

METHYL ISOBUTYL KETONE (C₆H₁₂O)

Chemical Abstracts Service (CAS) Number: 108-10-1

General Information

Methyl isobutyl ketone occurs as a colorless, flammable liquid that is moderately soluble in water. It has a faint ketonic and camphor odor. Acute (short-term) exposure to methyl isobutyl ketone may irritate the eyes and mucous membranes and cause weakness, headache, nausea, lightheadedness, vomiting, dizziness, incoordination, narcosis in humans. Chronic (long-term) exposure to methyl isobutyl ketone has been observed to cause nausea, headache, burning in the eyes, weakness, insomnia, intestinal pain, and slight enlargement of the liver in humans. No information is available on the cancer risk of exposure to methyl isobutyl ketone. U.S. EPA has classified methyl isobutyl ketone as a Group D, not classifiable as to human carcinogenicity.

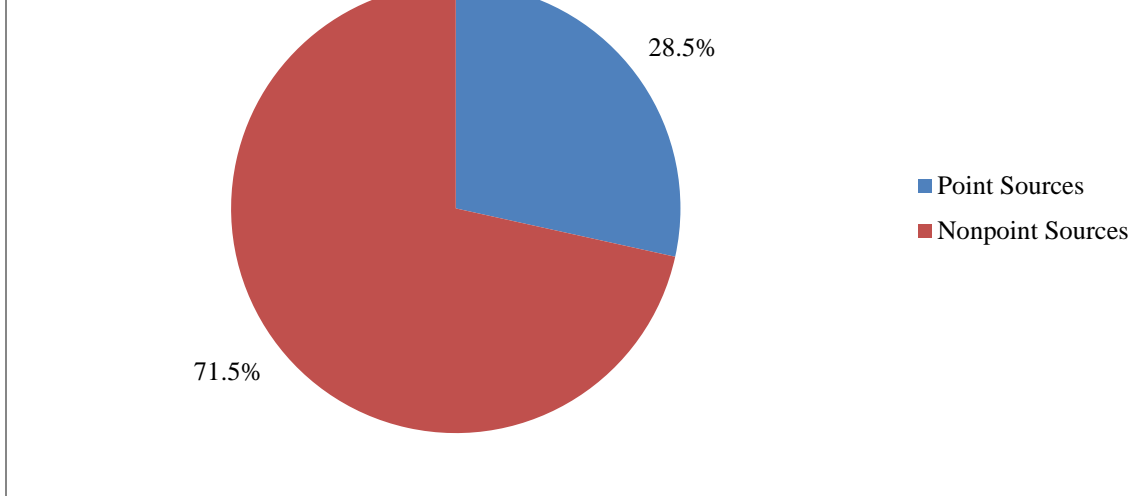
Sources

- Methyl isobutyl ketone is used as a solvent for gums, resins, paints, varnishes, lacquers, and nitrocellulose, as an alcohol denaturant, in the extraction of rare metals, and as a synthetic flavoring adjuvant.
- Occupational exposure may occur in the workplace by the inhalation of vapors and by skin and eye contact.
- The most probable routes of exposure to methyl isobutyl ketone by the general population are by inhalation and dermal contact during the use of consumer products that contain this compound.

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 methyl isobutyl ketone totaled 274.57 tons in the 2014 calendar year. Of this total, 71.5% were attributed to nonpoint sources with the remaining 28.5% attributed to point sources.

2014 Indiana Methyl Isobutyl Ketone 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

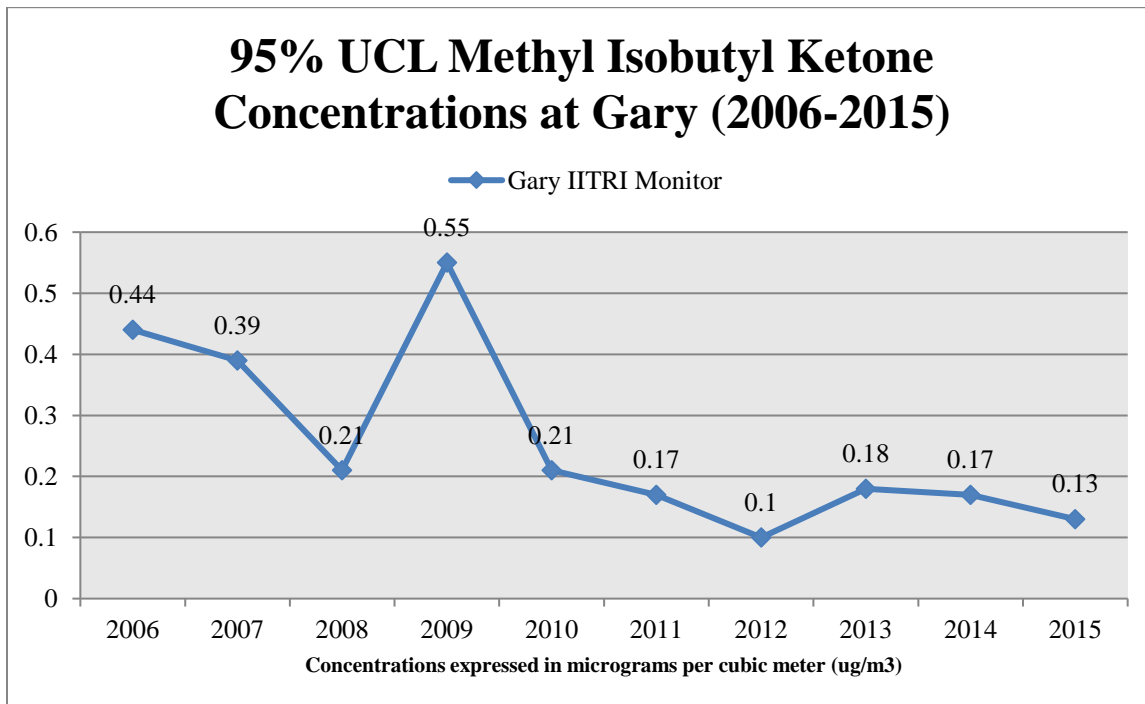
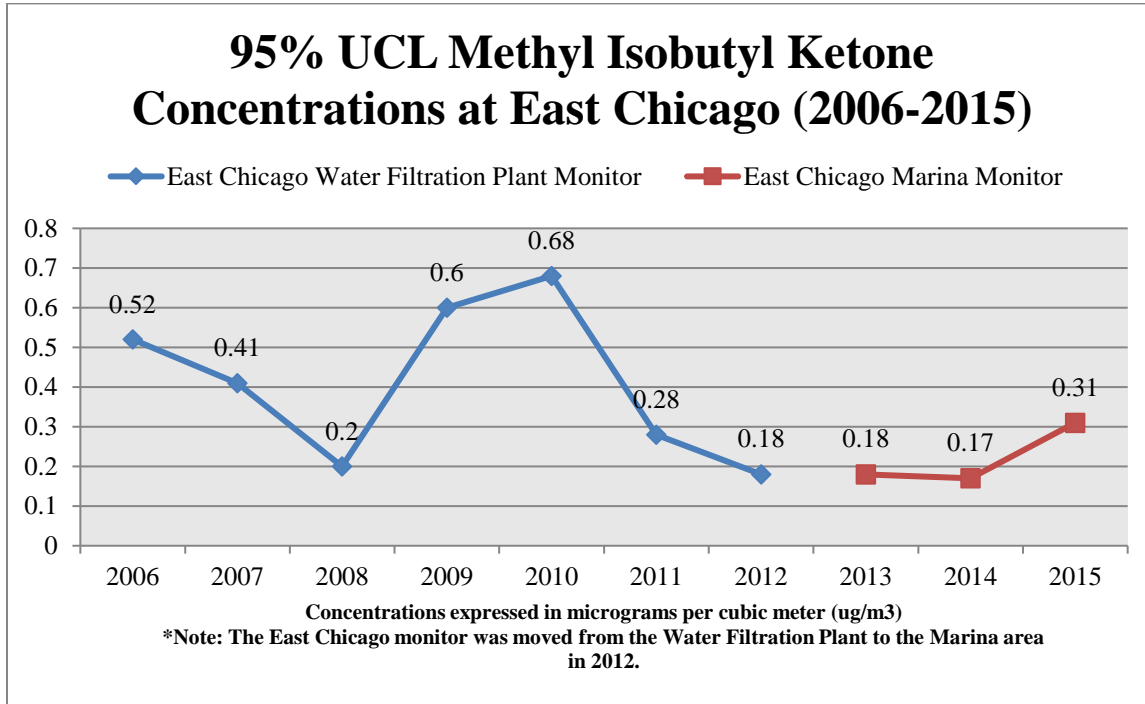
Ambient air monitoring data most accurately represents a limited area near the monitor location. All monitors for air toxics sample every sixth day. The monitoring locations by themselves are not sufficient to accurately characterize air toxic concentrations throughout the entire state, however, results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

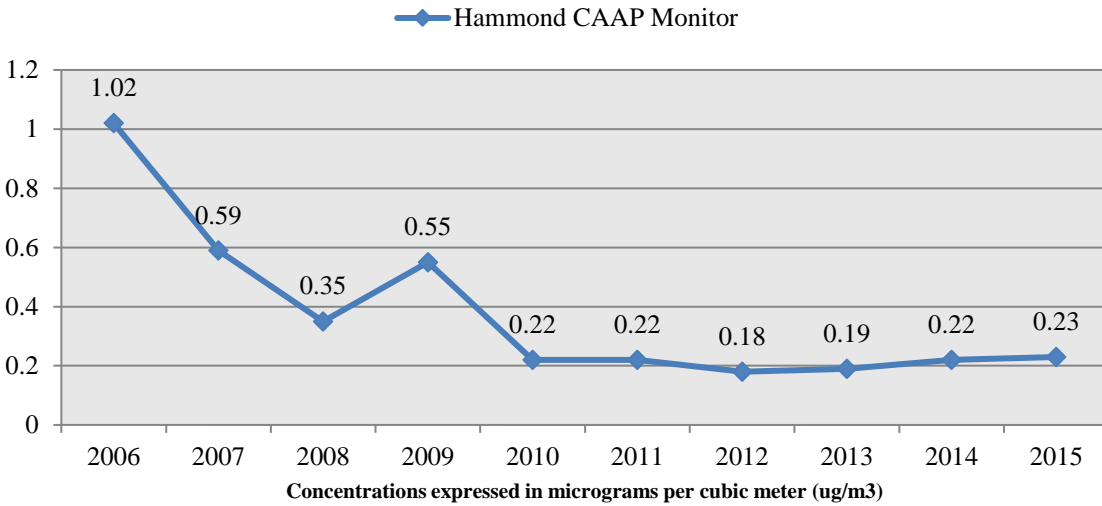
To learn more about the current monitoring locations, please visit IDEM's Air Toxics Monitor Siting webpage at: <http://www.in.gov/idem/toxic/2337.htm>

Data analysis was performed for each monitor that operated for the majority of 2015 and each historical 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 methyl isobutyl ketone for the monitors analyzed from 2006-2015 was 61.9%. This detection

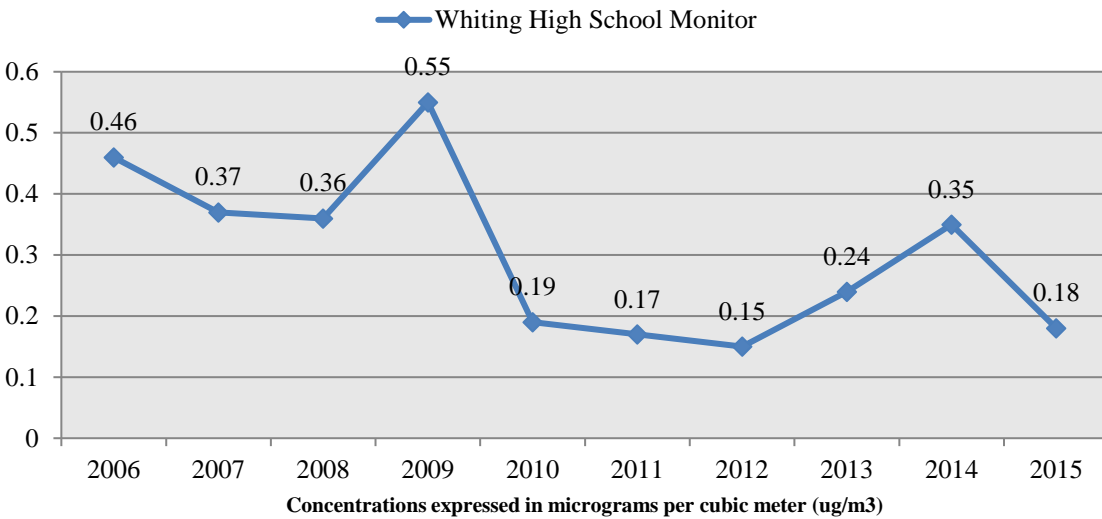
rate was sufficient to perform a trend analysis, but too low to support a high level of confidence in the results. Trend graphs for each of these monitors are provided below.



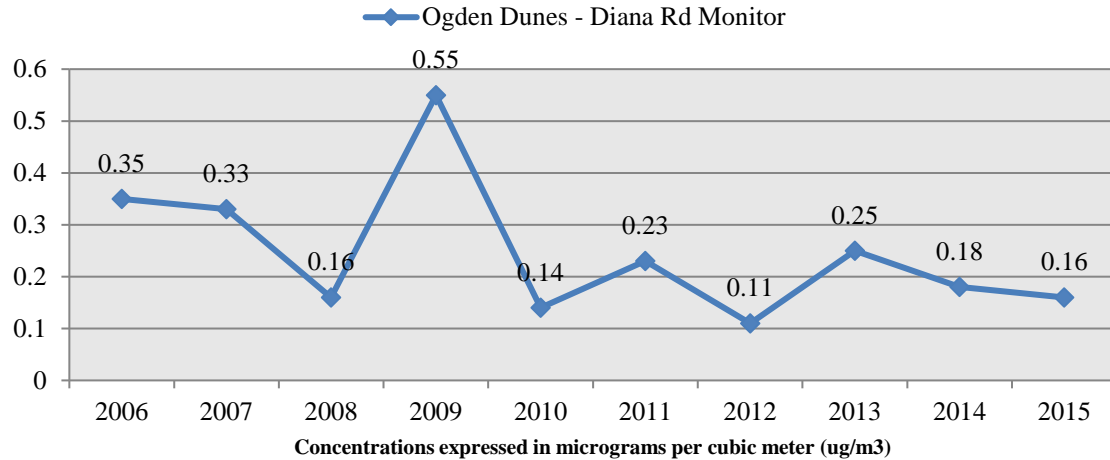
95% UCL Methyl Isobutyl Ketone Concentrations at Hammond (2006-2015)



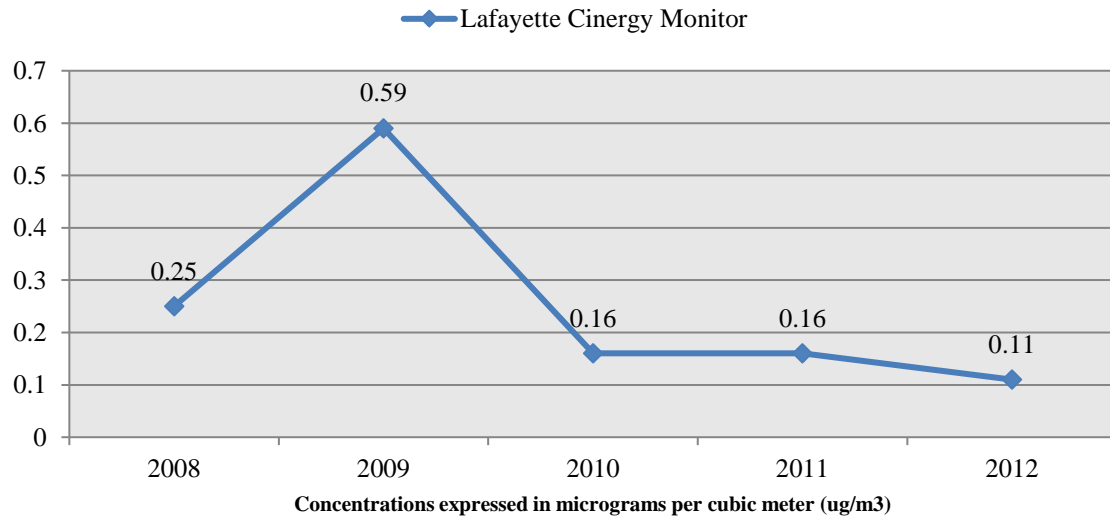
95% UCL Methyl Isobutyl Ketone Concentrations at Whiting (2006-2015)



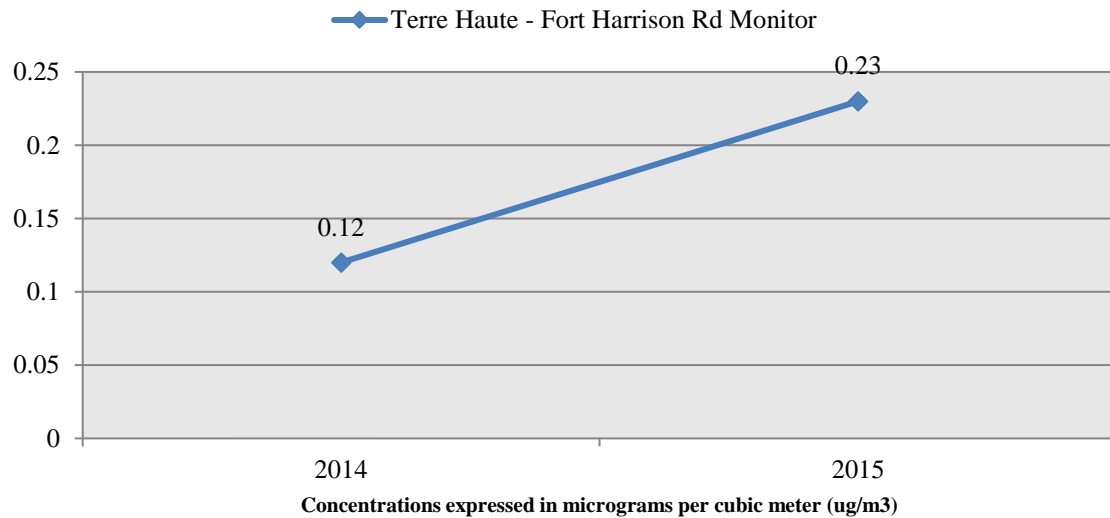
95% UCL Methyl Isobutyl Ketone Concentrations at Ogden Dunes (2006-2015)



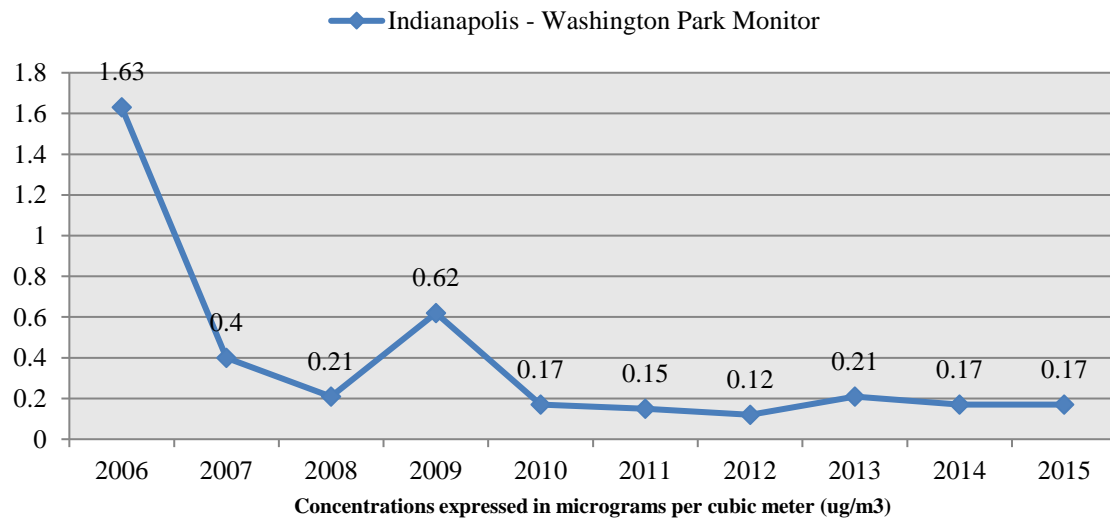
95% UCL Methyl Isobutyl Ketone Concentrations at Lafayette (2008-2012)



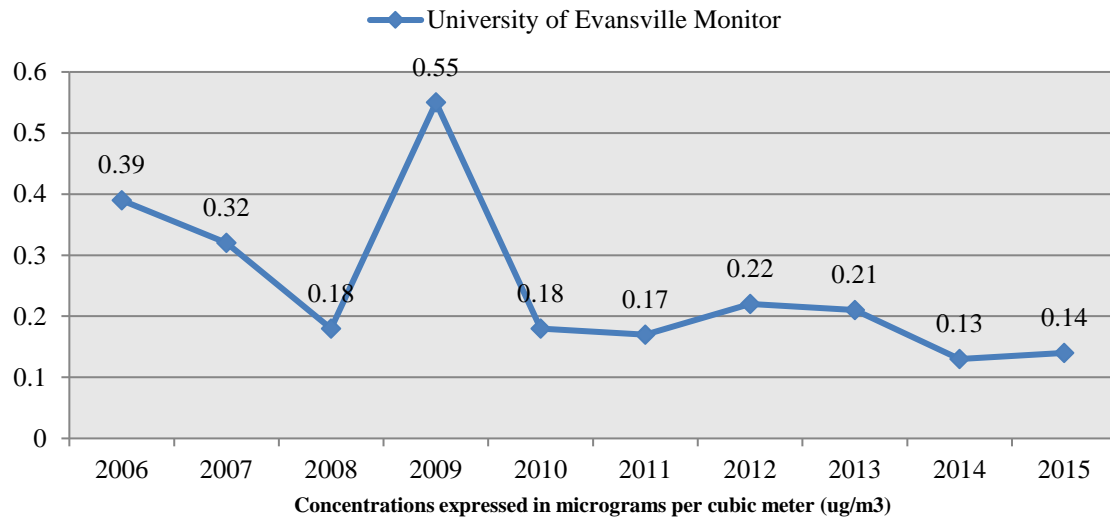
95% UCL Methyl Isobutyl Ketone Concentrations at Terre Haute (2014-2015)



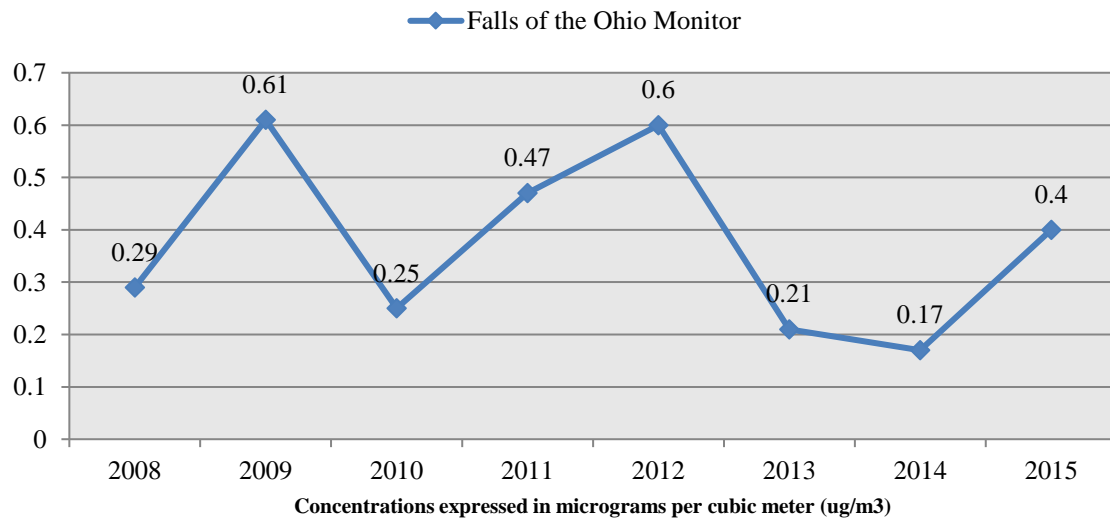
95% UCL Methyl Isobutyl Ketone Concentrations at Indianapolis (2006-2015)



95% UCL Methyl Isobutyl Ketone Concentrations at Evansville (2006-2015)



95% UCL Methyl Isobutyl Ketone Concentrations at Clarksville (2008-2015)



The analysis of monitoring data from 2006 to 2015 indicates that concentrations of methyl isobutyl ketone have generally declined throughout the state. The one apparent exception is a spike at all locations in 2009. This apparent spike is actually due to a higher calculated method detection limit (MDL) for 2009, and does not indicate an actual increase in concentrations of chloroform. The MDL is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence. The calculated MDL varies from year to year, and

is the value used when non-detections are identified. Years with a high rate of non-detections can be heavily influenced by variability in the MDL.

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 methyl isobutyl ketone 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 methyl isobutyl ketone do not present a risk for non-cancer health effects.

Table 1. Methyl Isobutyl Ketone 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	0.39	3000.00	0.00013
East Chicago Marina	2013-2015	0.20	3000.00	0.00007
Gary IITRI	2006-2015	0.24	3000.00	0.00008
Hammond CAAP	2006-2015	0.34	3000.00	0.00011
Whiting High School	2006-2015	0.28	3000.00	0.00009
Ogden Dunes – Diana Rd	2006-2015	0.23	3000.00	0.00008
Lafayette Cinergy	2008-2012	0.25	3000.00	0.00008
Terre Haute – Fort Harrison Rd	2014-2015	0.17	3000.00	0.00006
Indianapolis – Washington Park	2006-2015	0.31	3000.00	0.00010
University of Evansville	2006-2015	0.23	3000.00	0.00008
Clarksville – Falls of the Ohio	2008-2015	0.34	3000.00	0.00011

* Reference Concentration Source: U.S. EPA Region 9

Cancer Risk

There is no evidence at this time of increased cancer risk from exposure to methyl isobutyl ketone.