



A residential neighborhood abuts Cardinal Health's warehouse in east El Paso, Texas. Residents are unaware of the facility's ethylene oxide emissions.
Photo: *Ivan Pierre Aguirre / Grist*

Grist

ARE YOU BEING EXPOSED TO EtO?

Ethylene oxide, a colorless, toxic gas, is used to sterilize medical products, fumigate spices, and manufacture other industrial chemicals. If you work in a facility that uses it, or live next to one that does, you could be at risk.

“ This is a problem that’s national, that is in every community. We have to acknowledge that these products laden with carcinogens are distributed everywhere in our towns and our cities and our warehouses and are potentially affecting communities without even knowing. This is a very complicated problem.

—Rick Peltier, a professor of environmental health sciences at the University of Massachusetts.

Know the facts about ethylene oxide

What is ethylene oxide?

It is a colorless, toxic gas used primarily to sterilize medical products. About half of all sterile medical devices — such as wound dressings, stents, syringes, and catheters — in the U.S. are disinfected with it. It is also used to fumigate spices and dried herbs, dehydrated vegetables, sesame seeds, and walnuts and to manufacture other industrial chemicals.

Ethylene oxide is often abbreviated as **EtO**.

What are the health effects of inhaling ethylene oxide?

EtO is a human carcinogen, which means it can cause cancer. Long-term exposure by breathing it in can increase the likelihood of cancers including:

- Non-Hodgkin lymphoma
- Myeloma
- Lymphocytic leukemia
- Lung cancer
- Breast cancer

EtO exposure can also increase the risk of diseases of the nervous system and damage the lungs. Children may be more susceptible to these health effects because of their developing bodies.

Short-term exposure to high amounts of EtO can cause headache, dizziness, nausea, fatigue, respiratory irritation (such as coughing, shortness of breath, and wheezing) and, in some cases, vomiting and other types of gastrointestinal distress. It can also cause loss of consciousness or lead to a seizure or coma.

What is a harmful level of exposure?

The EPA has never been perfectly clear about what cancer risk level it deems acceptable for the public to shoulder. Instead, it has used risk “benchmarks” to guide decisions around the permitting of new pollution sources near communities.

The lower bound in this spectrum of risks is 1 in 1 million, a level above which the agency has said it strives to protect the greatest number of people possible. On the higher end of the spectrum is 1 in 10,000 — a level that public health experts have long argued is far too lax, since a person’s cancer risk from pollution exposure accumulates on top of the cancer risk they already have from genetics and other factors.

Ethylene oxide is so potent that if you are exposed to 0.1 part per trillion continually across a 70-year lifespan, your risk will be on the higher end of the spectrum at 1 in 10,000. That amount of EtO is often too small for some instruments to detect. If you are exposed to more than 0.1 parts per trillion of ethylene oxide, the EPA considers your EtO-related cancer risk unacceptable.

When the EPA makes determinations like these, however, it does not factor in that there are most likely other toxic chemicals in the air when a person is exposed to ethylene oxide, because it is an industrial chemical. So the EPA's estimate of 0.1 parts per trillion does not take into account the cumulative impact of other toxic chemicals that may be present, which may also contribute to cancer risks.

How could I be exposed?

If you live, work, attend school, or otherwise spend significant time next to a facility that emits ethylene oxide (for example, within 5 miles), you may be exposed to hazardous levels of EtO. In general, the risk of harm is greater the closer you are to the facility and the longer you spend time near it.

The sterilization industry releases EtO into the environment in several ways:

- **The plants that sterilize equipment:** A 2023 analysis by the Union of Concerned Scientists found that more than 14 million people live within 5 miles of commercial sterilization facilities, with 10,000 schools and childcare centers in these same areas.
- **Trucks that transport the equipment after sterilization:** In the hours and weeks following sterilization, ethylene oxide evaporates, or off-gases, from the products. As a result, EtO concentrations can build up in shipping containers and trucks as the products are being transported, turning them into potentially significant sources of toxic air pollution.

- **Warehouses where companies house the equipment:** EtO also off-gases in the warehouses that store medical devices after they've been sterilized. Often, medical supply warehouses are unmarked buildings in industrial parks, a ways away from the company's main sterilization plant, so they can be hard to pinpoint. The EPA does not require companies to regulate or monitor EtO emissions from warehouses.
- **Industrial chemical facilities** that manufacture ethylene oxide or use it to manufacture other chemicals, such as pesticides.
- **Health care facilities** that use ethylene oxide to sterilize medical equipment, which is of primary concern to the workers conducting the sterilization.

There is no significant evidence to suggest that using medical devices sterilized with EtO or eating spices fumigated with EtO is a harmful or significant source of exposure. The primary concern is emissions from sterilization equipment and the supply chain that follows.



Homes on the street behind Cardinal Health's east El Paso warehouse overlook the facility's loading dock. A Grist data analysis found parts of the neighborhood are likely being exposed to dangerously high levels of ethylene oxide. Photo: *Ivan Pierre Aguirre / Grist*

Vanessa Dominguez lives near a Cardinal Health warehouse in El Paso, Texas, that stores products sterilized with ethylene oxide. Grist found that emissions from the warehouse likely expose people on Vanessa's street to levels of EtO higher than EPA's acceptability threshold. After moving into the house, she and her children began suffering from respiratory issues.

Her young son developed severe breathing problems, so a respiratory specialist prescribed an inhaler and allergy medication to help

him breathe better. Her teenage daughter complained of persistent headaches. Dominguez is currently renting the property and was considering buying it from the owner, but after learning about the risks her family's future in their home is uncertain. "I really changed my mind about that," she said.

Read the story



Worried about your exposure? Here's what to know.

Many people are unaware of their risk. In the following pages, we've compiled accurate information about where EtO regulation stands and how you may be exposed.

What protections are in place?

In 2024, the EPA finished updating regulations that reduce the threshold for how much ethylene oxide sterilization facilities can legally release into the air. However, warehouses located away from sterilization facilities are not regulated by the EPA, so there are few protections for warehouse workers or residents nearby.

What's the biggest barrier to regulating warehouses?

Because the risk of exposure at these warehouses is such a new concern, there is no comprehensive public or government data on the identity, location, or number of these facilities, let alone any kind of risk assessments. Most companies have been unwilling to disclose the locations of their warehouses. Assessing the problem by finding out where they are and what they're emitting is the first step toward developing a solution.

Is any state addressing this?

Only two local and state regulators have broadened EtO regulation to include warehouses or acknowledged that warehouses are a potential source of emissions.

- **In Georgia**, facilities with a potential to emit greater than 4,000 pounds a year of ethylene oxide must obtain a permit and install emissions controls.
- **In Southern California**, the South Coast Air Quality Management District amended a rule in 2023 to note that storage facilities “may also be required to monitor emissions at the fenceline.”

Is there an alternative to using EtO at these facilities?

While EPA regulates EtO air emissions, medical device safety is regulated by the U.S. Food and Drug Administration. For some kinds of medical devices, EtO is the only FDA-approved sterilization method, but efforts are underway to identify other methods, including vaporized hydrogen peroxide, nitrogen dioxide, and supercritical carbon dioxide. This would require companies to change some of their processes, which is challenging but not impossible, experts say. In the meantime, the solution to EtO exposure is reducing the amount of the chemical used for each batch of sterilization, more monitoring, and installing control technology such as Permanent Total Enclosures.

What we know about warehouses

Grist's investigation into ethylene oxide's supply chain found 30 warehouses across the country that store products sterilized with EtO. Some of these warehouses are in industrial zones on the outskirts of cities, but others are near strip malls and suburban residential neighborhoods, close to schools and playgrounds. There are almost certainly dozens, if not hundreds, more of these warehouses.

Grist also identified roughly 100 other warehouses that store medical devices. These warehouses are owned or operated by companies that have reported to state or federal regulators that they distribute products sterilized with ethylene oxide. While there is no evidence to suggest that every warehouse on the second list emits ethylene oxide, they are being presented for further research by local reporters and concerned citizens.

Do you live near a warehouse listed here? —→



If you live close to a warehouse or your children go to school near one:

- EtO spreads through the air. Be on the lookout for symptoms like coughing, wheezing, or shortness of breath that occur more frequently when your windows are open or you're outside in your yard.

- Beyond the local efforts in some states, there is no federal requirement for monitoring "fenceline emissions" in the neighborhoods around a warehouse or plant. You'll have to push state agencies or your local officials to install air quality monitors.
- If you're concerned about the children in your area being exposed, you can get in touch with your local Pediatric Environmental Health Speciality Unit, a network of experts in children's health that can provide education and outreach.

Are you a warehouse or plant worker?

Some tips to keep in mind:

- Workers who are in direct contact with EtO, including those who handle products sterilized with EtO, drive trucks that contain products sterilized with EtO, or work close to a facility can be at risk of exposure.
- The U.S. Occupational Safety and Health Administration, or OSHA, requires that levels of EtO remain below 1 part per million in the workplace. Warehouse operators are required to adhere to this level, but researchers say the threshold should be much lower. OSHA set this standard in the 1980s and hasn't changed it since.
- If you suspect that your company is violating this requirement, you can contact OSHA. The agency evaluates employers on a case-by-case basis, so you'll have to file a complaint with the agency to have it reviewed. Call 800-321-6742.



Ambulances were called to this ConMed warehouse approximately 50 times between 2007 and 2019. *Photo courtesy of Atlanta News First*

Ira Montgomery spent more than a decade working at a ConMed warehouse just outside of Atlanta, unaware that he was being exposed to EtO. Montgomery eventually developed cancer and needed a liver transplant, which he attributes to being exposed to the chemical. Many workers at the ConMed warehouse developed rashes, had trouble breathing, fainted, and had seizures.

They eventually sued the warehouse, but since they had filed claims with the Georgia Workers' Compensation Board, the judge dismissed some of their claims, and the workers dropped the lawsuit in early 2024. Meanwhile, Montgomery had to take 26 pills a day for his ailments. "This is my new life," he said. "I thank God for being here, but it's hard."

Read the story



Getting support and more information

How do I get officials to address EtO?

According to organizations that have worked on this issue for years as well as residents and organizers who live near sterilization plants, there are actions you can take:

- 1. Report the issue to a government agency or official.** Read more below about some options that may be available to you.
- 2. Ask city and state officials to install fenceline air monitors around warehouses known to emit EtO.** In Laredo, Texas, pressure from residents led city and county officials, along with the school board, to put money toward air quality monitors. Start by talking about air quality monitoring with your city council, county commission, or local health department.
- 3. Focus on hyperlocal regulations.** Talk to your city council members or other local officials about performing more frequent inspections, zoning and building code changes that could be made, or how to reroute traffic to avoid emissions from trucks. For example, some residents near the Steri-Tech sterilizer plant in Puerto Rico are pushing for local officials to address noise violations to draw more attention to the problems the plant causes.
- 4. Ask your local and state officials to pressure federal regulators and Congress to address EtO in warehouses.** Politicians and local regulators often have more sway with federal regulators than constituents. Host a letter-writing event at your local library, or plan a day to have your neighbors call their congressional representatives.

Who should I report air quality concerns to?

- 1. Regional EPA offices:** There are 10 regional EPA offices, each with staff that deal directly with air pollutants in that area. You can submit comments about permits, request public hearings that would otherwise not be offered, and request town halls in your community. Residents in Kansas City, Missouri, successfully did this when a chemical company that used EtO applied for a new permit in 2023.
- 2. State environmental agency:** Every state has an agency responsible for environmental regulation and most have a complaints process. Look for a contact form or a phone number on your state environmental quality department's website to share your concerns.
- 3. Local health department:** Your city or county health department or city government website likely has a form or phone number to submit environmental health complaints. For instance, El Paso's county health department has an email (healthinfo@elpasoco.com) to submit an air quality complaint online.
- 4. Public health officials:** These officials can sometimes wield power when state or federal changes aren't being made. An organization in Memphis, Tennessee, along with Southern Environmental Law Center, petitioned Shelby County in 2023 to declare a public health emergency to force a sterilization company to reduce emissions or cease operations. (The company closed the facility and made plans to move later that year.)

Legal resources

- There are class action lawsuits in several states for people who have worked at or lived near a sterilization facility. You can search for those by reaching out to law firms in your area.
- Your local environmental groups may know more about how to get involved in legal cases, so reach out to them with questions. They can potentially connect you with other organizations, such as Earthjustice and the Southern Environmental Law Center, two nonprofits that litigate environmental issues and have worked with communities at risk of EtO emissions.

Scan the QR code to read more about EtO



Disclaimer: Grist is a nonpartisan news organization, not a law firm. We are not offering legal advice. Talk to your lawyer or a local legal aid organization for specific questions.

“ This is the EPA’s eighth rodeo on this issue. The wool is sort of over the country’s eyes for the most part about these emissions sources.

—Daniel Savery, legislative representative at Earthjustice sciences at the University of Massachusetts.

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This informational guide was created by Grist (grist.org), a nonprofit, independent media organization. Grist reporters Naveena Sadasivam and Lylla Younes have investigated ethylene oxide emissions at workplaces and fenceline communities around the U.S. since 2023.

If you have questions, please contact: community@grist.org.