

Ethylene Oxide (EtO)

What is EtO?

- Ethylene oxide (EtO) is a flammable, colorless gas at room temperature with a faint fruit-like odor at high concentrations.
- EtO is a synthetic/human-made chemical that does not occur naturally in the environment.
- Very low levels of EtO are present in sterilized packaged foods, spices, and cigarette smoke. A very low level is also naturally present/produced in the human body.

What are the uses of EtO?

- EtO is used to sterilize medical and dental equipment and medical devices that cannot be sterilized using steam or radiation.
- EtO is also used to make other chemicals that are then used to make a range of products, including antifreeze, textiles, plastics, detergents, and adhesives.

What are the sources of EtO emissions?

- According to U.S. Environmental Protection Agency's (EPA) National Emission Inventory, the majority of EtO emissions are from sterilization facilities, followed by chemical manufacturing industries.

How are people exposed to EtO?

- EtO is normally found in the air. Due to its chemical properties, it is unlikely to remain in water or soil, in/on food products, or be found on consumer products made or sterilized using EtO.
- People who live or work near EtO emission facilities may be exposed to EtO by breathing contaminated air.
- Workers may be exposed to EtO where it is produced or used, such as in chemical plants and commercial or hospital/dental sterilizing facilities.

- People can also be exposed to EtO from tobacco smoke.

What are the health risks from exposure to EtO?

- Long-term exposure to low levels of EtO may damage the nervous system and can cause reproductive effects, genetic changes, and blood cancers such as non-Hodgkin lymphoma, myeloma, leukemia, and breast cancer in women.
- Short-term exposure to low levels of EtO may not harm human health; however, exposure to high levels may cause eye/skin/respiratory irritation, headache, and nausea.

Is EtO a problem in Pennsylvania?

- As of July 27, 2022, EPA has identified the following [three](#) commercial sterilizing facilities in Pennsylvania that are known to emit EtO in ambient air.
 - B Braun Med Inc/Allentown, 901 Marcon Blvd, Allentown, PA
 - Cosmed Group LLC/Erie, 2205 E 33rd Street, Erie, PA
 - American Contract Systems, 4050 Jackson Pointe Court, Building 4000, Zelienopole, PA
- On August 3rd, 2022, EPA identified [two](#) of these three EtO emitting facilities ([Cosmed Group LLC/Erie](#) and [American Contract Systems](#)) posing elevated cancer risks (above 100 additional cancer cases per million people exposed or 1 additional cancer case per 10,000 people exposed) to nearby communities. EPA is working with these facilities and state agencies to reevaluate emissions from these facilities and update risk evaluations based on available new technology and information on air pollution control measures.
- An elevated cancer risk means that someone breathing air containing EtO at a certain level continuously for 24 hours a day for 70 years (a lifetime of exposure) has a slightly increased risk of developing a certain type of cancer as compared to someone not exposed to EtO. This risk is in addition to the risk of cancer from other causes such as heredity and lifestyle. To learn more about cancer, please click [here](#).

What is EPA doing about this?

- Since 2018, EPA has been working with communities, stakeholders, and federal and state partners to reduce the risks posed by EtO exposure.
- On August 10th 2022, EPA conducted a National Public [Webinar](#) on EtO from commercial sterilizers and risks in the community.
- EPA expects to propose an air pollution regulation later this year to protect public health by addressing EtO emissions at commercial sterilizers. In October/November, EPA is planning to conduct a community meeting for each of the EtO emitting sterilizing facilities identified. Please click [here](#) to register.

What actions has the PA Department of Health taken to assess EtO?

- Based on community concern and a petition from an U.S. Representative, the Pennsylvania DOH evaluated historical cancer incidence rates (1985 to 2017) near the B.Braun facility in Allentown.
- In May 2022, DOH released a [report](#) on their cancer analysis. The DOH didn't observe a significant pattern of cancer rates among adults or children living within a two-mile radius of the B.Braun site relative to adults and children living outside the two-mile radius.
- In July 2020, the B.Braun facility installed an enhanced new emission control system to reduce EtO emissions associated with B. Braun's medical instrument apparatus sterilization operations. The new emission control system achieved an estimated 99.9% reduction of EtO emissions.

Are levels of EtO near those three sterilizing facilities in PA high enough to cause immediate health effects?

- No. According to EPA, the short-term (one-hour) estimated levels in the air are well below levels that may immediately cause serious, long-lasting, or irreversible non-cancer health effects.

Did EtO emission from the commercial sterilizer in our town cause my cancer?

- We are not certain. The development of cancer is a complex process; many factors can impact an individual's cancer risk, including their genetic health, lifestyle (e.g., smoking, physical activity, diet), and other environmental exposures.

How far away from the facility do I have to be so that I am not at risk?

- It is challenging to say how far it is safe to be risk-free. EtO moves through the air and becomes less concentrated away from the facility. Many factors, such as wind speed, facility emission, etc., impact how far EtO can travel and how long it stays concentrated in outdoor air.
- State and federal agencies are working to protect public health by enforcing the usage of enhanced EtO emission control system at commercial sterilizers which can reduce exposure and health risks.

Are children at risk?

- Children are more sensitive to EtO than adults. This is because EtO can damage DNA, and growing children are more susceptible to DNA damage because their cells divide more rapidly than adults. The contribution to lifetime cancer risk from a single year of exposure to EtO is greater if that year occurred during childhood. For everyone, including children, risks would decrease with decreased exposure.

I live close to a commercial sterilizer and think my family and I are being exposed to EtO. How do I take care of our health?

- Factors that affect EtO's health risks are:
 - Your health risks such as age, family history, and lifestyle.
 - How much EtO is in the air you breathe.
 - How long and how often you have been breathing air with that level of EtO.
- The risk decreases with decreased exposure. Taking care of your and your family's health is always important. Maintaining a healthy diet and habits (Note: Tobacco smoke also contains EtO) and keeping up with regular medical checkups and

recommended health screenings is an important part of taking care of your and your family's health. If you are concerned, you can contact your health care provider. Please click [here](#) for the Clinician brief on EtO.

- The Pennsylvania DOH can help answer general questions about associations between EtO exposure and health conditions based on research study evidence. Please reach us at: Env.health.concern@pa.gov or call 717-787-3350 if you have any questions or concerns.

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