

HEXANE (C₆H₁₄)

Chemical Abstracts Service (CAS) Number: 110-54-3

General Information

Hexane is a colorless volatile liquid that is insoluble in water and highly flammable. The most probable route of human exposure to hexane is by inhalation. Acute (short-term) exposure to hexane causes mild central nervous system depression. Effects include dizziness, giddiness, slight nausea, and headache in humans. Acute exposure may also cause dermatitis and irritation of the eyes and throat. Chronic (long-term) exposure to hexane is associated with sensorimotor polyneuropathy in humans, with numbness in the extremities, muscular weakness, blurred vision, headache, and fatigue observed. U.S. EPA has classified hexane as a Group D, not classifiable as to human carcinogenicity.

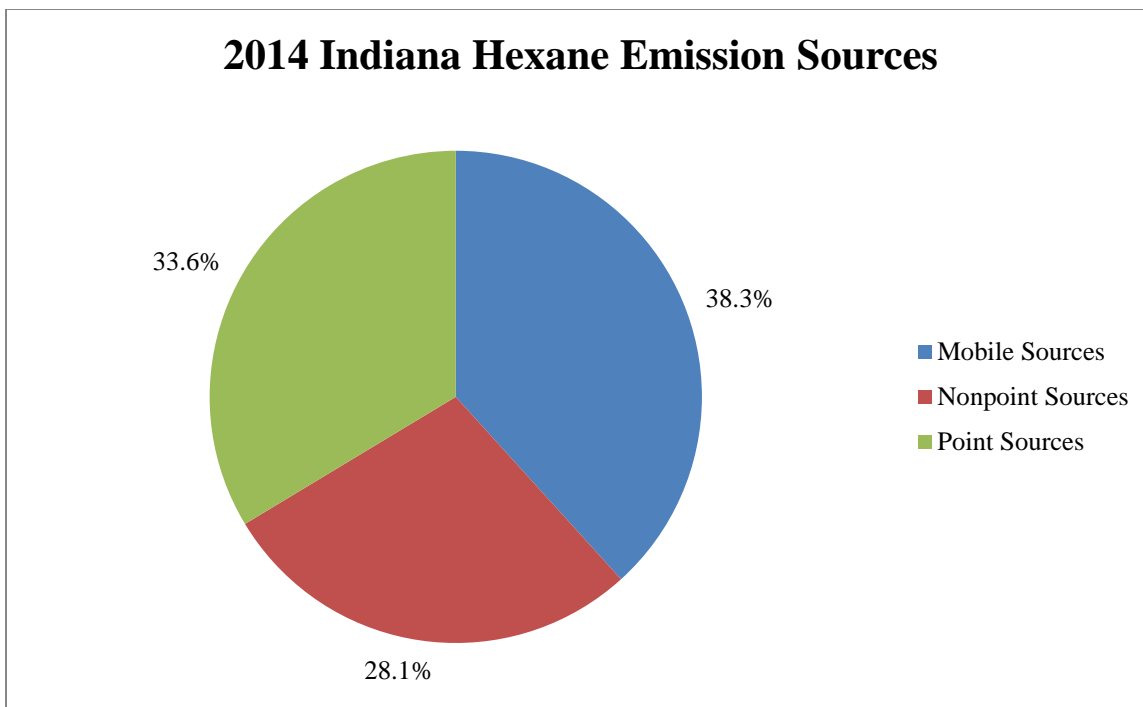
Sources

- Individuals are most likely to be exposed to hexane in the workplace.
- The main use of hexane is as a solvent to extract edible oils from seed and vegetable crops (e.g., soybeans, peanuts, corn).
- Commercial grades of hexane are used as solvents for glues (rubber cement, adhesives), varnishes, and inks. Hexane is also found in gasoline and natural gas emissions.
- Hexane is also used as a cleaning agent (degreaser) in the printing industry.

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 hexane totaled 4357.22 tons in the 2014 calendar year. Of this total, 38.3% was attributed to mobile sources, 33.6% to point sources, and the remaining 28.1% to nonpoint sources.

2014 Indiana Hexane 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

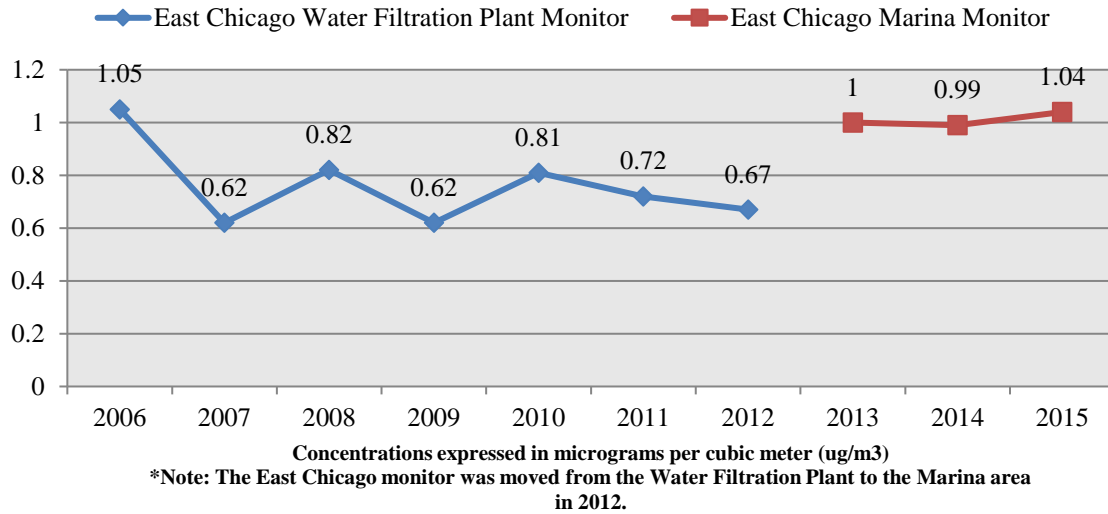
Ambient air monitoring data most accurately represents a limited area near the monitor location. All monitors for air toxics sample every sixth day. The monitoring locations by themselves are not sufficient to accurately characterize air toxic concentrations throughout the entire state, however, results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

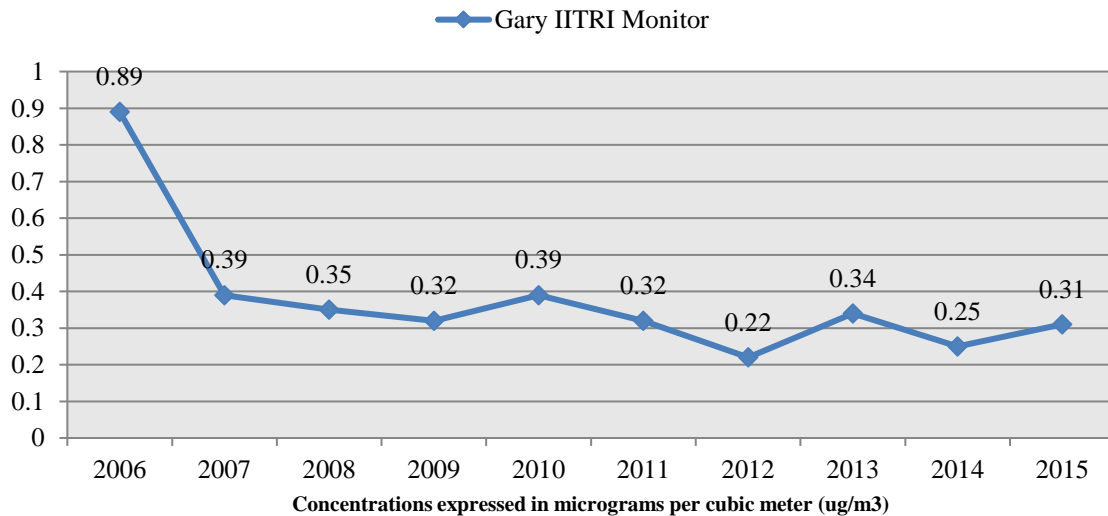
To learn more about the current monitoring locations, please visit IDEM's Air Toxics Monitor Siting webpage at: <http://www.in.gov/idem/toxic/2337.htm>

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 hexane for the monitors analyzed from 2006-2015 was 92.7%. Trend graphs for each of these monitors are provided below.

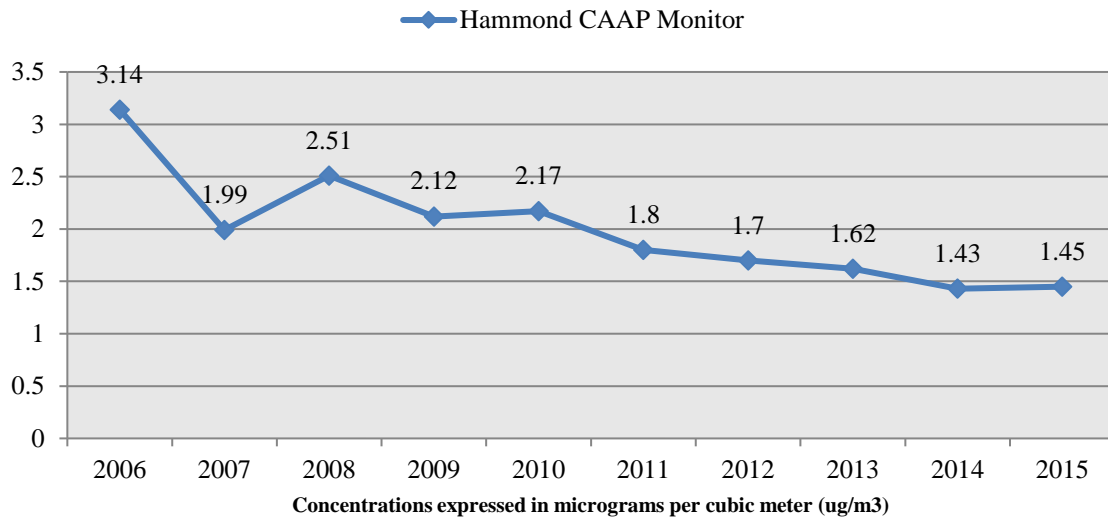
95% UCL Hexane Concentrations at East Chicago (2006-2015)



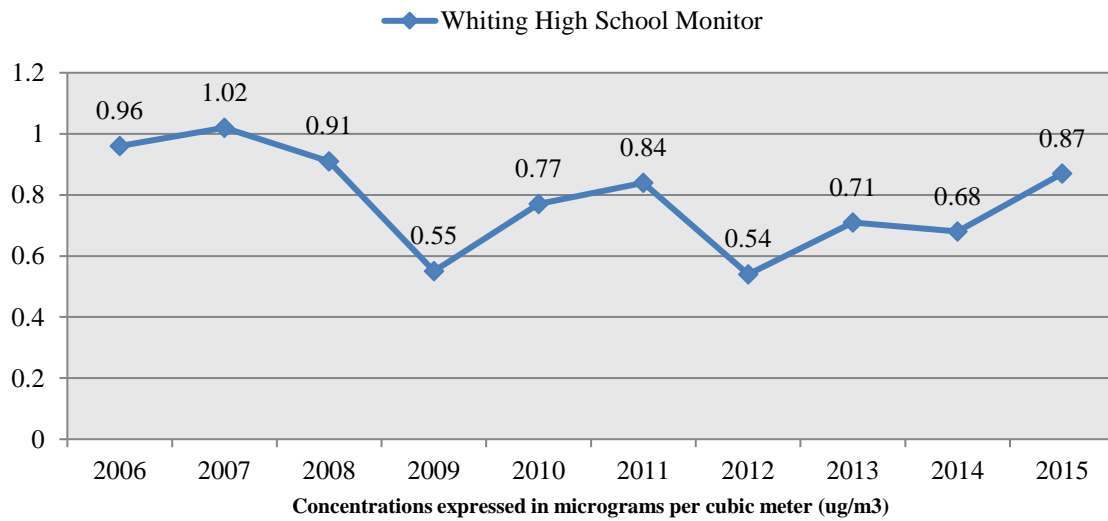
95% UCL Hexane Concentrations at Gary (2006-2015)



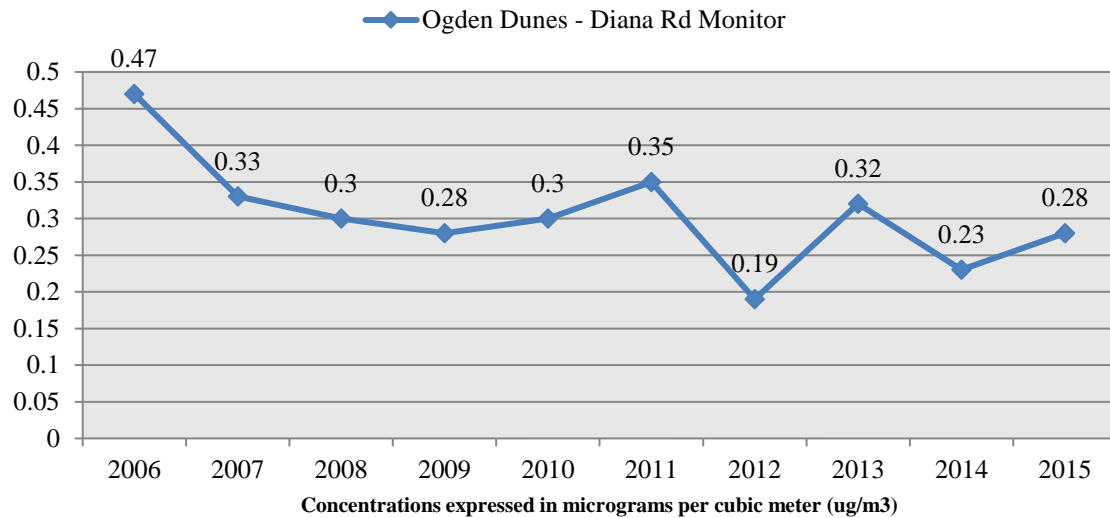
95% UCL Hexane Concentrations at Hammond (2006-2015)



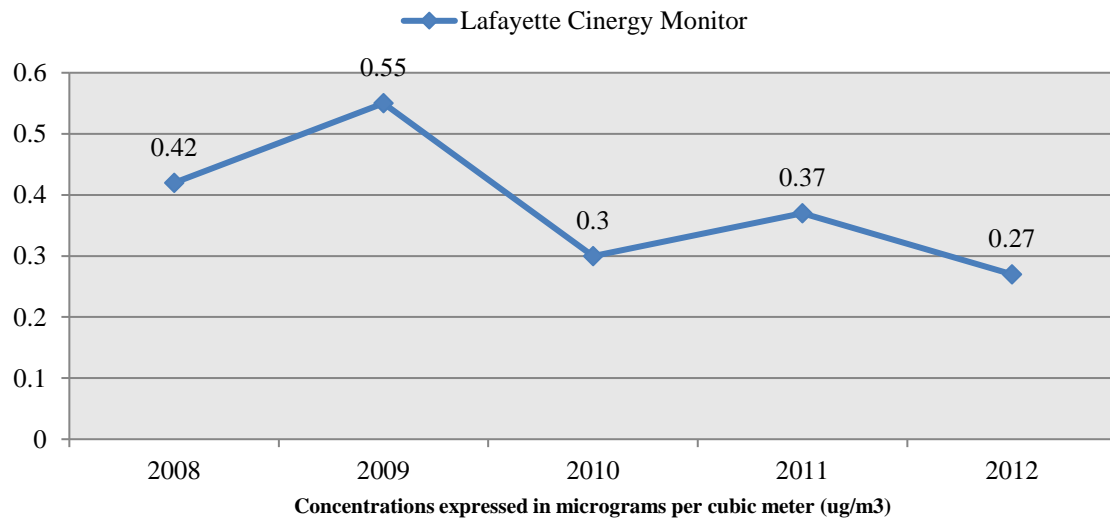
95% UCL Hexane Concentrations at Whiting (2006-2015)



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

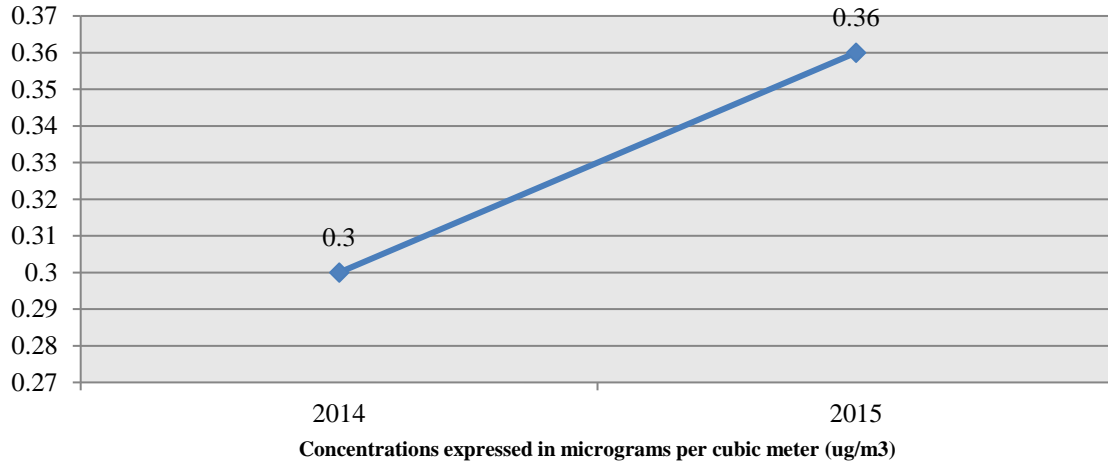


95% UCL Hexane Concentrations at Lafayette (2008-2012)



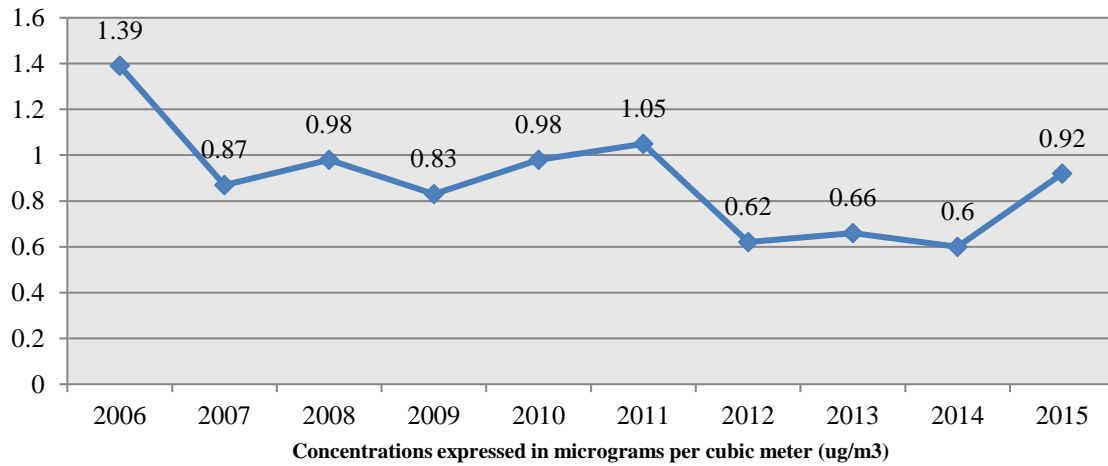
95% UCL Hexane Concentrations at Terre Haute (2014-2015)

◆ Terre Haute - Fort Harrison Rd Monitor

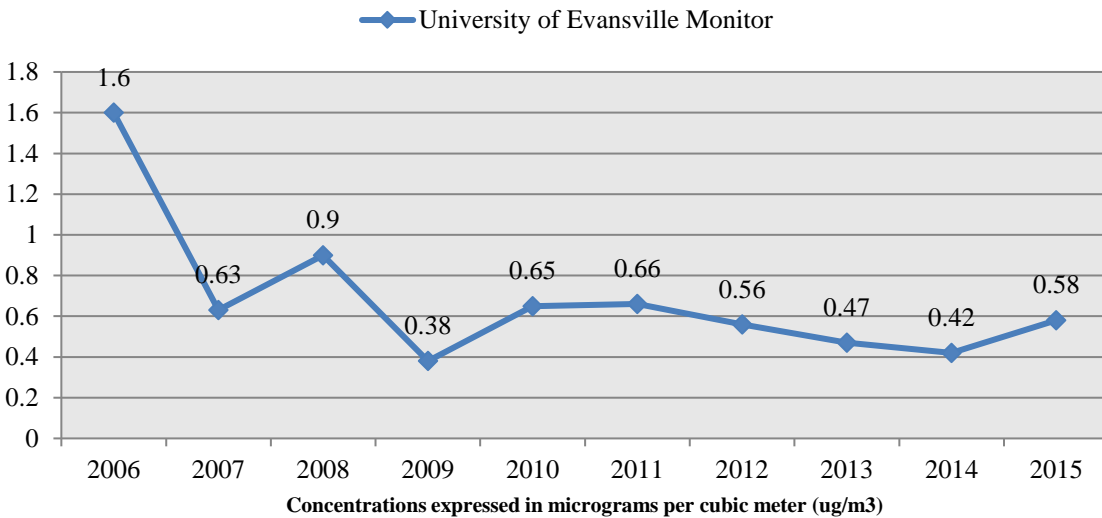


95% UCL Hexane Concentrations at Indianapolis (2006-2015)

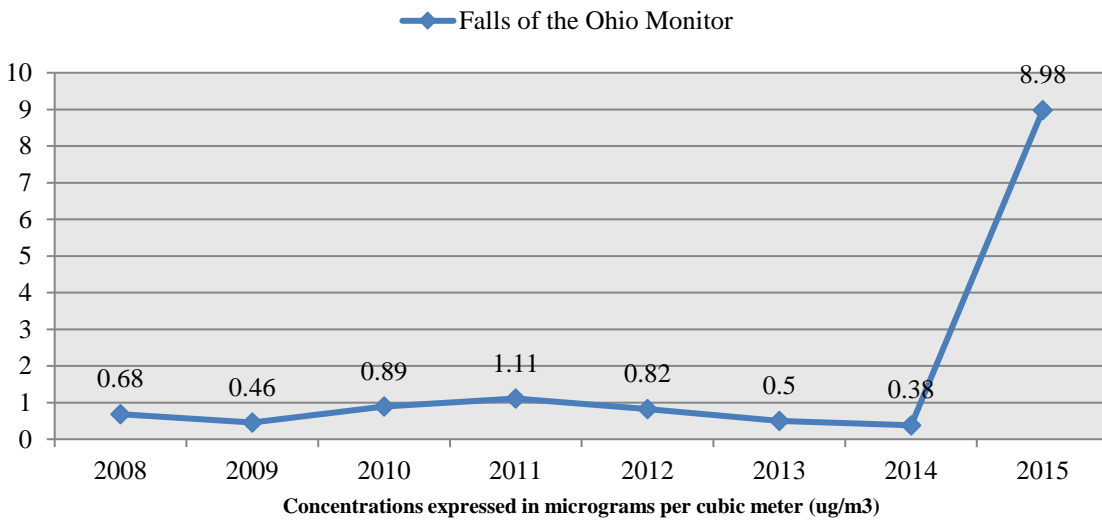
◆ Indianapolis - Washington Park Monitor



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



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



The analysis of monitoring data from 2006 to 2015 indicates that concentration patterns of hexane 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 heavily influenced by unusually high readings of 108.42 ug/m3 on 7/17/2015 and 53.54 ug/m3 on 11/19/2015. Forty-four of the forty-six readings taken at Clarksville in 2015 were actually below the 95% UCL value. The

unusually high readings are still well below the reference concentrations for hexane. 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 hexane 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 hexane do not present a risk for non-cancer health effects.

Table 1. Hexane 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	0.68	700.00	0.0010
East Chicago Marina	2013-2015	0.92	700.00	0.0013
Gary IITRI	2006-2015	0.34	700.00	0.0005
Hammond CAAP	2006-2015	1.72	700.00	0.0025
Whiting High School	2006-2015	0.69	700.00	0.0010
Ogden Dunes – Diana Rd	2006-2015	0.28	700.00	0.0004
Lafayette Cinergy	2008-2012	0.34	700.00	0.0005
Terre Haute – Fort Harrison Rd	2014-2015	0.32	700.00	0.0005
Indianapolis – Washington Park	2006-2015	0.77	700.00	0.0011
University of Evansville	2006-2015	0.58	700.00	0.0008

Clarksville – Falls of the Ohio	2008-2015	1.50	700.00	0.0021
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* Reference Concentration Source: Integrated Risk Information Service (IRIS)

Cancer Risk

Hexane is not classifiable as to its potential to cause cancer.