

Overview of Regulatory Status of Halogenated Solvents

Several solvents used in parts-cleaning operations — such as methylene chloride (MEC), perchloroethylene (PCE), trichloroethylene (TCE), and n-propyl bromide (nPB) — are all filed under “Risk Evaluation” by the U.S. EPA under the Toxic Substances Control Act (TSCA).

The purpose of the evaluation is to determine whether a chemical substance presents an unreasonable risk to health or the environment under the conditions of use. As part of this process, EPA must evaluate both hazards and exposure, exclude consideration of costs or other non-risk factors, use scientific information and approaches in a manner that is consistent with the requirements in TSCA for the best available science, and ensure that decisions are based on the weight of scientific evidence.

Part 1: Current Regulatory Status: October 23, 2023

- **Methylene Chloride:** In November 2022, EPA released a [final revised risk determination](#) for methylene chloride. The final revised risk determination finds that methylene chloride as a whole chemical substance presents an unreasonable risk of injury to health under its conditions of use.
- **Perchloroethylene:** In June 2023, EPA [proposed to ban most uses of PCE](#) and establish a workplace chemical protection program (WCCP) for uses not prohibited to address the unreasonable risk to human health.
- **Trichloroethylene:** In October 2023, EPA proposed a risk management rule to address unreasonable risk posed by trichloroethylene (TCE) to human health, including the [final revised risk determination for TCE](#)
- **nPB:** also known as 1-bromopropane (1-BP), In December 2022, EPA released a final revised risk determination for 1-BP. The final revised risk determination finds that 1-BP, as a whole chemical, presents an unreasonable risk of injury to health under its conditions of use. [Risk evaluation for 1-Bromopropane](#)

The next step in the process required by TSCA is addressing the risks of these solvents. EPA will develop ways to address the unreasonable risks identified and has up to one year to propose and take public comments on any risk management actions.

However, some states are taking it upon themselves to take action now. In 2020, Minnesota passed a law banning TCE after June 1, 2022, the first state to do so. Other states are also issuing regulations affecting the content limits of volatile organic compounds (VOCs) for solvent cleaners and degreasers:

- Massachusetts companies have reduced their use of TCE by 95%.
- Minnesota and New York have banned the use of TCE in industrial applications.
- Minnesota also banned the use of PCE.
- California has banned the use of TCE in some consumer applications.



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Part 2: Options to Meet Future Parts-Cleaning Needs Regulations

The decisions by the EPA, states, and local communities on further restrictions for halogenated solvent cleaners will have a profound impact on how facilities currently utilizing solvents such as nPB can continue to clean parts to meet stringent requirements.

There are two paths that facilities generally take to ensure they will be in compliance with current and future restrictions on the use of these solvents: using different cleaning chemistry or using different cleaning equipment.

Chemistry Conversion: this entails converting your cleaning system to take advantage of newer solvent-based degreasing systems that provide both efficiency and cost reduction as well as other benefits. Including:

- Significantly higher cleaning efficiency
- Non-flammability
- Faster drying
- Smaller equipment footprint
- Lower operating cost
- Self-cleaning

Equipment Conversion: those facilities that use an open-top vapor degreaser (OTVD) will need to evaluate engineering controls to determine how best to meet current and future regulations. This should include modifications to current equipment or investing in newer closed-loop equipment with better control technology.

For existing open-top vapor degreasers, modifications are recommended to limit vapors from escaping the machine. This can include additional freeboard, additional cooling coils, heated vapor zones or automatic closing covers, or programmable hoists.

- Closed loop or vacuum degreasing systems are completely sealed and do not have an open solvent/air interface. Parts are placed into the machine, and once closed, the solvent is introduced in a closed cabinet.
- Airless or vacuum degreasers effectively shield the operator from the solvent and any emissive vapors.
- Vacuum degreasers allow for the use of several different chemicals, including halogenated solvents, combustible modified alcohols, and azeotropic mixtures.



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Part 3: Considerations When Deciding Chemical Management Actions

Before deciding whether to change your parts-cleaning chemistry or equipment in order to comply with possible solvent regulatory changes, there are several considerations. A facility should examine these before making a decision on what action plan to undertake when it comes to chemical management:

- **Company Policies:** first among the list of considerations is checking whether your organization has policies and procedures already in place that cover using “Chemicals of Concern” as specified by the Toxic Substances Control Act (TSCA). Some companies have adopted “Chemical Prioritization Protocols” to systematically evaluate and potentially eliminate chemicals of concern, so a review of your organization’s policies will help you know where to start.
- **Futureproofing:** as new solvent regulations continue to emerge, a “wait and see” approach may not be an option. For instance, if your site is investing in new equipment, it may be a good time to find equipment solutions that move away from the targeted solvents. Consider what the right decision will be for your company to ensure solvent compliance for years to come.
- **Threshold Limit Value (TLV) vs. Process Needs:** when TLVs are eventually set on these solvents and other cleaning chemistries, will you be able to sufficiently clean parts to meet your needs as well as your customers’ quality expectations?
- **True Costs:** chemistries are just a small part of the overall cost of sustainable cleaning. Consider the direct and indirect costs of converting chemistries or equipment and waste treatment and how those will affect overall budgets and quality standards.
- **Global Manufacturing:** another important consideration is ensuring that your operations can perform the same consistent and high-quality parts-cleaning operations throughout an organization's global operations based on regional regulatory restrictions. For instance, companies that operate in a country where any of these solvents are banned may choose to eliminate it at sites worldwide.
- **Equipment:** ensure that the equipment you choose whether it is an open- or closed-loop system, will be able to meet and exceed requirements in future parts-cleaning operations.
- **Scalability:** is your organization poised to grow? While you may be able to operate within compliance limits now, will that still hold true if the production scale meets future growth objectives?
- **Stabilization:** your system may need to utilize stabilizers to reliably prevent problems with organic acids or sulfur compounds from happening in your system.



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In regard to stabilization, since vapor degreasing is a closed system where solvents are heated and then condensed to clean parts, contaminants such as oil, grease, and emulsions are removed from the parts, and that may have a negative effect on the machine's bath life. As is the case with all distillable cleaning agents, there is the possibility that the acid content of the medium may increase, which can lead to corrosion and process challenges.

Stabilizers are an excellent way to combat this from occurring as they alleviate many of the organic acids and sulfur compounds that can arise from the vapor process. The non-contact stabilizers are added to the machine's steam generator, instead of being added onto parts, and take effect in the areas where potentially harmful substances could develop. As the stabilizer remains in the distillation residue and counteracts the development of acids and sulfur there, it does not come into contact with critical components of the cleaning machine. More importantly, the stabilizers can also help to extend the service life of components in the system that are delicate, such as seals, shut-off slides, valves, and copper cooling units.

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