United States
Environmental Protection Agency

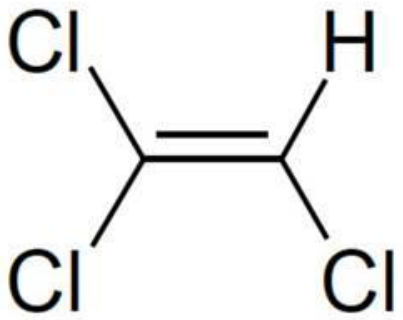
Office of Chemical Safety and
Pollution Prevention

Final Risk Evaluation for Trichloroethylene

Systematic Review Supplemental File:

Data Extraction for Biomonitoring Data

CASRN: 79-01-6



November 2020

Trichloroethylene (trichloroethene or TCE) Biomonitoring

Systematic review identified blood biomonitoring measurements for TCE from two sources. The most comprehensive source is the National Health and Nutrition Examination Survey (NHANES) conducted by CDC's National Center for Health Statistics (NCHS). The survey is "a complex, stratified, multistage, probability-cluster design survey" designed to collect data on the health and nutrition of a representative sample of the US population. The *Fourth National Report on Human Exposure to Environmental Chemicals, Updated Tables, January 2017* (CDC, 2017) is cumulative in its data, beginning in the sample years 1999-2000. NHANES measured TCE in whole blood of males and females ages 12+ years. Statistics were reported for the 50^{th}, 75^{th}, 90^{th}, and 95^{th} percentiles for 2-year cycles for 2001 through 2008. These concentration statistics were categorized by age group, gender, and race/ethnicity. The total sample sizes ranged from 922 (2001-2002) to 3,178 (2005-2006). The concentrations in all samples were less than the limit of detection (0.012 µg/L).

Another source (Sexton et al., 2005) measured concentrations of TCE in whole blood samples from 150 children. These samples were collected as part of the School Health Initiative: Environment, Learning, Disease (SHIELD) study. TCE was detected in only 3.2 to 7% of the samples, with concentrations ranging from 0.01 µg/L (10^{th} percentile) to 0.01-0.02 µg/L (99^{th} percentile). The limit of detection was 0.01 µg/L. The SHIELD study also collected 2-day, integrated personal air samples.

In addition to blood, NHANES also collected urine spot samples. The TCE metabolites N-Acetyl-S-(1,2-dichlorovinyl)-L-cysteine and N-Acetyl-S-(2,2-dichlorovinyl)-L-cysteine were measured in males and females ages 6+ years in survey years 2011-2012 (n=2,464-2,466). Statistics were reported for both uncorrected urine concentrations and creatine corrected urine concentrations. The concentrations in all samples were less than the limits of detection, 12.6 µg/L for N-Acetyl-S-(1,2-dichlorovinyl)-L-cysteine and 6.5 µg/L for N-Acetyl-S-(2,2-dichlorovinyl)-L-cysteine.

Breath samples were collected as part of the Total Exposure Assessment Methodology (TEAM) Study (Wallace, 1987), which also collected concurrent personal inhalation monitoring samples and outdoor air samples. In Phase II and III of the study conducted between 1981 and 1984, samples were collected from adults conducting normal daily activities in industrial/chemical manufacturing and /or petroleum refining regions of the US, including Elizabeth and Bayonne, NJ, Los Angeles, CA, and Contra Costa, CA. Samples were collected in fall, summer, and winter in the Elizabeth-Bayonne, NJ area. Samples were collected in Los Angeles during winter and summer and during summer in Contra Costa. For all six sampling events (n=686), arithmetic means ranged from 0.6 to 5.9 $\mu g/m^3$.

A 1992 study jointly conducted by the Research Triangle Institute, EPA Office of Research and Development, and IIT Research Institute (Pellizzari et al., 1992) involved collection of breath samples after exposing subjects to a variety of common consumer products. Four adult male participants were instructed to use specific consumer products, including air fresheners, dry-cleaning solvents, and paint strippers, over a three-day period while conducting normal daily activities at home and at work. Breath samples were then collected for each of four adult males at fixed time intervals over a 10-hour period in a clean-air environment (n=13). Of the two participants for which TCE was measured in their breath, the samples ranged from 1.2 $\mu g/m^3$ (measured at 439 minutes post-exposure) to 7 +/- 0.2 $\mu g/m^3$ (measured at 10 minutes post-exposure) for subject 1 and from 10 $\mu g/m^3$ (measured at 542 minutes post-exposure) to 75 +/- 12 $\mu g/m^3$ (measured at 30 minutes post-exposure) for subject 2. Because the subjects were purposefully exposed to the chemical-containing products, this study does not contain true biomonitoring data.