# 2016 Air Toxics Summary

**New Jersey Department of Environmental Protection**

## INTRODUCTION

Air pollutants can be generally divided into two categories: criteria pollutants (ozone, sulfur dioxide, carbon monoxide, nitrogen dioxide, particulate matter, and lead); and air toxics. The criteria pollutants have been addressed at the national level since the 1970s. The United States Environmental Protection Agency (USEPA) has set National Ambient Air Quality Standards (NAAQS) for them, and they are subject to a standard planning process that includes monitoring, reporting, and control requirements. Each of these pollutants is discussed in its own section of this New Jersey Department of Environmental Protection (NJDEP) 2016 Air Quality Report.

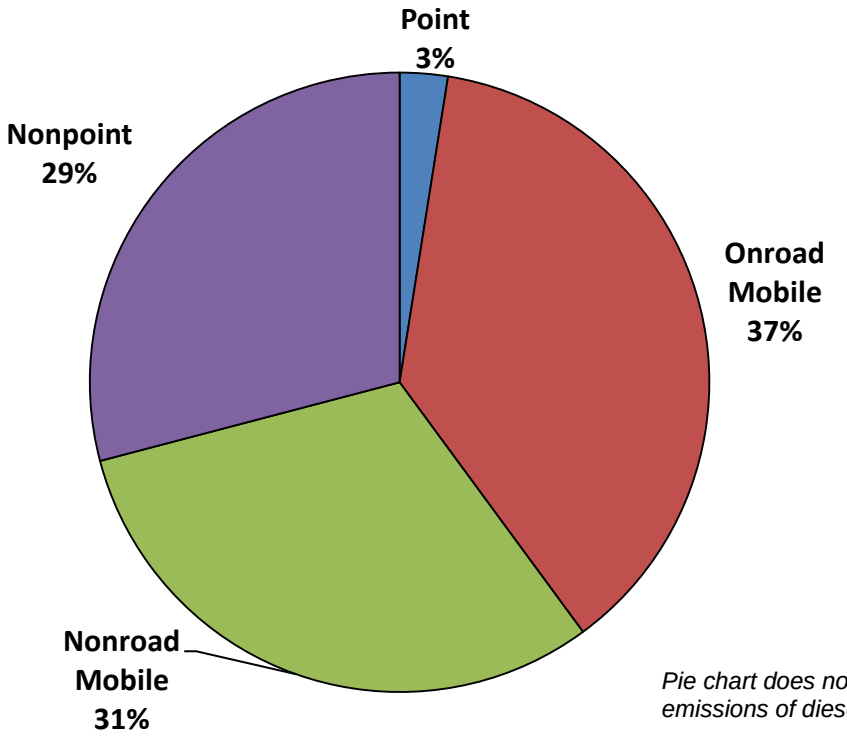
Air toxics are basically all the other chemicals released into the air that have the potential to cause adverse health effects in humans. These effects cover a wide range of conditions, from lung irritation to birth defects to cancer. There are no NAAQS for these pollutants, but in 1990 the U.S. Congress directed the USEPA to begin addressing a list of almost 200 air toxics by developing control technology standards for specific categories of sources that emit them. These air toxics are known as the Clean Air Act Hazardous Air Pollutants (HAPs). You can get more information about HAPs at the USEPA Air Toxics web site at www.epa.gov/ttn/atw. NJDEP also has several web pages dedicated to air toxics. They can be accessed at www.nj.gov/dep/airtoxics.

## SOURCES OF AIR TOXICS

USEPA compiles a National Emissions Inventory (NEI) every three years. In addition to criteria pollutants and criteria precursors, it also collects information on emissions of hazardous air pollutants. This data is then used for the National-Scale Air Toxics Assessment (NATA), which combines emissions data and complex dispersion and exposure models to estimate the public's exposure to air toxics around the country. The pie chart in Figure 10-1, taken from the 2011 NEI, shows that mobile sources are the largest contributors of air toxics emissions in New Jersey. More information can be found at www.epa.gov/national-air-toxics-assessment.

In New Jersey, on-road mobile sources (cars and trucks) account for 37% of the air toxics emissions, and non-road mobile sources (airplanes, trains, construction equipment, lawnmowers, boats, dirt bikes, etc.) contribute an additional 31%. Nonpoint sources (residential, commercial, and small industrial sources) represent 29% of the inventory, and point sources (such as factories and power plants) account for the remaining 3%.

Figure 10-1
2011 Air Toxics Emissions Source Estimates for New Jersey

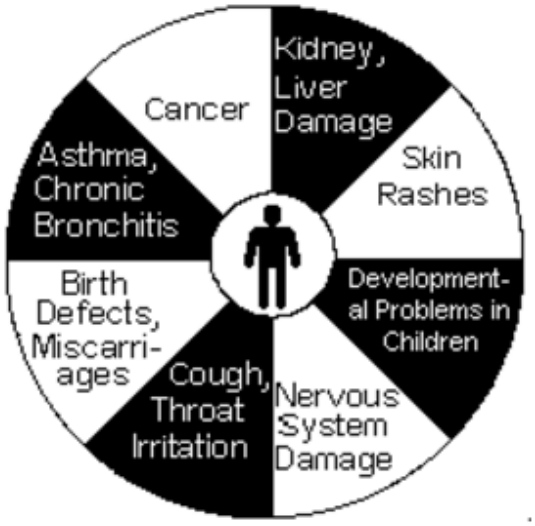



*Pie chart does not include emissions of diesel PM.*

## HEALTH EFFECTS

People exposed to significant amounts of air toxics may have an increased chance of developing cancer or experiencing other serious health effects. The noncancer health effects can range from respiratory, neurological, reproductive, developmental, or immune system damage, to irritation and effects on specific organs (see Figure 10-2). In addition to inhalation exposure, there can be risks from the deposition of toxic pollutants onto soil or surface water. There, they can be taken up by humans directly, or by consuming exposed plants and animals.

Figure 10-2
Potential Effects of Air Toxics

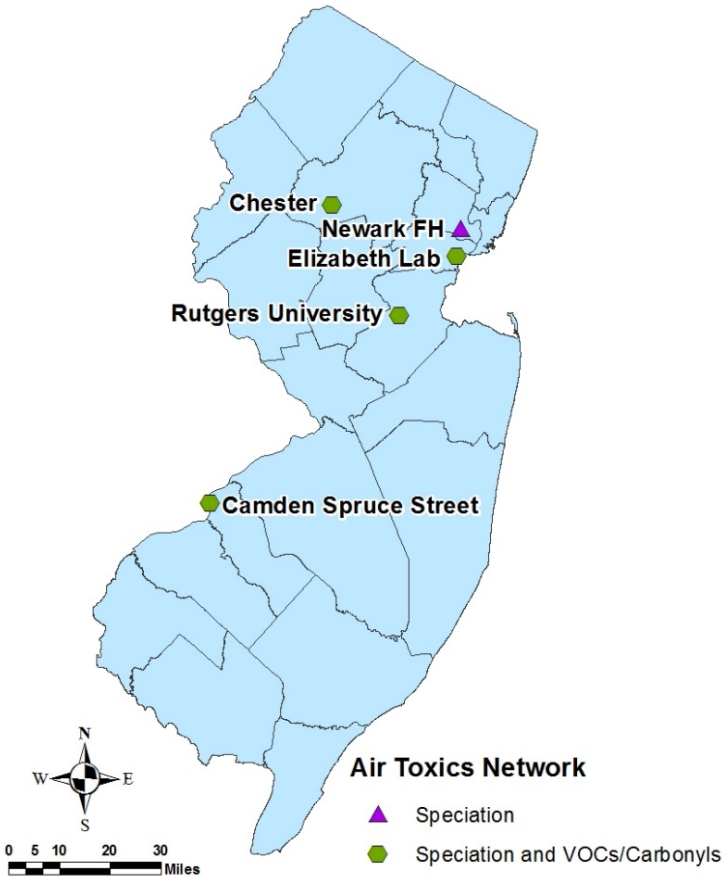



Source: www3.epa.gov/ttn/atw/3_90_024.html

## MONITORING LOCATIONS

NJDEP has four air toxics monitoring sites that measure volatile organic compounds (VOCs) and carbonyls, a subset of VOCs that includes formaldehyde, acetaldehyde and other related compounds. As shown in Figure 10-3, they are located in Camden, Chester, Elizabeth, and at Rutgers University in East Brunswick. Toxic metals data are collected at the same four monitoring stations plus Newark Firehouse.

Figure 10-3
2016 Air Toxics Monitoring Network




The Chester monitoring site is in rural Morris County, away from known sources, and serves as kind of a "background" monitor. The Rutgers University monitoring station is in a suburban setting on Rutgers agricultural lands in East Brunswick. In 2016 both the VOC and metals monitors were relocated to the new Rutgers station from the New Brunswick monitoring site, about eight-tenths of a mile away. The Elizabeth Lab monitoring station sits next to the Exit 13 tollbooths on the New Jersey Turnpike. The Camden Spruce Street monitoring station is located in an industrial urban setting. The Newark Firehouse monitoring station is in an urban residential area. More information about the air monitoring sites can be found in the Air Monitoring Network section and Appendix A of the annual Air Quality Report.

A previous monitoring site in Camden (officially called the Camden Lab site) had been measuring toxic VOCs since 1989. It was shut down in 2008 when NJDEP lost access to the location. A new monitoring station, the Camden Spruce Street monitoring site, became operational in 2013. The Elizabeth Lab site began measuring VOCs in 2000, and the New Brunswick and Chester sites started in July 2001. The new Rutgers site began measuring VOCs in January 2016. New Jersey's VOC monitors are part of the Urban Air Toxics Monitoring Program (UATMP), sponsored by the USEPA. A 24-hour integrated air sample is collected in a canister every six days, and then sent to the USEPA contract laboratory (ERG, located in North Carolina) to be analyzed for VOCs and carbonyls.

Analysis of metals at Camden Spruce Street, Chester, Elizabeth Lab and New Brunswick also began in 2001 as part of USEPA's Chemical Speciation Network (CSN). The Newark Firehouse site was added in 2010. In July 2016 the CSN monitor was moved from the New Brunswick site to Rutgers. The CSN was established to characterize the metals, ions and carbon constituents of $PM_{2.5}$. Filters are collected every three or six days and sent to a national lab for analysis. In 2016, USEPA switched to a different laboratory for CSN analysis and initiated a state review process, resulting in a delay in processing and finalizing samples. This report does not include 2016 information for toxic metals because of this delay. When it is available, data from the CSN monitors will be published in Appendix B (Fine Particulate Speciation Summary) of the annual Air Quality Report.

## NEW JERSEY AIR TOXICS MONITORING RESULTS FOR 2016

2016 air toxic monitoring results for VOCs and carbonyls are shown in Table 10-1. This table contains the annual average concentration for each air toxic measured at the four New Jersey monitoring sites. All values are in micrograms per cubic meter ($\mu g/m^3$). More detail can be found in Tables 10-4 through 10-7, including additional statistics, detection limit information, health benchmarks used by NJDEP, risk ratios, and concentrations in parts per billion by volume (ppbv). The ppbv units are more common in air monitoring, while $\mu g/m^3$ units are generally used in air dispersion modeling and health studies. A number of compounds that were analyzed were mostly below the detection limit of the method used (see Table 10-9). However, this does not mean they are not present in the air below the detection limit level.

For chemicals with less than 50% of the samples above the detection limit, there is significant uncertainty in the calculated averages. Median values (the value of the middle sample value when the results are ranked) are reported in Tables 10-4 through 10-7 along with the mean (average) concentrations because for some compounds only a single or very few high values were recorded. These high values will tend to increase the average concentrations, but would have less effect on the median value. In such cases, the median value may be a better indicator of long-term exposures.

USEPA has determined that the methods used to collect and analyze acrolein in ambient air are not producing reliable results. More information is available at http://archive.epa.gov/schoolair/web/html/acrolein.html. Although we are including the 2016 New Jersey acrolein data in this report, the concentrations are highly uncertain and should be viewed as such.

Table 10-1
2016 Summary of Toxic Volatile Organic Compounds Monitored in New Jersey

Annual Average Concentration
Micrograms per Cubic Meter ($\mu g/m^3$)

| | Pollutant | Synonym | HAP | CAS No. | Camden | Chester | Elizabeth | Rutgers |
|---|---|---|---|---|---|---|---|---|
| 1 | Acetaldehyde | | * | 75-07-0 | 2.467 | 0.938 | 2.018 | 1.323 |
| 2 | Acetone | | | 67-64-1 | 2.805 | 1.596 | 2.445 | 1.888 |
| 3 | Acetonitrile | | * | 75-05-8 | 1.480 | 4.977 | 0.369 | 0.378 |
| 4 | Acetylene | | | 74-86-2 | 0.939 | 0.422 | 1.097 | 0.713 |
| 5 | Acrolein[a] | | * | 107-02-8 | 0.853 | 0.737 | 0.841 | 0.886 |
| 6 | Acrylonitrile | | * | 107-13-1 | ND | ND | ND | ND |
| 7 | tert-Amyl Methyl Ether | | | 994-05-8 | *0.001* | *0.001* | *0.001* | *0.003* |
| 8 | Benzaldehyde | | | 100-52-7 | 0.926 | 0.069 | 0.220 | 0.145 |
| 9 | Benzene | | * | 71-43-2 | 0.742 | 0.344 | 0.828 | 0.515 |
| 10 | Bromochloromethane | | | 74-97-5 | *0.011* | *0.012* | *0.008* | *0.011* |
| 11 | Bromodichloromethane | | | 75-27-4 | *0.013* | *0.011* | *0.001* | *0.018* |
| 12 | Bromoform | | * | 75-25-2 | *0.011* | *0.008* | *0.006* | *0.019* |
| 13 | Bromomethane | Methyl bromide | * | 74-83-9 | 0.407 | 0.070 | 0.074 | 0.080 |
| 14 | 1,3-Butadiene | | * | 106-99-0 | 0.082 | 0.017 | 0.124 | 0.059 |
| 15 | Butyraldehyde | | | 123-72-8 | 0.434 | 0.122 | 0.416 | 0.244 |
| 16 | Carbon Disulfide | | * | 75-15-0 | 0.057 | 0.046 | 0.054 | ND |
| 17 | Carbon Tetrachloride | | * | 56-23-5 | 0.629 | 0.612 | 0.620 | 0.619 |
| 18 | Chlorobenzene | | * | 108-90-7 | *0.006* | *0.009* | *0.005* | *0.017* |
| 19 | Chloroethane | Ethyl chloride | * | 75-00-3 | 0.047 | *0.024* | 0.034 | 0.070 |
| 20 | Chloroform | | * | 67-66-3 | 0.148 | 0.119 | 0.164 | 0.169 |
| 21 | Chloromethane | Methyl chloride | * | 74-87-3 | 1.212 | 1.173 | 1.184 | 1.208 |
| 22 | Chloroprene | 2-Chloro-1,3-butadiene | * | 126-99-8 | ND | ND | ND | ND |
| 23 | Crotonaldehyde | | | 123-73-9 | 0.249 | 0.286 | 0.378 | 0.267 |
| 24 | Dibromochloromethane | Chlorodibromomethane | | 124-48-1 | *0.026* | *0.024* | *0.017* | 0.033 |
| 25 | 1,2-Dibromoethane | Ethylene dibromide | * | 106-93-4 | ND | *0.002* | *0.001* | *0.005* |
| 26 | m-Dichlorobenzene | 1,3-Dichlorobenzene | | 541-73-1 | *0.002* | *0.002* | *0.001* | *0.009* |
| 27 | o-Dichlorobenzene | 1,2-Dichlorobenzene | | 95-50-1 | *0.003* | *0.003* | *0.001* | *0.009* |
| 28 | p-Dichlorobenzene | 1,4-Dichlorobenzene | * | 106-46-7 | 0.059 | *0.009* | 0.044 | *0.035* |
| 29 | Dichlorodifluoromethane | | | 75-71-8 | 2.724 | 2.577 | 2.701 | 2.600 |
| 30 | 1,1-Dichloroethane | Ethylidene dichloride | * | 75-34-3 | *0.001* | *0.002* | *0.001* | *0.006* |
| 31 | 1,2-Dichloroethane | Ethylene dichloride | * | 107-06-2 | 0.077 | 0.065 | 0.075 | 0.079 |
| 32 | 1,1-Dichloroethylene | Vinylidene chloride | * | 75-35-4 | *0.007* | *0.004* | *0.002* | *0.008* |
| 33 | cis-1,2-Dichloroethylene | cis-1,2-Dichloroethene | | 156-59-2 | ND | ND | ND | ND |

- *Values in **italics** indicate averages based on less than 50% of samples above the detection limit.*
- **ND** indicates that all samples were below the detection limit.
- HAP = Hazardous air pollutant as listed in the Clean Air Act.

[a] Acrolein concentrations are highly uncertain because of problems with collection and analysis methods.

Table 10-1 (continued)
2016 Summary of Toxic Volatile Organic Compounds Monitored in New Jersey

Annual Average Concentration
Micrograms per Cubic Meter ($\mu g/m^3$)

| | Pollutant | Synonym | HAP | CAS No. | Camden | Chester | Elizabeth | Rutgers |
|---|---|---|---|---|---|---|---|---|
| 34 | trans-1,2-Dichloroethylene | trans-1,2-Dichloroethene | | 156-60-5 | *0.005* | *0.001* | *0.004* | *0.006* |
| 35 | Dichloromethane | Methylene chloride | * | 75-09-2 | 0.444 | 0.328 | 0.530 | 0.458 |
| 36 | 1,2-Dichloropropane | Propylene dichloride | * | 78-87-5 | *0.005* | *0.004* | *0.004* | *0.006* |
| 37 | cis-1,3-Dichloropropene | cis-1,3-Dichloropropylene | * | 542-75-6 | ND | ND | ND | ND |
| 38 | trans-1,3-Dichloropropene | trans-1,3-Dichloropropylene | * | 542-75-6 | ND | ND | ND | ND |
| 39 | Dichlorotetrafluoroethane | Freon 114 | | 76-14-2 | 0.130 | 0.130 | 0.122 | 0.132 |
| 40 | 2,5-Dimethylbenzaldehyde | | | 5799-94-2 | *0.292* | ND | *0.004* | *0.025* |
| 41 | Ethyl Acrylate | | * | 140-88-5 | *0.0004* | *0.0005* | ND | ND |
| 42 | Ethyl tert-Butyl Ether | tert-Butyl ethyl ether | | 637-92-3 | 0.049 | *0.003* | *0.006* | 0.149 |
| 43 | Ethylbenzene | | * | 100-41-4 | 0.468 | 0.073 | 0.320 | 0.283 |
| 44 | Formaldehyde | | * | 50-00-0 | 3.221 | 1.802 | 3.516 | 2.116 |
| 45 | Hexachloro-1,3-butadiene | Hexachlorobutadiene | * | 87-68-3 | *0.021* | *0.018* | *0.007* | *0.027* |
| 46 | Hexaldehyde | Hexanaldehyde | | 66-25-1 | 0.241 | 0.051 | 0.527 | 0.160 |
| 47 | Isovaleraldehyde | | | 590-86-3 | *0.041* | *0.003* | *0.211* | *0.082* |
| 48 | Methyl Ethyl Ketone | MEK | | 78-93-3 | 0.698 | 0.266 | 0.575 | 0.481 |
| 49 | Methyl Isobutyl Ketone | MIBK | * | 108-10-1 | 0.242 | 0.095 | 0.163 | 0.135 |
| 50 | Methyl Methacrylate | | * | 80-62-6 | *0.044* | *0.005* | *0.020* | *0.030* |
| 51 | Methyl tert-Butyl Ether | MTBE | * | 1634-04-4 | *0.013* | *0.002* | *0.006* | 0.044 |
| 52 | n-Octane | | | 111-65-9 | 0.259 | 0.086 | 0.318 | 0.141 |
| 53 | Propionaldehyde | | * | 123-38-6 | 1.068 | 0.225 | 0.394 | 0.632 |
| 54 | Propylene | | | 115-07-1 | 1.025 | 0.271 | 3.74 | 0.572 |
| 55 | Styrene | | * | 100-42-5 | 3.280 | *0.020* | 0.073 | 0.090 |
| 56 | 1,1,2,2-Tetrachloroethane | | * | 79-34-5 | *0.007* | *0.007* | *0.005* | *0.012* |
| 57 | Tetrachloroethylene | Perchloroethylene | * | 127-18-4 | 0.160 | 0.062 | 0.146 | 0.117 |
| 58 | Tolualdehydes | | | | 0.254 | 0.065 | 0.109 | 0.093 |
| 59 | Toluene | | * | 108-88-3 | 5.885 | 0.396 | 1.824 | 0.934 |
| 60 | 1,2,4-Trichlorobenzene | | * | 102-82-1 | *0.004* | *0.001* | ND | *0.002* |
| 61 | 1,1,1-Trichloroethane | Methyl chloroform | * | 71-55-6 | 0.035 | 0.024 | 0.027 | 0.036 |
| 62 | 1,1,2-Trichloroethane | | * | 79-00-5 | *0.001* | ND | ND | ND |
| 63 | Trichloroethylene | | * | 79-01-6 | *0.057* | *0.003* | *0.022* | *0.022* |
| 64 | Trichlorofluoromethane | | | 75-69-4 | 2.369 | 1.361 | 1.406 | 1.396 |
| 65 | Trichlorotrifluoroethane | 1,1,2-Trichloro-1,2,2-trifluoroethane | | 76-13-1 | 0.633 | 0.619 | 0.624 | *0.026* |
| 66 | 1,2,4-Trimethylbenzene | | | 95-63-6 | 0.678 | 0.053 | 0.331 | 0.188 |
| 67 | 1,3,5-Trimethylbenzene | | | 108-67-8 | 0.208 | *0.024* | 0.109 | 0.076 |
| 68 | Valeraldehyde | | | 110-62-3 | 0.159 | 0.046 | 0.175 | 0.453 |
| 69 | Vinyl chloride | | * | 75-01-4 | 0.021 | *0.006* | *0.0064* | 0.009 |
| 70 | m,p-Xylene | | * | 1330-20-7 | 1.008 | 0.147 | 0.839 | 0.530 |
| 71 | o-Xylene | | * | 95-47-6 | 0.479 | 0.068 | 0.365 | 0.260 |

- *Values in **italics** indicate averages based on less than 50% of samples above the detection limit.*
- **ND** indicates that all samples were below the detection limit.
- HAP = Hazardous air pollutant as listed in the Clean Air Act.

## ESTIMATING HEALTH RISK

The effects on human health resulting from exposure to specific air toxics can be estimated by using chemical-specific **health benchmarks**. These are based on toxicity values developed by the USEPA and other agencies, using chemical-specific animal or human health studies. For carcinogens, chemicals suspected of causing cancer, the health benchmark is the concentration of the pollutant that corresponds to a one-in-a-million increase in the risk of getting cancer if a person was to breathe that concentration over his or her entire lifetime. The health benchmark for a noncarcinogen is the air concentration at which no adverse health effect is expected to occur, even if a person is exposed to that concentration on a daily basis for a lifetime (this is also known as a reference concentration). Not all air toxics have health benchmarks, because of a lack of toxicity studies. Available health benchmarks for the VOCs and carbonyls monitored in New Jersey are listed in Tables 10-4 through 10-7.

If ambient air concentrations exceed health benchmarks, regulatory agencies can focus their efforts on reducing emissions or exposure to those chemicals. Dividing the air concentration of a chemical by its health benchmark gives us a number referred to as a **risk ratio**. If the risk ratio is less than one, the air concentration should not pose a health risk. If it is greater than one, it may be of concern. The risk ratio also indicates how much higher or lower the estimated air concentration is compared to the health benchmark.

The pollutants with risk ratios greater than one for at least one monitoring site are summarized in Table 10-3. Table 10-4 shows the different types of sources that contribute to the levels of those pollutants in the air. Formaldehyde showed the highest risk at all four monitoring sites. Risk ratios for formaldehyde at Camden and Elizabeth were almost double those at Chester and Rutgers.

Other pollutants above health benchmarks at all four sites were acetaldehyde, benzene, carbon tetrachloride, chloroform, chloromethane (methyl chloride), and 1,2-dichloroethane (ethylene dichloride). Risk ratios for ethylbenzene and styrene were of concern at the Camden site. 1,2-Dibromoethane had a risk ratio above one only at Rutgers, but most of the samples were below the detection limit. 1,3-Butadiene was above its health benchmark at all sites except Chester. To summarize, Camden had ten pollutants with annual average concentrations that exceeded their health benchmarks, Rutgers had nine, Elizabeth had eight, and Chester had seven.

Although the mean concentrations of **acrolein** exceeded the health benchmark at all sites (see Tables 10-4 through 10-7), risk ratios were not calculated because of problems with the sampling and analysis method, as previously mentioned. 61% of ambient acrolein in New Jersey is attributed to mobile sources, 13% to background or secondary formation, 11% to point sources, and 15% to nonpoint sources.

Table 10-2
Monitored Toxic Air Pollutants with Risk Ratios Greater Than One in NJ for 2016

| | Pollutant | CAS No. | Risk Ratio | | | |
|---|---|---|---|---|---|---|
| | | | Camden | Chester | Elizabeth | Rutgers |
| 1 | Acetaldehyde | 75-07-0 | 5 | 2 | 4 | 3 |
| 2 | Benzene | 71-43-2 | 6 | 3 | 6 | 4 |
| 3 | 1,3-Butadiene | 106-99-0 | 2 | | 4 | 1.8 |
| 4 | Carbon Tetrachloride | 56-23-5 | 4 | 4 | 4 | 4 |
| 5 | Chloroform | 67-66-3 | 3 | 3 | 4 | 4 |
| 6 | Chloromethane | 74-87-3 | 2 | 2 | 2 | 2 |
| 7 | *1,2-Dibromoethane* | 106-93-4 | | | | *3* |
| 8 | 1,2-Dichloroethane | 107-06-2 | 2 | 1.7 | 2 | 2 |
| 9 | Ethylbenzene | 100-41-4 | 1.2 | | | |
| 10 | Formaldehyde | 50-00-0 | 42 | 23 | 46 | 27 |
| 11 | Styrene | 100-42-5 | 1.8 | | | |

NOTE: Values in italics are based on less than 50% of samples above the detection limit.

Table 10-3
Sources of Air Toxics with Risk Ratios >1 in NJ

| | Pollutant | % Contribution from | | | | |
|---|---|---|---|---|---|---|
| | | Point Sources | Nonpoint Sources | On-Road Mobile Sources | Nonroad Mobile Sources | Background & Secondary Formation |
| 1 | Acetaldehyde | <1% | 2% | 9% | 4% | 84% |
| 2 | Benzene | 1% | 17% | 52% | 29% | 1% |
| 3 | 1,3-Butadiene | 2% | 13% | 56% | 28% | 1% |
| 4 | Carbon Tetrachloride | <1% | <1% | | | >99% |
| 5 | Chloroform | 83% | 17% | | | 0% |
| 6 | Chloromethane | <1% | | | | >99% |
| 7 | 1,2-Dibromoethane | >99% | <1% | | | <1% |
| 8 | 1,2-Dichloroethane | 7% | 93% | | | |
| 9 | Ethylbenzene | 1% | 13% | 58% | 24% | 4% |
| 10 | Formaldehyde | 1% | 5% | 9% | 8% | 77% |
| 11 | Styrene | 7% | 23% | 44% | 22% | 4% |

## TRENDS AND COMPARISONS

Monitoring of air toxics in New Jersey has been going on since a UATMP site was established in Camden in 1989. Sampling and analysis methods continue to evolve, most notably with improvements in the ability to detect chemicals at lower concentrations. Figures 10-4 through 10-14 present data for some of the VOCs that have been sampled over the past decade. As mentioned previously, the first toxics monitoring site in Camden (Camden Lab) was shut down in 2008. It is identified in Figures 10-4 through 10-14 as "Camden 1." The new Camden site (Camden Spruce Street), located about two miles from the old site, is designated "Camden 2" in the trend graphs.

According to USEPA's National Air Toxics Assessment (NATA), **acetaldehyde** concentrations in New Jersey (Figure 10-4) are primarily influenced by secondary formation, a process in which chemicals in the air react with each other and are transformed into other chemicals. Mobile sources also contribute to ambient levels. In 2003, no data was collected in Camden after September, which could have had an influence on the low annual average for that year. In 2004, high levels of acetaldehyde were measured over a number of weeks at both Camden and New Brunswick.

Figures 10-5 and 10-6 show a general decrease in **benzene** and **1,3-butadiene** concentrations over the past decade. Over 50% of New Jersey's ambient benzene and 1,3-butadiene comes from on-road mobile sources, and about 30% comes from non-road mobile sources.

**Carbon tetrachloride** (Figure 10-7) was once used widely as a degreaser, household cleaner, propellant, refrigerant, and fumigant. It has been phased out of most production and use because of its toxicity and its ability to deplete stratospheric ozone. However, about 100 tons are still emitted annually by industry in the U.S., although no emissions have been reported in New Jersey for years. It degrades slowly in the environment, so it can be transported from other areas, and levels in the air can remain relatively steady for a long time.

Some of the increase in **chloroform** concentrations shown in Figure 10-8 is believed to be from improvements in the detection limit. The high annual average concentration for New Brunswick in 2014 is attributable to a period of high values in May and June. Nonpoint sources and background are the major contributors to ambient chloroform levels in New Jersey. Chloroform can be formed in small amounts by chlorination of water. It breaks down slowly in ambient air.

**Chloromethane** (also known as methyl chloride) levels are influenced almost entirely by background, since it also degrades very slowly in the air. Figure 10-9 shows that concentrations have remained relatively stable from year to year, and that all the sites show similar levels. It was once commonly used as a refrigerant and in the chemical industry, but was phased out because of its toxicity.

**1,2-Dibromoethane** (or ethylene dibromide) (Figure 10-10) is currently used as a pesticide in the treatment of felled logs for bark beetles and termites, and control of wax moths in beehives. It was once used as an additive to leaded gasoline and as a soil and grain fumigant, but those uses have been banned by USEPA. Most of the monitoring results fall below the detection limit, so the data in the graph is relatively uncertain.

**1,2-Dichloroethane** (also called ethylene dichloride) (Figure 10-11) is primarily used in the production of chemicals, as a solvent, dispersant and wetting and penetrating agent. The increase in concentrations after 2011 is related to an improvement in the detection limit, resulting in over 90% of samples having detectable levels of 1,2-dichloroethane. The most recent National Emissions Inventory (2011) estimates

that 1.3 tons were emitted by point and area sources in New Jersey. Concentrations at monitors in New Jersey are comparable to levels elsewhere.

About 82% of **ethylbenzene** is emitted from mobile sources. Improvements in mobile source emissions controls have contributed to the downward trend in air concentrations. 2001 data for Chester and New Brunswick have been omitted from the graph because of technical problems encountered when sampling began that year (Figure 10-12).

**Formaldehyde** (Figure 10-13) is a ubiquitous pollutant that is often found at higher concentrations indoors rather than outdoors because of its use in many consumer goods. It is used in the production of fertilizer, paper, plywood, urea-formaldehyde resins, and many other products. In New Jersey the primary emitters of formaldehyde are mobile sources, although secondary formation and transport contribute the most to high outdoor levels. In 2014, concentrations at the New Brunswick site were consistently higher than at the other monitors, although they dropped in 2015.

**Styrene** is used in the production of polystyrene plastics and resins. A significant amount also comes from mobile sources. A possible source of the higher concentrations at the Camden Spruce Street monitor (see Figure 10-14) is being investigated but has not yet been identified.

Figure 10-4
ACETALDEHYDE – New Jersey Monitored Concentrations

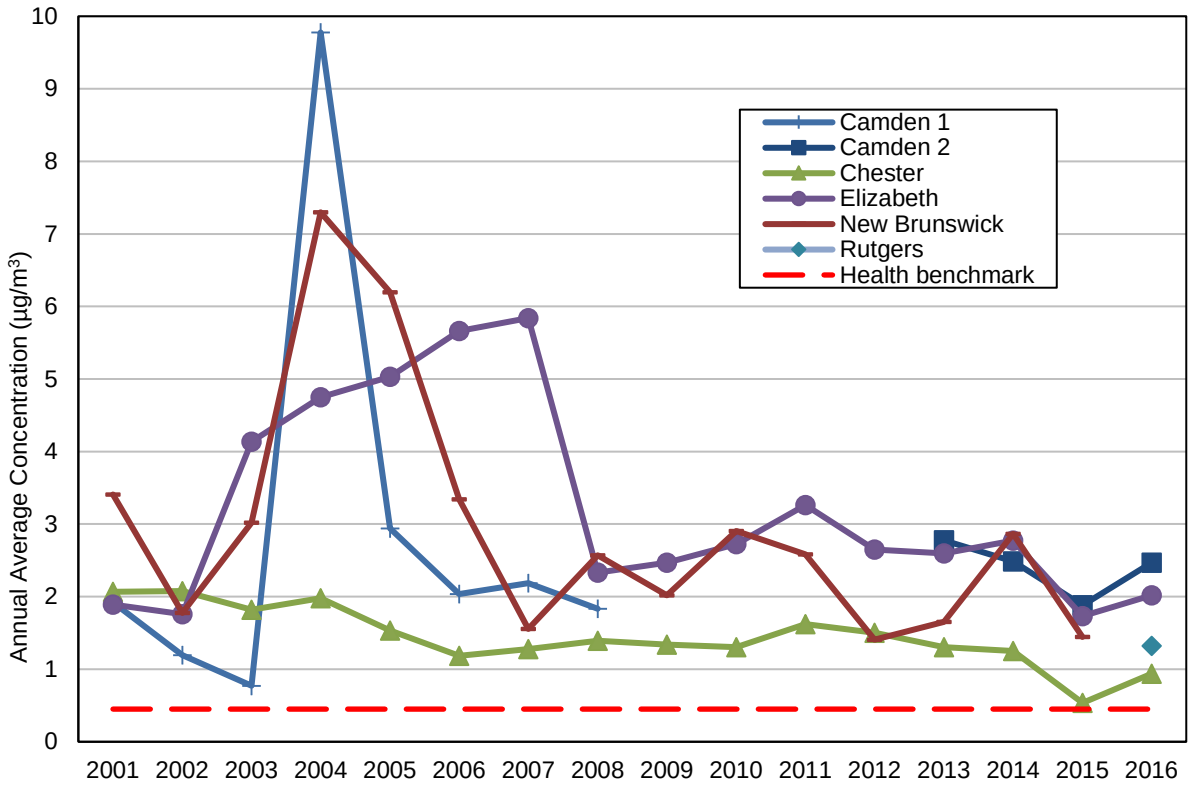


Figure 10-5
BENZENE – New Jersey Monitored Concentrations

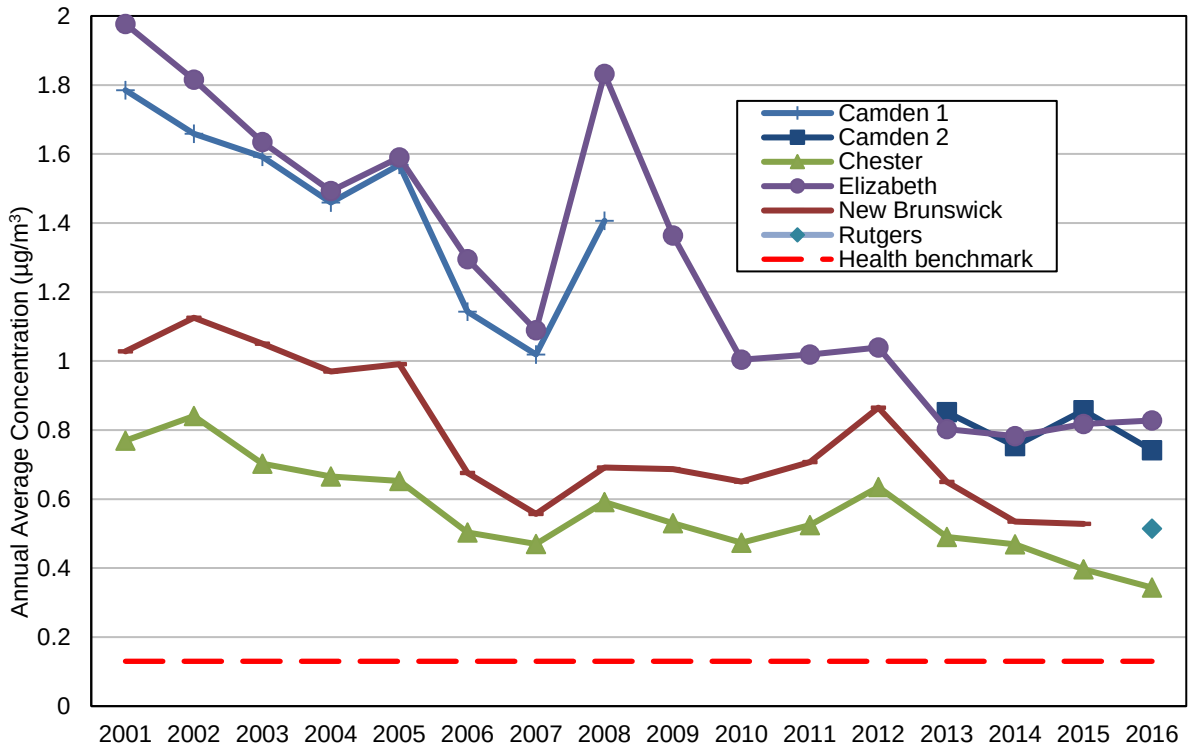



Figure 10-6
1,3-BUTADIENE – New Jersey Monitored Concentrations

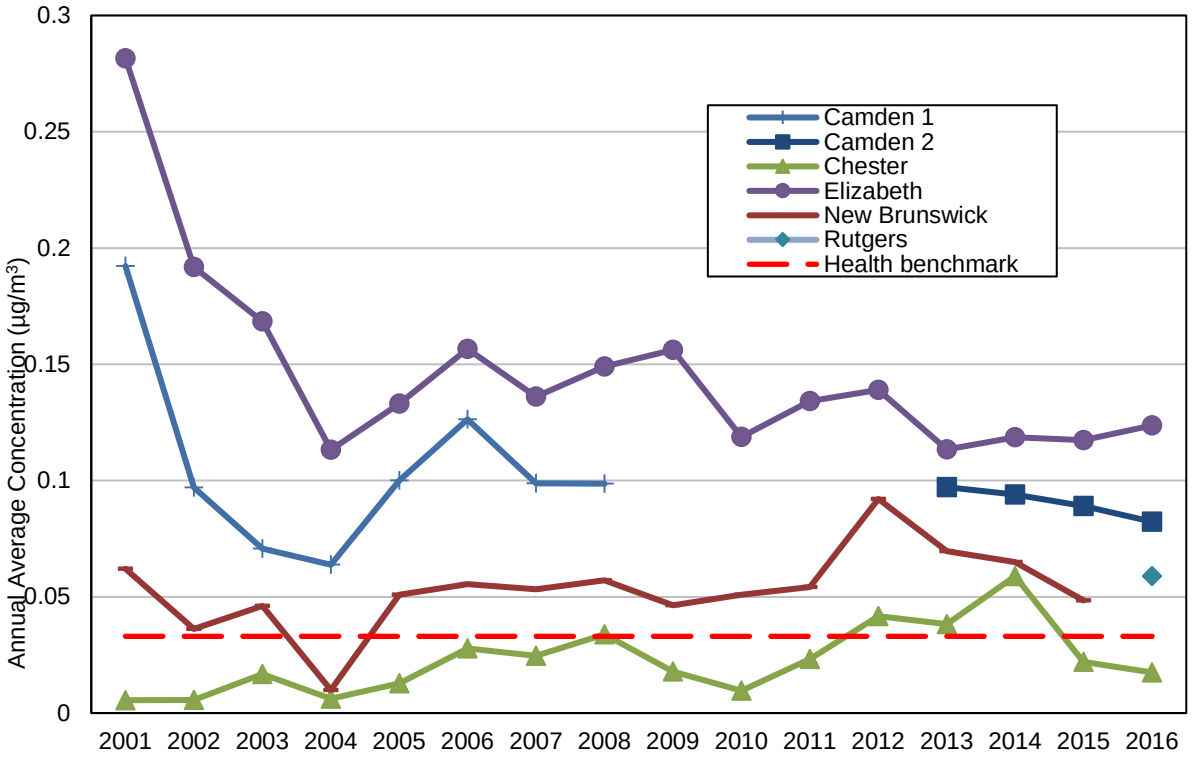


Figure 10-7

CARBON TETRACHLORIDE – New Jersey Monitored Concentrations

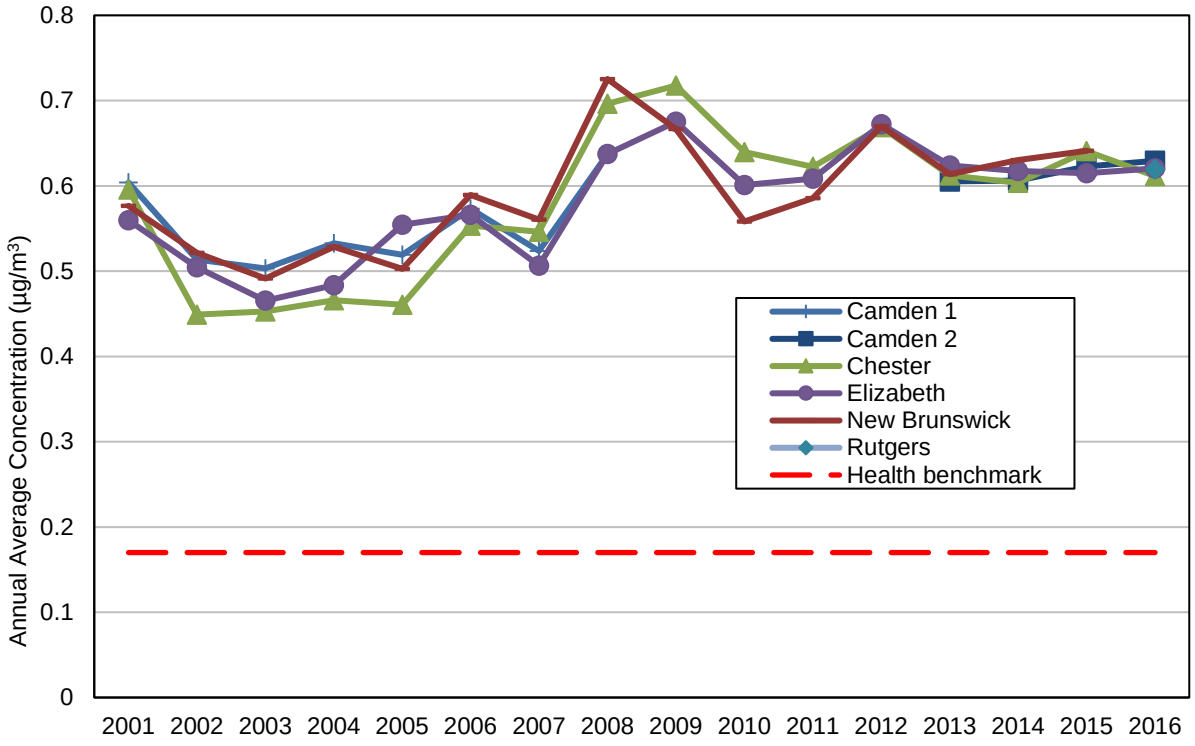



Figure 10-8

CHLOROFORM – New Jersey Monitored Concentrations

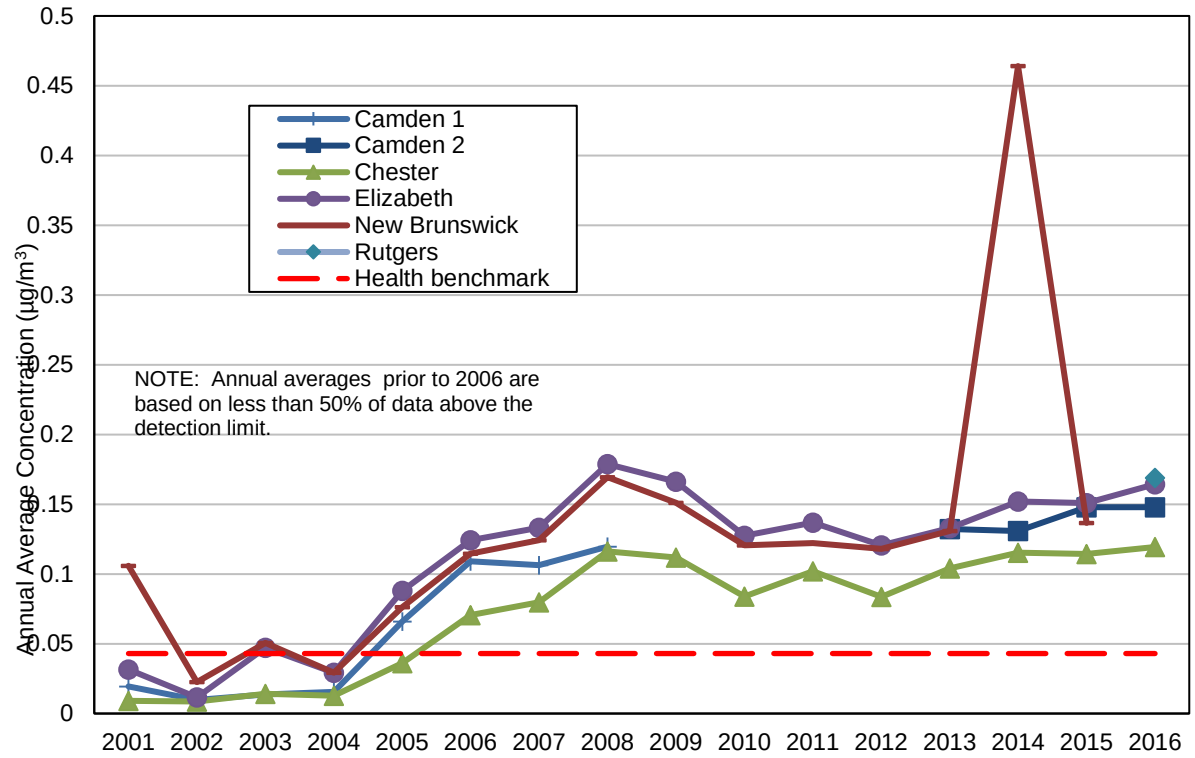


Figure 10-9

CHLOROMETHANE (Methyl Chloride) – New Jersey Monitored Concentrations

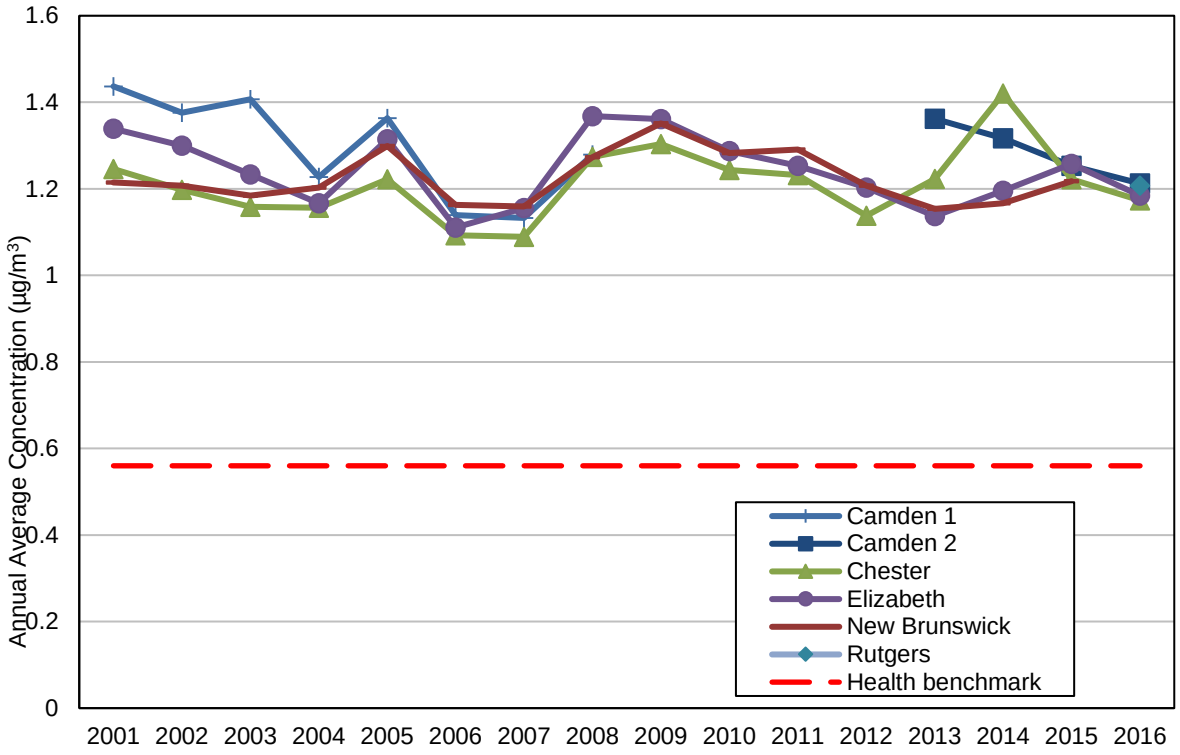



Figure 10-10

1,2-DIBROMOETHANE (Ethylene Dibromide) – New Jersey Monitored Concentrations

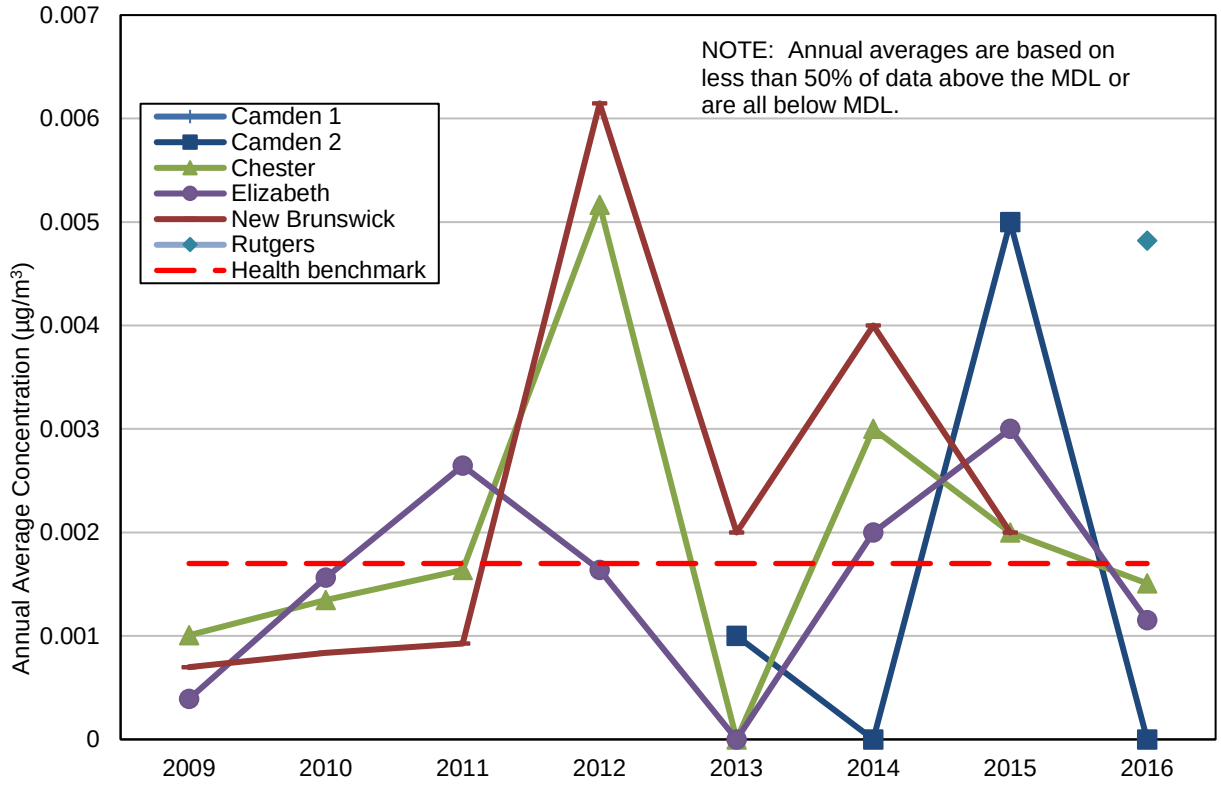


Figure 10-11

1,2-DICHLOROETHANE (Ethylene Dichloride) – New Jersey Monitored Concentrations

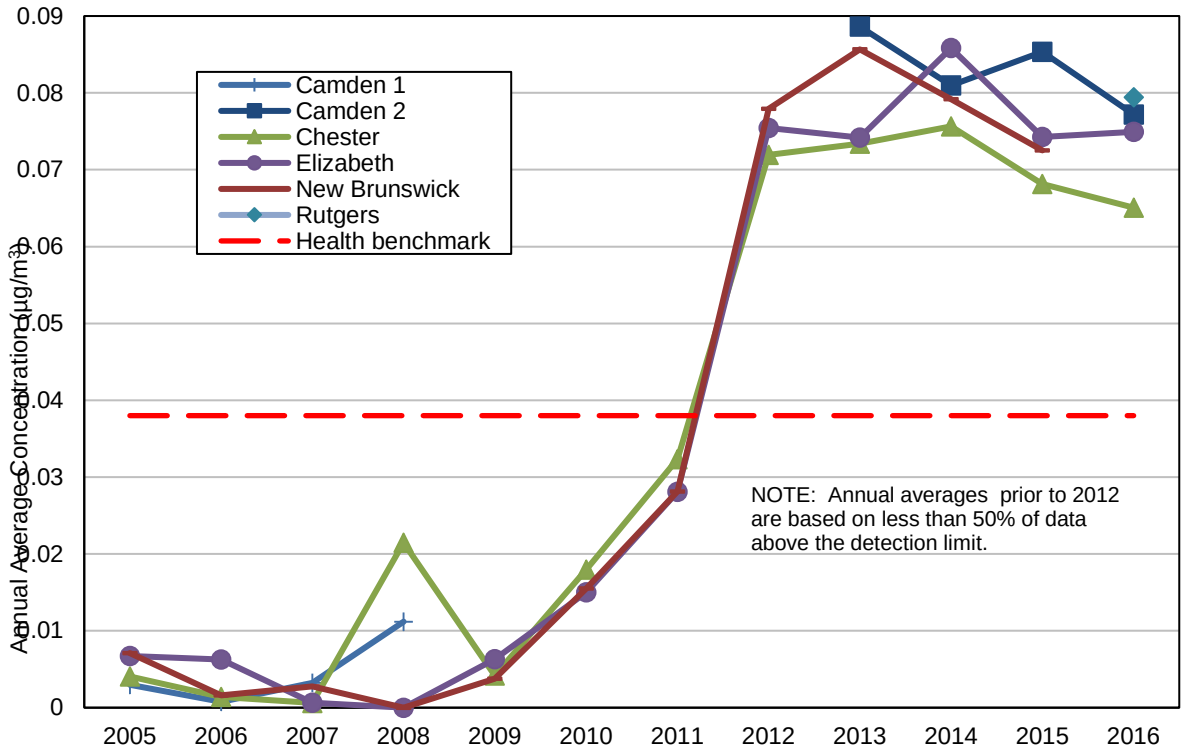



Figure 10-12

ETHYLBENZENE – New Jersey Monitored Concentrations

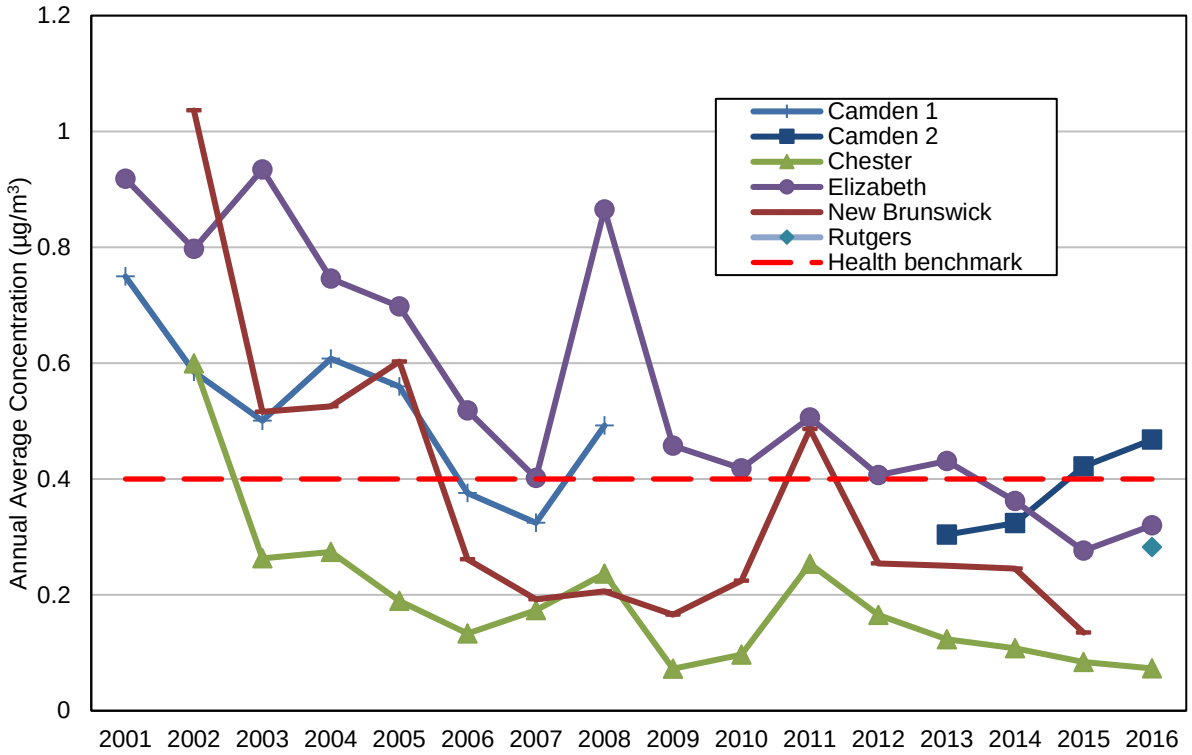


Figure 10-13

FORMALDEHYDE – New Jersey Monitored Concentrations

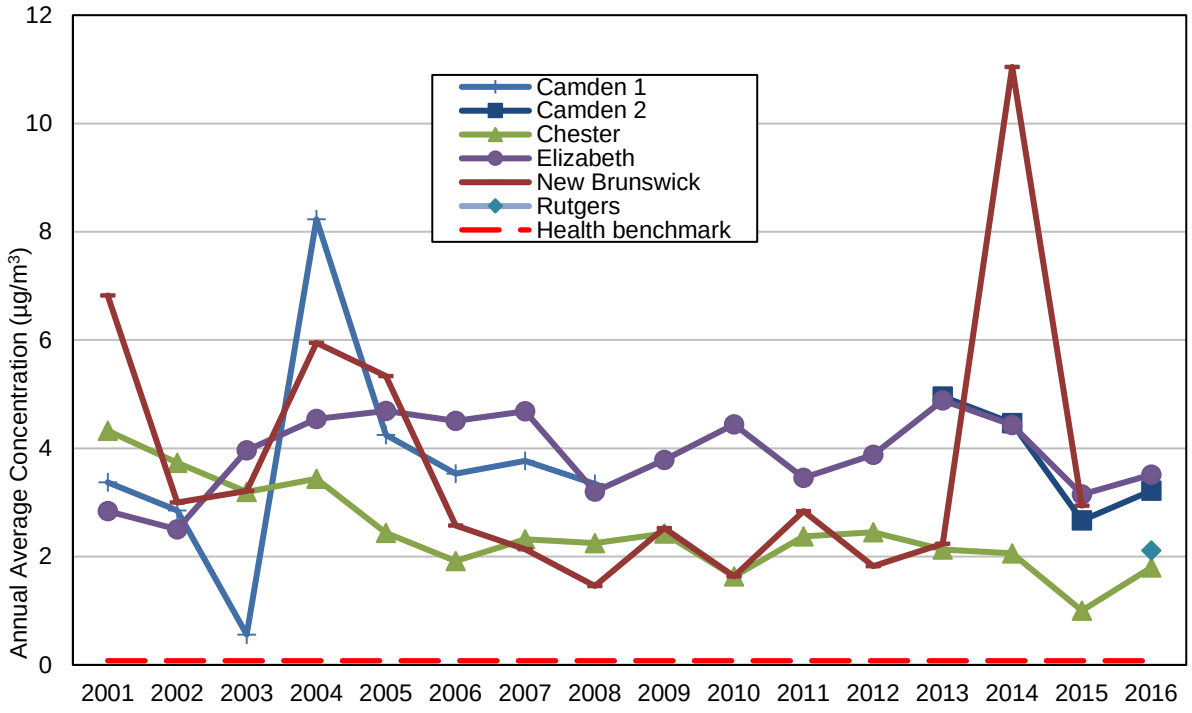



Figure 10-14

STYRENE – New Jersey Monitored Concentrations

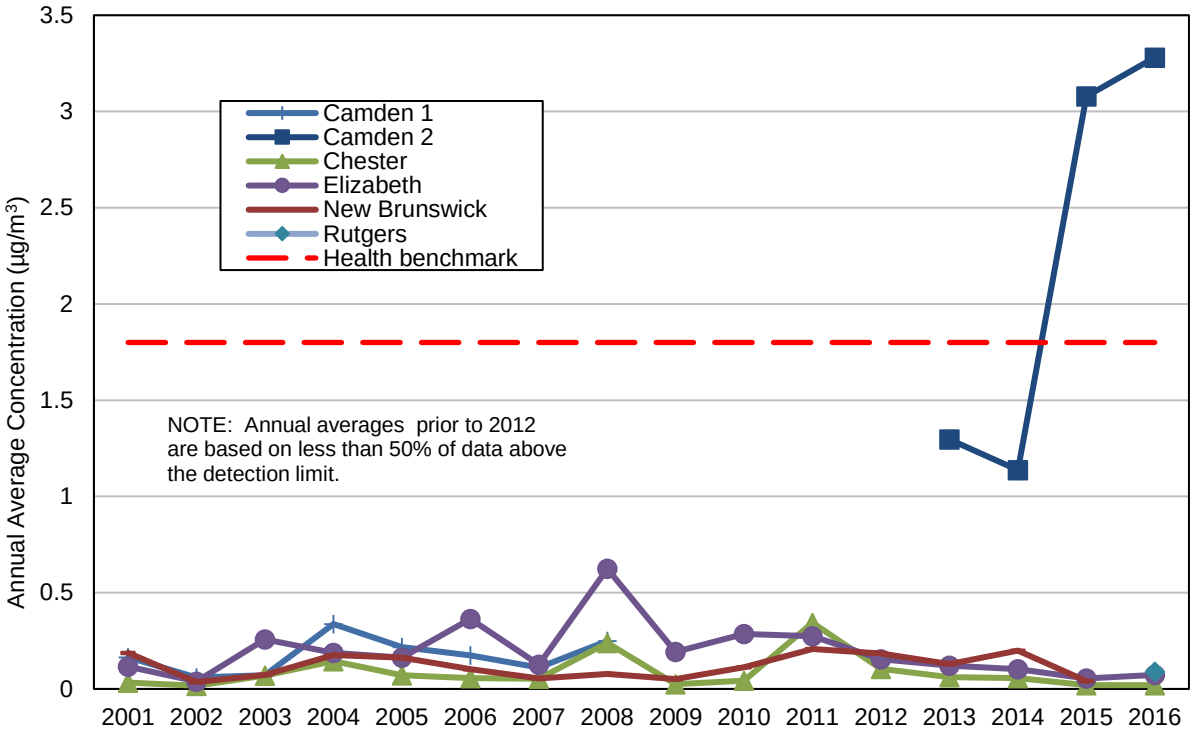


Table 10-4

CAMDEN SPRUCE STREET - 2016 NJ Toxic VOCs Monitoring Data[a]

| Analyte[b] | CAS No. | Annual Mean (ppbv)[c,d] | Annual Median (ppbv)[c,d] | 24-Hour Maximum (ppbv) | Annual Mean (µg/m³)[c,d] | Annual Median (µg/m³)[c,d] | 24-Hour Maximum (µg/m³) | Health Bench-mark (µg/m³)[e] | Annual Mean Risk Ratio[f] | Detection Limit (µg/m³) | % Above Minimum Detection Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Acetaldehyde** | 75-07-0 | 1.369 | 1.20 | 4.53 | 2.47 | 2.16 | 8.16 | 0.45 | **5** | 0.005 | 100 |
| Acetone | 67-64-1 | 1.181 | 1.02 | 6.13 | 2.81 | 2.42 | 14.6 | 31000 | 0.0001 | 0.014 | 77 |
| Acetonitrile | 75-05-8 | 0.882 | 0.271 | 9.77 | 1.48 | 0.455 | 16.4 | 60 | 0.02 | 0.020 | 100 |
| Acetylene | 74-86-2 | 0.882 | 0.629 | 5.11 | 0.939 | 0.670 | 5.44 | | | 0.033 | 100 |
| Acrolein | 107-02-8 | 0.372 | 0.316 | 0.94 | 0.853 | 0.725 | 2.16 | 0.02 | | 0.046 | 100 |
| Acrylonitrile | 107-13-1 | ND | ND | ND | ND | ND | ND | 0.015 | | 0.065 | 0 |
| tert-Amyl Methyl Ether | 994-05-8 | *0.0003* | 0 | 0.011 | *0.001* | 0 | 0.046 | | | 0.033 | 4 |
| Benzaldehyde | 100-52-7 | 0.213 | 0.204 | 0.816 | 0.926 | 0.883 | 3.54 | | | 0.074 | 100 |
| **Benzene** | 71-43-2 | 0.232 | 0.189 | 0.705 | 0.742 | 0.604 | 2.25 | 0.13 | **6** | 0.010 | 100 |
| Bromochloromethane | 74-97-5 | *0.002* | 0 | 0.032 | *0.011* | 0 | 0.169 | 40 | 0.0003 | 0.206 | 11 |
| Bromodichloromethane | 75-27-4 | *0.002* | 0 | 0.015 | *0.013* | 0 | 0.101 | 0.027 | 0.5 | 0.101 | 20 |
| Bromoform | 75-25-2 | *0.001* | 0 | 0.011 | *0.011* | 0 | 0.114 | 0.91 | 0.01 | 0.186 | 13 |
| Bromomethane | 74-83-9 | 0.105 | 0.022 | 1.28 | 0.407 | 0.085 | 4.97 | 5 | 0.1 | 0.066 | 100 |
| **1,3-Butadiene** | 106-99-0 | 0.037 | 0.031 | 0.168 | 0.082 | 0.069 | 0.372 | 0.033 | **2** | 0.031 | 96 |
| Butyraldehyde | 123-72-8 | 0.147 | 0.135 | 0.473 | 0.434 | 0.398 | 1.39 | | | 0.027 | 100 |
| Carbon Disulfide | 75-15-0 | 0.018 | 0.016 | 0.046 | 0.057 | 0.050 | 0.143 | 700 | 0.0001 | 0.009 | 100 |
| **Carbon Tetrachloride** | 56-23-5 | 0.100 | 0.103 | 0.132 | 0.629 | 0.648 | 0.830 | 0.17 | **4** | 0.075 | 100 |
| Chlorobenzene | 108-90-7 | *0.001* | 0 | 0.013 | *0.006* | 0 | 0.060 | 1000 | 0.00001 | 0.046 | 16 |
| Chloroethane | 75-00-3 | 0.018 | 0.015 | 0.096 | 0.047 | 0.040 | 0.253 | 10000 | 0.000005 | 0.047 | 69 |
| **Chloroform** | 67-66-3 | 0.030 | 0.029 | 0.053 | 0.148 | 0.142 | 0.259 | 0.043 | **3** | 0.044 | 100 |
| **Chloromethane** | 74-87-3 | 0.587 | 0.598 | 0.76 | 1.21 | 1.23 | 1.57 | 0.56 | **2** | 0.033 | 100 |
| Chloroprene | 126-99-8 | ND | ND | ND | ND | ND | ND | 0.002 | | 0.040 | 0 |
| Crotonaldehyde | 123-73-9 | 0.087 | 0.042 | 0.379 | 0.249 | 0.119 | 1.09 | | | 0.049 | 98 |
| Dibromochloromethane | 124-48-1 | *0.003* | 0 | 0.011 | *0.026* | 0.000 | 0.094 | 0.037 | 0.7 | 0.051 | 45 |
| 1,2-Dibromoethane | 106-93-4 | ND | ND | ND | ND | ND | ND | 0.0017 | | 0.138 | 0 |
| m-Dichlorobenzene | 541-73-1 | *0.000* | 0 | 0.007 | *0.002* | 0 | 0.042 | | | 0.168 | 7 |
| o-Dichlorobenzene | 95-50-1 | *0.001* | 0 | 0.008 | *0.003* | 0 | 0.048 | 200 | 0.00002 | 0.144 | 7 |
| p-Dichlorobenzene | 106-46-7 | 0.010 | 0.008 | 0.078 | 0.059 | 0.048 | 0.469 | 0.091 | 0.7 | 0.156 | 53 |
| Dichlorodifluoromethane | 75-71-8 | 0.551 | 0.543 | 0.758 | 2.72 | 2.69 | 3.75 | 100 | 0.03 | 0.064 | 100 |
| 1,1-Dichloroethane | 75-34-3 | *0.000* | 0 | 0.013 | *0.001* | 0.000 | 0.053 | 0.63 | 0.002 | 0.061 | 2 |
| **1,2-Dichloroethane** | 107-06-2 | 0.019 | 0.02 | 0.038 | 0.077 | 0.081 | 0.154 | 0.038 | **2** | 0.053 | 89 |
| 1,1-Dichloroethene | 75-35-4 | *0.002* | 0 | 0.008 | *0.007* | 0 | 0.032 | 200 | 0.00003 | 0.032 | 25 |
| cis-1,2-Dichloroethylene | 156-59-2 | ND | ND | ND | ND | ND | ND | | | 0.048 | 0 |
| trans-1,2-Dichloroethylene | 156-60-5 | *0.001* | 0 | 0.017 | *0.005* | 0 | 0.067 | | | 0.048 | 15 |
| Dichloromethane | 75-09-2 | 0.128 | 0.114 | 0.454 | 0.444 | 0.396 | 1.58 | 77 | 0.01 | 0.028 | 100 |

[a] See page 31 for footnotes.

Table 10-4 (continued)

CAMDEN SPRUCE STREET - 2016 NJ Toxic VOCs Monitoring Data[a]

| Analyte[b] | CAS No. | Annual Mean (ppbv)[c,d] | Annual Median (ppbv)[c,d] | 24-Hour Maximum (ppbv) | Annual Mean (µg/m³)[c,d] | Annual Median (µg/m³)[c,d] | 24-Hour Maximum (µg/m³) | Health Bench-mark (µg/m³)[e] | Annual Mean Risk Ratio[f] | Detection Limit (µg/m³) | % Above Minimum Detection Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dichloropropane | 78-87-5 | *0.001* | 0 | 0.015 | *0.005* | 0 | 0.069 | 0.1 | 0.1 | 0.079 | 9 |
| cis-1,3-Dichloropropene | 542-75-6 | ND | ND | ND | ND | ND | ND | 0.25 | | 0.064 | 0 |
| trans-1,3-Dichloropropene | 542-75-6 | ND | ND | ND | ND | ND | ND | | | 0.095 | 0 |
| Dichlorotetrafluoroethane | 76-14-2 | 0.019 | 0.02 | 0.033 | 0.130 | 0.140 | 0.231 | | | 0.133 | 100 |
| 2,5-Dimethylbenzaldehyde | 5799-94-2 | *0.053* | 0 | 0.403 | *0.292* | 0 | 2.21 | | | 0.011 | 25 |
| Ethyl Acrylate | 140-88-5 | *0.000* | 0 | 0.005 | *0.0004* | 0 | 0.020 | 8 | 0.00005 | 0.033 | 2 |
| Ethyl tert-Butyl Ether | 637-92-3 | 0.012 | 0.010 | 0.084 | 0.049 | 0.042 | 0.351 | | | 0.046 | 82 |
| **Ethylbenzene** | 100-41-4 | 0.108 | 0.080 | 0.383 | 0.468 | 0.347 | 1.66 | | **1.2** | 0.035 | 100 |
| **Formaldehyde** | 50-00-0 | 2.623 | 2.68 | 7.16 | 3.22 | 3.29 | 8.79 | 0.077 | **42** | 0.023 | 100 |
| Hexachloro-1,3-butadiene | 87-68-3 | *0.002* | 0 | 0.011 | *0.021* | 0 | 0.117 | 0.045 | 0.5 | 0.117 | 25 |
| Hexaldehyde | 66-25-1 | 0.059 | 0.057 | 0.306 | 0.241 | 0.231 | 1.25 | | | 0.139 | 82 |
| Isovaleraldehyde | 590-86-3 | *0.012* | 0 | 0.127 | *0.041* | 0 | 0.447 | | | 0.007 | 25 |
| Methyl Ethyl Ketone | 78-93-3 | 0.237 | 0.249 | 0.77 | 0.698 | 0.732 | 2.27 | 5000 | 0.0001 | 0.074 | 87 |
| Methyl Isobutyl Ketone | 108-10-1 | 0.059 | 0.046 | 0.212 | 0.242 | 0.188 | 0.868 | 3000 | 0.0001 | 0.057 | 98 |
| Methyl Methacrylate | 80-62-6 | *0.011* | 0 | 0.049 | *0.044* | 0 | 0.201 | 700 | 0.0001 | 0.115 | 45 |
| Methyl tert-Butyl Ether | 1634-04-4 | *0.004* | 0 | 0.034 | *0.013* | 0 | 0.123 | 3.8 | 0.003 | 0.050 | 29 |
| n-Octane | 111-65-9 | 0.055 | 0.044 | 0.18 | 0.259 | 0.206 | 0.841 | | | 0.079 | 100 |
| Propionaldehyde | 123-38-6 | 0.450 | 0.207 | 4.86 | 1.07 | 0.491 | 11.5 | 8 | 0.1 | 0.007 | 100 |
| Propylene | 115-07-1 | 0.595 | 0.367 | 3.25 | 1.02 | 0.632 | 5.59 | 3000 | 0.0003 | 0.055 | 100 |
| **Styrene** | 100-42-5 | 0.770 | 0.124 | 4.72 | 3.28 | 0.528 | 20.1 | 1.8 | **1.8** | 0.068 | 100 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | *0.001* | 0 | 0.011 | *0.007* | 0 | 0.076 | 0.017 | 0.4 | 0.124 | 13 |
| Tetrachloroethylene | 127-18-4 | 0.024 | 0.02 | 0.088 | 0.160 | 0.136 | 0.597 | 0.17 | 0.9 | 0.095 | 96 |
| Tolualdehydes | | 0.052 | 0.032 | 0.307 | 0.254 | 0.157 | 1.51 | | | 0.020 | 100 |
| Toluene | 108-88-3 | 1.562 | 0.693 | 10.6 | 5.89 | 2.61 | 39.9 | 5000 | 0.001 | 0.068 | 100 |
| 1,2,4-Trichlorobenzene | 102-82-1 | *0.001* | 0 | 0.019 | *0.004* | 0 | 0.141 | 2 | 0.002 | 0.371 | 4 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.006 | 0.006 | 0.02 | 0.035 | 0.033 | 0.109 | 1000 | 0.00004 | 0.071 | 78 |
| 1,1,2-Trichloroethane | 79-00-5 | *0.0002* | 0 | 0.009 | *0.001* | 0 | 0.049 | 0.063 | 0.01 | 0.093 | 2 |
| Trichloroethylene | 79-01-6 | *0.011* | 0 | 0.198 | *0.057* | 0 | 1.06 | 0.2 | 0.3 | 0.091 | 38 |
| Trichlorofluoromethane | 75-69-4 | 0.422 | 0.315 | 1.19 | 2.37 | 1.77 | 6.69 | 700 | 0.003 | 0.045 | 100 |
| Trichlorotrifluoroethane | 76-13-1 | 0.083 | 0.082 | 0.101 | 0.633 | 0.628 | 0.774 | 30000 | 0.00002 | 0.069 | 100 |
| 1,2,4-Trimethylbenzene | 95-63-6 | 0.138 | 0.09 | 0.608 | 0.678 | 0.442 | 2.99 | 7 | 0.1 | 0.103 | 100 |
| 1,3,5-Trimethylbenzene | 108-67-8 | 0.042 | 0.031 | 0.176 | 0.208 | 0.152 | 0.865 | | | 0.103 | 100 |
| Valeraldehyde | 110-62-3 | 0.045 | 0.047 | 0.154 | 0.159 | 0.164 | 0.543 | | | 0.007 | 77 |
| Vinyl chloride | 75-01-4 | 0.008 | 0.007 | 0.057 | 0.021 | 0.018 | 0.146 | 0.11 | 0.2 | 0.020 | 69 |
| m,p-Xylene | 1330-20-7 | 0.232 | 0.197 | 0.8 | 1.01 | 0.855 | 3.47 | 100 | 0.01 | 0.017 | 100 |
| o-Xylene | 95-47-6 | 0.110 | 0.092 | 0.322 | 0.479 | 0.399 | 1.40 | 100 | 0.005 | 0.069 | 100 |

[a] See page 31 for footnotes.

Table 10-5

CHESTER - 2016 NJ Toxic VOCs Monitoring Data[a]

| Analyte[b] | CAS No. | Annual Mean (ppbv)[c,d] | Annual Median (ppbv)[c,d] | 24-Hour Maximum (ppbv) | Annual Mean (µg/m³)[c,d] | Annual Median (µg/m³)[c,d] | 24-Hour Maximum (µg/m³) | Health Bench-mark (µg/m³)[e] | Annual Mean Risk Ratio[f] | Detection Limit (µg/m³) | % Above Minimum Detection Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Acetaldehyde** | 75-07-0 | 0.521 | 0.492 | 1.83 | 0.938 | 0.886 | 3.30 | 0.45 | **2** | 0.005 | 74 |
| Acetone | 67-64-1 | 0.672 | 0.696 | 2.38 | 1.60 | 1.65 | 5.65 | 31000 | 0.0001 | 0.014 | 74 |
| Acetonitrile | 75-05-8 | 2.96 | 0.156 | 153 | 4.98 | 0.262 | 257 | 60 | 0.1 | 0.020 | 100 |
| Acetylene | 74-86-2 | 0.397 | 0.356 | 1.00 | 0.422 | 0.379 | 1.06 | | | 0.033 | 100 |
| Acrolein | 107-02-8 | 0.321 | 0.245 | 0.842 | 0.737 | 0.562 | 1.93 | 0.02 | | 0.046 | 100 |
| Acrylonitrile | 107-13-1 | ND | ND | ND | ND | ND | ND | 0.015 | | 0.065 | 0 |
| tert-Amyl Methyl Ether | 994-05-8 | *0.0003* | 0 | 0.008 | *0.001* | 0 | 0.033 | | | 0.033 | 4 |
| Benzaldehyde | 100-52-7 | 0.016 | 0.014 | 0.060 | 0.069 | 0.061 | 0.260 | | | 0.074 | 72 |
| **Benzene** | 71-43-2 | 0.108 | 0.094 | 0.228 | 0.344 | 0.300 | 0.728 | 0.13 | **3** | 0.010 | 100 |
| Bromochloromethane | 74-97-5 | *0.002* | 0 | 0.033 | *0.012* | 0 | 0.175 | 40 | 0.0003 | 0.206 | 13 |
| Bromodichloromethane | 75-27-4 | *0.002* | 0 | 0.011 | *0.011* | 0 | 0.074 | 0.027 | 0.4 | 0.101 | 20 |
| Bromoform | 75-25-2 | *0.001* | 0 | 0.013 | *0.008* | 0 | 0.134 | 0.91 | 0.01 | 0.186 | 7 |
| Bromomethane | 74-83-9 | 0.018 | 0.018 | 0.025 | 0.070 | 0.070 | 0.097 | 5 | 0.01 | 0.066 | 100 |
| 1,3-Butadiene | 106-99-0 | 0.008 | 0.005 | 0.031 | 0.017 | 0.011 | 0.069 | 0.033 | 0.5 | 0.031 | 59 |
| Butyraldehyde | 123-72-8 | 0.041 | 0.043 | 0.109 | 0.122 | 0.127 | 0.321 | | | 0.027 | 82 |
| Carbon Disulfide | 75-15-0 | 0.015 | 0.014 | 0.031 | 0.046 | 0.044 | 0.097 | 700 | 0.0001 | 0.009 | 100 |
| **Carbon Tetrachloride** | 56-23-5 | 0.097 | 0.099 | 0.135 | 0.612 | 0.623 | 0.849 | 0.17 | **4** | 0.075 | 100 |
| Chlorobenzene | 108-90-7 | *0.002* | 0 | 0.017 | *0.009* | 0 | 0.078 | 1000 | 0.00001 | 0.046 | 21 |
| Chloroethane | 75-00-3 | *0.009* | 0 | 0.051 | *0.024* | 0.000 | 0.135 | 10000 | 0.000002 | 0.047 | 43 |
| **Chloroform** | 67-66-3 | 0.024 | 0.024 | 0.040 | 0.119 | 0.117 | 0.195 | 0.043 | **3** | 0.044 | 100 |
| **Chloromethane** | 74-87-3 | 0.568 | 0.575 | 0.800 | 1.17 | 1.19 | 1.65 | 0.56 | **2** | 0.033 | 100 |
| Chloroprene | 126-99-8 | ND | ND | ND | ND | ND | ND | 0.002 | | 0.040 | 0 |
| Crotonaldehyde | 123-73-9 | 0.100 | 0.021 | 0.767 | 0.286 | 0.060 | 2.20 | | | 0.049 | 72 |
| Dibromochloromethane | 124-48-1 | *0.003* | 0 | 0.011 | *0.024* | 0 | 0.094 | 0.037 | 0.6 | 0.051 | 45 |
| 1,2-Dibromoethane | 106-93-4 | *0.0002* | 0 | 0.011 | *0.002* | 0 | 0.085 | 0.0017 | 0.9 | 0.138 | 2 |
| m-Dichlorobenzene | 541-73-1 | *0.0004* | 0 | 0.009 | *0.002* | 0 | 0.054 | | | 0.168 | 5 |
| o-Dichlorobenzene | 95-50-1 | *0.0005* | 0 | 0.012 | *0.003* | 0 | 0.072 | 200 | 0.00001 | 0.144 | 5 |
| p-Dichlorobenzene | 106-46-7 | *0.002* | 0 | 0.012 | *0.009* | 0 | 0.072 | 0.091 | 0.1 | 0.156 | 16 |
| Dichlorodifluoromethane | 75-71-8 | 0.521 | 0.517 | 0.652 | 2.58 | 2.56 | 3.22 | 100 | 0.03 | 0.064 | 100 |
| 1,1-Dichloroethane | 75-34-3 | *0.0005* | 0 | 0.013 | *0.002* | 0 | 0.053 | 0.63 | 0.003 | 0.061 | 5 |
| **1,2-Dichloroethane** | 107-06-2 | 0.016 | 0.018 | 0.027 | 0.065 | 0.073 | 0.109 | 0.038 | **1.7** | 0.053 | 86 |
| 1,1-Dichloroethene | 75-35-4 | *0.001* | 0 | 0.010 | *0.004* | 0 | 0.040 | 200 | 0.00002 | 0.032 | 14 |
| cis-1,2-Dichloroethylene | 156-59-2 | ND | ND | ND | ND | ND | ND | | | 0.048 | 0 |
| trans-1,2-Dichloroethylene | 156-60-5 | *0.0003* | 0 | 0.007 | *0.001* | 0 | 0.028 | | | 0.048 | 4 |
| Dichloromethane | 75-09-2 | 0.095 | 0.092 | 0.164 | 0.328 | 0.320 | 0.570 | 77 | 0.004 | 0.028 | 100 |

[a] See page 31 for footnotes.

Table 10-5 (continued)

CHESTER - 2016 NJ Toxic VOCs Monitoring Data[a]

| Analyte[b] | CAS No. | Annual Mean (ppbv)[c,d] | Annual Median (ppbv)[c,d] | 24-Hour Maximum (ppbv) | Annual Mean (µg/m³)[c,d] | Annual Median (µg/m³)[c,d] | 24-Hour Maximum (µg/m³) | Health Bench-mark (µg/m³)[e] | Annual Mean Risk Ratio[f] | Detection Limit (µg/m³) | % Above Minimum Detection Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dichloropropane | 78-87-5 | *0.001* | 0 | 0.016 | *0.004* | 0 | 0.074 | 0.1 | 0.04 | 0.079 | 7 |
| cis-1,3-Dichloropropene | 542-75-6 | 0 | 0 | 0 | 0 | 0 | 0 | 0.25 | | 0.064 | 0 |
| trans-1,3-Dichloropropene | 542-75-6 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0.095 | 0 |
| Dichlorotetrafluoroethane | 76-14-2 | 0.019 | 0.019 | 0.034 | 0.130 | 0.133 | 0.238 | | | 0.133 | 100 |
| 2,5-Dimethylbenzaldehyde | 5799-94-2 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0.011 | 0 |
| Ethyl Acrylate | 140-88-5 | *0.0001* | 0 | 0.007 | *0.0005* | 0 | 0.029 | 8 | 0.0001 | 0.033 | 2 |
| Ethyl tert-Butyl Ether | 637-92-3 | *0.001* | 0 | 0.010 | *0.003* | 0 | 0.042 | | | 0.046 | 9 |
| Ethylbenzene | 100-41-4 | 0.017 | 0.017 | 0.040 | 0.073 | 0.072 | 0.174 | 0.4 | 0.2 | 0.035 | 95 |
| **Formaldehyde** | 50-00-0 | 1.47 | 1.2 | 5.91 | 1.80 | 1.47 | 7.26 | 0.077 | **23** | 0.023 | 100 |
| Hexachloro-1,3-butadiene | 87-68-3 | *0.002* | 0 | 0.012 | *0.018* | 0 | 0.128 | 0.045 | 0.4 | 0.117 | 18 |
| Hexaldehyde | 66-25-1 | 0.012 | 0.011 | 0.060 | 0.051 | 0.045 | 0.246 | | | 0.139 | 79 |
| Isovaleraldehyde | 590-86-3 | *0.001* | 0 | 0.008 | *0.003* | 0 | 0.028 | | | 0.007 | 12 |
| Methyl Ethyl Ketone | 78-93-3 | 0.090 | 0.096 | 0.271 | 0.266 | 0.283 | 0.799 | 5000 | 0.0001 | 0.074 | 91 |
| Methyl Isobutyl Ketone | 108-10-1 | 0.023 | 0.021 | 0.080 | 0.095 | 0.084 | 0.328 | 3000 | 0.00003 | 0.057 | 89 |
| Methyl Methacrylate | 80-62-6 | *0.001* | 0 | 0.014 | *0.005* | 0 | 0.057 | 700 | 0.00001 | 0.115 | 13 |
| Methyl tert-Butyl Ether | 1634-04-4 | *0.001* | 0 | 0.012 | *0.002* | 0 | 0.043 | 3.8 | 0.001 | 0.050 | 7 |
| n-Octane | 111-65-9 | 0.018 | 0.017 | 0.066 | 0.086 | 0.079 | 0.308 | | | 0.079 | 95 |
| Propionaldehyde | 123-38-6 | 0.095 | 0.086 | 0.233 | 0.225 | 0.204 | 0.553 | 8 | 0.03 | 0.007 | 100 |
| Propylene | 115-07-1 | 0.158 | 0.1415 | 0.434 | 0.271 | 0.244 | 0.747 | 3000 | 0.0001 | 0.055 | 100 |
| Styrene | 100-42-5 | *0.005* | 0 | 0.039 | *0.020* | 0 | 0.166 | 1.8 | 0.01 | 0.068 | 27 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | *0.001* | 0 | 0.013 | *0.007* | 0 | 0.089 | 0.017 | 0.4 | 0.124 | 11 |
| Tetrachloroethylene | 127-18-4 | 0.009 | 0.010 | 0.024 | 0.062 | 0.068 | 0.163 | 0.17 | 0.4 | 0.095 | 75 |
| Tolualdehydes | | 0.013 | 0.010 | 0.059 | 0.065 | 0.049 | 0.290 | | | 0.020 | 68 |
| Toluene | 108-88-3 | 0.105 | 0.100 | 0.309 | 0.396 | 0.375 | 1.16 | 5000 | 0.0001 | 0.068 | 100 |
| 1,2,4-Trichlorobenzene | 102-82-1 | *0.0001* | 0 | 0.008 | *0.001* | 0 | 0.059 | 2 | 0.001 | 0.371 | 2 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.004 | 0.005 | 0.014 | 0.024 | 0.027 | 0.076 | 1000 | 0.00002 | 0.071 | 57 |
| 1,1,2-Trichloroethane | 79-00-5 | ND | ND | ND | ND | ND | ND | 0.063 | | 0.093 | 0 |
| Trichloroethylene | 79-01-6 | *0.0005* | 0 | 0.010 | *0.003* | 0 | 0.054 | 0.2 | 0.01 | 0.091 | 5 |
| Trichlorofluoromethane | 75-69-4 | 0.242 | 0.244 | 0.315 | 1.36 | 1.37 | 1.77 | 700 | 0.002 | 0.045 | 100 |
| Trichlorotrifluoroethane | 76-13-1 | 0.081 | 0.082 | 0.104 | 0.619 | 0.628 | 0.797 | 30000 | 0.00002 | 0.069 | 100 |
| 1,2,4-Trimethylbenzene | 95-63-6 | 0.011 | 0.012 | 0.033 | 0.053 | 0.059 | 0.162 | 7 | 0.01 | 0.103 | 73 |
| 1,3,5-Trimethylbenzene | 108-67-8 | *0.005* | 0 | 0.026 | *0.024* | 0 | 0.128 | | | 0.103 | 48 |
| Valeraldehyde | 110-62-3 | 0.013 | 0.012 | 0.045 | 0.046 | 0.042 | 0.159 | | | 0.007 | 79 |
| Vinyl chloride | 75-01-4 | *0.002* | 0 | 0.012 | *0.006* | 0 | 0.031 | 0.11 | 0.1 | 0.020 | 34 |
| m,p-Xylene | 1330-20-7 | 0.034 | 0.036 | 0.074 | 0.147 | 0.156 | 0.321 | 100 | 0.001 | 0.017 | 96 |
| o-Xylene | 95-47-6 | 0.016 | 0.017 | 0.040 | 0.068 | 0.072 | 0.174 | 100 | 0.001 | 0.069 | 89 |

[a] See page 31 for footnotes.

Table 10-6

ELIZABETH LAB - 2016 NJ Toxic VOCs Monitoring Data[a]

| Analyte[b] | CAS No. | Annual Mean (ppbv)[c,d] | Annual Median (ppbv)[c,d] | 24-Hour Maximum (ppbv) | Annual Mean (µg/m³)[c,d] | Annual Median (µg/m³)[c,d] | 24-Hour Maximum (µg/m³) | Health Bench-mark (µg/m³)[e] | Annual Mean Risk Ratio[f] | Detection Limit (µg/m³) | % Above Minimum Detection Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Acetaldehyde** | 75-07-0 | 1.12 | 1.23 | 2.75 | 2.02 | 2.22 | 4.95 | 0.45 | **4** | 0.005 | 75 |
| Acetone | 67-64-1 | 1.03 | 0.838 | 4.17 | 2.45 | 1.99 | 9.91 | 31000 | 0.0001 | 0.014 | 100 |
| Acetonitrile | 75-05-8 | 0.220 | 0.193 | 0.909 | 0.369 | 0.323 | 1.53 | 60 | 0.01 | 0.020 | 100 |
| Acetylene | 74-86-2 | 1.03 | 0.767 | 4.21 | 1.10 | 0.816 | 4.48 | | | 0.033 | 100 |
| Acrolein | 107-02-8 | 0.367 | 0.335 | 0.981 | 0.841 | 0.767 | 2.25 | 0.02 | | 0.046 | 100 |
| Acrylonitrile | 107-13-1 | ND | ND | ND | ND | ND | ND | 0.015 | | 0.065 | 0 |
| tert-Amyl Methyl Ether | 994-05-8 | *0.0001* | 0 | 0.008 | *0.0006* | 0 | 0.033 | | | 0.033 | 2 |
| Benzaldehyde | 100-52-7 | 0.051 | 0.036 | 0.55 | 0.220 | 0.156 | 2.39 | | | 0.074 | 100 |
| **Benzene** | 71-43-2 | 0.259 | 0.236 | 0.643 | 0.828 | 0.752 | 2.05 | 0.13 | **6** | 0.010 | 100 |
| Bromochloromethane | 74-97-5 | *0.002* | 0 | 0.027 | *0.008* | 0 | 0.143 | 40 | 0.0002 | 0.206 | 10 |
| Bromodichloromethane | 75-27-4 | *0.0002* | 0 | 0.012 | *0.001* | 0 | 0.080 | 0.027 | 0.05 | 0.101 | 2 |
| Bromoform | 75-25-2 | *0.0005* | 0 | 0.013 | *0.006* | 0 | 0.134 | 0.91 | 0.01 | 0.186 | 5 |
| Bromomethane | 74-83-9 | 0.019 | 0.018 | 0.108 | 0.074 | 0.070 | 0.419 | 5 | 0.01 | 0.066 | 100 |
| **1,3-Butadiene** | 106-99-0 | 0.056 | 0.052 | 0.198 | 0.124 | 0.115 | 0.438 | 0.033 | **4** | 0.031 | 100 |
| Butyraldehyde | 123-72-8 | 0.141 | 0.125 | 0.364 | 0.416 | 0.369 | 1.07 | | | 0.027 | 100 |
| Carbon Disulfide | 75-15-0 | 0.017 | 0.016 | 0.052 | 0.054 | 0.048 | 0.162 | 700 | 0.0001 | 0.009 | 100 |
| **Carbon Tetrachloride** | 56-23-5 | 0.099 | 0.102 | 0.138 | 0.620 | 0.639 | 0.868 | 0.17 | **4** | 0.075 | 100 |
| Chlorobenzene | 108-90-7 | *0.001* | 0 | 0.012 | *0.005* | 0 | 0.055 | 1000 | 0.000005 | 0.046 | 12 |
| Chloroethane | 75-00-3 | 0.013 | 0.008 | 0.075 | 0.034 | 0.020 | 0.198 | 10000 | 0.000003 | 0.047 | 55 |
| **Chloroform** | 67-66-3 | 0.034 | 0.031 | 0.076 | 0.164 | 0.149 | 0.371 | 0.043 | **4** | 0.044 | 100 |
| **Chloromethane** | 74-87-3 | 0.574 | 0.590 | 0.801 | 1.18 | 1.22 | 1.65 | 0.56 | **2** | 0.033 | 100 |
| Chloroprene | 126-99-8 | ND | ND | ND | ND | ND | ND | 0.002 | | 0.040 | 0 |
| Crotonaldehyde | 123-73-9 | 0.132 | 0.068 | 0.815 | 0.378 | 0.194 | 2.34 | | | 0.049 | 100 |
| Dibromochloromethane | 124-48-1 | *0.002* | 0 | 0.01 | *0.017* | 0 | 0.085 | 0.037 | 0.5 | 0.051 | 35 |
| 1,2-Dibromoethane | 106-93-4 | *0.0002* | 0 | 0.009 | *0.001* | 0 | 0.069 | 0.0017 | 0.7 | 0.138 | 2 |
| m-Dichlorobenzene | 541-73-1 | *0.0002* | 0 | 0.008 | *0.001* | 0 | 0.048 | | | 0.168 | 3 |
| o-Dichlorobenzene | 95-50-1 | *0.0002* | 0 | 0.008 | *0.001* | 0 | 0.048 | 200 | 0.00001 | 0.144 | 3 |
| p-Dichlorobenzene | 106-46-7 | 0.007 | 0.006 | 0.034 | 0.044 | 0.036 | 0.204 | 0.091 | 0.5 | 0.156 | 52 |
| Dichlorodifluoromethane | 75-71-8 | 0.546 | 0.530 | 1.36 | 2.70 | 2.62 | 6.73 | 100 | 0.03 | 0.064 | 100 |
| 1,1-Dichloroethane | 75-34-3 | *0.0003* | 0 | 0.01 | *0.001* | 0 | 0.040 | 0.63 | 0.002 | 0.061 | 3 |
| **1,2-Dichloroethane** | 107-06-2 | 0.019 | 0.020 | 0.028 | 0.075 | 0.081 | 0.113 | 0.038 | **2** | 0.053 | 92 |
| 1,1-Dichloroethene | 75-35-4 | *0.0006* | 0 | 0.007 | *0.002* | 0 | 0.028 | 200 | 0.00001 | 0.032 | 10 |
| cis-1,2-Dichloroethylene | 156-59-2 | ND | ND | ND | ND | ND | ND | | | 0.048 | 0 |
| trans-1,2-Dichloroethylene | 156-60-5 | *0.001* | 0 | 0.02 | *0.004* | 0 | 0.079 | | | 0.048 | 10 |
| Dichloromethane | 75-09-2 | 0.152 | 0.131 | 0.666 | 0.530 | 0.455 | 2.31 | 77 | 0.01 | 0.028 | 100 |

[a] See page 31 for footnotes.

Table 10-6 (continued)

ELIZABETH LAB - 2016 NJ Toxic VOCs Monitoring Data[a]

| Analyte[b] | CAS No. | Annual Mean (ppbv)[c,d] | Annual Median (ppbv)[c,d] | 24-Hour Maximum (ppbv) | Annual Mean (µg/m³)[c,d] | Annual Median (µg/m³)[c,d] | 24-Hour Maximum (µg/m³) | Health Bench-mark (µg/m³)[e] | Annual Mean Risk Ratio[f] | Detection Limit (µg/m³) | % Above Minimum Detection Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dichloropropane | 78-87-5 | *0.001* | 0 | 0.015 | *0.004* | 0 | 0.069 | 0.1 | 0.04 | 0.079 | 7 |
| cis-1,3-Dichloropropene | 542-75-6 | ND | ND | ND | ND | ND | ND | 0.25 | | 0.064 | 0 |
| trans-1,3-Dichloropropene | 542-75-6 | ND | ND | ND | ND | ND | ND | | | 0.095 | 0 |
| Dichlorotetrafluoroethane | 76-14-2 | 0.017 | 0.018 | 0.03 | 0.122 | 0.126 | 0.210 | | | 0.133 | 100 |
| 2,5-Dimethylbenzaldehyde | 5799-94-2 | *0.001* | 0 | 0.013 | *0.004* | 0 | 0.071 | | | 0.011 | 8 |
| Ethyl Acrylate | 140-88-5 | ND | ND | ND | ND | ND | ND | 8 | | 0.033 | 0 |
| Ethyl tert-Butyl Ether | 637-92-3 | *0.002* | 0 | 0.065 | *0.006* | 0 | 0.272 | | | 0.046 | 7 |
| Ethylbenzene | 100-41-4 | 0.074 | 0.066 | 0.228 | 0.320 | 0.284 | 0.990 | 0.4 | 0.8 | 0.035 | 100 |
| **Formaldehyde** | 50-00-0 | 2.86 | 3.15 | 6.84 | 3.52 | 3.87 | 8.40 | 0.077 | **46** | 0.023 | 75 |
| Hexachloro-1,3-butadiene | 87-68-3 | *0.001* | 0 | 0.01 | *0.007* | 0 | 0.107 | 0.045 | 0.2 | 0.117 | 8 |
| Hexaldehyde | 66-25-1 | 0.129 | 0.053 | 0.855 | 0.527 | 0.217 | 3.50 | | | 0.139 | 100 |
| Isovaleraldehyde | 590-86-3 | *0.060* | 0 | 0.565 | *0.211* | 0 | 1.99 | | | 0.007 | 25 |
| Methyl Ethyl Ketone | 78-93-3 | 0.195 | 0.167 | 0.636 | 0.575 | 0.492 | 1.87 | 5000 | 0.0001 | 0.074 | 100 |
| Methyl Isobutyl Ketone | 108-10-1 | 0.040 | 0.037 | 0.108 | 0.163 | 0.152 | 0.442 | 3000 | 0.0001 | 0.057 | 93 |
| Methyl Methacrylate | 80-62-6 | *0.005* | 0 | 0.04 | *0.020* | 0 | 0.164 | 700 | 0.00003 | 0.115 | 25 |
| Methyl tert-Butyl Ether | 1634-04-4 | *0.002* | 0 | 0.022 | *0.006* | 0 | 0.079 | 3.8 | 0.002 | 0.050 | 15 |
| n-Octane | 111-65-9 | 0.068 | 0.055 | 0.219 | 0.318 | 0.255 | 1.02 | | | 0.079 | 100 |
| Propionaldehyde | 123-38-6 | 0.166 | 0.171 | 0.405 | 0.394 | 0.406 | 0.962 | 8 | 0.05 | 0.007 | 82 |
| Propylene | 115-07-1 | 2.17 | 0.858 | 14.5 | 3.74 | 1.48 | 25.0 | 3000 | 0.001 | 0.055 | 100 |
| Styrene | 100-42-5 | 0.017 | 0.017 | 0.059 | 0.073 | 0.070 | 0.251 | 1.8 | 0.04 | 0.068 | 80 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | *0.001* | 0 | 0.01 | *0.005* | 0 | 0.069 | 0.017 | 0.3 | 0.124 | 8 |
| Tetrachloroethylene | 127-18-4 | 0.022 | 0.018 | 0.061 | 0.146 | 0.122 | 0.414 | 0.17 | 0.9 | 0.095 | 92 |
| Tolualdehydes | | 0.022 | 0.022 | 0.075 | 0.109 | 0.108 | 0.369 | | | 0.020 | 75 |
| Toluene | 108-88-3 | 0.484 | 0.431 | 1.4 | 1.82 | 1.62 | 5.28 | 5000 | 0.0004 | 0.068 | 100 |
| 1,2,4-Trichlorobenzene | 102-82-1 | ND | ND | ND | ND | ND | ND | 2 | | 0.371 | 0 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.005 | 0.005 | 0.014 | 0.027 | 0.027 | 0.076 | 1000 | 0.00003 | 0.071 | 72 |
| 1,1,2-Trichloroethane | 79-00-5 | ND | ND | ND | ND | ND | ND | 0.063 | | 0.093 | 0 |
| Trichloroethylene | 79-01-6 | *0.004* | 0 | 0.029 | *0.022* | 0 | 0.156 | 0.2 | 0.1 | 0.091 | 30 |
| Trichlorofluoromethane | 75-69-4 | 0.250 | 0.254 | 0.314 | 1.41 | 1.42 | 1.76 | 700 | 0.002 | 0.045 | 100 |
| Trichlorotrifluoroethane | 76-13-1 | 0.081 | 0.082 | 0.098 | 0.624 | 0.628 | 0.751 | 30000 | 0.00002 | 0.069 | 100 |
| 1,2,4-Trimethylbenzene | 95-63-6 | 0.0673 | 0.059 | 0.3 | 0.331 | 0.290 | 1.47 | 7 | 0.05 | 0.103 | 98 |
| 1,3,5-Trimethylbenzene | 108-67-8 | 0.0222 | 0.020 | 0.088 | 0.109 | 0.098 | 0.433 | | | 0.103 | 95 |
| Valeraldehyde | 110-62-3 | 0.050 | 0.043 | 0.155 | 0.175 | 0.151 | 0.546 | | | 0.007 | 100 |
| Vinyl chloride | 75-01-4 | *0.003* | 0 | 0.017 | *0.0064* | 0 | 0.043 | 0.11 | 0.1 | 0.020 | 33 |
| m,p-Xylene | 1330-20-7 | 0.193 | 0.170 | 0.626 | 0.839 | 0.738 | 2.72 | 100 | 0.01 | 0.017 | 98 |
| o-Xylene | 95-47-6 | 0.084 | 0.078 | 0.27 | 0.365 | 0.337 | 1.17 | 100 | 0.004 | 0.069 | 98 |

[a] See page 31 for footnotes.

Table 10-7

RUTGERS - 2016 NJ Toxic VOCs Monitoring Data[a]

| Analyte[b] | CAS No. | Annual Mean (ppbv)[c,d] | Annual Median (ppbv)[d] | 24-Hour Maximum (ppbv) | Annual Mean (µg/m³)[c,d] | Annual Median (µg/m³)[d] | 24-Hour Maximum (µg/m³) | Health Bench-mark (µg/m³)[e] | Annual Mean Risk Ratio[f] | Detection Limit (µg/m³) | % Above Minimum Detection Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Acetaldehyde** | 75-07-0 | 0.734 | 0.729 | 1.98 | 1.32 | 1.31 | 3.57 | 0.45 | **3** | 0.005 | 75 |
| Acetone | 67-64-1 | 0.795 | 0.840 | 2.94 | 1.89 | 2.00 | 6.98 | 31000 | 0.0001 | 0.014 | 76 |
| Acetonitrile | 75-05-8 | 0.225 | 0.200 | 0.763 | 0.378 | 0.336 | 1.28 | 60 | 0.01 | 0.020 | 100 |
| Acetylene | 74-86-2 | 0.670 | 0.491 | 2.57 | 0.713 | 0.523 | 2.74 | | | 0.033 | 100 |
| Acrolein | 107-02-8 | 0.386 | 0.320 | 0.958 | 0.886 | 0.734 | 2.20 | 0.02 | | 0.046 | 100 |
| Acrylonitrile | 107-13-1 | ND | ND | ND | ND | ND | ND | 0.015 | | 0.065 | 0 |
| tert-Amyl Methyl Ether | 994-05-8 | *0.001* | 0 | 0.01 | *0.003* | 0 | 0.042 | | | 0.033 | 12 |
| Benzaldehyde | 100-52-7 | 0.033 | 0.028 | 0.069 | 0.145 | 0.122 | 0.299 | | | 0.074 | 100 |
| **Benzene** | 71-43-2 | 0.161 | 0.145 | 0.482 | 0.515 | 0.463 | 1.54 | 0.13 | **4** | 0.010 | 100 |
| Bromochloromethane | 74-97-5 | *0.002* | 0 | 0.03 | *0.011* | 0 | 0.159 | 40 | 0.0003 | 0.206 | 12 |
| Bromodichloromethane | 75-27-4 | *0.003* | 0 | 0.014 | *0.018* | 0 | 0.094 | 0.027 | 0.7 | 0.101 | 27 |
| Bromoform | 75-25-2 | *0.002* | 0 | 0.015 | *0.019* | 0 | 0.155 | 0.91 | 0.02 | 0.186 | 17 |
| Bromomethane | 74-83-9 | 0.021 | 0.020 | 0.058 | 0.080 | 0.078 | 0.225 | 5 | 0.02 | 0.066 | 100 |
| **1,3-Butadiene** | 106-99-0 | 0.027 | 0.021 | 0.103 | 0.059 | 0.046 | 0.228 | 0.033 | **1.8** | 0.031 | 86 |
| Butyraldehyde | 123-72-8 | 0.083 | 0.078 | 0.172 | 0.244 | 0.230 | 0.507 | | | 0.027 | 100 |
| Carbon Disulfide | 75-15-0 | ND | ND | ND | ND | ND | ND | 700 | | 0.009 | 0 |
| **Carbon Tetrachloride** | 56-23-5 | 0.098 | 0.102 | 0.135 | 0.619 | 0.642 | 0.849 | 0.17 | **4** | 0.075 | 100 |
| Chlorobenzene | 108-90-7 | *0.004* | 0 | 0.015 | *0.017* | 0 | 0.069 | 1000 | 0.00002 | 0.046 | 37 |
| Chloroethane | 75-00-3 | 0.027 | 0.023 | 0.146 | 0.070 | 0.061 | 0.385 | 10000 | 0.00001 | 0.047 | 78 |
| **Chloroform** | 67-66-3 | 0.035 | 0.031 | 0.077 | 0.169 | 0.151 | 0.376 | 0.043 | **4** | 0.044 | 100 |
| **Chloromethane** | 74-87-3 | 0.585 | 0.603 | 0.823 | 1.21 | 1.25 | 1.70 | 0.56 | **2** | 0.033 | 100 |
| Chloroprene | 126-99-8 | ND | ND | ND | ND | ND | ND | 0.002 | | 0.040 | 0 |
| Crotonaldehyde | 123-73-9 | 0.093 | 0.040 | 0.409 | 0.267 | 0.115 | 1.17 | | | 0.049 | 88 |
| Dibromochloromethane | 124-48-1 | 0.004 | 0.004 | 0.012 | 0.033 | 0.034 | 0.102 | 0.037 | 0.9 | 0.051 | 56 |
| **1,2-Dibromoethane** | 106-93-4 | *0.001* | 0 | 0.01 | *0.005* | 0 | 0.077 | 0.0017 | **3** | 0.138 | 7 |
| m-Dichlorobenzene | 541-73-1 | *0.001* | 0 | 0.015 | *0.009* | 0 | 0.090 | | | 0.168 | 15 |
| o-Dichlorobenzene | 95-50-1 | *0.001* | 0 | 0.014 | *0.009* | 0 | 0.084 | 200 | 0.00004 | 0.144 | 15 |
| p-Dichlorobenzene | 106-46-7 | *0.006* | 0 | 0.021 | *0.035* | 0 | 0.126 | 0.091 | 0.4 | 0.156 | 49 |
| Dichlorodifluoromethane | 75-71-8 | 0.526 | 0.536 | 0.655 | 2.60 | 2.65 | 3.24 | 100 | 0.03 | 0.064 | 100 |
| 1,1-Dichloroethane | 75-34-3 | *0.001* | 0 | 0.014 | *0.006* | 0 | 0.057 | 0.63 | 0.01 | 0.061 | 14 |
| **1,2-Dichloroethane** | 107-06-2 | 0.020 | 0.020 | 0.029 | 0.079 | 0.081 | 0.117 | 0.038 | **2** | 0.053 | 95 |
| 1,1-Dichloroethene | 75-35-4 | *0.002* | 0 | 0.01 | *0.008* | 0 | 0.040 | 200 | 0.00004 | 0.032 | 29 |
| cis-1,2-Dichloroethylene | 156-59-2 | ND | ND | ND | ND | ND | ND | | | 0.048 | 0 |
| trans-1,2-Dichloroethylene | 156-60-5 | *0.002* | 0 | 0.014 | *0.006* | 0 | 0.056 | | | 0.048 | 17 |
| Dichloromethane | 75-09-2 | 0.132 | 0.127 | 0.258 | 0.458 | 0.441 | 0.896 | 77 | 0.01 | 0.028 | 100 |

[a] See page 31 for footnotes.

Table 10-7 (continued)

RUTGERS - 2016 NJ Toxic VOCs Monitoring Data[a]

| Analyte[b] | CAS No. | Annual Mean (ppbv)[c,d] | Annual Median (ppbv)[c,d] | 24-Hour Maximum (ppbv) | Annual Mean (µg/m³)[c,d] | Annual Median (µg/m³)[c,d] | 24-Hour Maximum (µg/m³) | Health Bench-mark (µg/m³)[e] | Annual Mean Risk Ratio[f] | Detection Limit (µg/m³) | % Above Minimum Detection Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dichloropropane | 78-87-5 | *0.001* | 0 | 0.015 | *0.006* | 0 | 0.069 | 0.1 | 0.1 | 0.079 | 10 |
| cis-1,3-Dichloropropene | 542-75-6 | ND | ND | ND | ND | ND | ND | 0.25 | | 0.064 | 0 |
| trans-1,3-Dichloropropene | 542-75-6 | ND | ND | ND | ND | ND | ND | | | 0.095 | 0 |
| Dichlorotetrafluoroethane | 76-14-2 | 0.019 | 0.019 | 0.037 | 0.132 | 0.133 | 0.259 | | | 0.133 | 100 |
| 2,5-Dimethylbenzaldehyde | 5799-94-2 | *0.005* | 0 | 0.044 | *0.025* | 0 | 0.241 | | | 0.011 | 24 |
| Ethyl Acrylate | 140-88-5 | ND | ND | ND | ND | ND | ND | 8 | | 0.033 | 0 |
| Ethyl tert-Butyl Ether | 637-92-3 | 0.036 | 0.036 | 0.085 | 0.149 | 0.150 | 0.355 | | | 0.046 | 98 |
| Ethylbenzene | 100-41-4 | 0.065 | 0.054 | 0.437 | 0.283 | 0.234 | 1.90 | 0.4 | 0.7 | 0.035 | 100 |
| **Formaldehyde** | 50-00-0 | 1.72 | 1.60 | 4.27 | 2.12 | 1.96 | 5.24 | 0.077 | **27** | 0.023 | 100 |
| Hexachloro-1,3-butadiene | 87-68-3 | *0.003* | 0 | 0.012 | *0.027* | 0 | 0.128 | 0.045 | 0.6 | 0.117 | 29 |
| Hexaldehyde | 66-25-1 | 0.039 | 0.026 | 0.169 | 0.160 | 0.107 | 0.692 | | | 0.139 | 78 |
| Isovaleraldehyde | 590-86-3 | *0.023* | 0 | 0.123 | *0.082* | 0 | 0.433 | | | 0.007 | 25 |
| Methyl Ethyl Ketone | 78-93-3 | 0.163 | 0.164 | 0.499 | 0.481 | 0.483 | 1.47 | 5000 | 0.0001 | 0.074 | 95 |
| Methyl Isobutyl Ketone | 108-10-1 | 0.033 | 0.028 | 0.086 | 0.135 | 0.115 | 0.352 | 3000 | 0.00004 | 0.057 | 98 |
| Methyl Methacrylate | 80-62-6 | *0.007* | 0 | 0.042 | *0.030* | 0 | 0.172 | 700 | 0.00004 | 0.115 | 47 |
| Methyl tert-Butyl Ether | 1634-04-4 | 0.012 | 0.014 | 0.036 | 0.044 | 0.050 | 0.130 | 3.8 | 0.01 | 0.050 | 63 |
| n-Octane | 111-65-9 | 0.030 | 0.029 | 0.079 | 0.141 | 0.135 | 0.369 | | | 0.079 | 98 |
| Propionaldehyde | 123-38-6 | 0.266 | 0.169 | 0.693 | 0.632 | 0.401 | 1.65 | 8 | 0.1 | 0.007 | 100 |
| Propylene | 115-07-1 | 0.332 | 0.271 | 1.19 | 0.572 | 0.466 | 2.05 | 3000 | 0.0002 | 0.055 | 100 |
| Styrene | 100-42-5 | 0.021 | 0.019 | 0.126 | 0.090 | 0.081 | 0.537 | 1.8 | 0.1 | 0.068 | 92 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | *0.002* | 0 | 0.011 | *0.012* | 0 | 0.076 | 0.017 | 0.7 | 0.124 | 20 |
| Tetrachloroethylene | 127-18-4 | 0.017 | 0.016 | 0.062 | 0.117 | 0.109 | 0.421 | 0.17 | 0.7 | 0.095 | 92 |
| Tolualdehydes | | 0.019 | 0.019 | 0.059 | 0.093 | 0.093 | 0.290 | | | 0.020 | 76 |
| Toluene | 108-88-3 | 0.248 | 0.214 | 0.696 | 0.934 | 0.806 | 2.62 | 5000 | 0.0002 | 0.068 | 100 |
| 1,2,4-Trichlorobenzene | 102-82-1 | *0.0002* | 0 | 0.013 | *0.002* | 0 | 0.096 | 2 | 0.0008 | 0.371 | 2 |
| 1,1,1-Trichloroethane | 71-55-6 | 0.007 | 0.007 | 0.015 | 0.036 | 0.038 | 0.082 | 1000 | 0.00004 | 0.071 | 83 |
| 1,1,2-Trichloroethane | 79-00-5 | ND | ND | ND | ND | ND | ND | 0.063 | | 0.093 | 0 |
| Trichloroethylene | 79-01-6 | *0.004* | 0 | 0.030 | *0.022* | 0 | 0.161 | 0.2 | 0.1 | 0.091 | 32 |
| Trichlorofluoromethane | 75-69-4 | 0.248 | 0.258 | 0.315 | 1.40 | 1.45 | 1.77 | 700 | 0.002 | 0.045 | 100 |
| Trichlorotrifluoroethane | 76-13-1 | *0.003* | 0 | 0.1 | *0.026* | 0 | 0.766 | 30000 | 0.000001 | 0.069 | 3 |
| 1,2,4-Trimethylbenzene | 95-63-6 | 0.038 | 0.035 | 0.165 | 0.188 | 0.172 | 0.811 | 7 | 0.03 | 0.103 | 100 |
| 1,3,5-Trimethylbenzene | 108-67-8 | 0.016 | 0.014 | 0.050 | 0.076 | 0.069 | 0.246 | | | 0.103 | 97 |
| Valeraldehyde | 110-62-3 | 0.129 | 0.038 | 0.834 | 0.453 | 0.134 | 2.94 | | | 0.007 | 100 |
| Vinyl chloride | 75-01-4 | 0.004 | 0 | 0.016 | 0.009 | 0.000 | 0.041 | 0.11 | 0.1 | 0.020 | 42 |
| m,p-Xylene | 1330-20-7 | 0.122 | 0.102 | 0.549 | 0.530 | 0.443 | 2.38 | 100 | 0.01 | 0.017 | 100 |
| o-Xylene | 95-47-6 | 0.060 | 0.055 | 0.309 | 0.260 | 0.239 | 1.34 | 100 | 0.003 | 0.069 | 100 |

[a] See page 31 for footnotes.

**Footnotes for Tables 10-4 through 10-7**

[b] Analytes in bold text had annual means above the long-term health benchmark.

[c] Numbers in italics are arithmetic means (or averages) based on less than 50% of the samples above the detection limit.

[d] For a valid 24-hour sampling event, when the analyzing laboratory reports the term "Not Detected" for a particular pollutant, the concentration of 0.0 ppbv is assigned to that pollutant. These zero concentrations were included in the calculation of annual averages and medians for each pollutant regardless of percent detection.

[e] A health benchmark is defined as the chemical-specific air concentration above which there may be human health concerns. For a carcinogen (cancer-causing chemical), the health benchmark is set at the air concentration that would cause no more than a one-in-a-million increase in the likelihood of getting cancer, even after a lifetime of exposure. For a non-carcinogen, the health benchmark is the maximum air concentration to which exposure is likely to cause no harm, even if that exposure occurs on a daily basis for a lifetime. These toxicity values are not available for all chemicals. For more information, go to www.nj.gov/dep/aqpp/risk.html.

[f] A risk ratio for a chemical is a comparison of the annual mean air concentration to the long-term health benchmark. If the annual mean is 0, then the annual mean risk ratio is not calculated.

[g] Acrolein concentrations are highly uncertain because of problems with collection and analysis methods.

**ND** indicates that all samples were below the detection limit.

Table 10-8
Analytes with 100% Non-Detects in 2016

| | Pollutant | CAS No. | Camden | Chester | Elizabeth | Rutgers |
|---|---|---|---|---|---|---|
| 1 | Acrylonitrile | 107-13-1 | X | X | X | X |
| 2 | Carbon Disulfide | 75-15-0 | | | | X |
| 3 | Chloroprene | 126-99-8 | X | X | X | X |
| 4 | 1,2-Dibromoethane | 106-93-4 | X | | | |
| 5 | cis-1,2-Dichloroethylene | 156-59-2 | X | X | X | X |
| 6 | cis-1,3-Dichloropropene | 542-75-6 | X | X | X | X |
| 7 | trans-1,3-Dichloropropene | 542-75-6 | X | X | X | X |
| 8 | 2,5-Dimethylbenzaldehyde | 5799-94-2 | | X | | |
| 9 | 1,2,4-Trichlorobenzene | 102-82-1 | | | X | |
| 10 | 1,1,2-Trichloroethane | 79-00-5 | | X | X | X |

In 2016, samples of the chemicals in Table 10-8 were never above the detection limit at the specific monitoring location. However, these pollutants may be present in the air below the detection limit level. Chemical-specific detection limits can be found in Tables 10-4 through 10-7.

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