

CORRECTIVE ACTION – SEATTLE LABORATORY

Date Initiated: 2/7/2022



Terri Torres, Quality Assurance Manager

Subject: bis(2-Chloroethyl)ether false positive results

Client: AECOM

3/1/2022

Date Approved

Samples Affected: 580-109090-4 (20220106-F2-ZT08), 580-109117-5 (20220208-B1-ZT04), 580-109117-6 (20220108-A3-ZT01), 580-109117-8 (20220107-C2-YT02), 580-109054-1 (20220105-C1-ZT03), 580-109239-2 (20220111-H1-YT12), 580-109243-1 (20220111-H2-YT02), 580-109243-3 (20220111-H2-YT04), 580-109243-4 (20220111-H2-YT06), 580-109289-1 (2022112-H3-ZT13), 580-109289-3 (2022112-H3-ZT09) and 580-109289-5 (2022112-H3-ZT05)

Method: 8270E

Problem

The detections of the 8270E analyte bis(2-Chloroethyl)ether was determined to be due to false positive detections in several samples.

Assessment/Investigation

Bis(2-chloroethyl)ether is a relatively uncommon environmental contaminant and hits reported by Eurofins Seattle prompted confirmation by the client. Upon further review, it was determined that though a compound similar to Bis(2-chloroethyl)ether was detected, the compound lacked qualifying features: 1) overall mass spectral breakdown was inconsistent with that of Bis(2-chloroethyl)ether, 2) the ion ratio for m/z 95 was inconsistent with that of Bis(2-chloroethyl)ether. It was known to the lab that samples from this project occasionally contained a brominating or chlorinating agent, such as elemental bromine, elemental chlorine, or hypobromous or hypochlorous acid formed in situ from the addition of sodium hypochlorite or sodium hypobromite. These compounds, commonly added to drinking water to treat or disinfect, caused reactive halogenation of 2-methyl-2-butene (amylene), a stabilizer for methylene chloride used at the laboratory. By mass spectral interpretation, it was determined that a polychlorinated amylene was the cause of the false positive.

Final Assessment/Corrective Action

There were two main root causes for the miss-identification, overall mass spectral breakdown and ion ratio inconsistency. The overall mass spectral breakdown pattern was overlooked by analysts because the analyte eluted at the correct retention time, contained all quantifier and qualifier ions, and the ions appeared to present at the correct ratios. However there was a discrepancy of the mass spectral breakdown pattern that may have been caused by a coelution of another unknown analyte. Additionally there was an ion ratio inconsistency. After looking through settings in the quantitation software, it was determined that a setting which would flag false positives for inaccurate ion ratios was turned off. The analyst, unaware of any qualitative flags to the data as they had been turned off, would see a "PASS" for ions whose ratios were not necessarily consistent with the ratios obtained in the analyte ICAL.

To improve the data quality of the project, the samples were re-sampled using sodium sulfite, which quenches halogenated species, as a preservative. Use of this preservative was found to eliminate presence of the false positive amylene derivative. Additionally the setting in the software to flag analytes with inconsistent ion ratio results has been turned on with an ion ratio acceptance criteria of +-30% as specified by EPA 8270E. Analysts were instructed to contact additional resources or reviewers in the case of any doubt with regards to the qualitative identification of analytes.