

Reducing Trichloroethylene (TCE) Waste in the Fabricated Metals Sector

Overview of TCE and Fabricated Metal Manufacturing

Facilities in the [Fabricated Metal Product Manufacturing](#) sector make purchased metal into products through processes such as forging, stamping, bending, forming, welding, machining, and assembly. Some facilities in this sector use the solvent trichloroethylene (TCE) in vapor degreasers, which clean metal parts in preparation for further finishing operations, like painting or welding.

TCE, a volatile organic compound (VOC), poses a human health hazard to the central nervous system, kidney, liver, immune system, reproductive system, and to the developing fetus. TCE is also characterized by EPA as carcinogenic to humans by all routes of exposure (i.e., by inhalation, ingestion, and dermal exposure).^{*} Because of these concerns, EPA selected TCE as one of the first existing chemicals to evaluate for safety under its [Toxic Substances Control Act \(TSCA\) Work Plan](#) and released a [final risk assessment](#) in June 2014 indicating human health risks from inhalation exposures to TCE in certain commercial degreaser use scenarios.

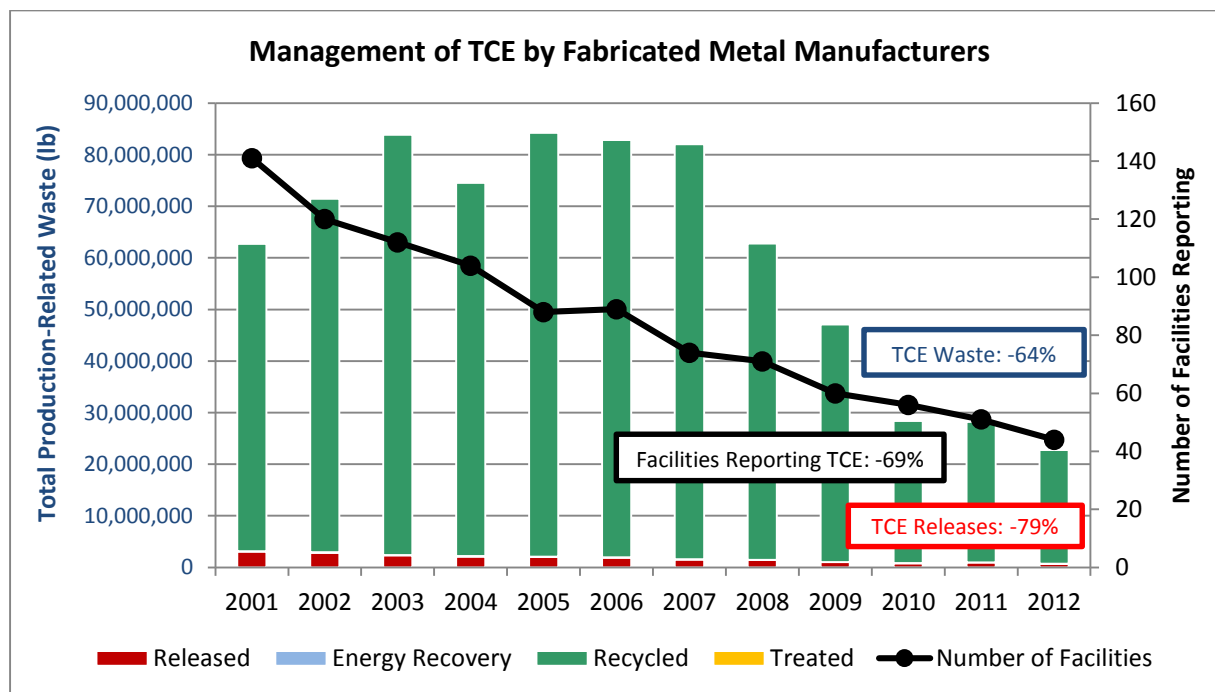
Quick Stats for 2012

- 44 Fabricated Metal facilities reported TCE to TRI
- 21 newly-implemented source reduction (i.e., P2) activities were reported by 15 facilities
- **79% decrease** in TCE releases from 2001-2012

TCE Reductions Reported to the Toxics Release Inventory (TRI)

The quantity of TCE releases reported to TRI by the fabricated metals sector decreased by 79% between 2001 and 2012. The sector's on- and off-site disposal and other releases fell from 3 million pounds to 0.6 million pounds, and its total production-related waste (which includes quantities released, recycled, used for energy recovery, and treated) fell from more than 80 million pounds to less than 30 million pounds reported annually.

The number of fabricated metal facilities reporting TCE to TRI decreased by 69% over this time period (from 141 to 44), indicating that many facilities eliminated TCE use entirely or reduced use below the 10,000 pound reporting threshold. This decrease appears to be the result of P2 activities rather than facility closures, given that the overall number of TRI-reporting facilities in this sector fell by only 20% over the same timeframe.



Commonly Reported P2 Activities for TCE

In 2012, 34% of fabricated metal facilities that submitted TRI forms for TCE reported newly implemented source reduction (i.e., P2) activities—almost four times higher than the national average of 9%. Two types of P2 practices were especially common at the fabricated metal facilities with the biggest reductions in TCE releases: cleaning and degreasing modifications, such as changing to aqueous cleaners from solvents or other materials, and raw material modification (e.g., chemical substitution).

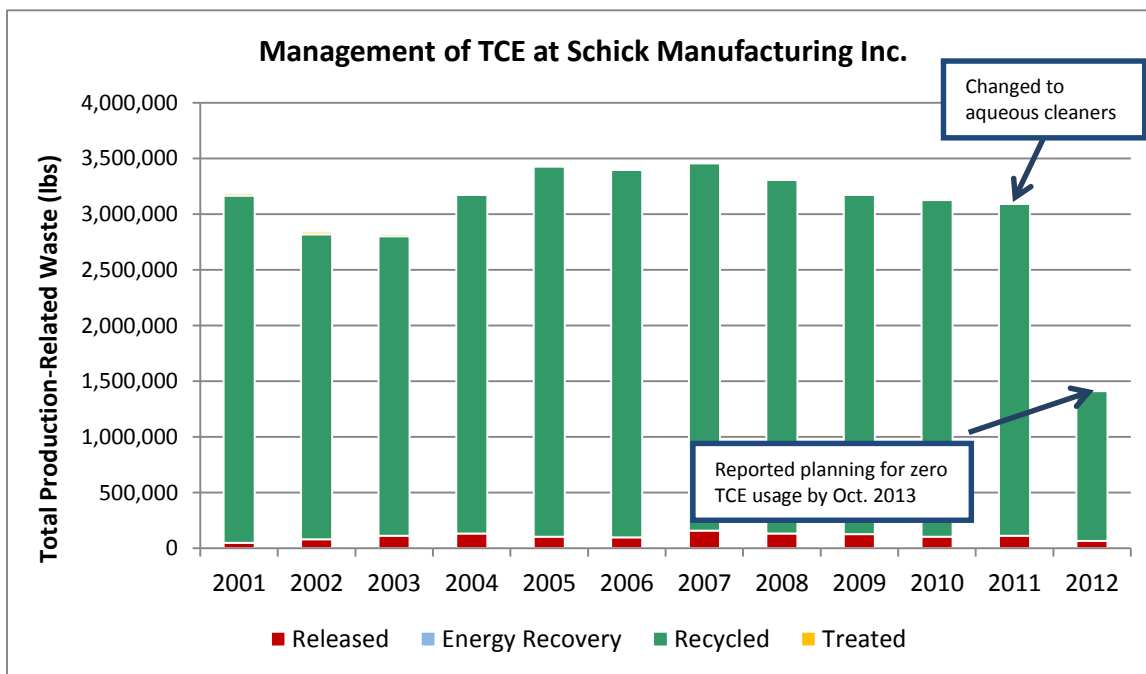
Facilities reporting to TRI have the option to submit text describing their P2 efforts. Examples include:

- Over several years, a [metal heat treating facility](#) first reduced TCE waste by maximizing the load size on their degreasers to improve efficiency, and later eliminated TCE by switching to aqueous degreasing.
- A [metal plating and coating company](#) switched from single-stabilized TCE to double-stabilized TCE, which increased the efficiency of their degreaser and reduced waste.
- A [finishing company](#) implemented additional testing for alkalinity and used additives to prolong bath life, resulting in fewer tank change-outs and a 19% decrease in TCE usage.

It must be noted that not all TCE substitutes are necessarily safer. EPA's [Design for the Environment \(DfE\)](#) Program provides a list of solvents (including degreasers) identified as “safer,” but finding safer alternatives that are functional in any specific application can be a challenge.

Facility Focus: Schick Manufacturing**

[Schick's Verona, Virginia facility](#) (formerly American Safety Razor) manufactures a wide variety of blades and tools. When Schick acquired the facility in 2010, TCE elimination became a priority. The plant installed aqueous “wash boxes” on production lines to replace TCE-based cleaning operations, and also uses an alcohol-based cleaner in vapor degreasing as an effective substitute for TCE. As of October 2013, TCE use was completely eliminated at this plant; the chemical is no longer used in operations and there is no remaining inventory. Although risk reduction was the key driver for these P2 measures, the plant estimates cost reductions of \$250,000 a year from reduced energy, material and hazardous waste disposal costs.



* EPA's toxicological review of TCE is available at www.epa.gov/IRIS/subst/0199.htm.

** Based on TRI forms and information provided in response to a request from EPA's P2 Program.