Ethylene Oxide: Technical Review
Status Report: Union Carbide Corp., St. Charles Operations – Taft, LA

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 Union Carbide Corp., St. Charles Operations (Union Carbide Corp.) in Taft, LA, 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 Louisiana in gathering the most current information on ethylene oxide emitting facilities, including Union Carbide Corp., and to assist with the update of technical assessments.

- EPA obtained updated facility emissions and control information on EtO from the State of Louisiana.
- The EPA NATA estimate was based on annual emissions data from 2014. EPA obtained 2019 annual routine EtO emissions data for Union Carbide Corp. in Taft, LA, which showed a decrease of 48 percent. Reported emissions were reduced through emission reductions and/or re-evaluation of actual emission levels.
- EPA and LDEQ conducted a conference call with Union Carbide Corp. on March 25, 2021 and discussed facility efforts to reduce reported ethylene oxide emissions and obtained additional technical information. On April 13, 2021, Union Carbide provided documentation of the information they shared on the call.

The Facility and EtO Processes

The St. Charles site is upriver from Hahnville. Multiple process operations on site utilize EtO to manufacture basic chemicals that are used in thousands of household, business and consumer products.

Preliminary 2020 Annual Emissions Data Update

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

- From 2014-2020, through emission reductions and/or re-evaluation of actual emission levels, reported EtO annual emissions at the Union Carbide facility were reduced approximately 64 percent.

Progress on Emission Reporting

- The EtO emissions calculations were revised to better reflect actual operations of two of the pressurized EO storage vessels that vent to the Site Logistics Flare. These tanks are operated at or near a constant level, so the quantity of displaced vapors from these tanks were lower than previously calculated, so less EtO was being vented to the flare than previously estimated.
- The site also evaluated and revised the EtO emission calculations to reflect the actual EtO amounts in the Higher Glycols Jet Vent. During the year 2018, the waste gas flowing to the Site Logistics flare was sampled and analyzed. Analytical results showed the actual EtO amounts in the waste gas going to the flare were lower than previously estimated.

Facility Improvements

- Prior to the year 2016, vapors from the site's railcar loading operation were vented to the Site Logistics Flare. In 2016, the site implemented a vapor balancing project for railcar loading to eliminate the venting to the flare, which reduced site EtO emissions.
- During the year 2020, the site installed a new water scrubber for the waste gas line between pressurized storage tanks and the Site Logistics Flare. The water scrubber absorbs EtO from the waste gas stream and the liquid from the water scrubber is returned back to the EtO manufacturing process where the EtO is recovered. This scrubber was placed into service in early 2021 and is expected to further reduce EtO emissions from the flare.

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 Union Carbide. 2018 data was chosen for its general availability and data quality. The revised increased cancer risk number based on 2018 emission data is 700 in 1 million[1].

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[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.

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 10,000) 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 Union Carbide. Our results indicate the estimated maximum individual cancer risk (the single highest estimated additional cancer risk for an individual in the area) decreased about 58 percent from the previous NATA risk estimate based on 2014 emissions (from 1,680 in a million to 700 in a million). Preliminary 2020 annual EtO emissions are slightly below the 2018 EtO emissions assessed by EPA.

Recent Action Taken

During the year 2020, the site installed a new water scrubber for the waste gas line between pressurized storage tanks and the Site Logistics Flare. The water scrubber absorbs EtO from the waste gas stream and the liquid from the water scrubber is returned back to the EtO manufacturing process where the EtO is recovered. This scrubber was placed into service in early 2021 and is expected to further reduce EtO emissions from the flare.

Additional information will be provided at a community outreach event currently being planned by EPA in coordination with LDEQ, and at the following website after the outreach event is conducted: https://www.epa.gov/hazardous-air-pollutants-ethylene-oxide/status-report-union-carbide-st-charles-operations-taft-la.