

CYCLOHEXANE (C₆H₁₂)

Chemical Abstracts Service (CAS) Number: 110-82-7

General Information

Cyclohexane is a colorless, highly flammable liquid occurring naturally in petroleum at concentrations of 0.5-1.0%. It has a pungent petroleum-like odor. Cyclohexane can be absorbed into the body by inhalation of its vapor and by ingestion. Potential symptoms of overexposure to cyclohexane are irritation of eyes, skin and respiratory system; drowsiness; dermatitis; narcosis and coma although cyclohexane generally has low acute toxicity. High vapor concentrations have produced convulsions in animal studies. U.S. EPA has assessed the data related to cyclohexane and found it inadequate to make a determination of carcinogenicity.

Sources

- The primary use of cyclohexane is in the production of nylon.
- Cyclohexane is present in all crude oils in concentrations ranging from 0.1 to 1.0%, and it is also found in gasoline formulations.
- The general population is primarily exposed to cyclohexane through the inhalation of ambient air due to its presence in gasoline vapors.

Indiana Emissions

Cyclohexane emissions totals are not available from the National Emission Inventory (NEI) for the 2014 calendar year.

Measured Concentration Trends

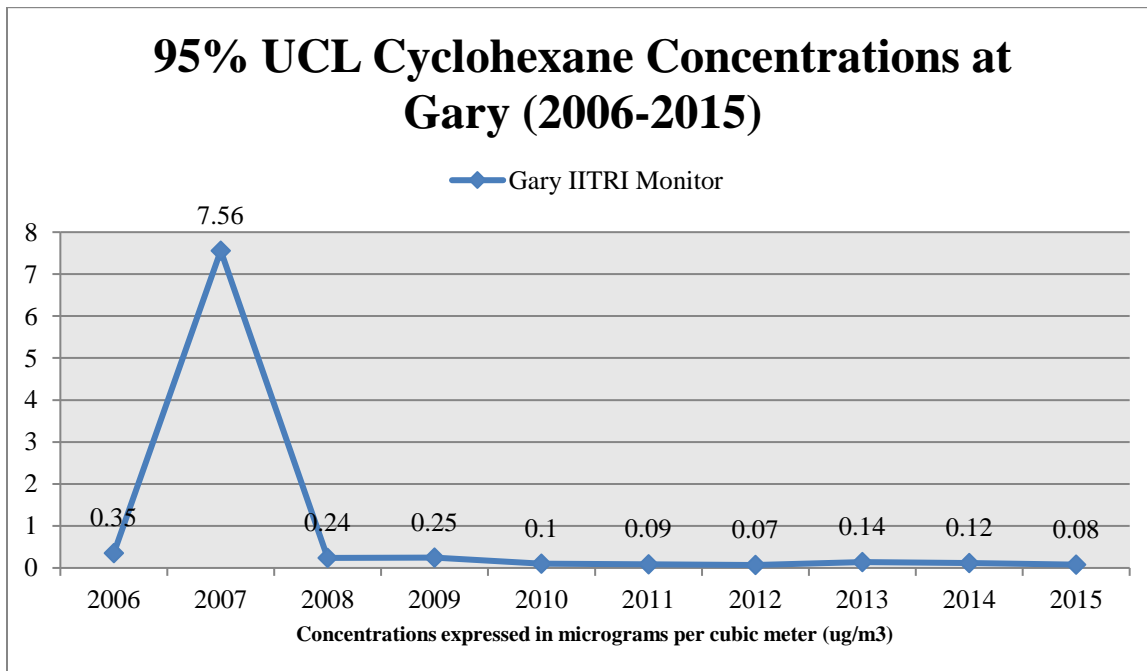
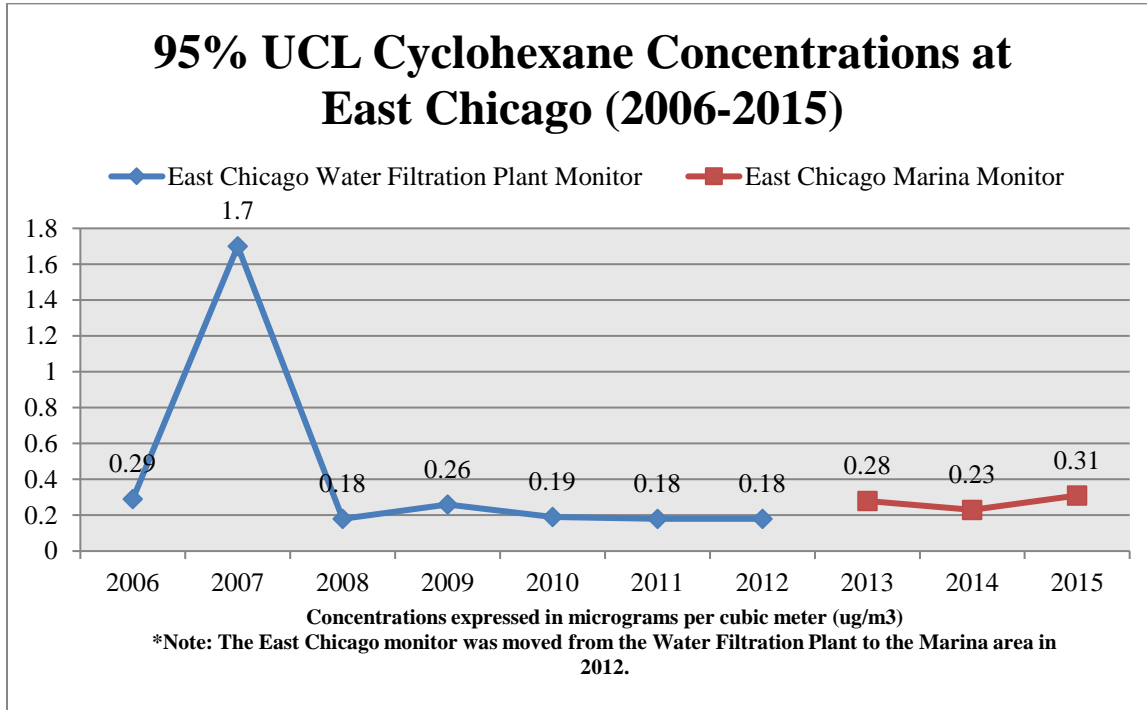
Ambient air monitoring data most accurately represents a limited area near the monitor location. All monitors for air toxics sample every sixth day. The monitoring locations by themselves are not sufficient to accurately characterize air toxic concentrations throughout the entire state, however, results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

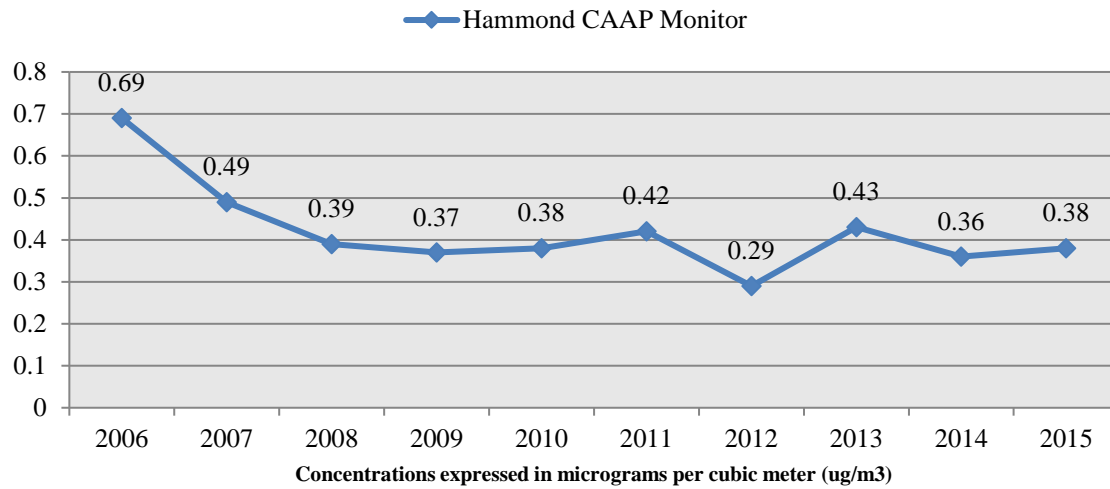
To learn more about the current monitoring locations, please visit IDEM's Air Toxics Monitor Siting webpage at: <http://www.in.gov/idem/toxic/2337.htm>

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

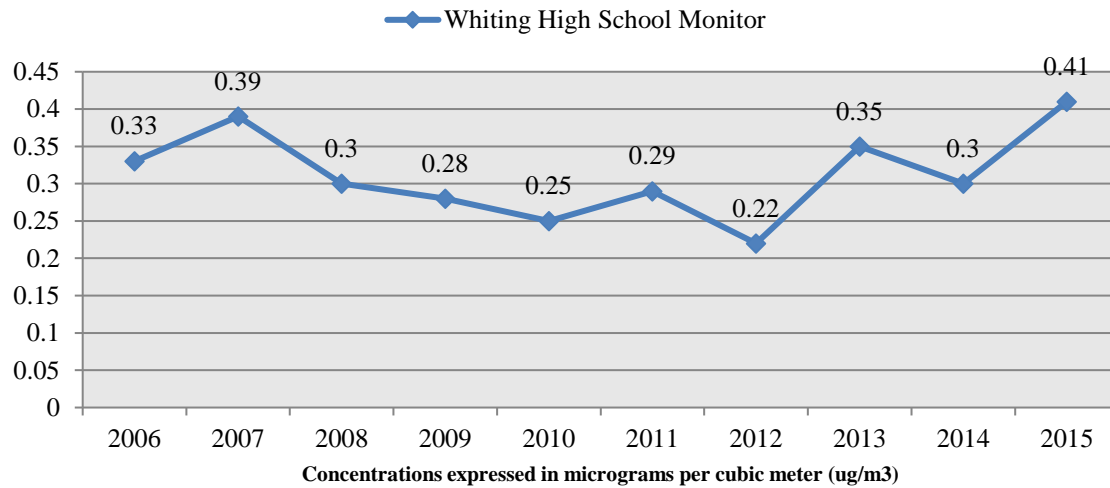
statewide detection rate of cyclohexane for the monitors analyzed from 2006-2015 was 67.1%. Trend graphs for each of these monitors are provided below.



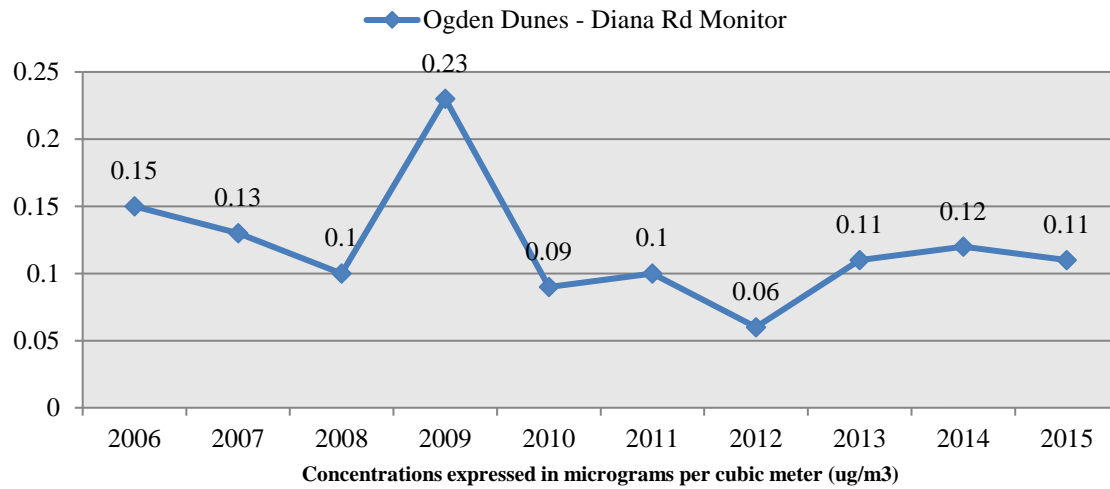
95% UCL Cyclohexane Concentrations at Hammond (2006-2015)



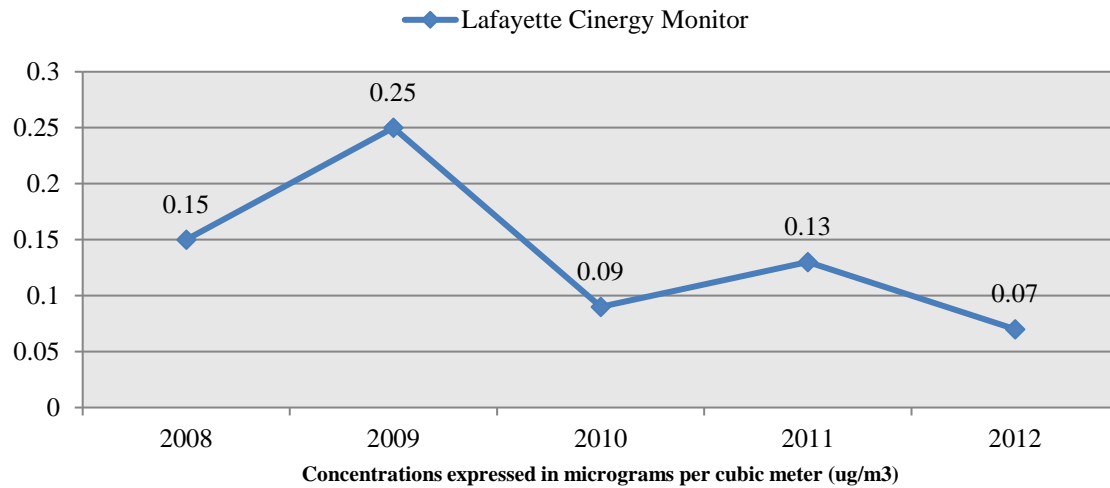
95% UCL Cyclohexane Concentrations at Whiting (2006-2015)



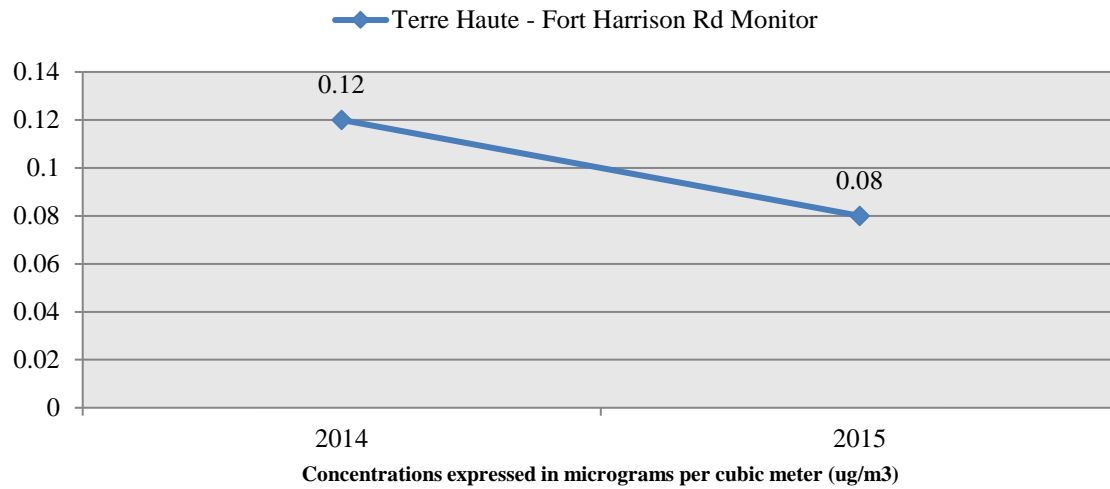
95% UCL Cyclohexane Concentrations at Ogden Dunes (2006-2015)



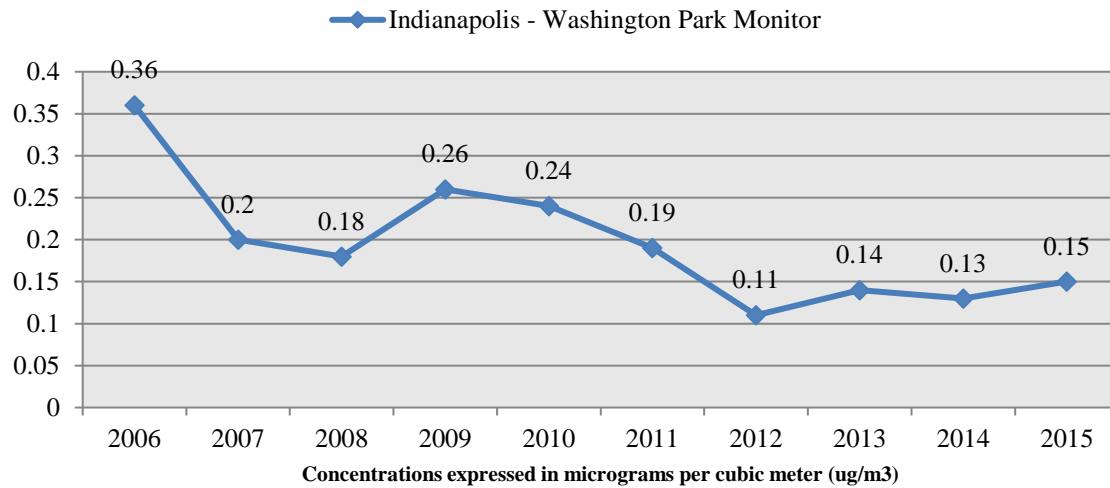
95% UCL Cyclohexane Concentrations at Lafayette (2008-2012)



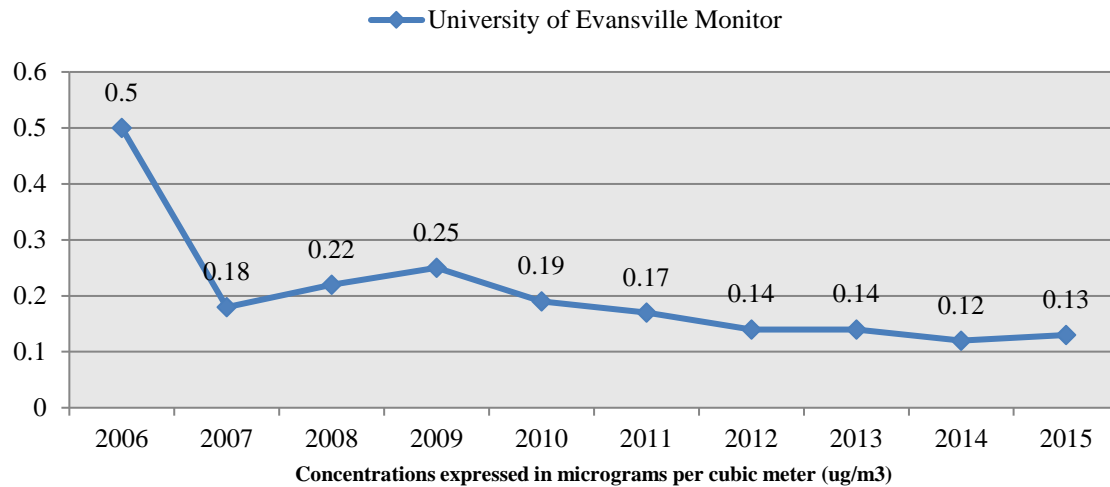
95% UCL Cyclohexane Concentrations at Terre Haute (2014-2015)



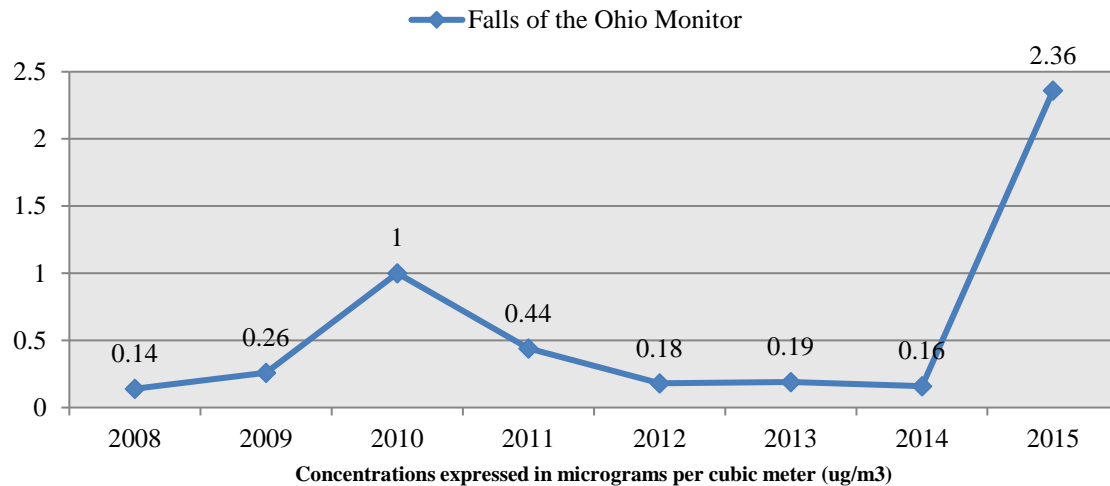
95% UCL Cyclohexane Concentrations at Indianapolis (2006-2015)



95% UCL Cyclohexane Concentrations at Evansville (2006-2015)



95% UCL Cyclohexane Concentrations at Clarksville (2008-2015)



The analysis of monitoring data from 2006 to 2015 indicates that concentrations of cyclohexane have decreased or held steady at most monitors. The most notable exception is 2015 at Clarksville where a spike in concentrations from late-May to mid-August led to a significantly higher value for the year. The overall highest readings occurred during 2007 at the Gary monitor. The single highest reading of cyclohexane was 98.32 ug/m³ at Gary on 8/16/2007. This reading is still well below the Reference Concentration of 6000.00. 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 cyclohexane 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 cyclohexane do not present a risk for non-cancer health effects.

Table 1. Cyclohexane 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	0.40	6000.00	0.00007
East Chicago Marina	2013-2015	0.25	6000.00	0.00004
Gary IITRI	2006-2015	0.86	6000.00	0.00014
Hammond CAAP	2006-2015	0.36	6000.00	0.00006
Whiting High School	2006-2015	0.27	6000.00	0.00005
Ogden Dunes – Diana Rd	2006-2015	0.11	6000.00	0.00002
Lafayette Cinergy	2008-2012	0.13	6000.00	0.00002
Terre Haute – Fort Harrison Rd	2014-2015	0.10	6000.00	0.00002
Indianapolis – Washington Park	2006-2015	0.17	6000.00	0.00003
University of Evansville	2006-2015	0.17	6000.00	0.00003
Clarksville – Falls of the Ohio	2008-2015	0.52	6000.00	0.00009

* Reference Concentration Source: Integrated Risk Information Service

Cancer Risk

The cancer risk from exposure to cyclohexane is not classifiable.