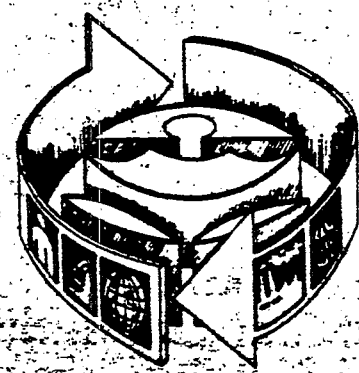


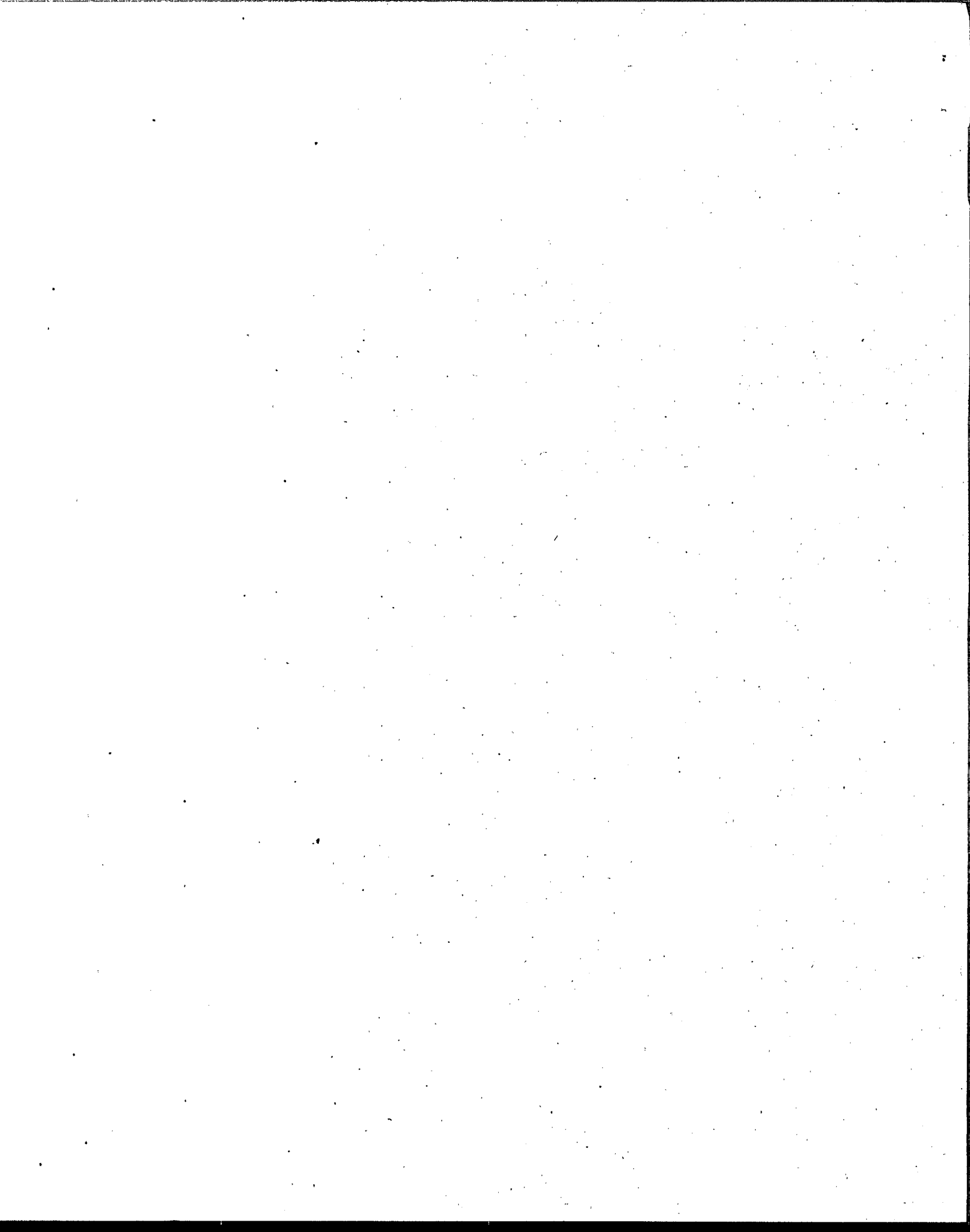
**CASE STUDIES  
from the  
Pollution Prevention Information Clearinghouse  
(PPIC)**

**PRINTING**



**U.S. Environmental Protection Agency  
Office of Environmental Engineering and  
Technology Demonstration  
and the  
Office of Pollution Prevention**

**November 1989**



**INDUSTRY/SIC CODE:**

Printing/2893

**NAME/CONTACT:**

North Carolina Department of Natural Resources, P.O. Box 27687, Raleigh, North Carolina 27611-7687

**TECHNOLOGY DESCRIPTION:**

The process involves substitution of alcohol/acetate inks with water-based inks, and batch distillation of solvents. On some runs, water-based inks are substituted for the traditional alcohol/acetate formulations used in their flexographic printing process. This substitution reduced both the quantity of waste solvents generated and the quantity of solvent released to the atmosphere. However, water-based inks did result in a decrease in print speed and could not be used on products requiring a gloss finish.

Rexham reduced by 80 percent the quantity of propyl alcohol and propyl acetate wastes generated during press cleanup. A 55-gallon capacity batch distillation system was installed to reclaim the solvents, which are then blended with virgin material and reused in ink formulations and press cleanup.

The water-based inks modification reduced the quantity of waste generated and the cost of waste management. The use of water-based inks did not require any capital costs but did require some operator retraining. Each year Rexham saves \$15,000 in virgin solvent costs and \$22,800 in waste disposal costs by recovering and reusing spent cleaning solvents. These savings paid back the \$16,000 installation costs for the distillation system in only 5 months.

**FEEDSTOCKS:** Water-based inks, alcohol and acetone based inks, spent solvents

**WASTES:** Propyl alcohol and propyl acetate, waste ink, spent solvents

**MEDIUM:** Ink

**COST:** (1986 dollars)

**CAPITAL COST:** \$16,000

**OPERATION/MAINTENANCE:**

**MONTHS TO RECOVER:** 5

**SAVINGS:**

**DISPOSAL & FEEDSTOCK:**

**FEEDSTOCK REDUCTION:**

\$15,000/year (16%)

**WASTE PRODUCTION:**

\$22,800/year saved (74%)

**IMPACT:**

The substitution of water-based inks for traditional alcohol/acetate inks significantly reduced waste production. Also, the distillation of alcohol and acetate wastes greatly reduced disposal costs and the demand for virgin feedstocks.

**CITATION/PAGE:**

**Accomplishments of North Carolina Industries - Case Studies, G. Hunt, et al.**

**A presentation of this case study can also be found in:**

**"Proven Profit from Pollution Prevention," D. Huisingsh, L. Martin, H. Hilger, N. Seldman, The Institute for Self-Reliance 2425 18<sup>th</sup> Street, N.W., Washington, D.C., 1985, case study 9, Page 49.**

**KEY WORDS: NC, PRINTING, INK, RECOVERY, SOLVENT, REBLENDING, DISTILLATION, MATERIAL SUBSTITUTION, SIC=2893**

**INDUSTRY/SIC CODE:**

**Commercial Printer/2750**

**NAME/CONTACT:**

**California Department Of Health Services, Alternative Technology Section, 744 P Street, Sacramento, California.**

**TECHNOLOGY DESCRIPTION:**

**The company recycles spent printing inks on site. Under current operating condition a commercial printer produces 200-300 pound waste ink per month which is returned to the manufacturer for reblending and then sold back to the printer. By purchasing a small ink recycler, the printer can recycle its own waste ink by reblending it followed by filtering. A small ink recycler can blend 60 pounds of waste ink with 120 pounds of fresh ink to produce a 180 pounds of reformulated black ink. An ink recycler is manufactured by KMI Marketing, Inc.**

**FEEDSTOCKS: Printing inks**

**WASTES: Waste inks**

**MEDIUM: Waste ink**

**COST:**

**CAPITAL COST: \$5,900**

**OPERATION/MAINTENANCE: \$7,440/year**

**MONTHS TO RECOVER: 7.9**

**SAVINGS:**

**DISPOSAL & FEEDSTOCK: \$8,940/year**

**FEEDSTOCK REDUCTION:**

**WASTE PRODUCTION:**

**IMPACT:**

**Reduces cost of recycling ink by not having supplier recycle ink.**

**CITATION/PAGE:**

**"Waste Audit Study: Commercial Printing Industry," prepared for Alternative Technology Section, Toxic Substances Control Division, California Department of Health Services, May, 1988, Page A-2.**

**KEYWORDS: Printing, SIC=2750, Ink, Reblending**

**INDUSTRY/SIC CODE:**

Printing /

**NAME/CONTACT:**

Alaska Health Project, 431 West Seventh Avenue, Suite 101, Anchorage, AK 99501, (907)276-2864.

**TECHNOLOGY DESCRIPTION:**

This audit was done at a printing company. Suggestions were made as to waste reduction technologies. The three technologies discussed in terms of feasibility were (1) using an aqueous plate making process (2) installing silver recovery units, and (3) use of water-based inks to eliminate spent solvents wastes. All of these would help reduce generation of waste and improve raw materials use.

**FEEDSTOCKS:** Photographic chemicals, developer, replenisher, silver, ink, and solvents

**WASTES:** Photographic chemicals, silver, waste ink, spent solvents

**MEDIUM:** Photographic developers and replenishers

**COST:**

**CAPITAL COST:** \$1,500 (to convert present plate processor), or \$10,000-13,000 for a new aqueous processor  
\$600 (silver recovery)

**OPERATION/MAINTENANCE:**

**MONTHS TO RECOVER:** 24 (silver recovery)

**SAVINGS:**

**DISPOSAL & FEEDSTOCK:**

**FEEDSTOCK REDUCTION:**

**WASTE PRODUCTION:**

**IMPACT:**

By using an aqueous plate processor could potentially reduced hazardous waste disposal costs and resulting decreased liability due to a smaller quantity of hazardous waste produced. Silver recovery technology would reduce the amount of silver to be purchased due to recovery, and would reduce the silver concentration of the photographic wastes. Replacement of solvent-based inks with water-based inks would eliminate spent solvents.

**CITATION/PAGE:** Alaska Health Project - Waste Reduction Assistance Program (WRAP) On Site Consultation Audit Report: Printing Company. Anchorage, Alaska, March 17, 1987, pp. 16.

**KEYWORDS:** Printing, Aqueous Print Plate, Silver Recovery, Film Processing, Material Substitution

**INDUSTRY/SIC CODE:**

Printing/2893

**NAME/CONTACT:**

North Carolina Department of Natural Resources, P.O. Box 27687, Raleigh, North Carolina  
27611-7687

**TECHNOLOGY DESCRIPTION:**

The process involves solvent segregation and reuse, and utilizes carbon adsorption recovery of toluene. Rexham has developed a comprehensive waste management program incorporating several managerial and technical initiatives to reduce waste generation. For example, waste toluene from printing press cleanup has been eliminated by segregating the solvent according to the color and type of ink cleaned from the press. Each segregated batch of toluene is then reused for thinning the same type and color of ink. A carbon adsorption recovery system on the printing lines allows Rexham to capture and recover 90 percent of the toluene previously lost to the atmosphere. The recovered toluene is sold to the coating industry for use as a thinner at about one half the price of virgin solvent. Another major solvent waste stream containing methyl ethyl ketone is sent off-site for recovery and then reused by Rexham for cleanup operations.

Rexham's waste management program has reduced waste management and production costs. The sale of over 4,500 tons per year of toluene captured by the carbon adsorption system realized a small financial return of 1 to 1 1/2 percent. The reuse of the waste toluene cleaning solvent reduced raw material costs and eliminated the cost of disposing of this waste stream.

**FEEDSTOCKS:**

Spent solvents (toluene, methyl ethyl ketone)

**WASTES:**

Toluene, MEK

**MEDIUM:**

Solvents

**COST:**

**CAPITAL COST:**

**OPERATION/MAINTENANCE:**

**MONTHS TO RECOVER:**

**SAVINGS:**

**DISPOSAL & FEEDSTOCK:**

**FEEDSTOCK REDUCTION:**

**WASTE PRODUCTION:**

90% recovery of toluene  
4515 lb toluene waste/year eliminated

**IMPACT:**

**Toluene based waste streams are recovered, segregated and reused, resulting in substantial feedstock reduction. Some is also sold, realizing a small return and eliminating disposal costs. A similar process is employed for methyl ethyl ketone wastes.**

**CITATION/PAGE:**

**Accomplishments of North Carolina Industries - Case Studies, G. Hunt, et al.**

**A presentation of this case study can also be found in:**

**"Proven Profit from Pollution Prevention," D. Huisling, L. Martin, H. Hilger, N. Seldman, The Institute for Self-Reliance 2425 18<sup>th</sup> Street, N.W., Washington, D.C., 1985, case study 35, Page 134.**

**KEY WORDS: NC, SOLVENT, DISTILLATION, CARBON ADSORPTION, ORGANIC CHEMICALS, INK, PRINTING, RECOVERY, WASTE SEGREGATION, SIC=2893**



**INDUSTRY/SIC CODE:**

Printing/27

**NAME/CONTACT:**

Chemical Engineering, January 31, 1977. J.M. Teale, et al., J.M. Teale and Associates, Woodcliffe Lake, New Jersey

**TECHNOLOGY DESCRIPTION:**

The process utilizes a solvent recovery distillation unit. This article reviews the problems of solvent disposal faced by a small printing company and gives the design criteria used to develop a distillation unit to recover solvents at the facility. Calculations are provided for the equipment sizing and selection.

A summary of the capital and operating costs show that for the system designed, the total installation cost of \$6,940 will be paid back in 3.7 months. Therefore, for a relatively minimal capital outlay, this facility can solve the cost and availability problems faced in purchasing virgin solvent as well as avoiding the regulations for disposal of solvent-laden wastestreams.

**FEEDSTOCKS:**

Solvent

**WASTES:**

Still bottoms

**MEDIUM:**

**COST: (1977 dollars)**

**CAPITAL COST:**

\$6,940

**OPERATION/MAINTENANCE:**

**MONTHS TO RECOVER:**

3.7 months (1985 dollars)

**SAVINGS:**

**DISPOSAL & FEEDSTOCK:**

**FEEDSTOCK REDUCTION:**

**WASTE PRODUCTION:**

**IMPACT:** Solves cost and availability problems faced in purchasing virgin solvent as well as avoiding the regulations for disposal of solvent laden waste streams.

**CITATION/PAGE:**

"Fast Payout from In-Plant Recovery of Spent Solvents," J.M. Teale, et al., Chemical Engineering, January 31, 1979.

**KEY WORDS:** NJ, SOLVENT, DISTILLATION, RECOVERY, PRINTING, SIC=27

**INDUSTRY/SIC CODE:**

Package Labeling/7389

**NAME/CONTACT:**

North Carolina Department of Natural Resources, P.O. Box 27687, Raleigh, North Carolina  
27611-7687

**TECHNOLOGY DESCRIPTION:**

The process involves substitution of solvent-based inks, coatings and adhesives with water based ones. Venture Packaging is engaged in a major development program to replace solvent-based inks, coatings and adhesives with water-based materials in order to reduce VOC emissions and the volume of ignitable waste generated. Since this program began in 1980, emissions have been reduced by approximately 55 percent. A further 15-20 percent reduction appears possible with further application of water-based materials.

The greatest success has been achieved in adhesives. Water-based adhesives are now being used for almost all production. Ink development has been more difficult and has varied with the substrate to be printed. Laminating inks have been more successful than surface-print inks.

Although water-based inks are marginally more expensive at present, the long term prediction is that they will be more economical. Capital expenditures have been minimal but experimental costs have been incurred. The alternative, the addition of incineration equipment, would be very costly. Though some incineration will be required to handle those product lines on which water-based material cannot be used, use of water-based inks should reduce the capital costs by at least 50 percent.

**FEEDSTOCKS:** Water and solvent based inks, coatings and adhesives

**WASTES:** Solvent-based inks, coatings and adhesives wastes

**MEDIUM:** Air

**COST:**

**CAPITAL COST:**

**OPERATION/MAINTENANCE:**

**MONTHS TO RECOVER:**

**SAVINGS:**

**DISPOSAL & FEEDSTOCK:**

**FEEDSTOCK REDUCTION:**

**WASTE PRODUCTION:**

**IMPACT:**

**The substitution of solvent-based inks, coatings and adhesives with water-based products reduces VOC emissions and the volume of ignitable wastes generated. Incineration equipment demand is limited due to reduced volume.**

**CITATION/PAGE:**

**Accomplishments of North Carolina Industries - Case Studies, G. Hunt, et al.**

**KEY WORDS: NC, INK, PRINTING, SOLVENT, MATERIAL SUBSTITUTION, SIC=7389**

**INDUSTRY/SIC CODE:**

**Flexible Packaging/275**

**NAME/CONTACT:**

**North Carolina Department of Natural Resources, P.O. Box 27687, Raleigh, North Carolina 27611-7687**

**TECHNOLOGY DESCRIPTION:**

**The process utilizes a carbon adsorption system. RJR Archer installed a carbon adsorption system to capture and recover 98 percent of the solvents that were lost to the atmosphere from printing presses. An average of 2,655 gallons per day of solvent are recovered and either reused in the printing process or sold. To make the system cost effective, two process modifications were initiated prior to installation. Hot exhaust air from the press drying ovens was recirculated in order to minimize the total exhaust volume. The recirculation enabled the size of the recovery system to be scaled down. Additionally, all inks and coatings which normally contain up to five different solvents, were reformulated using only two solvents in each blend. This allowed the adsorption system to operate efficiently. Steam is used to regenerate the carbon beds and recover the captured solvents.**

**The recovery system saves RJR Archer over \$6,300 per day in solvent costs. Such savings enable the company to recover the \$4.3 million cost of the recovery system in 2.5 years. After pay back, RJR Archer estimates about \$1.7 million each year will be saved on operating costs.**

**FEEDSTOCKS:**

**Solvents**

**WASTES:**

**Solvents**

**MEDIUM:**

**Inks, coatings**

**COST:**

**CAPITAL COST:**

**\$4.3 million**

**OPERATION/MAINTENANCE:**

**MONTHS TO RECOVER:**

**30**

**SAVINGS:**

**DISPOSAL & FEEDSTOCK:**

**FEEDSTOCK REDUCTION:**

**\$6,300/day in solvent costs**

**WASTE PRODUCTION:**

**IMPACT:**

**Solvent recovery system pays for itself in 2-1/2 years**

**CITATION/PAGE:**

**Accomplishments of North Carolina Industries - Case Studies, G. Hunt, et al.**

**KEY WORDS: NC, CARBON ADSORPTION, PRINTING, SOLVENT, REBLENDING, MATERIAL  
SUBSTITUTION, RECOVERY, SIC=275**

**INDUSTRY/SIC CODE:**

**Cigarette Paper and Flexible Packaging/2621, 275**

**NAME/CONTACT:**

**North Carolina Department of Natural Resources, P.O. Box 27687, Raleigh, North Carolina  
27611-7687**

**TECHNOLOGY DESCRIPTION:**

**The process utilizes a carbon adsorption system. Ecusta installed a solvent recovery system to remove and recover the solvents contained in the air emissions from their printing operations. All fumes from the presses are collected and ducted to an activated carbon adsorption system consisting of three carbon absorbers each containing 13,350 pounds of activated carbon. After each absorber is spent it is reactivated on-site using steam. Over 700 pounds of solvent is recovered each hour by the system and is reused in the formulation of printing inks.**

**Ecusta reports that the solvent recovery system and ink formulation process saves thousands of dollars each year in raw material costs.**

**FEEDSTOCKS: Cleaning solvents**

**WASTES: Solvent**

**MEDIUM: Air**

**COST:**

**CAPITAL COST:**

**OPERATION/MAINTENANCE:**

**MONTHS TO RECOVER:**

**SAVINGS:**

**DISPOSAL & FEEDSTOCK:**

**FEEDSTOCK REDUCTION:**

**WASTE PRODUCTION:**

**Thousands of dollars each year**

**IMPACT:**

**Solvent recovery system used in printing operation.**

**CITATION/PAGE:**

**Accomplishments of North Carolina Industries - Case Studies, G. Hunt, et al.**

**KEY WORDS: NC, CARBON ADSORPTION, REBLENDING, RECOVERY, SOLVENT, SIC=2621,  
SIC=275**

**INDUSTRY/SIC CODE:**

Printing Inks/2893

**NAME/CONTACT:**

North Carolina Department of Natural Resources, P.O. Box 27687, Raleigh, North Carolina 27611-7687

**TECHNOLOGY DESCRIPTION:**

Thiele-Engdahl recovers and reuses spent isopropyl acetate generated during equipment cleanup. Solvent is used twice for equipment cleanup before being recovered. The solvent is reclaimed on-site using a batch distillation unit. The distillation system processes two 55-gallon batches every 24 hours. The distillation bottoms are sent off-site for disposal.

Before the distillation system was installed, Thiele-Engdahl sent about 5,000 gallons of spent solvent off-site for disposal every 45 days. Reclaiming and reusing the solvents on-site significantly reduced this volume and the quantity of virgin solvents purchased. The savings are projected to fully cover costs for the distillation systems in two years.

**FEEDSTOCKS:**

Isopropyl acetate

**WASTES:**

Organic liquids

**MEDIUM:**

Liquids

**COST:**

**CAPITAL COST:**

**OPERATION/MAINTENANCE:**

**MONTHS TO RECOVER:**

24

**SAVINGS:**

**DISPOSAL & FEEDSTOCK:**

**FEEDSTOCK REDUCTION:**

**WASTE PRODUCTION:**

**IMPACT:**

Reclaiming and reusing the solvents on-site significantly reduced the volume and quantity of virgin solvents purchased.

**CITATION/PAGE:**

Accomplishments of North Carolina Industries - Case Studies, G. Hunt, et al.

**KEY WORDS:** NC, DISTILLATION, ORGANIC CHEMICALS, SOLVENT, RECOVERY, SIC=2893

**INDUSTRY/SIC CODE:**

Printing Ink/2893

**NAME/CONTACT:**

Pollution Prevention Challenge Grant Program, North Carolina Department of Natural Resources, Raleigh, North Carolina

**TECHNOLOGY DESCRIPTION:**

To minimize the waste being generated in the manufacture of water-based inks, wastewater reduction and rinsewater reuse were evaluated. Water Ink Technologies, Inc. installed a high-pressure spray unit that when combined with minor operational changes eliminated the need for a soapy rinse to remove the caked ink. This practice eliminated the addition of contaminants to the rinsewater and allowed the company to reuse the rinsewater. The company benefits by saving the costs of treatment and disposal of wastewater.

**FEEDSTOCKS:**

Ink, Ink/rinsewater

**WASTES**

Aqueous waste with low dissolved solids

**MEDIUM:**

Water

**COST:**

**CAPITAL COST:**

**OPERATION/MAINTENANCE:**

**MONTHS TO RECOVER:**

**SAVINGS:**

**DISPOSAL & FEEDSTOCK:**

**FEEDSTOCK REDUCTION:**

**WASTE PRODUCTION:**

**IMPACT:**

Use of high-pressure unit to clean equipment allows ink manufacturer to reuse rinsewater.

**CITATION/PAGE:**

Waste Reduction Study from Water Based Ink Formulation, Pollution Prevention Challenge Grant Program, July 1987

**KEY WORDS:** NC, INK, WASTEWATER, RINSE PROCEDURES, RECOVERY, SIC=2893



**INDUSTRY/SIC CODE:**

**Photopolymer Printing Plates Manufacturer/2796**

**NAME/CONTACT:**

**San Diego County, Department of Health Services**

**TECHNOLOGY DESCRIPTION:**

**The company used source reduction techniques to reduce the quantity of waste generated in primer application and photopolymer resin preparation. The techniques involved implementing better controls and educating employees about the costs associated with waste generation. Liquid waste was reduced by changing the primer preparation from a system using 55-gallon drums to a bulk tank system. Savings on disposal costs and revenues from the sale of recovered material run to \$344,000.**

**FEEDSTOCKS:**

**Steel coils**

**WASTES: Water with off-spec primer materials, residue from the preparation of photopolymer resin**

**MEDIUM:**

**Liquid, solid**

**COST:**

**CAPITAL COST:**

**OPERATION/MAINTENANCE:**

**MONTHS TO RECOVER:**

**SAVINGS:**

**DISPOSAL & FEEDSTOCK:**

**\$304,000**

**FEEDSTOCK REDUCTION:**

**WASTE PRODUCTION:**

**IMPACT:**

**Review of and implementation of new operating procedures saves money and reduces waste generation.**

**CITATION/PAGE:**

**Source Reduction in Manufacturing Photopolymer Printing Plates, Confidential, Hazardous Waste Minimization, A Resource Book for Industry, San Diego County, Department of Health Services, November 1987**

**KEY WORDS: CA, RINSE PROCEDURES, PRINTING, SIC=2796**

**INDUSTRY/SIC CODE:**

**Printing and Publishing/27**

**NAME/CONTACT:**

**Michael Reid from The Daily Californian**

**TECHNOLOGY DESCRIPTION:**

**The Daily Californian Publishing Company has recycled used ink through the installation of an E-Z ink recycling system. The system collects ink contaminated with paper dust, fountain solutions, and any other contaminants from the ink press and converts the waste ink to usable black ink. The company has realized a net savings of \$28,800.**

**FEEDSTOCKS:**

**Ink**

**WASTES:**

**Waste Ink**

**MEDIUM:**

**Liquid**

**COST:**

**CAPITAL COST:**

**\$8,000**

**OPERATION/MAINTENANCE:**

**MONTHS TO RECOVER:**

**SAVINGS:**

**DISPOSAL & FEEDSTOCK:**

**FEEDSTOCK REDUCTION:**

**\$28,800**

**WASTE PRODUCTION:**

**IMPACT:**

**Ink waste recycle reduces demand for virgin ink and amount of waste to be disposed.**

**CITATION/PAGE:**

**Ink Recycling System, The Daily Californian Publishing, Hazardous Waste Minimization, San Diego County, Department of Health Services, November, 1987**

**KEY WORDS: CA, INK, PRINTING, RECOVERY, SIC=27**

**INDUSTRY/SIC CODE:**

**Printing Inks/2893**

**NAME/CONTACT:**

**Gerrard Salomon for Custom Printing Inks, Ltd.**

**TECHNOLOGY DESCRIPTION:**

**Custom Printing Inks installed a distillation unit to reduce the amount of hazardous waste sludge from 3.5 tons to 1,100 lbs. per year.**

**FEEDSTOCKS:** Ink

**WASTES:** Sludge without heavy metals and sludge containing lead chromate and lead molybdate pigments

**MEDIUM:** Sludge

**COST:**

**CAPITAL COST:**

**OPERATION/MAINTENANCE:**

**MONTHS TO RECOVER:**

**SAVINGS:**

**DISPOSAL & FEEDSTOCK:**

**FEEDSTOCK REDUCTION:**

**WASTE PRODUCTION:** Liquid waste reduced from 3.5 tons to 1,100 lbs

**IMPACT:**

**Reduced cost of disposal.**

**CITATION/PAGE:**

**Waste Recycling Project, Custom Printing Inks, Ltd., Hazardous Waste Minimization, San Diego County, Department of Health Services, November, 1987**

**KEY WORDS: CA, INK, DISTILLATION, SLUDGE, PRINTING, SIC=2893**

**INDUSTRY/SIC CODE:**

**Tobacco Products/SIC 2111**

**TECHNOLOGY DESCRIPTION:**

A batch-distillation unit is used to recover 90%+ of the solvent used to clean engraved printing cylinders, cylinder pans, splatter guards and other machinery used for printing cartons and labels for cigarette packages. The contaminated solvents, after solids settling, had previously been discharged to a 5,000-gallon underground storage tank. The solvents were shipped to a recycler for solvent reclamation or incineration. Sludge was accumulated in 55-gallon drums before shipment to an incineration facility.

**FEEDSTOCKS:** Contaminated solvents

**WASTES:** Solvent, sludge

**MEDIUM:** Liquid, solids

**COST:**

**CAPITAL COST:** \$23,400

**OPERATION/MAINTENANCE:** \$3,500 was reported as hazardous waste disposal costs remaining after installation of this unit

**MONTHS TO RECOVER:** Not reported

**SAVINGS:**

**DISPOSAL & FEEDSTOCK:** \$33,500 in purchase of 55-gal drums, \$5,500 in disposal costs

**FEEDSTOCK REDUCTION:** Recovery of 90+% of cleaning solvents

**WASTE PRODUCTION:** Reduced 95% from 8,820 lbs/mo to 440 lbs/mo

**IMPACT:** 95% reduction in waste production has allowed Liggett to become a small quantity generator. They have significantly reduced their waste disposal costs, while recovering 90% of their cleaning solvents.

**CITATION:** "Case Summaries of Waste Reduction by Industries in the Southeast", Schecter, Roger N., Hunt, Gary, July, 1989, Page 7.

**KEYWORDS:** Solvent recovery, distillation, SIC=2111

**INDUSTRY/SIC CODE:**

**Newspaper production/ISIC = 3420**

**TECHNOLOGY DESCRIPTION:** Discarded printing ink is collected, purified, and reused as black printing ink. Waste ink produced from the printing process and from color changes is collected in an accumulation vessel, passes through four filters, the last of which removes particles down to 25 micron. The purified ink is then mixed with new printing ink for reuse in newspaper production.

**FEEDSTOCKS:** Waste ink with moisture content below 5% and other impurities such as oil and organic solvents below 2%, 0.05 kWh energy consumption per ton paper

**WASTES:** Low volume of synthetic filters and objects from coarse filter

**MEDIUM:** Solid

**COST:**

**CAPITAL COST:** 37,000 Danish kroner (1980)

**OPERATION/MAINTENANCE:** 1.23 Danish kroner per ton of paper

**MONTHS TO RECOVER:** Not reported

**SAVINGS:**

**DISPOSAL & FEEDSTOCK:** 3.0 Dk/ton of paper for destruction of discarded ink  
21.5 Dk/ton savings for reusing the ink

**FEEDSTOCK REDUCTION:** 7 tons of discarded printing ink is treated per year

**WASTE PRODUCTION:** 7 tons of discarded ink requiring disposal in national treatment plant

**IMPACT:** 7 tons of waste no longer require waste disposal in a treatment plant. With a net savings of 24.5 Danish kroner per ton of paper, and about 185,000 tons of paper used per year in Denmark, the possible savings are 4 - 5 million Danish kroner. Annual costs of printing ink are 50 to 60 million Dk (1980).

**CITATION/PAGE:**

Compendium on Low and Non-waste Technology, United Nations Economic and Social Counsel, "Re-use of Printing Ink for Newspaper Production" Monograph ENV/WP.2/5/Add109.

**KEYWORDS:** Ink, printing, recycling, filtration

