Pollution Prevention (P2) Spotlight

Reducing Dichloromethane Waste Management

Overview of Dichloromethane (DCM) / Methylene Chloride

Dichloromethane, also known as DCM and methylene chloride (CAS 75-09-2), is an organic solvent that has many industrial uses, including use as a solvent in paint strippers, a process solvent in the manufacture of pharmaceuticals and film coatings, a propellant in aerosols, and a solvent for metal cleaning and finishing in electronics manufacturing.

Inhalation of high levels of DCM can have acute irreversible effects on the central nervous system (CNS), including impaired visual, auditory, and psychomotor functions (e.g., hand eye coordination) and impaired cognition/memory loss. At higher levels DCM exposure can be fatal. Chronic exposure can affect the CNS, causing headaches, dizziness, nausea, and memory loss as well as liver toxicity. EPA considers DCM to be a probable human carcinogen.[1]

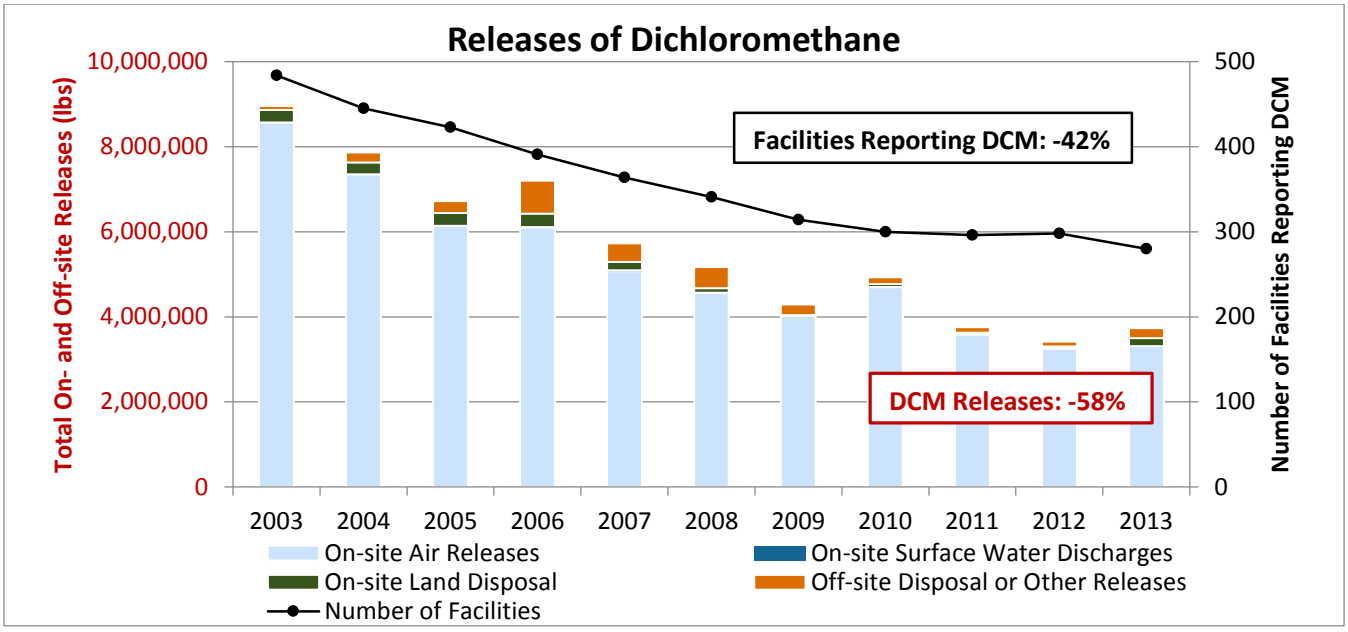
Quick Stats for 2013

- **280 facilities** reported DCM to TRI
- **61** of these facilities reported **78** newly implemented source reduction (P2) activities
- Facilities reported a 58**% decrease** in DCM releases from 2003 to 2013

Dichloromethane Reported to the Toxics Release Inventory (TRI)

The industry that reports the most pounds of releases of DCM is the Chemical Manufacturing sector (NAICS 325), followed by Plastics and Rubber Manufacturing (NAICS 326) and Miscellaneous Manufacturing (NAICS 339, primarily medical device manufacturers). These three industries have each reported significant decreases in their releases of DCM in recent years, as part of an overall trend toward chemical substitution and other P2 activities involving this chemical.

Total releases of DCM have decreased by 58% since 2003, primarily due to a reduction in releases to air, which have fallen 61% and currently make up 92% of all DCM releases. During this time, the quantity of total production-related waste managed (which includes quantities recycled, used for energy recovery, treated, and released) decreased by 41%, from over 250 million pounds to 150 million pounds. The number of facilities reporting DCM also declined over this time period. While facility closures or reduced production levels may explain why some of these facilities stopped reporting DCM, most continued to report to TRI on other chemicals. This indicates that these facilities remain active but have eliminated or reduced DCM usage below TRI reporting thresholds, and in many cases P2 practices have played a role.



[1] EPA's hazard summary of DCM, http://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0070tr.pdf

Commonly Reported P2 Activities for Dichloromethane

In 2013, 61 out of 280 facilities (22%) reporting DCM to the TRI Program also reported newly implemented source reduction (P2) activities. Commonly reported activities include eliminating or reducing use of DCM as a cleaning solvent and modifying equipment to prevent evaporative losses. Other facilities have changed production schedules to minimize changeovers reducing the need for DCM, or have implemented inspection or monitoring programs to prevent potential leaks or spills.

Facilities have the option to give the TRI Program more details describing their P2 efforts. Example P2 projects include:

- An organic chemical manufacturer, who previously used DCM to clean equipment when changing from one process to another, switched to a less hazardous cleaning solution (water and limonene).
- A pharmaceutical facility reuses solvents in distillation for cleaning purposes rather than using virgin solvents, when its clients permit.
- A medical instrument manufacturer redesigned an etching workstation by installing a closed container that dispenses DCM with compressed air through a hose, reducing evaporation by up to 30%.
- An optical instrument manufacturer started using aqueous cleaning solutions instead of DCM.

Dichloromethane is a TSCA Work Plan Chemical

The EPA develops the Toxic Substances Control Act (TSCA) Work Plan for Chemical Assessments to evaluate the risk associated with high-exposure chemicals and formulate risk management actions.

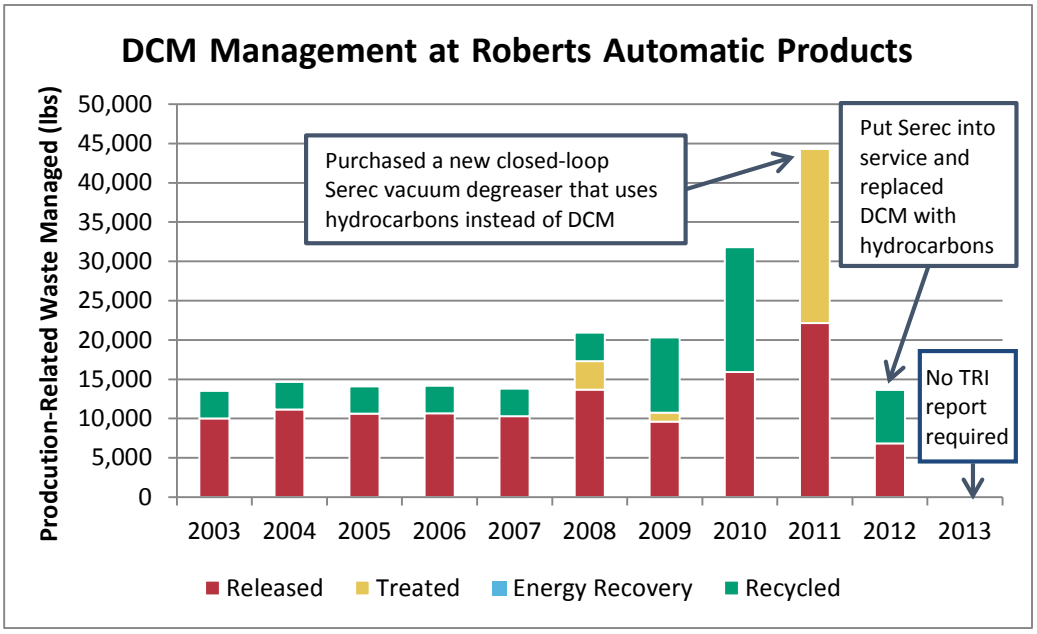
DCM (methylene chloride) was added as a TSCA Work Plan Chemical in 2012 and a risk assessment was completed in 2014 for DCM used in paint stripping. Currently, EPA is initiating a rulemaking to address the risks identified in the risk assessment. To learn more, visit EPA's TSCA website.

Facility Focus: Roberts Automatic Products, Inc.

Roberts Automatic Products, in Chanhassen, Minnesota, is a specialty manufacturer of precision machine parts. Roberts uses a wide variety of metals, including stainless steel, brass and copper alloys, steel and aluminum, as well as engineering polymers such as nylon or Teflon. Roberts used DCM as a degreasing solvent to clean its manufactured parts and reported to TRI as much as 40,000 pounds a year of DCM wastes that were released or treated by the plant.

In 2009, as part of a settlement agreement with the Minnesota Pollution Control Agency, Roberts Automatic designed a supplemental environmental project (SEP) to eliminate the use of DCM at the Roberts plant. The SEP called for Roberts to purchase and convert degreasing operations to a Serec closed-loop vacuum degreasing unit to clean machine parts. Instead of DCM, the new unit uses non-DCM solvents (hydrocarbons) that do not trigger TRI reporting.

Roberts purchased the Serec unit in 2011 and put it into service in 2012. DCM waste managed as reported by the company in 2012 reduced to 13,636 pounds from more than 44,000 pounds the previous year. The facility is no longer required to file TRI reports for DCM and has eliminated DCM as a source of toxic waste and a hazardous air pollutant. In addition to eliminating the use and employee exposure to this chemical, the Serec vacuum reduces energy and solvent consumption and automates the degreasing process while getting the parts cleaner.



Find more P2 examples using the P2 Search Tool at: www.epa.gov/tri/p2