Aqueous Cleaning: A Toolkit for Resilient Business

MITIGATING THE BUSINESS RISKS OF HAZARDOUS CLEANERS

In many industries, solvents and degreasers are critical to ensuring operations run smoothly and profitably. However, many of these chemicals come with risks, from worker illness and environmental degradation to company reputation damage. Fortunately, businesses can mitigate these and other risks by switching to a safe, highly effective, aqueous cleaning system.

> ***"Using hazardous materials can be detrimental to a company's reputation. Today's companies are very cognizant about environmental social justice, and how they're perceived in the marketplace by both their clients and communities. Using safe cleaning solvents is part of being a good neighbor."***
>
> LAURA BABCOCK, DIRECTOR, MnTAP

Hazardous Solvents Can Be Bad for Business

Successful businesses help their communities stay strong. Unfortunately, the use of hazardous cleaning solvents can undermine these relationships. Trichloroethylene (TCE) is a good example. While it's inexpensive and effective, it poses well-documented risks to environmental and human health. Community groups are well aware of these dangers. What are less commonly discussed are the potential consequences and hidden costs for the businesses who use it.

THE MANY RISKS OF TCE

Health Risks

- Cancer
- Immunotoxicity
- Reproductive toxicity
- Liver toxicity
- Kidney toxicity
- Neurotoxicity
- Developmental toxicity

Environmental Risks

- Climate change
- Air pollution (smog)
- Surface and groundwater contamination
- Soil contamination

Business Bottom Line

- Productivity and workforce retention challenges
- Workers comp and liability issues
- Regulatory costs/fines
- PPE costs
- Hazardous waste disposal costs
- Environmental clean-up costs
- Reputation damage

Drop-in TCE Alternatives are Not Safer

Many commonly used TCE alternatives pose the same or similar risks as noted above. That's why they're known as "regrettable substitutions." **Yet, when Minnesota banned the use of TCE in 2022, many affected businesses switched to these alternatives. Why?**

Here's what we've learned:

- *The replacement solvent could be dropped in to current processes without requiring new equipment or training.*
- *The solvent was recommended by a trusted supplier.*
- *Product marketing made halogenated alternatives appear superior to aqueous cleaners.*
- *Impartial comparison information was not readily available.*
- *Regulatory compliance deadlines left little time for research and/or conversion to a safer alternative.*

COMMON REGRETTABLE SUBSTITUTIONS

n-Propyl Bromide (nPB)
(referred to as 1-Bromopropane by the EPA)

trans-1,2-Dichloroethylene (tDCE)

HydroFluoroEther (HFE)
Also used as a tDCE co-solvent.

HydroFluoroOlefin (HFO)
Also used as a tDCE co-solvent.

Solvent Choices are Changing Rapidly

The EPA has evaluated the risks of Trichloroethylene (TCE), Tetrachloroethylene (PERC), and n-Propyl Bromide (nPB), which it refers to as 1-Bromopropane, and determined that all three present unreasonable risk of injury to human health under their conditions of use. Now, it's looking at trans-1,2-dichloroethylene (tDCE) using the same evaluation process.

These tDCE-based products are blended with fluorinated solvents (per- and polyfluoroalkyl substances known as PFAS) to reduce flammability and enable use in a vapor degreaser. While PFAS are not currently federally regulated, these "forever chemicals" are facing increasing EPA, state, and consumer scrutiny.

In January 2023, 3M, a major manufacturer of PFAS, announced that it would discontinue making these chemicals, and work to discontinue use of PFAS across its product portfolio by the end of 2025. This change may limit the availability of tDCE-based cleaners in the future.

LACK OF REGULATION DOES NOT MEAN A CHEMICAL IS SAFE

In the United States, chemicals are assumed safe until proven otherwise. It's important to understand that most chemicals in use today have not been evaluated for their risks to humans and the environment. Therefore, lack of regulation cannot be considered an endorsement of safety.

Businesses that chose tDCE as a substitute for TCE are now in a challenging position. Will they need to change their cleaning process again to remain compliant? This all-too-common cycle of repeated change is expensive and time consuming.

Aqueous Cleaning Can Be Better for Business

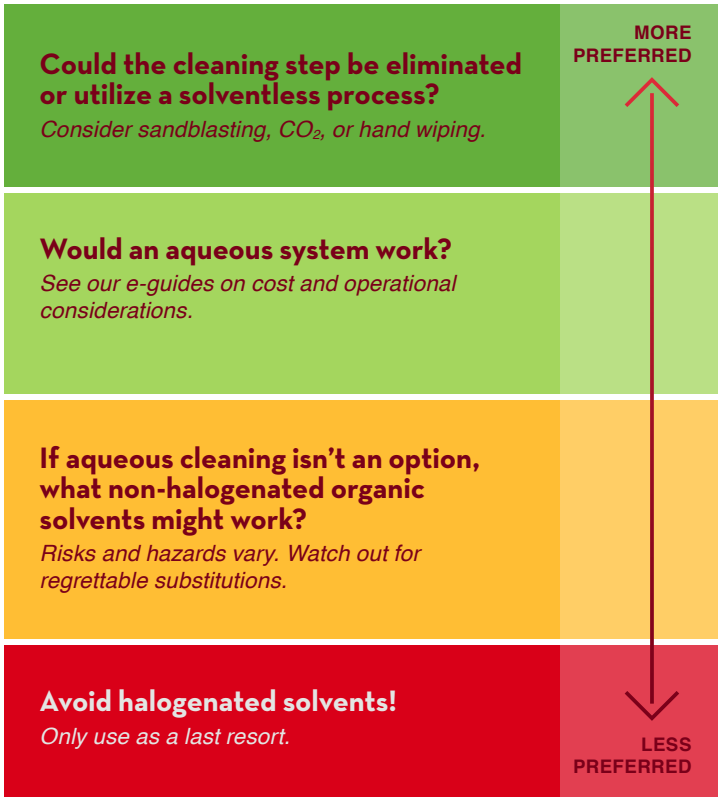
MnTAP's expertise in pollution prevention and TCE elimination in Minnesota provides a reliable, third-party perspective on how businesses of all types can eliminate the risks of using hazardous solvents.

Our research shows that aqueous cleaners come out on top for long-term safety. These cleaners are water soluble—typically water mixed with detergents and surfactants (soaps) to aid in the cleaning process. They perform well, particularly for removing grease, and in most cases, they are non-hazardous to workers and the environment.

> ***"We have definitely reduced our hazardous waste footprint. Even when we used TCE, we were classified as a small waste generator. Now we're 'very small' and I think going forward we might get to the point where we don't have to report at all. That's what I'm hopeful for."***
>
> TIM CARLSON, VICE PRESIDENT OF OPERATIONS
> HIAWATHA RUBBER

ELIMINATING RISK AT THE SOURCE

Businesses have more control than they may think when it comes to mitigating risk. Here are some key questions to ask when changing cleaning processes.



Is an Aqueous Cleaner Always Best?

Aqueous cleaners will work in almost all cases where the cleaning of parts or other materials is required. Cleaning goals will vary for each business, as will the aqueous cleaning formulations, equipment, and processes. In rare cases where an aqueous system is not sufficient, businesses should consult with trusted experts to identify the safest effective options.

Conversion costs will also vary, but given the risks to workers, the environment, and a business' bottom line, these costs can be a smart—even profitable— investment.

Our e-guides *Conversion Cost and Benefits* and *The Nuts and Bolts of Converting to Aqueous* can help businesses explore whether aqueous cleaning might be right for them.

The Time to Act is Now

Many states are keenly interested in Minnesota's 2022 TCE ban, and we're seeing increased oversight and scrutiny of other halogenated solvents. That's why making the switch now to an effective, safe aqueous cleaning system makes good business sense—for the long-term. It could help companies avoid costly risks, and if new regulations are enacted, will help ensure that the businesses our communities depend on keep running smoothly.

HOW TO GET STARTED

MnTAP is here to help businesses learn more about whether aqueous cleaning is the right choice for them. We put business health on par with worker and environmental safety—because they're all intertwined, and they're all important to ensuring our communities thrive.

Additional Resources:

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