

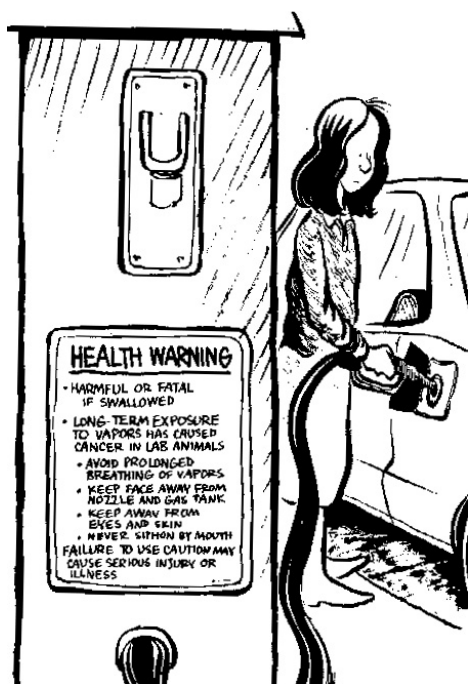
Air Pollution Control in Vermont

Closing the Loop

On Gasoline Vapors

Gasoline: Friend And Foe

You know the fumes you smell when you fill your car with gas? You're probably so used to them you never give them a second thought. You should. They aren't healthy and over time can cause a variety of health problems, including blood and kidney damage, developmental disorders, and cancer.



That might be hard to believe, for gasoline is an important part of our everyday lives as a widely distributed, convenient fuel. But gasoline is a complex mixture of literally hundreds of chemical compounds. Some of these compounds have been shown to be very dangerous to humans. Recent studies have indicated we'd all be better off if we limited our exposure to these potentially toxic gasoline vapors.

Now we can, thanks to the utilization of “vapor recovery systems” that help to “close the loop” and keep gas in our cars, not in our air.

Gasoline's distinctive smell is caused by the release of hydrocarbon vapors whenever gas comes in contact with air. This happens when you or a service station attendant tanks up your car. It also happens when the station's underground tanks are filled by a tanker truck, or even when the gas sits in the tanks and fumes

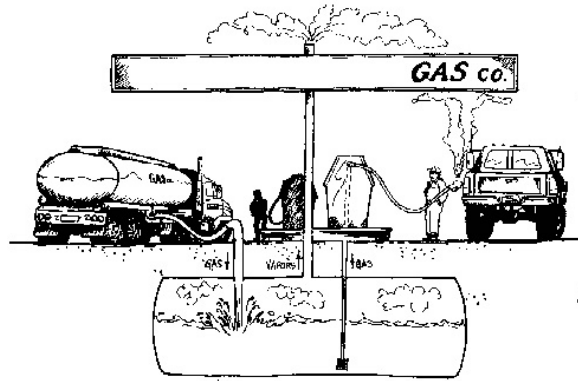
escape through the tanks' vents.

Currently, all tank trucks are fitted with equipment that includes vapor return lines. Vapors that would otherwise be released during deliveries are returned to a distribution terminal and are destroyed or turned back into liquid gasoline. This first stage of “closing the loop” is known as “Stage I” vapor recovery.

Beginning in 1997, the second part of the process was implemented: major gas stations began installing “Stage II” vapor recovery systems. These systems include new nozzles at the pump that capture escaping vapors when individual vehicles are refueled. Small service stations and stores -- those pumping fewer than 400,000 gallons of gas per year -- are not required to install the new nozzles. The phase-in schedule for installing Stage II systems was completed in 2000; all stations in Vermont pumping more than 400,000 gallons of gasoline per year are now required to have these controls in place.

The Vapor Problem

Without vapor recovery systems, gas vapors escape into the atmosphere during tanker truck deliveries and car fill-ups.



Containing Gas Vapors Is Easy

Efforts to control the release of gasoline vapors focus on two key points: when a tanker truck fills the station's storage tanks and when we fill our cars' gas tanks.

The equipment needed for Stage I vapor recovery is quite simple. It consists of the proper fittings on the storage tanks and on the tanker truck so vapors released during the filling of the storage tank are transferred to the truck. Stage II controls require that special nozzles be installed on the pump hoses we use for fill-ups. These nozzles capture the vapors that would otherwise be released when gas is pumped, and route them back to the station's storage tank.

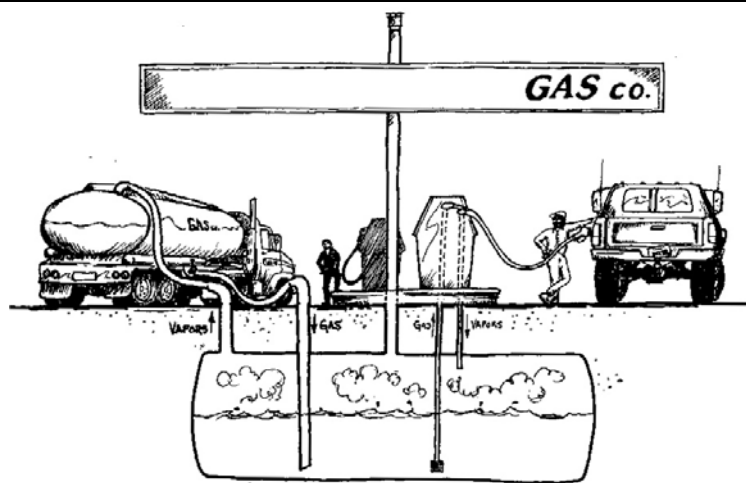
The nozzles and fittings create a "closed loop" for the vapors, preventing them from escaping into the atmosphere. Eventually the vapors are destroyed or turned back into liquid gasoline.

In general, installing Stage II controls may increase gas prices by about a penny a gallon. That's a small price to pay to make Vermont's air cleaner and keep ourselves healthier. And we can save a lot of gasoline, too.

Taking the time to understand these systems and supporting the efforts to install fuel vapor controls on pumps and tanks in Vermont is a smart investment.

The Solution: The Vapor Recovery System

By "closing the loop" and containing gas vapors, we recapture lost gas and protect ourselves from serious health risks.



The Gasoline-Ozone Connection

Another threat to our health and our environment occurs when gasoline vapors and other volatile hydrocarbons react with nitrogen oxides to form ground level ozone (smog). Visible injury to sensitive Vermont forest species has been traced to high ozone concentrations.

Ground level ozone (as opposed to stratospheric ozone that shields the earth from harmful ultraviolet radiation from the sun) poses yet another environmental problem. It is a "greenhouse gas," contributing to global warming.

In the Northeast, ozone concentrations already exceed federal standards in all states except Vermont. Even we, however, are very close to an unacceptable level. Reducing gas vapors will help us stay within standards and contribute to improved air quality in the entire region.

Why Close the Loop?

The popularity of self-service gasoline stations means more people are exposed to gas vapors. And here in Vermont, we are pumping more gasoline every year.

Additionally, gasoline mixtures -- which can contain hundreds of different chemical compounds -- have become more and more complex since lead was eliminated as an additive. These compounds enter our bodies when we breathe gas vapors. It's difficult to evaluate the health risks of all the compounds, but the three that scientists are especially concerned about are benzene, toluene, and xylene.

NESCAUM (Northeast States for Coordinated Air Use Management, a group of air quality officials from the Northeastern states) undertook a three-year review of human and animal studies that showed these vapors pose both a short-term and long-term health risk to humans.

The NESCAUM report concluded that gasoline generally is a probable human carcinogen, and found that its most sensitive adverse health effect is kidney damage. Benzene is a known human carcinogen. Also, benzene is toxic to the blood system and may adversely affect human development. Toluene affects the central nervous system. Xylene may affect the reproductive system and -- like benzene -- adversely affect human development.

What Happens When You Pump Gas

Your car's gas tank contains both liquid gasoline and gasoline vapors. When you pull into a station and fill the tank, liquid gas replaces the vapors. The vapors come out of the tank at the opening, which is what you smell when you pump the gas.

With Stage II controls, the vapor recovery nozzle captures the vapors and sends them back to the station's storage tank. Fittings on the hoses that tankers use to fill the storage tank capture these vapors. They are returned to the distribution terminal, where they can be destroyed or turned back into liquid gasoline.

The NESCAUM study shows inhaling gas vapors should be a major health concern. Those at greatest risk are gas station attendants, followed by drivers who pump their own gas. A system controlling the vapors reduces the risks significantly.



The Vermont Air Pollution Control Division was established to maintain and improve the quality of Vermont's air. Clean air safeguards citizens' health and safety, promotes economic and social development, and enhances enjoyment of the state's natural attractions.

The program described in this pamphlet is one of several administered by the Department of Environmental Conservation as part of this mission.

Questions?

For more information about gas vapors or other air pollution issues, or to receive additional copies of this pamphlet, call the Air Pollution Control Division at 802/241-3840.

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