

CHLOROMETHANE (CH₃Cl)

also known as Methyl Chloride

Chemical Abstracts Service (CAS) Number: 74-87-3

General Information

Chloromethane is a colorless gas with a faint sweet smell. Acute (short-term) exposure to high concentrations of chloromethane in humans has caused severe neurological effects.

Chloromethane has also caused effects on the heart rate, blood pressure, liver, and kidneys in humans. The effects of chronic (long-term) exposure to chloromethane in humans are unknown. Chronic animal studies have shown liver, kidney, spleen and central nervous system effects. Information regarding carcinogenicity in humans after exposure to chloromethane is limited. U.S. EPA has classified chloromethane as a Group D (not classifiable) carcinogen.

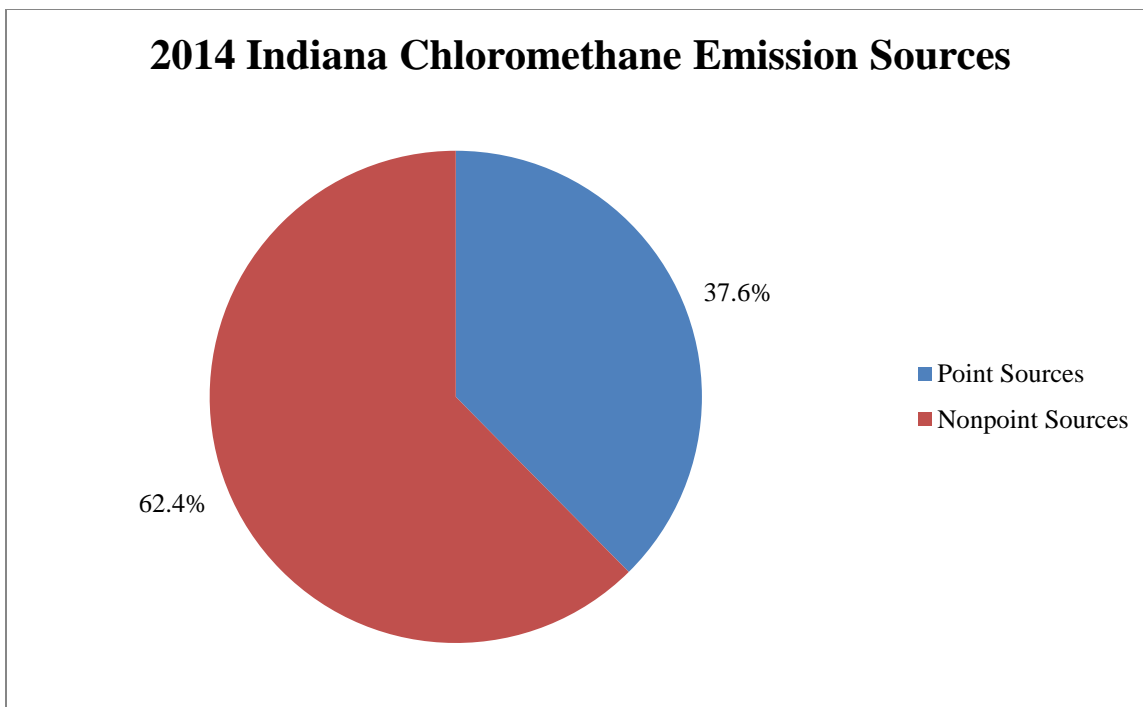
Sources

- Low levels of chloromethane occur naturally in the environment. Higher levels may occur at chemical plants where it is made or used.
- Chloromethane is used mainly in the production of silicones where it is used to make methylate silicon. It is also used in the production of agricultural chemicals, methyl cellulose, quaternary amines, and butyl rubber and for miscellaneous uses including tetramethyl lead.
- Chloromethane was used widely in refrigerators in the past, but generally this use has been taken over by newer chemicals such as Freon.
- Occupations that present a higher risk of exposure include building contracting, metal industries, transportation, car dealers, and service-station attendants.

Indiana Emissions

IDEM collects HAP emissions information for the categories of point sources (large stationary sources like power plants and factories), nonpoint sources (aka area sources - smaller stationary sources like gas stations and dry cleaners), and mobile sources (vehicles, airplanes, marine vessels, etc.).* Estimated statewide emissions of chloromethane totaled 51.54 tons in the 2014 calendar year. Of this total, 62.4% was attributed to nonpoint sources and the remaining 37.6% was attributed to point sources.

2014 Indiana Chloromethane Emission Sources



* For additional examples of types of emission sources, please visit IDEM's Hazardous Air Pollutants page at: <http://www.in.gov/idem/toxic/pages/hap/index.html>. For specific details on industrial sources of air toxics, please visit U.S. EPA's Toxics Release Inventory (TRI) page at: <https://www.epa.gov/toxics-release-inventory-tri-program>.

Measured Concentration Trends

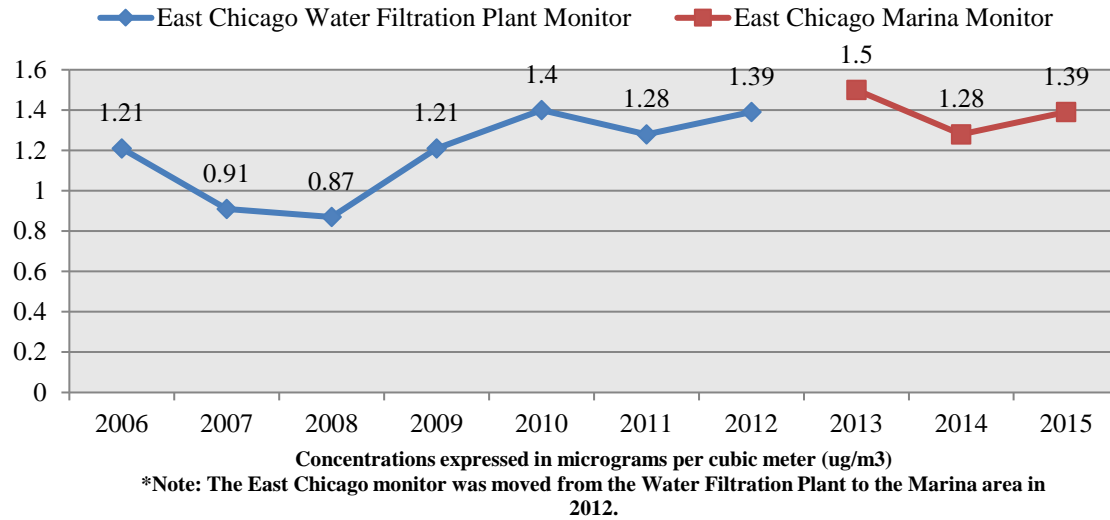
Ambient air monitoring data most accurately represents a limited area near the monitor location. All monitors for air toxics sample every sixth day. The monitoring locations by themselves are not sufficient to accurately characterize air toxic concentrations throughout the entire state, however, results from the monitors will provide exposure concentrations with a great deal of confidence at the monitoring locations.

The ambient air monitoring results were analyzed using U.S. EPA recommended statistical methods. IDEM evaluated the data so that a 95% upper confidence limit of the mean (UCL) could be determined. A 95% UCL represents a value which one can be 95% confident that the true mean of the population is below that value.

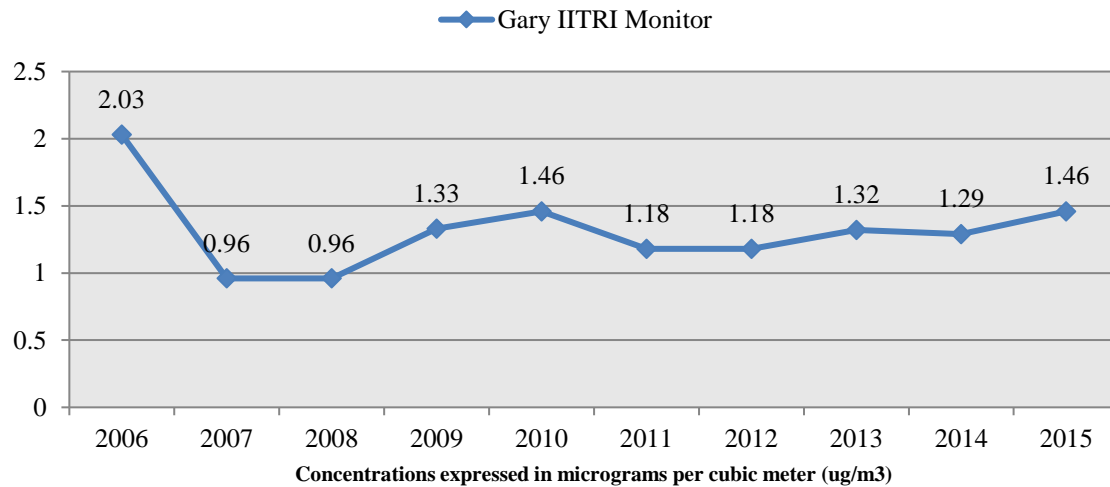
To learn more about the current monitoring locations, please visit IDEM's Air Toxics Monitor Siting webpage at: <http://www.in.gov/idem/toxic/2337.htm>

Data analysis was performed for each monitor that operated for a significant portion of the analysis period. This analysis determined the detection rate, which is defined as the percentage of valid samples taken statewide that had a quantifiable concentration of the pollutant. The statewide detection rate of chloromethane for the monitors analyzed from 2006-2015 was 99.4%. Trend graphs for each of these monitors are provided below.

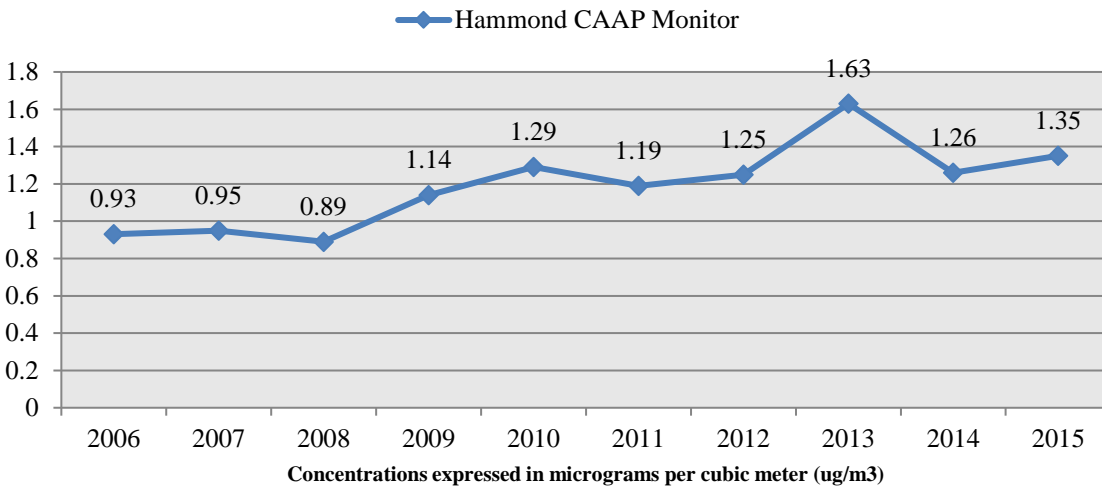
95% UCL Chloromethane Concentrations at East Chicago (2006-2015)



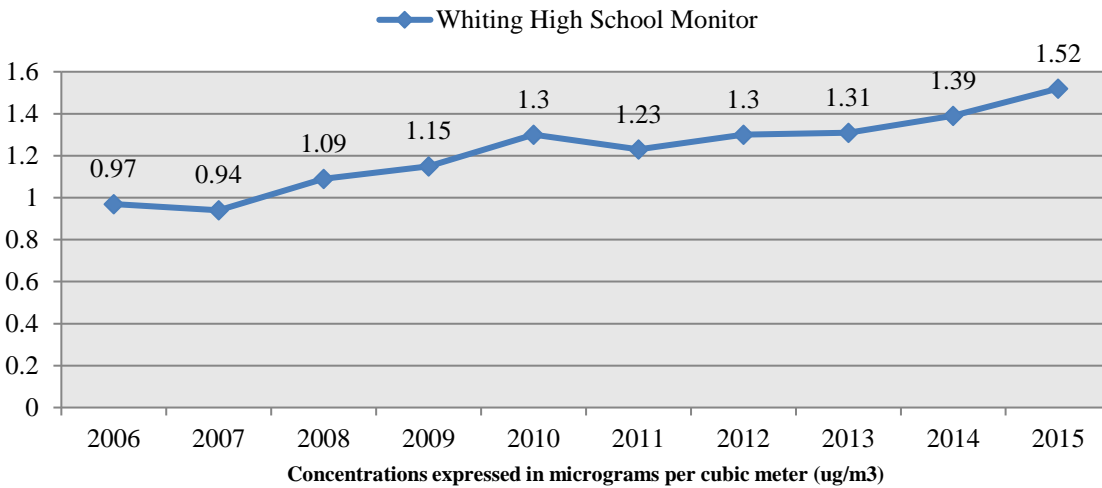
95% UCL Chloromethane Concentrations at Gary (2006-2015)



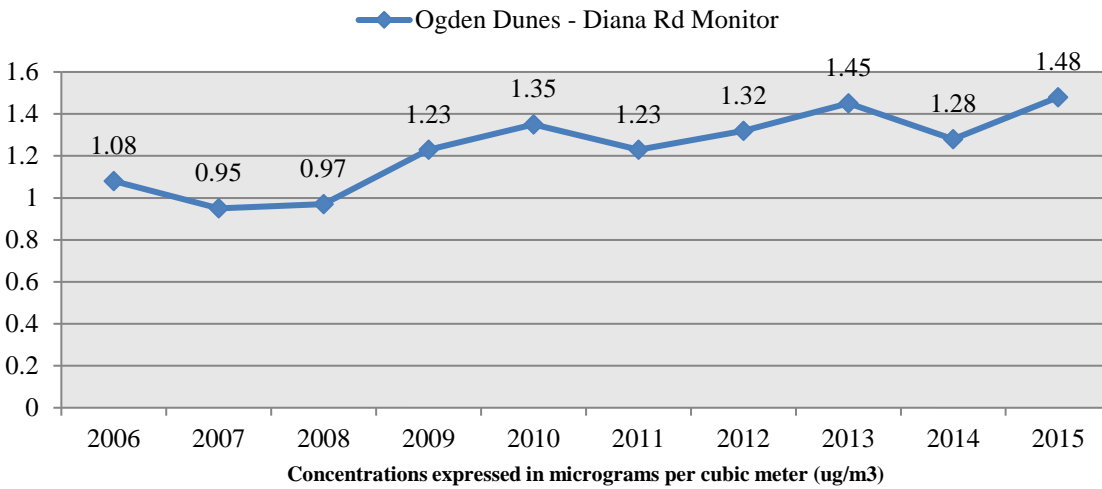
95% UCL Chloromethane Concentrations at Hammond (2006-2015)



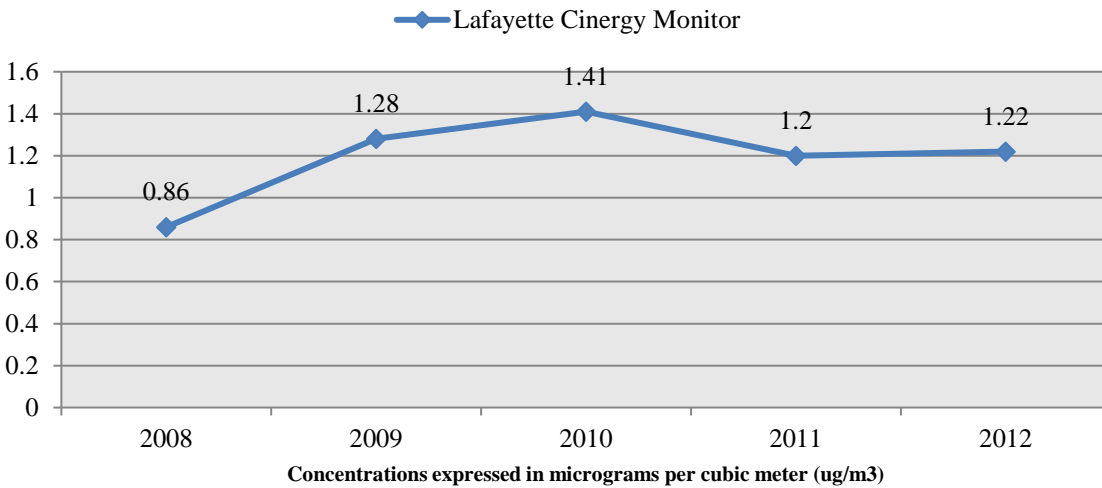
95% UCL Chloromethane Concentrations at Whiting (2006-2015)



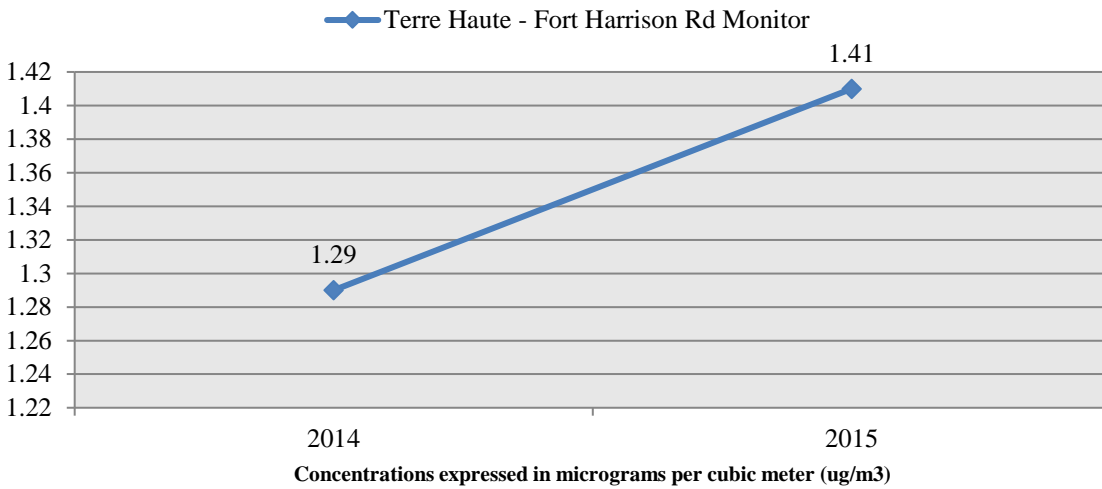
95% UCL Chloromethane Concentrations at Ogden Dunes (2006-2015)



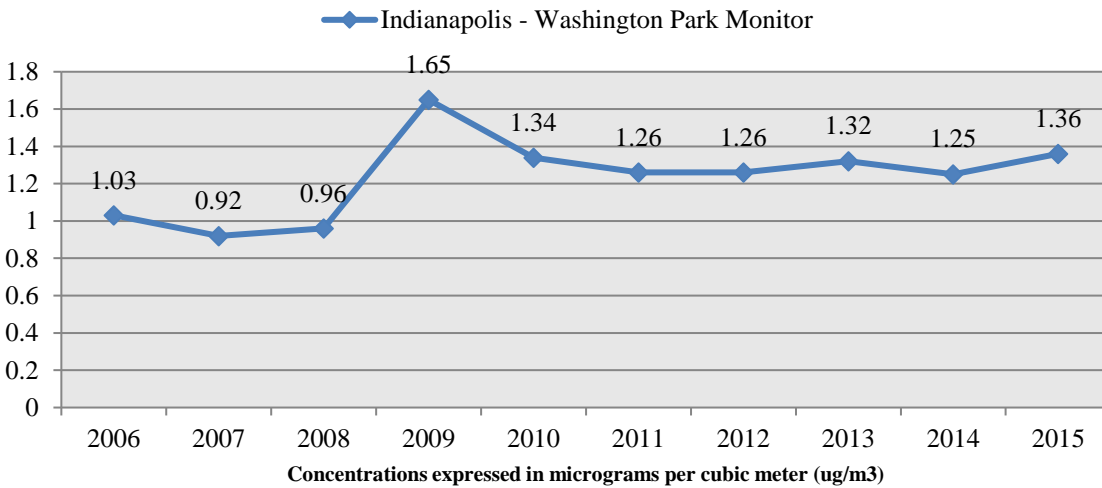
95% UCL Chloromethane Concentrations at Lafayette (2008-2012)

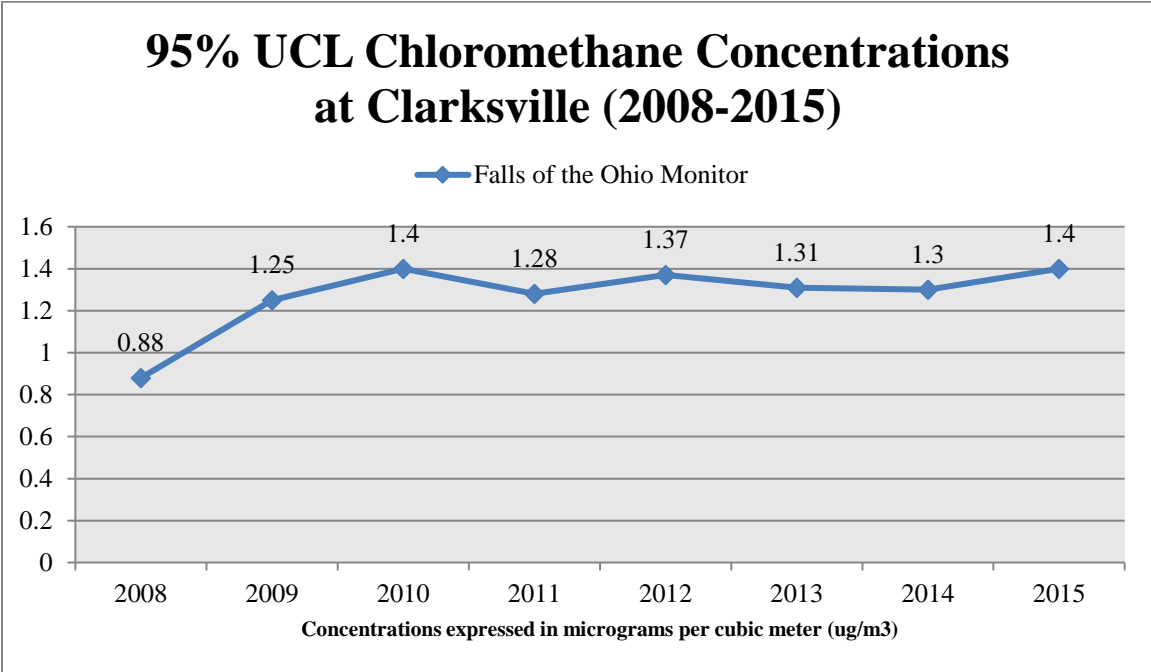
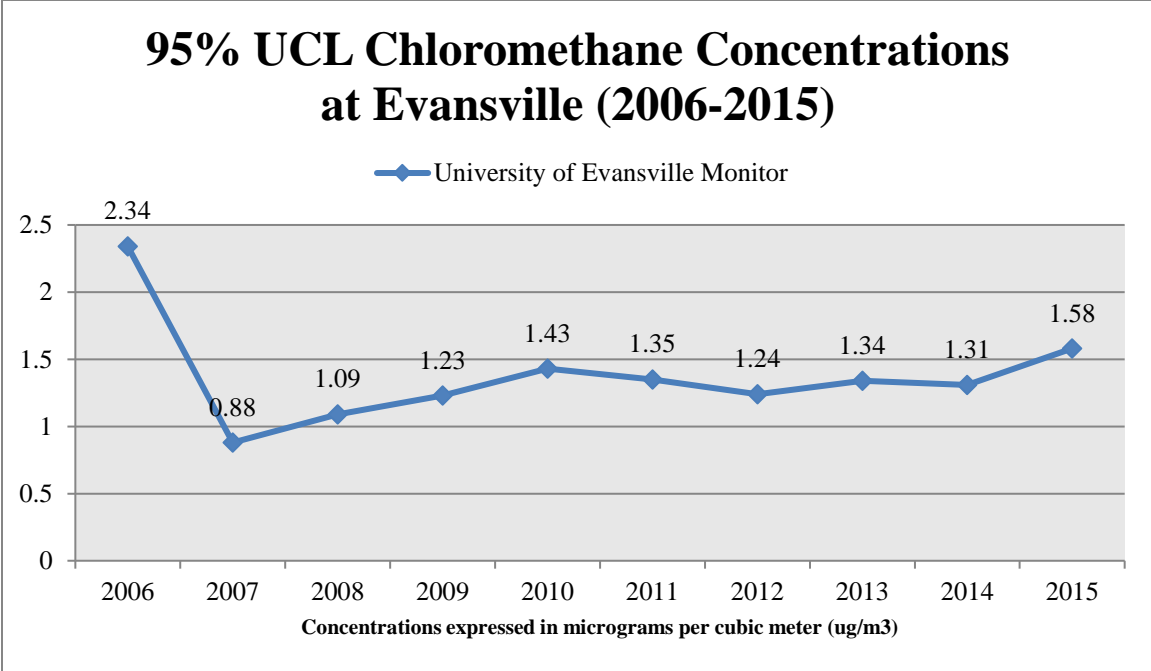


95% UCL Chloromethane Concentrations at Terre Haute (2014-2015)



95% UCL Chloromethane Concentrations at Indianapolis (2006-2015)





The analysis of monitoring data from 2006 to 2015 indicates that concentrations of chloromethane have increased slightly at most monitors. Exceptions to this pattern can be noted at Gary and Evansville, where concentrations were higher in 2006 before dropping significantly in 2007 and rising slowly from there. Another exception is the Indianapolis monitor where concentrations peaked in 2009 before dropping and remaining fairly consistent from 2010-2015. All monitoring data were well below the Reference Concentration of 90.00. More information about the reference concentration can be found in the hazard quotient section below.

Hazard Quotient

IDEM evaluates chronic (lifetime) non-cancer hazard assuming a threshold for each pollutant at which a health effect can be observed. That is, it assumes safe exposure to the pollutant up to a certain level before it is possible to experience a health effect from breathing the pollutant. IDEM uses health protective assumptions by taking into account people who might be more sensitive to the pollutants. The hazard quotient is a ratio that divides the measured concentration of a pollutant by the reference concentration (RfC). A hazard quotient under 1.0 is commonly recognized to be below the health-protective level. Hazard quotients over 1.0 indicate that further investigation may be necessary and does not necessarily mean that health effects are expected. Given the many health-protective assumptions used in the evaluation, most non-cancer hazards over 1.0 are still unlikely to be associated with observable adverse health effects.

The average concentration of chloromethane was evaluated for each air pollutant monitor over the span of this study. The results for each monitor are displayed in the table below. The calculated hazard quotient is well below 1.0 at all monitors, which indicates that the measured concentrations of chloromethane do not present a risk for non-cancer health effects.

Table 1. Chloromethane Hazard Quotients (concentrations expressed in micrograms per cubic meter)

Monitor	Years	Average Concentration	Reference Concentration (RfC)*	Hazard Quotient
East Chicago Water Filtration Plant	2006-2012	1.15	90.00	0.0128
East Chicago Marina	2013-2015	1.37	90.00	0.0152
Gary IITRI	2006-2015	1.26	90.00	0.0140
Hammond CAAP	2006-2015	1.16	90.00	0.0129
Whiting High School	2006-2015	1.18	90.00	0.0131
Ogden Dunes – Diana Rd	2006-2015	1.19	90.00	0.0132
Lafayette Cinergy	2008-2012	1.16	90.00	0.0129
Terre Haute – Fort Harrison Rd	2014-2015	1.34	90.00	0.0149
Indianapolis – Washington Park	2006-2015	1.19	90.00	0.0132
University of Evansville	2006-2015	1.30	90.00	0.0144
Clarksville – Falls of the Ohio	2008-2015	1.25	90.00	0.0139

* Reference Concentration Source: Integrated Risk Information Service

Cancer Risk

The cancer risk from exposure to chloromethane is not classifiable.