METHYL ETHYL KETONE (C_4H_8O)

Chemical Abstracts Service (CAS) Number: 78-93-3

General Information

Methyl ethyl ketone is a colorless volatile liquid that is soluble in water. Acute (short-term) exposure of humans to high concentrations of methyl ethyl ketone produces irritation to the eyes, nose, and throat. Other effects reported from acute inhalation exposure include central nervous system depression, headache, and nausea. Limited information is available on the effects of chronic (long-term) exposure to methyl ethyl ketone in humans. Animal studies have reported slight neurological, liver, kidney, and respiratory effects from chronic exposure to methyl ethyl ketone. Due to the lack of available data, U.S. EPA has classified methyl ethyl ketone as a Group D, not classifiable as to human carcinogenicity.

Sources

- The primary use of methyl ethyl ketone is as a solvent in processes involving gums, resins, cellulose acetate, and cellulose nitrate.
- Methyl ethyl ketone is also used in the synthetic rubber industry, in the production of paraffin wax, and in household products such as lacquer and varnishes, paint remover, and glues.
- Methyl ethyl ketone can be present in outdoor air due to the photooxidation of certain air pollutants, such as butane and other hydrocarbons.
- Exposure to methyl ethyl ketone could also occur at the workplace and through exposure to household products containing the chemical.

Indiana Emissions

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

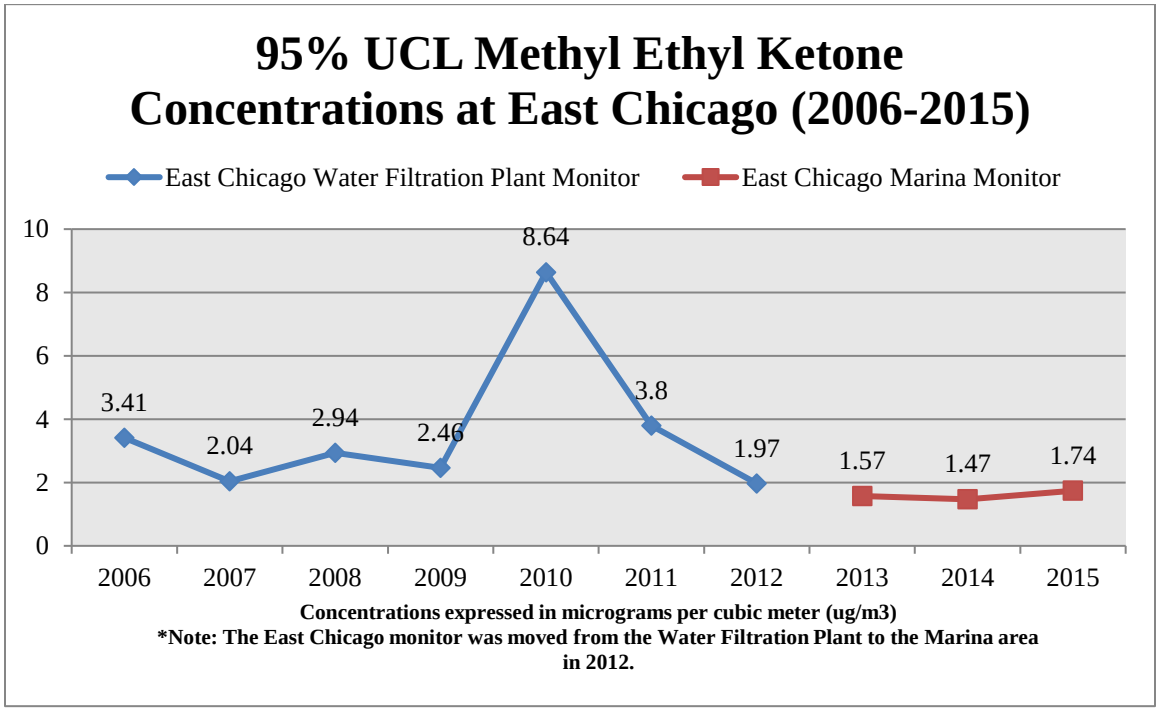
Measured Concentration Trends

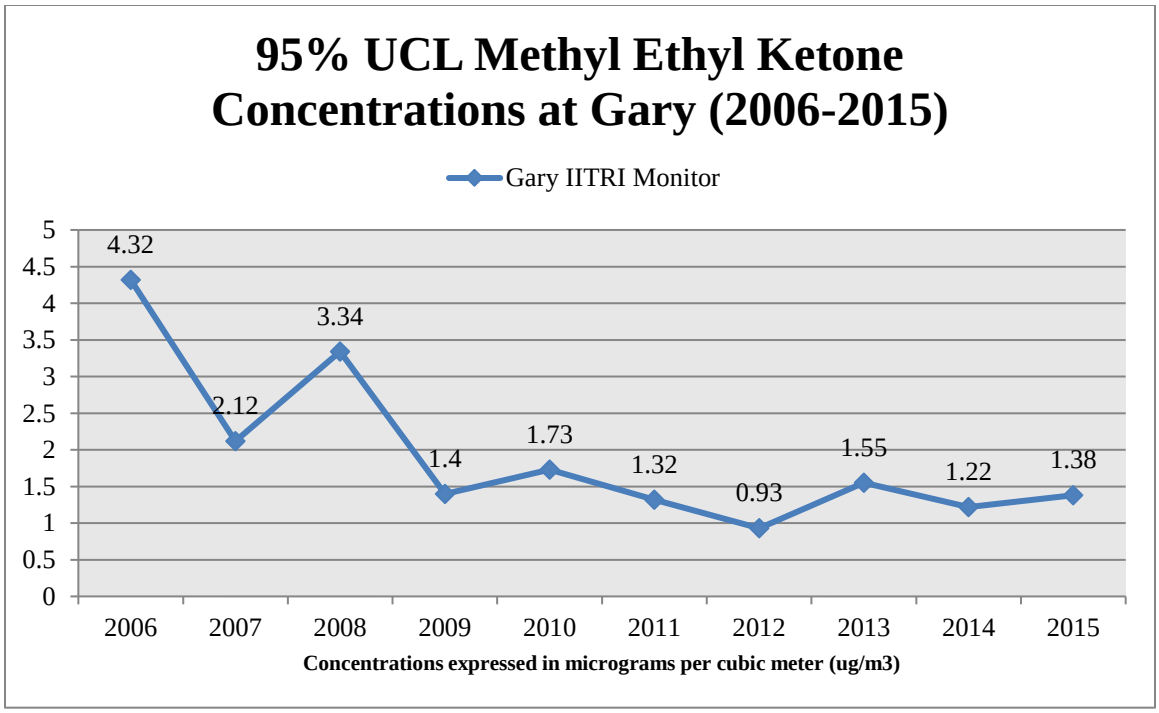
Ambient air monitoring data most accurately represents a limited area near the monitor location. All monitors for air toxics sample every sixth day. The monitoring locations by themselves are not sufficient to accurately characterize air toxic concentrations throughout the entire state, however, results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

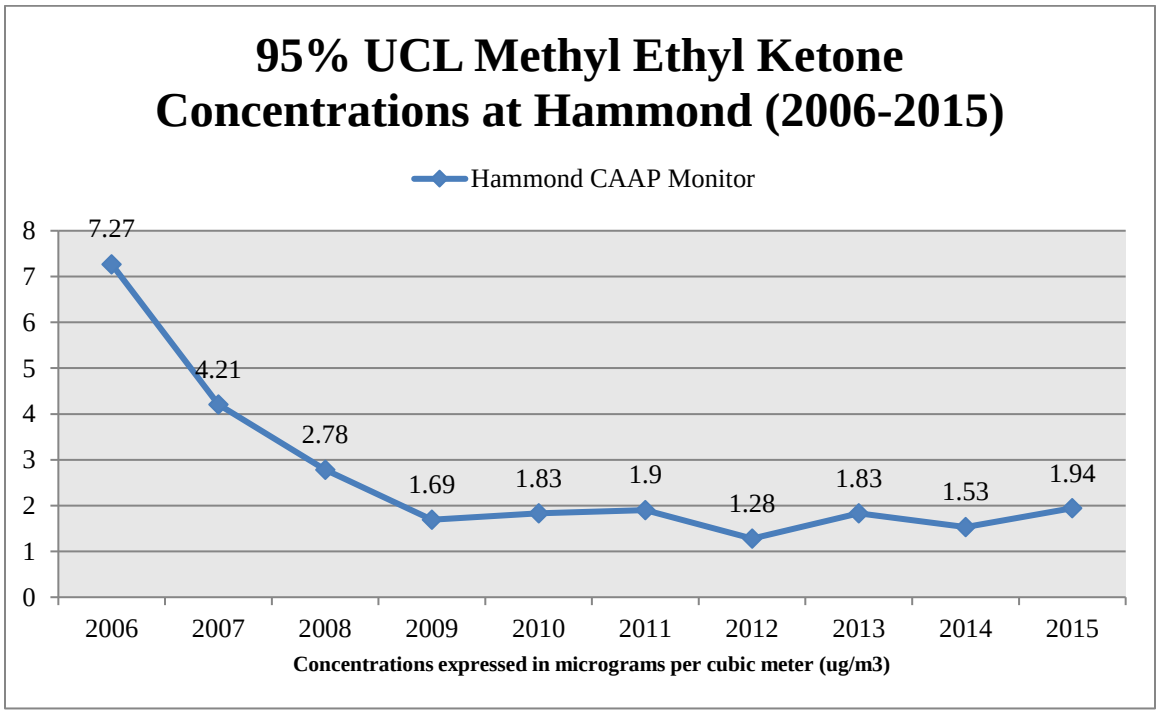
The ambient air monitoring results were analyzed using U.S. EPA recommended statistical methods. IDEM evaluated the data so that a 95% upper confidence limit of the mean (UCL) could be determined. A 95% UCL represents a value which one can be 95% confident that the true mean of the population is below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

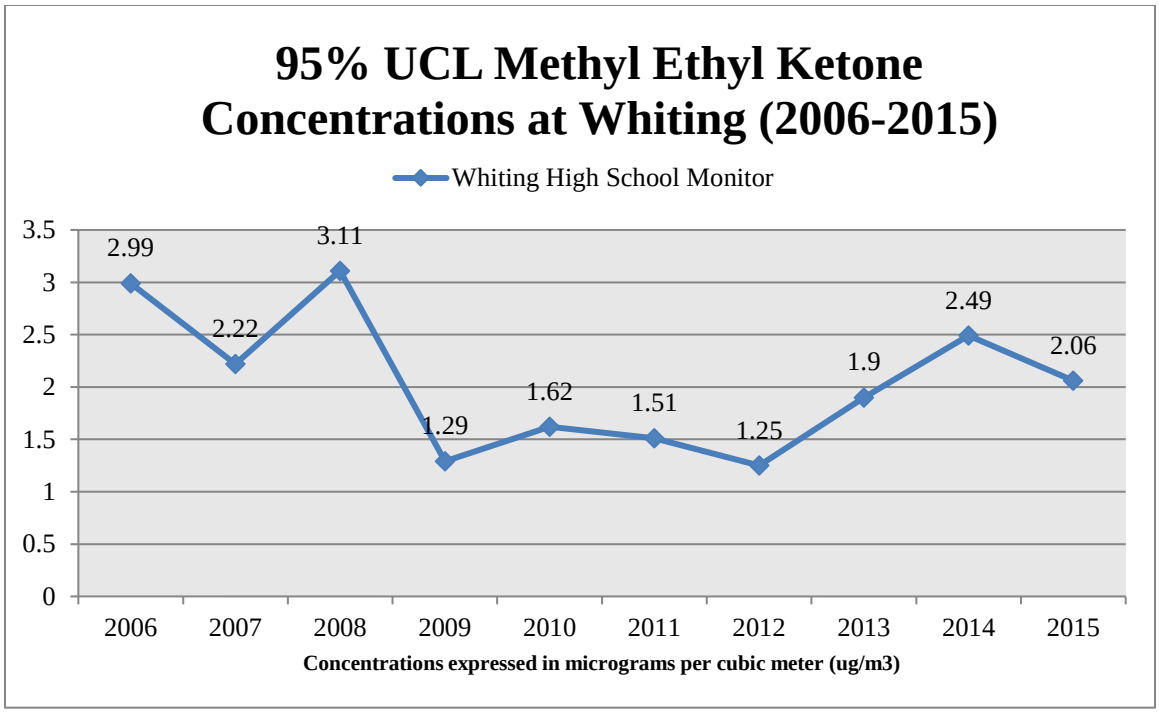
To learn more about the current monitoring locations, please visit IDEM's Air Toxics Monitor Siting webpage at: http://www.in.gov/idem/toxic/2337.htm

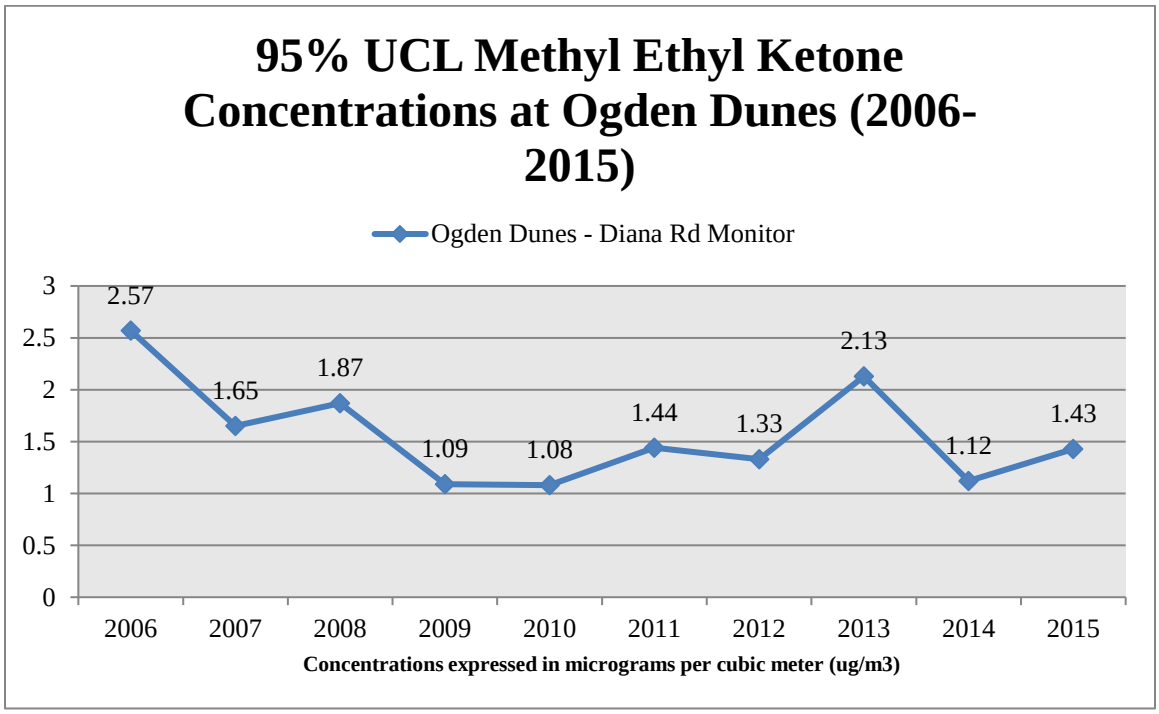
Data analysis was performed for each monitor that operated for a significant portion of the analysis period. This analysis determined the detection rate, which is defined as the percentage of valid samples taken statewide that had a quantifiable concentration of the pollutant. The statewide detection rate of methyl ethyl ketone for the monitors analyzed from 2006-2015 was 98.3%. Trend graphs for each of these monitors are provided below.

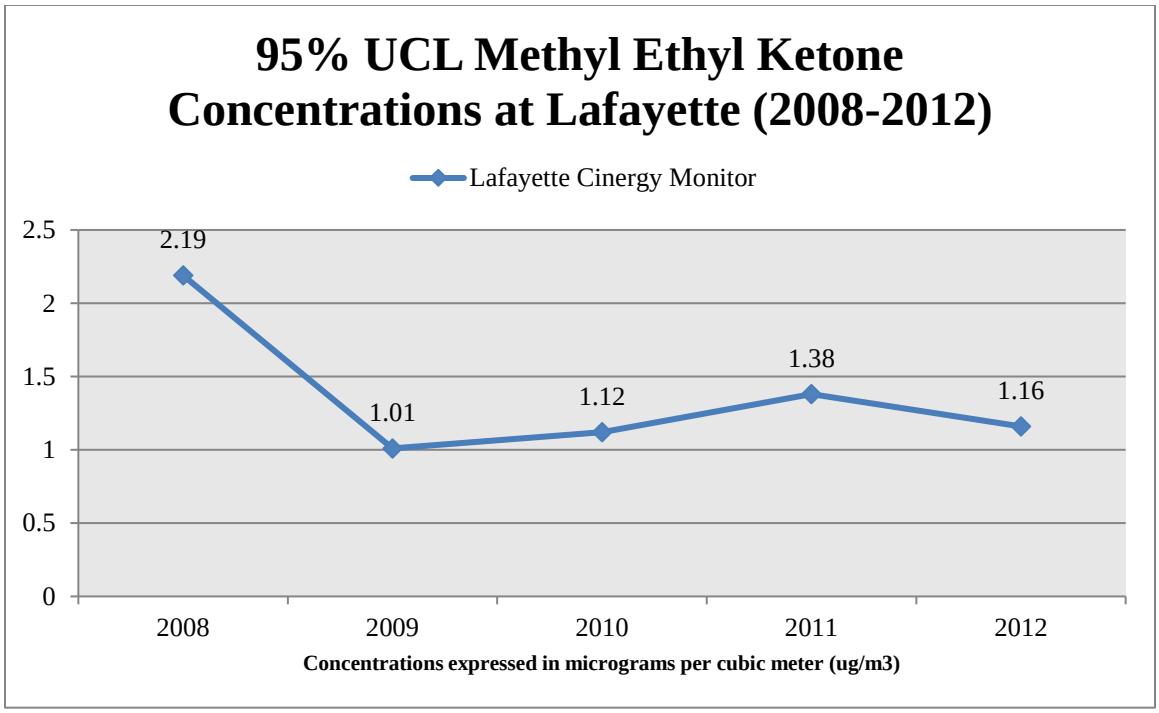


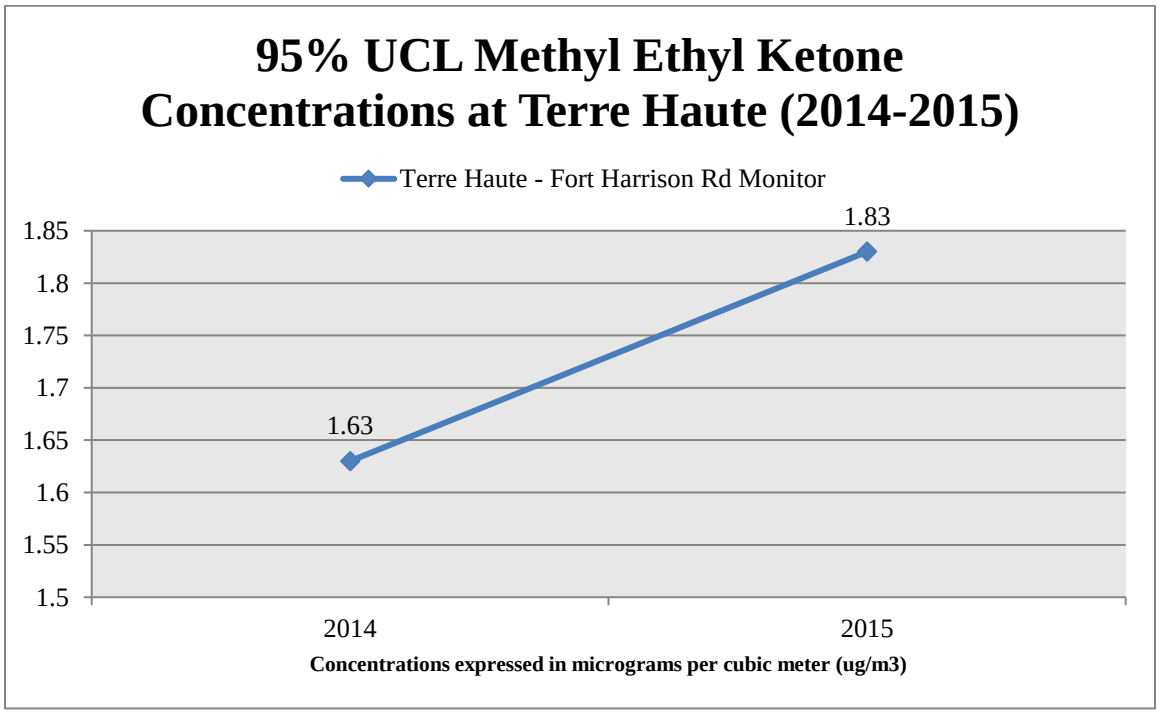

95% UCL Methyl Ethyl Ketone Concentrations at Gary (2006-2015)
Gary IITRI Monitor
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
4.32
2.12
3.34
1.4
1.73
1.32
0.93
1.55
1.22
1.38
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Concentrations expressed in micrograms per cubic meter (ug/m3)

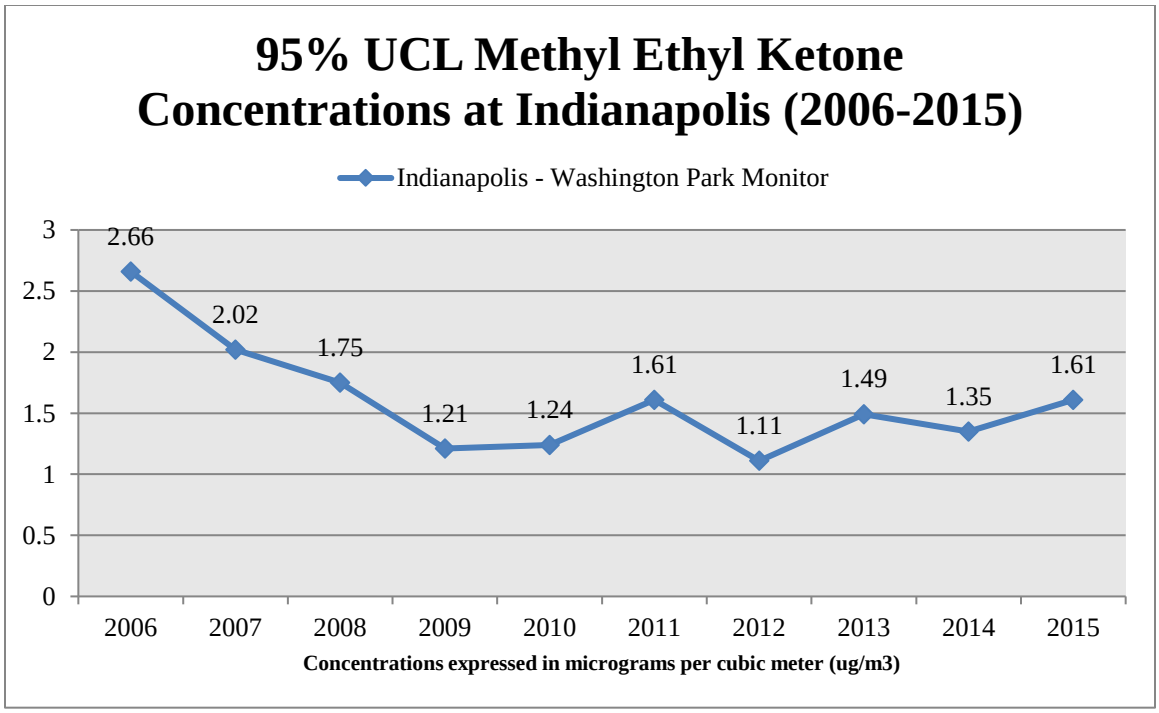

95% UCL Methyl Ethyl Ketone Concentrations at Hammond (2006-2015)
Hammond CAAP Monitor
8
7
6
5
4
3
2
1
0
7.27
4.21
2.78
1.69
1.83
1.9
1.28
1.83
1.53
1.94
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Concentrations expressed in micrograms per cubic meter (ug/m3)

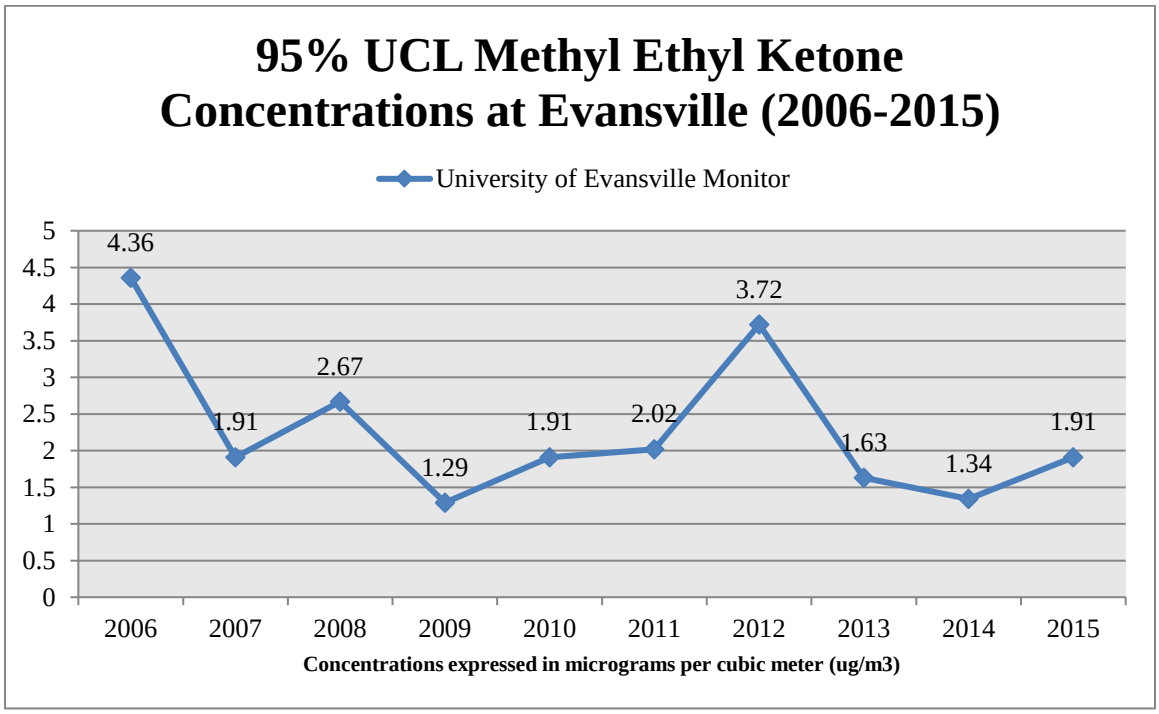

95% UCL Methyl Ethyl Ketone Concentrations at Whiting (2006-2015)
Whiting High School Monitor
3.5
3
2.5
2
1.5
1
0.5
0
2.99
2.22
3.11
1.29
1.62
1.51
1.25
1.9
2.49
2.06
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Concentrations expressed in micrograms per cubic meter (ug/m3)

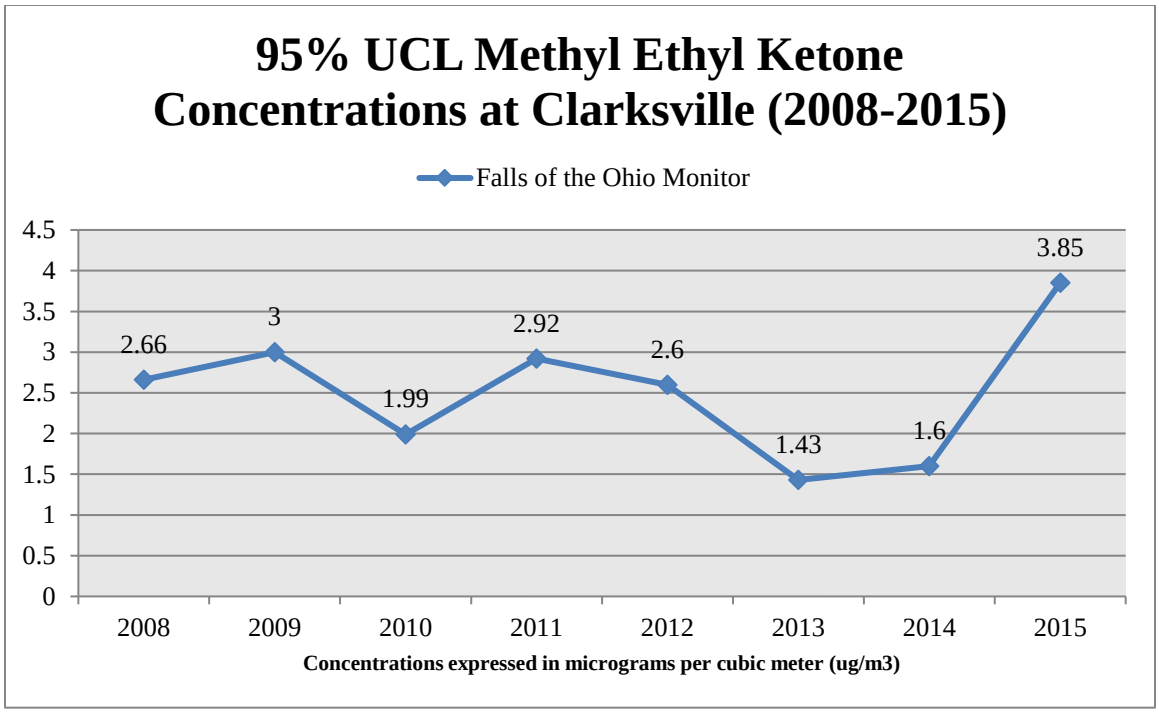

95% UCL Methyl Ethyl Ketone Concentrations at Ogden Dunes (2006-2015)
Ogden Dunes - Diana Rd Monitor
3
2.5
2
1.5
1
0.5
0
2.57
1.65
1.87
1.09
1.08
1.44
1.33
2.13
1.12
1.43
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Concentrations expressed in micrograms per cubic meter (ug/m3)


95% UCL Methyl Ethyl Ketone
Concentrations at Lafayette (2008-2012)
Lafayette Cinergy Monitor
2.5
2
1.5
1
0.5
0
2.19
1.01
1.12
1.38
1.16
2008
2009
2010
2011
2012
Concentrations expressed in micrograms per cubic meter (ug/m3)


95% UCL Methyl Ethyl Ketone
Concentrations at Terre Haute (2014-2015)
Terre Haute - Fort Harrison Rd Monitor
1.85
1.8
1.75
1.7
1.65
1.6
1.55
1.5
1.63
1.83
2014
2015
Concentrations expressed in micrograms per cubic meter (ug/m3)


95% UCL Methyl Ethyl Ketone
Concentrations at Indianapolis (2006-2015)
Indianapolis - Washington Park Monitor
3
2.5
2
1.5
1
0.5
0
2.66
2.02
1.75
1.21
1.24
1.61
1.11
1.49
1.35
1.61
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Concentrations expressed in micrograms per cubic meter (ug/m3)


95% UCL Methyl Ethyl Ketone
Concentrations at Evansville (2006-2015)
University of Evansville Monitor
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
4.36
1.91
2.67
1.29
1.91
2.02
3.72
1.63
1.34
1.91
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Concentrations expressed in micrograms per cubic meter (ug/m3)



The analysis of monitoring data from 2006 to 2015 indicates that concentration patterns of methyl ethyl ketone have declined or held steady at most monitors around the state. The most notable exception to the pattern observation is at Clarksville, where measured concentrations spiked during 2015. The 95% UCL value for this year was influenced by an unusually high reading of 16.37 ug/m3 on 7/29/2015. While this reading was considered high based on the history of the Clarksville monitor, it was still well below the reference concentration for methyl ethyl ketone. 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 methyl ethyl 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 below 1.0 at all monitors, which indicates that the measured concentrations of methyl ethyl ketone do not present a risk for non-cancer health effects.

Table 1. Methyl Ethyl 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	3.50	5000.00	0.0007
East Chicago Marina	2013-2015	1.50	5000.00	0.0003
Gary IITRI	2006-2015	1.77	5000.00	0.0004
Hammond CAAP	2006-2015	2.41	5000.00	0.0005
Whiting High School	2006-2015	1.87	5000.00	0.0004
Ogden Dunes – Diana Rd	2006-2015	1.44	5000.00	0.0003
Lafayette Cinergy	2008-2012	1.28	5000.00	0.0003
Terre Haute – Fort Harrison Rd	2014-2015	1.68	5000.00	0.0003
Indianapolis – Washington Park	2006-2015	1.46	5000.00	0.0003
University of Evansville	2006-2015	2.00	5000.00	0.0004
Clarksville – Falls of the Ohio	2008-2015	2.25	5000.00	0.0005

* Reference Concentration Source: Integrated Risk Information Service (IRIS)

Cancer Risk

Methyl ethyl ketone is not classifiable as to its potential to cause cancer.