found to be effective at each of the facilities for cleaning blankets and/or rollers. The VOC content of these alternatives is listed in parenthesis in the table.

The two newspapers participating in the project, the Los Angeles Times and the San Bernardino Sun, have converted to cleaners that meet the future VOC limit of the SCAQMD regulation. The City of Santa Monica Print Shop also converted to alternatives that were tested in the course of the project. Nelson Nameplate, another project participant, has recently converted to the alternatives tested during the project. IRTA tested the alternative blanket and roller washes that are identified in Table E-1 at the remaining six facilities.

In all cases, IRTA identified and tested alternative cleaners that had a VOC content of 100 grams per liter or less. The alternatives that were tested and found to be most effective include water-based cleaners, soy based cleaners and acetone, blends of the

three categories of cleaners and blends of the cleaners with small amounts of VOC solvents. Acetone is not classified as a VOC and is low in toxicity.

The facilities participating in the project perform much of their on-press cleaning with wipes. These wipes are shipped to industrial laundries to be cleaned for reuse and, as a result, are not classified as hazardous waste.. Use of the low-VOC alternative cleaners would not change this practice and the wipes generated would not be classified as hazardous waste.

Table E-1
Project Testing Results

Company	Press Type	Ink Type	Substrate(s)	Blanket Wash (VOC in g/l)	Roller Wash (VOC in g/l)
L.A. Times	Coldset Web	Soy	Newsprint	water-based cleaner (83)	N/A
San Bernardino Sun	Coldset Web	Soy	Newsprint	water-based cleaner (38)	N/A
PIP	Sheet Fed	Solventborne	Coated & Uncoated Paper	N/A	soy (20)
City of Santa Monica	Sheet Fed	Soy	Coated & Uncoated Paper	water-based cleaner (75)	soy (20)
Presslink	Sheet Fed	Solventborne	Coated & Uncoated Paper	soy (20)	soy (20)
The Castle Press	Sheet Fed	Solventborne	Coated & Uncoated Paper	soy/acetone (10)	soy (50)
Nelson Nameplate	Sheet Fed	Soy	Metal, Plastic	Acetone/mineral spirits (100)	Acetone/water/ mineral spirits (100)
The Dot Printer	Sheet Fed	Solventborne	Coated & Uncoated Paper	Acetone/soy (2)	soy (50)
J.S. Paluch	Coldset Web	Solventborne	Newsprint	soy (20)	soy (20)
R.R. Donnelley	Heat Set Web	Solventborne	Coated & Uncoated Paper	soy (20)	N/A

Note: N/A is not applicable

The cost analysis indicates that four of the facilities reduced or would reduce their cleaning costs through conversion to the alternatives taking into account VOC emission fees. The six remaining facilities increased or would increase their cleaning cost by

converting to the alternatives. Other factors that could affect the cost include longer-term performance and compatibility testing. IRTA is conducting extended testing in the ongoing SCAQMD project to determine the impact of these variables.

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I. INTRODUCTION AND BACKGROUND

Volatile Organic Compound (VOC) emissions from solvent cleaning operations contribute significantly to the South Coast Air Basin's emission inventory. The South Coast Air Quality Management District (SCAQMD or District) periodically adopts an Air Quality Management Plan (AQMP). This AQMP calls for significant reductions in VOC emissions from cleaning and degreasing operations by 2010 to achieve attainment status.

One of the District's rules that focuses on cleaning applications has future compliance limits for which technology has not yet been developed. This rule is SCAQMD Rule 1171 "Solvent Cleaning Operations." One of the categories of cleaning regulated in Rule 1171 is lithographic printing cleanup operations. This is an important category because VOC emissions of cleanup solvents amount to about four tons per day. Table 1-1 shows the VOC limits specified in the rule for this category.

Table 1-1
VOC Limits for Cleanup Solvents Used in Lithographic Printing

Cleaning Activity	Current VOC Limit (grams per liter)	VOC Limit on July 1, 2005 (grams per liter)
Lithographic or Letterpress Printing		
Roller Wash--step 1	600	100
Roller Wash--step 2, Blanket Wash & On-Press Components	800	100
Removable Press Components	25	25

The values of Table 1-1 show that the VOC limit of the cleanup solvents used today for cleaning rollers and blankets in on-press cleaning ranges from 600 to 800 grams per liter. By July 1, 2005, the VOC content of cleaners used for these purposes must have a lower VOC content of 100 grams per liter. The table also shows that cleaners used in off-press cleaning have a VOC limit of 25 grams per liter today.

Project Structure

The Institute for Research and Technical Assistance (IRTA) is a nonprofit organization established in 1989. IRTA works with companies to test and demonstrate alternatives to ozone depleting, VOC and toxic solvents. IRTA also conducts projects that focus on finding low-VOC, low toxicity alternatives for whole industries. IRTA runs and operates the Pollution Prevention Center, a loose affiliation of local, state and federal governmental organizations and a large electric utility company.

Cal/EPA's Department of Toxic Substances Control (DTSC), with DTSC and U.S. EPA Region IX funding, contracted with IRTA to work with lithographic printers to identify, test and demonstrate alternative low-VOC, low toxicity cleanup solvents. The SCAQMD

provided DTSC with additional funding from U.S. EPA Region IX to expand the DTSC project with IRTA. In these two projects, IRTA is working with 10 lithographic printing facilities to test alternative low-VOC, low toxicity on-press cleanup materials.

The SCAQMD also contracted with IRTA separately to conduct the technology assessment that is called for in Rule 1171 to investigate alternative on-press cleanup materials. As part of the SCAQMD project, IRTA is testing alternatives with an additional 10 lithographic printing facilities in the South Coast Basin. IRTA is charged with finding suitable alternative cleaning agents that have a VOC content of 100 grams per liter or less that will meet the July 1, 2005 VOC limits in Rule 1171 and will help to satisfy the AQMP's goals for reducing VOC emissions.

The SCAQMD project includes a technical working group consisting of representatives from printing facilities, a trade organization, roller manufacturers, blanket manufacturers, solvent suppliers and government agencies. It also includes an effort to investigate the compatibility of the alternative cleaning agents with the materials used to make rollers and blankets. The University of Tennessee (UT) is conducting the compatibility testing with assistance from the roller and blanket manufacturers. The Graphic Arts Technical Foundation (GATF), an industry supported technical organization, is charged with developing low-VOC cleaning materials by reformulating existing cleaners.

IRTA has conducted the two DTSC projects and the SCAQMD project jointly with one another. Together, the three projects include 20 lithographic printing facilities. This document reports the results of the two DTSC projects and it describes the alternatives that were tested in 10 of the 20 lithographic printing facilities. The analysis reported here will be included in a later report that describes the results of the SCAQMD technology assessment.

Lithographic Printing

The number of lithographic printers in the U.S. is about 54,000. Most of the printing companies are located in six states, one of them California. The state has about 8,300 lithographic printers and many of them are located in southern California. There are about 2,000 newspapers in California and many of them also use the lithographic printing process.

Lithographic printing is often referred to as offset printing and it is based on the fact that oil and water do not mix. The ink is offset from the plate to a rubber blanket on an intermediate cylinder and from the blanket to the substrate--which could be paper, plastic or metal--on an impression cylinder. On the plate, the printing areas are oil or ink receptive and water repellent and the non-printing areas are water receptive and ink repellent. When the plate, mounted on a cylinder, rotates, it contacts rollers that have been wet by water or dampening solution and rollers wet by ink. The dampening solution wets the non-printing areas of the plate, which prevents the ink from wetting these areas. The ink wets the image areas and these are transferred to the blanket cylinder. As the

substrate passes between the blanket cylinder and impression cylinder, the inked image is transferred to the substrate.

Some of the lithographic presses used by the industry are sheet fed where the image is printed on sheets of a substrate and some are web presses where the image is printed on a continuous web. Sheet fed presses are used for printing products like advertising, books, catalogs, greeting cards, posters, labels, packaging and coupons. Web presses, which print on rolls of paper, are used for printing business forms, newspapers, inserts, long-run catalogs, books and magazines.

Participating Facilities

The Printing Industries Association of Southern California (PIASC) assisted IRTA in finding lithographic printing facilities to participate in the DTSC and SCAQMD projects. The on-press cleanup solvents used in this industry are influenced by three factors: the type of press; the substrates; and the type of ink. In facility selection, IRTA and PIASC tried to find facilities that would represent the range of different press, substrate and ink types used by the industry. Table 1-2 shows the 20 facilities that participated in the project and provides information on their presses, the substrates they print on and the type of ink they use. In some cases, the facilities had more than one press type but the table presents information on only the press types where alternative cleanup materials were tested.

The second column of Table 1-2 shows that the first 10 facilities participated in the DTSC projects and the second 10 facilities are still participating in the ongoing SCAQMD project. This document summarizes the results of the testing for the first 10 facilities. In the SCAQMD project, additional longer-term testing is underway for several of the facilities participating in the project. The results of the DTSC and SCAQMD projects will be combined in a document when the SCAQMD project is completed.

The third column of Table 1-2 shows the type of press used at each facility. Six of the DTSC project facilities have sheet fed presses. PIP and the Santa Monica Print Shop have very small A.B. Dick automated presses. Nelson Nameplate has two small manual sheet fed presses. Presslink and The Castle Press have four color sheet fed presses and The Dot Printer has six color sheet fed presses. Two of the facilities, the Los Angeles Times and the San Bernardino Sun, have coldset web presses. Finally, RR Donnelley & Sons has a heatset web press.

The fourth column of the table shows the type or types of substrates each of the facility prints on. Six of the DTSC project facilities print on coated and uncoated paper. Three of the DTSC project facilities print on newsprint. Finally, one of the facilities prints on metal and plastic.

The fifth column of Table 1-2 shows the type of ink used for printing in each of the facilities. Four of the DTSC project facilities use soy based ink and six of the facilities

use solventborne ink. None of the DTSC project facilities uses either ultraviolet or electron beam curable ink. All five of the facilities using these ink types are included in the SCAQMD project.

Table 1-2
Facilities Participating in DTSC and SCAQMD Projects

Company	Project	Press Type	Substrate(s)	Ink Type
Los Angeles Times	DTSC	coldset web	newsprint	soy
San Bernardino Sun	DTSC	coldset web	newsprint	soy
PIP	DTSC	sheet fed	coated, un-coated paper	solventborne
City of Santa Monica Print Shop	DTSC	sheet fed	coated, un-coated paper	soy
Presslink	DTSC	sheet fed	coated, un-coated paper	solventborne
The Castle Press	DTSC	sheet fed	coated, un-coated paper	solventborne
Nelson Nameplate	DTSC	sheet fed	metal, plastic	soy
The Dot Printer	DTSC	sheet fed	coated, un-coated paper	solventborne
J.S. Paluch	DTSC	coldset web	newsprint	solventborne
RR Donnelley & Sons	DTSC	heatset web	coated, un-coated paper	solventborne
SCAQMD Print Shop	SCAQMD	sheet fed	coated, un-coated paper	solventborne
Print 2000 Graphics	SCAQMD	sheet fed	coated, un-coated paper	solventborne
Fanfare Media Works	SCAQMD	sheet fed	coated, un-coated paper	solventborne
Vertis	SCAQMD	heatset web	coated, un-coated paper	solventborne
Western Metal	SCAQMD	heatset sheet fed	coated, un-coated paper	solventborne
Anderson Litho-graph	SCAQMD	sheet fed	coated, un-	solventborne
		heatset web	coated, un-coated paper	solventborne
		sheet fed	coated, un-coated paper	ultraviolet curable
Lithographix	SCAQMD	sheet fed	coated, un-coated paper	ultraviolet curable
Tedco	SCAQMD	sheet fed	paper, plastic	ultraviolet curable
Oberthur Card	SCAQMD	sheet fed	plastic	solventborne
		sheet fed	plastic	ultraviolet curable
Huhtamaki	SCAQMD	web	coated paper	electron beam curable

Project Approach

The first step in the project was to visit each of the participating facilities. During these visits, IRTA toured the facility and focused particularly on the press or presses. IRTA also discussed the type of ink or inks used by the printer and the current cleaning process with the facility representatives. IRTA requested a sample of ink or inks from the facilities.

The second step in the project was to perform preliminary tests at the IRTA office using the ink and several alternative cleaning agents. At this stage, IRTA wanted to screen alternative cleaning materials to see if they could clean the ink. IRTA obtained a blanket from one of the printers. The ink was applied to the blanket and the different cleaning agents were rubbed on the ink with a paper towel to see if they could effectively remove the ink. This test procedure allowed IRTA to determine which alternatives might be effective in cleaning the ink on a press.

The third step in the project was to visit the facilities and test the alternatives that appeared effective in the preliminary testing to clean the ink on the blankets and rollers on the presses with the press operators. The on-press cleaning is much more difficult than the preliminary testing so IRTA visited the facilities often and conducted testing on some presses as many as 30 times.

Printing facilities have different practices for cleaning the blankets and rollers. A picture of a blanket at one of the facilities is shown in Figure 1-1. Press operators commonly apply the solvent to a wipe cloth and wipe across the blanket to remove the ink. In some cases, this completes the blanket cleaning process. Some operators rinse the blanket after applying the solvent with a wipe cloth wet with water. Other operators apply a dry wipe cloth to the blanket after cleaning with the solvent to dry the blanket. 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.

A picture of a roller train is shown in Figure 1-2. 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. Operators generally apply the roller cleaner three to five times. Some facilities use two cleaners on the rollers; the first cleaner, called a Step 1 cleaner, is applied a few times to the roller train; application of the Step 1 cleaner is followed by application of the second cleaner, called a Step 2 cleaner, which also may be applied a few times.

In some cases, facilities use the same cleaner on both the blankets and the rollers. In other cases, different cleaners are used. Blankets are cleaned at the end of a job and they are often cleaned several times during a run. Rollers are generally cleaned at the end of a

job when the ink color is changed or at the end of the day if no color changes have been made. Blanket cleaning requires a cleaner that solubilizes the ink but the aggressive action of hand pressure on the wipe cloth helps substantially with the cleaning. In roller cleaning, the cleaner must pass through a long series of rollers so it must solubilize the ink effectively. Although there is some pressure during cleaning when the roller train is engaged, this does not help as much in the cleaning as the hand action on blanket cleaning.

Figure 1-1. Blanket on lithographic printing press

Figure 1-2. Rollers on Small Lithographic Press

The fourth step in the project was to conduct scaled-up testing with each of the facilities on one or more of their presses. For scaled-up testing, IRTA provided the facilities with the blanket and roller wash that were found to be most effective by the operators during the on-site testing. IRTA generally provided enough cleaner for the facilities to clean for a week.

The fifth step in the project was to analyze and compare the cost and performance of the alternative and currently used cleaners. Section II of this document presents this analysis for the 10 facilities participating in the DTSC projects.

Current Cleanup Solvents

Solvents of various types are used in the inks utilized by lithographic printers. These solvents are emitted during the printing process. Cleanup materials used by the industry for cleaning blankets, ink rollers, dampening rollers, metering rollers and plates also contain solvents. In fact, the emissions from the solvents used for cleanup are much higher than the emissions from the solvents used in the inks. As mentioned earlier, VOC emissions of cleanup solvents from the lithographic printing process in the South Coast Basin are estimated to be about four tons per day.

Solvents used for on-press cleanup in lithographic printing include mineral spirits, methyl ethyl ketone, toluene, xylene, glycol ethers, terpenes, heptane and hexane. All of these solvents are classified as VOCs and many of them are toxic. Mineral spirits contain trace quantities of benzene, toluene and xylene. Benzene is an established human carcinogen; toluene causes central nervous system damage and xylene causes birth defects. Benzene, toluene and xylene are listed on California's Proposition 65, The Safe Drinking Water and Toxic Enforcement Act. Hexane causes peripheral neuropathy, a nervous system disease.

The project sponsors are concerned about the VOC emissions from the solvents and the exposure of the workers and community members to the solvents. The aim of the three projects is to identify, test and demonstrate alternative low-VOC, low toxicity cleanup materials. The alternative cleaners were tested for blanket and ink roller cleaning but not for dampening roller, metering roller or plate cleaning.

Alternative Cleanup Materials

The alternative low-VOC, low toxicity cleanup materials IRTA tested during this project can be classified into three categories. The first category is water-based cleaners. The second category is solvents that are exempt from VOC regulations. The third category is methyl esters which have a very low VOC content. Each of these categories of cleaners is discussed in more detail below.

Water-Based Cleaners. These cleaners generally contain a high concentration of water. They are often diluted further with water when they are used for cleaning. Some water-based cleaners are based on surfactants; others contain solvents that are miscible with

water. Water-based cleaners are most applicable for cleaning the soy based ink used by newspapers or the ultraviolet or electron beam curable ink used by some lithographic printers.

One of the facilities participating in the DTSC project, the Los Angeles Times, has been using a water-based cleaner called Super Clean BW for a number of years. A Material Safety Data Sheet (MSDS) for this cleaner is shown in Section II of this report in the analysis for the Los Angeles Times. The cleaner contains a VOC solvent, d-limonene, and a surfactant. The VOC content of the cleaner is 495 grams per liter. The Los Angeles Times dilutes the cleaner in a five to one ratio of water to cleaner. In diluted form, the VOC content of the cleaner is about 83 grams per liter, which meets the SCAQMD Rule 1171 VOC limit specified for July 1, 2005.

Another facility participating in the DTSC project, the San Bernardino Sun, has also been using a water-based cleaner called Mirachem Pressroom Cleaner for several years. An MSDS for this cleaner is shown in Section II of this report in the analysis for the San Bernardino Sun. This cleaner contains small quantities of two VOC solvents, a surfactant and water. The VOC content of the cleaner concentrate is 75 grams per liter. The San Bernardino Sun uses the cleaner in a 50 percent concentration with water. The VOC content of this cleaner during use is about 38 grams per liter which meets the SCAQMD Rule 1171 VOC limit for July 1, 2005.

A water-based cleaner, called Daraclean 236, was tested by IRTA at the Los Angeles Times. This cleaner contains surfactants but does not contain solvents. The VOC content of the cleaner is 60 grams per liter. IRTA tested the cleaner at a one-third concentration in water; the VOC content of this cleaner is 20 grams per liter as used. The Daraclean 236 would comply with the SCAQMD Rule 1171 VOC limit that becomes effective in July 2005.

IRTA tested the Mirachem Pressroom Cleaner at several of the other facilities participating in the DTSC projects. It was effective in only one case, the City of Santa Monica Print Shop. As described in the Section II analysis for this facility, the shop converted to this cleaner for blanket cleaning. One of the reasons the cleaner worked effectively for this facility might be because the City used soy based ink. In facilities where solventborne ink is used, the cleaner was not effective even at full concentration or in blends with other materials.

IRTA tested other water-based cleaners for cleaning ultraviolet and electron beam curable ink. These cleaners consist of heavy concentrations of surfactants. All of the facilities where these cleaners worked effectively are included in the SCAQMD project so this report does not analyze them further.

Exempt Solvents. There are a number of solvents that have been specifically deemed exempt from VOC regulations by U.S. EPA and SCAQMD. Some of these contribute to ozone depletion and their production has been banned. The use of others, perchloroethylene and methylene chloride, is severely restricted because they are

classified as carcinogens. One of the volatile methyl siloxanes and parachlorobenzotrifluoride, have potential toxicity problems.

Two solvents that are exempt from VOC regulation could be used for on-press cleaning. Acetone is an aggressive solvent that is very low in toxicity. It evaporates readily and its disadvantage is its low flash point. IRTA tested acetone extensively during this project and it is a very effective ink cleaner. Methyl acetate, also an aggressive solvent, is more toxic than acetone. It has similar properties to acetone, a fast evaporation rate and a low flash point. It is much more expensive than acetone. Because of its higher toxicity and cost, IRTA did not test methyl acetate during this project.

Methyl Esters. This class of chemical generally contains methyl esters that have a 16 to 18 carbon chain length. Materials like soy, canola oil, grape seed oil and coconut oil are composed of methyl esters. These materials clean most types of inks very effectively. During this project, IRTA relied heavily on soy based cleaners in the alternative roller and blanket washes. Soy was selected because it is more widely available and lower cost than some of the other methyl esters. IRTA had several different formulations tested by the SCAQMD lab to determine the VOC content of the soy materials and the VOC content ranged from five grams per liter to 25 grams per liter.

Other Formulations. During the projects, IRTA tested water-based cleaners, acetone, soy based cleaners, blends of these cleaners with one another and blends of the cleaners with VOC solvents. All the cleaners that were blended with VOC solvents had a VOC content at or below 100 grams per liter.

Compatibility

Rollers are generally replaced once every six months or once a year and are very expensive. Blankets, which are less expensive, are replaced much more often. Most lithographic printers using soy or solventborne inks use rollers and blankets made of nitrile. Printers using ultraviolet or electron beam curable inks generally use rollers and blankets made of EPDM. The EPDM is compatible with these inks.

All solvents damage rollers and blankets to some extent but some solvents damage them more and some damage them less. For example, acetone is compatible with EPDM but high concentrations of the solvent may damage nitrile. Solvents like toluene and xylene damage nitrile. Compatibility of the cleaners with the roller and blanket material is a very important issue and, accordingly, the SCAQMD project involves a compatibility testing task. As mentioned earlier, the University of Tennessee (UT) is conducting the compatibility testing and will provide compatibility results on some of the cleaners used today and the alternatives tested by IRTA and GATF. UT worked with the roller and blanket manufacturers to develop test protocols and the manufacturers provided UT with samples of rubbers of various types for the testing. The compatibility testing has not been completed so the results are not available to be reported here.

IRTA relied on guidance from the roller and blanket manufacturers and some of the preliminary results of the UT compatibility testing to determine what alternative materials to test with the printers involved in the DTSC and SCAQMD projects. The information indicated that water-based cleaners are compatible with nitrile and EPDM, soy based cleaners are compatible with nitrile but not EPDM and acetone in high concentrations is compatible with EPDM but not nitrile.

All of the printers involved in the DTSC projects have blankets and rollers made of nitrile. IRTA identified water-based cleaning and soy based cleaning alternatives wherever possible. In the case of blanket washes, when the facility personnel requested that the cleaner evaporate more quickly, IRTA generally provided an acetone blend. Because the UT analysis is not yet complete, it is not clear whether the blends tested during this project will be found to be compatible. In the SCAQMD project, IRTA is performing longer-term testing for a three month period with several of the facilities. One of the purposes of this extended testing is to determine whether the laboratory compatibility tests represent what actually happens in a printing facility. IRTA plans to monitor the blanket and roller failure time during the testing.

Cleaner Performance

Performance of the alternative cleaning agents at each facility was evaluated on a case-by-case basis. In each instance, the plant personnel provided information on their requirements for the cleaning process. In all cases, it was important for the cleaning agent to effectively clean the ink from the rollers or the blankets in a reasonable period of time. The facility personnel were the judges of which cleaners cleaned effectively. In addition, IRTA suggested that the facility print after cleaning to make sure that the print quality was acceptable and to ensure that the press came back up to color without generating an excessive amount of paper waste.

In the case of blanket cleaning, IRTA requested information from the press personnel on how fast they needed the cleaner to evaporate. Acetone has a very high vapor pressure and evaporates too quickly to effectively clean the blankets. IRTA used acetone in some of the alternative blanket washes but it was always blended with one or more other cleaners to slow down the evaporation. In general, if the facility wanted a very fast evaporating blanket wash, IRTA formulated with a high percentage of acetone.

In the case of roller cleaning, acetone alone was not an effective cleaner. Its high evaporation rate prevented it from traversing the entire roller train before it evaporated. In most cases, IRTA tried to find a roller wash based on soy based cleaners for the facility. In a few cases, the soy which is very oily, could not be sufficiently rinsed from the rollers and the print quality was not adequate or there was an increase in the amount of waste paper generated before the press came back up to color. In those cases, IRTA tested various alternatives that contained some acetone.

Cost Analysis

IRTA performed cost analysis for each of the alternatives that was successfully tested at each of the facilities participating in the DTSC projects. In all cases, it was assumed that there would be no capital equipment requirement. As discussed earlier, IRTA is conducting longer-term testing with some of the facilities in the SCAQMD project and the results of that investigation may indicate compatibility problems and higher or lower capital costs. It was also assumed that there was no increase in labor during the cleaning. Again, the longer-term testing for the SCAQMD project may reveal that there are increases or decreases in labor through use of the alternatives. The cost analysis assumed that there was no difference in utility costs and that there was no difference in disposal fees. Virtually all printers in the Basin use laundry services to recycle their wipe cloths and there should be no difference in the cost of this service with use of the alternatives. IRTA analyzed the cost differences in VOC emission fees paid to the SCAQMD in Section III of this report.

The cost analysis focused on the difference in cost of the alternative cleaner and the currently used cleaner on an annual basis. In all cases, it was assumed that the use of the current and alternative cleaners was the same. There is no way to judge whether the company would use more or less of the alternative cleaner because of the limited testing time. In the SCAQMD project that is still ongoing, IRTA is testing the most effective alternatives for a three month period. This longer testing period should provide information on whether more or less of the alternative cleaner is used for the facilities participating in this testing phase.

Report Organization

Section II of this report includes the analysis of the most effective alternatives for each facility. It presents cost analysis and comparison of the current and alternative cleaning agents. Section III of the report discusses the results of the cost analysis for the 10 participating facilities and summarizes the results of the testing.

II. ANALYSIS OF THE ALTERNATIVE CLEANING AGENTS

This section presents analysis of the performance and cost of the alternative cleaning agents. It provides a description of each of the facilities where the testing was conducted, the cleaning agents that are used currently, the alternatives that were tested and the alternatives that were most effective. It also provides a cost comparison of the current and alternative cleaners. The alternative cleaners were tested for only a week in some of the facilities so it is unknown whether other problems would arise if they were tested for a longer period. As mentioned earlier, IRTA is working with several of the facilities participating in the SCAQMD project to conduct three month testing of the alternatives.

Los Angeles Times

The Los Angeles Times San Fernando Valley Plant is located in Chatsworth, California. The company has two other plants in Southern California. The L.A. Times is a large newspaper with four presses at the Chatsworth location. A picture of one of the presses is shown in Figure 2-1. The company prints on newsprint with soy based ink and runs three shifts per day.

Figure 2-1. Press at Los Angeles Times

IRTA began working with the L.A. Times in 2001 as part of a project sponsored by Cal/EPA's Department of Toxic Substances Control, the South Coast Air Quality Management District and U.S. EPA to test, demonstrate and evaluate cleaning alternatives. At that time, the company was already using a water-based cleaner that had a very low VOC content. An MSDS for this cleaner, called Superclean BW, is shown in Exhibit 2-1. The company had converted from a VOC solvent some years before and no longer has records of the solvent use. The Pressroom Manager believes that the cost of using the water-based cleaner is lower than the cost of using the solvent cleaner. This

Exhibit 2-1
Current Cleaner Used at Los Angeles Times

MATERIAL SAFETY DATA SHEET
May be used to comply with
OSHA'S Hazard Communication Standard
29 CFR 1910.1200. Standard must be
consulted for specific requirements.

U.S. Department of Labor
Occupational Safety & H Adm.
(Non Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY (As used on label and list)	SUPER CLEAN BW

SECTION I

Manufacture's Name: SUPER CHEM CORP.	Emergency Telephone Number: (714) 995-5988
Address: 2635 W. Woodland Drive	Telephone Number For Information: (714) 995-5988
Anaheim, CA 92801	Date Prepared: Revised: March 11, 2001
	Signature Of Prepared: (Optional)

SECTION II - HAZARDOUS INGREDIENTS / IDENTIFY INFORMATION

Hazardous Components Specific Chemical Identity; Common Names	OSHA	ACGIH TLV	Other Limits Recommended	% Optional
Etylphenoxypolyethoxy - Ethanol				
CAS # 9036-19-5	None	None		
D-Limonene				
CAS # 5989-27/5	None	None		

SECTION III - PHYSICAL / CHEMICAL CHARACTERISTICS

Boiling Point:	>200F	Specific Gravity (H20 = 1):	0.96
Vapor Pressure (mm Hg):	20C	Melting Points:	NA
Vapor Density (AIR = 1):	N.E.	Evaporation Rate (Butyl Acetate = 1):	<1
Solubility in water :	Emulsifiable	VOC: 3.65 lb per gal	495 gm per liter
Appearance and Odor:	Blue Green Clear Liquid with Citrus Odor		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used):	180F	Flammable Limits.	LEL: 0.7 UEL: 6.1
Extinguishing Media:	Class B fires: Foam Co2 or Dry Compound		
Special Fire Fighting Procedures:	If confined in a container, cool exterior with water spray		
Unusual Fire and Explosion Hazards:	Dense black smoke produced		

SECTION V - REACTIVITY DATA

Stability:	Unstable:		Conditions to avoid:
	Stable:	XX	High heat & direct sunlight
Incompatibility (Materials to avoid):		Oxidizing agents, acids, peroxides, halogens	
Hazardous Decomposition or Byproducts:			
Hazardous Polymerization:	May Occur:		Conditions to avoid:
	Will Not Occur:	XX	High temp. contact w/reactive monomer

SECTION VI - HEALTH AND HAZARD DATA

Route of Entry:	Inhalation		Skin	Ingestion
Health Hazards (Acute & Chronic):	Over exposure my irritate eyes and mucus membranes, may cause localized itching on skin			
Carcinogenicity:	NTP?:	No	IARC Monographs?:	No
		OSHA Regulated?: NO		
Signs & Symptoms of Exposure:	Slight irritation or itching			
Medical Conditions Generally Aggravated by Exposure:		None Known		

Emergency & First Aid Procedures:
Flush eyes with water for at least 15 minutes and wash from skin with soap and water. If irritation persists see a physician. See Physician if ingested.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material is Released or Spilled:
Keep open flames and sparks away. Contain and absorb with sand or earth

Waste Disposal Method:	Dispose spent absorbent in sealed containers in accordance to Federal, State and Local regulations.
Precautions to be Taken in Handling & Storage:	Store in cool well ventilated place away from reactive chemicals, spark sources & open flames, Keep containers closed.

SECTION VIII - CONTROL MEASURES

Respiratory Protection (specify type): None			
Ventilation:			
Local Exhaust:	Adequate	Special: None	
Mechanical (general):	Recommended	Other:	
Protective Gloves:	Rubber Gloves	Eye Protection:	Safety Glasses
Protective Clothing or Equipment:	Synthetic apron and boots		
Work/Hygienic Practices:	Safety shower & Eye wash should be nearby		

analysis does not include a cost comparison of use of the solvent cleaner and the water-based cleaner used today.

IRTA worked with the L.A. Times to test other low-VOC water-based cleaners and a soy based cleaner. One of the alternative cleaners that was tested is Mirachem Pressroom Cleaner; an MSDS for this cleaner is shown in Exhibit 2-2. This cleaner is used by other newspapers. The second cleaner that was tested is a water-based cleaner called Daraclean 236. This cleaner is used by industrial facilities for metal cleaning; an MSDS is shown in Exhibit 2-3. The third cleaner that was tested is an emulsion of soy and water; an MSDS for this cleaner is shown in Exhibit 2-4.

The L.A. Times currently purchases 2,700 gallons of the Superclean BW. It is diluted with water in a five parts water, one part Superclean BW blend. Taking this into account, the amount of diluted cleaner used is 16,200 gallons per year. The cost of the cleaner is $10.81 per gallon. On this basis, the cost of using the cleaner is $29,187 per year. The Mirachem Pressroom cleaner worked effectively at a 50 percent concentration in water. The cost of this cleaner is $9 per gallon. Assuming that 16,200 gallons at 50 percent concentration are required, the cost of using the Mirachem cleaner would amount to $72,900 annually. The Daraclean 236 was determined to be effective at one-third concentration in water. The cost of this cleaner is $11 per gallon. On this basis and assuming that 16,200 gallons are required, the annual cost of using the Daraclean cleaner would amount to $59,400. The soy based cleaner was found to perform well and the press people thought it was the most effective cleaner. The cost of the cleaner is $3.75 per gallon. Again assuming 16,200 gallons are used, the cost of using the soy based cleaner would be $60,750.

Table 2-1 shows the cost comparison for the current cleaner and the alternative cleaners that were tested. The cost of all of the alternative cleaners is higher than the cost of the Superclean BW. The L.A. Times decided to continue using the Superclean BW because it is very low cost.

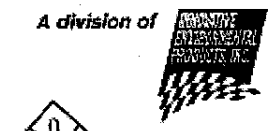
Table 2-1
Annualized Cost Comparison for the Los Angeles Times

Cleaner	Concentration Used	Annual Cost
Superclean BW	16.7 percent	$29,187
Mirachem Pressroom Cleaner	50 percent	$72,900
Darclean 236	33.3 percent	$59,400
ES-219	100 percent	$60,750

Exhibit 2-2
Alternative Mirachem Pressroom Cleaner Tested At Los Angeles Times

HIGH PERFORMANCE MIRACHEM®

A division of



Material Safety Data Sheet

MIRACHEM. Pressroom Cleaner (Formulation No. 2501)

Section I - General

Manufacturer Name:	The Mirachem Corporation P.O. Box 27608 Tempe, Arizona 85285-7608	Date Prepared: Revision Date:	7/3/96
Emergency Phone:	1-(800) 847-3527		

Section II - Hazardous Ingredients/Identity Information

Hazardous Component (CAS #)	OSHA PEL	ACGIH TLV	Other Limits	% (Optional)
None				

N.E. = None Established

Section III - Physical/Chemical Characteristics

Boiling Point:	>210°F	Specific Gravity (H_2O = 1):	0.9957
Vapor Pressure (mm Hg.): @ 20°C	Composite 0.006	pH:	8.7-9.5
Vapor Density (AIR =1):	> 1	Evaporation Rate (Butyl Acetate=1):	> 1
Solubility in Water:	Complete	Melting Point:	N/A

Appearance and Odor: Clear liquid with a mild citrus odor

N/A = Not Applicable N.E. = Not Established

Section IV - Fire and Explosion Hazard

Flash Point (Method Used):	>212°F (PMCC ASTM D93)	Explosive Limits:	N/A
Extinguishing Media:	N/A		
Special Fire Fighting Procedures:	N/A	Unusual Fire Fighting and Explosion Hazards:	N/A

Section V - Reactivity

Stability:	Unstable Stable X	Incompatibility (Materials to Avoid):	Strong Acids and Alkalies. demulsify product.	
Hazardous Decomposition or By-products:	Thermal decomposition may produce CO_2			
Hazardous Polymerization:	May Occur		Will Not Occur X	

Section VI - Health Hazard Data

Eye Contact:	May cause mild temporary irritation.
Skin Contact:	Prolonged or repeated exposure may cause mild irritation.
Inhalation:	No adverse effects expected.
Ingestion:	No adverse health effects are anticipated to occur as a result of acute ingestion. Chronic effects are not known.
Carcinogenicity:	None of the components in this material are listed by IARC, NTP, OSHA, or ACGIH as a carcinogen.
Signs/Symptoms of Overexposure:	Prolonged contact may cause mild irritation or dryness to sensitive skin.
Medical Conditions Generally Aggravated by Exposure:	None known.

Section VII - Emergency and First Aid Procedures

Eyes:	Immediately flush with clean water. Consult physician if necessary.
Skin:	Rinse with water.
Ingestion:	If swallowed, treat symptomatically and supportively. Do not induce vomiting. If victim conscious and alert, give two glasses of water or milk to drink. If vomiting occurs, keep head below hips to prevent aspiration. Contact Physician.
Inhalation:	No adverse effects anticipated.

Section VIII - Precautions for Safe Handling and Use

In Case of Spill:	Flush with water into containing area.
Waste Disposal:	Flush to sewer where applicable within Federal, State or Local disposal requirements.
Handling & Storage Precautions:	Wear protective goggles or face shield if splashing or spraying liquid. Protect from freezing.
Other Precautions:	Keep container tightly closed. Keep out of reach of children.

Section IX - Control Measures

Respiratory Protection:	No respiratory protection is necessary.
Ventilation:	Good general ventilation is sufficient.
Protective Clothing:	When prolonged skin contact is expected, wear protective gloves.
Eye Protection:	Wear safety glasses.
Work/Hygienic Practices:	Use good personal hygiene practices, wash hands before eating, drinking, smoking, or using toilet facilities.

Exhibit 2-3
Alternative Daraclean 236 Cleaner Tested at Los Angeles Times

MAGNAFLUX®

A Division of Illinois Tool Works Inc.

MATERIAL SAFETY DATA SHEET

DARACLEAN® 236

1. **IDENTIFICATION**

Company:	MAGNAFLUX
Address:	3624 West Lake Avenue, Glenview, Illinois 60025
Telephone No.:	(847) 657-5300 (Off-Hour Emergency Number - CHEMTREC - 1-800-424-9300)
Product Use:	Aqueous alkaline cleaner
Packages:	5 gallon pail, 55 gallon drum
NFPA Rating:	Health 2, Flammability 0, Reactivity 0
PIN:	None
Revision Date:	October 23, 2001

2. **INGREDIENTS**

Hazardous Ingredients	CAS Number	% by Weight	OSHA PEL*	ACGIH TLV**
Triethanolamine	102-71-6	1 – 5	Not available	Not available

This product contains no hazardous chemical substances at 1.0% or more listed in 29 CFR 1910 Subpart Z, or ACGIH Threshold limit Values. Also this product contains no carcinogens at 0.1% or more listed in NTP Annual Report on Carcinogens, IARC Monographs, or 29 CFR 1910 Subpart Z.

3. **HAZARDS IDENTIFICATION**

EMERGENCY OVERVIEW
Bland, nonflammable, thin liquid which may irritate the skin and eyes.

Signs & Symptoms of Acute Exposure

Inhalation: Irritation may occur if material becomes airborne.

Eyes: Irritation upon direct contact.

Skin: Irritation upon direct contact.

Ingestion: None known.

4. **FIRST AID**

Skin Contact: Wash off with soap and water. Use soothing lotion.
Eyes: Rinse carefully under upper and lower eyelids using plenty of water.
Inhalation: Remove to fresh air.
Ingestion: If conscious, dilute by giving 2 glasses of water. Call physician or local poison control center immediately.
NOTE: In all severe cases, contact physician immediately. Local telephone operators can furnish number of regional poison control center.

5. **FIRE HAZARD**

Conditions of flammability: None
Flash point: None to boiling
Flammable limits in air: None
Extinguishing media: Carbon Dioxide, dry chemical, foam. Avoid water if possible. *Special fire fighting procedures:* None
Hazardous combustion products: Combustion will result in the release of the usual decomposition products including oxides of carbon and nitrogen
Unusual fire hazards: None

6. **ACCIDENTAL RELEASE MEASURES**

For Small Spills: Wipe up, or absorb with sand or other absorbent material. Collect waste in sealed containers.
For Large Spills: Dike area to prevent spreading. Shovel or pump to drum or salvage tank. Absorb residual material with sand, or other absorbent material. Wash area with soapy water and rinse. Area will be slippery until cleaned.

Dispose of all product wastes and water rinses in accordance with current local, state, and Federal regulations.

7. **HANDLING AND STORAGE**

-Does not normally become airborne; in operations where it does, if general ventilation or local exhaust is inadequate, persons exposed to mists should wear approved breathing devices.
-Wear neoprene gloves if direct contact likely; wear eye protection.
-Store product at 40-100°F in a well-ventilated area.
-Do not mix with nitrites or nitrite containing compounds (49 FR 24858, 6/14/84).

8 **EXPOSURE CONTROLS/PERSONAL PROTECTION**

Respiratory protection:	None
Ventilation:	Mechanical (general) sufficient
Protective gloves:	Recommended (rubber)
Eye protection:	Recommended
Work/hygienic practices:	Avoid breathing spray mist

9 **PHYSICAL PROPERTIES**

Initial boiling point (bub):	212°F approx.	*Vapor pressure:*	18 mmHg @ 20°C
Percent volatile:	Not Established	*Vapor density:*	None established
Density/sp. gravity:	1.0 approx.	*Evaporation rate:*	1.0 (water = 1.0)
Water solubility:	100%	*Appearance:*	Colorless to pale yellow slightly hazy liquid
pH of concentrate:	7.5		

10 **STABILITY AND REACTIVITY**

Stability:	Stable
Incompatibility:	None
Hazardous decomposition products:	None
Reactivity:	None

11 **TOXICOLOGICAL INFORMATION**

Carcinogenicity:	Contains no known or suspected carcinogens listed with OSHA, IARC, NTP, or ACGIH.
Threshold limit value:	Not established.
WHMIS information (Canada):	According to available information, the ingredients have not been found to show reproductive toxicity, teratogenicity, mutagenicity, skin sensitization, or synergistic toxic effects with other materials.

12 **ECOLOGICAL INFORMATION**

No data is available. It dissolves in to water and is biodegradable. Its low vapor pressure may exempt it from VOC restrictions.

13 **DISPOSAL**

Dispose according to Federal, State and Local laws and 40 CFR.

RCRA:	Not a hazardous waste
U.S. EPA Waste Number:	None

14 **TRANSPORTATION**

U.S. DOT: 49 CFR 172.101 Hazardous Materials Table

	Bulk
Proper shipping name:	Not regulated
Hazard class or division:	None
Identification No.:	None
Packing Group:	None

15 **REGULATORY INFORMATION**

TSCA:	All ingredients are listed in TSCA inventory.
CERCLA:	Not reportable
SARA TITLE III, Section 313:	Contains nothing on this list.
California Proposition 65:	Contains nothing on this list.
WHMIS Class (Canada):	Not a controlled product.

Note: This MSDS has been prepared to meet WHMIS (Canada) requirements with the exception of using 16 headings.

16 **OTHER INFORMATION**

Revision Statement:	New format
Supersedes:	April 6, 2001
Prepared by:	Fannie Simmons, R&D Manager

Exhibit 2-4
Alternative 219-ES Cleaner Tested at Los Angeles Times

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Trade Name: 219-ES Ester Emulsion
Generic Name: Water Based Emulsion Cleaner

CAS #: Proprietary Blend

Manufacturer: Sieben, Inc.
Address: 8134 West 47th Street
City: Lyons State: IL Zip: 60534

Emergency phone#: (800) 535-5053
Technical phone#: (708) 442-2010

DOT Hazard Classification: Not Regulated
NFPA Codes: Health - 0 Flammability - 0 Reactivity - 0
HMIS Codes: Health - 1 Flammability - 0 Reactivity - 0 Personal Protection - B

II. HAZARDOUS INGREDIENTS

If present, IARC, NTP, and OSHA carcinogens and chemicals subject to the reporting requirements of SARA Title III Section 313 are identified in this section.

Ingredient Name	CAS Number	%wt	TLV	STEL	SARA TITLE III
Fatty esters	Various	20 to 25	None established	None established	No
Surfactants	Various	15 to 30	None established	None established	No
Coco amide	68603-42-9	5 to 15	None established	None established	No

References: 29CFR 1910.1000, ACGIH "Threshold Limit Values for Chemicals in the Workplace", National Toxicology Program Annual Report, International Agency for Research on Cancer Monographs, and 40CFR Part 372. All components of this product are in compliance with TSCA.

III. PHYSICAL DATA

Boiling Point @ 760 mm Hg:	308 - 335°F
Vapor Pressure @ 80°F:	<0.1 mm Hg
Specific Gravity @ 68°F:	0.92
Water Solubility (%):	Soluble
Specific Vapor Density (air=1):	<1.0
% Volatile by Volume:	53.0
% Volatile Organic Compound(s):	<1.0
Appearance:	Clear golden liquid
Odor:	Typical organic odor

IV. FIRE AND EXPLOSION DATA

Flash Point (Method): >300°F (TCC)
Explosive Limit: LEL - N/E UEL - N/E
Extinguishing Media: Water fog, carbon dioxide, or dry chemical.
Special Fire Fighting Procedures: Wear self-contained breathing apparatus when fighting chemical fires.
Unusual Fire and Explosion Hazards: Fine sprays/mists may be combustible at temperatures below normal flash point. Rags soaked with material, stored for a long period while mixed with strong alkali or acidic materials, may smolder, then smoke, and may even ignite.

V. HEALTH HAZARD DATA

Eyes - May cause temporary irritation, redness, tearing, blurred vision. Contact lenses must not be worn when possibility exists for eye contact due to spraying liquid or airborne particles.

Skin - Prolonged or repeated contact may cause irritation.
Breathing - Excessive inhalation of vapors may cause nasal and respiratory irritation, central nervous system effects including dizziness, weakness, fatigue, nausea, headache and possible unconsciousness.
Swallowing - Can cause gastrointestinal irritation, nausea, vomiting, and diarrhea.

First Aid/Emergency Procedures

Inhalation: Remove to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Keep person warm, quiet and get medical attention.
Skin Contact: Wash thoroughly with soap and water. Remove contaminated clothing. Launder contaminated clothing before re-use.
Eyes: Flush with copious amounts of water. Get medical attention.
Ingestion: Do not induce vomiting. If large quantity is swallowed, give lukewarm water (pint). NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. Get medical attention immediately. Risk of damage to lungs exceeds poisoning risk.
Primary Entry Route(s): Inhalation, skin contact.
Chronic Health Effects: Chronic overexposure may aggravate existing skin, eye and lung conditions.

VI. REACTIVITY DATA

Stability: Stable. Hazardous Polymerization: Cannot occur.
Incompatibilities: Avoid contact with strong oxidizing materials, strong alkalies, strong mineral acids.
Hazardous Decomposition Products: Carbon mono/di oxides.
Conditions to Avoid: None

VII. SPILL OR LEAK PROCEDURES

Procedures for Spill/Leak:
Eliminate all ignition sources (flares, flames including pilot lights, electrical sparks, etc.).
Small Spill - Absorb liquid on paper, vermiculite, floor absorbent, or other absorbent material and transfer to a recovery drum.
Large Spill - Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Stop spill at source, dike area of spill to prevent spreading, pump liquid to salvage tank. Remaining liquid may be taken up on sand, clay, earth, floor absorbent, or other absorbent material and shoveled into recovery drums. Prevent run-off to sewers, streams or others bodies of water. Notify proper authorities, as required, that a spill has occurred.
Waste Management:
Landfill solids at permitted sites. Use registrated transporters. Burn concentrated liquids at permitted sites. Avoid flameouts. Assure emissions comply with applicable regulations. Dilute aqueous waste may biodegrade. Avoid overloading/poisoning plant biomass. Assure effluent complies with applicable regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection:
If workplace exposure limit(s) of product is exceeded, a NIOSH/MSHA approved air supplied respirator is advised in the absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions. Engineering or administrative controls should be implemented to reduce exposure.
Ventilation: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain minimum exposure.
Eye Protection: Chemical Splash Proof Goggles and full face shield are advised for operations where eye or face contact can occur.
Gloves: Wear impervious gloves.
Other Protective Equipment: To prevent repeated or prolonged skin contact, wear impervious clothing and boots.

IX. SPECIAL PRECAUTIONS

Special Handling/Storage:

To avoid skin contact and ingestion, wash hands and face well before eating or smoking. Do not permit food in work area. Avoid breathing mists if generated. Store at room temperature. Reseal container when not in use. Do not store near acids, bases or flammable liquids. Containers of this material should be rinsed when emptied, since emptied containers retain product residues (vapor, liquid, and/or solid). All hazard precautions given in this data sheet must be observed.

As of the date of preparation of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state law(s). However, no warranty or representation with respect to such information is intended or given.

Date revised: 03/22/2002
jpm

San Bernardino Sun

The San Bernardino Sun is a large lithographic newspaper printer located in San Bernardino, California. The company prints the San Bernardino Sun and USA Today. The Sun prints on newsprint and, like many other newspapers, uses soy based ink.

IRTA began work with the San Bernardino Sun in 2001 as part of a project sponsored by Cal/EPA's Department of Toxic Substances Control, the South Coast Air Quality Management District and U.S. EPA to test, demonstrate and evaluate cleaning alternatives. A picture of one of the presses in the pressroom is shown in Figure 2-2. The San Bernardino Sun previously used a cleaner purchased from Pressroom Solutions for all cleaning tasks including blanket cleaning, pipe roller cleaning and ink tray cleaning. An MSDS for this cleaner is shown in Exhibit 2-5.

Figure 2-2. Press at San Bernardino Sun

When IRTA began testing with the San Bernardino Sun, the company had already converted to an alternative cleaner for their blanket cleaning. This cleaner, called Mirachem Pressroom Cleaner, is a water-based cleaner. An MSDS for the product is shown in Exhibit 2-6. The Sun uses this cleaner in a 50 percent blend with water for blanket cleaning. The Mirachem product cannot be used for the pipe roller cleaning because the paper web is in when the pipe rollers are cleaned. Water-based cleaners can

Exhibit 2-5
Original Cleaner Used at the San Bernardino Sun

PRESSROOM SOLUTIONS
4701 Martin St. Fort Worth, TX 76119
(817) 535-3898 • Fax: (817) 536-8556

HAZARD RATING	
LEAST	- 0
SLIGHT	- 1
MODERATE	- 2
HIGH	- 3
EXTREME	- 4

HEALTH	= 1
FIRE	= 2
REACTIVITY	= 0

MATERIAL SAFETY DATA SHEET

EMERGENCY PHONE NUMBER FOR CHEMTREC: 1-800-424-9300
TRANSPORTATION EMERGENCY NUMBER: 1-800-424-9300

PRODUCT NAME: BLANKET & ROLLER WASH **PRODUCT ID NUMBER:** 5001-5
CHEMICAL NAME: N/A **SYNONYMS:** N/A **MSDS REVISION DATE:** 03/09/2000

Product Class: N/A **CAS Number:** N/A **DOT Proper Shipping Name:** Combustible Liquid, n.o.s., (Petroleum Distillates) **DOT Identification Number:** NA1993 **VOC Content:** 6.5 lb/gal (773 g/l) **VOC Composite Partial Pressure, PP$_c$:** 1.6 mm Hg @ 68°F	**WARNING STATEMENT:** Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling. Keep away from heat. Keep containers closed. Use with adequate ventilation. **FOR INDUSTRIAL USE ONLY** Do not cut, grind, drill, or reuse any container that contained this product.

SECTION 1 - HAZARDOUS INGREDIENTS

MATERIAL		CAS NUMBER	PEL/TLV	SOURCE
Aromatic hydrocarbons	10 - 15%	64742-95-6	NE	
contains 1,2,4-Trimethylbenzene †	3 - 5%	95-63-6	25 ppm	ACGIH
Aliphatic hydrocarbons	85 - 90%	64742-88-7	100 ppm	ACGIH
† Subject to the reporting requirements of Section 313 of SARA Title III.				

SECTION 2 - EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT	Gently flush eyes with water for at least 15 minutes, while holding eyelids apart to ensure complete irrigation. Seek medical attention immediately.
SKIN CONTACT	Remove contaminated clothing and shoes. Wash affected areas with soap and water and seek medical attention if irritation persists.
INHALATION	If high vapor concentrations are encountered or breathing difficulties or light headedness occur, remove to fresh air. If breathing stops, give artificial respiration and seek medical attention immediately.
INGESTION	Do NOT induce vomiting. Seek medical attention immediately. If spontaneous vomiting occurs, keep head below hips to prevent aspiration of the liquid into the lungs.

PEL - Permissible Exposure Limit (OSHA) **TLV** - Threshold Limit Value (ACGIH) **NE** - Not Established **N/A** - Not Applicable
Federal law requires persons receiving this Material Safety Data Sheet to study it carefully and become aware of the hazards of the product involved. Notify your employees, visitors, agents, and contractors of the information on this sheet.

SECTION 3 - PHYSIOLOGICAL EFFECTS AND HEALTH INFORMATION

EYES	Eye contact with liquid and vapors may cause mild irritation. Prolonged or repeated eye contact may cause moderate to severe irritation and aggravate pre-existing conditions.
SKIN	May cause skin irritation. Prolonged or repeated exposure may defat the skin with burning, drying and cracking, and skin burns. May aggravate pre-existing skin conditions.
SYSTEMIC	Acute overexposure is possible by way of inhalation and ingestion and may lead to nasal and respiratory tract irritation, gastrointestinal disturbances including nausea and diarrhea, central nervous system (CNS) effects including headache, dizziness, fatigue, and unconsciousness, and respiratory failure. Swallowing even small amounts of this product may lead to aspiration pneumonitis, which is evidenced by cyanosis, and death. Chronic overexposure to this product may cause liver and kidney damage based on studies of laboratory animals.

SECTION 4 - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION	If workplace exposure limits of any component is exceeded, the use of a NIOSH/MSHA-approved respirator is advised.		
VENTILATION	Provide sufficient local exhaust or general ventilation to maintain exposure below PEL's and TLV's.		
PROTECTIVE GLOVES	Recommended	**EYE PROTECTION**	Recommended
OTHER PROTECTIVE EQUIPMENT	To prevent repeated or prolonged skin contact, wear impervious clothing and boots. Accessibility to eye washes and safety showers in work areas is always recommended.		

SECTION 5 - REACTIVITY DATA

STABILITY	Stable	**CONDITIONS TO AVOID**	Heat, sparks, flames, and pilot lights
INCOMPATIBLE MATERIALS TO AVOID	Strong oxidizing agents		
HAZARDOUS DECOMPOSITION PRODUCTS	Thermal decomposition in the presence of air may potentially yield various hydrocarbons as well as oxides of carbon.		
HAZARDOUS POLYMERIZATION	Will not occur		

SECTION 6 - SPILL OR LEAK PROCEDURES

PRECAUTIONS IN CASE OF RELEASE OR SPILL	Keep away from any source of ignition. Wear protective equipment. Stop and/or contain discharge and ventilate area. Prevent from entering drains, sewers, or streams.
WASTE DISPOSAL METHOD	Pump or transfer spilled material to containers for recovery. Absorb unrecoverable product. Dispose of in accordance with applicable regulations.

SECTION 7 - STORAGE AND SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS	Keep from sources of heat and ignition. Ground containers when transferring material. Store with adequate ventilation and keep containers closed when not in use.
OTHER PRECAUTIONS	Emptied containers may retain product residue; therefore, all hazard precautions given in this data sheet should be observed.

SECTION 8 - FIRE AND EXPLOSION HAZARD DATA

DOT HAZARD CLASSIFICATION	Combustible Class	**FLASH POINT AND METHOD**	>100°F by Setaflash
LOWER EXPLOSIVE LIMIT	0.7% (approximate)	**UPPER EXPLOSIVE LIMIT**	7% (approximate)
EXTINGUISHING MEDIA	Use foam, CO_2, or dry chemical fire apparatus.		
UNUSUAL FIRE AND EXPLOSION HAZARDS	Vapors are heavier than air and may travel along the ground and be ignited by sources of heat, pilot lights, and other flames distant from the material handling point. Empty containers can also still provide a source of combustible vapors and ignite explosively.		
FIRE FIGHTING PROCEDURES	Fire fighters should wear self-contained breathing apparatus and chemical-resistant, protective clothing. Spraying water directly into fire may cause material to float on surface and become reignited. Water spray should be used to cool nearby containers and structures that are exposed to fire.		

SECTION 9 - PHYSICAL DATA

APPEARANCE	Clear, colorless liquid	**pH (APPROXIMATE)**	N/A
BOILING RANGE (APPROXIMATE)	300 - 360°F	**VAPOR DENSITY**	Heavier than air
WEIGHT LB. PER GALLON	6.5	**EVAPORATION RATE**	Slower than water
PERCENT VOLATILE INCLUDING WATER	100%	**SOLUBILITY IN WATER**	Negligible

SECTION 10 - DOCUMENTARY INFORMATION

PRODUCT NAME: BLANKET & ROLLER WASH **PRODUCT ID NUMBER:** 5001-5

PREPARED BY: DA **APPROVED BY:** AF **MSDS REVISION DATE:** 03/09/2000

The information contained in this data sheet is, to the best of our knowledge, accurate but is not warranted. All materials may present unknown health hazards and should be used with caution. It is the user's responsibility to evaluate the information in a prudent manner and to use it in a manner consistent with its purpose. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances.

Exhibit 2-6
Alternative Mirachem Pressroom Cleaner Used for
Blanket Cleaning at the San Bernardino Sun

HIGH PERFORMANCE MIRACHEM®

A division of

Material Safety Data Sheet

MIRACHEM. Pressroom Cleaner (Formulation No. 2501)

Section I - General

Manufacturer Name:	The Murachem Corporation P.O. Box 27608 Tempe, Arizona 85285-7608	Date Prepared: Revision Date:	7/3/96
Emergency Phone:	1-(800) 847-3527		

Section II - Hazardous Ingredients/Identity Information

Hazardous Component (CAS #)	OSHA PEL	ACGIH TLV	Other Limits	% (Optional)
None				

N.E. = None Established

Section III - Physical/Chemical Characteristics

Boiling Point:	>210°F	Specific Gravity (H_2O = 1):	0.9957
Vapor Pressure (mm Hg.): @ 20°C	Composite 0.008	pH:	8.7-9.5
Vapor Density (AIR =1):	> 1	Evaporation Rate (Butyl Acetate=1):	> 1
Solubility in Water:	Complete	Melting Point:	N/A

Appearance and Odor: Clear liquid with a mild citrus odor

N/A = Not Applicable N.E. = Not Established

Section IV - Fire and Explosion Hazard

Flash Point (Method Used):	>212°F (PMCC ASTM D93)	Explosive Limits:	N/A
Extinguishing Media:	N/A		
Special Fire Fighting Procedures:	N/A	Unusual Fire Fighting and Explosion Hazards:	N/A

Section V - Reactivity

Stability:	Unstable Stable X	Incompatibility (Materials to Avoid):	Strong Acids and Alkalies. demulsify product.	
Hazardous Decomposition or By-products:	Thermal decomposition may produce CO_2			
Hazardous Polymerization:	May Occur		Will Not Occur X	

Section VI - Health Hazard Data

Eye Contact:	May cause mild temporary irritation.
Skin Contact:	Prolonged or repeated exposure may cause mild irritation.
Inhalation:	No adverse effects expected.
Ingestion:	No adverse health effects are anticipated to occur as a result of acute ingestion. Chronic effects are not known.
Carcinogenicity:	None of the components in this material are listed by IARC, NTP, OSHA, or ACGIH as a carcinogen.
Signs/Symptoms of Overexposure:	Prolonged contact may cause mild irritation or dryness to sensitive skin.
Medical Conditions Generally Aggravated by Exposure:	None known.

Section VII - Emergency and First Aid Procedures

Eyes:	Immediately flush with clean water. Consult physician if necessary.
Skin:	Rinse with water.
Ingestion:	If swallowed, treat symptomatically and supportively. Do not induce vomiting. If victim conscious and alert, give two glasses of water or milk to drink. If vomiting occurs, keep head below hips to prevent aspiration. Contact Physician.
Inhalation:	No adverse effects anticipated.

Section VIII - Precautions for Safe Handling and Use

In Case of Spill:	Flush with water into containing area.
Waste Disposal:	Flush to sewer where applicable within Federal, State or Local disposal requirements.
Handling & Storage Precautions:	Wear protective goggles or face shield if splashing or spraying liquid. Protect from freezing.
Other Precautions:	Keep container tightly closed. Keep out of reach of children.

Section IX - Control Measures

Respiratory Protection:	No respiratory protection is necessary.
Ventilation:	Good general ventilation is sufficient.
Protective Clothing:	When prolonged skin contact is expected, wear protective gloves.
Eye Protection:	Wear safety glasses.
Work/Hygienic Practices:	Use good personal hygiene practices, wash hands before eating, drinking, smoking, or using toilet facilities.

dissolve the web. The Mirachem was not used for cleaning the ink trays because it cleaned too slowly.

IRTA tested alternatives with the Sun for blanket cleaning and for pipe roller and ink tray cleaning. IRTA tested a soy based cleaner called Soy Gold 2000 and in various dilutions with water as a blanket wash. This cleaner, even when diluted in a 50 percent blend with water, cleaned the blankets well. The Sun was not interested in switching to an alternative cleaner for the blanket cleaning, however. IRTA tested several alternatives including a variety of different water-based cleaners for cleaning the pipe rollers and ink trays. The most effective cleaner was a cleaner called Soy Gold 1000. This cleaner is similar to Soy Gold 2000 but it does not contain a surfactant for rinsing. An MSDS for Soy Gold 1000 is shown in Exhibit 2-7.

The Sun used five drums per month of the original solvent based cleaner for all of their cleaning. About 80 percent of the solvent was used for blanket cleaning, five gallons per month was used for ink tray cleaning and the remaining solvent was used for pipe roller cleaning. On this basis, of the 3,300 gallons of solvent used annually, 2,640 gallons were used for blanket cleaning, 600 gallons were used for pipe roller cleaning and 60 gallons were used for ink tray cleaning. Eliminating the ink tray cleaning, which is off-press cleaning, the Sun used 3,240 gallons of solvent per year. The cost of the solvent is $5 per gallon. On this basis, the annual cost of on-press cleaning was $16,200. The annual cost of ink tray off-press cleaning was $300.

The Sun substituted the Mirachem water-based cleaner for the solvent in blanket cleaning. The price of the Mirachem cleaner is $9.09 per gallon. Assuming the Mirachem is diluted 50 percent with water and that the same amount of cleaner is required, the cost of the cleaner for blanket cleaning now is $11,999 per year. After IRTA conducted the testing, the Sun switched from the solvent cleaner to the soy based cleaner for pipe roller cleaning. The cost of the soy cleaner is $8.90 per gallon. The annual cost of the pipe roller cleaner is now $5,340. The company also adopted the soy based cleaner for cleaning the ink trays. The annual cost of ink tray cleaning is now $534.

Table 2-2 shows the cost comparison for the on-press cleaning. The cost of using the alternative cleaners is seven percent higher than the cost of using the original cleaner. The blanket cleaner has a lower cost but this is more than offset by the higher cost of the pipe roller cleaner.

Table 2-2
Annualized Cost Comparison for On-Press Cleaning for the San Bernardino Sun

	Original Cleaner	Alternative Cleaners
Blanket Cleaner Cost	$13,200	$11,999
Pipe Roller Cleaner Cost	$3,000	$5,340
Total Cost	$16,200	$17,339

Exhibit 2-7
Alternative Soy Gold 1000 Cleaner Used for
Pipe Roller Cleaning at the San Bernardino Sun

SOYGOLD® 1000 SOLVENT

MATERIAL SAFETY DATA SHE

EMERGENCY PHONE: 913-599-6911 CHEMTREC: 800-424

SECTION I-IDENTIFICATION

PRODUCT: SOYGOLD® 1000
CAS No.: 67784-80-9
CHEMICAL: Fatty acid methyl esters
SYNONYMS: Methyl esters of soybean oil

SECTION II-INGREDIENTS AND HAZARD CLASSIFICATION

TYPICAL COMPOSITION

Alkyl C_{16}-C_{18}-Methyl Esters

This product contains no hazardous material.

SARA HAZARD: TITLE III SECTION 313-Not listed FIRE-(Section 311/312) None noted

SECTION III-HEALTH INFORMATION

EFFECTS OF OVEREXPOSURE

INHALATION: No known problems
INGESTION: LD50:>50ml/kg (albino rats)(similar products)
EYE CONTACT: Not classified as eye irritants
SKIN CONTACT: Not classified as a skin irritant or corrosive material

SECTION IV-OCCUPATIONAL EXPOSURE LIMITS

PEL: NO OSHA PEL TLV: NO ACGIH TLV

SECTION V-EMERGENCY FIRST AID PROCEDURE

FOLLOW STANDARD FIRST AID PROCEDURES:

SWALLOWING: Call physician or poison control center.
SKIN CONTACT: Wash affected area.
EYE CONTACT: Flush eyes with cool water for at least 15 minutes. Do not let victim rub eyes.
INHALATION: Immediately remove victim to fresh air. Get medical attention immediately.

SECTION VI-PHYSICAL DATA

BOILING POINT:	Over 600° F (315° C) at 760 mm Hg pressure
MELTING POINT:	-1° C
VAPOR PRESSURE:	Less than 5 mm Hg at 72° F
SPECIFIC GRAVITY:	0.87 at 25° C
SOLUBILITY IN WATER:	Negligible at room temperature
APPEARANCE AND COLOR:	Light yellow and liquid at room temperature
ODOR:	Light vegetable oil odor

SECTION VII-FIRE AND EXPLOSION HAZARDS

FLASH POINT & METHOD USED:	425° F (218° C)(PMCC)
FLAMMABLE LIMITS:	Not applicable
NFPA RATING:	No NFPA rating

HMIS RATING: HEALTH: 0 FIRE: 1 REACTIVITY: 0

SPECIAL FIRE FIGHTING PROCEDURES & PRECAUTIONS: Treat as oil fire.
Use water spray, dry chemical, foam or carbon dioxide.

UNUSUAL FIRE & EXPLOSION HAZARDS:
Rags soaked with any solvent present a fire hazard and should always be stored in UL listed or Factory Mutual approved, covered containers. Improperty stored rags can create conditions that lead to oxidation. Oxidation, under certain conditions can lead to spontaneous combustion. This product contains antioxidants to retard oxidation.

SECTION VIII-REACTIVITY

STABILITY:	Stable
HAZARDOUS POLYMERIZATION:	None likely
MATERIALS TO AVOID:	Strong oxidizing agents
HAZARDOUS DECOMPOSITION PRODUCTS:	CO_2, CO
CONDITIONS TO AVOID:	None known

SECTION IX-EMPLOYEE PROTECTION

CONTROL MEASURES:	Adequate ventilation
RESPIRATORY PROTECTION:	None required
PROTECTIVE CLOTHING:	No need anticipated
EYE PROTECTION:	None required

SECTION X-ENVIRONMENTAL PROTECTION

ENVIRONMENTAL PRECAUTIONS: Avoid uncontrolled releases of this material to environment.

SPILL OR LEAK PRECAUTIONS: Contain spilled material. Transfer to secure containers. Where necessary, collect using absorbent media.

WASTE DISPOSAL: Dispose of according to federal, state and/or local requirements.

SECTION XI-REGULATORY CONTROLS

DOT CLASSIFICATION:	Class 55
DOT PROPER SHIPPING NAME:	Cleaning Compound, N.O.S.
OTHER REGULATORY REQUIREMENTS:	Listed in TSCA inventory

SECTION XII-PRECAUTIONS: HANDLING, STORAGE AND USAGE

No special precautions necessary.

SECTION XIII-DATE AND SIGNATURE

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process. The stated MSDS is reliable to the best of the company's knowledge and believed accurate as of the date indicated. However, no representation, warranty or guarantee of any kind, expressed or implied, is made as to its accuracy, reliability or completeness and we assume no responsibility for any loss, damage or expense, direct or consequential, arising out of use. It is the user's responsibility to satisfy himself as to the suitableness and completeness of such information for his own particular use.

AC ENVIRONMENTAL PRODUCTS, L.L.C.
9804 PFLUMM
LENEXA, KS 66215

SIGNATURE: William A. Ayres

PREPARED BY: WILLIAM A. AYRES REVISION DATE: 7-1-98

Table 2-3 shows the cost comparison for the off-press ink tray cleaning. The company increased their cost by 78 percent in converting to the alternative soy based cleaner.

Table 2-3
Annualized Cost Comparison for Off-Press Cleaning for the San Bernardino Sun

	Original Cleaner	Alternative Cleaner
Ink Tray Cleaner Cost	$300	$534
Total Cost	$300	$534

PIP Printing

PIP Printing is located in Santa Monica, California. The shop provides a service as a commercial lithographic printer. Among the products printed by PIP are flyers and newsletters.

IRTA began working with PIP in 2004 as part of a project sponsored by Cal/EPA's Department of Toxic Substances Control, the South Coast Air Quality Management District and U.S. EPA to test, demonstrate and evaluate cleaning alternatives. The company has a small A.B. Dick printing press. A picture of the press is shown in Figure 2-3. PIP generally cleans the rollers four or five times a day. An MSDS for PIP's current cleaning agent is shown in Exhibit 2-8.

During the cleaning process, the operator replaces the plate with paper cleanup mats. The cleaning agent is applied to the rollers with a squeeze bottle while the press is running. The cleaner is circulated down through the roller train and the excess ink is taken up by the cleanup mat. As the rollers are cleaned, the cleanup mats contain less and less ink. With the current cleaner, the operator uses about five cleanup mats per cleaning cycle.

Figure 2-3. Press at PIP Printing

Exhibit 2-8
Current Cleaner Used at PIP Printing

MATERIAL SAFETY DATA SHEET

I C Compound Co.
150 E 162nd St P.O. Box 66 Gardena, CA 90248
(310) 323-6210

HAZARD RATING

Acute Health	Fire	Reactivity
2	2	0

Least = 0 Slight = 1 Moderate = 2 High = 3 Extreme = 4

Date Printed: November 18, 2001
PRODUCT NAME: **I.C. ALL PRO**
CHEMICAL NAME: A proprietary blend containing aliphatic/aromatic petroleum distillates, glycol ethers, esters and other diluents
CHEMICAL FAMILY: Hydrocarbon and Glycol Ether Solvent

I. PHYSICAL DATA

BOILING POINT (760 mm Hg): 360° F
FREEZING POINT: NA
SPECIFIC GRAVITY (H2O=1): .847
VAPOR PRESSURE @20° C: 3.1 mm Hg
VAPOR DENSITY (AIR=1): 3.9
SOLUB. IN H20: Part. Soluble
% VOLATILES (BY VOLUME): 99
EVAP. RATE (BUT. ACET.=1): .1
APPEARANCE AND ODOR: Clear liquid with mild odor
V.O.C (lbs/gal) 6.6

II. HAZARDOUS INGREDIENT / COMPOSITION

MATERIAL	CAS NO.	TLV UNITS
A. Mineral Spirits	64742-88-7*	100
B. Aromatic Hydrocarbon Distillates	64742-95-6	25
C. 2-Phenoxyethanol	2807-30-9	N/A

* A combination of complex hydrocarbons; exact combination will vary

III. ACUTE TOXICITY DATA

MAT. NO	ACUTE ORAL LD50	ACUTE DERMAL LD50	ACUTE INHALATION DATA
II.A	>25 ml/kg (rat)	>4 ml/kg (rabbit)	>700 ppm/4hr (rat)
II.B	>4.7 g/kg (rat)	>4 ml/kg (rat)	>3670 ppm/8hr (rat)
II.C	>3.1 g/kg (rat)	>1.9 g/kg (rabbit)	>2132 ppm/6hr (rat)

IV. HEALTH INFORMATION

The health effects listed below are consistent with requirements under the OSHA Hazard Communication Standard 29 CFR 1910.1200

A. Eye Contact: Liquid is irritating to the eyes under normal vapor concentration. This material may cause eye irritation; (burning, tearing and redness).
B. Skin Contact: Liquid is slightly irritating to the skin. Prolonged or repeated liquid contact can result in defatting and/or drying of the skin which may result in skin irritation and/or dermatitis other symptoms of toxicity as described in effects if ingestion.
C. Inhalation: Vapors may be irritating to the eyes, nose, throat and respiratory tract. High vapor concentrations may cause CNS depression, headache, nausea, vomiting, weakness.
D. Ingestion: Ingestion of product may induce vomiting. Aspiration (breathing) of vomitus into the lungs must be avoided as even small quantities may result in aspiration pneumonitis. Ingestion may also cause CNS depression, headache, nausea and drowsiness, and dizziness.
E. Signs and Symptoms: Irritation as noted above. Slight to moderate CNS (Central Nervous System) depression may be evidenced by giddiness, headache, dizziness and nausea. Aspiration pneumonitus may be evidenced by coughing, labored breathing and cyanosis (bluish skin); in severe cases, death may occur.
F. Aggravated Medical Conditions: Pre-existing eye, skin, and respiratory disorders may be aggravated by exposure to this product.

V. OCCUPATIONAL EXPOSURE LIMITS

NO	PEL/TWA	PEL CEILING	TLV/TWA	TLV/STEL
A.	100 ppm	N/A	100 ppm	N/A
B.*	25 ppm	N/A	25 ppm	N/A
C.	N/A	N/A	N/A	N/A

*TLV information provided for the Trimethylbenzene component only- no data available for the mixture as a whole.

VI. EMERGENCY AND FIRST AID PROCEDURES

A. Eye Contact: Immediately flush eyes with plenty of water for 15 minutes while holding eyelids open. Do not let victim rub their eyes. Get medical attention.
B. Skin Contact: Remove contaminated clothing and shoes. Flush skin with water. Follow by washing with soap and water. If irritation occurs, get medical attention. Do not reuse clothing until cleaned.
C. Inhalation: Remove victim to fresh air and provide oxygen if breathing is difficult. Give artificial respiration if not breathing. Get medical attention immediately.
D. Ingestion: *DO NOT INDUCE VOMITING*. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs. Get medical attention.

VII. FIRE AND EXPLOSION HAZARDS

A. Flash Point and Method: 103° F (TCC)
B. Flammable Limits / % by Volume in Air: LEL (Lower Expl. Limit) =1: UEL (Upper Expl. Limit)=7
C. Extinguishing Media: Use water fog, foam, dry chemical or CO2. Do not use a direct stream of water. Product will float and can be reignited on surface of water.
D. Special Firefighting Procedures and Precautions: CAUTION. COMBUSTIBLE. Do not enter confined firespace without full bunker gear, including a positive pressure NIOSH approved self contained breathing apparatus. Cool fire exposed containers with water.

VIII. REACTIVITY

A. Stability: Stable
B. Hazardous Polymerization: Will not occur.
C. Conditions and Materials to Avoid: Avoid heat, flame and contact with strong oxidizing agents.
D. Hazardous Decomposition Products: Carbon dioxide, carbon monoxide and unidentified organic compounds may be formed during combustion.

IX. EMPLOYEE PROTECTION

A. Respiratory Protection: Avoid prolonged or repeated breathing of vapors. In accord with 29 CFR 1910.134, use either an atmosphere-supplying respirator or an air-purifying respirator for organic vapors.

B. Protective Clothing: Avoid contact with eyes. Wear safety glasses or goggles as appropriate. Avoid prolonged or repeated contact with skin. Wear chemical resistant gloves (butyl rubber) and other clothing to minimize contact.

C. Additional Protective Measures / Equipment: Use explosion proof ventilation as required to control vapor concentrations. Clean contaminated clothing before reusing.

X. ENVIRONMENTAL PROTECTION

A. Spill or Leak procedures: CAUTION - COMBUSTIBLE - LARGE SPILLS - Eliminate potential sources of ignition. Wear appropriate respirator and other protective clothing. Shut off source of leak only if safe to do so. Dike and contain, remove with vacuum trucks or pump to storage / salvage vessels. Soak up residue with an absorbent such as clay, sand or other suitable material; place in non-leaking containers and seal tightly for proper disposal. Flush areas with water to remove trace residue, dispose of flush solution as above. SMALL SPILLS- Take up with an absorbent material and place in non-leaking containers for proper disposal.

B. Waste Disposal: Under EPA-RCA (40 CFR 261.21). If this product becomes a waste material, it would be ignitable hazardous waste, hazardous waste number D001. Refer to the latest EPA or State regulations regarding proper disposal.

C. Environmental Hazards: Under EPA-CWA, this product is classified as an oil under section 311. Spills into or leading to surface waters that cause a sheen must be reported to the National Response Center, 1-800-424-8802.

EPA-Comprehensive Environmental Response, Compensation as Liability Act. Under EPA-CERCLA (Superfund), releases to air, land or water may be reportable to the National Response Center, 1-800-424-8802 (circumstances surrounding the release and cleanup determine reportability)

XI. SPECIAL PRECAUTIONS

A. Keep liquid and vapor away from heat, sparks and flame. Keep containers closed when not in use. Use with adequate ventilation.

B. Containers, even empty, can contain explosive vapors. Do not cut, drill, grind, weld or perform similar operations on or near containers.

C. Static electricity may accumulate and create a fire hazard. Ground fixed equipment. Bond and ground transfer equipment and containers.

XII. OTHER REGULATORY INFORMATION

A. The components of this product are listed on the EPA / TSCA Inventory of Chemical Substances.

B. SARA Hazard Category: This product has been reviewed according to the EPA "Hazard categories" per Section 311 / 312 of SARA Title III, and is considered to meet the following categories:

1. An immediate health hazard
2. A delayed health hazard
3. A fire hazard

C. SARA 313 Information: This product contains the following substances subject to the reporting requirements of SARA Title III, Section 313, and 40 CFR Part 372:

Name	CAS NO.	Concentration
Trimethylbenzene	95-63-6	1 - 7 %
Cumene	98-82-8	0 - 2 %
Xylene	1330-20-7	0 - 1.5 %
Glycol Ethers	2807-30-9	7 - 12 %

The information contained herein is based on the data available to us and is believed to be correct. However, we make no warranty, expressed or implied, regarding the accuracy of these data or the results to be obtained from the use thereof. We assume no responsibility for injury from the use of the product described herein.

IRTA conducted testing of a variety of alternatives with PIP. IRTA tested Mirachem Pressroom Cleaner, a water-based cleaner that is used by some newspapers to clean their presses. This cleaner did not clean fast enough. IRTA tested a blend of 50 percent acetone and a water/mineral spirits emulsion and this cleaner was not effective. IRTA then tried the same cleaner with 75 percent acetone. Although this formulation did clean, it was not effective enough. IRTA tried cleaning with a white oil but this cleaner did not clean effectively.

The cleaning alternative that did work on PIP's press was a soy based cleaner. An MSDS for the cleaner is shown in Exhibit 2-9. The soy cleaner contains a surfactant so it can be rinsed with water. This cleaner effectively cleaned the ink with five cleanup mats. Two additional mats were required to rinse the rollers with tap water.

PIP uses five gallons per month of their current cleaner which is priced at $12 per gallon. The annual cost of the cleanup solvent is $720. The price of the cleanup mats is 16 cents per sheet. Assuming PIP cleans up 4.5 times per day and uses five cleanup mats, the daily cost of cleanup sheets is $3.60. The annual cost of the cleanup mats amounts to $936. The total cost of cleanup currently is $1,656 annually.

The cost of the alternative soy cleaner in five gallon quantities is about $8 per gallon. Assuming the same amount of usage of the soy as the current cleaner, the annual cleaner cost would amount to $480. With the soy cleaner, more cleanup mats were required because of the rinsing step. Assuming 4.5 cleanups per day and use of seven cleanup mats each time, the annual cost of cleanup mats would amount to $1,310. The total cost of cleaning the press with the alternative would be $1,790.

Table 2-4 shows the cost comparison of using the current cleaner and the alternative cleaner. The figures show that the cost of using the alternative cleaner would increase the cleaning cost by about eight percent.

Table 2-4
Annualized Cost Comparison for PIP Printing

	Current Cleaner	Alternative Soy Cleaner
Cleaner Cost	$720	$480
Cleanup Mat Cost	$936	$1,310
Total Cost	$1,656	$1,790

Exhibit 2-9
Alternative Soy Gold 2000 Cleaner Tested at PIP Printing

SOYGOLD 2000 SOLVENT

MATERIAL SAFETY DATA SHEET

EMERGENCY PHONE: 913-599-6911 CHEMTREC: 800-424-9300

SECTION I-IDENTIFICATION

PRODUCT: SOYGOLD® 2000
CAS No.: 67784-80-9
CHEMICAL: Fatty acid methyl esters
SYNONYMS: Methyl esters of soybean oil

SECTION II-INGREDIENTS AND HAZARD CLASSIFICATION

TYPICAL COMPOSITION	CAS	%
Alkyl C_{16}-C_{18}-Methyl Esters	67784-80-9	97-99
Surfactant	9016-45-9	1-3

SARA HAZARD: TITLE III SECTION 313: Not listed FIRE (Section 311/312): None noted

SECTION III-HEALTH INFORMATION

EFFECTS OF OVEREXPOSURE
INHALATION: No known problems
INGESTION: LD_{50}>50ml/kg (albino rats)(similar products)
EYE CONTACT: Not classified as eye irritants
SKIN CONTACT: Not classified as a skin irritant or corrosive material

SECTION IV-OCCUPATIONAL EXPOSURE LIMITS

PEL: NO OSHA PEL TLV: NO ACGIH TLV

SECTION V-EMERGENCY FIRST AID PROCEDURE

FOLLOW STANDARD FIRST AID PROCEDURES
SWALLOWING: Call physician or poison control center.
SKIN CONTACT: Wash affected area.
EYE CONTACT: Flush eyes with cool water for at least 15 minutes. Do not let victim rub eyes.
INHALATION: Immediately remove victim to fresh air. Get medical attention immediately.

SECTION VI-PHYSICAL DATA

BOILING POINT: Over 600° F (315° C) at 760 mm Hg pressure
MELTING POINT: -1° C
VAPOR PRESSURE: 0.882 mm Hg at 25° C
SPECIFIC GRAVITY: 0.882 g/mL at 25° C
DIELECTRIC STRENGTH: >56.9
SOLUBILITY IN WATER: Negligible at room temperature
APPEARANCE AND COLOR: Light yellow to clear and liquid at room temperature
ODOR: Light vegetable oil odor

SECTION VII-FIRE AND EXPLOSION HAZARDS

FLASH POINT & METHOD USED: 425° F (218° C)(PMCC)
FLAMMABLE LIMITS: Not applicable
NFPA RATING: No NFPA rating

HMIS RATING: HEALTH: 0 FIRE: 1 REACTIVITY: 0

AEP 6/2003

SPECIAL FIRE FIGHTING PROCEDURES & PRECAUTIONS
Treat as oil fire. Use water spray, dry chemical, foam or carbon dioxide.

UNUSUAL FIRE & EXPLOSION HAZARDS
Rags soaked with any solvent present a fire hazard and should always be stored in UL listed or Factory Mutual approved, covered containers. Improperly stored rags can create conditions that lead to oxidation. Oxidation, under certain conditions can lead to spontaneous combustion. This product contains antioxidants to retard oxidation.

SECTION VIII-REACTIVITY

STABILITY:	Stable
HAZARDOUS POLYMERIZATION:	None likely
MATERIALS TO AVOID:	Strong oxidizing agents
HAZARDOUS DECOMPOSITION PRODUCTS:	CO_2, CO
CONDITIONS TO AVOID:	None known

SECTION IX-EMPLOYEE PROTECTION

CONTROL MEASURES:	Adequate ventilation
RESPIRATORY PROTECTION:	None required
PROTECTIVE CLOTHING:	No need anticipated
EYE PROTECTION:	None required

SECTION X-ENVIRONMENTAL PROTECTION

ENVIRONMENTAL PRECAUTIONS:	Avoid uncontrolled releases of this material into environment.
SPILL OR LEAK PRECAUTIONS:	Contain spilled material. Transfer to secure containers. Where necessary, collect using absorbent media.
WASTE DISPOSAL:	Dispose of according to federal, state and/or local requirements.

SECTION XI-REGULATORY CONTROLS

DOT CLASSIFICATION:	Class 55
DOT PROPER SHIPPING NAME:	Cleaning Compound, N.O.S.
OTHER REGULATORY REQUIREMENTS:	Listed in TSCA inventory

SECTION XII-PRECAUTIONS: HANDLING, STORAGE AND USAGE

No special precautions necessary.

SECTION XIII-DATE AND SIGNATURE

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process. The stated MSDS is reliable to the best of the company's knowledge and believed accurate as of the date indicated. However, no representation, warranty or guarantee of any kind, expressed or implied, is made as to its accuracy, reliability or completeness and we assume no responsibility for any loss, damage or expense, direct or consequential, arising out of use. It is the user's responsibility to satisfy himself as to the suitableness and completeness of such information for his own particular use.

AG ENVIRONMENTAL PRODUCTS, L.L.C.
9804 PFLUMM
LENEXA, KS 66215

SIGNATURE: William A. Ayres

PREPARED BY: WILLIAM A. AYRES REVISION DATE: 5-01-01

City of Santa Monica Print Shop

The City of Santa Monica Print Shop provides support to the city for various printing activities. One of their operations involves printing on envelopes and stationary with a small lithographic printing press. The press is used twice a month and it is cleaned after each print session.

In the past, the city used two high VOC cleaners, one for cleaning the rollers and the other for cleaning the cylinder plate. The city used one gallon of the roller cleaner each year. At a cost of $40 per gallon, the total cost of purchasing the roller cleaner was $40 per year. The city used one quart of the cylinder cleaner each year. At a cost of $15 per gallon, the total cost of purchasing the cylinder cleaner was about $4 annually. Cleanup mats are used to collect the ink when the solvent is applied to the rollers. The city used 120 cleanup mats per year. At a cost of 28 cents per cleanup mat, the total annual cost was $34. The cost of purchasing cleaning materials was about $78 annually.

IRTA worked with the city to test alternatives. After testing several formulations, the city decided to convert to a soy based cleaner called Soy Gold 2000 for roller cleaning and a water-based cleaner called Mirachem Pressroom Cleaner for the cylinder cleaning. Both the soy cleaner and the water-based cleaner are lower in toxicity than the VOC cleanup solvents used by the city previously. About one gallon per year of the soy cleaner is required. At a price of $8 per gallon, the annual cost of purchasing the roller cleaner is now $8. For cleaning the cylinder, the city uses one quart per year of the water-based cleaner. At a cost of $10 per gallon, the annual cost of the formulation is $3. The city uses more cleanup mats with the new cleaner because the soy cleaner needs to be rinsed with water so it does not leave a residue; about nine cleanup mats per job or 216 cleanup mats per year are required. The annual cost of the cleanup mats is now about $60. The yearly total cost of cleaning materials is now $71.

The labor cost for cleaning has increased. When the city used the VOC cleaners, it took about one-half hour to clean the press twice a month. At a labor rate of $17.50 per hour, the annual labor cost for cleaning amounted to $210. The cleanup now takes one hour twice a month. The labor cost is twice what it was in the past, at $420.

The annual cost comparison of the VOC solvents and the low VOC cleaners is shown in Table 2-5.

Table 2-5
Annual Cost Comparison for City of Santa Monica

	VOC solvents	Soy and Water-Based Cleaner
Cleaner and Cleanup Mat Cost	$78	$71
Labor Cost	$210	$420
Total Cost	$288	$491

The values of Table 2-5 show that the cost for cleaning at the city increased by 70% when the city substituted the low VOC alternatives.

Presslink

Presslink is located in Anaheim, California. The company is a commercial lithographic printer with two sheet fed presses. One of the presses is a small Ryobi and the other is a larger four color press. Pictures of the small and larger presses are shown in Figure 2-4 and Figure 2-5 respectively. Presslink prints flyers and brochures.

Figure 2-4. Small Press at Presslink

Figure 2-5. Larger Press at Presslink

IRTA began working with Presslink as part of a project sponsored by Cal/EPA's Department of Toxic Substances Control, the South Coast Air Quality Management District and U.S. EPA to test, demonstrate and evaluate alternative on-press cleaning

agents. Presslink uses an air dry solventborne ink on their small press and a heat set ink on their larger press. On the small press, the company uses a blanket wash and a two step roller wash for cleaning. An MSDS for the blanket wash is shown in Exhibit 2-10. MSDSs for the two roller washes are shown in Exhibits 2-11 and 2-12. On the larger press, which has an automated roller wash system, Presslink uses the same blanket wash and the step 2 roller wash.

IRTA tested a variety of alternatives at Presslink. IRTA tested Mirachem Pressroom Cleaner, a cleaner used by some newspapers but it did not clean effectively. IRTA tested a few different blends of the Mirachem cleaner and acetone but they did not work well. IRTA tested a soy based cleaner called Soy Gold 2000 which did clean effectively. IRTA provided Presslink with a week's supply of the soy based cleaner and it was tested as a blanket and roller wash on both presses. During the time period, it cleaned both presses well. An MSDS for the soy based cleaner is shown in Exhibit 2-13.

Presslink uses 20 gallons per month or 240 gallons per year of blanket wash. The price of the blanket wash is $3.66 per gallon, so the annual cost of using the blanket wash is $878. The company uses 2.5 gallons per month or 30 gallons per year of the two roller washes. The price of the roller washes is $10 per gallon. The annual cost of the roller wash is $300. The total annual cost of the current cleaners is $1,178.

The cost of the alternative soy based cleaner is $8 per gallon. Assuming the cleaner is used as both a blanket and roller wash and assuming that the same amount of cleaner is required, the annual cost of the alternative cleaner is $2,160.

Table 2-6 shows the annualized cost comparison for Presslink. The values show that the cleaning cost with the soy based alternative cleaner is 83 percent higher than the cleaning cost with the current cleaners.

Table 2-6
Annualized Cost Comparison for Presslink

	Current Cleaners	Alternative Cleaners
Blanket Wash Cost	$878	$1,920
Roller Wash Cost	$300	$240
Total Cost	$1,178	$2,160

Exhibit 2-10
Current Blanket Wash Used at Presslink

LITHO-CHEM, INC.

9441 SANTA FE SPRINGS ROAD, SANTA FE SPRINGS, CA 90670
TEL: 562.946.5537 FAX: 562.946.2333

LC-1700

MATERIAL SAFETY DATA SHEET

DATE PREPARED: August 2003 | FOR EMERGENCY: 800-424-9300

SECTION I - IDENTIFICATION

PRODUCT	PRESS WASH
CODE	LC-1700
CHEMICAL FAMILY	Proprietary blend of aliphatic hydrocarbon solvents with ketone
DOT CLASSIFICATION	Paint related material,3,UN1263,II

SECTION II - HAZARDOUS INGREDIENTS

	%	TLV	CAS NO.
2-propanone	1-10	750	67-64-1
Aliphatic hydrocarbon	>50	300	64742-89-8

HEALTH	FIRE	REACTIVITY	PERSONAL
1	3	0	B

PROTECTION

HAZARD RATING
LEAST = 0 SLIGHT = 1
MODERATE = 2 HIGH = 3
EXTREME = 4

SECTION III - PHYSICAL PROPERTIES

BOILING POINT	131 °F (minimum boiling component)
PARTIAL PRESSURE (mmHg@20°C)	69.1 (32.3 calculated as per AQMD Rule 1171)
DENSITY (Lbs/Gal)	6.0
SPECIFIC GRAVITY	0.72
SOLUBILITY IN WATER	Appreciable
APPEARANCE AND ODOR	Clear, lavender liquid with a mild solvent odor
VOLATILE ORGANIC COMPOUNDS (VOC)	5.5 lb/gal (663 gm/l) EPA Method 24

SECTION IV - FIRE AND EXPLOSION HAZARDS

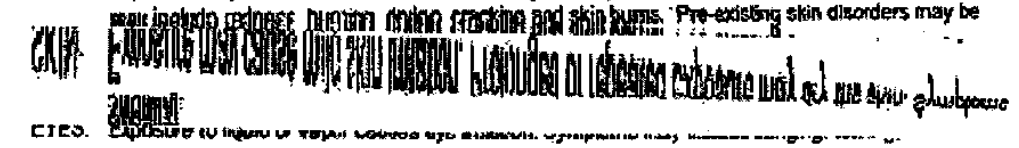
FLASH POINT (TCC)	0°F
EXPLOSIVE LIMITS IN AIR (% BY VOLUME)	LL=1.2% UL=12.8%
EXTINGUISHING MEDIA	Alcohol resistant foam, carbon dioxide, dry chemical
SPECIAL FIRE FIGHTING PROCEDURES	Use self-contained breathing apparatus and protective clothing
UNUSUAL FIRE AND EXPLOSION HAZARD	Material is highly volatile. Vapors may travel at ground level and be ignited by pilot lights, sparks, heaters, electrical motors, etc

SECTION V - HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL: Not established
THRESHOLD VALUE: Not established
EFFECTS OF OVEREXPOSURE

EYES: Exposure to liquid or vapor causes eye irritation. Symptoms may include stinging, tearing, redness and swelling.

SKIN: Exposure may cause mild skin irritation. Prolonged or repeated exposure may dry the skin. Symptoms may include redness, burning, drying, cracking and skin burns. Pre-existing skin disorders may be



EYES: Exposure to liquid or vapor causes eye irritation. Symptoms may include stinging, tearing, redness and swelling.

SKIN: Exposure may cause mild skin irritation. Prolonged or repeated exposure may dry the skin. Symptoms may include redness, burning, drying, cracking and skin burns. Pre-existing skin disorders may be aggravated by exposure to this material. Absorption is possible but harmful effects are not expected from this route of exposure under normal conditions of handling and use.

BREATHING: Exposure to vapors or mist is possible. Short-term inhalation toxicity is low. Breathing small amounts during normal handling is not likely to cause harmful effects; breathing large amounts may be harmful. Symptoms are more reliably seen at air concentrations exceeding the recommended exposure limits. Symptoms of exposure may include:

- Irritation of nose, throat, respiratory tract
- Pre-existing lung disorders, e.g. asthma-like conditions, may be aggravated by exposure to this material resulting in cough, central nervous system (CSN) depression (dizziness, weakness, drowsiness, fatigue, nausea, headache, unconsciousness) and other CNS effects (coma).

SWALLOWING: Single dose oral toxicity is low. Swallowing small amounts during normal handling is not likely to cause harmful effects. Swallowing large amounts may be harmful. Symptoms may include: throat irritation, gastrointestinal irritation (nausea, vomiting, diarrhea), central nervous system depression (dizziness, weakness, fatigue, nausea, headache, unconsciousness), high blood sugar, coma. This material can enter the lungs during swallowing or vomiting and cause lung inflammation and/or damage.

FIRST AIDE:
- If on skin: Remove contaminated clothing, wash exposed area with soap and water. If symptoms persist, seek medical attention. Launder clothing before re-use.
- If in eyes: If symptoms develop, move individual away from exposure and into fresh air. Flush eyes with water for at least 15 minutes while holding eyelids apart. If symptoms persist, seek medical attention.
- If swallowed: DO NOT INDUCE VOMITING. This material is an aspiration hazard. If individual is drowsy or unconscious, place on left side with head down. Seek medical attention. If possible, do not leave individual unattended.
- If breathed: If symptoms develop, immediately move individual away from exposure and into fresh air. Seek medical attention. Keep individual warm and quiet. If person is not breathing, begin artificial respiration. If breathing is difficult, administer oxygen.

NOTE TO PHYSICIAN This material (or a component) has produced hyperglycemia and ketosis following substantial ingestion.

PRIMARY ROUTES OF ENTRY: Inhalation, skin absorption, skin contact, eye contact.

EFFECTS OF CHRONIC EXPOSURE: This material (or a component) shortens the time of onset or worsens the liver and kidney damaged induced by other chemicals. This material (or a component) has been shown to cause harm to the fetus in laboratory animal studies; harm to the fetus occurs only at exposure levels that harm the pregnant animal. The relevance of these findings to humans is uncertain. Overexposure to this material (or it's components) has been suggested as a cause of the following effects in laboratory animals and may aggravate pre-existing disorders of these organs in humans: mild, reversible liver effects and mild, reversible kidney effects.

SECTION VI - REACTIVITY DATA

STABILITY	Stable under normal conditions of storage and handling
INCOMPATIBLE MATERIALS	Avoid contact with strong oxidizing agents and strong acids
HAZARDOUS POLYMERIZATION	Cannot occur

SECTION VII - SPILL OR LEAK PROCEDURE

STEPS TO BE TAKEN IN CASE OF RELEASE OR SPILL

Small spill: Absorb liquid on vermiculite, floor absorbent, or other absorbent material and transfer to hood

Large spill: Eliminate all ignition sources (flares, flames, electrical sparks). Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Stop spill at source. Prevent spill from entering drains, sewers, streams or other bodies of water. Prevent from spreading. If runoff occurs, notify authorities as required. Absorb unrecoverable product. Transfer contaminated absorbent, soil and other materials to approved containers for disposal.

WASTE DISPOSAL METHOD

Small spill: Dispose of in accordance with all local, state and federal regulations

Large spill: Dispose of in accordance with all local, state and federal regulations

SECTION VIII - PROTECTIVE EQUIPMENT TO BE USED

RESPIRATORY PROTECTION: If workplace exposure limit(s) of product (or a component) is exceeded (see Section II), a NIOSH/MSHA air supplied respirator is advised. In absence of proper environmental control, OSHA regulation also permits other NIOSH/MSHA respirators (negative pressure type) under specified conditions. Engineering or administrative controls should be implemented to reduce exposure.

VENTILATION: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure levels below TLV's (see Section II) or to below level of overexposure (from known, suspected or apparent adverse effects).

PROTECTIVE GLOVES: Wear resistant gloves (consult safety equipment supplier).

EYE PROTECTION: Chemical splash goggles in compliance with OSHA regulations are advised. However, OSHA regulations also permit other types of safety glasses (consult safety equipment supplier).

OTHER PROTECTIVE EQUIPMENT: To prevent repeated or prolonged skin contact, wear impervious clothing and boots.

SECTION IX - SPECIAL PRECAUTIONS OR OTHER COMMENTS

Containers of this material may be hazardous when emptied since emptied containers retain product residues (vapor, liquid and/or solids). All hazard precautions given in this sheet must be observed.

WARNING!!! Sudden release of hot organic vapors or mists from processor equipment operating at elevated temperatures and pressures, or sudden ingress of air into vacuum equipment may result in ignitions without the presence of obvious ignition sources. Published "autoignition" or "ignition" temperature values cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions. Any use of this product at elevated process temperatures should be thoroughly evaluated to establish and maintain safe operating conditions.

THE INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH THE COMPANY OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE AND SUITABLE TO THEIR CIRCUMSTANCES.

Exhibit 2-11
Current Roller Wash Step 1 Cleaner Used at Presslink

LITHO-CHEM, INC.

9441 SANTA FE SPRINGS ROAD, SANTA FE SPRINGS, CA 90670
TEL: 562.946.5537 FAX: 562.946.2333

AQ 1301

MATERIAL SAFETY DATA SHEET

DATE PREPARED: OCTOBER 2002	FOR EMERGENCY: 562.946.5537

SECTION I - IDENTIFICATION

PRODUCT	ROLLER WASH NO.1
CODE	AQ 1301
CHEMICAL FAMILY	Aqueous emulsion of aliphatic and aromatic solvents with glycol ether and non-hazardous proprietary ingredients
DOT CLASSIFICATION	Combustible liquid,n.o.s.,(naphtha),NA1993,III

SECTION II - HAZARDOUS INGREDIENTS

	%	TLV	CAS NO.
Aliphatic Hydrocarbon	30-60	275	8008-20-6
Aromatic Hydrocarbon	10-30	100	64742-95-6
Glycol ether	1-10	20	111-76-2

HEALTH	FIRE	REACTIVITY	PERSONAL PROTECTION	HAZARD RATING
 2	 2	 0	B	LEAST = 0 SLIGHT = 1 MODERATE = 2 HIGH = 3 EXTREME = 4

SECTION III - PHYSICAL PROPERTIES

BOILING POINT	259°F
PARTIAL PRESSURE (mmHg@20°C)	9.5 (1.7 Calculated as per SCAQMD rule 1171)
DENSITY (Lbs/Gal)	7.3
SPECIFIC GRAVITY	0.84
SOLUBILITY IN WATER	Appreciable
APPEARANCE AND ODOR	Translucent amber liquid with a mild solvent odor
VOLATILE ORGANIC COMPOUNDS (VOC)	4.7 lb/gal (564 gm/l)

SECTION IV - FIRE AND EXPLOSION HAZARDS

FLASH POINT (TCC)	120 °F
EXPLOSIVE LIMITS IN AIR (% BY VOLUME)	LL=0.7% UL=10.6%
EXTINGUISHING MEDIA	Alcohol foam, carbon dioxide, dry chemical
SPECIAL FIRE FIGHTING PROCEDURES	Use self-contained breathing apparatus and protective clothing
UNUSUAL FIRE AND EXPLOSION HAZARD	Containers exposed to intensive heat should be cooled with water spray

SECTION V - HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL: Not Established
THRESHOLD VALUE: Not Established
EFFECTS OF OVEREXPOSURE:

EYES: Exposure to liquid or vapor causes eye irritation. Symptoms may include stinging, tearing, redness and swelling.

SKIN: Exposure may cause mild skin irritation. Prolonged or repeated exposure may dry the skin. Symptoms may include redness, burning, drying, cracking and skin burns. Pre-existing skin disorders may be aggravated by exposure to this material. Absorption is possible but harmful effects are not expected from this route of exposure under normal conditions of handling and use.

BREATHING: Exposure to vapors or mist is possible. Short-term inhalation toxicity is low. Breathing small amounts during normal handling is not likely to cause harmful effects; breathing large amounts may be harmful. Symptoms are more typically seen at air concentrations exceeding the recommended exposure limits. Symptoms of exposure may include:

- Irritation of nose, throat, respiratory tract
- Pre-existing lung disorders, e.g. asthma-like conditions, may be aggravated by exposure to this material resulting in cough, central nervous system (CSN) depression (dizziness, weakness, drowsiness, fatigue, nausea, headache, unconsciousness) and other CNS effects (coma).

SWALLOWING: Single dose oral toxicity is low. Swallowing small amounts during normal handling is not likely to cause harmful effects. Swallowing large amounts may be harmful. Symptoms may include: throat irritation, gastrointestinal irritation (nausea, vomiting, diarrhea), central nervous system depression (dizziness, weakness, fatigue, nausea, headache, unconsciousness), high blood sugar, coma. This material can enter the lungs during swallowing or vomiting and cause lung inflammation and/or damage.

FIRST AIDE:
- If on skin: Remove contaminated clothing, wash exposed area with soap and water if symptoms persist, seek medical attention. Launder clothing before re-use.
- If in eyes: If symptoms develop, move individual away from exposure and into fresh air. Flush eyes with water for at least 15 minutes while holding eyelids apart. If symptoms persist, seek medical attention.
- If swallowed: DO NOT INDUCE VOMITING. This material is an aspiration hazard. If individual is drowsy or unconscious, place on left side with head down. Seek medical attention. If possible, do not leave individual unattended.
- If breathed: If symptoms develop, immediately move individual away from exposure and into fresh air. Seek medical attention. Keep individual warm and quiet. If person is not breathing, begin artificial respiration. If breathing is difficult, administer oxygen.

NOTE TO PHYSICIAN: This material (or a component) has produced hyperglycemia and ketosis following substantial ingestion.

PRIMARY ROUTES OF ENTRY: Inhalation, skin absorption, skin contact, eye contact.

EFFECTS OF CHRONIC EXPOSURE: This material (or a component) shortens the time of onset or worsens the liver and kidney damaged induced by other chemicals. This material (or a component) has been shown to cause harm to the fetus in laboratory animal studies; harm to the fetus occurs only at exposure levels that harm the pregnant animal. The relevance of these findings to humans is uncertain. Overexposure to this material (or it's components) has been suggested as a cause of the following effects in laboratory animals and may aggravate pre-existing disorders if these organs in humans: mild, reversible liver effects and mild, reversible kidney effects.

SECTION VI - REACTIVITY DATA

STABILITY	Stable under normal conditions of storage and handling
INCOMPATIBLE MATERIALS	Avoid contact with strong oxidizing agents and strong acids
HAZARDOUS POLYMERIZATION	Cannot occur

SECTION VII - SPILL OR LEAK PROCEDURE

STEPS TO BE TAKEN IN CASE OF RELEASE OR SPILL

Small spill: Absorb liquid on vermiculite, floor absorbent, or other absorbent material and transfer to hood

Large spill: Eliminate all ignition sources (flares, flames, electrical sparks). Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Stop spill at source. Prevent spill from entering drains, sewers, streams or other bodies of water. Prevent from spreading. If runoff occurs, notify authorities as required. Absorb unrecoverable product. Transfer contaminated absorbent, spill and other materials to approved containers for disposal.

WASTE DISPOSAL METHOD

Small spill: Dispose of in accordance with all local, state and federal regulations

Large spill: Dispose of in accordance with all local, state and federal regulations

SECTION VIII - PROTECTIVE EQUIPMENT TO BE USED

RESPIRATORY PROTECTION: If workplace exposure limit(s) of product (or a component) is exceeded (see Section II), a NIOSH/MSHA air supplied respirator is advised. In absence of proper environmental control, OSHA regulation also permits other NIOSH/MSHA respirators (negative pressure type) under specified conditions. Engineering or administrative controls should be implemented to reduce exposure.

VENTILATION: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure levels below TLV's (see Section II) or to below level of overexposure (from known, suspected or apparent adverse effects).

PROTECTIVE GLOVES: Wear resistant gloves (consult safety equipment supplier).

EYE PROTECTION: Chemical splash goggles in compliance with OSHA regulations are advised. However, OSHA regulations also permit other types of safety glasses (consult safety equipment supplier).

OTHER PROTECTIVE EQUIPMENT: To prevent repeated or prolonged skin contact, wear impervious clothing and boots.

SECTION IX - SPECIAL PRECAUTIONS OR OTHER COMMENTS

Containers of this material may be hazardous when emptied since emptied containers retain product residues (vapor, liquid and/or solids). All hazard precautions given in this sheet must be observed.

WARNING!!! Sudden release of hot organic vapors or mists from processor equipment operating at elevated temperatures and pressures, or sudden ingress of air into vacuum equipment may result in ignitions without the presence of obvious ignition sources. Published "autoignition" or "ignition" temperature values cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions. Any use of this product at elevated process temperatures should be thoroughly evaluated to establish and maintain safe operating conditions.

THE INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH THE COMPANY OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE AND SUITABLE TO THEIR CIRCUMSTANCES.

Exhibit 2-12
Current Roller Wash Step 2 Cleaner Used at Presslink

LITHO-CHEM, INC.

9441 SANTA FE SPRINGS ROAD, SANTA FE SPRINGS, CA 90670
TEL: 562 946 5537 FAX: 562.946 2333

AQ 1302

MATERIAL SAFETY DATA SHEET

DATE PREPARED OCTOBER 1998 | FOR EMERGENCY, 562 946 5537

SECTION I - IDENTIFICATION

PRODUCT	ROLLER WASH No. 2
CODE	AQ 1302
CHEMICAL FAMILY	Blend of aromatic and aliphatic hydrocarbon solvents
DOT CLASSIFICATION	Combustible liquid n.o.s.(naphtha), NA1993,III

SECTION II - HAZARDOUS INGREDIENTS

	%	TLV	CAS NO.
Aliphatic hydrocarbon	70 - 80	400	8052-41-3
Aromatic hydrocarbon	15 - 25	100	64742-95-6
Glycol ether	7 - 12	50	111-76-2

HEALTH	FIRE	REACTIVITY	PERSONAL PROTECTION
2	2	0	B

HAZARD RATING
LEAST = 0 SLIGHT = 1
MODERATE = 2 HIGH = 3
EXTREME = 4

SECTION III - PHYSICAL PROPERTIES

BOILING POINT	310°F
PARTIAL PRESSURE (mmHg@20°C)	2.9
DENSITY (Lbs/Gal)	6.6
SPECIFIC GRAVITY	0.792
SOLUBILITY IN WATER	Dispersible
APPEARANCE AND ODOR	Clear, yellow, liquid, mild odor
VOLATILE ORGANIC COMPOUNDS (VOC)	6.6 lb/gal (792 gm/l)

SECTION IV - FIRE AND EXPLOSION HAZARDS

FLASH POINT (TCC)	113°F
EXPLOSIVE LIMITS IN AIR (% BY VOLUME)	LL=1.0% UL=6.2%
EXTINGUISHING MEDIA	Water, foam, carbon dioxide , dry chemical
SPECIAL FIRE FIGHTING PROCEDURES	Use self-contained breathing apparatus and protective clothing
UNUSUAL FIRE AND EXPLOSION HAZARD	Material is highly volatile. Vapors may travel at ground level and be ignited by pilot lights, sparks, heaters, electrical motors, etc

SECTION V - HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL 750 ppm
THRESHOLD VALUE 750 ppm

EFFECTS OF OVEREXPOSURE

EYES: Exposure to liquid or vapor causes eye irritation. Symptoms may include stinging, tearing, redness and swelling

SKIN: Exposure may cause mild skin irritation. Prolonged or repeated exposure may dry the skin. Symptoms may include redness, burning, drying, cracking and skin burns. Pre-existing skin disorders may be aggravated by exposure to this material. Absorption is possible but harmful effects are not expected from this route of exposure under normal conditions of handling and use

BREATHING: Exposure to vapors or mist is possible. Short-term inhalation toxicity is low. Breathing small amounts during normal handling is not likely to cause harmful effects; breathing large amounts may be harmful. Symptoms are more typically seen at air concentrations exceeding the recommended exposure limits. Symptoms of exposure may include

-Irritation of nose, throat, respiratory tract

-Pre-existing lung disorders, e.g. asthma-like conditions, may be aggravated by exposure to this material resulting in cough, central nervous system (CSN) depression (dizziness, weakness, drowsiness, fatigue, nausea, headache, unconsciousness) and other CNS effects (coma).

SWALLOWING: Single dose oral toxicity is low. Swallowing small amounts during normal handling is not likely to cause harmful effects. Swallowing large amounts may be harmful. Symptoms may include: throat irritation, gastrointestinal irritation (nausea, vomiting, diarrhea), central nervous system depression (dizziness, weakness, fatigue, nausea, headache, unconsciousness), high blood sugar, coma. This material can enter the lungs during swallowing or vomiting and cause lung inflammation and/or damage.

FIRST AIDE: If on skin: Remove contaminated clothing, wash exposed area with soap and water. If symptoms persist, seek medical attention. Launder clothing before re-use.

If in eyes: If symptoms develop, move individual away from exposure and into fresh air. Flush eyes with water for at least 15 minutes while holding eyelids apart. If symptoms persist, seek medical attention.

If swallowed: DO NOT INDUCE VOMITING. This material is an aspiration hazard. If individual is drowsy or unconscious, place on left side with head down. Seek medical attention. If possible, do not leave individual unattended

If breathed: If symptoms develop, immediately move individual away from exposure and into fresh air. Seek medical attention. Keep individual warm and quiet. If person is not breathing, begin artificial respiration. If breathing is difficult, administer oxygen.

NOTE TO PHYSICIAN This material (or a component) has produced hyperglycemia and ketosis following substantial ingestion.

PRIMARY ROUTES OF ENTRY: Inhalation, skin absorption, skin contact, eye contact.

EFFECTS OF CHRONIC EXPOSURE: This material (or a component) shortens the time of onset or worsens the liver and kidney damaged induced by other chemicals. This material (or a component) has been shown to cause harm to the fetus in laboratory animal studies; harm to the fetus occurs only at exposure levels that harm the pregnant animal. The relevance of these findings to humans is uncertain. Overexposure to this material (or it's components) has been suggested as a cause of the following effects in laboratory animals and may aggravate pre-existing disorders if these organs in humans: mild, reversible liver effects and mild, reversible kidney effects.

SECTION VI - REACTIVITY DATA

STABILITY	Stable under normal conditions of storage and handling
INCOMPATIBLE MATERIALS	Avoid contact with strong oxidizing agents and strong acids
HAZARDOUS POLYMERIZATION	Cannot occur

SECTION VII - SPILL OR LEAK PROCEDURE

STEPS TO BE TAKEN IN CASE OF RELEASE OR SPILL

Small spill: Absorb liquid on vermiculite, floor absorbent, or other absorbent material and transfer to hood

Large spill: Eliminate all ignition sources (flares, flames, electrical sparks). Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Stop spill at source. Prevent spill from entering drains, sewers, streams or other bodies of water. Prevent from spreading. If runoff occurs, notify authorities as required. Absorb unrecoverable product. Transfer contaminated absorbent, soil and other materials to approved containers for disposal.

WASTE DISPOSAL METHOD

Small spill: Dispose of in accordance with all local, state and federal regulations

Large spill: Dispose of in accordance with all local, state and federal regulations

SECTION VIII - PROTECTIVE EQUIPMENT TO BE USED

RESPIRATORY PROTECTION: If workplace exposure limit(s) of product (or a component) is exceeded (see Section II), a NIOSH/MSHA air supplied respirator is advised. In absence of proper environmental control, OSHA regulation also permits other NIOSH/MSHA respirators (negative pressure type) under specified conditions. Engineering or administrative controls should be implemented to reduce exposure.

VENTILATION: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure levels below TLV's (see Section II) or to below level of overexposure (from known, suspected or apparent adverse effects).

PROTECTIVE GLOVES: Wear resistant gloves (consult safety equipment supplier)

EYE PROTECTION: Chemical splash goggles in compliance with OSHA regulations are advised. However, OSHA regulations also permit other types of safety glasses (consult safety equipment supplier).

OTHER PROTECTIVE EQUIPMENT: To prevent repeated or prolonged skin contact, wear impervious clothing and boots

SECTION IX - SPECIAL PRECAUTIONS OR OTHER COMMENTS

Containers of this material may be hazardous when emptied since emptied containers retain product residues (vapor, liquid and/or solids). All hazard precautions given in this sheet must be observed.

WARNING!!! Sudden release of hot organic vapors or mists from processor equipment operating at elevated temperatures and pressures, or sudden ingress of air into vacuum equipment may result in ignitions without the presence of obvious ignition sources. Published "autoignition" or "ignition" temperature values cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions. Any use of this product at elevated process temperatures should be thoroughly evaluated to establish and maintain safe operating conditions.

THE INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH THE COMPANY OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE AND SUITABLE TO THEIR CIRCUMSTANCES.

Exhibit 2-13
Alternative Soy Gold 2000 Cleaner Tested at Presslink

SOYGOLD 2000 SOLVENT

MATERIAL SAFETY DATA SHEET

EMERGENCY PHONE: 913-599-6911 CHEMTREC: 800-424-9300

SECTION I-IDENTIFICATION

PRODUCT: SOYGOLD® 2000
CAS No.: 67784-80-9
CHEMICAL: Fatty acid methyl esters
SYNONYMS: Methyl esters of soybean oil

SECTION II-INGREDIENTS AND HAZARD CLASSIFICATION

TYPICAL COMPOSITION	CAS	%
Alkyl C_{16}-C_{18}-Methyl Esters	67784-80-9	97-99
Surfactant	9016-45-9	1-3

SARA HAZARD: TITLE III SECTION 313: Not listed FIRE (Section 311/312): None noted

SECTION III-HEALTH INFORMATION

EFFECTS OF OVEREXPOSURE
INHALATION: No known problems
INGESTION: LD_{50}>50ml/kg (albino rats\similar products)
EYE CONTACT: Not classified as eye irritants
SKIN CONTACT: Not classified as a skin irritant or corrosive material

SECTION IV-OCCUPATIONAL EXPOSURE LIMITS

PEL: NO OSHA PEL TLV: NO ACGIH TLV

SECTION V-EMERGENCY FIRST AID PROCEDURE

FOLLOW STANDARD FIRST AID PROCEDURES
SWALLOWING: Call physician or poison control center.
SKIN CONTACT: Wash affected area.
EYE CONTACT: Flush eyes with cool water for at least 15 minutes. Do not let victim rub eyes.
INHALATION: Immediately remove victim to fresh air. Get medical attention immediately.

SECTION VI-PHYSICAL DATA

BOILING POINT: Over 600° F (315° C) at 760 mm Hg pressure
MELTING POINT: -1° C
VAPOR PRESSURE: 0.882 mm Hg at 25° C
SPECIFIC GRAVITY: 0.882 g/mL at 25° C
DIELECTRIC STRENGTH: >36.9
SOLUBILITY IN WATER: Negligible at room temperature
APPEARANCE AND COLOR: Light yellow to clear and liquid at room temperature
ODOR: Light vegetable oil odor

SECTION VII-FIRE AND EXPLOSION HAZARDS

FLASH POINT & METHOD USED: 425° F (218° CRPMCC)
FLAMMABLE LIMITS: Not applicable
NFPA RATING: No NFPA rating

HMIS RATING: HEALTH: 0 FIRE: 1 REACTIVITY: 0

AEP 4/2001

SPECIAL FIRE FIGHTING PROCEDURES & PRECAUTIONS
Treat as oil fire. Use water spray, dry chemical, foam or carbon dioxide.

UNUSUAL FIRE & EXPLOSION HAZARDS
Rags soaked with any solvent present a fire hazard and should always be stored in UL listed or Factory Mutual approved, covered containers. Improperly stored rags can create conditions that lead to oxidation. Oxidation, under certain conditions can lead to spontaneous combustion. This product contains antioxidants to retard oxidation.

SECTION VIII-REACTIVITY

STABILITY:	Stable
HAZARDOUS POLYMERIZATION:	None likely
MATERIALS TO AVOID:	Strong oxidizing agents
HAZARDOUS DECOMPOSITION PRODUCTS:	CO_2, CO
CONDITIONS TO AVOID:	None known

SECTION IX-EMPLOYEE PROTECTION

CONTROL MEASURES:	Adequate ventilation
RESPIRATORY PROTECTION:	None required
PROTECTIVE CLOTHING:	No need anticipated
EYE PROTECTION:	None required

SECTION X-ENVIRONMENTAL PROTECTION

ENVIRONMENTAL PRECAUTIONS:	Avoid uncontrolled releases of this material into environment.
SPILL OR LEAK PRECAUTIONS:	Contain spilled material. Transfer to secure containers. Where necessary, collect using absorbent media.
WASTE DISPOSAL:	Dispose of according to federal, state and/or local requirements.

SECTION XI-REGULATORY CONTROLS

DOT CLASSIFICATION:	Class 55
DOT PROPER SHIPPING NAME:	Cleaning Compound, N.O.S.
OTHER REGULATORY REQUIREMENTS:	Listed in TSCA inventory

SECTION XII-PRECAUTIONS: HANDLING, STORAGE AND USAGE

No special precautions necessary.

SECTION XIII-DATE AND SIGNATURE

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process. The stated MSDS is reliable to the best of the company's knowledge and believed accurate as of the date indicated. However, no representation, warranty or guarantee of any kind, expressed or implied, is made as to its accuracy, reliability or completeness and we assume no responsibility for any loss, damage or expense, direct or consequential, arising out of use. It is the user's responsibility to satisfy himself as to the suitableness and completeness of such information for his own particular use.

AG ENVIRONMENTAL PRODUCTS, L.L.C.
9804 PFLUMM
LENEXA, KS 66215

SIGNATURE: William A. Ayres

PREPARED BY: WILLIAM A. AYRES REVISION DATE: 5-01-01

The Castle Press

The Castle Press is located in Pasadena, California. The company is a commercial lithographic printer with five sheet fed presses. A picture of one of Castle's presses is shown in Figure 2-6. The company prints items like newsletters and brochures.

Figure 2-6. Press at the Castle Press

IRTA began working with Castle as part of a project sponsored by Cal/EPA's Department of Toxic Substances Control, the South Coast Air Quality Management District and U.S. EPA to test, demonstrate and evaluate alternative on-press cleaning agents. Castle cleans their sheet fed presses with two blanket washes, one for cleaning with the automated system and one for cleaning by hand. The company uses a two step roller wash. Exhibits 2-14, 2-15, 2-16 and 2-17 show MSDSs for the hand blanket wash, the automated blanket wash, the step 1 roller wash and the step 2 roller wash respectively.

IRTA conducted testing of a variety of alternatives at Castle. During blanket wash testing, one of the alternatives that was tested was Mirachem Pressroom Cleaner, a water-based cleaner used by some newspapers. This cleaner did not clean aggressively enough. IRTA also tested a soy based cleaner as a blanket wash. Although it cleaned the ink well, the operator indicated that it did not evaporate quickly enough. IRTA also tested acetone but the operator thought it was too strong. IRTA tested a blend of 25 percent acetone and

Exhibit 2-14
Current Hand Blanket Wash Used at The Castle Press

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: POWERKLENE VC HMIS CODES: H P R P
PRODUCT CODE: A748 1*2 0 B
CHEMICAL NAME: BLANKET AND ROLLER WASH

SECTION I - MANUFACTURER IDENTIFICATION

MANUFACTURER'S NAME: PRINTERS' SERVICE
ADDRESS : 26 Blanchard Street
Newark, New Jersey 07105

EMERGENCY PHONE : 1-800-424-9300 DATE REVISED : 06/10/97
INFORMATION PHONE : 1-973-589-7800 NAME OF PREPARER : ENVIRONMENTAL DEPT.

SECTION II - HAZARDOUS INGREDIENTS/SARA III INFORMATION

REPORTABLE COMPONENTS	CAS NUMBER	VAPOR PRESSURE mm Hg @ TEMP		WEIGHT PERCENT
AROMATIC PETRO DISTILLATE (C8-C11)	64742-95-6	2.7mmHg	25 C	40 - 50%
PEL 100 ppm // LD50 4.7g/kg; LC50 3670 ppm/8hr				
ALIPHATIC PETRO DISTILLATE (C9 - C11)	64742-48-9	2.7	25 C	40 - 50%
PEL 100ppm; TLV 100ppm // LD50> 25ml/kg; LC50 700ppm/4hr				
DIPROPYLENE GLYCOL METHYL ETHER	34590-94-8	0.3mmHg	20 C	1 - 10%
PEL 100ppm; TLV 100ppm // LD50 7.5g/Kg				
1-METHYL-4-(1-METHYLETHENYL)CYCLOHEXENE	5989-27-5	1mmHg	20 C	1 - 10%
LD50 > 5g/kg				
SORBITAN MONOLEATE	1338-43-8	NO DATA	NO DATA	1 - 10%
LD50 > 15g/kg				

CAS# 64742-95-6 contains approximately 5% XYLENE (CAS# 1330-20-7) which has a PEL and TLV of 100 ppm; approximately 4% CUMENE (CAS# 98-82-8), which has a PEL and TLV of 50 ppm-skin; and approximately 2% 1,2,4 TRIMETHYLBENZENE (CAS# 95-63-7), which has a PEL and TLV of 25 ppm. XYLENE, CUMENE AND 1,2,4 TRIMETHYLBENZENE are subject to the reporting requirements of section 313 OF SARA TITLE III.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING POINT : 316 F
VAPOR DENSITY : 4.4 (air =1)
DRYING RATE : 0.29(nButyl Acet.=1)
PHOTOREACTIVE : YES
VOLATILES : 96%
PHYSICAL STATE : LIQUID
SPECIFIC GRAVITY (H2O=1): 0.82
VAPOR PRESSURE : 2.52 mmHg
VOC : 6.69 lb/gal METHOD: EPA #24
H2O SOLUBILITY : SLIGHT
APPEARANCE : YELLOW
ODOR : MODERATE

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT : 114 F METHOD USED: TCC
FLAMMABLE LIMITS IN AIR BY VOLUMES- LOWER: 0.5 UPPER: 6.1
EXTINGUISHING MEDIA: CARBON DIOXIDE, FOAM, OR DRY POWDER (WATER MAY BE INEFFECTIVE)
SPECIAL FIREFIGHTING PROCEDURES : KEEP CONTAINER COOL. CONTROL COOLING WATER SINCE IT MAY TEND TO SPREAD BURNING MATERIAL.
UNUSUAL FIRE AND EXPLOSION HAZARDS: IF BOILING POINT OF SOLVENT IS REACHED, THE CONTAINER MAY RUPTURE EXPLOSIVELY AND IF IGNITED, GENERATE A FIREBALL.

SECTION V - REACTIVITY DATA

STABILITY: YES IF NO CONDITIONS:
INCOMPATIBILITY (MATERIALS TO AVOID): YES IF YES WHICH ONES: STRONG OXIDIZER
HAZARDOUS DECOMPOSITION OR BYPRODUCTS: CARBON DIOXIDE, CARBON MONOXIDE ON IGNITION
HAZARDOUS POLYMERIZATION: NONE

SECTION VI - HEALTH HAZARD DATA

INDICATIONS OF EXPOSURE:
INHALATION HEALTH RISKS AND SYMPTOMS OF EXPOSURE: HEADACHE, DIZZINESS, NAUSEA. VERY HIGH LEVELS OF VAPORS COULD CAUSE UNCONSCIOUSNESS. SLIGHT IRRITATION OF THE MUCOUS MEMBRANE
EYE CONTACT AND SYMPTOMS OF EXPOSURE: REDNESS OR BURNING SENSATION.
SKIN HEALTH RISKS AND SYMPTOMS OF EXPOSURE: REDNESS, ITCHING, IRRITATION OR OVEREXPOSURE.

Exhibit 2-15
Current Automated Blanket Wash Used at The Castle Press

MATERIAL SAFETY DATA SHEET

AUTOWASH 6000

PRODUCT NAME: AUTOWASH 6000
PRODUCT CODE: A299
CHEMICAL NAME: BLANKET AND ROLLER WASH

HMIS CODES: H F R P
1 2 C E

SECTION I - MANUFACTURER IDENTIFICATION

MANUFACTURER'S NAME: PRINTERS' SERVICE
ADDRESS : 26 Blanchard Street
Newark, New Jersey 07105

EMERGENCY PHONE : 1-800-424-9300
INFORMATION PHONE : 1-973-589-7800

LAST REVISION : 8/02/2000
DATE REVISED : 09/22/00
PREPARER : ENVIRONMENTAL DEPT.

SECTION II - HAZARDOUS INGREDIENTS/SARA III INFORMATION

REPORTABLE COMPONENTS	CAS NUMBER	VAPOR PRESSURE mm Hg @ TEMP		WEIGHT PERCENT
ALIPHATIC PETRO DISTILLATE (C9 - C11) PEL 100ppm TLV 100ppm // LD50> 25ml/kg: LC50 700ppmv4hr	64742-48-9	2.7 mmHg	25 C	70 - 80%
* AROMATIC PETRO DISTILLATE (C8-C11) PEL 100 ppm // LD50 4.7g/kg: LC50 3670 ppm/8hr	64742-95-6	2.7mmHg	25 C	20 - 30%
NONYLPHENOXYPOLY(ETHYLENEOXY)ETHANOL LD50 2.4g/kg	9016-45-9	NO DATA	NO DATA	1 - 10%

* Indicates chemical(s) subject to the reporting requirements of section 313 of Title III and of 40 CFR 372. CAS# 64742-95-6 contains approximately 5% XYLENE (CAS# 1330-20-7) an HAP reportable which has a PEL and TLV of 100 ppm: approximately 4% CUMENE (CAS# 98-82-8), an HAP reportable which has a PEL and TLV of 50 ppm-skin: and approximately 27% 1,2,4 TRIMETHYLBENZENE (CAS# 95-63-6), which has a PEL and TLV of 25 ppm. XYLENE, CUMENE AND 1,2,4 TRIMETHYLBENZENE are subject to the reporting requirements of section 313 OF SARA TITLE III.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING POINT : 313 F
VAPOR DENSITY : 4.66 (air = 1)
DRYING RATE : .12(n-Butyl Acet.=1)
PHOTOREACTIVE : YES
VOLATILES : 98%
PHYSICAL STATE : LIQUID

SPECIFIC GRAVITY (H20=1): 0.78
VAPOR PRESSURE : 2.7 mmHg at 20 C
VOC : 6.48 lb/gl METHOD: EPA 24
H2O SOLUBILITY : SLIGHT
APPEARANCE : CLEAR
ODOR : SOLVENT ODOR

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT : 105 F METHOD USED: TCC
FLAMMABLE LIMITS IN AIR BY VOLUME- LOWER: 0.5 UPPER: 6.0
EXTINGUISHING MEDIA: CARBON DIOXIDE, FOAM, OR DRY POWDER (WATER MAY BE INEFFECTIVE)
SPECIAL FIREFIGHTING PROCEDURES : KEEP CONTAINER COOL. CONTROL COOLING WATER SINCE IT MAY TEND TO SPREAD BURNING MATERIAL.
UNUSUAL FIRE AND EXPLOSION HAZARDS: IF BOILING POINT OF SOLVENT IS REACHED, THE CONTAINER MAY RUPTURE EXPLOSIVELY AND IF IGNITED, GENERATE A FIREBALL.

SECTION V - REACTIVITY DATA

STABILITY: YES IF NO CONDITIONS: .
INCOMPATIBILITY (MATERIALS TO AVOID): YES
IF YES WHICH ONES: STRONG OXIDIZER
HAZARDOUS DECOMPOSITION OR BYPRODUCTS: CARBON DIOXIDE, CARBON MONOXIDE ON IGNITION
HAZARDOUS POLYMERIZATION: NONE

SECTION VI - HEALTH HAZARD DATA

INDICATIONS OF EXPOSURE:
INHALATION HEALTH RISKS AND SYMPTOMS OF EXPOSURE: HEADACHE, DIZZINESS, NAUSEA, VERY HIGH LEVELS OF VAPORS COULD CAUSE UNCONCIOUSNESS.
SLIGHT IRRITATION OF THE MUCOUS MEMBRANE
E CONTACT AND SYMPTOMS OF EXPOSURE: REDNESS OR BURNING SENSATION.
SKIN HEALTH RISKS AND SYMPTOMS OF EXPOSURE: REDNESS, ITCHING, IRRITATION ON OVEREXPOSURE.

Exhibit 2-16
Current Roller Wash Step 1 Cleaner Used at The Castle Press

MATERIAL SAFETY DATA SHEET

SUPERKLENE 1 IC-EXEMPT

PRODUCT NAME: SUPERKLENE 1 IC-EXEMPT
PRODUCT CODE: A222
CHEMICAL NAME: BLANKET AND ROLLER WASH (SHLS 1171-STEP1)

HMIS CODES: H F R
1 2 1

SECTION I - MANUFACTURER IDENTIFICATION

MANUFACTURER'S NAME: PRINTERS' SERVICE
ADDRESS : 26 Blanchard Street
Newark, New Jersey 07105

EMERGENCY PHONE : 1-800-424-9300
INFORMATION PHONE : 1-973-589-7800

LAST REVISION : 12/03/01
DATE REVISED : 01/24/02
PREPARER : ENVIRONMENTAL DEPT.

SECTION II - HAZARDOUS INGREDIENTS/SARA III INFORMATION

REPORTABLE COMPONENTS	CAS NUMBER	VAPOR PRESSURE mm Hg @ TEMP	WEIGHT PERCENT
ALIPHATIC PETROLEUM DISTILLATE	64742-88-7	0.5mmHg 20 C	60 - 70%
PEL 100ppm; TLV 100ppm // LD50> 25ml/kg; LC50> 700ppm/4hr			
DIETHANOLAMINE OLEATE	93-83-4	<0.1mmHg 20 C	10-20%
NO DATA			
AROMATIC PETROLEUM DISTILLATE (C9-C12)	64742-94-5	<1mmHg 20 C	1 - 10%
PEL 100ppm; TLV 100ppm // LD50 4.7g/kg; LC50 > 3470ppm/4hr			
TRIETHANOLAMINE BENZENE SULFONATE	1864-81-3	17.6mmHg 20 C	1 - 5%
NO DATA			

CAS# 64742-94-5 contains approximately 4% 1,2,4 TRIMETHYLBENZENE (CAS# 95-63-6), which has a PEL and TLV of 25 ppm and approximately 1% NAPHTHALENE (CAS# 91-20-3), an HAP reportable which has a PEL and TLV of 10 ppm. NAPHTHALENE and 1,2,4 TRIMETHYLBENZENE are subject to the reporting requirements of section 313 of SARA TITLE III.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING POINT : 212 - 360 F
VAPOR DENSITY : 2.4 (air = 1)
DRYING RATE : <0.1(nButyl Acet.=1)
PHOTOREACTIVE : NO
VOLATILES : > 70 % by weight
PHYSICAL STATE : LIQUID

SPECIFIC GRAVITY (H2O=1): 0.84
VAPOR PRESSURE : 11.2 mmHg(-H2O 0.53) at 20 C
VOC : 5.00 lb/gal METHOD: EPA 24
H2O SOLUBILITY : MISCIBLE
APPEARANCE : BROWN AND CLOUDY
ODOR : MILD SOLVENT

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT : 142 F METHOD USED: TCC
FLAMMABLE LIMITS IN AIR BY VOLUME- LOWER: 0.5 UPPER: 7.0
EXTINGUISHING MEDIA: CARBON DIOXIDE, FOAM, OR DRY POWDER (WATER MAY BE INEFFECTIVE)
SPECIAL FIREFIGHTING PROCEDURES : KEEP CONTAINER COOL. CONTROL COOLING WATER SINCE IT MAY TEND TO SPREAD BURNING MATERIAL.
UNUSUAL FIRE AND EXPLOSION HAZARDS: IF BOILING POINT OF SOLVENT IS REACHED, THE CONTAINER MAY RUPTURE EXPLOSIVELY AND IF IGNITED, GENERATE A FIREBALL.

SECTION V - REACTIVITY DATA

STABILITY: YES IF NO CONDITIONS: .
INCOMPATIBILITY (MATERIALS TO AVOID) : YES
IF YES WHICH ONES: STRONG OXIDIZER
HAZARDOUS DECOMPOSITION OR BYPRODUCTS: CARBON DIOXIDE, CARBON MONOXIDE, NITROGEN OXIDES, OXIDES OF SULFUR AND HYDROGEN SULFIDE ON IGNITION
HAZARDOUS POLYMERIZATION: NONE

SECTION VI - HEALTH HAZARD DATA

INDICATIONS OF EXPOSURE:
INHALATION HEALTH RISKS AND SYMPTOMS OF EXPOSURE: HEADACHE, DIZZINESS, NAUSEA. VERY HIGH LEVELS OF VAPORS COULD CAUSE UNCONSCIOUSNESS. SLIGHT IRRITATION OF THE MUCOUS MEMBRANE
EYE CONTACT AND SYMPTOMS OF EXPOSURE: REDNESS OR BURNING SENSATION.

Exhibit 2-17
Current Roller Wash Step 2 Cleaner Used at The Castle Press

MATERIAL SAFETY DATA SHEET

SUPERKLENE 2P

PRODUCT NAME: SUPERKLENE 2P
PRODUCT CODE: A315
CHEMICAL NAME: TWO STEP ROLLER WASH - SECOND STEP

HMIS CODES: H F R P
1*2 2 E

========== SECTION I - MANUFACTURER IDENTIFICATION ==========
MANUFACTURER'S NAME: PRINTERS' SERVICE
ADDRESS : 25 Blanchard Street
Newark, New Jersey 07105

EMERGENCY PHONE : 1-800-424-9300 DATE REVISED : 07/23/97
INFORMATION PHONE : 1-973-589-7800 NAME OF PREPARER : ENVIRONMENTAL DEPT.

========== SECTION II - HAZARDOUS INGREDIENTS/SARA III INFORMATION ==========

REPORTABLE COMPONENTS	CAS NUMBER	VAPOR PRESSURE mm Hg @ TEMP	WEIGHT PERCENT
AROMATIC PETRO DISTILLATE (C8-C11)	64742-95-6	2.7mmHg 25 C	50 - 60%
PEL 100 ppm // [illegible]			
ALIPHATIC PETRO DISTILLATE (C9 - C11)	64742-48-9	2.7 mmHg 25 C	40 - 50%
PEL 100ppm; TLV 100ppm // LD50> 25ml/kg; LC50 700ppm/4hr			

CAS# 64742-95-6 contains approximately 5% XYLENE (CAS# 1330-20-7) which has a PEL and TLV of 100 ppm; approximately 4% CUMENE (CAS# 98-82-8), which has a PEL and TLV of 50 ppm-skin; and approximately 27% 1,2,4 TRIMETHYLBENZENE (CAS# 95-63-7), which has a PEL and TLV of 25 ppm. XYLENE, CUMENE AND 1,2,4 TRIMETHYLBENZENE are subject to the reporting requirements of section 313 OF SARA TITLE III.

========== SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS ==========
BOILING POINT : 315 F
VAPOR DENSITY : 4.4 (air = 1)
DRYING RATE : 0.29(nBuAc=1) Acet.=1)
PHOTOREACTIVE : YES
VOLATILES : 100%
PHYSICAL STATE : LIQUID
SPECIFIC GRAVITY (H20=1): 0.83
VAPOR PRESSURE : 2.7 mmHg
VOC : 6.85 lb/gal METHOD: EPA #24
H2O SOLUBILITY : NONE
APPEARANCE : GREEN
ODOR : SOLVENT ODOR

========== SECTION IV - FIRE AND EXPLOSION HAZARD DATA ==========
FLASH POINT : 105 F METHOD USED: TCC
FLAMMABLE LIMITS IN AIR BY VOLUME- LOWER: 0.6 UPPER: 6
EXTINGUISHING MEDIA: CARBON DIOXIDE, FOAM, OR DRY POWDER (WATER MAY BE INEFFECTIVE)
SPECIAL FIREFIGHTING PROCEDURES : KEEP CONTAINER COOL. CONTROL COOLING WATER SINCE IT MAY TEND TO SPREAD BURNING MATERIAL.
UNUSUAL FIRE AND EXPLOSION HAZARDS: IF BOILING POINT OF SOLVENT IS REACHED, THE CONTAINER MAY RUPTURE EXPLOSIVELY AND IF IGNITED, GENERATE A FIREBALL.

========== SECTION V - REACTIVITY DATA ==========
STABILITY: YES IF NO CONDITIONS:
INCOMPATIBILITY (MATERIALS TO AVOID): YES IF YES WHICH ONES: STRONG OXIDIZER
HAZARDOUS DECOMPOSITION OR BYPRODUCTS: CARBON DIOXIDE, CARBON MONOXIDE ON IGNITION
HAZARDOUS POLYMERIZATION: NONE

========== SECTION VI - HEALTH HAZARD DATA ==========
INDICATIONS OF EXPOSURE:
INHALATION HEALTH RISKS AND SYMPTOMS OF EXPOSURE: HEADACHE, DIZZINESS, NAUSEA. VERY HIGH LEVELS OF VAPORS COULD CAUSE UNCONSCIOUSNESS SLIGHT IRRITATION OF THE MUCOUS MEMBRANE
EYE CONTACT AND SYMPTOMS OF EXPOSURE: REDNESS OR BURNING SENSATION.
SKIN HEALTH RISKS AND SYMPTOMS OF EXPOSURE: REDNESS, ITCHING. IRRITATION ON OVEREXPOSURE
INGESTION HEALTH RISKS AND SYMPTOMS OF EXPOSURE: SEVERE GASTROINTESTINAL IRRITATION, NAUSEA, VOMITING AND DIARRHEA.
EMERGENCY AND FIRST AID PROCEDURES
IF IN EYES: FLUSH WITH WATER FOR 15 MIN. LIFT UPPER AND LOWER EYE LIDS. SEE A DOCTOR
IF ON SKIN: WASH WITH SOAP AND WATER.
IF INHALED: REMOVE TO FRESH AIR. IF UNCONSCIOUS, USE ARTIFICIAL RESPIRATION
IF INGESTED: DO NOT INDUCE VOMITING. SEE DOCTOR IMMEDIATELY TO PUMP STOMACH.

75 percent Mirachem which was not aggressive enough. Finally, IRTA tested a blend of 50 percent acetone and 50 percent of a soy based cleaner and, according to the operator, this cleaner worked well. An MSDS for the soy based cleaner, called Soy Gold 2000, and for acetone are shown in Exhibits 2-18 and 2-19 respectively.

For the rollers, IRTA tested Mirachem Pressroom Cleaner which did not work well. IRTA also tested a soy based cleaner, called Soy Gold 2000, followed by a water rinse. This cleaner worked effectively. With further testing, however, the soy product did not rinse adequately. IRTA tested a blend of acetone with a mineral spirits/water emulsion but it did not clean adequately. Finally, IRTA tested another soy based cleaner, called Magic Wash 522C. With rinsing, this product cleaned well. An MSDS for this product is shown in Exhibit 2-20.

IRTA provided Castle with a week's supply of the blanket and roller wash that worked best for scaled up testing. After testing for that time frame, the blend of 50 percent acetone and 50 percent Soy Gold 2000 worked effectively as a blanket wash and the Magic Wash 522C worked effectively as a roller wash.

Castle uses 80 gallons per month of their current blanket wash. The cost of the blanket wash is $7.62 per gallon. On this basis, the annual blanket wash cost is $7,315. The company uses 12 gallons per month of each of the two roller washes. The cost of the two roller washes is $10.32 per gallon and $9.22 per gallon. The annual cost of the roller washes is $2,814. The total annual cost of the current cleaning materials is $10,129.

The cost of the alternative blanket wash, consisting of 50 percent acetone and 50 percent Soy Gold 2000 is estimated at $6 per gallon. Assuming the company would use the same amount of the new blanket wash as the current blanket wash, the annual cost of the alternative blanket wash would be $5,760. The cost of the Magic Wash 522C is about $20 per gallon. Again assuming the use would be the same as for the current roller washes, the annual cost of the alternative roller wash would be $5,760. The total cost for the new blanket and roller washes would amount to $11,520.

Table 2-7 shows the cost comparison for the current and alternative blanket and roller washes. The alternative blanket wash is lower cost than the current blanket wash but the cost of the alternative roller wash is higher than the cost of the current products. Conversion to the alternatives would increase the cleaning cost by 14 percent.

Table 2-7
Annualized Cost Comparison for The Castle Press

	Current Cleaners	Alternative Cleaners
Blanket Wash Cost	$7,315	$5,760
Roller Wash Cost	$2,814	$5,760
Total Cost	$10,129	$11,520

Exhibit 2-18
Alternative Soy Gold 2000 Blanket Cleaner Ingredient Tested at The Castle Press

SOYGOLD 2000 SOLVENT

MATERIAL SAFETY DATA SHEET

EMERGENCY PHONE: 913-599-6911 CHEMTREC: 800-424-9300

SECTION I-IDENTIFICATION

PRODUCT: SOYGOLD® 2000
CAS No.: 67784-80-9
CHEMICAL: Fatty acid methyl esters
SYNONYMS: Methyl esters of soybean oil

SECTION II-INGREDIENTS AND HAZARD CLASSIFICATION

TYPICAL COMPOSITION	CAS	%
Alkyl C_{16}-C_{18}-Methyl Esters	67784-80-9	97-99
Surfactant	9016-45-9	1-3

SARA HAZARD: TITLE III SECTION 313: Not listed FIRE (Section 311/312): None noted

SECTION III-HEALTH INFORMATION

EFFECTS OF OVEREXPOSURE
INHALATION: No known problems
INGESTION: LD_{50}>50ml/kg (albino rats)(similar products)
EYE CONTACT: Not classified as eye irritants
SKIN CONTACT: Not classified as a skin irritant or corrosive material

SECTION IV-OCCUPATIONAL EXPOSURE LIMITS

PEL: NO OSHA PEL TLV: NO ACGIH TLV

SECTION V-EMERGENCY FIRST AID PROCEDURE

FOLLOW STANDARD FIRST AID PROCEDURES
SWALLOWING: Call physician or poison control center.
SKIN CONTACT: Wash affected area.
EYE CONTACT: Flush eyes with cool water for at least 15 minutes. Do not let victim rub eyes.
INHALATION: Immediately remove victim to fresh air. Get medical attention immediately.

SECTION VI-PHYSICAL DATA

BOILING POINT: Over 600° F (315° C) at 760 mm Hg pressure
MELTING POINT: -1° C
VAPOR PRESSURE: 0.882 mm Hg at 25° C
SPECIFIC GRAVITY: 0.882 g/mL at 25° C
DIELECTRIC STRENGTH: >36.9
SOLUBILITY IN WATER: Negligible at room temperature
APPEARANCE AND COLOR: Light yellow to clear and liquid at room temperature
ODOR: Light vegetable oil odor

SECTION VII-FIRE AND EXPLOSION HAZARDS

FLASH POINT & METHOD USED: 425° F (218° C)(PMCC)
FLAMMABLE LIMITS: Not applicable
NFPA RATING: No NFPA rating

HMIS RATING: HEALTH: 0 FIRE: 1 REACTIVITY: 0

AEP 02003

SPECIAL FIRE FIGHTING PROCEDURES & PRECAUTIONS
Treat as oil fire. Use water spray, dry chemical, foam or carbon dioxide.

UNUSUAL FIRE & EXPLOSION HAZARDS
Rags soaked with any solvent present a fire hazard and should always be stored in UL listed or Factory Mutual approved, covered containers. Improperly stored rags can create conditions that lead to oxidation. Oxidation, under certain conditions can lead to spontaneous combustion. This product contains antioxidants to retard oxidation.

SECTION VIII-REACTIVITY

STABILITY:	Stable
HAZARDOUS POLYMERIZATION:	None likely
MATERIALS TO AVOID:	Strong oxidizing agents
HAZARDOUS DECOMPOSITION PRODUCTS:	CO_2, CO
CONDITIONS TO AVOID:	None known

SECTION IX-EMPLOYEE PROTECTION

CONTROL MEASURES:	Adequate ventilation
RESPIRATORY PROTECTION:	None required
PROTECTIVE CLOTHING:	No need anticipated
EYE PROTECTION:	None required

SECTION X-ENVIRONMENTAL PROTECTION

ENVIRONMENTAL PRECAUTIONS:	Avoid uncontrolled releases of this material into environment.
SPILL OR LEAK PRECAUTIONS:	Contain spilled material. Transfer to secure containers. Where necessary, collect using absorbent media.
WASTE DISPOSAL:	Dispose of according to federal, state and/or local requirements.

SECTION XI-REGULATORY CONTROLS

DOT CLASSIFICATION:	Class 55
DOT PROPER SHIPPING NAME:	Cleaning Compound, N.O.S.
OTHER REGULATORY REQUIREMENTS:	Listed in TSCA inventory

SECTION XII-PRECAUTIONS: HANDLING, STORAGE AND USAGE

No special precautions necessary.

SECTION XIII-DATE AND SIGNATURE

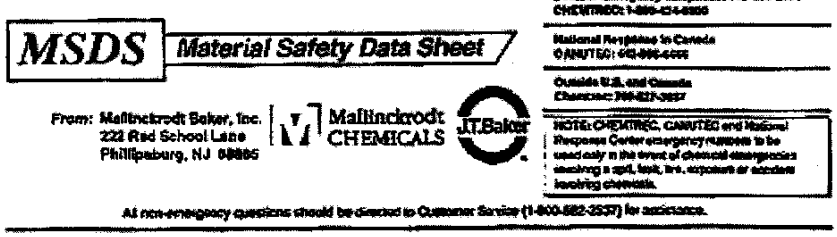
This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process. The stated MSDS is reliable to the best of the company's knowledge and believed accurate as of the date indicated. However, no representation, warranty or guarantee of any kind, expressed or implied, is made as to its accuracy, reliability or completeness and we assume no responsibility for any loss, damage or expense, direct or consequential, arising out of use. It is the user's responsibility to satisfy himself as to the suitableness and completeness of such information for his own particular use.

AG ENVIRONMENTAL PRODUCTS, L.L.C.
9304 PFLUMM
LENEXA, KS 66215

SIGNATURE: William A. Ayres

PREPARED BY: WILLIAM A. AYRES REVISION DATE: 5-01-01

Exhibit 2-19
Alternative Acetone Blanket Wash Ingredient Tested at The Castle Press



ACETONE

MSDS Number: A0446 — *Effective Date: 04/10/01*

1. Product Identification

Synonyms: Dimethylketone; 2-propanone; dimethylketal
CAS No.: 67-64-1
Molecular Weight: 58.08
Chemical Formula: (CH3)2CO
Product Codes:
J.T. Baker: 5356, 5580, 5805, 9001, 9002, 9003, 9004, 9005, 9006, 9007, 9008, 9009, 9010, 9015, 9036, 9125, 9254, 9271, A134, V655
Mallinckrodt: 0018, 2432, 2435, 2437, 2438, 2440, 2443, 2445, 2850, H451, H580, H981

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Acetone	67-64-1	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight

Flammability Rating: 4 - Extreme (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors irritates the respiratory tract. May cause coughing, dizziness, dullness, and headache. Higher concentrations can produce central nervous system depression, narcosis, and unconsciousness.
Ingestion:
Swallowing small amounts is not likely to produce harmful effects. Ingestion of larger amounts may produce abdominal pain, nausea and vomiting. Aspiration into lungs can produce severe lung damage and is a medical emergency. Other symptoms are expected to parallel inhalation.
Skin Contact:
Irritating due to defatting action on skin. Causes redness, pain, drying and cracking of the skin.
Eye Contact:
Vapors are irritating to the eyes. Splashes may cause severe irritation, with stinging, tearing, redness and pain.
Chronic Exposure:
Prolonged or repeated skin contact may produce severe irritation or dermatitis.
Aggravation of Pre-existing Conditions:
Use of alcoholic beverages enhances toxic effects. Exposure may increase the toxic potential of chlorinated hydrocarbons, such as chloroform, trichloroethane.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention.

5. Fire Fighting Measures

Fire:
Flash point: -20C (-4F) CC
Autoignition temperature: 465C (869F)
Flammable limits in air % by volume:
lel: 2.5; uel: 12.8
Extremely Flammable Liquid and Vapor! Vapor may cause flash fire.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. This material may produce a floating fire hazard. Sensitive to static discharge.

Fire Extinguishing Media:
Dry chemical, alcohol foam or carbon dioxide. Water may be ineffective. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB(R) solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Acetone:
-OSHA Permissible Exposure Limit (PEL):
1000 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
500 ppm (TWA), 750 ppm (STEL) A4 - not classifiable as a human carcinogen
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin

contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless, volatile liquid.
Odor:
Fragrant, mint-like
Solubility:
Miscible in all proportions in water.
Specific Gravity:
0.79 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
56.5C (133F) @ 760 mm Hg
Melting Point:
-95C (-139F)
Vapor Density (Air=1):
2.0
Vapor Pressure (mm Hg):
400 @ 39.5C (104F)
Evaporation Rate (BuAc=1):
ca. 7.7

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Concentrated nitric and sulfuric acid mixtures, oxidizing materials, chloroform, alkalis, chlorine compounds, acids, potassium t-butoxide.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Oral rat LD50: 5800 mg/kg; Inhalation rat LC50: 50,100mg/m3; Irritation eye rabbit, Standard Draize, 20 mg severe; investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Acetone (67-64-1)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material is expected to readily biodegrade. When released to water, this material is expected to quickly evaporate. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be moderately degraded by photolysis. When released into the air, this material is expected to be readily removed from the atmosphere by wet deposition.
Environmental Toxicity:
This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ACETONE
Hazard Class: 3
UN/NA: UN1090
Packing Group: II
Information reported for product/size: 350LB

International (Water, I.M.O.)

Proper Shipping Name: ACETONE
Hazard Class: 3
UN/NA: UN1090
Packing Group: II
Information reported for product/size: 350LB

15. Regulatory Information

Ingredient \Chemical Inventory Status - Part 1\	TSCA	EC	Japan	Australia

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Acetone (67-64-1)	Yes	Yes	No	Yes

Ingredient	-SARA 302- RQ	TPQ	-SARA 313- List	Chemical Catg.
Acetone (67-64-1)	No	No	Yes	No

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Acetone (67-64-1)	5000	U002	No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes
SARA 311/312: Acute: Yes Chronic: No Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2[Y]E
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: 1 Flammability: 3 Reactivity: 0
Label Hazard Warning:
DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.
Label First Aid:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
No changes.
Disclaimer:
****

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Exhibit 2-20
Alternative Roller Magic Wash 522C Cleaner Tested at The Castle Press

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Trade Name: MAGIC WASH 522C
Generic Name: Lithographic Press Wash

CAS #: Proprietary Blend

Manufacturer: Siebert, Inc.
Address: 8134 West 47th Street
City: Lyons State: IL Zip: 60534

Emergency phone#: (800) 535-5053
Technical phone#: (708) 442-2010

DOT Hazard Classification: Not Regulated
NFPA Codes: Health - 0 Flammability - 0 Reactivity - 0
HMIS Codes: Health - 1 Flammability - 0 Reactivity - 0 Personal Protection - B

II. HAZARDOUS INGREDIENTS

If present, IARC, NTP, and OSHA carcinogens and chemicals subject to the reporting requirements of SARA Title III Section 313 are identified in this section.

Ingredient Name	CAS Number	%wt	TLV	STEL	SARA TITLE III
Fatty esters	Various	70 to 90	None established	None established	No
Surfactants	Various	15 to 30	None established	None established	No

References: 29CFR 1910.1000, ACGIH "Threshold Limit Values for Chemicals in the Workplace", National Toxicology Program Annual Report, International Agency for Research on Cancer Monographs, and 40CFR Part 372. All components of this product are in compliance with TSCA

III. PHYSICAL DATA

Boiling Point @ 760 mm Hg:	308 - 335°F
Vapor Pressure @ 80°F:	<0.1 mm Hg
Specific Gravity @ 68°F:	0.92
Water Solubility (%):	Insoluble
Specific Vapor Density (air=1):	<1.0
% Volatile by Volume:	<2.0
% Volatile Organic Compound(s):	<2.0
Appearance:	Clear golden liquid
Odor:	Typical organic odor

IV. FIRE AND EXPLOSION DATA

Flash Point (Method): >300°F (TCC)
Explosive Limit: LEL - N/E UEL - N/E
Extinguishing Media: Water fog, carbon dioxide, or dry chemical.
Special Fire Fighting Procedures: Wear self-contained breathing apparatus when fighting chemical fires.
Unusual Fire and Explosion Hazards: Fine sprays/mists may be combustible at temperatures below normal flash point. Rags soaked with material, stored for a long period while mixed with strong alkali or acidic materials, may smolder, then smoke, and may even ignite.

V. HEALTH HAZARD DATA

Eyes - May cause temporary irritation, redness, tearing, blurred vision. Contact lenses must not be worn when possibility exists for eye contact due to spraying liquid or airborne particles.
Skin - Prolonged or repeated contact may cause irritation.

Breathing - Excessive inhalation of vapors may cause nasal and respiratory irritation, central nervous system effects including dizziness, weakness, fatigue, nausea, headache and possible unconsciousness.
Swallowing - Can cause gastrointestinal irritation, nausea, vomiting, and diarrhea.

First Aid/Emergency Procedures

Inhalation: Remove to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Keep person warm, quiet and get medical attention.
Skin Contact: Wash thoroughly with soap and water. Remove contaminated clothing. Launder contaminated clothing before re-use.
Eyes: Flush with copious amounts of water. Get medical attention.
Ingestion: Do not induce vomiting. If large quantity is swallowed, give lukewarm water (pint). NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. Get medical attention immediately. Risk of damage to lungs exceeds poisoning risk.
Primary Entry Route(s): Inhalation, skin contact.
Chronic Health Effects: Chronic overexposure may aggravate existing skin, eye and lung conditions.

VI. REACTIVITY DATA

Stability: Stable. Hazardous Polymerization: Cannot occur.
Incompatibilities: Avoid contact with strong oxidizing materials, strong alkalies, strong mineral acids.
Hazardous Decomposition Products: Carbon mono/di oxides.
Conditions to Avoid: None

VII. SPILL OR LEAK PROCEDURES

Procedures for Spill/Leak:

Eliminate all ignition sources (flares, flames including pilot lights, electrical sparks, etc.).

Small Spill - Absorb liquid on paper, vermiculite, floor absorbent, or other absorbent material and transfer to a recovery drum.

Large Spill - Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Stop spill at source, dike area of spill to prevent spreading, pump liquid to salvage tank. Remaining liquid may be taken up on sand, clay, earth, floor absorbent, or other absorbent material and shoveled into recovery drums. Prevent run-off to sewers, streams or others bodies of water. Notify proper authorities, as required, that a spill has occurred.

Waste Management:

Landfill solids at permitted sites. Use registrated transporters. Burn concentrated liquids at permitted sites. Avoid flameouts. Assure emissions comply with applicable regulations. Dilute aqueous waste may biodegrade. Avoid overloading/poisoning plant biomass. Assure effluent complies with applicable regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection:

If workplace exposure limit(s) of product is exceeded, a NIOSH/MSHA approved air supplied respirator is advised in the absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions. Engineering or administrative controls should be implemented to reduce exposure.

Ventilation: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain minimum exposure.
Eye Protection: Chemical Splash Proof Goggles and full face shield are advised for operations where eye or face contact can occur.
Gloves: Wear impervious gloves.
Other Protective Equipment: To prevent repeated or prolonged skin contact, wear impervious clothing and boots.

IX. SPECIAL PRECAUTIONS

MAGIC WASH 522C

Special Handling/Storage:

To avoid skin contact and ingestion, wash hands and face well before eating or smoking. Do not permit food in work area. Avoid breathing mists if generated. Store at room temperature. Reseal container when not in use. Do not store near acids, bases or flammable liquids. Containers of this material should be rinsed when emptied, since emptied containers retain product residues (vapor, liquid, and/or solid). All hazard precautions given in this data sheet must be observed.

As of the date of preparation of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state law(s). However, no warranty or representation with respect to such information is intended or given.

Date revised: 04/01/2001
jpm

Nelson Nameplate

Nelson Nameplate is located in Los Angeles, California. The company manufactures membrane switches and nameplates made of aluminum, stainless steel and brass. As part of the manufacturing process, Nelson has a lithographic printing operation.

IRTA started working with Nelson several years ago as part of a project sponsored by Cal/EPA's Department of Toxic Substances Control, the South Coast Air Quality Management District and U.S. EPA to test, demonstrate and evaluate cleaning alternatives. Nelson has two manual presses that print on metal and plastic, one sheet at a time. A picture of one of the presses is shown in Figure 2-7.

Figure 2-7. Press at Nelson Nameplate

Nelson historically used a roller wash called Hydro Clean which is an emulsion of water and mineral spirits. An MSDS for the product is shown in Exhibit 2-21. The Hydro Clean was used in a 50 percent blend with water. Nelson purchased 65 gallons of the Hydro Clean annually. The cost of the product is $10 per gallon. On this basis, the annual cost of using the Hydro Clean roller wash was $650. Nelson also used 125 gallons of a blanket wash cleaner each year. An MSDS for the blanket wash is shown is Exhibit 2-22. The price of the blanket wash, a blend of mineral spirits and acetone, is $8.25 per gallon. The annual cost of purchasing the blanket wash is $1,031. The total cost of on-press cleanup amounts to $1,681 per year.

Exhibit 2-21
Original Roller Cleaner Used at Nelson Nameplate

A.G. LAYNE, INC.

Shell Oil & Chemical Jobbers
LEE CHEMICAL CO.
4578 Brazil Street
Los Angeles, CA 90039
(323) 245-2346 • FAX (818) 242-7804

MATERIAL SAFETY DATA SHEETS

ISSUE DATE: 8/1/98 PAGE 1

Health Emergencies: Call Los Angeles Poison Information Center (24 hrs.):
(800) 777-0476 or (714) 634-5988 in Orange County

PRODUCT IDENTIFICATION

Product name: H Y D R O C L E A N
A Water-Activated Power Cleaner for Lithographic Presses

Generic Name: Water Miscible Solvent Blend
DOT Proper Shipping Name: Paint Related Material
ID Number: UN-1263
Classification: Combustible Liquid, PG III

SCAQMD INFORMATION

The VOC for This Product Before Adding Water is:
90% by Mass or
795 Grams/Liter or 6.62 Pounds/Gallon

VOC Composite Partial Pressure
(Vapor Pressure):
2.0 mm Hg @ 20 Degs. C

SECTION I - HAZARDOUS INGREDIENTS/EXPOSURE LIMITS

HAZARDOUS INGREDIENTS	CAS NUMBERS	TLV/PEL	UNITS	AGENCY	TYPE
This is an industrial product and should only be used or handled by trained personnel.					
MINERAL SPIRITS					
Hydrotreated Distillate, Light (Comparable to Stoddard Solvent)	64742-47-8	See Stoddard Solvent			
	8052-41-3	100	PPM	OSHA	TWA
		100	PPM	ACGIH	TWA
		100	PPM	MSHA	TWA
		200	PPM	MSHA	STEL
		100	PPM	CAL OSHA	TWA

SECTION 1 - CONTINUED - HAZARDOUS INGREDIENTS/EXPOSURE LIMITS

HAZARDOUS INGREDIENTS	CAS NUMBERS	TLV/PEL	UNITS	AGENCY	TYPE
75% AROMATIC HYDROCARBON	64742-95-6	NONE			
Xylene	1330-20-7	100	PPM	OSHA	TWA
		100	PPM	ACGIH	TWA
		150	PPM	ACGIH	STEL
		150	PPM	OSHA	STEL
		200	PPM	CAL OSHA	EXCUR
		100 SKIN	PPM	CAL OSHA	TWA
		300 SKIN	PPM	CAL OSHA	CEIL
		100	PPM	MSHA	TWA
1,3,5-Trimethylbenzene	108-67-8	No Exposure Limits Established			
1,2,4-Trimethylbenzene	95-63-6	No Exposure Limits Established			
Isopropylbenzene	98-82-8	50 SKIN	PPM	ACGIH	TWA
		50 SKIN	PPM	OSHA	TWA

SECTION 1A- This product contains the following chemicals subject to the reporting requirements of SARA 313 AND 40CFR 372.65:

Listed ingredients	CAS Numbers	Percent Range
Xylene	1330-20-7	2.20 %
1,2,4-Trimethylbenzene	95-63-6	11.0 %
Isopropylbenzene	98-82-8	1.65 %

SECTION 1B – SARA SECTIONS 311/312 HAZARD RATINGS

This product is rated as a fire hazard under the reporting requirements of SARA 311 and 312. The health hazard category for this product under SARA Sections 311/312 reporting meets both immediate (acute) and delayed (chronic) definitions. Discharge to the environment including the sewer may be reportable (under the regulations of CERCLA/DOT) to the National Response Center; (800) 424-8802. Protection of stratospheric ozone (pursuant to Section 611 of the Clean Air Act Amendments of 1990) per 40 CFR Part 82: This product does not contain nor was it directly manufactured with any Class I or Class II ozone-depleting substances.

CALIFORNIA PROPOSITION 65 WARNING

This product contains detectable amounts of substances known to the State of California to cause cancer, birth defects, or other reproductive harm.

SECTION II - EMERGENCY AND FIRST AID PROCEDURES

****EMERGENCY****
Have a physician call Los Angeles Poison Information Center (24hrs.): 800-777-6470
Orange County Poison Center: 714-634-5988

EYE CONTACT:

Move victim away from exposure and into fresh air. If irritation or redness develops, flush eyes gently with clean water and seek medical attention. For direct contact, hold eyelids apart and flush the affected eye(s) with clean water for at least 15 minutes--seek medical attention.

SKIN CONTACT:

Immediately flush affected area(s) with large amounts of water while removing contaminated shoes, clothing, and constrictive jewelry. If skin surface is damaged, apply a clean dressing and seek immediate medical attention. If skin surface is not damaged, cleanse the affected area(s) thoroughly by washing with mild soap and water. If irritation or redness develops, seek immediate medical attention.

INHALATION (BREATHING):

Immediately move victim away from source of exposure and into fresh air. If respiratory symptoms or other symptoms of exposure develop, seek immediate medical attention. If victim is not breathing, immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

INGESTION (SWALLOWING):

****SEEK EMERGENCY MEDICAL ATTENTION****If victim is drowsy or unconscious, place on left side with head down, and do not give anything by mouth. ***DO NOT INDUCE VOMITING***If vomiting occurs spontaneously, keep head below hips. Vomiting should only be induced under the direction of a physician or poison control center. Do not leave victim unattended.

SECTION III - HEALTH HAZARDS/ROUTES OF ENTRY

EYE CONTACT:

One or more components of this material is an eye irritant. Direct contact with the liquid or exposure to its vapors or mists may cause stinging, tearing, redness, and swelling

SKIN CONTACT:

One or more components of this material may cause skin irritation. Prolonged or repeated skin contact may cause redness, burning, drying and cracking of the skin, and skin damage. Please use protective gloves.

SKIN ABSORPTION:

Skin contact may be harmful. Contact may result in skin absorption. This material may be toxic when absorbed through the skin. Persons with pre-existing skin disorders or sensitive skin may be more susceptible to the effects of this material.

INHALATION (BREATHING):

Do not breathe vapors; use adequate ventilation.

This material has a low degree of toxicity by inhalation. Breathing high concentrations of vapors or mists may cause:

Irritation of the nose and throat.
Signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, fatigue, and nausea).

Prolonged or repeated exposure to vapors or mists may cause:

Liver and/or kidney damage.

Respiratory symptoms associated with pre-existing lung disorders (e.g., asthma-like conditions) may be aggravated by exposure to this material.

Refer to Section I for proper Threshold Limit Values (TLV).

SECTION III - CONTINUED - HEALTH HAZARDS/ROUTES OF ENTRY

INGESTION (SWALLOWING):

Ingestion of this material may cause irritation of the digestive tract, nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, and fatigue), nausea, vomiting, and diarrhea.

ASPIRATION HAZARD:

One or more components of this material can enter the lungs during swallowing or vomiting and cause lung inflammation, lung damage, or chemical pneumonia.

TARGET ORGAN EFFECTS/DEVELOPMENTAL INFORMATION/CANCER INFORMATION:

Pre-existing heart, blood, eye, skin, kidney, liver, lung or respiratory, spleen, or testis disorders may be aggravated by exposure to this material. This material (or a component) has been shown to lower activity of certain immune system cells in experimental animals. Exposure to this material (or a component) has been found to cause kidney damage in male rats. Overexposure to this material (or a component) has been suggested as a cause to the following in laboratory animals: liver abnormalities, blood abnormalities, cataracts, cardiac sensitization, hearing damage, kidney damage. The significance of these animal studies to human health is uncertain. Overexposure to this material (or a component) has been suggested as a cause to the following in humans: liver abnormalities. This material (or a component) has been shown to cause birth defects in laboratory animal studies. Harm to the fetus occurred only at exposure levels that harmed the pregnant animal. The significance of these animal studies to human development is uncertain. Based on available information, this material cannot be classified with regard to carcinogenicity. This material is not listed as a carcinogen by the International Agency for Research on cancer, the National Toxicology Program, or the Occupational Safety and Health Administration.

WARNING:

Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage (sometimes called Solvent or Painters' Syndrome). Intentional misuse by deliberately concentrating and inhaling the contents of this product may be harmful or fatal.

SECTION IV - SPECIAL PROTECTION INFORMATION

VENTILATION:

If current ventilation practices are not adequate to maintain airborne concentrations below established exposure limits (see Section I), additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used.

RESPIRATORY PROTECTION:

The use of respiratory protection is advised when concentrations exceed the established exposure limits (see Section I). Depending on the airborne concentration, use a respirator or gas mask with approved cartridges and canisters (NIOSH approved, if available) or supplied air equipment.

PROTECTIVE GLOVES:

The use of gloves impermeable to the specific material handled is strongly advised to prevent skin contact and possible skin irritation and damage.

EYE PROTECTION:

Approved eye protection to safeguard against potential eye contact, irritation, or injury is strongly recommended.

OTHER PROTECTIVE EQUIPMENT:

It is suggested that a source of clean water be available in the work area for flushing eyes and skin. Special safety stations and equipment are available for this purpose. Impervious clothing should be worn as needed.

SECTION V - REACTIVITY DATA

STABILITY:

This product is stable.

INCOMPATIBILITY (MATERIALS TO AVOID):

This product forms combustible and/or explosive mixtures with air and/or oxygen. This product is incompatible with oxidizing agents, strong acids or bases, or selected amines.

HAZARDOUS POLYMERIZATION:

Hazardous polymerization will not occur.

SECTION VI - SPILL OR LEAK PROCEDURES

PRECAUTIONS IN CASE OF RELEASE OR SPILL:

Keep all sources of ignition and hot metal surfaces away from spill/release. Stay upwind and away from spill/release. Isolate hazard area and limit entry to emergency crew. Stop spill/release if it can be done without risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section IV). Prevent spilled material from entering sewers, storm drains, other unauthorized treatment drainage systems, and natural waterways. Dike far ahead of spill/release for later recovery or disposal. Spilled material may be absorbed into suitable absorbent material. Immediate cleanup of any spill/release is recommended. Notify appropriate federal, state, and local agencies. Discharge to the environment including the sewer may be reportable (under the regulations of CERCLA/DOT) to the National Response Center; (800) 424-8802.

WASTE DISPOSAL METHOD:

Product waste is considered hazardous and must be disposed of in accordance with local, county, state, and federal regulations.

SECTION VII - STORAGE AND SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS:

Keep containers tightly closed. Keep containers cool, dry, and away from sources of ignition. Use and store this product with adequate ventilation. Avoid inhalation of vapors and personal contact with this product. Containers of this material may be hazardous when emptied. Since emptied containers retain product residue (vapor, liquid, or solid), all hazard precautions given in this MSDS must be observed. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose product containers to heat, flame, sparks, or other sources of ignition; they may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. Other containers should be disposed of in an environmentally safe manner and in accordance with government regulations. All five-gallon pails and larger containers must be grounded and/or bonded when transferring material. Hydrocarbon solvents are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, or pumping at high flow rates. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable and combustible liquids. To prevent "autoignition," any use of this product in an elevated temperature or pressure process should be thoroughly evaluated to establish and maintain safe operating conditions. **All of the information contained in these pages applies to rags, sponges, or other materials that are used to hold this material.**

SECTION VIII - FIRE AND EXPLOSION HAZARD DATA

NFPA HAZARD CLASS		HAZARD RANKING	HMIS HAZARD CLASS	
HEALTH HAZARD:	1	0 = LEAST	HEALTH HAZARD:	2
FLAMMABILITY:	2	1 = SLIGHT	FLAMMABILITY:	2
REACTIVITY:	0	2 = MODERATE	REACTIVITY:	0
OTHER:	---	3 = HIGH	PERSONAL PROTECTION:	B
		4 = EXTREME		
		B = GLASSES & GLOVES		

Lower - Upper Explosive Limit (% Vol.): Unknown

Est. Flash Point (Deg. Fahr.): 107

EXTINGUISHING MEDIA:

Extinguish with dry chemical, CO_2, or a universal type foam.

FIRE AND EXPLOSION HAZARDS:

This material is <u>combustible.</u> This material readily gives off vapors that may travel long distances from their source by air currents or by ventilation equipment. These vapors may be ignited by heat, flame, spark, smoking, electric motors, or other sources of ignition far from their source. If container is not properly cooled, it may explode in the heat of a fire.

FIRE FIGHTING PROCEDURES:

Wear a SCBA with a full facepiece operated in the positive pressure demand mode with appropriate turnout gear and chemical resistant personal protective equipment. Water spray may be useful in minimizing vapors and cooling containers exposed to heat and flame. Avoid spreading burning liquid with water used for cooling purposes. Vapors are heavier than air and will collect in low areas. Vapors may travel by air currents and ignite at a distance from container or spill.

SECTION IX - PHYSICAL DATA

<u>APPROXIMATE BOILING POINT (Initial):</u>
307 - 389 Degrees F.

<u>RELATIVE EVAPORATION RATE (N-Butyl Acetate=1):</u>
.30 (Approximate)

<u>VAPOR PRESSURE:</u>
2.6 mm Hg @ 20 Degrees C

<u>VAPOR DENSITY (Air = 1):</u>
4.8 (Heavier Than Air)

<u>SPECIFIC GRAVITY:</u>
.827

<u>SOLUBILITY IN WATER:</u>
Slight

<u>ODOR:</u>
Characteristic Solvent Odor

<u>APPEARANCE:</u>
Clear, light-colored, mobile liquid

Disclaimer of Expressed and Implied Warranties

The information in this document has been carefully prepared and is believed to be correct as of the date issued. Because Star Products, Dist'rs., does not make its products, qualified experts from the chemical suppliers and manufacturers to Star Products, Dist'rs., furnished the information and opinions expressed herein. No warranty of merchantability, fitness for any particular purpose, or any other warranty is expressed or is implied regarding the accuracy or completeness of this information, the results obtained from the use of this information and the product, or the safety of this product and the hazards related to its use. This information and the product are furnished on the condition that the person(s) receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use thereof. Please study this Material Safety Data Sheet carefully and become aware of the information it contains. There are specific federal laws on the responsibilities of purchasers and users of chemicals.

Exhibit 2-22
Original Blanket Cleaner Used at Nelson Nameplate

LOW VOC 1.68 BLANKET WASH

A. G. Layne, Inc.

MATERIAL SAFETY DATA SHEET

Date Prepared: August 10, 1996

NFPA Ratings:

H	F	R	S
1	3	0	--

Material Safety Data Sheet

SECTION I - COMPANY IDENTIFICATION

Manufacturer:
A. G. Layne, Inc.
4578 Brazil Street
Los Angeles, California 90039

Telephone Numbers:
Office (213) 245-2345
24 Hour Emergency Contact:
Chemtrec (800) 424-9300

SECTION II - HAZARDOUS INGREDIENTS

OSHA Hazardous Components (29 CFR 1910.1200)		EXPOSURE LIMITS: 8 HR. TWA OSHA PEL	ACGIH TLV
Acetone	(CAS# 67-64-1)	750 ppm	750 ppm
Vent Naphtha, light aliphatic	(CAS# 64742-89-8)	300 ppm*	300 ppm*
Xylene	(CAS# 1330-20-7)	100 ppm	100 ppm
Solvent Naphtha, light aromatic	(CAS# 64742-95-6)		
1,2,4-Trimethylbenzene	(CAS# 95-63-6)	25 ppm	25 ppm

*recommend exposure limits of VM&P Naphtha as guideline

SECTION III - HAZARDS IDENTIFICATIONS

EMERGENCY OVERVIEW: **DANGER!** High exposures can cause nausea, vomiting, narcosis, and central nervous system (CNS) depression. Liquid may irritate skin and eyes. Mist may irritate mucous membranes and respiratory system.

POTENTIAL HEALTH EFFECTS:

INHALATION: Inhalation of high vapor concentrations may cause central nervous system (CNS) depression. Symptoms of CNS depression include: giddiness, headache, dizziness, and nausea; in extreme cases unconsciousness and death may occur. Aspiration of the liquid must be avoided as even small quantities may result in aspiration pneumonitis.

EYE CONTACT: Liquid severely irritates the eyes. High vapor concentrations irritate the eyes. Preexisting eye disorders may be aggravated by exposure.

SKIN CONTACT: Liquid irritates the skin. Prolonged contact can cause defatting and drying of the skin. Preexisting skin disorders may be aggravated by exposure.

INGESTION: Ingestion may cause vomiting and central nervous system (CNS) depression. Symptoms of CNS depression include: giddiness, headache, dizziness, and nausea; in extreme cases unconsciousness and death may occur.

CHRONIC: None known.

CARCINOGENICITY: LISTED IN NTP? No IARC? No OSHA Regulated? No

SECTION IV - FIRST AID MEASURES

INHALATION: Remove to fresh air. Supply oxygen if breathing is difficult. If not breathing, apply artificial respiration. Get medical attention.

EYE CONTACT: Flush with large amounts of running water for 15 minutes, while holding eyelids open. Get medical attention.

SKIN CONTACT: Remove contaminated clothing or shoes. Flush skin with water. Follow by washing with soap and water. Seek medical advice if irritation develops.

INGESTION: Do NOT induce vomiting. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into lungs. Get medical attention immediately.

SECTION V - FIRE FIGHTING MEASURES

Flashpoint (Method): 0° F (Flashpoint of lowest flashing component)
Flammable Limits: Lower: NE Upper: NE
Autoignition Temperature: NE

GENERAL HAZARD: DANGER! Extremely flammable. Clear area of unprotected personnel and isolate. Vapors are denser than air, flashback along vapor trail may occur. Vapor may explode if ignited in enclosed space. Product components will float and can be reignited on surface of water.

FIRE FIGHTING INSTRUCTIONS: Approach fire from upwind side. Avoid breathing smoke, fumes, mist, or vapors. Firefighters wear protective clothing, and self contained breathing apparatus.

EXTINGUISHING MEDIA: Use extinguishing media such as foam, dry chemical, carbon dioxide, or water fog. Water in straight hose stream may scatter product and spread the fire. Cool containers exposed to heat with water to prevent vapor pressure buildup leading to container rupture.

HAZARDOUS COMBUSTION PRODUCTS: Acrid smoke, irritating fumes, carbon monoxide, carbon dioxide and unidentified organic compounds

SECTION VI - ACCIDENTAL RELEASE MEASURES

DANGER! Extremely flammable. Keep unnecessary and unprotected people away. Isolate hazard area. Eliminate all ignition sources. Handling equipment should be grounded to prevent sparks. Stay upwind.

LARGE SPILL: Wear appropriate respirator and protective clothing. Shut off source of leak if safe to do so. Dike and contain. Water fog may be useful in suppressing vapor cloud. Keep spills and cleaning runoff out of municipal sewers and open waterways. Collect free product with vacuum truck or pump to storage container. Absorb residue with inert material, then place waste in a chemical waste container for disposal. Flush area with water to remove trace residue; dispose of flush solution as above.

SMALL SPILL: Absorb product with inert material, then place waste in a chemical waste container for disposal. Seal waste container for proper disposal.

SECTION VII - HANDLING AND STORAGE

Keep liquid away from heat, sparks, and flame. Static electricity may accumulate and create a fire hazard. Ground fixed equipment. Bond and ground transfer containers and equipment.

Use with adequate ventilation. Prevent vapor accumulation. Keep containers closed when not in use. Containers, even emptied, will retain product residue and can contain explosive vapors. Do not cut, drill, grind, weld or perform similar operations on or near containers. Do not pressurize containers to empty them.

Avoid prolonged or repeated breathing of mist or vapors. Do not get into eyes or on skin. Do not swallow. Wash hands thoroughly after handling material and before eating, drinking, smoking, or using restroom facilities.

Store in a cool, dry place away from oxidizers and oxidizing agents.

SECTION VIII - EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Explosion - proof ventilation is recommended.

PERSONAL PROTECTION: Not normally needed under proper conditions of use and storage. If exposure may or does exceed occupational exposure limits use a NIOSH approved respirator.

PROTECTIVE CLOTHING: Avoid contact with eyes; use chemical goggles to protect eyes if contact is likely. Wear chemical resistant gloves and other clothing as required to minimize contact. Air dry contaminated clothing in well-ventilated space, then launder before reusing.

SECTION IX - PHYSICAL AND CHEMICAL PROPERTIES

Vapor Pressure:	160 mm Hg @ 100°F (est.)	**Vapor Density (Air=1):**	>2
Specific Gravity:	0.8	**Evaporation Rate**	
Solubility in Water:	NE	**(n-Butyl Acetate=1):**	NE
pH:	NE	**Freezing Point:**	NE
Boiling Point:	NE	**VOC:**	1.6 lb./gal. (calc.)

Appearance & Odor: Clear, colorless liquid with hydrocarbon odor.

SECTION X - STABILITY AND REACTIVITY

GENERAL: Stable

INCOMPATIBLE MATERIALS: Strong oxidizing agents.

CONDITIONS TO AVOID: Avoid heat, sparks and flame. Avoid vapor accumulation.

HAZARDOUS POLYMERIZATION: Will not occur.

LOW VOC 1.68 BLANKET WASH

SECTION XI - TOXICOLOGICAL INFORMATION

Acetone	CAS#	67-64-1	TD_{LO}: 2857 mg/kg (oral - man) TD_{LO}: 10 mg/m^3/6h (inhalation - man)
Solvent Naphtha, light aliphatic	CAS#	64742-89-8	LD_{50}: >8 ml/kg (oral - rat)
Xylene	CAS#	1330-20-7	LD_{50}: 4.3 g/kg (oral - rat)
Solvent naphtha, light aromatic	CAS#	64742-95-6	LD_{50}: 4.7 g/kg (oral - rat)

SECTION XII - ECOLOGICAL INFORMATION

Acetone	CAS#	67-64-1	14,250 ppm/24 h/sunfish/lethal/tap water 13,000 ppm/48 h/mosquito fish/TL_m/turbid water
Xylene	CAS#	1330-20-7	22 ppm/96 hr/bluegill/TL_m/fresh water Solvent

SECTION XIII - DISPOSAL CONSIDERATIONS

Classification and documentation is required before disposing of this product. If the product becomes a waste material, it may be an ignitable hazardous waste.

Follow all local, state, and federal regulations regarding proper disposal.

SECTION XIV - TRANSPORTATION INFORMATION

PROPER SHIPPING NAME: Flammable Liquids, n.o.s., (Acetone, Petroleum Distillates), 3, UN1993, PG II

HAZARD CLASS: 3

IDENTIFICATION NUMBER: UN1993

DOT Emergency Guide #: 128

Reportable Quantity (RQ): 5000 lb. acetone

SECTION XV - REGULATORY INFORMATION

TSCA (Toxic Substance Control Act):
The components of this product are listed on the TSCA Inventory.

CERCLA (Comprehensive Environmental Response, Compensation and Liability Act):
Reportable quantity from release or spill: 5000 lb. acetone

CWA (Clean Water Act, Section 311):
Components of this product are considered oils. Spills into or leading into surface waters that cause a sheen must be reported to the National Response Center, (800) 424-8802

SARA TITLE III (Superfund Amendments and Reauthorization Act):

311/312 Hazard Categories: acute, chronic, ignitable

313 Reportable Ingredients: Xylene (CAS# 1330-20-7) - 1-2%
1,2,4-Trimethylbenzene (CAS# 95-63-6) - 2%

STATE REQUIREMENTS:

Benzene (CAS# 71-43-2), Cumene (CAS# 98-82-8), Toluene (CAS 108-88-3), Acetone (CAS# 67-44-1), and Xylene (CAS# 1330-20-7) are regulated by CA, CT, FL, IL, LA, MA, ME, MN, NJ, PA, and RI. Other states may also have special requirements. This product contains less than 10 ppm benzene and less than 0.3% cumene.

1,2,4-trimethylbenzene (CAS# 95-63-6) is regulated by CA, MA, MN, PA, and NJ. Other states may also have special requirements.

Other components of this product may be also be subject to state regulations. For details on specific state requirements, contact the appropriate agency in your state.

CALIF. PROP. 65: This product contains the following chemicals known to the State of California to cause cancer, birth defects, and/or reproductive harm: Benzene.

SECTION XVI - OTHER INFORMATION

PREPARED BY: TALEM, Inc. - Engineering & Consulting Services (817) 335 - 1186
INFORMATION SUPPLIED BY: A. G. Layne, Inc.
PREPARATION DATE: 08/96
REVISED 9/96: Section XIV - Proper Shipping Name

FOOTNOTES:
NA - Not Applicable NE - Data Not Established CS - Cancer Suspect Agent OX - Oxidizer ND - No Data Cor - Corrosive
CALC - Calculated EST - Estimated STEL - Short Term Exposure Limit TLV - Threshold Limit Value
PEL - Permissible Exposure Limit TWA - Time Weighted Average, 8 hours

THE INFORMATION RELATES TO THIS SPECIFIC MATERIAL. IT MAY NOT BE VALID FOR THIS MATERIAL IF USED IN COMBINATION WITH ANY OTHER MATERIALS OR IN ANY PROCESS. IT IS THE USER'S RESPONSIBILITY TO SATISFY ONESELF AS TO THE SUITABILITY AND COMPLETENESS OF THIS INFORMATION FOR HIS OWN PARTICULAR USE. NEITHER THE SELLER NOR PREPARER MAKES ANY WARRANTIES, EXPRESS OR IMPLIED, CONCERNING THE INFORMATION PRESENTED.

IRTA tested a variety of roller wash alternatives at Nelson. IRTA tested Mirachem, a water based cleaner used by a few newspapers but this cleaner was not effective. Nelson uses a soy based ink so IRTA tested a variety of different soy based cleaners. Although the soy based cleaners cleaned the ink effectively, a residue that could not be removed with even several water rinses remained. IRTA also tested blends of the soy based products with other components that might aid in the rinsing but, in all cases, there was a residue that did not allow the quality printing Nelson requires. IRTA then began testing a series of blends of acetone with Hydro Clean, the cleaner used by Nelson for many years. The roller wash that was most effective is a blend of 25 percent acetone, 12.5 percent Hydro Clean and 62.5 percent water. Nelson used 26 gallons of roller wash composed of 65 gallons of Hydro Clean and 65 gallons of water. Assuming 130 gallons of the new roller wash are required and that the cost of the alternative is $2.25 per gallon, the cost of using the alternative is $293 per year.

IRTA also tested a variety of different formulations that might serve as an alternative blanket wash. Because Nelson used a blend of mineral spirits and acetone, IRTA focused on similar blends that had a lower VOC content. The blanket wash that appeared to be effective is a blend of 89 percent acetone and 11 percent of a mineral spirits. An MSDS for this material is shown in Exhibit 2-23. The price of this blend is $5.84 per gallon. On this basis, assuming the same usage as the original blanket wash, the cost of using the alternative blanket wash is $730 per year.

Table 2-8 shows the annualized cost comparison of using the original blanket and roller wash and the new blanket and roller wash. The figures show that the cost of using the alternative cleaners is lower than the cost of using the original cleaners by about 39 percent.

Table 2-8
Annualized Cost Comparison for Nelson Nameplate

	Original Cleaners	Alternative Cleaners
Blanket Wash Cost	$1,031	$730
Roller Wash Cost	$650	$293
Total Cost	$1,681	$1,023

The Dot Printer

The Dot Printer is located in Irvine, California. The company is a commercial lithographic printer that prints high quality posters and the Thomas Guide. Dot has three six-color sheet fed presses that use an air dry ink and two web presses that use a heat set ink.

IRTA began working with Dot in 2003 as part of a project sponsored by Cal/EPA's Department of Toxic Substances Control, the South Coast Air Quality Management District and U.S. EPA to test, demonstrate and evaluate cleaning alternatives. IRTA

Exhibit 2-23
Alternative Acetone/Mineral Spirits Blanket Cleaner Used at Nelson Nameplate

MATERIAL SAFETY DATA SHEET
RHO-CHEM CORPORATION

(A Fully Owned Subsidiary of Philip Services Corporation)
425 Isis Avenue, Inglewood, California – 90301
Tel.: (323)776-6233, Fax: (310)645-6379

Product : Rhosolv-7248, Revision- Initial Release/10-21-2004

1. **COMPANY AND MATERIAL IDENTIFICATION :**

Product Name/Number	:	Rho-Solv 7248
Synonyms	:	N. A.
Chemical Family	:	Flammable Solvent Blend
Stock Number	:	Technical Grade –7248 Electronic/Semiconductor Grade – N. A. Reconstituted Grade – N.A. ACS Reagent Grade – N.A.

2. **COMPOSITION OF THE MATERIAL: MIXTURE**

Chemical Name	CAS No.	% Concentration
Acetone	67-64-1	70 – 90%
Naphtha (light aliphatic)	64742-89-8	< 10%
Naphtha (light aromatic)	64742-95-6	< 10%

3. **HAZARDS IDENTIFICATION :**

EXTREMELY FLAMMABLE LIQUID & VAPOR. MAY CAUSE FLASH FIRE.

Inhalation:
High concentration of vapors will be irritating to the respiratory tract and may cause dizziness, headache, and dizziness Central Nervous System effects & possibly death.

Ingestion:
Ingestion of larger amounts may produce abdominal pain, nausea and vomiting. Aspiration into lungs can cause lung damage.

Skin Contact:
May cause some irritation, drying, redness or cracking to skin

Eye Contact:
Vapors may be irritating to eyes. Splashing may cause redness and pain to eyes.

Symptoms & Signs to Exposure:
Basically, same symptoms and signs will occur, as given above.

Medical Conditions Aggravated:
Pre-existing medical conditions of the Respiratory System, Skin dermatitis and Eyes may be aggravated by further exposure to this material.

4. FIRST AID :

Inhalation:
Remove the person to fresh air. If no improvement noticed, then transport to the nearest medical care facility for further treatment.

Ingestion:
If swallowed, do not induce vomiting. transport to the nearest medical care facility for further treatment.

Skin Contact:
Remove contaminated clothing. Flush exposed area with water followed by washing with soap.

Eye Contact:
Flush eyes with water with eyelids open. Rest eyes for 30 minutes. If redness, burning, blurred vision , or swelling persist, transport to the nearest medical care facility for further treatment.

Advice to Physician:
Causes CNS depression. Prolonged or repeated exposure may result in dermatitis.

5. FIRE FIGHTING MEASURES :
Clear the area of all non-emergency, un-protected personnel.

Ingredient	Flash Point	U.F.L.	L.F.L.	Auto Ignition Temp.
Acetone	-20° C – CC	12.8	2.5	465° C (869° F)
Naphtha (aliphatic)	14-18° C-CC	0.7	0.9	Not available
Naphtha (aromatic)	40-47° C –CC	0.1	0.6	Not available

Specific Hazards:
Carbon Monoxide may be evolved in case of incomplete combustion. Will float on the surface water and can be re-ignited. Containers exposed to intense heat from fires should be cooled with water to prevent vapor pressure buildup, which could result in container rupture. Containers exposed to direct flame should be cooled with large quantities of water as needed to prevent weakening of container structure or rupture.
Extinguishing Media:
Use water, foam dry chemical or Carbon dioxide, sand or earth may be used in case of small fires. The extinguishing water must be collected separately and disposed of as a waste. At no instance, this contaminated water will be discharged to the environment or into sewage, city or

municipal waters. Material can accumulate static discharge. Empty containers still retain residue, a liquid & or vapor mixture.

Protective Equipment:
Wear full protective clothing and Self contained breathing apparatus for large spill/fire.

6. **ACCIDENTAL RELEASE MEASURES**
Observe all relevant local, State, Federal and International regulations as applicable.

Protective measures:
Avoid contact with spilled or released material. Immediately remove all contaminated clothing. For guidance on selection of personal protective equipment, please refer to section 8 and for disposal of spilled material refer to section 13 of this MSDS. Shut off leaks, if no risk is involved. Eliminate all possible ignition sources in surrounding area. Use appropriate containment methods to avoid further contamination to environment and to neighboring areas. Avoid spreading or entering the spilled material into the drains, ditches or rivers by using sand, earth or other appropriate barriers. Attempt to Disperse the vapors to divert its flow to a safe location, by using fog sprays, for example. Take precautionary measures against static discharge. Ensure electrical continuity by bonding and grounding all equipment. Monitor area with combustible gas indicator. A leaking drum or container can be rolled or made up side down in the direction opposite to the leaking spot

Clean Up Methods:
For small liquid spills (< 1 drum of 55 gal), transfer to a labeled, seallable container by mechanical means for safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely.
For large liquid spills (> 1 drum of 55 gal), transfer by mechanical means such as vacuum truck to a salvage tank for safe disposal. Retain as a contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.

Additional Information:
Notify appropriate authorities if there is a risk involved to the general public or to the environment or to the neighborhood due to the spill or release of this material. Vapor may form ~~an explosive mixture with air. Please report to the National Response Center @ (800)424-8802~~ if the spilled quantity exceeds the reportable quantity. (Refer to chapter 15 of this MSDS. Required under CERCLA (Comprehensive Environment Response, Compensation & Liability Act).

7. HANDLING AND STORAGE

General Precautions :
Avoid breathing of or contact with material. Only use in well ventilated areas. Wash thoroughly after handling. Use appropriate P.P.E. per section 8 of this MSDS.

Handling:
Handle and open the container with CARE in well ventilated area. Remove ignition sources. Avoid sparks. **Do not create friction.** Keep container closed, to avoid emissions and inhalation. Avoid any force opening, creating friction. Avoid contact with skin, eyes and clothing. **Ensure electrical continuity by bonding and grounding all equipment**. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (<=1 m./sec until fill pipe is submerged to twice its diameter, then <= 7 m/sec.) Avoid splash filling. Do not use compressed air for filling, discharging or handling operations. The vapor is heavier than air spreads along the ground and distant ignition is possible. Extinguish any naked flames. Do not smoke. Ventilate workplace in such a way that the Occupational Exposure Limit (OEL) is not exceeded. Do not empty into drains. **Avoid handling above its flash point**, otherwise the product will form flammable/explosive vapor-air mixtures.

Storage:
Must be stored in a diked (bunded) well-ventilated area, away from sunlight, ignition sources and other sources of heat. Store at ambient temperature. Keep away from aerosols, oxidizers, corrosives.

Product Transfer:
Keep containers closed when not in use. Do not use compressed air for filling. Discharging or handling.

Recommended Materials:
For containers or container linings, use mild steel or Stainless steel. For container paints, use epoxy paint, zinc silicate paint.

Unsuitable Materials:
Avoid prolonged contact with natural, butyl or nitrile rubbers.

Container Recommendation :
Emptied containers may still contain explosive vapors. Do Not cut, drill grind or perform similar operations on or near containers Do not re-use empty containers without commercial cleaning or reconditioning.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

Following table may be referred in absence of occupational standards for this material.

Material	Source	Type	PPM	mg/m^3
Acetone	OSHA	TWA	1000	----
	Cal/OSHA	TWA	750	1780
	Cal/OSHA	STEL	1000	2400
	ACGIH	TWA	500	N.A
	ACGIH	STEL	750	N.A
Naphtha-aliphatic	OSHA	TWA	300	1,350
	Cal/OSHA	TWA	400	1,800
	ACGIH	TWA	300	N.A.
Naphtha-aromatic	OSHA	TWA	100	400
	Cal/OSHA	TWA	100	400
	ACGIH	TWA	400	N.A.

General Information:
Wash hands before eating, drinking, smoking and using toilet.

Exposure Control:

The levels of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local environment. Ensure adequate ventilation to control airborne concentration, below the exposure guidelines/limits. Eye washes and showers must be used in case of an emergency.

Personal Protective Equipment:
Use Personal Protective Equipment (P.P.E.) that are NIOSH approved and/or recommended per National Standards.

Respiratory Protection:
If an engineering control fail to maintain airborne concentrations to a level which is safe to protect workers' health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Also check with the Respiratory Protective Equipment suppliers and refer to the OSHA Respiratory Standard 1910.134 for detailed information. When air purifying respirator is required, select appropriate respirator and filters suitable for organic gases and vapors. Where air purifying respirators are un-suitable, for example airborne concentration is high, or oxygen is deficient, confined space etc., use appropriate positive pressure, breathing apparatus. For regular handling, full face respirator With organic vapor cartridges is recommended in order to protect the face from splashes.

Hand Protection:
Nitrile rubber gloves give good chemical resistance and can be used for regular use.
In case of direct incidental contact, splash, clean up etc., PVC or Neoprene rubber gloves should be used.

Eye Protection:
Chemical Splash goggles (Chemical mono-goggles) should be used

Protective Clothing:
Use chemical resistant clothing, chemical resistant shoes or boots.

Environmental Exposure Controls:
Follow and comply with the local, state and federal guidelines for V.O.C. emission control limits, and for the discharge of exhaust air containing vapors of this material.

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9. **PHYSICAL AND CHEMICAL PROPERTIES of Acetone, being a major component in this mixture.**

Appearance	:	Colorless volatile liquid
Odor	:	Distinct fragrant odor
Boiling point	:	56.5° C (133° F) @ 760 mm Hg
Vapor Pressure	:	400 @ 39.5°C (104°F)
Specific Gravity	:	0.79 @ 20°C
Water Solubility	:	Miscible in water
Vapor density (air =1)	:	2.0 (Air =1)
Volatile Organic Compound	:	100 %

---

10. **STABILITY AND REACTIVITY**

Stability:
Stable under normal conditions of use.
Conditions to Avoid:
Avoid heat, sparks, open flames and other ignition sources.
Materials to Avoid:
Strong Oxidizing agents, Conc. Nitric or Sulfuric acid, halogenated compounds
Hazardous Decomposition Products:
Will not occur.

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11. TOXICOLOGICAL INFORMATION

Basis of Assessment:
The information given herein is based on similar products, and or compounds.

Acetone:
Oral Toxicity: LD50: 5800 mg/kg , rat

Inhalation Toxicity: LC50 : 5, 100 mg/m^3

Carcinogenicity: Not classified as a human carcinogen by ACGIH or IARC.

Naphtha solvents:
Oral Toxicity: LD50: >2000 mg/kg , rat

Inhalation Toxicity: LC50 : > 5, 000 p.p.m. / 1hour

Carcinogenicity: Not classified as a human carcinogen by ACGIH or IARC.

12. ECOLOGICAL INFORMATION

Acetone: CAS # 67-64-1
Acetone Is not expected to be toxic to aquatic life.

Environmental Toxicity:	Less toxic: LC50/96 – hour - > 100 mg/l
Mobility:	Will quickly evaporate from water, will evaporate if released to soil.
Bioaccumulation:	Does not bio-accumulate significantly.
Persistence/degradability:	Moderately bio-degradable, by reaction with photo-chemically produced hydroxyl radicals.

Naphtha (Aromatic) CAS # 64742-95-6

Fish, Algae & Aquatic Invertebrates:	1 < LC/EC/IC50 < = 10 mg/l
Mobility:	Low mobility. Absorbs to soil, floats on water
Persistence/degradability:	Expected to be readily biodegradable.
Bio-accumulation:	Has the potential to bioaccumulate

13. DISPOSAL METHODS

Material Disposal:
Recover or recycle if possible. It is the responsibility of a waste generator to determine the extent of hazard, and physical properties of the material generated. Additionally, the generator of the waste of this material must determine its waste classification and disposal methods in compliance with local, state and federal or other regulations.

Container Disposal:
Drain the container thoroughly, and then vent it in a safe place away from sparks, and fire. Residues may cause an explosion hazard. Do not puncture, cut or weld un-cleaned containers. Send the waste drum to the drum re-coverer or reclaimer.

Local Regulatory Compliance:
The disposal should be in compliance with applicable local, regional, state and national laws and regulations.

14. TRANSPORT INFORMATION

U. S. Department of Transportation Classification (49 CFR)

Identification number:	UN 1993
Proper shipping name:	Flammable liquid, n. o. s. (Acetone/Naphtha mixture)
Class/Division:	3
Packing Group:	II
Contains OIL	
Emergency Response Guide No.:	128

15. REGULATORY INFORMATION

Federal Regulatory Status:
Notification:

TSCA	Listed

SARA TITLE III, Sections 311, 312
Classified as Fire hazard.
SARA Toxic Release Inventory (TRI) 313
Naphtha (aromatic) in contains following chemicals:
1, 2, 4 Trimethyl benzene : < 5%
Cumene: < 0.5% and Xylene: <0.2%

State Regulatory Information:
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)
Not listed.

16. **OTHER INFORMATION**

HMIS Rating: **(Health, Flammability & Reactivity)**	H=1, F=3, R = 0
NFPA Rating : **(Health, Flammability & Reactivity**	H=1, F=3, R = 0
MSDS Revision level:	New – Initial Release
Uses and Restrictions:	Industrial solvent
MSDS Distribution:	The copy of this MSDS should be available to every one who may handle this material.

Disclaimer:
The content and format of this MSDS is in accordance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200 and the information contained herein is to the best of our knowledge for its original form in which it is supplied and is intended as guidelines for the purpose of handler's and environmental safety. No warranty or guarantee is expressed or implied regarding the accuracy of this data or of the resulting product, using this material.

worked with Dot to test alternative cleaners for the sheet fed presses. A picture of one of the sheet fed presses is shown in Figure 2-8.

Figure 2-8. Press at The Dot Printer

Dot uses the same cleaner for both blanket and roller cleaning on the sheet fed presses. An MSDS for this cleaner, from Day International, is shown in Exhibit 2-24. IRTA tested a number of alternative blanket and roller washes with Dot. IRTA tested Mirachem Pressroom Cleaner, a water-based cleaner used by some newspapers but it did not effectively clean the ink. IRTA tested a number of soy based cleaners and blends of soy based cleaners with other components as a roller wash. Rinsing with water did not remove the residue sufficiently. IRTA did find a soy based cleaner, called Magic Wash 522C, that could be rinsed and it cleaned the ink well. An MSDS for this cleaner is shown in Exhibit 2-25. IRTA tested a variety of different cleaners and blends consisting of soy based cleaners, acetone and other solvents with the operator to find a blanket wash that suited his needs. The operator indicated that a blend of 92 percent acetone and eight percent of a cleaner called Soy Gold 2000 worked best. An MSDS for the Soy Gold 2000 is shown in Exhibit 2-26.

IRTA provided Dot with larger quantities of the alternative roller and blanket wash and Dot tested them for a week. The cleaners performed well but the operator did not like the smell of the blanket wash. The company also thought it was inconvenient that the roller wash could not be used to clean the plate because it leaves a residue and it removed the image from the plate.

The company cleans the blankets 10 of 15 times a day and cleans the rollers when a job is completed and a color change is necessary. Dot uses 50 gallons per week or 2,600 gallons per year of the cleaner on the three sheet fed presses. Three-fourths of the cleaner

Exhibit 2-24
Current Blanket and Roller Cleaner Used at The Dot Printer

MATERIAL SAFETY DATA SHEET

RESPONSE #0000

Revised: February 20, 2003

PRODUCT CODE: 8030008

HMIS CODES: H F R P
1 2 0 X

Bioculent Wash

SECTION I - MANUFACTURER IDENTIFICATION

MANUFACTURER'S NAME: Day International Chemical Products Div.
ADDRESS : 905 South Westwood Avenue
Addison, Illinois 60101

EMERGENCY PHONE: 800-424-9300 INFORMATION PHONE: 800-336-8276
NAME OF PREPARER: DAY Chemical Prod. Div. DATE PRINTED: 2/20/03
REASON REVISED: Update; Supersedes All Previous Revisions.

SECTION II - COMPOSITION/INFORMATION ON INGREDIENTS

REPORTABLE COMPONENTS	CAS NUMBER	VAPOR MM HG @ TEMP	PRESSURE	WEIGHT PERCENT
Petroleum Naphtha	64742-47-8	2.8	68°F	53
OSHA PEL: 500ppm TWA, ACGIH TLV: N/E				
Petroleum Naphtha	64742-95-6	2.7	68°F	28
OSHA PEL: N/E, ACGIH TLV: N/E, Mfg: 50ppm				
* 1,2,4-Trimethyl Benzene	95-63-6			11
Dipropylene Glycol Methyl Ether	34590-94-8	0.17	68°F	3
OSHA PEL: 100ppm, ACGIH TLV: 100ppm, STEL: 150ppm				
* Xylenes	1330-20-7			1
Hazardous Air Pollutant				

* indicates toxic chemical(s) subject to the reporting requirements of Section 313 of SARA Title III and of 40 CFR 372. All ingredients are listed on the EPA TSCA Inventory.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING RANGE/POINT: 315°F - 335°F SPECIFIC GRAVITY (H2O=1): .82
VAPOR DENSITY: Heavier than air.
EVAPORATION RATE: Slower than n-Butyl Acetate.
V.O.C. (EPA METHOD 24): 6.6 lb/gl
VAPOR PRESSURE (MM HG @ 20°C): 2.6
SOLUBILITY IN WATER: Emulsible
APPEARANCE AND ODOR: Yellow Liquid - Petroleum Odor

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 107°F METHOD USED: TAG CC
FLAMMABLE LIMITS IN AIR BY VOLUME- LOWER: 1.0% UPPER: 6.5%

EXTINGUISHING MEDIA:
Foam, Alcohol Foam, CO2, Dry Chemical, Water Fog.

SPECIAL FIREFIGHTING PROCEDURES:
As in any fire, wear self-contained breathing apparatus (MSHA/NIOSH approved) and full protective gear. Water may not be effective to extinguish fire. Use water spray to cool fire-exposed containers and to protect personnel.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
Treat as Petroleum Fire.

SECTION 5 - REACTIVITY DATA

STABILITY:
Stable

CONDITIONS TO AVOID:
Avoid heat, sparks, flame and other sources of ignition.

INCOMPATIBILITY (MATERIALS TO AVOID):
Avoid mixing with strong oxidizing agents.

HAZARDOUS DECOMPOSITION OR BYPRODUCTS:
Burning will produce oxides of carbon and dense smoke.

HAZARDOUS POLYMERIZATION:
Will Not Occur.

SECTION 6 - HEALTH HAZARD DATA

INHALATION HEALTH RISKS AND SYMPTOMS OF EXPOSURE:
Breathing high concentrations of vapors will cause irritation of the nose and throat. Signs of central nervous system depression such as headache, drowsiness, dizziness and nausea may be experienced with overexposure.

SKIN AND EYE CONTACT HEALTH RISKS AND SYMPTOMS OF EXPOSURE:
Skin and eye contact may cause moderate to severe irritation.

SKIN ABSORPTION HEALTH RISKS AND SYMPTOMS OF EXPOSURE:
Single prolonged exposure is not likely to result in the product being absorbed through the skin in harmful amounts.

INGESTION HEALTH RISKS AND SYMPTOMS OF EXPOSURE:
Ingestion of this product will cause nausea, gastro-intestinal irritation, diarrhea and possible damage to vital organs. Follow first aid procedures.

HEALTH HAZARDS (ACUTE AND CHRONIC):
Repeated or abusive breathing of concentrated vapors may affect pulmonary, cardiovascular, and central nervous systems. Repeated skin contact will dry out and crack skin. Aspiration hazard if swallowed; aspiration of product into the lungs can cause chemical pneumonitis.

CARCINOGENICITY: NTP CARCINOGEN: No IARC MONOGRAPHS: No OSHA REGULATED: No

This product contains no known carcinogens.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:
Skin contact may aggravate pre-existing dermatitis. Inhalation of vapors may aggravate pre-existing asthmatic like conditions.

EMERGENCY AND FIRST AID PROCEDURES:
INHALATION: Remove victim to fresh air. Give oxygen if breathing is labored. Apply artificial respiration if not breathing. Seek medical help. SKIN: Remove all contaminated clothing and shoes. Wash with soap and water. Do not reuse clothing and shoes until cleaned. EYES: Flush eyes with plenty of water while removing any contact lenses. Hold eyelids open and continue flushing for at least 15 minutes. INGESTION: DO NOT INDUCE vomiting. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs. Seek medical attention immediately.

SECTION 7 - PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
Eliminate all ignition sources. Spills should be diked and must be kept from entering the sewer. Soak up with absorbent or transfer liquid into a closed container for later disposal. Use spark-proof tools and explosion proof equipment.

WASTE DISPOSAL METHOD:
If this product as supplied, becomes a waste it is regulated by RCRA as ignitable Waste, EPA I.D. #D001. Suitable methods of disposal include reclamation and fuel blending. Contact a licensed Hazardous Waste Hauler for more information.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:
Containers should be grounded and bonded before transferring product. Store in the original closed container away from sunlight, excess heat, sparks, flames and other sources of ignition. Avoid skin or eye contact. Avoid breathing vapors. When transferring or using this product, wear proper personal protective equipment. Store and handle as a Combustible Liquid.

OTHER PRECAUTIONS/DOT INFORMATION:
DOT Proper Shipping Name: Combustible Liquid n.o.s. (Naphthol, Hazard Class: Combustible Liquid, ID No.: NA1993, Packing Group: III, Non-bulk packagings not regulated as per 49CFR 173.150 (f)(2). Product is classified as an OSHA Class II Combustible Liquid.

SECTION 8 - CONTROLS MEASURES

RESPIRATORY PROTECTION:
The use of respiratory protection is advised when concentrations exceed the established exposure limits in SECTION 2. Depending on the airborne concentration, use a respirator with appropriate organic vapor cartridge (NIOSH approved).

VENTILATION:
If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits in SECTION 2, additional general ventilation or local exhaust systems may be required.

PROTECTIVE GLOVES:
Wear solvent resistant gloves made of nitrile or butyl rubber.

EYE PROTECTION:
Wear safety glasses with side shields.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:
A personal protective rating of X means you must see your supervisor for guidance. OSHA regulations (29CFR Part 1910, Subpart I) require employers to evaluate Personal Protective Equipment requirements in the workplace.

WORK/HYGIENIC PRACTICES:
Wash with soap and water after product contact with skin.

SECTION 9 - DISCLAIMER

The information on this MSDS is believed to be accurate as of the date shown in SECTION 1. Since the use of this product is not under the control of DAY Chemical Products Division, it is the user's responsibility to determine what constitutes safe usage for particular product. This form may be reproduced in quantities necessary to meet your requirements.

Exhibit 2-25
Alternative Roller Magic Wash 522C Cleaner Tested at The Dot Printer

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Trade Name: MAGIC WASH 522C
Generic Name: Lithographic Press Wash

CAS #: Proprietary Blend

Manufacturer: Siebert, Inc.
Address: 8134 West 47th Street
City: Lyons State: IL Zip: 60534

Emergency phone#: (800) 535-5053
Technical phone#: (708) 442-2010

DOT Hazard Classification: Not Regulated
NFPA Codes: Health - 0 Flammability - 0 Reactivity - 0
HMIS Codes: Health - 1 Flammability - 0 Reactivity - 0 Personal Protection - B

II. HAZARDOUS INGREDIENTS

If present, IARC, NTP, and OSHA carcinogens and chemicals subject to the reporting requirements of SARA Title III Section 313 are identified in this section.

Ingredient Name	CAS Number	%wt	TLV	STEL	SARA TITLE III
Fatty esters	Various	70 to 90	None established	None established	No
Surfactants	Various	15 to 30	None established	None established	No

References: 29CFR 1910.1000, ACGIH "Threshold Limit Values for Chemicals in the Workplace", National Toxicology Program Annual Report, International Agency for Research on Cancer Monographs, and 40CFR Part 372. All components of this product are in compliance with TSCA

III. PHYSICAL DATA

Boiling Point @ 760 mm Hg:	308 - 335°F
Vapor Pressure @ 80°F:	<0.1 mm Hg
Specific Gravity @ 68°F:	0.92
Water Solubility (%):	Insoluble
Specific Vapor Density (air=1):	<1.0
% Volatile by Volume:	<2.0
% Volatile Organic Compound(s):	<2.0
Appearance:	Clear golden liquid
Odor:	Typical organic odor

IV. FIRE AND EXPLOSION DATA

Flash Point (Method): >300°F (TCC)
Explosive Limit: LEL - N/E UEL - N/E
Extinguishing Media: Water fog, carbon dioxide, or dry chemical.
Special Fire Fighting Procedures: Wear self-contained breathing apparatus when fighting chemical fires.
Unusual Fire and Explosion Hazards: Fine sprays/mists may be combustible at temperatures below normal flash point. Rags soaked with material, stored for a long period while mixed with strong alkali or acidic materials, may smolder, then smoke, and may even ignite.

V. HEALTH HAZARD DATA

Eyes - May cause temporary irritation, redness, tearing, blurred vision. Contact lenses must not be worn when possibility exists for eye contact due to spraying liquid or airborne particles.
Skin - Prolonged or repeated contact may cause irritation.

Breathing - Excessive inhalation of vapors may cause nasal and respiratory irritation, central nervous system effects including dizziness, weakness, fatigue, nausea, headache and possible unconsciousness.
Swallowing - Can cause gastrointestinal irritation, nausea, vomiting, and diarrhea.

First Aid/Emergency Procedures

Inhalation: Remove to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Keep person warm, quiet and get medical attention.
Skin Contact: Wash thoroughly with soap and water. Remove contaminated clothing. Launder contaminated clothing before re-use.
Eyes: Flush with copious amounts of water. Get medical attention.
Ingestion: Do not induce vomiting. If large quantity is swallowed, give lukewarm water (pint). NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. Get medical attention immediately. Risk of damage to lungs exceeds poisoning risk.
Primary Entry Route(s): Inhalation, skin contact.
Chronic Health Effects: Chronic overexposure may aggravate existing skin, eye and lung conditions.

VI. REACTIVITY DATA

Stability: Stable. Hazardous Polymerization: Cannot occur.
Incompatibilities: Avoid contact with strong oxidizing materials, strong alkalies, strong mineral acids.
Hazardous Decomposition Products: Carbon mono/di oxides.
Conditions to Avoid: None

VII. SPILL OR LEAK PROCEDURES

Procedures for Spill/Leak:
Eliminate all ignition sources (flares, flames including pilot lights, electrical sparks, etc.).
Small Spill - Absorb liquid on paper, vermiculite, floor absorbent, or other absorbent material and transfer to a recovery drum.
Large Spill - Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Stop spill at source, dike area of spill to prevent spreading, pump liquid to salvage tank. Remaining liquid may be taken up on sand, clay, earth, floor absorbent, or other absorbent material and shoveled into recovery drums. Prevent run-off to sewers, streams or others bodies of water. Notify proper authorities, as required, that a spill has occurred.
Waste Management:
Landfill solids at permitted sites. Use registrated transporters. Burn concentrated liquids at permitted sites. Avoid flameouts. Assure emissions comply with applicable regulations. Dilute aqueous waste may biodegrade. Avoid overloading/poisoning plant biomass. Assure effluent complies with applicable regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection:
If workplace exposure limit(s) of product is exceeded, a NIOSH/MSHA approved air supplied respirator is advised in the absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions. Engineering or administrative controls should be implemented to reduce exposure.
Ventilation: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain minimum exposure.
Eye Protection: Chemical Splash Proof Goggles and full face shield are advised for operations where eye or face contact can occur.
Gloves: Wear impervious gloves.
Other Protective Equipment: To prevent repeated or prolonged skin contact, wear impervious clothing and boots.

IX. SPECIAL PRECAUTIONS

- MAGIC WASH 522C

Special Handling/Storage:

To avoid skin contact and ingestion, wash hands and face well before eating or smoking. Do not permit food in work area. Avoid breathing mists if generated. Store at room temperature. Reseal container when not in use. Do not store near acids, bases or flammable liquids. Containers of this material should be rinsed when emptied, since emptied containers retain product residues (vapor, liquid, and/or solid). All hazard precautions given in this data sheet must be observed.

As of the date of preparation of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state law(s). However, no warranty or representation with respect to such information is intended or given.

Date revised: 04/01/2001
jpm

Exhibit 2-26
Alternative Blanket Soy Gold 2000 Cleaner Ingredient Tested at The Dot Printer

SOYGOLD 2000 SOLVENT

MATERIAL SAFETY DATA SHEET

EMERGENCY PHONE: 913-599-6911 CHEMTREC: 800-424-9300

SECTION I-IDENTIFICATION

PRODUCT: SOYGOLD® 2000
CAS No.: 67784-80-9
CHEMICAL: Fatty acid methyl esters
SYNONYMS: Methyl esters of soybean oil

SECTION II-INGREDIENTS AND HAZARD CLASSIFICATION

TYPICAL COMPOSITION	CAS	%
Alkyl C_{16}-C_{18}-Methyl Esters	67784-80-9	97-99
Surfactant	9016-45-9	1-3

SARA HAZARD: TITLE III SECTION 313: Not listed FIRE (Section 311/312): None noted

SECTION III-HEALTH INFORMATION

EFFECTS OF OVEREXPOSURE
INHALATION: No known problems
INGESTION: LD_{50}>50ml/kg (albino rats/similar products)
EYE CONTACT: Not classified as eye irritants
SKIN CONTACT: Not classified as a skin irritant or corrosive material

SECTION IV-OCCUPATIONAL EXPOSURE LIMITS

PEL: NO OSHA PEL TLV: NO ACGIH TLV

SECTION V-EMERGENCY FIRST AID PROCEDURE

FOLLOW STANDARD FIRST AID PROCEDURES
SWALLOWING: Call physician or poison control center.
SKIN CONTACT: Wash affected area.
EYE CONTACT: Flush eyes with cool water for at least 15 minutes. Do not let victim rub eyes.
INHALATION: Immediately remove victim to fresh air. Get medical attention immediately.

SECTION VI-PHYSICAL DATA

BOILING POINT: Over 600° F (315° C) at 760 mm Hg pressure
MELTING POINT: -1° C
VAPOR PRESSURE: 0.882 mm Hg at 25° C
SPECIFIC GRAVITY: 0.882 g/mL at 25° C
DIELECTRIC STRENGTH: >56.9
SOLUBILITY IN WATER: Negligible at room temperature
APPEARANCE AND COLOR: Light yellow to clear and liquid at room temperature
ODOR: Light vegetable oil odor

SECTION VII-FIRE AND EXPLOSION HAZARDS

FLASH POINT & METHOD USED: 425° F (218° C)(PMCC)
FLAMMABLE LIMITS: Not applicable
NFPA RATING: No NFPA rating

HMIS RATING: HEALTH: 0 FIRE: 1 REACTIVITY: 0

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SPECIAL FIRE FIGHTING PROCEDURES & PRECAUTIONS
Treat as oil fire. Use water spray, dry chemical, foam or carbon dioxide.

UNUSUAL FIRE & EXPLOSION HAZARDS
Rags soaked with any solvent present a fire hazard and should always be stored in UL listed or Factory Mutual approved, covered containers. Improperly stored rags can create conditions that lead to oxidation. Oxidation, under certain conditions can lead to spontaneous combustion. This product contains antioxidants to retard oxidation.

SECTION VIII-REACTIVITY

STABILITY:	Stable
HAZARDOUS POLYMERIZATION:	None likely
MATERIALS TO AVOID:	Strong oxidizing agents
HAZARDOUS DECOMPOSITION PRODUCTS:	CO_2, CO
CONDITIONS TO AVOID:	None known

SECTION IX-EMPLOYEE PROTECTION

CONTROL MEASURES:	Adequate ventilation
RESPIRATORY PROTECTION:	None required
PROTECTIVE CLOTHING:	No need anticipated
EYE PROTECTION:	None required

SECTION X-ENVIRONMENTAL PROTECTION

ENVIRONMENTAL PRECAUTIONS:	Avoid uncontrolled releases of this material into environment.
SPILL OR LEAK PRECAUTIONS:	Contain spilled material. Transfer to secure containers. Where necessary, collect using absorbent media.
WASTE DISPOSAL:	Dispose of according to federal, state and/or local requirements.

SECTION XI-REGULATORY CONTROLS

DOT CLASSIFICATION:	Class 55
DOT PROPER SHIPPING NAME:	Cleaning Compound, N.O.S.
OTHER REGULATORY REQUIREMENTS:	Listed in TSCA inventory

SECTION XII-PRECAUTIONS: HANDLING, STORAGE AND USAGE

No special precautions necessary.

SECTION XIII-DATE AND SIGNATURE

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process. The stated MSDS is reliable to the best of the company's knowledge and believed accurate as of the date indicated. However, no representation, warranty or guarantee of any kind, expressed or implied, is made as to its accuracy, reliability or completeness and we assume no responsibility for any loss, damage or expense, direct or consequential, arising out of use. It is the user's responsibility to satisfy himself as to the suitableness and completeness of such information for his own particular use.

AG ENVIRONMENTAL PRODUCTS, L.L.C.
9804 PFLUMM
LENEXA, KS 66215

SIGNATURE: William A. Ayres

PREPARED BY: WILLIAM A. AYRES REVISION DATE: 5-01-01

is used as a blanket wash and one-fourth is used as a roller wash. The cost of the cleaner is $4.25 per gallon. The annual cost of the cleaner amounts to $11,050.

The alternative blanket wash is composed of 92 percent acetone which has a price of $4 per gallon and eight percent Soy Gold 2000 which has a price of $8 per gallon. The cost of the blend is $4.32 per gallon. Assuming Dot uses 1,950 gallons of blanket wash per year and assuming the same amount of the alternative blanket wash would be used, the annual cost of the alternative blanket wash would amount to $8,424. The alternative roller wash is priced at $20 per gallon. Assuming 650 gallons of roller wash are used each year and assuming that the new soy based roller wash would be used in the same quantity, the annual cost of roller wash would be $13,000. The total annual cost of the alternative cleanup materials would be $21,424.

Table 2-9 shows the annual cost comparison for the current and alternative cleaners assuming they are used on Dot's three sheet fed presses. The cost of using the alternative cleaners is slightly less than double the cost of using the current cleaner.

Table 2-9
Annualized Cost Comparison for The Dot Printer

	Current Cleaner	Alternative Cleaners
Blanket Wash Cost	$8,288	$8,424
Roller Wash Cost	$2,762	$13,000
Total Cost	$11,050	$21,424

J.S. Paluch Co., Inc.

J.S. Paluch is located in Santa Fe Springs, California. The company exclusively prints church newsletters and prints on an uncoated book paper with soy based inks. J.S. Paluch has four narrow web presses that can print four colors. A picture of one of the presses is shown in Figure 2-9.

IRTA started working with J.S. Paluch in 2003 as part of a project sponsored by Cal/EPA's Department of Toxic Substances Control, the South Coast Air Quality Management District and U.S. EPA to test, demonstrate and evaluate cleaning alternatives. The company presently uses a cleaner that serves as both a blanket and roller wash called Allied Hydrowash. An MSDS for this cleaner is shown in Exhibit 2-27.

IRTA conducted testing at J.S. Paluch to try to identify a suitable alternative cleaning agent. IRTA tested Mirachem Pressroom Cleaner, a cleaner used by some newspapers. This water-based cleaner did clean the ink and cleaned about as effectively as the current cleaner. IRTA also tested blends of acetone and the Mirachem cleaner and these cleaners performed reasonably well. IRTA tested a soy based cleaner called Soy Gold 2000 and this cleaner was the most effective cleaner. An MSDS for this cleaner is shown in Exhibit 2-28. IRTA provided several week's supply of this cleaner to J.S. Paluch and the

Exhibit 2-27
Current Cleaner Used at J.S. Paluch

ALLIED HYDROWASH

MATERIAL SAFETY DATA SHEET

ALLIED PHOTO OFFSET SUPPLY CORPORATION
2040 LEE STREET
HOLLYWOOD, FL 33020

EFFECTIVE: AUGUST 22, 1996

I - PRODUCT IDENTIFICATION

MANUFACTURER'S NAME: ALLIED PHOTO OFFSET SUPPLY CORP.
ADDRESS: 2040 LEE STREET, HOLLYWOOD, FL 33020
PHONE NUMBER: (305) 923-9884
EMERGENCY PHONE NUMBER: 1-800-424-9300 CHEMTREC
TRADE NAME: ALLIED HYDROWASH
SYNONYMS: Blanket & Roller Cleaner for Lithographic Presses

II - HAZARDOUS INGREDIENTS

Material or Component	% Mass	Hazard Data
Aromatic Petroleum Distillates CAS#64742-95-6	50%	ACGIH (TWA-TLV) 100 PPM
(This ingredient contains:		
Xylene CAS#1330-20-7 2-5% *		ACGIH (TWA-TLV) 100 PPM
Cumene CAS#98-82-8 1-4% *		ACGIH (TWA-TLV) 50 PPM-SKIN
1,2,4-Trimethylbenzene CAS#95-63-6 24-29%)*		Not Established
Aliphatic Petroleum Distillates CAS#64741-41-9	46%	ACGIH (TWA-TLV) 100 PPM

*These ingredients are subject to the reporting requirements of SARA 313 and 40 CFR 372.

None of the ingredients present in the product are identified as carcinogenic or potentially carcinogenic by NTP, IARC or ACGIH.

All ingredients are listed in the U.S. TSCA inventory.

HEALTH HAZARD: 2

4 - Deadly
3 - Extreme Danger
2 - Hazardous
1 - Slightly Hazardous
0 - Normal Material

FIRE HAZARD: 2

Flash Points:
4 - Below 73°F
3 - Below 100°F
2 - Above 100°F (Not exceeding 200°F)
1 - Above 200°F
0 - Will Not Burn

REACTIVITY: 0

4 - May Detonate
3 - Shock and Heat May Detonate
2 - Violent Chemical Change
1 - Unstable if heated
0 - Stable

PROTECTIVE EQUIPMENT: SC
(Synthetic gloves, apron and splash goggles)

III - PHYSICAL DATA

BOILING POINT @ 760 mm Hg: 307°F - 389°F
MELTING POINT: Liquid
SPECIFIC GRAVITY (H_2O=1): 0.827
VAPOR PRESSURE: < 3 mm Hg at 20° (68° F)
VAPOR DENSITY (Air = 1): >1
SOLUBILITY IN H_2O, % BY WEIGHT: Negligible
% VOLATILES BY VOLUME: 96%
EVAPORATION RATE (Butyl Acetate = 1): <1
APPEARANCE AND ODOR: Clear, colorless liquid, hydrocarbon odor
pH: N/A
VOLATILE ORGANIC COMPOUNDS (VOC's)= 96% By Mass
= 8.62 lb/Gal.

IV - FIRE AND EXPLOSION DATA

FLASH POINT: 107°F TCC
AUTOIGNITION TEMPERATURE: Unknown
FLAMMABLE LIMITS IN AIR, % BY VOLUME: LOWER: Unknown
UPPER: Unknown
EXTINGUISHING MEDIA: Dry chemical, carbon dioxide or universal type foam.
SPECIAL FIRE FIGHTING PROCEDURES: Use self-contained breathing apparatus.
UNUSUAL FIRE & EXPLOSION HAZARD: Avoid spreading burning liquid with water used for cooling purposes.

V - HEALTH HAZARD INFORMATION

HEALTH HAZARD DATA
ROUTES OF EXPOSURE:

INHALATION: High concentrations of vapors or mists may cause irritation of nose and throat, and signs of central nervous system depression e.g. headaches, drowsiness, loss of coordination, possible unconsciousness.
SKIN CONTACT: May cause skin irritation, redness, burning and drying.
SKIN ABSORPTION: Possible absorption on prolonged contact.
EYE CONTACT: Severe irritation, tearing, redness and swelling.
INGESTION: Irritation of digestive tract, signs of central nervous system depression. Material is an aspiration hazard.

EFFECTS OF:

ACUTE OVEREXPOSURE: All of the above.

CHRONIC OVEREXPOSURE: Prolonged and repeated overexposure to solvents have been associated with permanent brain and central nervous system damage.

EMERGENCY FIRST AID PROCEDURES

EYES: Flush eyes for 15 minutes holding eyelids apart. Seek medical attention.
SKIN: Wash affected areas with soap and water. Remove contaminated clothing and launder before reuse.
INHALATION: Remove to fresh air. If breathing difficulties occur, oxygen should be administered by trained personnel. If breathing stops begin artificial respiration. Seek immediate medical attention.
INGESTION: Do not induce vomiting. Material is an aspiration hazard and can enter lungs during swallowing or vomiting and cause lung damage. Seek immediate medical attention.

VI - REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY: Stable
INCOMPATIBILITY: Strong acids or bases, oxidizing agents, selected amines.
HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, carbon dioxide, various hydrocarbons.
CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION: None

VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:
Ventilate area of spill. Extinguish all sources of ignition. Prevent spill from spreading. Large spill, pump material into containers. For small spill, absorb into inert absorbent and shovel into containers. Do not flush with water.

NEUTRALIZING CHEMICALS: None needed

WASTE DISPOSAL METHOD: Dispose of in accordance with all applicable local, county, state and federal regulations.

SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS: Provide sufficient mechanical ventilation (general and/or local exhaust) to prevent exposure exceeding TLV and the irritating buildup of vapors.

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT:

RESPIRATORY (Specify in Detail): Use NIOSH approved respirator where needed.

EYE: Chemical splash goggles.

GLOVES: Impermeable

OTHER CLOTHING AND EQUIPMENT: Safety apron, appropriate work clothes to prevent repeated skin contact; eyewash station, drench shower.

SPECIAL PRECAUTIONS

This is an industrial product and should be used by trained personnel only.

Containers of this material may be hazardous even when emptied, since containers retain product residue. Follow all hazard warnings given in this data sheet even after container is emptied.

Do not breathe vapors. Use with adequate ventilation.

SPECIAL PRECAUTIONS, CONT.

Avoid prolonged skin contact. Wash thoroughly after handling.

Do not get in eyes. Wear appropriate eye protection. Material will cause severe eye irritation.

Do not ingest.

Keep away from heat sparks and open flame.

STORAGE REQUIREMENTS

Keep container tightly closed when not in use.

Store in cool, dry place.

Store as COMBUSTIBLE MATERIAL.

Keep away from heat sparks and open flame.

SHIPPING REQUIREMENTS.

DOT Shipping Name: Combustible Liquid NOS
(Contains: Petroleum Distillates)

I.D. # : NA1993

The above information is believed to be correct as of the date hereof and is based on data supplied by raw material suppliers, however, no warranty of merchantability , fitness for any use, or any other warranty is expressed or is to be implied regarding the accuracy of these data, the results to be obtained from the use of the material, or the hazards connected with each use. Since the information contained herein may be applied under conditions beyond our control and with which we may be unfamiliar, and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume responsibility for the results of its' use. This information is furnished on the condition that the person receiving it shall make his own determination as to the suitability of the material for his particular purpose and on the condition that he assume risk of his use thereof.

Exhibit 2-28
Alternative Soy Gold 2000 Cleaner Tested at J.S. Paluch

SOYGOLD 2000 SOLVENT

MATERIAL SAFETY DATA SHEET

EMERGENCY PHONE: 913-599-6911 CHEMTREC: 800-424-9300

SECTION I-IDENTIFICATION

PRODUCT: SOYGOLD® 2000
CAS No.: 67784-80-9
CHEMICAL: Fatty acid methyl esters
SYNONYMS: Methyl esters of soybean oil

SECTION II-INGREDIENTS AND HAZARD CLASSIFICATION

TYPICAL COMPOSITION	CAS	%
Alkyl C_{16}-C_{18}-Methyl Esters	67784-80-9	97-99
Surfactant:	9016-45-9	1-3

SARA HAZARD: TITLE III SECTION 313: Not listed FIRE (Section 311/312): None noted

SECTION III-HEALTH INFORMATION

EFFECTS OF OVEREXPOSURE
INHALATION: No known problems
INGESTION: LD_{50}>50ml/kg (albino rats)(similar products)
EYE CONTACT: Not classified as eye irritants
SKIN CONTACT: Not classified as a skin irritant or corrosive material

SECTION IV-OCCUPATIONAL EXPOSURE LIMITS

PEL: NO OSHA PEL TLV: NO ACGIH TLV

SECTION V-EMERGENCY FIRST AID PROCEDURE

FOLLOW STANDARD FIRST AID PROCEDURES
SWALLOWING: Call physician or poison control center.
SKIN CONTACT: Wash affected area.
EYE CONTACT: Flush eyes with cool water for at least 15 minutes. Do not let victim rub eyes.
INHALATION: Immediately remove victim to fresh air. Get medical attention immediately.

SECTION VI-PHYSICAL DATA

BOILING POINT: Over 600° F (315° C) at 760 mm Hg pressure
MELTING POINT: -1° C
VAPOR PRESSURE: 0.882 mm Hg at 25° C
SPECIFIC GRAVITY: 0.882 g/mL at 25° C
DIELECTRIC STRENGTH: >56.9
SOLUBILITY IN WATER: Negligible at room temperature
APPEARANCE AND COLOR: Light yellow to clear and liquid at room temperature
ODOR: Light vegetable oil odor

SECTION VII-FIRE AND EXPLOSION HAZARDS

FLASH POINT & METHOD USED: 425° F (218° C)(PMCC)
FLAMMABLE LIMITS: Not applicable
NFPA RATING: No NFPA rating

HMIS RATING: HEALTH: 0 FIRE: 1 REACTIVITY: 0

AEP 6/2003

SPECIAL FIRE FIGHTING PROCEDURES & PRECAUTIONS
Treat as oil fire. Use water spray, dry chemical, foam or carbon dioxide.

UNUSUAL FIRE & EXPLOSION HAZARDS
Rags soaked with any solvent present a fire hazard and should always be stored in UL listed or Factory Mutual approved, covered containers. Improperly stored rags can create conditions that lead to oxidation. Oxidation, under certain conditions can lead to spontaneous combustion. This product contains antioxidants to retard oxidation.

SECTION VIII-REACTIVITY

STABILITY:	Stable
HAZARDOUS POLYMERIZATION:	None likely
MATERIALS TO AVOID:	Strong oxidizing agents
HAZARDOUS DECOMPOSITION PRODUCTS:	CO_2, CO
CONDITIONS TO AVOID:	None known

SECTION IX-EMPLOYEE PROTECTION

CONTROL MEASURES:	Adequate ventilation
RESPIRATORY PROTECTION:	None required
PROTECTIVE CLOTHING:	No need anticipated
EYE PROTECTION:	None required

SECTION X-ENVIRONMENTAL PROTECTION

ENVIRONMENTAL PRECAUTIONS:	Avoid uncontrolled releases of this material into environment.
SPILL OR LEAK PRECAUTIONS:	Contain spilled material. Transfer to secure containers. Where necessary, collect using absorbent media.
WASTE DISPOSAL:	Dispose of according to federal, state and/or local requirements.

SECTION XI-REGULATORY CONTROLS

DOT CLASSIFICATION:	Class 55
DOT PROPER SHIPPING NAME:	Cleaning Compound, N.O.S.
OTHER REGULATORY REQUIREMENTS:	Listed in TSCA inventory

SECTION XII-PRECAUTIONS: HANDLING, STORAGE AND USAGE

No special precautions necessary.

SECTION XIII-DATE AND SIGNATURE

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process. The stated MSDS is reliable to the best of the company's knowledge and believed accurate as of the date indicated. However, no representation, warranty or guarantee of any kind, expressed or implied, is made as to its accuracy, reliability or completeness and we assume no responsibility for any loss, damage or expense, direct or consequential, arising out of use. It is the user's responsibility to satisfy himself as to the suitableness and completeness of such information for his own particular use.

AG ENVIRONMENTAL PRODUCTS, L.L.C.
9804 PFLUMM
LENEXA, KS 66215

SIGNATURE: William A. Ayres

PREPARED BY: WILLIAM A. AYRES REVISION DATE: 5-01-01

operator who used the cleaner indicated that it performed very well and that it cut through the ink more quickly than the current cleaner.

J.S. Paluch uses 80 gallons per year of the current cleaner. The cost of the cleaner is $16 per gallon. On this basis, the annual cost of the current cleaner amounts to $1,280.

Figure 2-9. Press at J.S. Paluch Co.

The cost of the alternative soy based cleaner is $8 per gallon. Assuming the same amount of the soy cleaner would be required, the annual cost of the alternative cleaner would be $640.

Table 2-10 shows the annual cost comparison for J.S. Paluch. The figures show that the company could cut their cost in half by converting to the alternative soy based cleaner.

Table 2-10
Annualized Cost Comparison for J.S. Paluch

	Current Cleaner	Alternative Cleaner
Cleaner Cost	$1,280	$640
Total Cost	$1,280	$640

R.R. Donnelley & Sons Co.

R.R. Donnelley & Sons is a large lithographic printer. One of the company's facilities is located in Torrance, California. Donnelley prints newspaper inserts and high quality magazines. The company has several large four-color presses at the Torrance location.

IRTA began working with Donnelley in 2001 as part of a project sponsored by Cal/EPA's Department of Toxic Substances Control, the South Coast Air Quality

Management District and U.S. EPA to test, demonstrate and evaluate cleaning alternatives. IRTA assisted the company in converting their off-press cleaning operations to alternative low-VOC materials. IRTA also tested alternatives with Donnelley for on-press cleaning.

Donnelley has an automated roller wash system on their presses. The company uses a roller cleaner based on mineral spirits and a methyl ester. An MSDS for this product is shown in Exhibit 2-29. The operators clean the blankets by hand "on the run." They apply the cleaning solvent in spray bottles directly onto the blankets while the press is operating during printing. The blanket wash is a mineral spirit and an MSDS for the material is shown in Exhibit 2-30.

IRTA conducted testing of alternatives with Donnelley. The company tested a soy based product containing a surfactant for both blanket and roller cleaning for more than three months. An MSDS for this product is shown in Exhibit 2-31. Donnelley had blanket failures and the testing was stopped. It is unknown whether the blanket failures were attributable to use of the new cleaner. The press operators indicated that it took slightly longer to get the press back to color but did not provide details. The press operators also indicated that the residue from the new cleaner made the floor slippery and that the excess cleaner occasionally dripped onto the web. A possible explanation for these two problems is the operator practice of applying the blanket wash to the blanket in squeeze bottles in the "on the run" cleaning. The new cleaner does not evaporate readily and an alternative application method might solve these problems.

Donnelley uses 3,675 gallons of their roller wash annually. The price of this product is $10.50 per gallon. The cost of the roller wash is $38,588 per year. Donnelley uses 13,950 gallons of the other mineral spirits product in their plant and two-thirds or 9,300 gallons per year are used to clean the blankets. The price of this product is $2.60. On this basis, the annual cost of the blanket wash is $24,180. The current cost of roller and blanket wash is $62,768 per year.

The cost of the alternative Soy Gold 2000 product is $8 per gallon. Assuming the product is used for cleaning rollers and blankets and assuming the same amount is required, Donnelley would use 12,975 gallons of the alternative cleaner per year. On this basis, the cost of the alternative product would be $103,800 annually.

Table 2-11 shows the annualized cost comparison for Donnelley. The alternative soy cleaner is less costly than the current roller wash and more costly than the current blanket wash. The figures show that the cost to Donnelley would increase by 66 percent if the company adopted the alternative.

Table 2-11
Annualized Cost Comparison for R.R. Donnelley & Sons

	Current Cleaners	Alternative Soy Cleaner
Blanket Wash Cost	$24,180	$74,400
Roller Wash Cost	$38,588	$29,400
Total Cost	$62,688	$103,800

Exhibit 2-29
Current Roller Cleaner Used at R.R. Donnelley & Sons

ANCHOR

MATERIAL SAFETY DATA SHEET

The Anchor MSDS information provided on this site is updated on a monthly basis and com
OSHA's Hazard Communication Standard (CFR 1910.1200) and the American National Standard
(ANSI Standard for Material Safety Data Sheets (ANSI Z400.1).

Finished Goods Catalog

7755 - ENVIROWASH 220 ACID LCMX

Manufacturer Name

ANCHOR LITHOKEMO, A SUBSIDIARY OF FUJI HUNT

SECTION 1 - COMPANY IDENTIFICATION

Catalog / Sub-assembly Number: 7755
ANCHOR LITHOKEMO, A SUBSIDIARY OF FUJI HUNT
50 Industrial Loop North
Orange Park, FL 32073

TRANSPORTATION EMERGENCIES (24HR)
Inside US/Canada 800-424-9300
Outside US/Canada 703-527-3887
(accepts collect calls)
MEDICAL EMERGENCIES (24HR)
Prosar 877-915-7787
NON-EMERGENCY
EHS Info 904-264-3500
General Info 800-354-2300

FOR INDUSTRIAL USE ONLY.....USE ONLY AS DIRECTED.....DO NOT TAKE INTERNALLY!

SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

Ingredients	CAS Number	Wt.%	OSHA PEL (mg/m3)	ACGIH (mg/m3)
Aliphatic Hydrocarbon	64742-88-7	10-20%	100ppm	100ppm
Aromatic Hydrocarbons	70693-06-6	5-10%	NE	NE
Fatty Acid Ester	TSPM 05-0836 -332-5835	15-30%	NE	NE
Aliphatic Hydrocarbon	8042-47-5	50-70%	5 TWA	10 STEL

NE=Not Established STEL=Short Term Exposure Limit C=Ceiling Limits

SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

****

Appearance: Light, yellow liquid
Odor: Mild Odor

Avoid contact with eyes, skin or clothing. Avoid breathing mist or vapor. Do not swallow. Wear chemical safety goggles & chemical resistant gloves. Wash thoroughly after handling. Keep container closed when not in use. Use only

with adequate ventilation. May produce hazardous gases under fire conditions. During emergencies, wear equipment to protect eyes, skin and respiratory tract. Dike or absorb spills to keep material and run-off from entering sewer or waterways. Use water spray to cool containers and disperse vapors. Consult MSDS for additional information.

HMIS: Health: 2 Flammability: 2 Reactivity: 0 Protection: B
NFPA: Health: 2 Flammability: 2 Reactivity: 0 Spec. Haz.: CORR

Hazard Rating: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe
A = Gloves B = Gloves & Goggles C = Gloves, Goggles & Apron
D = Face Shield, Gloves, Goggles & Apron

UN NO: NA1993
DOT GUIDE: ERG Guide 128

****

Potential Health Effects:
Skin: Contact causes irritation.
Eyes: Causes irritation.
Inhalation: Irritant to respiratory tract and mucous membranes.
Ingestion: Ingestion of product may cause nausea and vomiting.
Conditions aggravated by exposure:
None expected except those associated with acute effects.
N

SECTION 4 - FIRST AID MEASURES

Eye Contact: Immediately flush with CLEAN water for 15 minutes. Call a physician.
Skin Contact: In case of skin contact; wash with soap and water for 15 minutes. Call a physician.
Ingestion: In case of ingestion; do not drink water. Do not induce vomiting. Call a physician.
Inhalation: Immediately remove victim to fresh air. Call a physician for further recommendations.

SECTION 5 - FIRE FIGHTING MEASURES

Flammable Properties
Flash Point: 165 Deg F (TCC)
Autoignition Temperature: N/A deg F (CC)
Explosion Limits: Lower: N/A vol.%: Not Tested
Upper: N/A vol.%:
OSHA Class IIIA Combustible Liquid

Extinguishing Media:
Choose extinguishing media suitable for the surrounding materials, such as water spray, dry chemical, alcohol foam or carbon dioxide.
Unsuitable Extinguishing Media:
No restrictions on media based on knowledge of this material.
Fire Fighting Instructions:
Water spray should be used to cool fire exposed containers and to disperse un-ignited vapors. Use NIOSH/MSHA approved positive pressure self-contained breathing apparatus when material has ignited or becomes involved in a fire. Try to remove material containers from fire area if can be accomplished without risk to personnel.

Evacuate area and fight fire from a safe distance. Call your local fire department. Wear positive pressure, breathing apparatus and protect eyes and skin. Use water to cool fire-exposed containers, to protect personnel and to disperse vapors and spills. Fire media run-off can damage the environment. Dike and collect media used to fight fire.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Small Spills:
For small incidental spills and leaks wear chemical safety goggles, and neoprene gloves and apron or coveralls. Isolate area of spill by diking. Stop source of leak. Add dry absorbent. Clean up and place in an approved D.O.T. container and seal. Wash all contaminated clothing before reuse, and discard contaminated leather shoes.
Large Spills:
For larger spills requiring emergency response, neoprene boots and respiratory protection may also be required. Follow OSHA regulations and NIOSH recommendations for respirator use (29 CFR 1910.134 and NIOSH Pub. 87-108) and emergency response (see 29 CFR 1910.120). Isolate area of spill by diking. Stop source of leak. Add dry absorbent. Clean up and place in an approved D.O.T. container and seal. Wash all contaminated clothing before reuse, and discard contaminated leather shoes. Call the emergency telephone number shown on the front of this sheet.

SECTION 7 - HANDLING / STORAGE

Handling:
Avoid contact with eyes, skin or clothing. Avoid breathing mist or vapor. Do not swallow. Wear chemical safety goggles and neoprene gloves and apron. Wash thoroughly after handling. Keep container closed when not in use. Use only with adequate ventilation.
Storage:
Store in a cool, dry, well-ventilated area away from all sources of ignition. Keep containers closed when not in use.

SECTION 8 - EXPOSURE CONTROL AND PERSONAL PROTECTION

Ventilation:
Good general ventilation should be sufficient for most processing operations. Vent work area to ensure airborne concentrations are below the current occupational exposure limits. Ten (10) or more room air changes per hour containing a minimum of 15% fresh air will meet these requirements. Consult ASHRAE 62-1989 for further requirements.
Personal Protective Equipment
Respiratory Protection: If used under normal operating conditions and with adequate ventilation, respiratory protection is not required. However, refer to OSHA 29 CFR 1910.13
4.
Skin Protection: Chemical resistant gloves
Eye Protection: Chemical safety goggles

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Light, yellow liquid
Odor: Mild Odor
Change in Physical State:

Boiling Point:	350-350	Deg F	
Melting Point:	N/D	deg F	
Specific Gravity:	0.85		Water=1
Vapors Pressure:	0.2		mmHg @ 20C
Viscosity:	N/A		
Solubility in Water:	Emulsifies		
pH Value:	N/A		
VOC (lbs/gal):	2.28	(USEPA Method 24)	

SECTION 10 - STABILITY AND REACTIVITY

Hazardous Polymerization:

Hazardous polymerization WILL NOT occur if product is used and stored as directed. Product is stable if used and stored as directed.
Hazardous Decomposition Products:
Oxides of Nitrogen; Oxides of Carbon
Materials and Conditions to Avoid:
Keep containers and liquids away from all potential sources of ignition. Keep away from excess heat. Avoid contact with strong oxidizers, strong acids and strong bases.

SECTION 11 - TOXICOLOGICAL INFORMATION

Product Information
LD50 (oral, rat): No Data Available
Acute Overexposure:
Skin, eye, mucous membrane and respiratory tract irritant.
Chronic Overexposure:
Prolonged or repeated skin contact may cause allergic reaction and dermatitis.
Ingredient Information:
Swallowing of Hydrocarbons can cause lung damage. Repeated exposure to Hydrocarbons can cause dermatitis.

SECTION 12 - ECOLOGICAL INFORMATION

Ecotoxicity Data: No Data Available
Chemical Fate Data: No Data Available

SECTION 13 - DISPOSAL CONSIDERATIONS

Hazardous Waste Characteristic:
None
Recommendation:
Dispose of contaminated product, empty containers and materials used in cleaning up spills or leaks in a manner approved for this material. Consult appropriate federal, state and local regulatory agencies to ascertain proper disposal procedures. Discharge of processing effluent to the sewer may require a permit. DO NOT discharge effluent solutions to septic systems.

SECTION 14 - TRANSPORTATION INFORMATION

Ground Shipping Information
Proper Shipping Name: Combustible Liquid, N.O.S. (contains Petroleum Naphtha)
Hazard Class: 3
UN/NA Number: NA1593
Packing Group: PGIII
Air (ICAO/IATA) Shipping Information
Proper Shipping Name: Chemicals, N.O.I., Not D.O.T. regulated.
Hazard Class: None
UN No: None
Packing Group: None
Subsidiary Risk: None
UN/DOT Labels Needed: Combustible
International Maritime Organization (IMO) Additional Shipping Class:
IMDG Code: Not Applicable
Amdt. Code: Amdt. N/A
HTS Code: HTS#3814.00.5000.0
Product is labeled in accordance with US D.O.T. 49 CFR.

Further information:
Please call (904) 264-1500 for further D.O.T. information.

SECTION 15 - REGULATORY INFORMATION

**Note: The ingredient information listed in this section is provided for reporting requirements as dictated by USEPA, state and local regulation. If ingredient is listed in this section but not in Section 2, then the concentration of this ingredient is below de minimus (less than 0.1%).

U.S. FEDERAL REGULATIONS:
313 = SARA Title III Section 313 (40 CFR 372 -- Toxic Release Inventory)
355 = SARA Title III Section 302 (40 CFR 355 -- Extremely Hazardous Substance)
302 = SARA Title III Section 304 (40 CFR 302 -- Hazardous Substance List)
CWA = Clean Water Act Priority Pollutants List
CAA = Clean Air Act 1990 Hazardous Air Contaminants
HAP = Clean Air Act - NOM Rule - HAPs

Ingredients	CAS Number	313	355	302	CWA	CAA	HAP
Aliphatic Hydrocarbon	64742-88-7	N	N	N	N	N	N
Aromatic Hydrocarbons	70693-06-0	N	N	N	N	N	N
Fatty Acid Ester	TSRN 06-0826 -331-5005	N	N	N	N	N	N
Aliphatic Hydrocarbon	8042-47-5	N	N	N	N	N	N

TSCA 12(b) Export Notification
CAS NUMBER CHEMICAL NAME
131-11-3 DIMETHYL PHTHALATE (DMP)

TOXICITY INFORMATION:
IRC1 = IARC Group 1 Human Carcinogens List
IRC2 = IARC Group 2 Human Carcinogens List (limited human data)
IRC3 = IARC Group 2B Human Carcinogens List (sufficient animal data)
NTP = NTP Known Carcinogens List
OSHA = OSHA Known Carcinogens List

Ingredients	CAS Number	IRC1	IRC2	IRC3	NTP	OSHA
Aliphatic Hydrocarbon	64742-88-7	N	N	N	N	N
Aromatic Hydrocarbons	70693-06-0	N	N	N	N	N
Fatty Acid Ester	TSRN 06-0826 -331-5005	N	N	N	N	N
Aliphatic Hydrocarbon	8042-47-5	N	N	N	N	N

STATE REGULATIONS:
FL = Florida Hazardous Substance List MA = Massachusetts Right-To-Know List
MI = Michigan Critical Materials List MN = Minnesota Hazardous Substance List
NJ = New Jersey Right-To-Know List PA = Pennsylvania Right-To-Know List

Ingredients	CAS Number	PA	NJ	MN	MI	MA	FL
Aliphatic Hydrocarbon	64742-88-7	N	N	N	N	N	N
Aromatic Hydrocarbons	70693-06-0	N	N	N	N	N	N
Fatty Acid Ester	TSRN 06-0826 -331-5005	N	N	N	N	N	N
Aliphatic Hydrocarbon	8042-47-5	N	N	N	N	N	N

The following information is required by the State of California's Safe Drinking Water and Toxic Enforcement Act of 1986 or Proposition 65. This regulation does not address di minimus levels; therefore, even trace amounts of chemicals included on these lists must be noted with the "Safe Harbor" wording.

WARNING: Known to the State of California to cause cancer:
CAS NUMBER CHEMICAL NAME
91-20-3 NAPHTHALENE
WARNING: Known to the State of California to cause developmental toxicity:
****None Listed****
WARNING: Known to the State of California to cause female reproductive effects
****None listed****

WARNING: Known to the State of California to cause male reproductive effects:
****None listed****

The following designation is used only for those facilities that have air permits in nonattainment areas for ozone:
Non-Photochemically Reactive

SECTION 16 - OTHER INFORMATION

This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.

Exhibit 2-30
Current Blanket Cleaner Used at R.R. Donnelley & Sons

MATERIAL SAFETY DATA SHEET

MSDS NUMBER ▶ 7,591-3 PAGE 1

24 HOUR EMERGENCY ASSISTANCE	GENERAL MEDS ASSISTANCE
SHELL: 713-473-8481 CHEMTREC: 800-424-9300	SHELL: 713-241-4518

BE SAFE

ACUTE HEALTH *	FIRE	REACTIVITY	HAZARD RATING ▶
2	2	0	MINOR - 1 MODERATE - 2 SERIOUS - 3 EXTREME - 4

*For acute and chronic health effects refer to the discussion in Section III

SECTION I

PRODUCT ▶	SHELL MINERAL SPIRITS 145 HT
CHEMICAL NAME ▶	SOLVENT NAPHTHA (PETROLEUM), MEDIUM ALIPHATIC
CHEMICAL FAMILY ▶	HYDROCARBON SOLVENT
SHELL CODE ▶	83003

SECTION II-A PRODUCT/INGREDIENT

NO.	COMPOSITION	CAS NUMBER	PERCENT
1	SHELL MINERAL SPIRITS 145 HT*	64742-88-7	100

*A COMPLEX COMBINATION OF PREDOMINANTLY C8-C12 HYDROCARBONS: EXACT COMPOSITION WILL VARY.

SECTION II-B ACUTE TOXICITY DATA

NO.	ACUTE ORAL LD50	ACUTE DERMAL LD50	ACUTE INHALATION LC50
1	NOT AVAILABLE		
	>35 ML/KG (RAT)	>4 ML/KG (RAT)	>5670 PPM/8H (RAT)

A. G. LAYNE, INC.
4578 BRAZIL STREET
LOS ANGELES, CA 90039
213/245-2345 * FAX # 818/242-7804

SIGNS AND SYMPTOMS
INHALATION AS NOTED ABOVE. EARLY TO MODERATE CNS (CENTRAL NERVOUS SYSTEM) DEPRESSION MAY BE EVIDENCED BY GIDDINESS, HEADACHE, DIZZINESS AND NAUSEA; IN EXTREME CASES, UNCONSCIOUSNESS AND DEATH MAY OCCUR. ASPIRATION PNEUMONITIS MAY BE EVIDENCED BY COUGHING, LABORED BREATHING AND CYANOSIS (BLUISH SKIN); IN SEVERE CASES DEATH MAY OCCUR.

AGGRAVATED MEDICAL CONDITIONS
PREEXISTING EYE, SKIN, AND RESPIRATORY DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

SECTION IV OCCUPATIONAL EXPOSURE LIMITS

ID.	OSHA PEL/TWA	OSHA PEL/CEILING	ACGIH TLV/TWA	ACGIH TLV/STEL	OTHER
**	100 PPM		100 PPM		

**RECOMMEND THAT LIMITS FOR STODDARD SOLVENT BE USED AS A GUIDE.

SECTION V EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT
FLUSH EYES WITH PLENTY OF WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION.

SKIN CONTACT
REMOVE CONTAMINATED CLOTHING/SHOES. FLUSH SKIN WITH WATER. FOLLOW BY WASHING WITH SOAP AND WATER. IF IRRITATION OCCURS, GET MEDICAL ATTENTION. DO NOT REUSE CLOTHING UNTIL CLEANED.

INHALATION
REMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING.

INGESTION
DO NOT INDUCE VOMITING. IF VOMITING OCCURS SPONTANEOUSLY, KEEP HEAD BELOW HIPS TO PREVENT ASPIRATION OF LIQUID INTO THE LUNGS. GET MEDICAL ATTENTION.

NOTE TO PHYSICIAN
"IF MORE THAN 2.0 ML PER KG HAS BEEN INGESTED AND VOMITING HAS NOT OCCURRED, EMESIS SHOULD BE INDUCED WITH SUPERVISION. KEEP VICTIM'S HEAD BELOW HIPS TO PREVENT ASPIRATION. IF SYMPTOMS SUCH AS LOSS OF GAG REFLEX, CONVULSIONS OR UNCONSCIOUSNESS OCCUR BEFORE EMESIS, GASTRIC LAVAGE USING A CUFFED ENDOTRACHEAL TUBE SHOULD BE CONSIDERED.

SECTION VI SUPPLEMENTAL HEALTH INFORMATION

MALE RATS EXPOSED FOR 80 DAYS BY INHALATION TO VAPORS OF SIMILAR SOLVENTS SHOWED EVIDENCE OF KIDNEY DAMAGE. THE RELEVANCE OF THIS EFFECT TO MANIS UNKNOWN. IN ONE OF THE STUDIES A LOW GRADE ANEMIA WAS ALSO OBSERVED.

SECTION VII PHYSICAL DATA

BOILING POINT: 320-372 SPECIFIC GRAVITY: 0.78 VAPOR PRESSURE: <5 @ 100 DEG F (MM HG)

MELTING POINT: NOT AVAILABLE (DEG F) | SOLUBILITY: (IN WATER) NEGLIGIBLE | VAPOR DENSITY: 5.5 (AIR=1)

EVAPORATION RATE (N-BUTYL ACETATE = 1): 0.07

APPEARANCE AND ODOR:
LIGHT COLORED LIQUID. HYDROCARBON ODOR.

SECTION VIII FIRE AND EXPLOSION HAZARDS

FLASH POINT AND METHOD:
104 DEG F (TCC)

FLAMMABLE LIMITS /% VOLUME IN AIR
LOWER: 1 UPPER: 7

EXTINGUISHING MEDIA
USE WATER FOG, FOAM, DRY CHEMICAL OR CO2. DO NOT USE A DIRECT STREAM OF WATER. PRODUCT WILL FLOAT AND CAN BE REIGNITED ON SURFACE OF WATER.

SPECIAL FIRE FIGHTING PROCEDURES AND PRECAUTIONS
CAUTION. COMBUSTIBLE. DO NOT ENTER CONFINED FIRE SPACE WITHOUT FULL BUNKER GEAR (HELMET WITH FACE SHIELD, BUNKER COATS, GLOVES AND RUBBER BOOTS), INCLUDING A POSITIVE PRESSURE NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER.

UNUSUAL FIRE AND EXPLOSION HAZARDS
CONTAINERS EXPOSED TO INTENSE HEAT FROM FIRES SHOULD BE COOLED WITH WATER TO PREVENT VAPOR PRESSURE BUILDUP WHICH COULD RESULT IN CONTAINER RUPTURE. CONTAINER AREAS EXPOSED TO DIRECT FLAME CONTACT SHOULD BE COOLED WITH LARGE QUANTITIES OF WATER AS NEEDED TO PREVENT WEAKENING OF CONTAINER STRUCTURE.

SECTION IX REACTIVITY

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS AND MATERIALS TO AVOID:
AVOID HEAT, FLAME AND CONTACT WITH STRONG OXIDIZING AGENTS.

HAZARDOUS DECOMPOSITION PRODUCTS
CARBON MONOXIDE AND UNIDENTIFIED ORGANIC COMPOUNDS MAY BE FORMED DURING COMBUSTION.

SECTION X EMPLOYEE PROTECTION

RESPIRATORY PROTECTION
AVOID PROLONGED OR REPEATED BREATHING OF VAPORS. IF EXPOSURE MAY OR DOES EXCEED OCCUPATIONAL EXPOSURE LIMITS (SEC. IV) USE A NIOSH-APPROVED RESPIRATOR TO PREVENT OVEREXPOSURE. IN ACCORD WITH 29 CFR 1910.134 USE EITHER AN ATMOSPHERE-SUPPLYING RESPIRATOR OR AN AIR-PURIFYING RESPIRATOR FOR ORGANIC VAPORS.

OSHA HAS ESTABLISHED TRANSITIONAL OCCUPATIONAL EXPOSURE LIMITS FOR THIS PRODUCT AND/OR COMPONENTS OF THIS PRODUCT. REFER TO 29 CFR 1910.1000 FOR THESE TRANSITIONAL LIMITS AND REQUIREMENTS FOR MEETING THESE LIMITS.

PROTECTIVE CLOTHING
AVOID CONTACT WITH EYES. WEAR SAFETY GLASSES OR GOGGLES AS APPROPRIATE. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. WEAR CHEMICAL-RESISTANT GLOVES AND OTHER CLOTHING AS REQUIRED TO MINIMIZE CONTACT. TEST DATA FROM PUBLISHED LITERATURE AND/OR GLOVE AND CLOTHING MANUFACTURERS INDICATE THAT

ADDITIONAL PROTECTIVE MEASURES
BEST PROTECTION IS PROVIDED BY NITRILE MATERIAL. USE EXPLOSION-PROOF VENTILATION AS REQUIRED TO CONTROL VAPOR CONCENTRATIONS. AIR-DRY CONTAMINATED CLOTHING IN A WELL VENTILATED AREA THEN LAUNDER BEFORE REUSING.

ION XI ENVIRONMENTAL PROTECTION

R LEAK PROCEDURES
ION. COMBUSTIBLE. *** LARGE SPILLS *** ELIMINATE POTENTIAL SOURCES OF IGNITION. WEAR
OPRIATE RESPIRATOR AND OTHER PROTECTIVE CLOTHING. SHUT OFF SOURCE OF LEAK ONLY IF SAFE TO DO
DIKE AND CONTAIN. REMOVE WITH VACUUM TRUCKS OR PUMP TO STORAGE/SALVAGE VESSELS. SOAK UP
DUE WITH AN ABSORBENT SUCH AS CLAY, SAND, OR OTHER SUITABLE MATERIAL; PLACE IN NON-LEAKING
AINERS AND SEAL TIGHTLY FOR PROPER DISPOSAL. FLUSH AREA WITH WATER TO REMOVE TRACE RESIDUE;
OSE OF FLUSH SOLUTION AS ABOVE. *** SMALL SPILLS *** TAKE UP WITH AN ABOSRBENT MATERIAL AND
E IN NON-LEAKING CONTAINERS FOR PROPER DISPOSAL.

ION XII SPECIAL PRECAUTIONS

LIQUID AND VAPOR AWAY FROM HEAT, SPARKS AND FLAME. SURFACES THAT ARE SUFFICIENTLY HOT MAY
TE EVEN LIQUID PRODUCT IN THE ABSENCE OF SPARKS OR FLAME. EXTINGUISH PILOT LIGHTS, CIGARETTES
TURN OFF OTHER SOURCES OF IGNITION PRIOR TO USE AND UNTIL ALL VAPORS ARE GONE. VAPORS MAY
MULATE AND TRAVEL TO IGNITION SOURCES DISTANT FROM THE HANDLING SITE; FLASH-FIRE CAN RESULT.
CONTAINERS CLOSED WHEN NOT IN USE. USE WITH ADEQUATE VENTILATION.

AINERS, EVEN THOSE THAT HAVE BEEN EMPTIED, CAN CONTAIN EXPLOSIVE VAPORS. DO NOT CUT, DRILL.
D, WELD OR PERFORM SIMILAR OPERATIONS ON OR NEAR CONTAINERS.

IC ELECTRICITY MAY ACCUMULATE AND CREATE A FIRE HAZARD. GROUND FIXED EQUIPMENT, BOND AND
AND TRANSFER CONTAINERS AND EQUIPMENT.

ION XIII TRANSPORTATION REQUIREMENTS

MENT OF TRANSPORTATION CLASSIFICATION:
AMABLE LIQUID

.T. PROPER SHIPPING NAME:
OLEUM NAPHTHA

ER REQUIREMENTS:
1255, GUIDE SHEET 27.

TION XIV OTHER REGULATORY CONTROLS

S PRODUCT IS LISTED ON THE EPA/TSCA INVENTORY OF CHEMICAL SUBSTANCES.

ACCORDANCE WITH SARA TITLE III, SECTION 313, THE MDS SHOULD ALWAYS BE COPIED AND SENT WITH THE
E.

TION XV STATE REGULATORY INFORMATION

THIS INFORMATION IS BEING SYSTEMATICALLY ADDED TO OUR MSDS. IT WAS PREVIOUSLY BEEN PROVIDED TO YOU IN VARIOUS WAYS, INCLUDING THE MSDS. THE NEW MSDS FORMAT IS INTENDED TO PROVIDE THE USER WITH THE INFORMATION IN A MORE CONVENIENT MANNER.

SECTION XVI SPECIAL NOTES

THIS REVISION REFLECTS A PRODUCT NAME CHANGE.

THE INFORMATION CONTAINED HEREIN IS BASED ON THE DATA AVAILABLE TO US AND IS BELIEVED TO BE CORRECT. HOWEVER, SHELL MAKES NO WARRANTY, EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF. SHELL ASSUMES NO RESPONSIBILITY FOR INJURY FROM THE USE OF THE PRODUCT DESCRIBED HEREIN.

DATE PREPARED: JANUARY 31, 1990

BE SAFE
READ OUR PRODUCT
SAFETY INFORMATION ...AND PASS IT ON
(PRODUCT LIABILITY LAW
REQUIRES IT)

G. A. VAN BELDEN

SHELL OIL COMPANY
PRODUCT SAFETY AND COMPLIANCE
P. O. BOX 4320
HOUSTON, TX 77210

Exhibit 2-31
Alternative Soy Gold 2000 Blanket Cleaner Tested at R.R. Donnelley & Sons

SOYGOLD 2000 SOLVENT

MATERIAL SAFETY DATA SHEET

EMERGENCY PHONE: 913-599-6911 CHEMTREC: 800-424-9300

SECTION I-IDENTIFICATION

PRODUCT: SOYGOLD® 3000
CAS No.: 67784-80-9
CHEMICAL: Fatty acid methyl esters
SYNONYMS: Methyl esters of soybean oil

SECTION II-INGREDIENTS AND HAZARD CLASSIFICATION

TYPICAL COMPOSITION	CAS	%
Alkyl C_{16}-C_{18}-Methyl Esters	67784-80-9	97-99
Surfactant	9016-45-9	1-3

SARA HAZARD: TITLE III SECTION 313: Not listed FIRE (Section 311/312): None noted

SECTION III-HEALTH INFORMATION

EFFECTS OF OVEREXPOSURE
INHALATION: No known problems
INGESTION: LD_{50}>50ml/kg (albino rats)(similar products)
EYE CONTACT: Not classified as eye irritants
SKIN CONTACT: Not classified as a skin irritant or corrosive material

SECTION IV-OCCUPATIONAL EXPOSURE LIMITS

PEL: NO OSHA PEL TLV: NO ACGIH TLV

SECTION V-EMERGENCY FIRST AID PROCEDURE

FOLLOW STANDARD FIRST AID PROCEDURES
SWALLOWING: Call physician or poison control center.
SKIN CONTACT: Wash affected area.
EYE CONTACT: Flush eyes with cool water for at least 15 minutes. Do not let victim rub eyes.
INHALATION: Immediately remove victim to fresh air. Get medical attention immediately.

SECTION VI-PHYSICAL DATA

BOILING POINT: Over 600° F (315° C) at 760 mm Hg pressure
MELTING POINT: -1° C
VAPOR PRESSURE: 0.882 mm Hg at 25° C
SPECIFIC GRAVITY: 0.882 g/mL at 25° C
DIELECTRIC STRENGTH: >36.9
SOLUBILITY IN WATER: Negligible at room temperature
APPEARANCE AND COLOR: Light yellow to clear and liquid at room temperature
ODOR: Light vegetable oil odor

SECTION VII-FIRE AND EXPLOSION HAZARDS

FLASH POINT & METHOD USED: 425° F (218° C)(PMCC)
FLAMMABLE LIMITS: Not applicable
NFPA RATING: No NFPA rating

HMIS RATING: HEALTH: 0 FIRE: 1 REACTIVITY: 0

AEP 6/2003

SPECIAL FIRE FIGHTING PROCEDURES & PRECAUTIONS
Treat as oil fire. Use water spray, dry chemical, foam or carbon dioxide.

UNUSUAL FIRE & EXPLOSION HAZARDS
Rags soaked with any solvent present a fire hazard and should always be stored in UL listed or Factory Mutual approved, covered containers. Improperly stored rags can create conditions that lead to oxidation. Oxidation, under certain conditions can lead to spontaneous combustion. This product contains antioxidants to retard oxidation.

SECTION VIII-REACTIVITY

STABILITY:	Stable
HAZARDOUS POLYMERIZATION:	None likely
MATERIALS TO AVOID:	Strong oxidizing agents
HAZARDOUS DECOMPOSITION PRODUCTS:	CO_2, CO
CONDITIONS TO AVOID:	None known

SECTION IX-EMPLOYEE PROTECTION

CONTROL MEASURES:	Adequate ventilation
RESPIRATORY PROTECTION:	None required
PROTECTIVE CLOTHING:	No need anticipated
EYE PROTECTION:	None required

SECTION X-ENVIRONMENTAL PROTECTION

ENVIRONMENTAL PRECAUTIONS:	Avoid uncontrolled releases of this material into environment.
SPILL OR LEAK PRECAUTIONS:	Contain spilled material. Transfer to secure containers. Where necessary, collect using absorbent media.
WASTE DISPOSAL:	Dispose of according to federal, state and/or local requirements.

SECTION XI-REGULATORY CONTROLS

DOT CLASSIFICATION:	Class 55
DOT PROPER SHIPPING NAME:	Cleaning Compound, N.O.S.
OTHER REGULATORY REQUIREMENTS:	Listed in TSCA inventory

SECTION XII-PRECAUTIONS: HANDLING, STORAGE AND USAGE

No special precautions necessary.

SECTION XIII-DATE AND SIGNATURE

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process. The stated MSDS is reliable to the best of the company's knowledge and believed accurate as of the date indicated. However, no representation, warranty or guarantee of any kind, expressed or implied, is made as to its accuracy, reliability or completeness and we assume no responsibility for any loss, damage or expense, direct or consequential, arising out of use. It is the user's responsibility to satisfy himself as to the suitableness and completeness of such information for his own particular use.

AG ENVIRONMENTAL PRODUCTS, L.L.C.
9304 PFLUMM
LENEXA, KS 66215

SIGNATURE: William A. Ayres

PREPARED BY: WILLIAM A. AYRES REVISION DATE: 5-01-01

III. ANALYSIS OF RESULTS AND CONCLUSIONS

Analysis of Testing Results

During this project, IRTA tested alternative on-press low-VOC, low toxicity roller and blanket cleaners with 10 participating lithographic printing facilities. One of the facilities, the Los Angeles Times, converted to an alternative that meets the SCAQMD July 1, 2005 VOC limit for on-press cleaners a number of years ago. IRTA tested other alternatives with the Times but the facility decided to continue using the water-based cleaner they had adopted. The San Bernardino Sun converted to a water-based cleaner that meets the future rule requirements for blanket cleaning. IRTA tested other alternatives with the San Bernardino Sun and the company adopted one of them for pipe roller cleaning. A third facility, the City of Santa Monica Print Shop, converted to alternatives more than a year ago after the testing with IRTA was completed. IRTA tested alternatives with a fourth facility, Nelson Nameplate; this facility recently converted to alternatives with a VOC content of 100 grams per liter. IRTA identified and tested alternative blanket and roller wash cleaners with the remaining six facilities. The scaled-up testing for these facilities was conducted for a week.

Table 3-1 summarizes the results of the scaled-up testing for each of the facilities. The first column lists the companies that participated in the testing. The second, third and fourth columns summarize the press type, the ink type and the substrate(s) respectively for each company. The fifth column identifies the alternative low-VOC, low toxicity blanket wash that was found to be most effective at each facility. The VOC content of the cleaner in grams per liter is also shown in this column in parenthesis below the identity of the alternative cleaning agent. The sixth column of Table 3-1 identifies the alternative roller wash that cleaned most effectively in the facility. Again, the VOC content of each of these cleaners is shown below the cleaner in parenthesis.

In all cases, IRTA identified and tested alternative blanket and roller washes that had a VOC content of 100 grams per liter or less. Many of the cleaners had a VOC content that was well below the 100 gram per liter VOC cutoff level specified in Rule 1171. For the Los Angeles Times, the San Bernardino Sun and R. R. Donnelley, IRTA did not test alternative roller washes. The two newspapers use roller wash infrequently and they use materials that comply with the July 1, 2005 VOC limit. R. R. Donnelley & Sons did not elect to perform roller wash testing. IRTA did not test blanket wash alternatives with PIP; the company performs blanket cleaning infrequently.

The two newspapers involved in the project found water-based cleaners to be suitable as alternatives. IRTA also tested a dilute soy based cleaner at the Los Angeles Times and it cleaned very well. For two additional facilities, J.S. Paluch and Presslink, soy based cleaners appeared to perform well as blanket washes and as roller washes. For R. R. Donnelley & Sons, a soy based cleaner was suitable for cleaning blankets. For PIP, a soy based cleaner performed well as a roller wash. For the City of Santa Monica, a soy based

Table 3-1
Project Testing Results

Company	Press Type	Ink Type	Substrate(s)	Blanket Wash (VOC in g/l)	Roller Wash (VOC in g/l)
L.A. Times	Coldset Web	Soy	Newsprint	water-based cleaner (83)	N/A
San Bernardino Sun	Coldset Web	Soy	Newsprint	water-based cleaner (38)	N/A
PIP	Sheet Fed	Solventborne	Coated & Uncoated Paper	N/A	soy (20)
City of Santa Monica	Sheet Fed	Soy	Coated & Uncoated Paper	water-based cleaner (75)	soy (20)
Presslink	Sheet Fed	Solventborne	Coated & Uncoated Paper	soy (20)	soy (20)
The Castle Press	Sheet Fed	Solventborne	Coated & Uncoated Paper	soy/acetone (10)	soy (50)
Nelson Nameplate	Sheet Fed	Soy	Metal, Plastic	acetone/mineral spirits (100)	acetone/water / mineral spirits (100)
The Dot Printer	Sheet Fed	Solventborne	Coated & Uncoated Paper	acetone/soy (2)	soy (50)
J.S. Paluch	Coldset Web	Solventborne	Newsprint	soy (20)	soy (20)
R.R. Donnelley	Heat Set Web	Solventborne	Coated & Uncoated Paper	soy (20)	N/A

Note: N/A is not applicable

cleaner performed well as a roller wash and a water-based cleaner performed well as a blanket wash. At two facilities, The Castle Press and The Dot Printer, the press operators indicated they wanted a faster evaporating cleaner for the blanket wash. In these two cases, IRTA provided a blend of acetone and soy and these were acceptable. Finally, at Nelson Nameplate, soy based cleaners were not appropriate and IRTA tested alternatives that were a blend of acetone, mineral spirits and/or water.

Analysis of Costs

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

cleaning process and the alternative cleaning process respectively. The fourth column shows the percent change in the cleaning cost the facility experienced or would experience by adopting the alternative cleaner. The fifth and sixth columns of Table 3-2 show the VOC emissions from the facility from use of the original and alternative cleaner respectively. Note that the emissions listed here apply only to the cleaning solvent emissions from the specific cleanup operations that were analyzed. They do not include emissions from inks or other non-printing operations or cleaning operations on other presses in the facility that were not analyzed.

Table 3-2
Cost and VOC Emission Comparison for Original and Alternative Cleaners

Company	Original Cleaning Cost	Alternative Cleaning Cost	Percent Change	VOC Emissions With Original Cleaner(s)	VOC Emissions With Alternative Cleaner(s)
Los Angeles Times[a]	Unknown	$29,187	-	54 tpy	5 tpy
San Bernardino Sun	$16,200	$17,339	+7	10.7 tpy	0.5 tpy
PIP Printing	$1,655	$1,790	+8	0.2 tpy	< 0.1 tpy
City of Santa Monica Print Shop[b]	$288	$491	+70	< 0.1 tpy	< 0.1 tpy
Presslink[c]	$1,178	$2,160	+83	0.7 tpy	< 0.1 tpy
The Castle Press[d]	$10,129	$11,520	+14	4 tpy	0.1 tpy
Nelson Nameplate	$1,681	$1,023	-39	0.3 tpy	< 0.1 tpy
The Dot Printer	$11,050	$21,424	+94	8.6 tpy	0.2 tpy
J.S. Paluch	$1,280	$640	-50	0.3 tpy	< 0.1 tpy
R.R. Donnelley & Sons[e]	$62,688	$103,800	+66	35 tpy	1 tpy

[a] The Los Angeles Times has no records to determine the cleaning costs of their original cleaner. IRTA assumed the original cleaner had a VOC content of 800 grams per liter.

[b] Costs include one quart per year of plate cleaner. The VOC content of all original cleaners is unknown and IRTA assumed a VOC content of 800 grams per liter.

[c] IRTA assumed the average VOC content of the two roller washes for the calculations.

[d] IRTA assumed the average VOC content for the two blanket washes and for the two roller washes for the calculations.

[e] The VOC content of the blanket wash was not provided on the MSDS and IRTA assumed it is 800 grams per liter.

The values of Table 3-2 show that three of the facilities that participated in the project reduced or would reduce their cleaning costs through adoption of the alternatives. The values also show that seven of the facilities increased or would increase their cleaning cost through adoption of the alternatives. The cost increases range from seven percent to 94 percent. In general, the companies that would increase their cost through adoption of the alternatives used mineral spirits of various types as their original cleaners. Mineral

spirits are very low cost materials and virtually all other cleaners with either high VOC or low VOC content are more costly. Thus any printer that has relied heavily on mineral spirits cleaners which have high VOC content would likely experience a cost increase in adopting low VOC alternatives.

The costs that were evaluated did not include any savings in emissions fees through reduced VOC emissions. The SCAQMD charges a fee on VOC emissions if a facility emits more than four tons per year of VOCs. The fee amounts to $366.50 per ton of emissions when companies emit between four and 25 tons of VOC per year. The fee is higher, $595 per ton, if companies emit between 25 and 75 tons of VOC per year. The fee applies only to the VOC emissions above four tons per year. Some of the facilities that participated in the project have VOC emissions above four tons per year. From the data in Table 3-2, IRTA believes that four facilities in particular may have VOC emissions above four tons per year. These include the Los Angeles Times, the San Bernardino Sun, The Dot Printer and R. R. Donnelley & Sons. IRTA also believes that R.R. Donnelley & Sons may have emissions that exceed 25 tons per year.

Table 3-3 shows the revised costs of using the original and alternative cleaners taking into account the savings each of the four facilities would realize through the conversion. Four of the facilities are included in the table and the first column shows their identity. The second column shows the VOC emission reduction that was achieved or could be achieved through the adoption of the alternative cleaners. The third column shows the original cleaning cost adjusted to include the VOC emissions fee. The fourth column shows the cleaning cost using the alternative cleaner. The fifth column shows the percent change in the cleaning cost.

Table 3-3
Annualized Cleaning Costs for Original and Alternative Cleaners
With Emissions Fee Savings

Company	VOC Emissions Reduction	Original Cleaning Cost	Alternative Cleaning Cost	Percent Change
Los Angeles Times	49 tpy	Unknown	Unknown	-
San Bernardino Sun	10.2 tpy	$19,938	$17,339	-13
The Dot Printer	8.4 tpy	$14,128	$21,424	+52
R. R. Donnelley & Sons	34 tpy	$82,918	$103,800	+25

Table 3-2 indicated that the Los Angeles Times reduced their cleaning costs through their conversion. Taking into account the additional savings from avoided emission fees of $17,959 per year, the company saved even more. The figures of Table 3-2 indicated that the San Bernardino Sun increased their costs through their cleaning conversion. The values of Table 3-3, taking into account the emissions fees, show that the San Bernardino Sun actually reduced their costs by 13 percent through the conversion. Table 3-2 showed that The Dot Printer would increase their cost by 94 percent through adoption of the alternatives. Taking into account avoided emission fees of $3,078 annually, the company

would still experience a cost increase of 52 percent. R. R. Donnelley & Sons, similarly, would reduce their cost increase from 66 percent to 25 percent because of an avoided emission fee of $20,230 annually.

Summary of Results

During this project, IRTA worked with 10 lithographic printing facilities. The project involved testing low-VOC, low toxicity alternatives for cleaning blankets and rollers. All of the alternatives that were tested had a VOC content of 100 grams per liter or less. The alternative cleaners that were successfully tested were water-based cleaners, soy based cleaners, acetone and blends of these cleaners.

IRTA found alternative cleaners for all of the facilities participating in the project. Four of the ten participating companies had converted or did convert to the alternatives during the project. The other six facilities conducted testing of the alternatives for at least a week and, in one case, for three months. Taking into account avoided emission fees, four of the companies reduced or would reduce their cleaning cost through the conversion. Six companies increased or would increase their cost through the conversion.

This project is part of a larger project involving an additional 10 printing facilities that is designed to evaluate compatibility of the original and alternative cleaners with the blankets and rollers used in the lithographic printing industry. In the larger project, IRTA is conducting longer-term testing with at least seven printing facilities to learn more about extended field performance and compatibility of the alternatives. The results presented here will be included in a report that will summarize the results for all 20 participating facilities.