The RLs used to calculate the HQs are previously established exposure levels below which no adverse effect in humans is expected. If available, RLs adopted by the Colorado Department of Public Health and Environment (CDPHE) were selected for use within this assessment. If the analyte was not listed by CDPHE, CTEH® followed a federal and state recommended hierarchy for selection of RLs[2]. Acute HQs were calculated as follows:

Eq. 1 – Hazard Quotient (HQ) Equation

$$HQ = EC / RL$$

Where:

HQ = Hazard Quotient

EC = 1-hour average air concentration

RL = Acute Health-based Reference Level (from USEPA, ATSDR, Cal EPA and TCEQ)

Health risks from potential cumulative exposures to all detected analytes were calculated by adding together each individual analyte's HQ calculated for a given sampling location. The sum of all the individual HQs is called a Hazard Index (HI). Adding together all the HQs is also a very health-conservative approach because it assumes that all the measured analytes exert an adverse effect on the body in a similar manner, which is rarely the case.

A HQ or HI of less than or equal to one is an indication that the estimated exposure is likely to be without an appreciable risk of adverse health effects, even for sensitive sub-populations. The potential for adverse health effects increases as HQ or HI increase above one, but it is not known by how much. Therefore, calculated hazard values in this assessment that are equal to or less than one indicates an acceptable risk level. HQ or HI values of greater than one would prompt a second-tier risk assessment beyond the screening-level assessment.

According to the USEPA and ATSDR, the federal agencies that establish the RLs note that these values "*are set below levels that, based on current information, might cause adverse health effects in the people most sensitive*." This is because RLs are based on observed toxicity in human or animal studies with an added safety factor to account for uncertainties in the toxicity data. For example, ATSDR identified the lowest observed adverse effect level (LOAEL) for acute exposure to benzene as 10,200 parts per billion (ppb), based on a study of mice exposed six hours per day for six days. ATSDR then applied a combined safety factor of 300 to derive the final RL to account for several uncertainties, including differences between mice and humans and for sensitive individuals[3]. Therefore, it is scientifically incorrect to assume that all real-world exposures to a chemical at levels higher than an RL likely will result in an adverse effect.

The USEPA also has established values for use in emergency situations, termed Acute Exposure Guideline Levels (AEGLs). Unlike health-based reference levels that can be thousands of times below exposure levels where adverse effects are observed, AEGL values are levels at which different acute adverse health effects may be anticipated to occur. According to USEPA, "*AEGL-1 represent exposure levels that could produce mild and progressively increasing but transient and non-disabling odor, taste and sensory irritation or certain asymptomatic, non-sensory effects. With increasing airborne concentration above each AEGL, there is a progressive increase in the*

[2] Available at: https://drive.google.com/file/d/1P2KEvu0MFiyzQAOQtjQUclqR-WGh1bEX/view
[3] Available at: https://www.atsdr.cdc.gov/toxprofiles/tp3-c3.pdf