

## **CARBON DISULFIDE (CS<sub>2</sub>)**

Chemical Abstracts Service (CAS) Number: 75-15-0

### **General Information**

Carbon disulfide occurs as a colorless liquid with a sweet, pleasant, chloroform-like odor. Acute (short-term) exposure to carbon disulfide has caused changes in breathing and chest pains. Nausea, vomiting, dizziness, fatigue, headache, mood changes, lethargy, blurred vision, delirium, and convulsions from acute exposure have also been reported. Chronic (long-term) exposure to carbon disulfide has been linked to neurologic effects, including behavioral and neurophysiological changes. Reproductive effects, such as decreased sperm count and decreased libido in men and menstrual disturbances in women, have been reported from occupational settings involving inhalation exposure to carbon disulfide. U.S. EPA has not classified carbon disulfide for human carcinogenicity.

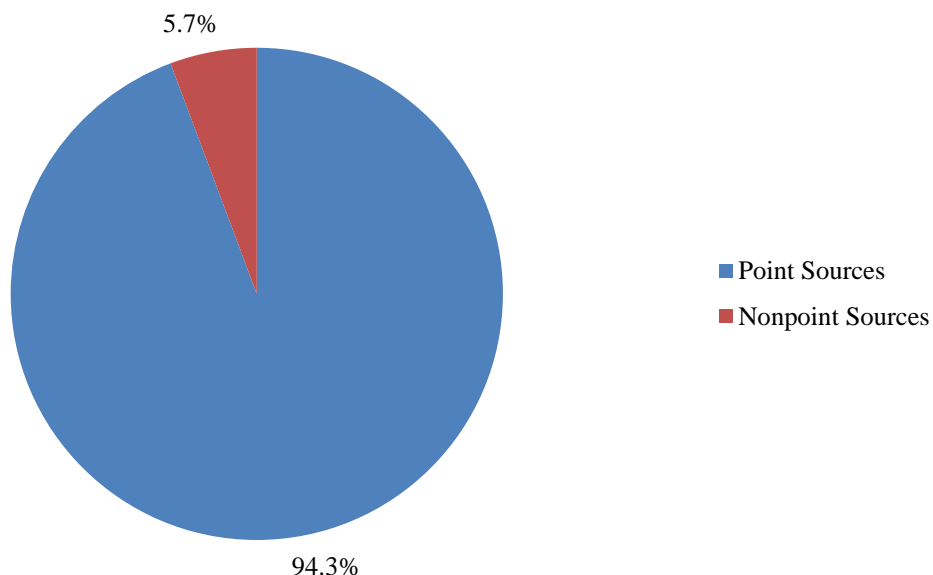
### **Sources**

- Carbon disulfide is used predominantly in the manufacture of rayon, cellophane, and carbon tetrachloride.
- Carbon disulfide is also used to produce rubber chemicals and pesticides.
- The main route of exposure to this compound is in the workplace. Workers in plants that use carbon disulfide in their manufacturing processes have a high degree of exposure potential.
- Carbon disulfide has been detected in some samples of drinking water.
- Low amounts of carbon disulfide may be emitted naturally from volcanoes and marshes.

### **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 carbon disulfide totaled 7.39 tons in the 2014 calendar year. Of this total, 94.3% was attributed to point sources with the remaining 5.7% attributed to nonpoint sources.

## 2014 Indiana Carbon Disulfide 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

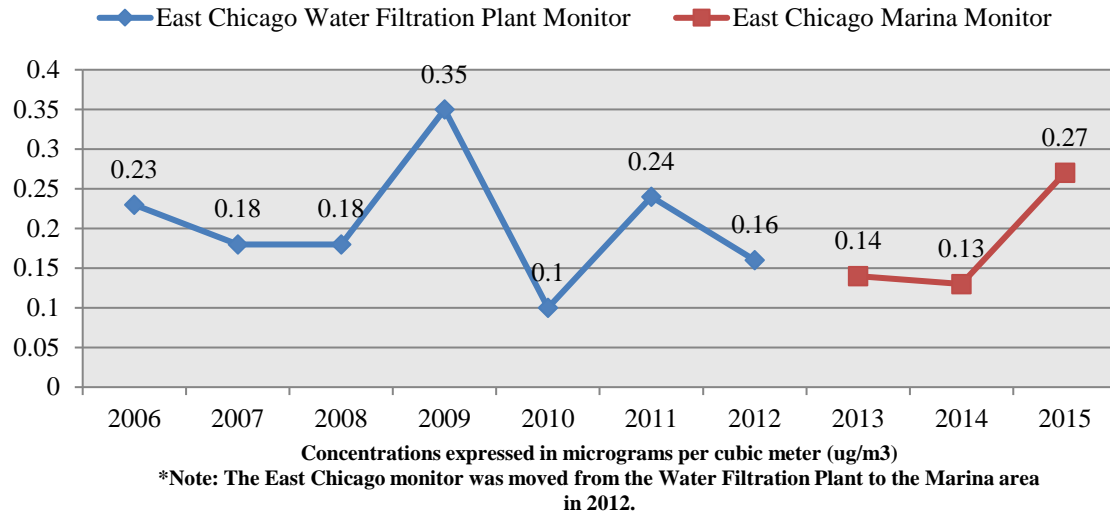
Ambient air monitoring data most accurately represents a limited area near the monitor location. All monitors for air toxics sample every sixth day. The monitoring locations by themselves are not sufficient to accurately characterize air toxic concentrations throughout the entire state, however, results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

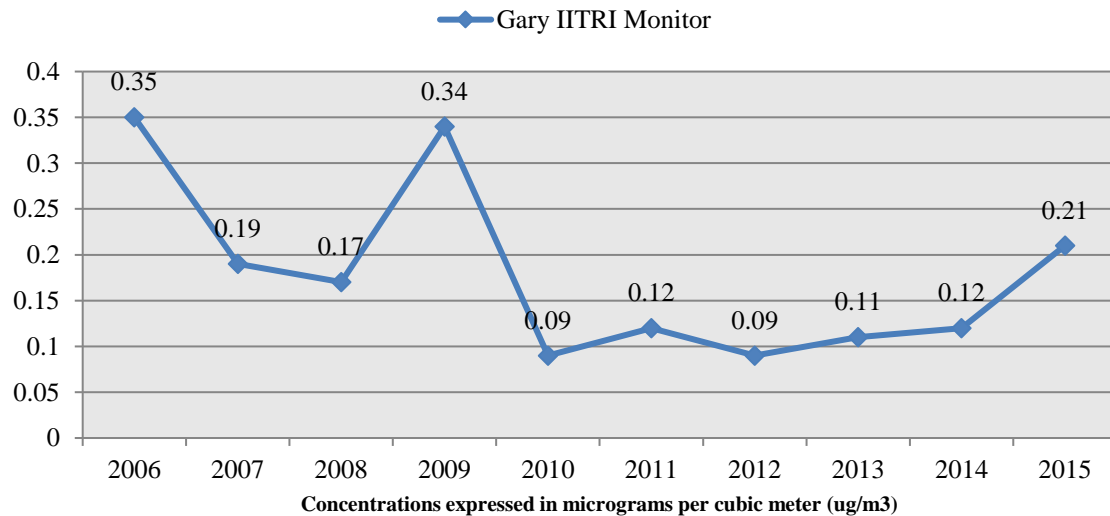
To learn more about the current monitoring locations, please visit IDEM's Air Toxics Monitor Siting webpage at: <http://www.in.gov/idem/toxic/2337.htm>

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 carbon disulfide for the monitors analyzed from 2006-2015 was 60.4%. Trend graphs for each of these monitors are provided below.

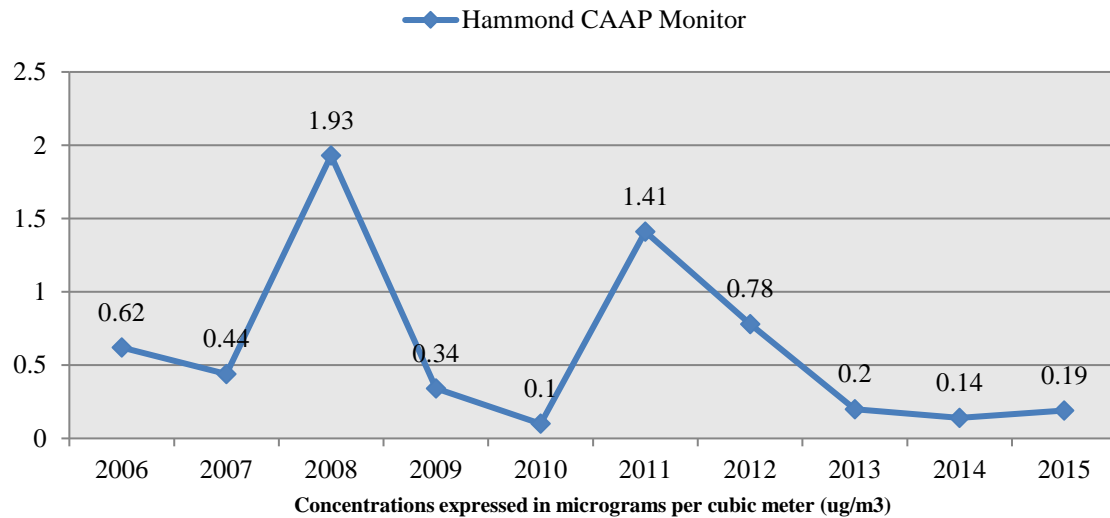
## 95% UCL Carbon Disulfide Concentrations at East Chicago (2006-2015)



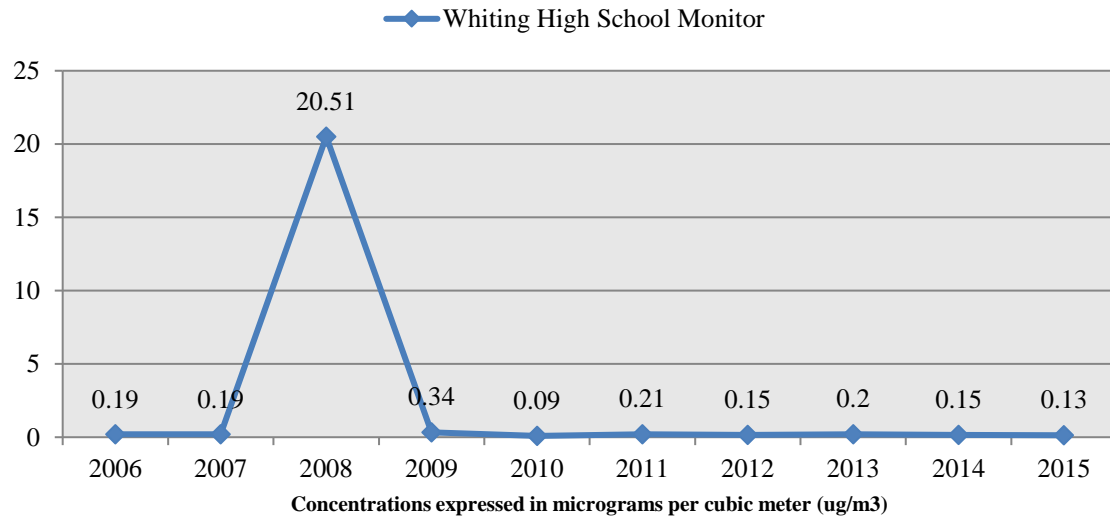
## 95% UCL Carbon Disulfide Concentrations at Gary (2006-2015)



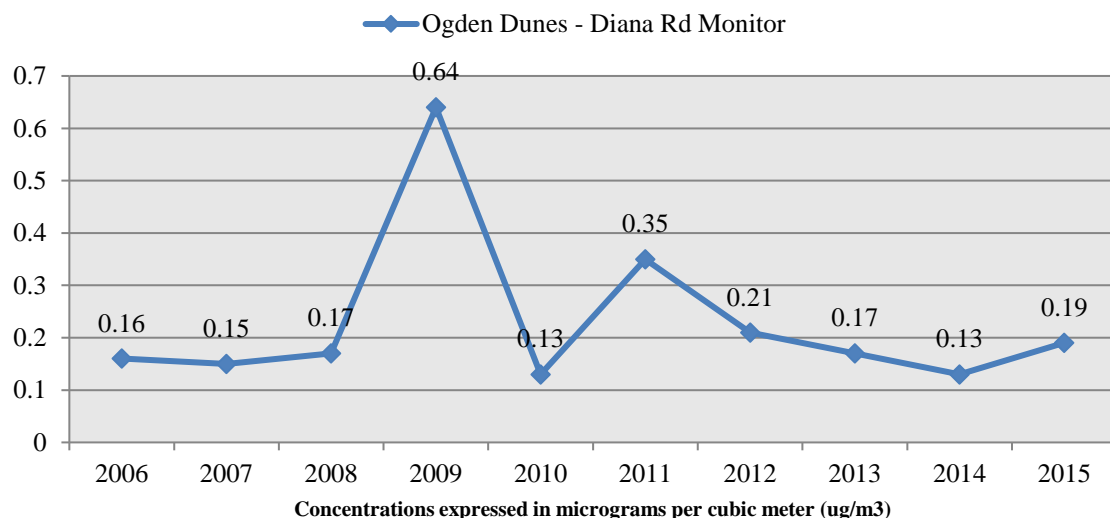
## 95% UCL Carbon Disulfide Concentrations at Hammond (2006-2015)



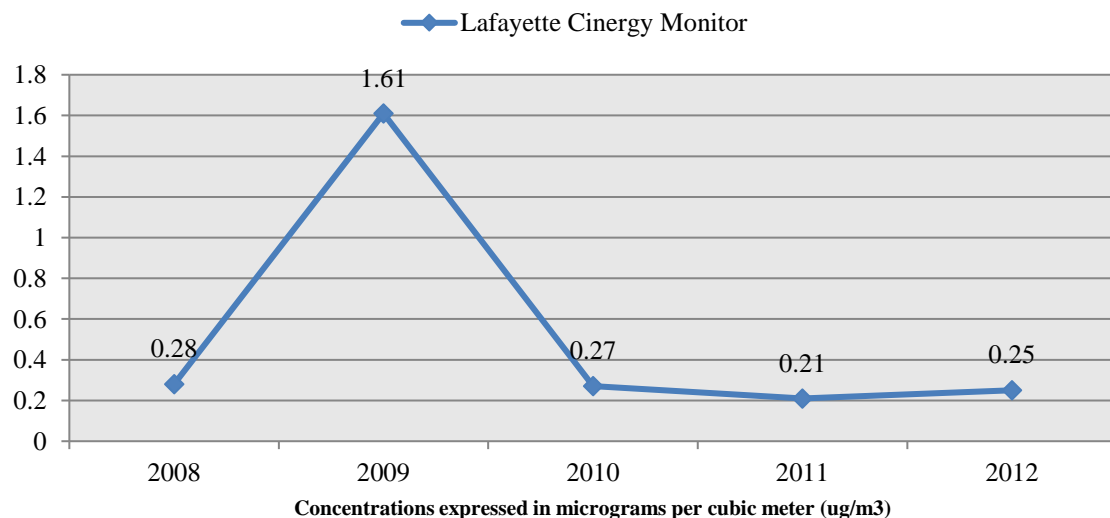
## 95% UCL Carbon Disulfide Concentrations at Whiting (2006-2015)



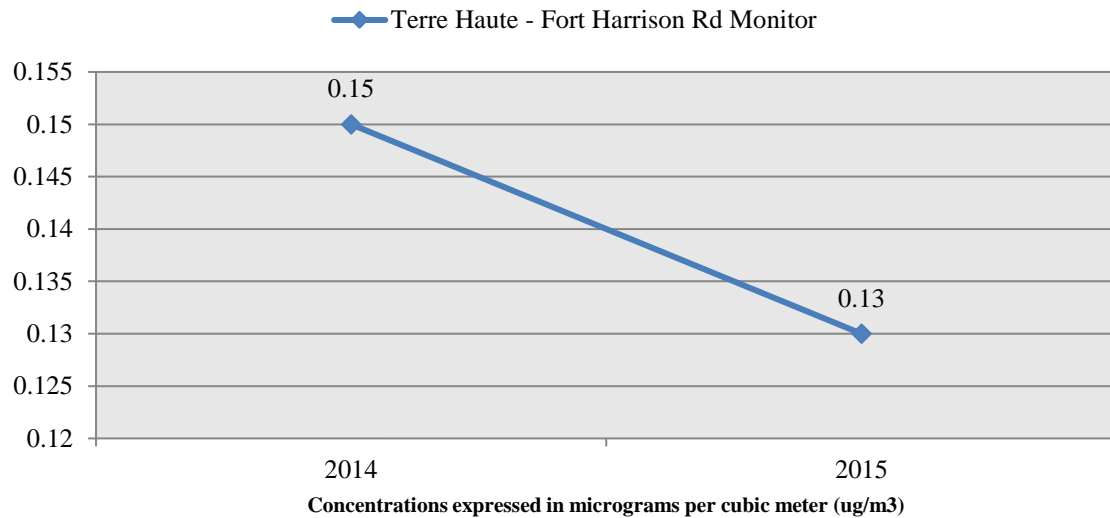
## 95% UCL Carbon Disulfide Concentrations at Ogden Dunes (2006-2015)



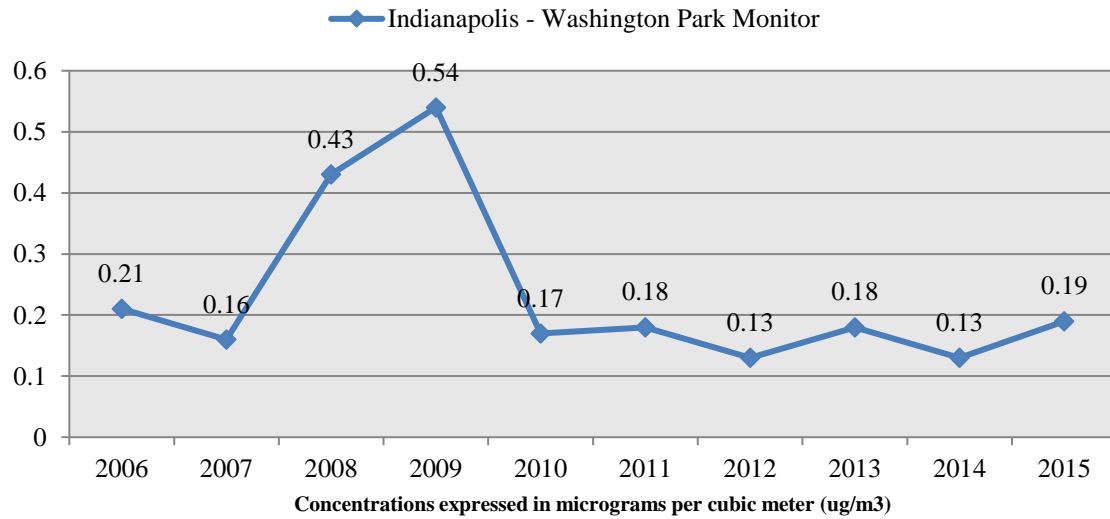
## 95% UCL Carbon Disulfide Concentrations at Lafayette (2008-2012)



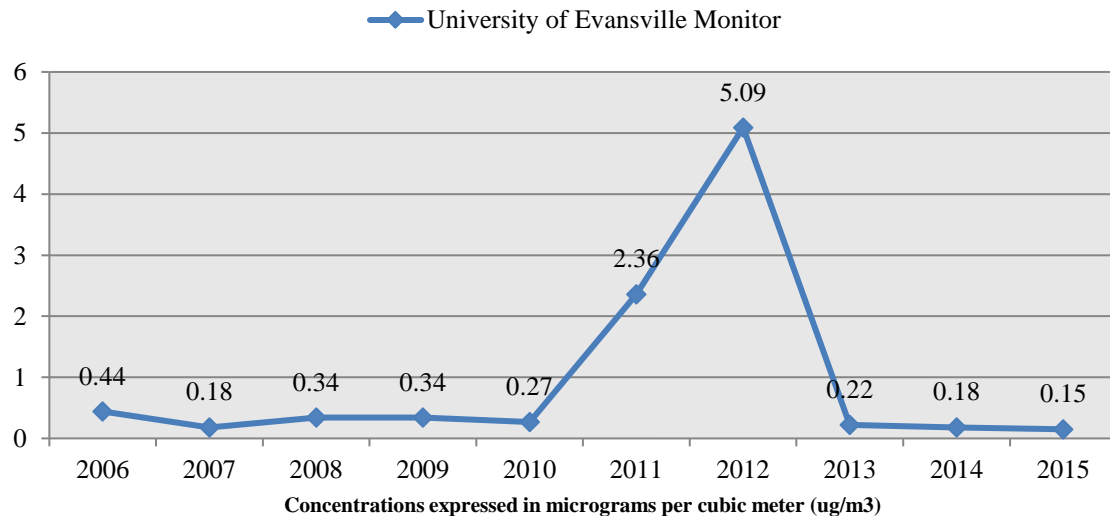
## 95% UCL Carbon Disulfide Concentrations at Terre Haute (2014-2015)



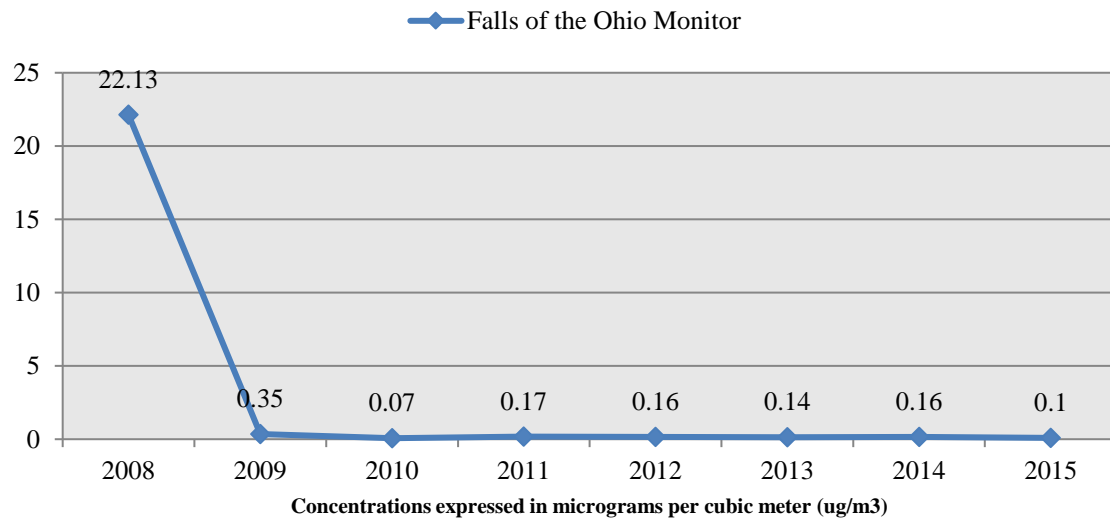
## 95% UCL Carbon Disulfide Concentrations at Indianapolis (2006-2015)



## 95% UCL Carbon Disulfide Concentrations at Evansville (2006-2015)



## 95% UCL Carbon Disulfide Concentrations at Clarksville (2008-2015)



The analysis of monitoring data from 2006 to 2015 indicates that concentrations of carbon disulfide have not followed consistent patterns throughout the state. Concentrations have declined at many monitors, including Whiting and Clarksville where dramatic spikes occurred in 2008. The spike at Whiting in 2008 was due to a period of elevated readings from 4/30/2008-9/9/2008, while a similar period of elevated readings was recorded at Clarksville from 3/19/2008-8/28/2008. In each of these cases, recorded concentrations of carbon disulfide

declined significantly following these periods and have never returned to those elevated levels. The single highest reading of 51.66 at Clarksville on 3/19/2008 was still well below the Reference Concentration of 700.00. 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 carbon disulfide 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 carbon disulfide do not present a risk for non-cancer health effects.

**Table 1. Carbon Disulfide 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	0.21	700.00	0.0003
East Chicago Marina	2013-2015	0.16	700.00	0.0002
Gary IITRI	2006-2015	0.17	700.00	0.0002
Hammond CAAP	2006-2015	0.54	700.00	0.0008
Whiting High School	2006-2015	2.37	700.00	0.0034
Ogden Dunes – Diana Rd	2006-2015	0.22	700.00	0.0003
Lafayette Cinergy	2008-2012	0.56	700.00	0.0008
Terre Haute – Fort Harrison Rd	2014-2015	0.14	700.00	0.0002
Indianapolis – Washington Park	2006-2015	0.22	700.00	0.0003
University of Evansville	2006-2015	0.94	700.00	0.0013
Clarksville – Falls of the Ohio	2008-2015	2.48	700.00	0.0035



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

### **Cancer Risk**

There is no evidence at this time of increased cancer risk from exposure to carbon disulfide.