

## Aqueous Cleaning: A Toolkit for Resilient Business

# CONVERSION COSTS AND BENEFITS

MnTAP's work in pollution prevention and TCE elimination in Minnesota provides businesses with a valuable, third-party perspective on how they can mitigate the risks of using hazardous solvents—for workers, for the environment, and for their bottom lines—by converting to aqueous cleaning.

Our research, in partnership with the Minnesota Pollution Control Agency (MPCA) and the Toxics Use Reduction Institute (TURI) at the University of Massachusetts Lowell, shows that aqueous cleaners come out on top for long-term safety. In many cases, switching to an aqueous cleaning system is a smart long-term business investment as well.

### There's No 'One-Size-Fits-All' Answer

A good aqueous system will meet the needs of a specific business—and we've found that there's an aqueous solution for almost every cleaning challenge. Because these systems are customized to the business need, the costs to adopt aqueous cleaning will vary as well. For example, aqueous systems can work quite well for parts with complex geometries such as threads and blind holes, but in some cases, heat and ultrasonics may be needed to boost effectiveness.

### Considerations for Conversion

#### HAZARDOUS SOLVENTS POSE HIDDEN RISKS TO BUSINESS

In our e-guide *Mitigating the Business Risks of Hazardous Cleaners*, we list many of the business risks companies can face when using hazardous solvents, including worker illness and liability, regulatory non-compliance, loss of productivity, and even reputation damage within their communities.

***"We're always trying to improve our processes and make them easier for our operators. But it has to have a strong ROI from a management perspective. Our aqueous system has not changed the way we cost our product to our customers."***

TIM CARLSON, VICE PRESIDENT OF OPERATIONS  
HIAWATHA RUBBER

Here, we'll focus on the financial considerations of converting to an aqueous cleaning system.

#### LOOK AT BOTH THE INITIAL AND ONGOING EXPENSES

Converting to any new process takes investment. However, with an aqueous cleaning system, upfront costs can often be offset by ongoing annual savings.

In fact, ten out of 11 studies created by pollution prevention organizations across the U.S. showed an overall cost savings. Nine of these studies demonstrated savings of between 15-42%, and one showed 93% savings. Actual savings will vary, but these findings are telling.

#### Initial investments

- **Equipment and training:** Switching to an aqueous cleaning system typically requires new or additional equipment. However, depending on a company's needs, aqueous equipment can be more affordable than other new cleaning systems. New procedures may require workforce training.

## Operating expenses

- **Cleaner costs:** Aqueous cleaners may save money over time. Chemical costs vary widely per pound, but most aqueous cleaners are used at very low concentrations. Reusing or recirculating the cleaning solution is another way to keep chemical costs down. Cleaning chemical suppliers and groups like MnTAP can help businesses assess which products will be most cost-effective.
- **Regulatory licensing and reporting:** Aqueous cleaners are typically considered non-hazardous and may reduce or eliminate the licensing and reporting burdens.
- **Throughput:** How long is the cleaning cycle? Will large parts be cleaned individually, or will many smaller parts be bulk cleaned? Spray systems work well for individual or racked parts. Immersion systems can be used for baskets of parts.



- **Oxidation prevention:** Depending on the level of clean required, rinsing and drying will be added to the system. Rust/oxidation inhibitors are often included with the cleaner.
- **Water treatment:** Softened or deionized water may be required to ensure cleaning and rinsing performance.
- **Waste disposal:** Since most aqueous cleaners are considered non-hazardous, businesses may save money on waste permits and shipping. With proper approvals, an aqueous cleaner may be suitable for disposal down a drain. However,

*“Overall, the process of switching from Trichlor to aqueous has been seamless and a benefit to Hiawatha. We couldn’t be happier with the results thus far, and hope other companies make the same decision.”*

TIM CARLSON, VICE PRESIDENT OF OPERATIONS  
HIAWATHA RUBBER



if the cleaner picks up hazardous contaminants during the cleaning process, the waste may be classified as hazardous.

- **Equipment footprint:** Companies switching to an aqueous cleaning system could see a gain in floor space, especially if replacing an old, large vapor degreasing unit. One of our clients cut its equipment footprint by 87% and another site, from a TURI case study, gained 1,920 sq. ft. of floor space.
- **Maintenance and labor:** Many studies verify that labor costs are similar between aqueous cleaning and vapor degreasing.
- **Safety equipment:** Switching to an aqueous cleaning system may decrease worker exposure to hazardous materials. This may reduce required safety equipment and improve overall worker satisfaction.

## Utilities

- **Energy use:** Energy needs vary by type of equipment. For instance, processes that require a dryer may have higher energy needs. Conversely, modern new equipment may be more energy efficient than the equipment being replaced. There are some examples where switching to aqueous cleaning can reduce overall energy use.
- **Water use:** Aqueous systems do use water for cleaning and rinsing. However, long-lasting aqueous cleaners and closed loop systems can help minimize water use. Enzymatic-microbial cleaners can break down contaminants to prolong cleaner life, reducing wastewater.

## HOW TO GET STARTED

Calculating the costs of conversion to an aqueous cleaning system can be complex. Fortunately, there are many organizations that are eager to help.

## For more information, contact:

- MnTAP ([MnTAP.umn.edu/AqueousToolkit](https://MnTAP.umn.edu/AqueousToolkit))
- Minnesota Pollution Control Agency (MPCA) ([pca.state.mn.us](https://pca.state.mn.us))
- National Small Business Environmental Assistance Program (SBEAP) ([nationalsbeap.org](https://nationalsbeap.org))
- Technical Assistance in Your State ([epa.gov/p2](https://epa.gov/p2))

## ABOUT MnTAP

The Minnesota Technical Assistance Program (MnTAP) is part of the University of Minnesota School of Public Health. Our mission is to strengthen Minnesota businesses by helping them improve efficiency while saving money through energy, water, and waste reduction. Our services are confidential, no-cost, and non-regulatory.

## WHY WE CREATED THIS TOOLKIT

In 2022, Minnesota became the first state to ban the use of Trichloroethylene (TCE) for all businesses requiring an air permit. Known as a powerhouse cleaning agent, TCE is also used in other industrial processes and as an ingredient in some consumer products—but its hazards are now well recognized.

MnTAP, in partnership with the Minnesota Pollution Control Agency (MPCA), the Toxics Use Reduction Institute (TURI) at the University of Massachusetts Lowell, and funded with a grant from the U.S. Environmental Protection Agency Region 5 (U.S. EPA R5), launched the TCE Alternatives Project to help Minnesota businesses make the switch from TCE to effective, safer alternatives.

What we discovered was a need in our business community: a third-party perspective on mitigating the risks associated with cleaning solvents and degreasers, and clear information about alternatives. We hope you'll find this toolkit useful.