

## Summary

### Chicagoland Background Ethylene Oxide Study

December 18, 2018

Sterigenics U.S. LLC (“Sterigenics”) retained Ramboll to conduct testing of background ethylene oxide levels in the Chicagoland area. Sample locations were selected by Ramboll to provide a picture of routine ambient air conditions across the area. The sample locations spanned from Golden Gate Park in the south to Highland Park in the north and from the lake out to Naperville in the west.

Two different types of samples were collected, 5-minute sample collections (grab samples) and 12-hr sample collections that reflect average conditions over a prolonged period. Samples were collected under the supervision of Ramboll Certified Industrial Hygienists using the standard ambient air collection method known as Summa canisters. Twelve-hour samples were collected in residential backyards where access could be controlled and the canisters could be monitored throughout the collection period. This element of study design was included so that we could be confident samples were not influenced by nearby smokers. Tobacco smoke is a well-known source of ethylene oxide and we wanted to be confident that the results reflected general ambient air conditions and not a local, transient impact from tobacco smoke. Grab samples were included because this allowed for easier sampling of a variety of location types such as parks, parking lots and downtown in the Loop. Samples were collected from 14 different 12-hour locations and 35 different grab sample locations.

In order to be able to address similarities or differences in ambient ethylene oxide levels between day and night, both day and night 12-hour samples were collected at seven of the locations. Also, grab samples were collected at various times of day from before sunrise, through the day, and after sunset. To evaluate the variability in results at the same location across different days, samples were collected at seven grab sample locations and six 12-hr sample locations in both October and November. To document the reliable repeatability of measurements, duplicate samples were collected simultaneously at four of the grab sample locations and during two of the 12-hr sample collections. Thirty-nine samples were collected between 12-23 October and another 37 samples were collected between 12-20 November for a total of 76 samples.

All samples were analysed by a nationally certified laboratory using EPA Method TO-15 refined to eliminate potential interference from trans-2-butene when measuring ethylene oxide. The effectiveness of this method was verified by having the laboratory include known mixtures of trans-2-butene, acetaldehyde and other chemicals with ethylene oxide in quality control tests and documenting that each chemical could be identified and measured separately. The results for ethylene oxide that we have presented are accurate and are not affected by interference from other chemicals.

To verify that the samples we collected were not reflective of ethylene oxide from nearby tobacco combustion, the laboratory also analysed all samples for another chemical that is a known characteristic marker for tobacco smoke (2,5-dimethylfuran). The tobacco smoke marker was not present in any sample.

The results that we have presented represent background levels of ethylene oxide from general and routine ambient air conditions in urban and suburban areas around Chicago.