VINYL ACETATE ($C_4H_6O_2$)

Chemical Abstracts Service (CAS) Number: 108-05-4

General Information

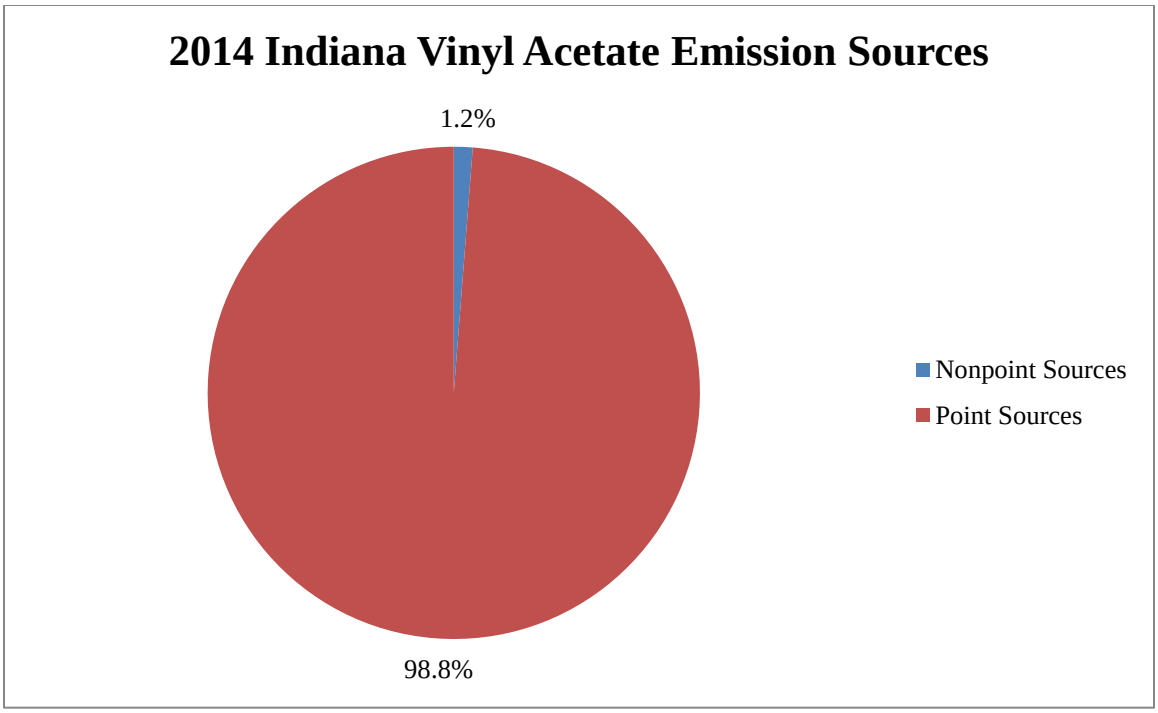
Vinyl acetate is a clear, flammable liquid that dissolves easily in water. It has a sweet, pleasant, fruity odor in small quantities, but may be sharp and irritating at higher levels. Acute (short-term) exposure of humans to vinyl acetate has resulted in eye irritation and upper respiratory tract irritation. Chronic (long-term) exposure of humans to vinyl acetate has resulted in some instances of upper respiratory tract irritation, cough, and/or hoarseness. Nasal epithelial lesions and irritation and inflammation of the respiratory tract were observed in mice and rats chronically exposed by inhalation. U.S. EPA has not classified vinyl acetate as to its possible human carcinogenicity.

Sources

- Vinyl acetate is primarily used as a monomer in the production of polyvinyl acetate and polyvinyl alcohol.
- Vinyl acetate is also used as a raw material in the production of other chemicals, in adhesives, water-based paints, nonwoven textile fibers, textile sizings and finishes, paper coatings, inks, films, and lacquers.
- Exposure is most likely to occur in the workplace, where individuals may be occupationally exposed to vinyl acetate via inhalation or dermal contact during its manufacture or use.

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 vinyl acetate totaled 75.63 tons in the 2014 calendar year. Of this total, 98.8% was attributed to point sources, with the remaining 1.2% attributed to nonpoint 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.

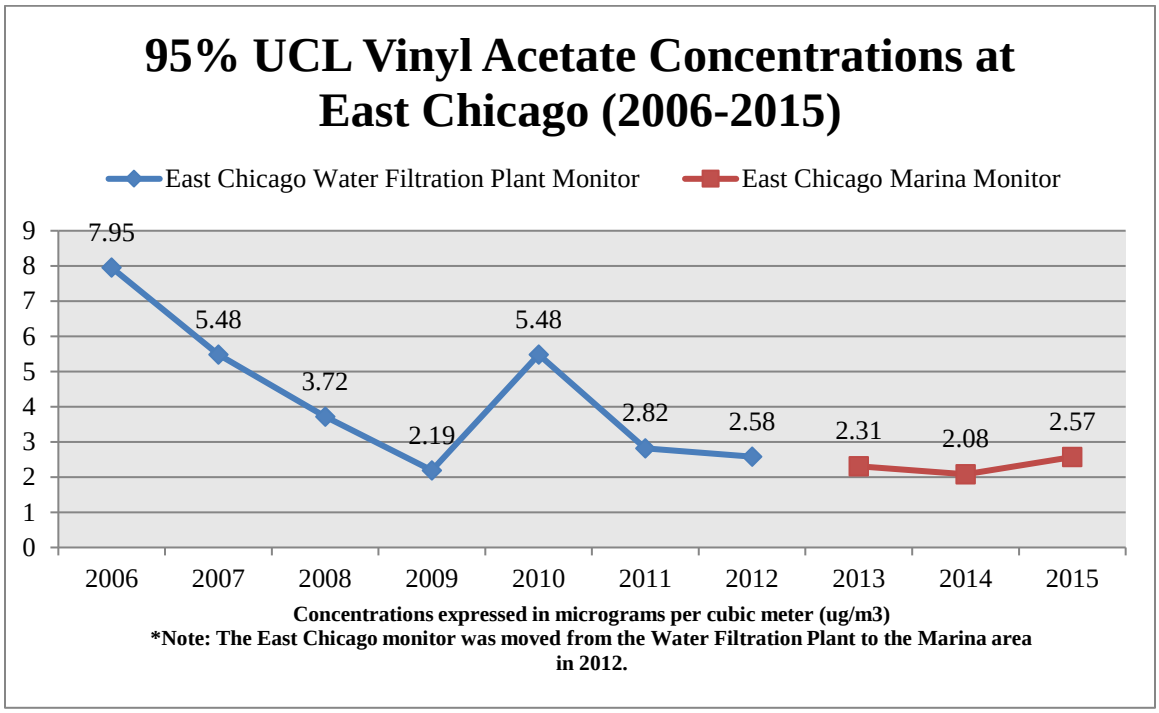
Measured Concentration Trends

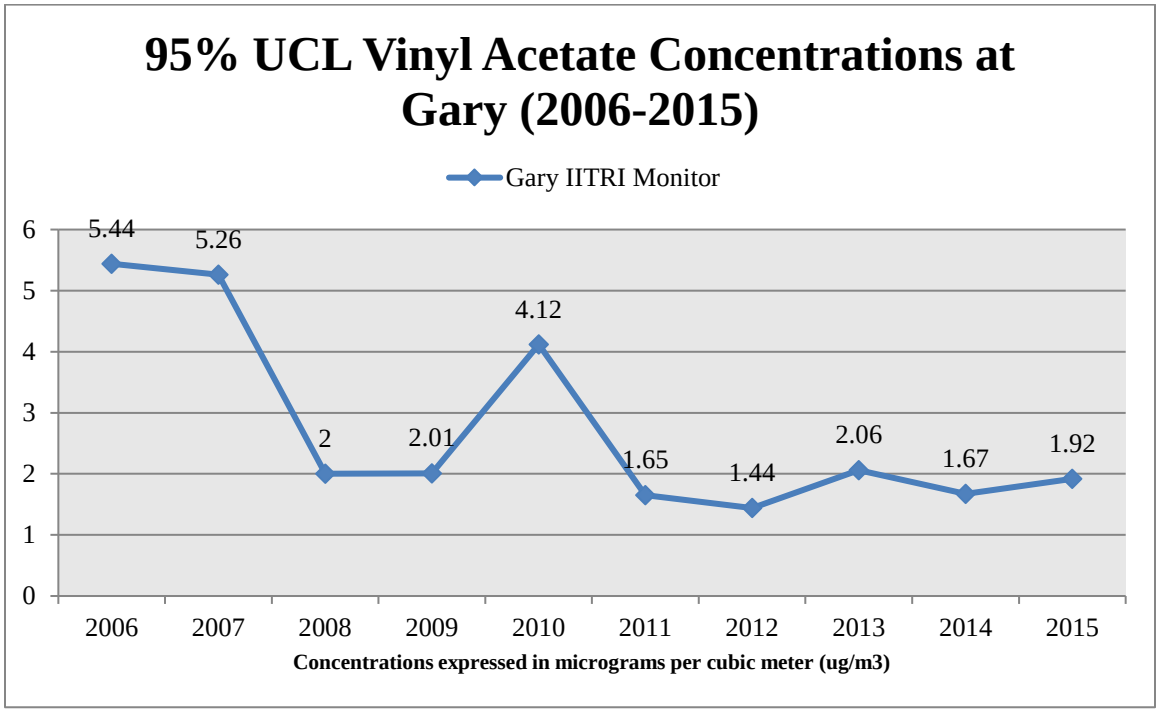
Ambient air monitoring data most accurately represents a limited area near the monitor location. All monitors for air toxics sample every sixth day. The monitoring locations by themselves are not sufficient to accurately characterize air toxic concentrations throughout the entire state, however, results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

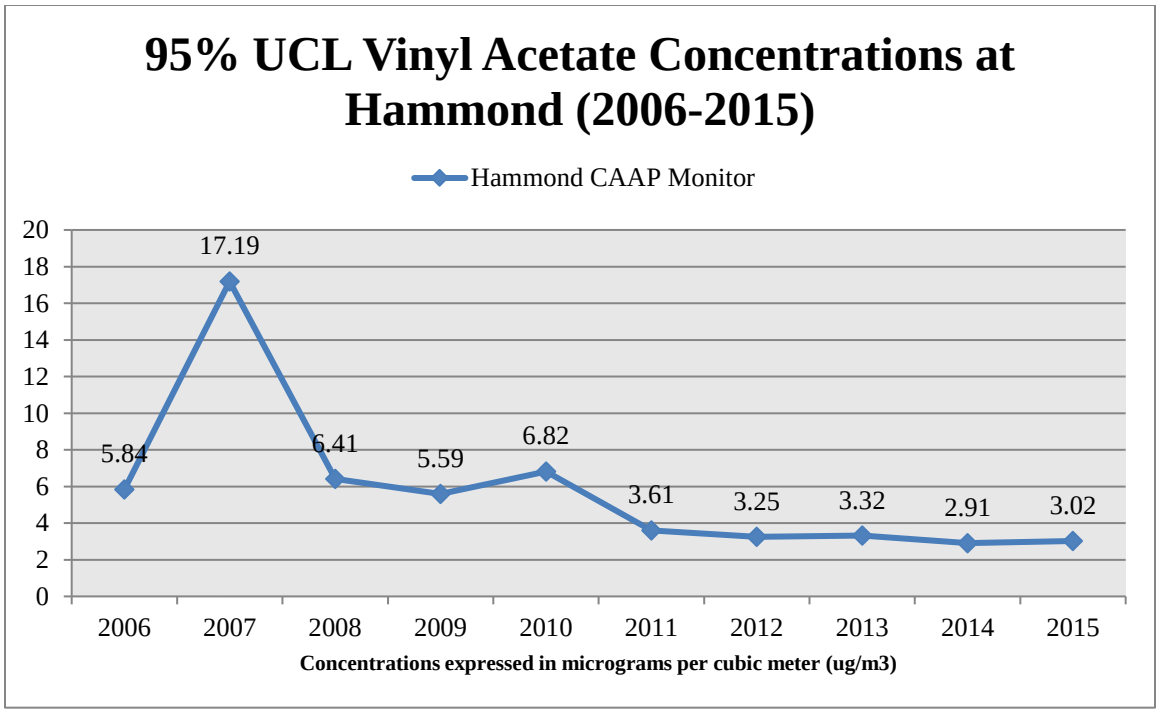
The ambient air monitoring results were analyzed using U.S. EPA recommended statistical methods. IDEM evaluated the data so that a 95% upper confidence limit of the mean (UCL) could be determined. A 95% UCL represents a value which one can be 95% confident that the true mean of the population is below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

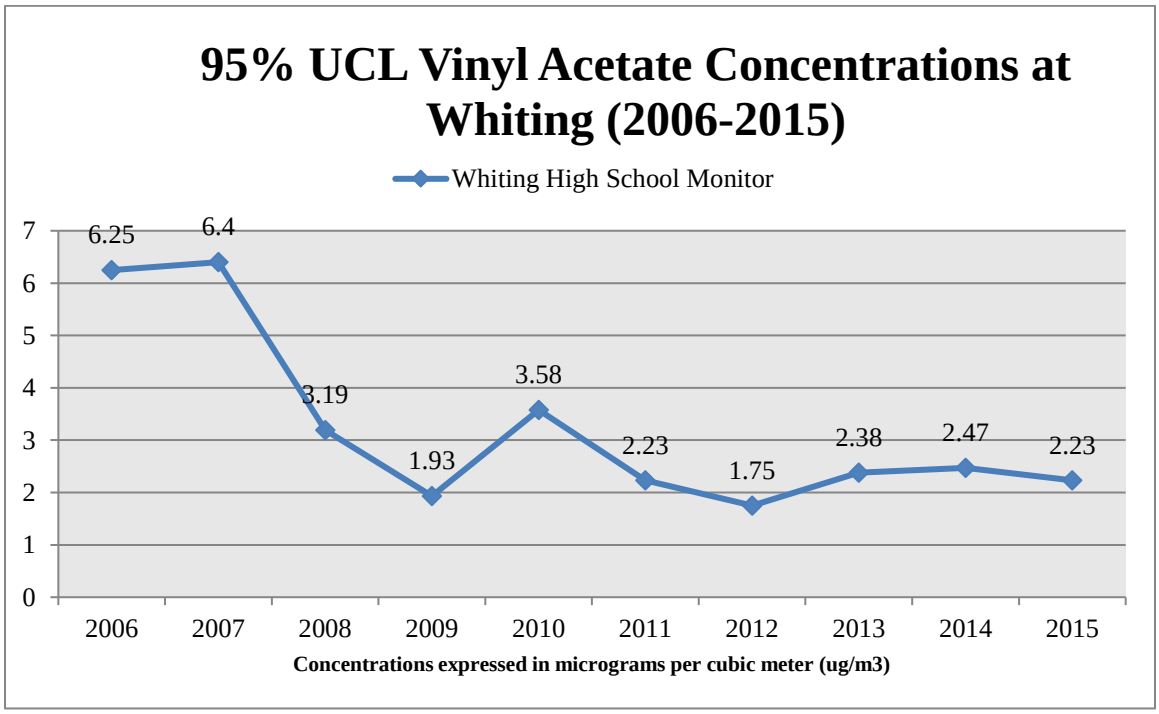
To learn more about the current monitoring locations, please visit IDEM's Air Toxics Monitor Siting webpage at: http://www.in.gov/idem/toxic/2337.htm

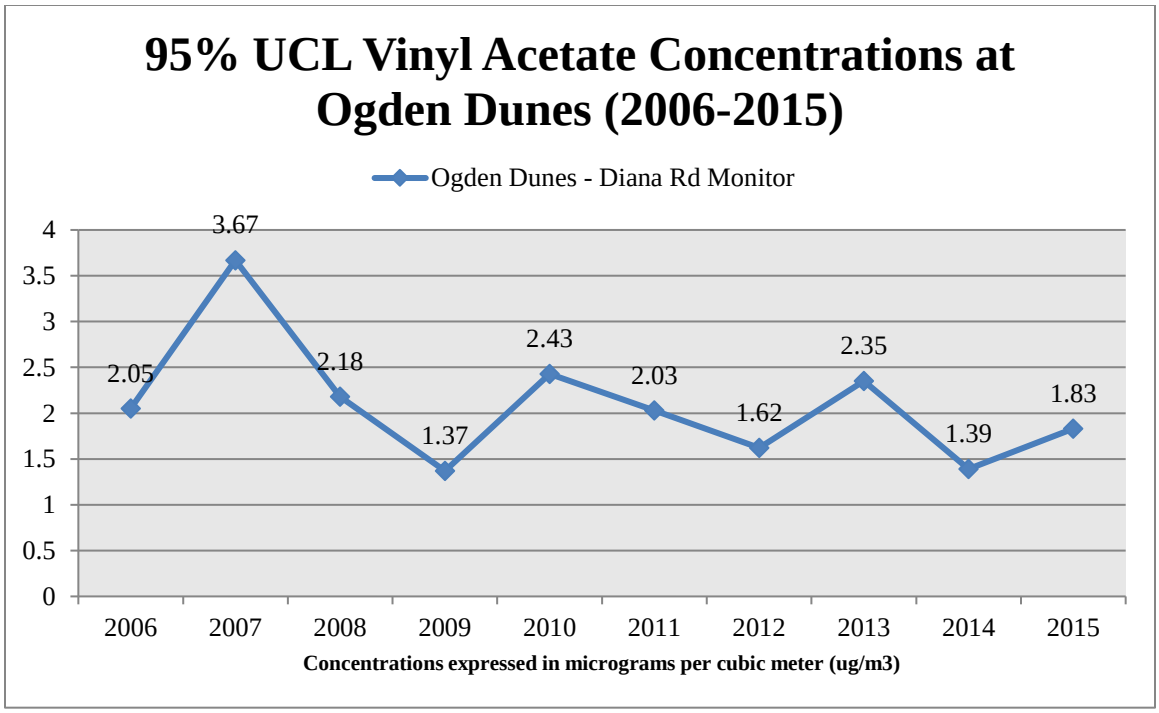
Data analysis was performed for each monitor that operated for a significant portion of the analysis period. This analysis determined the detection rate, which is defined as the percentage of valid samples taken statewide that had a quantifiable concentration of the pollutant. The statewide detection rate of vinyl acetate for the monitors analyzed from 2006-2015 was 93.1%. Trend graphs for each of these monitors are provided below.

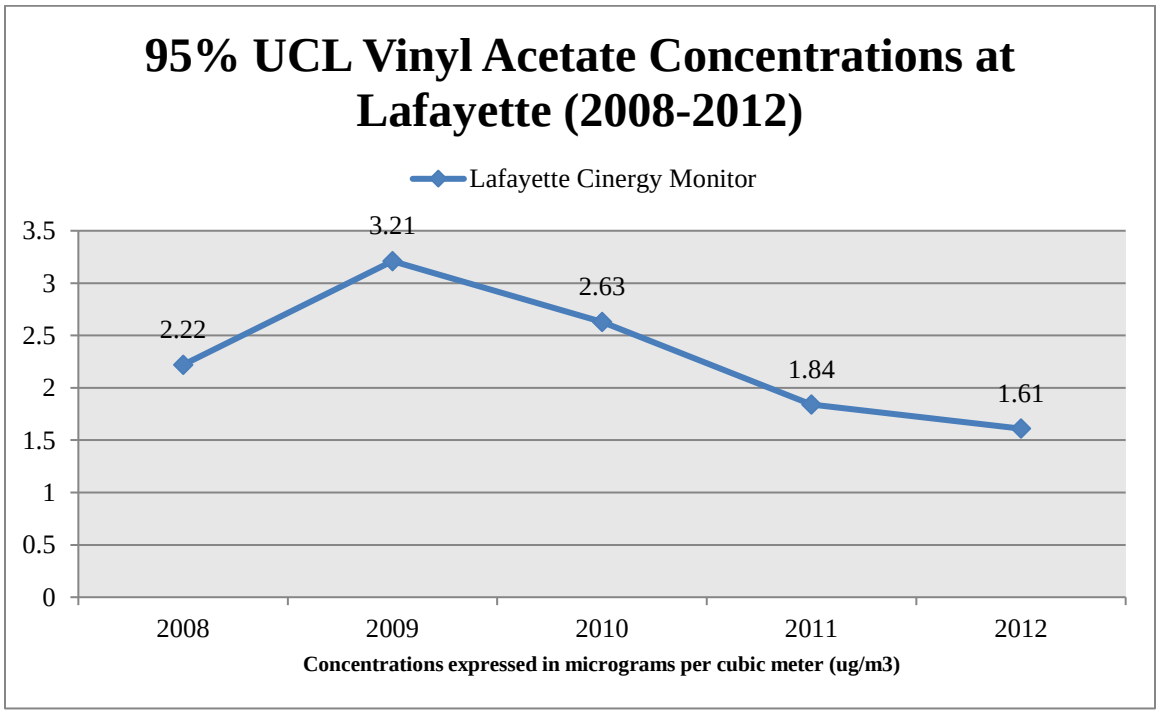

95% UCL Vinyl Acetate Concentrations at East Chicago (2006-2015)
East Chicago Water Filtration Plant Monitor
East Chicago Marina Monitor
9
8
7
6
5
4
3
2
1
0
7.95
5.48
3.72
2.19
5.48
2.82
2.58
2.31
2.08
2.57
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Concentrations expressed in micrograms per cubic meter (ug/m3)
*Note: The East Chicago monitor was moved from the Water Filtration Plant to the Marina area in 2012.

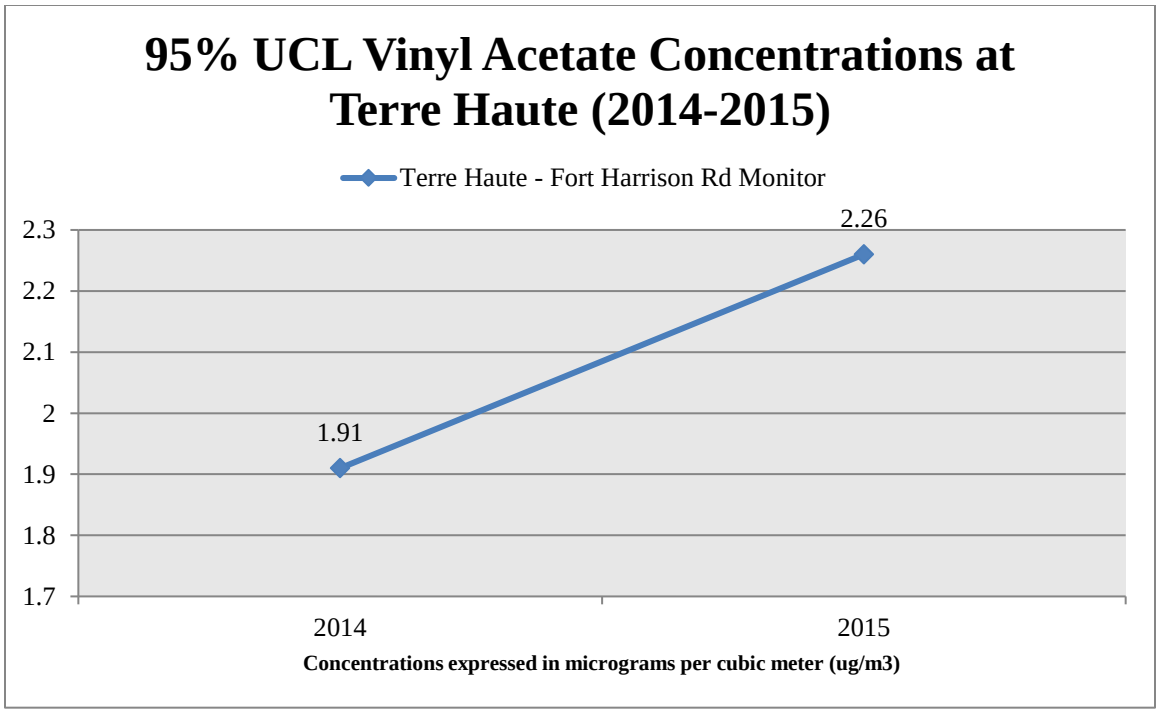

95% UCL Vinyl Acetate Concentrations at Gary (2006-2015)
Gary IITRI Monitor
6
5
4
3
2
1
0
5.44
5.26
2
2.01
4.12
1.65
1.44
2.06
1.67
1.92
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Concentrations expressed in micrograms per cubic meter (ug/m3)

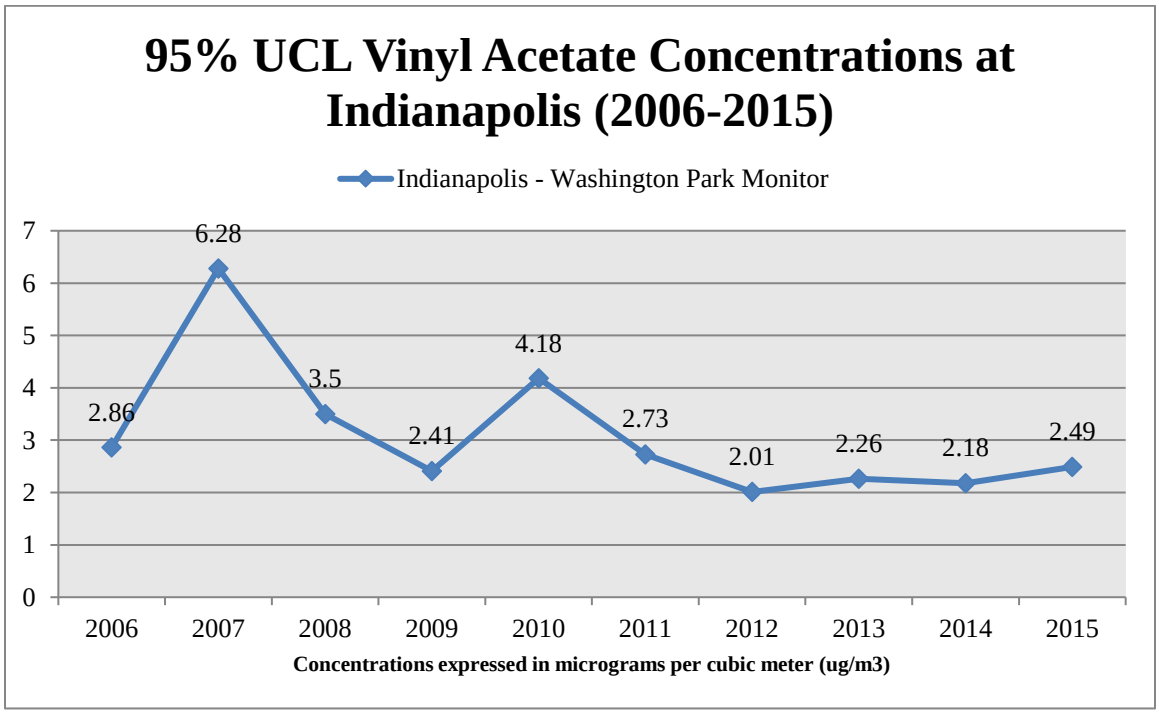

95% UCL Vinyl Acetate Concentrations at Hammond (2006-2015)
Hammond CAAP Monitor
20
18
16
14
12
10
8
6
4
2
0
17.19
5.84
6.41
5.59
6.82
3.61
3.25
3.32
2.91
3.02
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Concentrations expressed in micrograms per cubic meter (ug/m3)

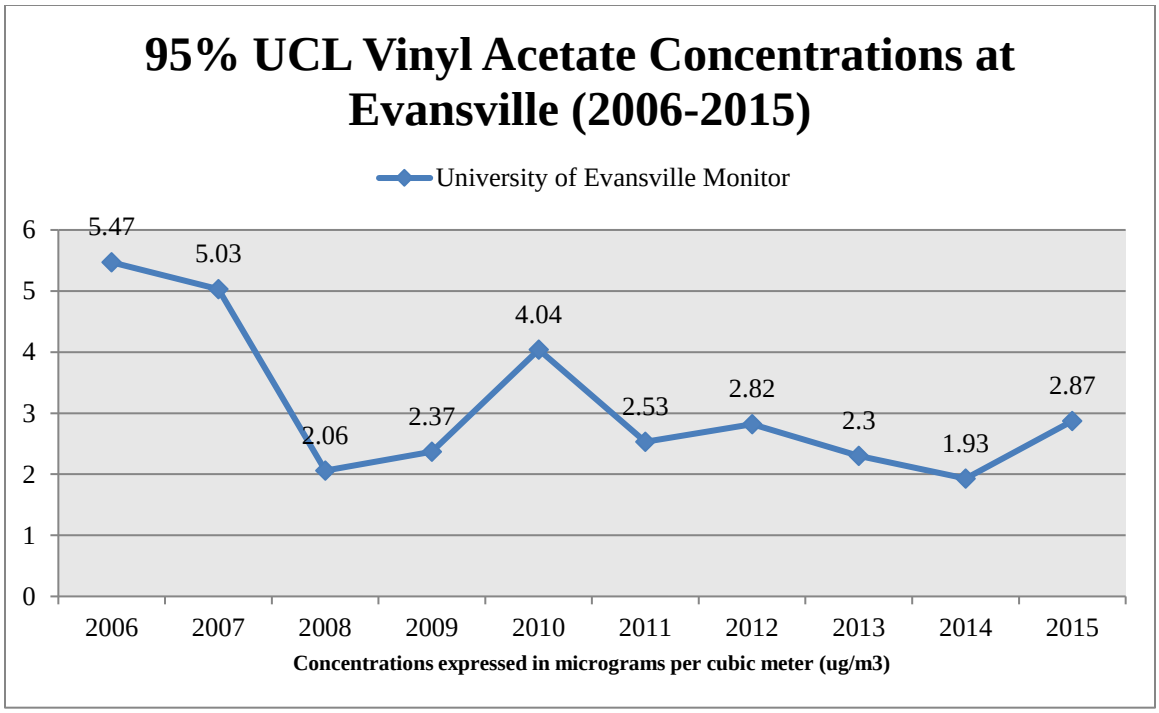

95% UCL Vinyl Acetate Concentrations at Whiting (2006-2015)
Whiting High School Monitor
7
6
5
4
3
2
1
0
6.25
6.4
3.19
1.93
3.58
2.23
1.75
2.38
2.47
2.23
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Concentrations expressed in micrograms per cubic meter (ug/m3)

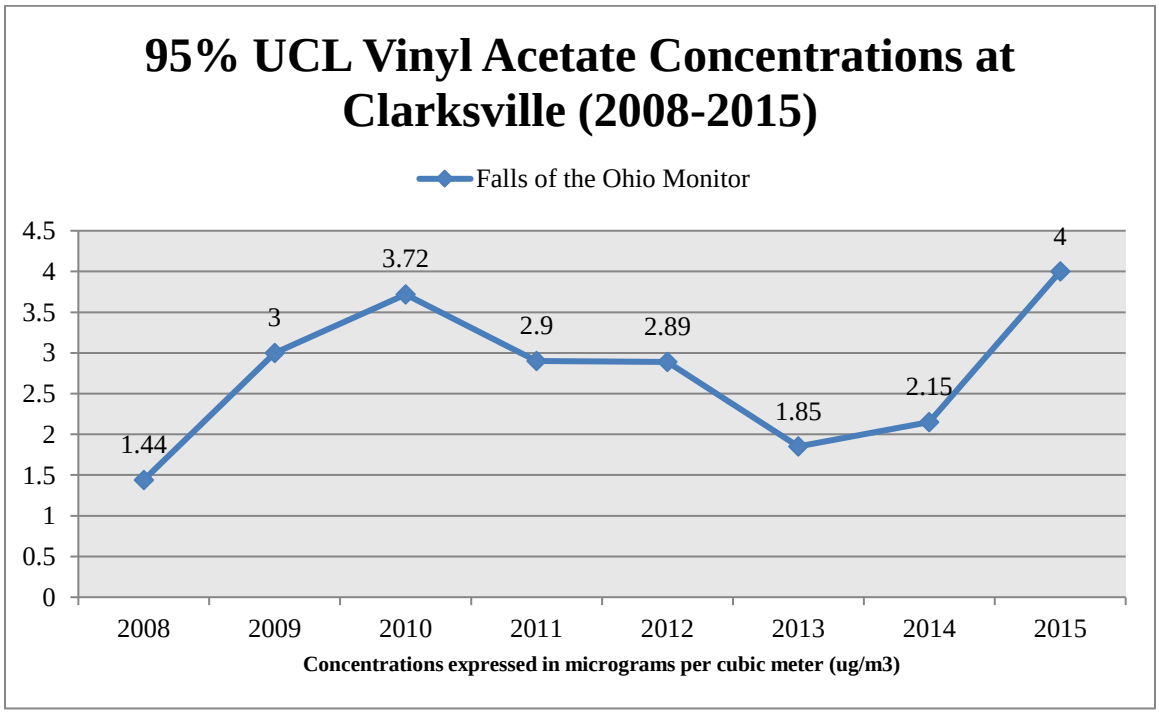

95% UCL Vinyl Acetate Concentrations at Ogden Dunes (2006-2015)
Ogden Dunes - Diana Rd Monitor
4
3.5
3
2.5
2
1.5
1
0.5
0
2.05
3.67
2.18
1.37
2.43
2.03
1.62
2.35
1.39
1.83
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Concentrations expressed in micrograms per cubic meter (ug/m3)


95% UCL Vinyl Acetate Concentrations at Lafayette (2008-2012)
Lafayette Cinergy Monitor
3.5
3
2.5
2
1.5
1
0.5
0
2.22
3.21
2.63
1.84
1.61
2008
2009
2010
2011
2012
Concentrations expressed in micrograms per cubic meter (ug/m3)


95% UCL Vinyl Acetate Concentrations at Terre Haute (2014-2015)
Terre Haute - Fort Harrison Rd Monitor
2.3
2.2
2.1
2
1.9
1.8
1.7
1.91
2.26
2014
2015
Concentrations expressed in micrograms per cubic meter (ug/m3)


95% UCL Vinyl Acetate Concentrations at Indianapolis (2006-2015)
Indianapolis - Washington Park Monitor
7
6
5
4
3
2
1
0
2.86
6.28
3.5
2.41
4.18
2.73
2.01
2.26
2.18
2.49
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 vinyl acetate have declined or remained relatively steady at most monitors around the state. The most notable spike in readings occurred in Hammond during 2007. The single highest reading in this study was 90.43 ug/m3 recorded in Hammond on 10/27/2007. This reading is well below the reference concentration for vinyl acetate. 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 vinyl acetate 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 vinyl acetate do not present a risk for non-cancer health effects.

Table 1. Vinyl Acetate 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	3.56	200.00	0.0178
East Chicago Marina	2013-2015	2.16	200.00	0.0108
Gary IITRI	2006-2015	2.30	200.00	0.0115
Hammond CAAP	2006-2015	5.17	200.00	0.0259
Whiting High School	2006-2015	2.73	200.00	0.0137
Ogden Dunes – Diana Rd	2006-2015	1.89	200.00	0.0095
Lafayette Cinergy	2008-2012	2.07	200.00	0.0104
Terre Haute – Fort Harrison Rd	2014-2015	2.03	200.00	0.0102
Indianapolis – Washington Park	2006-2015	2.86	200.00	0.0143
University of Evansville	2006-2015	2.64	200.00	0.0132

Clarksville – Falls of the Ohio	2008-2015	2.48	200.00	0.0124

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

Cancer Risk

Vinyl acetate is not classifiable as to its potential to cause cancer.