

Fact Sheet



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY • ENVIRONMENTAL ASSISTANCE DIVISION • 1-800-662-9278

Considerations in Selecting a Commercial (Off-Site) Solvent Recycling Service

Companies that generate solvent waste understand that the most cost effective and environmentally acceptable method of managing spent solvent is by not generating it in the first place. Source reduction techniques—or minimizing the generation of spent solvent at the source—should be investigated *before* examining the feasibility of recycling spent solvents.

Companies must consider many issues before pursuing solvent recycling as a waste management option. While some companies have chosen to install in-house solvent distillation units to recycle their own spent solvent, others have enlisted the services of a commercial solvent recycling service.

In-house solvent distillation units minimize transportation, disposal, and potential liability costs associated with off-site disposal. Sometimes, however, in-house recycling is not cost effective or consistent with existing facilities and labor skills, or it fails to produce solvent that can be reused by the facility. In these instances, a commercial solvent recycling service may be preferred.

TYPES OF SERVICES OFFERED

Most commercial solvent recyclers accept and recycle spent solvent at a central location. However, a few companies operate mobile units and perform on-site solvent recycling. The mobile units can recycle the same types and quantities of solvents as centralized recyclers, but customers bear the responsibility for disposing of the residuals.

Generally, companies pursue one of three arrangements for recycling spent solvent off-site:

1. *toll recycling*,
2. *speculative recycling*, or
3. *using waste brokers*

MICHIGAN DEPARTMENT OF
ENVIRONMENTAL QUALITY
ENVIRONMENTAL ASSISTANCE DIVISION
PO BOX 30457
LANSING MI 48909-7957
www.deq.state.mi.us



Environmental Assistance Center
1-800-662-9278

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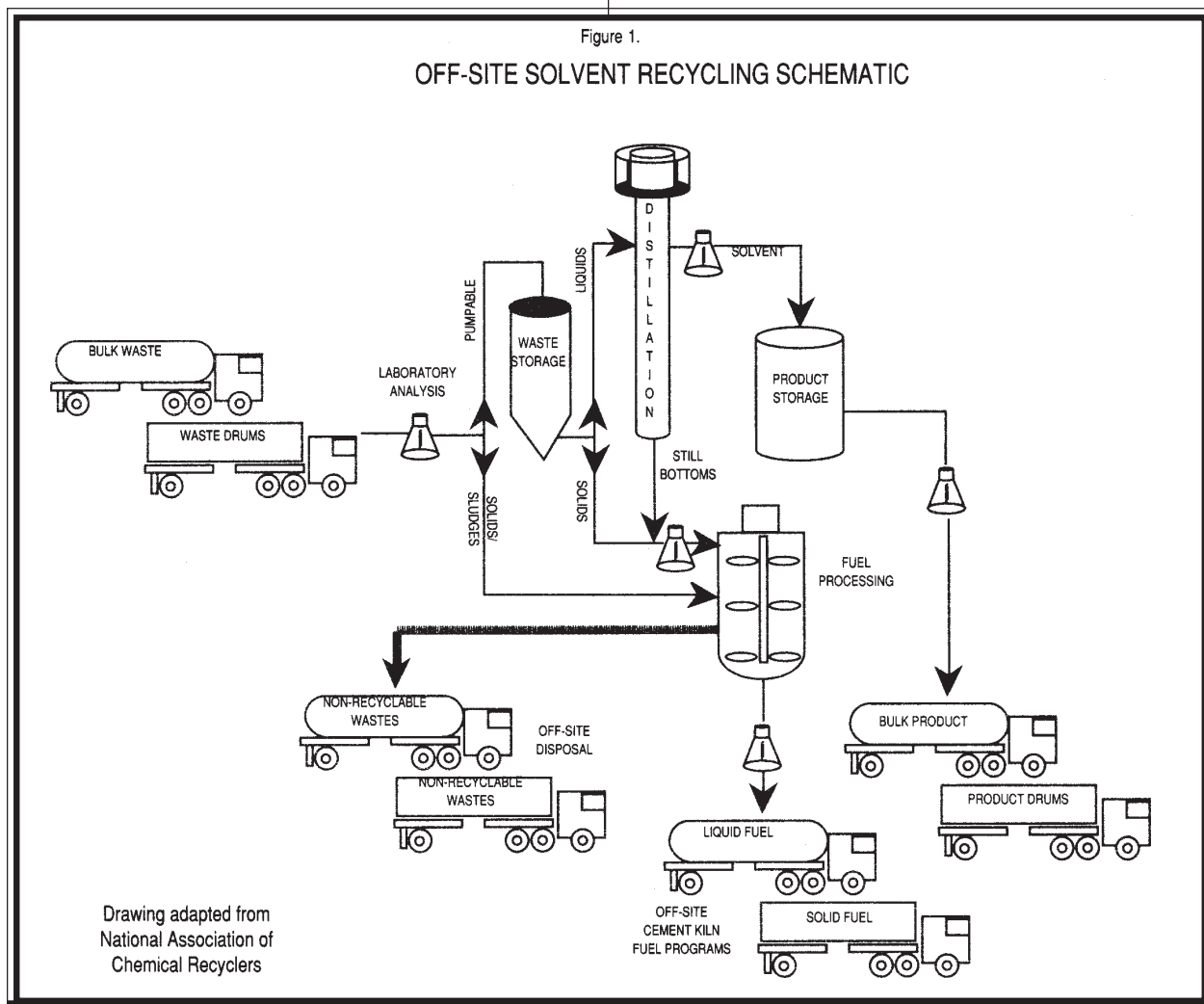
Using waste brokers may not be a true recycling arrangement because even though they sometimes sell spent solvent to solvent recyclers, they usually sell it as a waste-derived fuel for cement kilns and industrial furnaces.

Toll Recycling

Toll recycling offers companies an opportunity to have their spent solvents recycled and then returned to them (see enclosed recycling loop represented in Figure 1). Toll recyclers typically recycle only large batches (2,000 to 5,000 gallons) of solvent, as distillation or other recycling technologies are impractical for small quantities. However, some toll recyclers may accept small quantities (as little as five gallons), which can be combined with small quantities

received by others until they have adequate quantities for batch recycling. Frequently toll recyclers offer a solvent management package including: supplying and maintaining solvent wash equipment, pumping spent solvent from cleaning tanks, replenishing the tanks with fresh solvent, hauling both the spent and replacement solvents to and from the recycling site, and recycling the waste solvent.

During the solvent recycling process contaminants such as water, oil, dirt, and paint residues—called still bottoms—are separated from the clean solvent. Because of their high BTU content, still bottoms are often processed into a fuel and burned for energy recovery in cement kilns.



Speculative Recycling

Companies that wish to dispose of spent solvent without receiving recycled solvent in return may opt for *speculative recycling*.

Speculative recyclers commingle similar solvents from many generators, recycle the spent solvents, and sell the product in the market place as a recycled solvent. Fees charged for speculative recycling reflect the market value of the solvents to be recycled. In some cases where the solvent has high market value, such as chlorinated solvents, the reclaimer will pay the generator for it.

Waste Brokers

Commercial waste brokerage services match waste with potential users who can utilize the waste as a feedstock. Solvent recyclers represent one segment of spent solvent users.

CONSIDERATIONS WHEN SELECTING A RECYCLER

Screening Potential Services

Evaluation of recycling as a waste management option proceeds in stages. Initial evaluation tends to center on logistics and economic feasibility.

When determining whether to explore commercial solvent recycling, first identify solvent recyclers that service a geographic area. Solvent recyclers are included in the Oils & Solvents category of the Michigan Recycled Materials Market Directory (<http://www.deq.state.mi.us/ead/reycle/rmmd.html>).

www.deq.state.mi.us/ead/reycle/rmmd.html.

Solvent recyclers frequently handle only certain types of solvents and usually stipulate minimum quantities accepted.

Prior to processing, solvent recyclers will test spent solvent to determine its composition. Most solvents used today are blends of different solvents of the same family.

In addition to identifying solvent recyclers, determine the availability of registered haulers to transport the spent solvent. Many solvent recyclers offer transportation services to their customers. Alternatively, consider waste brokers or third-party transportation services. Mobile recycling services eliminate the need to transport solvent. However, the company generating the spent solvent will be responsible for the transportation and disposal of the still bottoms.

TYPES OF RECYCLABLE SOLVENTS

PETROLEUM DISTILLATES

- Aliphatics
- Hexane
- Heptane
- Stoddard Solvent
- Mineral Spirits
- Aromatics
- Toluene
- Xylene

OXYGENATED SOLVENTS

- Ketones
- Acetone
- Methyl Ethyl Ketone
- Methyl Isobutyl Ketone
- Esters
- Ethyl Acetate
- Butyl Acetate
- Alcohols
- Butyl
- Methyl
- Isopropyl

HALOGENATED SOLVENTS

- Chlorinated Solvents
- Methylene Chloride
- Perchloroethylene
- Trichloroethylene
- 1,1,1 Trichloroethane
- Fluorinated Solvents
- 1,1,2 Trichlorotrifluoroethane

When evaluating the logistics of off-site solvent recycling, analyze the economic feasibility of using each available commercial recycling service. When conducting an economic analysis, consider the following factors:

- **Quality of recycled solvent.** *The tighter the specification for the recycled solvent, the higher the processing costs (see below for more information regarding solvent quality).*
- **Quality of spent solvent.** *Segregate solvents and keep water out to improve recyclability of the spent solvent and reduce the processing costs.*
- **Quantities.** *Increasing the batch size of spent solvent lowers unit processing costs. Higher recovery or yield of clean solvent is achieved from economy of scale. The set-up costs for processing 100 gallons of spent solvent are the same as for processing 1,000 gallons. Larger batch sizes also reduce unit transportation costs.*
- **Disposal costs of the still bottoms or unrecovered portion of the waste stream.**
- **Transportation costs.**
- **Type of solvent.** *Most chlorinated solvents have higher resale value.*

SOLVENT QUALITY

Solvent quality requirements greatly affect the cost of solvent recycling. It is wise to become familiar with solvent quality requirements.

Although all solvent that has been recycled bears the label “recycled solvent,” the quality of recycled solvent may vary significantly. The solvent quality determination will depend on the type of solvent under consideration. For recycled, non-chlorinated solvents, quality simply refers to solvent purity; i.e., the relative

quantities of contaminants the solvent contains. To determine quality, examine the identities and amounts of constituents in the recycled solvent. For example, recycled acetone may actually contain 95% acetone, 3% water, and 2% various other solvents. Some recyclers can adjust the quality of recycled solvents produced by removing specific contaminants in addition to suspended solids. Others only possess the ability to remove solids. When conducting research, pinpoint the recycler’s ability to adjust solvent quality to meet your needs.

Determining quality for chlorinated solvents requires evaluating whether the recycled products contain proper amounts of acid inhibitors and metal stabilizers. Acid inhibitors neutralize acids formed in the solvent, while metal stabilizers prevent the solvent from corroding the metal it comes in contact with. A recycled chlorinated solvent can be classified as either:

- *a simple recycled solvent to which no inhibitors or stabilizers have been added;*
- *a recycled solvent to which acid inhibitors have been added; or*
- *a recycled solvent that recyclers have restabilized with acid inhibitors and metal stabilizers.*

When accepting recycled solvent, know the quality of solvent being accepted. Set standards and communicate these to recyclers, as contaminated or improperly stabilized solvents can produce problems (see Table 1). Obtain an analysis of the recycled solvents and make certain that those received possess the minimum purity negotiated. The best solvent recyclers analyze their products and will provide data showing contaminant and stabilizer content of their product.

Table 1.

**PROBLEMS RESULTING FROM POOR SOLVENT QUALITY
FOR CHLORINATED SOLVENTS**

<u>Solvent Quality Characteristic</u>	<u>Problems Produced</u>
Low acid inhibitor content	Increased susceptibility to acid condition
Low metal stabilizer content	Reduced corrosion protection, shortened solvent life
Excess metal stabilizer content	Increased flammability hazard
Improper ratio of stabilizers	Reduced effectiveness of metal stabilizers
Presence of incompatible solvents	Increased susceptibility to acid condition
Water contamination	Shortened solvent life. Corrosion on the work piece.

FINAL CONSIDERATIONS

Once a commercial recycler capable of providing the services needed at an acceptable price is identified, final consideration should focus on the recycler's ability to meet regulatory compliance, as well as its reputation.

The federal Resource Conservation and Recovery Act of 1976 (RCRA) and Michigan's Part 111, Hazardous Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451) MCL 324.11101, et seq. charges generators of hazardous wastes with "cradle to grave" responsibility for the hazardous waste they produce. Most spent solvents qualify as hazardous waste because they are flammable and/or toxic. Solvent waste generators must comply with federal and state regulations governing the management and shipment of spent solvent to off-site recyclers. Solvent waste generators may also be liable for damages resulting from mishandling spent solvent. Therefore, learn whether the recyclers being considered are complying with RCRA and Part 111. Before selecting a recycler, conduct an inspection of the facility to ensure that

compliance with regulations is being taken seriously. In particular, pay attention to the following:

- *manifesting and reporting requirements;*
- *permits held by recycling facilities;*
- *record-keeping practices;*
- *liability insurance;*
- *disposal procedures used by recycling facilities for still bottoms;*
- *proof of regulatory compliance; and*
- *environmental monitoring practices of recyclers.*

For information about the status of a solvent recycler's regulatory compliance, contact the nearest field office of the Waste Management Division, Michigan Department of Environmental Quality (telephone numbers follow).

Finally, evaluate the expertise and reputation of solvent recyclers being considered. Do they have their product analyzed? How well do they understand solvent purity requirements prescribed by products and processes?

Most reputable reclaimers can provide testimonials on the services received. Also, speak with other customers. Relying on reputable experts allows for reliable service and helps avoid potential liability problems. Consider similar evaluations of transporters as well.

For further information, contact:

Michigan Department of Environmental Quality
P.O. Box 30004
Lansing, MI 48909
(517) 335-1178 or (800) 662-9278

Michigan Department of Environmental Quality

Waste Management Division Field Offices:

- Marquette (906) 228-6561
- Cadillac (616) 775-3960
- Gaylord (517) 732-3541
- Grayling (517) 348-6371
- Bay City (517) 684-9141
- Grand Rapids (616) 456-5071
- Lansing (517) 373-2730
- Plainwell (616) 685-6851
- Jackson (517) 780-7900
- Livonia (734) 953-0241

National Association of Chemical Recyclers
1875 Connecticut Avenue, N.W., Suite 1200
Washington, D.C. 20009-5728
(202) 986-8150

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Chapter 11: *Commercial (Off-Site) Solvent Reclamation*, by Brian R. Dawson.

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