



# The Ethylene Oxide Sterilization Association, Inc.

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June 14, 2023

Via E-mail

Dr. Kannan Krishnan  
Chief, Air and Site Assessment and Climate Indicators Branch  
Office of Environmental Health Hazard Assessment  
1001 I Street, 12<sup>th</sup> Floor  
Sacramento, CA 95814

**Re: OAL Notice File No. Z2023-0328-02 Draft Cancer Inhalation  
Unit Risk factor for Ethylene Oxide and Draft Technical  
Support Document**

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Dear Dr. Krishnan:

On behalf of its members, the Ethylene Oxide Sterilization Association, Inc. (EOSA) appreciates the opportunity to comment on the Office of Environmental Health Hazard Assessment's (OEHHA) proposed Cancer Inhalation Unit Risk Factor (Draft OEHHA IUR) for ethylene oxide (EtO), and its accompanying Draft Technical Support Document (OEHHA Draft TSD Appendix B).

EOSA members represent a broad spectrum of the U.S. ethylene oxide (EtO) sterilization industry. EOSA is a nonprofit organization that represents EtO suppliers, spice processors, contract sterilizers, sterilization equipment manufacturers, medical device manufacturers, analytical equipment and systems suppliers, and laboratories. EOSA members work diligently to assist in providing life-saving sterile healthcare products around the world, over 50% of which are sterilized using EtO, and assist in providing safe and wholesome spices for consumers. EOSA works to educate industry, regulators, and the public on the essential uses and benefits of EtO sterilization, for which no direct replacement is currently, and not for the foreseeable future, available. EOSA also works to improve safety standards, foster industry communication, and provide a forum for many subjects related to EtO sterilization.

EOSA and its members believe that the safety of surrounding communities and workers in the EtO sterilization industry is critically important. The EtO sterilization industry has historically undertaken, and will continue to undertake, significant efforts to reduce the emissions and potential worker exposure of EtO. EOSA is providing these comments to ensure that regulatory decisions reflect accurate facts, the best available science, and proven technologies and practices.

EOSA agrees with, and adopts by reference, the comments submitted by the American Chemistry Council (ACC) on the draft OEHHA IUR and TSD. As discussed in the ACC comments:

- OEHHA’s draft IUR adopts the U.S. Environmental Protection Agency’s (EPA) flawed Integrated Risk Information System (IRIS) value, and the TSD uncritically accepts EPA’s IRIS 2016 methodology and assumptions, resulting in the same grave errors and flaws as IRIS contains. This leads to an implausible IUR and Residual Risk Specific Concentration (RSC). While OEHHA attempts to conduct an “independent” evaluation of bias in EPA’s model and the National Institute for Occupational Safety and Health (NIOSH) epidemiological data, its efforts are wholly inadequate due to questionable assumptions in the absence of access to the actual data being considered, as well as mimicking EPA’s faulty reasoning;
- The original NIOSH study, upon which OEHHA’s IUR is based, found no indication of increased risk of lymphoid cancers in males at lower categories of exposures and concluded there were no exposure-related effects in females. In addition, the NIOSH breast cancer incidence data should not be used for quantitative risk assessment based on substantial under-ascertainment of incident cases reported by Steenland *et al.* (2003)<sup>1</sup>, and subsequent risk deficits in the lower exposure. OEHHA, however, inaccurately exaggerates the reliability of the NIOSH worker exposure estimates prior to 1978 based on uncritical acceptance of the IRIS evaluation. They have also uncritically accepted EPA’s incorrect statistical search for the knot as an estimated statistical parameter, which has led to unsupported proposed IUR and RSC values;
- OEHHA’s sole reliance on internal analyses and OEHHA’s complete exclusion of external analysis is based on a scientifically untenable oversimplified main conclusion that all external analysis should be ignored because it is confounded by Healthy Worker Effect (HWE). This is contradicted by the NIOSH study authors’ own published conclusions that “the healthy worker effect would seem an unlikely explanation for the lack of cancer excesses in the exposed versus non-exposed comparisons.” Furthermore, OEHHA’s uncritical acceptance of conclusions of a more recent paper by Park that there is a Healthy Worker Survival Effect

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<sup>1</sup> Steenland K, Whelan E, Deddens J, Stayner L and Ward L. 2003. Ethylene oxide and breast cancer incidence in a cohort study of 7576 women (United States). *Cancer Causes Control* 14(6): 531-539. 10.1023/a:1024891529592.

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(HWSE) led OEHHA to support EPA IRIS model.<sup>2</sup> The conclusions, however, are not supported by the actual results in the paper; and

- It is also critically important to take into consideration the background levels of EtO in the ambient air and the numerous other ubiquitous sources of EtO, such as decaying plant material, and from consumer items like cars and trucks, lawn mowers, and gas generators. Background endogenous and ambient EtO levels are an important reality check for model and risk assessment. Data from extensive ambient air measurement campaigns over the last several years have shown that endogenous levels greatly exceed the levels to which residents near sterilization facilities may be exposed.<sup>3,4</sup> While OEHHA states that the potency estimates technically only apply to exposures above endogenous levels, it is implausible that a chemical would be a potent carcinogen at fraction of levels that the body produces through natural processes and also be well within the population variability.

Thank you for your consideration of these comments. It is critical that OEHHA consider the information outlined in these comments, and the extensive comments provided by ACC. It is of paramount importance not to overestimate the potential risk of EtO from its critical sterilization use, and to be able to continue using this life sustaining, life-saving, and irreplaceable substance, to sterilize healthcare devices and pasteurize certain food products.

Sincerely,



Meibao Zhuang  
Senior Manager  
The Ethylene Oxide Sterilization Association, Inc.

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<sup>2</sup> Park RM. 2020. Associations between exposure to ethylene oxide, job termination, and cause-specific mortality risk. *Am J Ind Med* 63(7):577-588. 10.1002/ajim.23115.

<sup>3</sup> Filser, J.G., and D. Klein. 2018. A physiologically based toxicokinetic model for inhaled ethylene and ethylene oxide in mouse, rat, and human. *Toxicol. Lett.* 286:54-79.

<sup>4</sup> Kirman, C.R.; Li, A.A.; Sheehan, P.J.; Bus, J.S.; Lewis, R.C.; Hays, S.M. 2021. Ethylene oxide review: Characterization of total exposure via endogenous and exogenous pathways and their implications to risk assessment and risk management. *J. Toxicol. Environ. Health Part B Crit. Rev.* 24, 1-29.