



Ethylene Oxide Frequently Asked Questions

The Ethylene Oxide Panel of the American Chemistry Council (ACC) is comprised of producers of ethylene oxide and is a leading source of product stewardship and regulatory information on this important chemical product.

What is ethylene oxide (EO)?

A versatile and valuable intermediate building block of chemistry, ethylene oxide and its derivatives help make many of the products we use every day, such as certain plastics, antifreeze, household cleaners, safety glass, adhesives, textiles, and detergents. It is also directly used to sterilize medical equipment and supplies.

Learn more about the applications of ethylene oxide [here](#).

Where is ethylene oxide produced?

At the end of 2018, ethylene oxide was being produced in the U.S. at 15 facilities in 11 locations by 9 companies. In the U.S., ethylene oxide is primarily produced in two states: Texas and Louisiana.

How is ethylene oxide regulated for worker safety and air emissions?

For workers in or near facilities where ethylene oxide gas is present, OSHA has set exposure limits. In addition, employers must provide protective clothing and equipment to employees who may be exposed to ethylene oxide. The [National Institute of Occupational Safety and Health \(NIOSH\)](#) and the [American Conference of Governmental Industrial Hygienists \(ACGIH\)](#) also provide guidance for industrial exposure to ethylene oxide.

Sources of EO emissions to the atmosphere are regulated under EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) rules. These regulatory standards require, among other things, the installation of control devices to reduce emissions, emissions monitoring, performance testing, site-specific operating parameters, and continuing reporting and recordkeeping requirements to ensure compliance with the NESHAP rules. The most recent EPA National Emissions Inventory (NEI) is a testament to the effectiveness of these standards, reporting a significant continuing downward trend in national EO emissions for the industrial sector (716.49 tons per year in 2002 to 153.16 tons per year in 2014).



Is it true that the EPA has warned there is an elevated risk of cancer due to EO exposure levels?

In 2016, the EPA Integrated Risk Information System (IRIS) program released an updated cancer value based on modeling. ACC believes the value is significantly flawed.

For many years, ACC has raised substantive and serious concerns about EPA's IRIS program and its lack of transparency, failure to incorporate best available science, and resistance to any reform. ACC is not alone in its concerns. In 2011, the National Academy of Sciences (NAS) also criticized IRIS assessments for their poor scientific quality – a result of the IRIS program's unnecessary reliance on overly conservative and default assumptions in its modeling and outdated scientific information. Additionally, two EPA Science Advisory Boards outlined similar and additional key issues with the EO IRIS assessment.

In its failure to incorporate the 2011 NAS recommended improvements, the EO assessment suffers from the same shortcomings as the IRIS program. The EO assessment also includes significant errors in modeling historical exposures to EO. The result is a value that is significantly flawed, based on selective science, and results in an overly conservative cancer value to the point of absurdity.

In fact, the EO cancer value derived from EPA's modeling is 19,000 times lower than the normal, naturally-created levels of EO in the human body. Last year, [ACC submitted](#) a petition under the Information Quality Act seeking correction of the use of the EO value in EPA's National Air Toxics Assessment (NATA).

Is there likely exposure to ethylene oxide for the general population?

There are trace elements of ethylene oxide in a normal, everyday environment that are created by various sources, including vehicle exhaust, plants or cigarette smoke. The human body also creates ethylene oxide. When regulatory agencies test for commercial ethylene oxide emissions, they should consider and adjust for these background levels, especially in urban areas.

What is the public health risk of EO?

As an intermediate chemical used to make other products, almost all of the EO is reacted with other substances to form new products. Potential exposure, if any, to the general public from EO manufacturing emissions regulated by NESHAP rules is likely to be negligible.



The EO IRIS assessment and resulting cancer value are substantially flawed. A more accurate cancer risk estimate could be developed by using the modeling approach published by Valdez-Flores et al. (2010). This approach models potential mortality excesses for lymphohematopoietic tissue (LH) cancers from the two strongest epidemiological studies (NIOSH and Union Carbide Corporation (UCC)) using a log-linear Cox proportional hazard model. Valdez-Flores et al. (2010) estimated ranges for the maximum likelihood estimate (MLE) and the 95% lower confidence limit of the environmental concentration corresponding to an extra risk of one in a million [LEC (1/million)] of, respectively, 1.5-9.2 parts per billion (ppb) and 0.5-1.2 ppb.

What efforts are being made to continue to study EO safety?

At this time, the EPA is [undertaking multiple efforts](#) to address EO emissions, review existing regulations and gather additional information as needed. Additionally, similar efforts are underway at the state level. Read more here:

<https://www.epa.gov/hazardous-air-pollutants-ethylene-oxide>

What are ACC Ethylene Oxide Panel member companies doing to ensure the safe handling of EO?

The Ethylene Oxide Panel is a leading source of product stewardship and regulatory information on ethylene oxide. The panel promotes the principles of [Responsible Care®](#) with respect to the safe handling and use of ethylene oxide.

Responsible Care® is the chemical manufacturing industry's environmental health, safety and security performance indicator. Responsible Care® provides a foundation for the ACC Ethylene Oxide Panel member companies to safely operate and protect the health and safety of their employees, the communities in which they operate and the environment as a whole.

Ethylene Oxide Panel member companies implement safety technology and practices at every step of the production process – from plant design, to personnel safety precautions, equipment maintenance and preparation, transportation, and loading and unloading operations.

The Ethylene Oxide Panel supports policies based on the best available science and research on health, safety and environmental issues arising from the production, use, storage, transportation and disposal of ethylene oxide.

Ethylene Oxide Panel member companies:

- Share information to enhance operational and emergency response practices to protect public health and our environment



- Produce product stewardship guidance that documents rigorous guidelines for facility design, production, safe handling, and shipment of ethylene oxide, including guidelines for the protection of workers
- Sponsor product stewardship seminars to support the safe manufacture, handling and transportation of ethylene oxide
- Conduct and/or actively participate in toxicology and environmental research to ensure the best available science is publicly available