Ethylene Oxide: Technical Review
Report for Eastman Chemical Texas Operations Longview, TX

As EPA pursues its mission to protect public health and the environment, addressing ethylene oxide (EtO) remains a major priority for the Agency. EPA's National Air Toxics Assessment (NATA), released in August 2018, identified a number of areas across the nation with potentially elevated risk from continuous exposure to EtO in the outdoor air. NATA estimated these risks based on EtO emissions from 2014, which were the most recently available at the time, and are now seven years old.

NATA is a screening-level analysis that is intended to identify pollutants or areas for closer examination. EPA and the State air agencies are working together to better understand emissions in areas that NATA identified as potentially having elevated risk. State air agency partners are in discussions with individual facilities to identify opportunities for reducing EtO emissions from those facilities. EPA is reviewing its national regulations for industrial facilities that emit EtO. Actual risks today may be lower or higher than NATA estimated due to several factors, including updated or more refined facility emissions information or recent facility changes including the installation of pollution controls.

The information below describes the technical analyses conducted for Eastman Chemical Texas Operations (Eastman Chemical) in Longview, TX, to update and document work conducted since NATA was issued in August 2018. EPA is providing this information to address, in part, the EPA Office of Inspector General's Management Alert (dated March 31, 2020).

Initial Actions Conducted

On October 15, 2020, EPA Region 6 requested assistance from the State of Texas in gathering the most current information on ethylene oxide emitting facilities, including Eastman Chemical, and to assist with the update of technical assessments.

- EPA obtained updated facility emissions and control information on EtO from the State of Texas.
- The EPA NATA estimate was based on annual routine emissions data from 2014. EPA obtained the 2019 annual routine EtO emissions data for Eastman Chemical in Longview, TX, which showed a decrease of 48 percent. Reported emissions were reduced through emission reductions and/or re-evaluation of actual emission levels.
- On April 14, 2021, EPA Region 6 sent a letter to Eastman asking for updates on EtO since 2014. Eastman responded to EPA Region 6 in writing on April 22, 2021.
- EPA and TCEQ held a conference call with Eastman on April 20, 2021 and discussed facility efforts to reduce reported ethylene oxide emissions and obtained additional technical information.

Preliminary 2020 Annual EtO Emissions Data Update

The 2020 emissions inventory data updates from facilities were due for submissions to TCEQ on April 1, 2021. While a TCEQ quality assurance/quality control review of this new 2020 emissions data continues, the preliminary review of this data, along with information received from Eastman indicates that:

- From 2014-2020, through emission reductions and/or re-evaluation of actual emission levels, reported EtO annual emissions at the Eastman facility were reduced approximately 75 percent.

How EtO is Handled at the Facility

The facility manufactures EtO at two process lines: Ethylene Oxide Plant 1 and Ethylene Oxide Plant 2. Refined EtO product is consumed in other process units on site to produce other chemicals.

Progress on Emission Reporting

The changes to the Eastman EtO emission estimates are the result of refinements to the engineering estimates of the emissions. They are not due to physical or operational changes at the Eastman facility.

In 2019, Eastman reviewed the operation of its EtO emissions sources, its emissions calculations and its emission inventory reports to confirm their precision. Eastman representatives submitted changes to the State's air emissions inventory for 2014 through 2019. Calculations were refined in the following areas and are presented below: process vents, cooling towers, wastewater process drains, and equipment leaks.

Process Vents

For process vents, Eastman refined its emissions data using the most recent stack test data for each year.

Cooling Towers

The annual emissions reported in 2014 and 2015 were based on a prior, less precise method used to measure EtO concentrations in the water. Reported emissions for 2016 and 2017 were based on more precise, refined results using a response factor for the specific analyzer used to measure strippable organics.

Process Drains

The facility initially reported process wastewater drain fugitive emissions estimates that assumed 100% of EtO in the wastewater drains evaporated and that there was a constant wastewater flow. However, this overestimated EtO emissions because EtO does not readily evaporate. Emission estimates were refined based on flowrates from plant data and evaporation rates from wastewater drain emissions factors.

Fugitive Equipment Leaks

Eastman refined the site's fugitive estimates utilizing recommended settings in the site's leak detection and repair program software. The refined calculation method utilized EPA correlation equations, current year readings and the most recent historical reading to develop a full year estimate.

Updated EPA Risk Assessment

Based on 2018 emission inventory data, EPA is updating the estimated inhalation public health risk from ethylene oxide in the community near Eastman. 2018 data was chosen for its general

availability and data quality. The revised increased cancer risk number based on 2018 emission data is 300 in 1 million[1].

EPA modeling of estimated risks is very conservative. It provides a threshold recommendation to warrant a closer look at facility operations and emissions and is not a "bright-line" regulatory action limit for required action. EPA uses a general 100 in 1 million (1 in 10,00) increased risk of cancer as a guideline for further investigation. It assumes a continuous, 24 hours per day inhalation exposure to hazardous pollutants, including EtO, for a lifetime of 70 years.

Based on 2018 data, EPA reassessed and updated the estimated inhalation public health risk from hazardous air pollutants, including EtO, in the community near Eastman. Our results indicate the estimated maximum individual cancer risk (the single highest estimated additional cancer risk for an individual in the area) decreased about 78 percent from the previous NATA risk estimate based on 2014 emissions (From 1,355 in a million down to 300 in a million.)

Preliminary 2020 annual EtO emissions are about half of the 2018 EtO emissions assessed by EPA.

Future Actions Planned

Eastman plans to add a scrubber to the Eastman Solvents Plant 1 distillation column vent. The new scrubber is similar to the one the facility operates on Eastman Solvents Plant 2's distillation column vent. Based on a stack test on the Eastman Solvents Plant 2's scrubber, the EtO removal efficiency of the new scrubber is expected to be 95%. This should further lower the facility's EtO emissions from 3,820 lbs to about 1,280 lbs, depending on production rates. This projected future EtO annual emissions value is about one third of the 2018 value evaluated in the updated 2018 EPA risk assessment and over 91% lower than the 2014 EtO emissions evaluated in NATA.

Additional information will be provided at a community outreach event currently being planned by EPA in coordination with TCEQ, and at the following website after the outreach event is conducted: https://www.epa.gov/hazardous-air-pollutants-ethylene-oxide/status-report-eastman-chemical-longview-tx.

[1] In a letter dated June 17, 2021, pursuant to CAA section 307(d)(7)(B), the Agency will grant reconsideration on the following aspects of the final Miscellaneous Organic NESHAP (MON) rule to provide an additional opportunity for public comment: (1) the use of EPA's Integrated Risk Information System (IRIS) value for ethylene oxide in assessing cancer risk for the source category; and (2) the use of the TCEQ risk value for ethylene oxide as an alternative risk value to EPA's IRIS value. Reconsideration is being granted on this topic on the basis that the TCEQ risk value for ethylene oxide was finalized after the comment period closed and because the risk posed by ethylene oxide is of central relevance to EPA's determination that risks from sources in the Miscellaneous Organic Chemical Manufacturing source category are unacceptable and that more stringent standards are required.