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Environmental Protection Agency

F a c t S h e e t

Pollution Prevention

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On-Site Solvent Recycling Equipment

The generation of solvent wastes contributes to air and water pollution and hazardous waste generation. It is one of Ohio's most common environmental problems. Pollution preveniion for industrial solvents should be practiced whenever possible.

The first priority of pollution prevention is to eliminate the initial generation or release of wastes and pollutants at the source (source reduction). For the wastes or pollutants that are generated, the goal is to recycle or reuse them in an environmentally sound manner.

There is a trend of increasing costs for hazardous waste treatment and disposal. The Clean Air Act Amendments of 1990 also mandate reduced release of solvents into the atmosphere. Generators of solvent wastes can profit by creating less waste. Reducing the quantity of solvent used saves on the cost of purchasing virgin solvents and also their management

Businesses may be able to eliminate their solvent wastes by finding an aqueous or semi-aqueous cleaner to replace the solvent. However, these alternatives can create other problems such as additional waste water management Businesses also can recycle solvents on-site in their own equipment, which is the subject of this fact Sheet

Before a company purchases any solvent recycling equipment it needs to consider possible limitations. It is important for a company to investigate whether its spent solvents are recyclable. some industrial solvents are blends of two or more pure solvents and additives. Recycling could alter the industrial solvent's composition and usefulness. By-products of the industrial process also may prevent recycling. Explosive or fire hazard conditions can be created when some materials are distilled. suspended solids affect the efficiency of recycling apparatus and limit which recycling units can be used.

The end-product of the recycling process is of obvious importance. The purity of the recycled solvents should be considered, as some recycled solvents may not be usable for the original purpose. Alternative uses generally can be found. It may not be necessary to recycle a solvent to 100 percent purity for an intended purpose. Additives may be necessary for a solvent to be safe and effective for an industrial process.

Solvent Still Types

There are three generaI solvent still types. The most common technique for recycling solvents is distillation by a simple still Distillation uses the unique boiling points of liquids to separate them from other materials and liquids. The second type, fractional stills, can recover high purity solvents. A fractional still may separate an industrial solvent blend into its pure constituents. Third, thin film evaporation is a rapid process for solvent recycling. In this process a thin film of dirty solvent runs down a heated cylindrical vessel and is vaporized. The pure solvent vapors rise to the top of the evaporator. The vapors are collected and condensed. The recovered solvent is collected in a receiving container. Thin film evaporation requires the dirty solvent to have a low suspended solids content to work well.

Wastes should be segregated whenever possible. If two wastes containing two solvents with similar boiling points are distilled, a simple still may produce a solvent blend of the two solvents. This blend may not be usable for the original purposes of the individual solvents. When pure solvent is the goal, it is best not to mix solvent wastes.

A simple distillation still consists of a heating chamber, a condenser, and a clean solvent collection container. spent so1vent is placed in the heating chamber and vaporized. The vapor is cooled in the condenser, where it liquefies into purified solvent ? The recycled solvent drains into a receiving container. Then the still bottom is removed. Mote spent solvent is placed into the still and the process starts again.

The ease of cleaning should be considered when choosing a still. Still liners facilitate cleaning the still and in disposing the solvent wastes. still bottoms are considered hazardous when a listed hazardous waste solvent is distilled or if they meet hazardous waste characteristics as defined by the federal Resource Conservation and Recovery Act and by Ohio law.

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Solvents with every high boiling points may require reduced atmospheric pressures to be distillled. A vacuum can be used to reduce the atmospheric pressure. Danger from fire hazards explosions are possible in simple stills and can be reduced with the vacuum unit, These units increase the cost of the still.

A variety of stills exist. Batch stills can range in size from three to over 55 gallons. They distill their capacity in a six to eight hour work shift. Small stills can run on electricity while larger stills may require a steam connection. The condenser may be cooled by circulating air, water or a chemical refrigerant. A water hook-up is necessary for water cooled stills. Continuous flow stills range in distillation capacity and can distill as much as 500 gallons per hour.

Stainless steel and teflon fittings and gaskets which are corrosion resistant last longer than other materials. During distillation of spent solvents, water can mix with the solvent resulting in an acidic mixture that is corrosive to the still. Still components such as steel and teflon reduce the wear on the still.

Recycling Costs

Several factors should be considered when reviewing the cost efficiency of a still. These factors include the amount of solvent used by the business, the cost of new solvent, the cost of still bottom or other waste disposal, usefulness of recycled solvent, the operating cost of the still, and the payback period. Electricity, labor requirements, and still liners should be included in the operating costs.

The cost of disposing bulk solvent wastes and the cost of disposing still bottoms only should be compared. The amount of waste and its disposal have associated costs which should be considered. Hazardous waste transporters may have a minimum charge to collect waste.

Safety features should be reviewed before choosing a still. Safety features available include explosion proof electrical compartments and automatic shutdown features. Businesses should investigate if the still shuts down automatically after a batch is finished, if there is a water failure, if the boiling chamber's temperature exceeds a threshold setting, and if the water temperature in the condenser goes above some threshold temperature.

In all circumstances, companies should ask a sales representative to recycle waste samples from their company. This will demonstrate the effectiveness of the recycling still and help determine what is required to make the recycled solvent usable.

Manufacturers and Distributors Servicing Ohio

This partial list of manufactures and distributors of solvent recycling units was prepared bythe Pollution Prevention Section, Division of Hazardous Waste Management, Ohio EPA. Inclusion of a company's name on this list does not constitute endorsement by Ohio EPA. Contact the RCRA Technical Assistance Section, (614) 644-2956, or the Pollution Prevention Section, Columbus, (614) 644-3469, if you have questions concerning hazardous waste and solvent recycling.

Manufacturers of Recycling Stills:

Acra Electric Corp.
3801 N. 25th Ave.
Schiller Park, lL 60176
708-678-8870

Alpha Laval Inc.
955 Meams Rd.
Warminster, PA 48974
215-443-4000

American Auto Products, Inc.
19B Arsenal and Terminal
39th and Butler St
P.O. Box 40136
Pittsburgh, PA 15201

Artisan Industries, Inc.
73 Pond Street
Waltbam, MA 02254-9193
617-893-6800

Better Engineering Mfg., Inc.
7101 Belair Rd.
Baltimore, MD 21206

B/R Instrument Corp.
9119 Centerville Road
Easton, MD 21601
301-820-8800
800-922-9206

Branson Ultrasonic
41 Eagle Road
Danbury, CT 06813
203-796-0392

Ceilcote Master Builders
140 Sheldon Rd.
Berea, OH 44017
216-243-0700

Chemical Management Technology, Inc.
329-7 Parkridge
Orange Park, FL 32065
800-749-1008
904-276-3737

Detrex Corp.
P.O. Box 5111
Southfield, Ml 48086
313-358-5800
502-782-2411

Finish Thompson Inc.
921 Greengarden Road
Erie, PA 16501-1591
814-4554478

Gardner Machinery Co.
P.O. Box 33818
700 N. Summit Ave.
Charlotte, NC 38233
704-372-3890

Giant Distillation and Recovery Co.
900 N. Westwood
Toledo, OH 43607
419-531-4600

Hoffman/Clarkson Ind.
P.O. Box 548
East Syracuse, NY 13057-0548
315-437-0311
800-258-8008

Interel Corp.
P.O. Box 4676
11234 E. Caley Ave. #B
Englewood, CO 80155
303-773-0753

Process Division, LCI Corp.
2407 Worthing Drive
Suite 101
Naperville, IL 60565
708-305-8693

Lenape Equipment Co.
P.O. Box 285
Manasquan, NJ 08736
908-919-0405

Lenape Systems
Bldg. 28, Perimeter Rd.
Allaire Airport
Wall, NJ 07727

National Fluid Separators
Div. of M/J Industries
827 Hanley Industrial Ct.
St. Louis, MO 63144
314-968-2838

PBR Industries, Inc.
400 Farmingdale Road
West Babylon, NY 11704
516-422-0057
800-842-1630

Phaudler Co.
100 West Avenue
Rochester, NY 14692
716-235-1000

Pope Scientific, Inc.
N90 W14337
Commerce Drive
Box 495
Menomonee Falls, WI 53051
414-251-9300

Processall, Inc.
10596 Springfield Pike
Cincinnati, OH 45215
513-771-2266

Progressive Recovery, Inc.
P.0. Box 126
700 Industrial Drive
Dupo, IL 62239
61 8-286-5000

Pure-Flo Distillers, Inc.
16619 Wikiup Road
P.O. Box 1470
Ramona, CA 92065
619-788-0248

D.W. Renzmann GmbH
6557 Monzingen/Nahe
West Germany
0 6751-5011

Siva International
405 Eccles Avenue South
San Francisco, CA 94080
415-589-9600

Solvent Recovery Systems, Inc.
14335 W. Interdrive, Bldg. A
Houston, TX 77032
800-367-5773
713-449-8871

Unique Industries
P.O. Box C4530
Pacoima, CA 91333-4530
818-249-5620

Venus Products
1862 Ives Ave.
Kent, WA 98032
206-854-2660

Westport Environmental Systems
Forge Rd.
P.O. Box 217
Westport, MA 02790-0217
508-636-8811
800-343-9411

Manufacturers of Thin-Film Evaporators:

Artisan Industries, Inc.
73 Pond Street
Waltham, MA 02254-9193
617-893-6800

Blaw-Knox Corp.
750 East Ferry Street
Buffalo, NY
716-895-2100

Cherry-Burrell Corp.
Votator Division
P.O. Box 35600
Louisville, KY 40232
502-491-4310

Groen Inc.
1900 Pratt Blvd.
Elk Grove Village, IL 60007
708-439-2400

LCI Corp.
(Formerly LUWA Corp.)
2407 Worthing Drive
Suite 101
Naperville, IL 60565
708-305-8693

Phaudler Corp.
100 West Avenue
Rochester, NY 14692
716-235-1000

Pope Scientific, Inc.
N90 W14337
Commerce Drive
P. 0. Box 495
Menomonee Falls, WI 53051
414-251-9300

Schott Process Systems
1640 Southwest Blvd.
Vineland, NJ 08360
609-692-4700

Timberline Industries
211 Pawnee Drive
Boulder, CO 80303
800-777-5996

UIC Incorporated
P.O. Box 863
Joliet, IL 60434
800-342-5842

Distributors:

G. H. Diers Co.
P.O. Box 43198
Cincinnati, OH 45243
513-791-1188
Distributor for Westport Environmental Systems, Inc.

Distil Kleen
22 Hudson Place
Hoboken, NJ 07030-5512
201-217-0505
Distributor for D.W. Renzman

Eco/Solutions
388 Morrison Road
Columbus, OH 43213
614-868-2656
Distributor for Chemical Management Technology, Inc.

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Qn-Site Solvent Recycling Equipment

Erie Industrial Supply
931 Greengarden Blvd.
Erie, PA 16512
814-452-3231
800-999-0452
800-999-0575
Representing Finish Thompson Engineering

Flanagan Associates, Inc.
10999 Reed Hartman Hwy.
Suite 139
Cincinnati, OH 45242
513-984-8880
800-852-5820
Distributor for Artisan Industries and D.W. Renzmann

Flanagan Associates, Inc.
6520 Taywood Rd.
Dayton, OH 45322
Distributor for Artisan Industries and D.W. Renzmann

FPE Co.
2 Wildwood Dr.
Milford, OH 45150
513-248-0300
Distributor for Giant Distillation and Recovery

Giangarlo Scientific Co., Inc.
Analytical Instrumentation Sales and Service
162 Steuben Street
Pittsburgh, PA 15220
412-922-8850
Distributor for Pope Scientific

The Lester Johnson Co.
7777 Hub Parkway
Valley View, OH 44125
216-447-5010
Distributor for Siva International (Recyclene and Disti Inc.)

The Lester Johnson Co.
3322-B Morse Rd.
Columbus, OH 43231
614-478-3211

The Lester Johnson Co.
10168 International Blvd.
Cincinnati, OH 45246
513-860-2400

The Lester Johnson Co.
5640 W. Central Ave.
Toledo, OH 43615
419-531-0689

On-Site Recycling of Ohio
1987 Fossway
Cincinnati, OH 45230
513-231-9507
Distributor for Solvent Recovery Systems, Inc.

Patoman, Inc.
4599 County Road 1
Swanton, OH 43558
419-826-6675
Distributor for Giant (Purastill) and Porter Systems

Protech Equipment Co.
10979 Reed Hartman Hwy.
Suite 226
Cincinnati, OH 45242
800-535-3099
Distributor for Ceilcote

R.F.D. Associates
1276 W. 3rd Street
Suite 419, Marion Bldg.
Cleveland, OH 44113
216-781-1855
Distributor for Branson Ultrasonics

Donald E. Sortman Co.
P.O. Box 216
Centerville, OH 45459
513-433-0236
Distributor for Hoffman Air and Filtration Systems.

Tape Industrial Sales, Inc.
3501 E. Conner St.
Noblesville, IN 46060
317-773-6600
Distributor for Finish Thompson Engineering

Tape Industrial Sales, Inc.
204 Production Court
Louisville, KY 40299
502-495-6560
Distributor for Finish Thompson Engineering

Sources

Hazardous Waste Reduction Program, Oregon Department of Environmental Quality. 1989. Guidelines For Waste Reduction and Recycling. August 1989. 45 pages.

Michigan Department of Commerce and Natural Resources. 1991. Considerations in Selecting a Distillation Unit for On- Site Solvent Recycling . Office of Waste Reduction Services Fact Sheet. #9005A. December 1991.

Pollution Prevention Program. North Carolina Department of Environment, Health, and Natural Resources. 1987. Pollution Prevention Tips. 4 pages.

Wisconsin Department of Natural Resources . 1991. Agitated Thin Film Evaporators. Waste Minimization Program Factsheet. PUBL-SW-146 91.

Wisconsin Department of Natural Resources. 1991. On-Site Solvent Recovery Stills. Waste Minimization Program Factsheet. PUBL-SW-150 91.

This is the ninth of a series of fact sheets that Ohio EPA has prepared on pollution prevention. For more information, including a description of the regulatory aspects of on-site solvent recycling, call the RCRA Technical Assistance Section at (614) 644-2956 or the Pollution Prevention Section at (614) 644-3469.

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