

## **TRICHLOROTRIFLUOROETHANE (C<sub>2</sub>Cl<sub>3</sub>F<sub>3</sub>)**

*also known as Freon 113*

Chemical Abstracts Service (CAS) Number: 76-13-1

### **General Information**

Trichlorotrifluoroethane is a clear, colorless liquid with an ether-like odor. It was banned from use as a chlorofluorocarbon for its ozone-layer destroying properties. Trichlorotrifluoroethane was primarily used as a dry cleaning solvent. It was also used as a refrigerant.

### **Sources**

- The manufacture of trichlorotrifluoroethane has been phased out via the Montreal Protocol due to its part in ozone depletion.

### **Indiana Emissions**

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

### **Measured Concentration Trends**

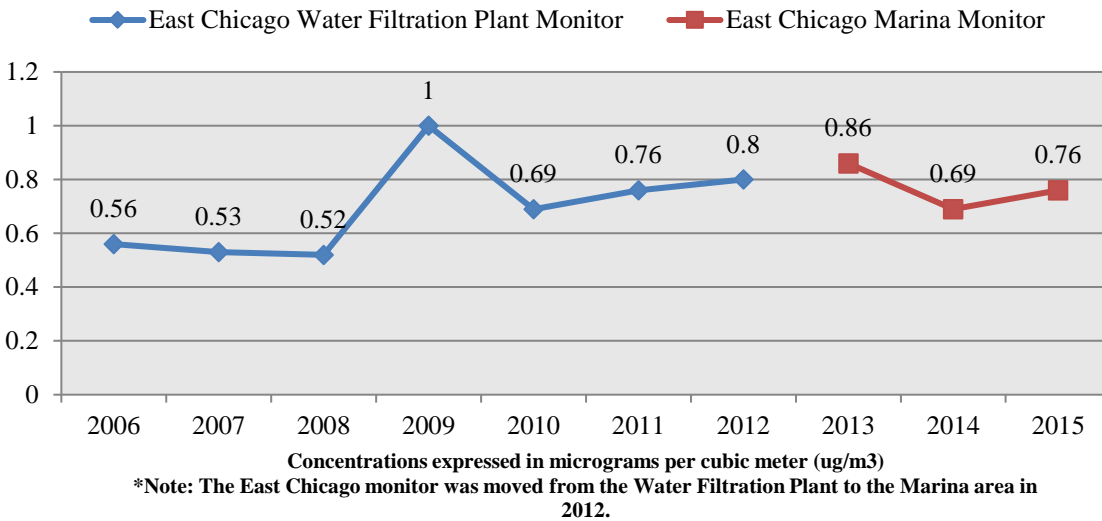
Ambient air monitoring data most accurately represents a limited area near the monitor location. All monitors for air toxics sample every sixth day. The monitoring locations by themselves are not sufficient to accurately characterize air toxic concentrations throughout the entire state, however, results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

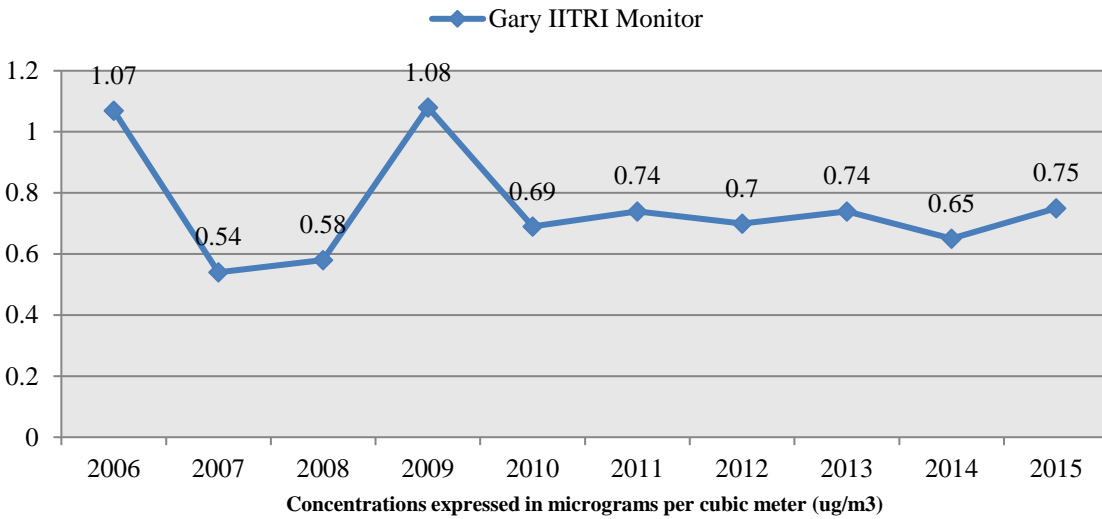
To learn more about the current monitoring locations, please visit IDEM's Air Toxics Monitor Siting webpage at: <http://www.in.gov/idem/toxic/2337.htm>

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 trichlorotrifluoroethane for the monitors analyzed from 2006-2015 was 88.0%. Trend graphs for each of these monitors are provided below.

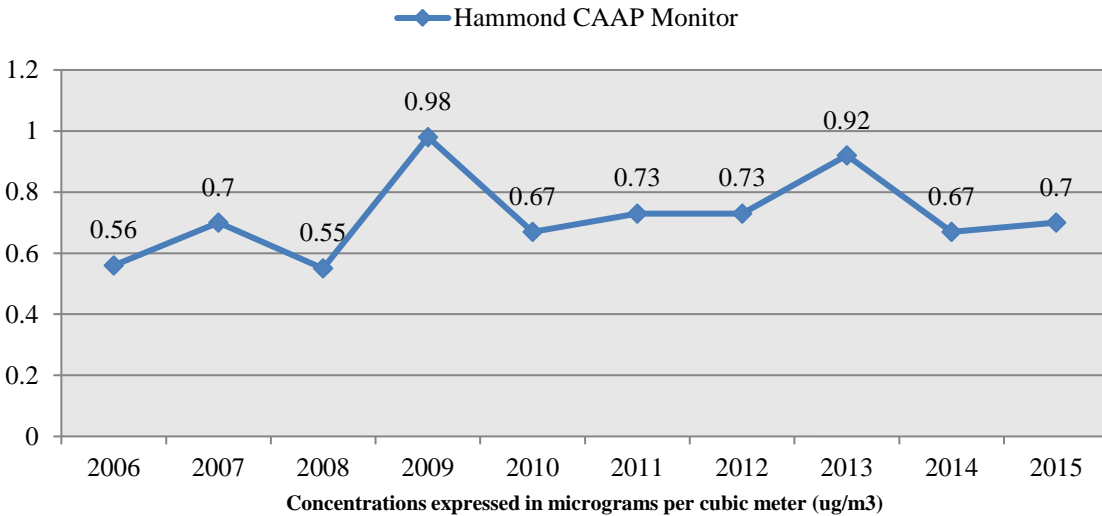
## 95% UCL Trichlorotrifluoroethane Concentrations at East Chicago (2006-2015)



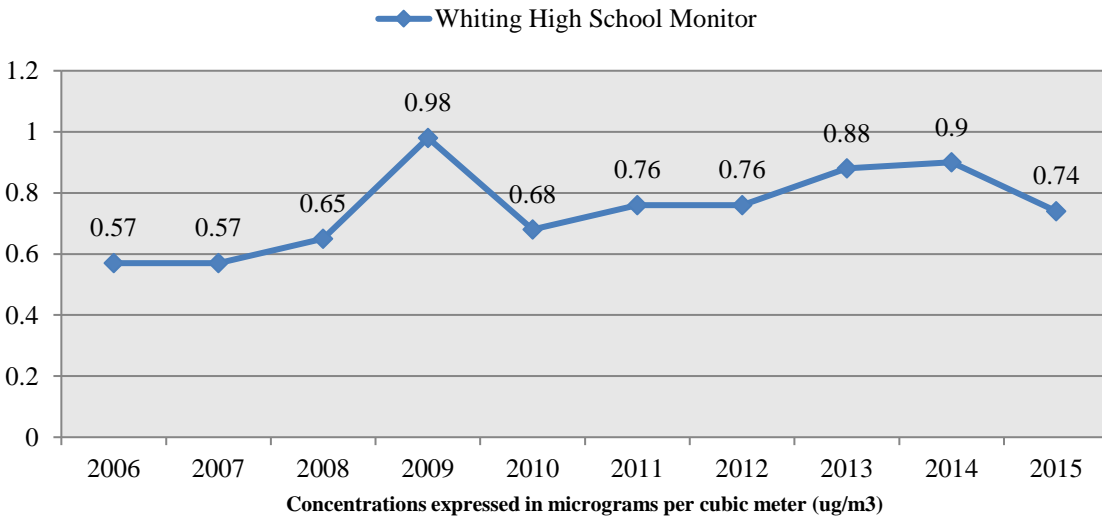
## 95% UCL Trichlorotrifluoroethane Concentrations at Gary (2006-2015)



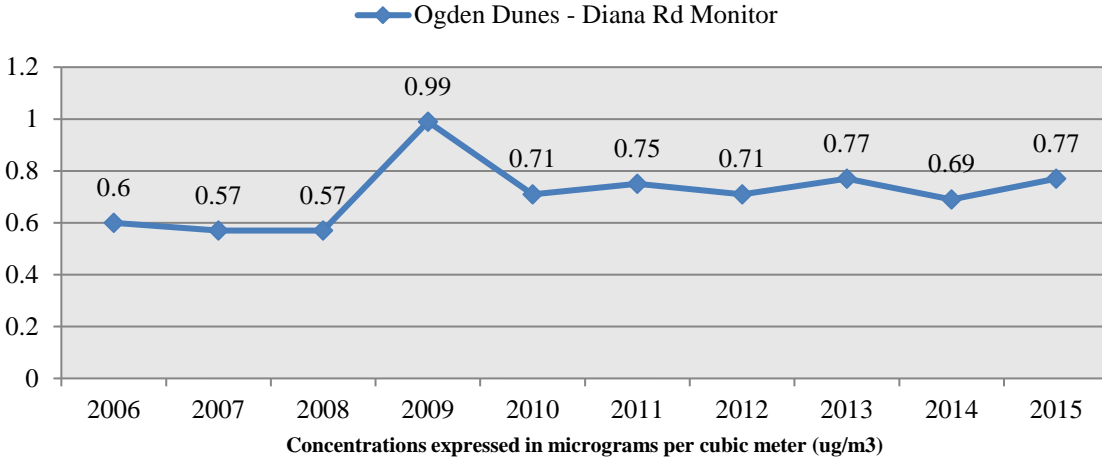
## 95% UCL Trichlorotrifluoroethane Concentrations at Hammond (2006-2015)



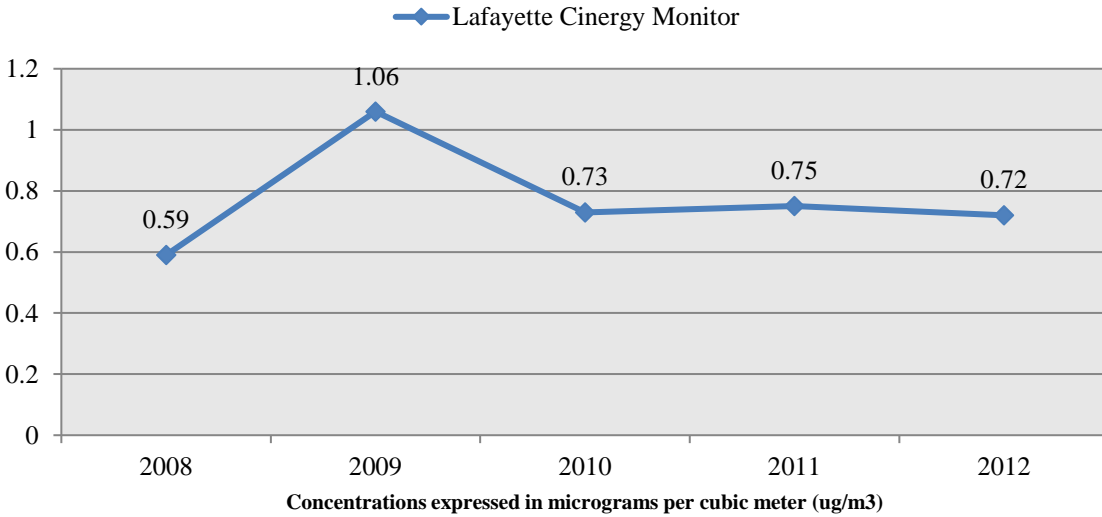
## 95% UCL Trichlorotrifluoroethane Concentrations at Whiting (2006-2015)



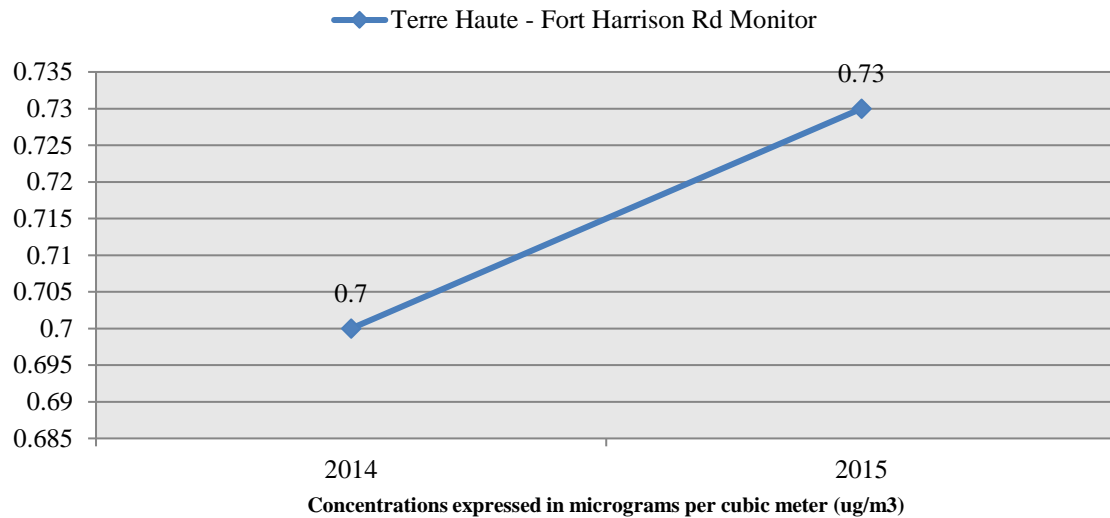
## 95% UCL Trichlorotrifluoroethane Concentrations at Ogden Dunes (2006-2015)



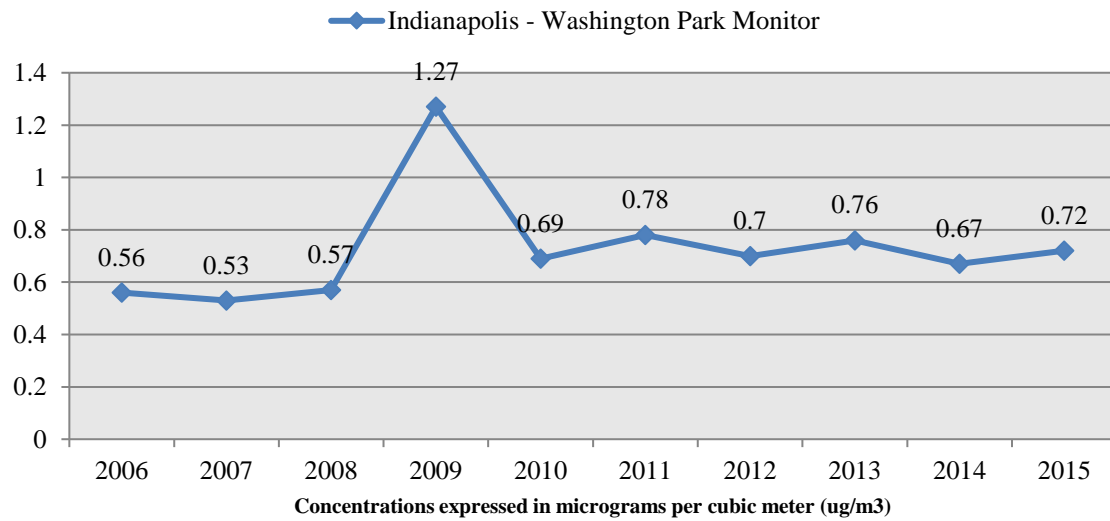
## 95% UCL Trichlorotrifluoroethane Concentrations at Lafayette (2008-2012)



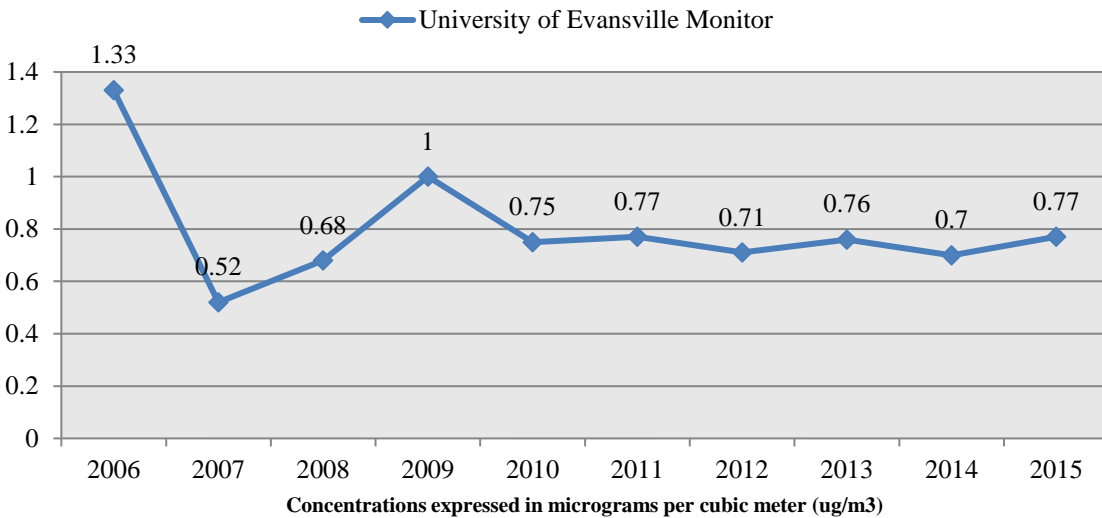
## 95% UCL Trichlorofluoroethane Concentrations at Terre Haute (2014-2015)



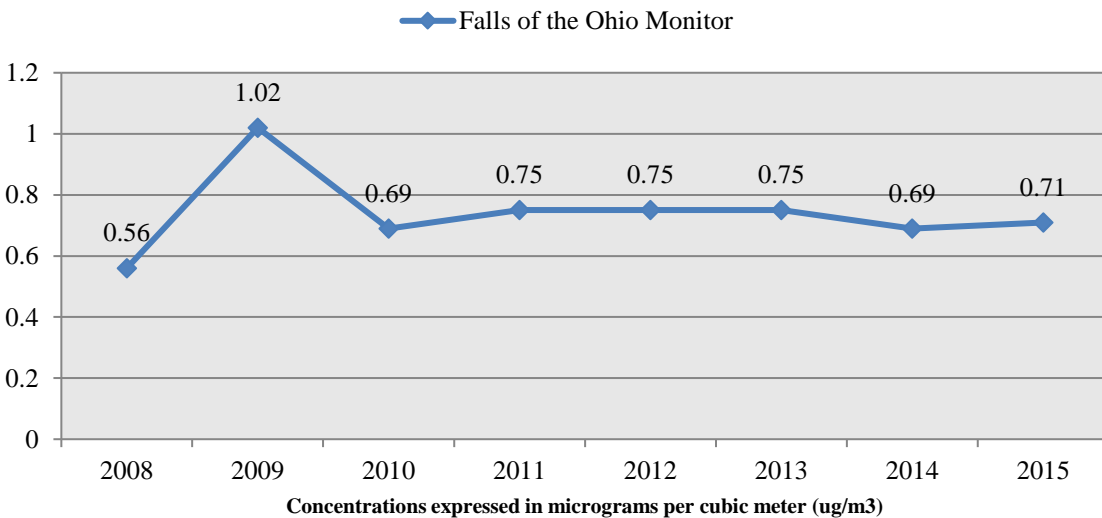
## 95% UCL Trichlorofluoroethane Concentrations at Indianapolis (2006-2015)



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



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



The analysis of monitoring data indicates that concentrations of trichlorotrifluoroethane have generally remained stable over the past six years after some instability from 2006 to 2009. The instability in the early years of this study is likely due to varying sensitivities in monitoring equipment during this time, but it is possible that some amount of trichlorotrifluoroethane was in use prior to 2010. Since the manufacture of trichlorotrifluoroethane was phased out by 2010, but

the gas remains in the atmosphere about 90 years, the stability in readings from 2010 to 2016 would be expected.

## 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 trichlorotrifluoroethane 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 trichlorotrifluoroethane do not present a risk for non-cancer health effects.

**Table 1. Trichlorotrifluoroethane 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	30000.0	0.000023
East Chicago Marina	2013-2015	0.75	30000.0	0.000025
Gary IITRI	2006-2015	0.73	30000.0	0.000024
Hammond CAAP	2006-2015	0.70	30000.0	0.000023
Whiting High School	2006-2015	0.72	30000.0	0.000024
Ogden Dunes – Diana Rd	2006-2015	0.70	30000.0	0.000023
Lafayette Cinergy	2008-2012	0.75	30000.0	0.000025
Terre Haute – Fort Harrison Rd	2014-2015	0.71	30000.0	0.000024
Indianapolis – Washington Park	2006-2015	0.71	30000.0	0.000024
University of Evansville	2006-2015	0.75	30000.0	0.000025
Clarksville – Falls of the Ohio	2008-2015	0.73	30000.0	0.000024

\* Reference Concentration Source: Health Effects Assessment Summary Tables (HEAST).

**Cancer Risk**

There is no known cancer risk associated with exposure to trichlorotrifluoroethane.