2001 Air Toxics Summary

New Jersey Department of Environmental Protection

Introduction

Air pollutants can be divided into two categories. The six criteria pollutants (ozone, sulfur dioxide, carbon monoxide, nitrogen dioxide, particulate matter, and lead), for which the USEPA has set National Ambient Air Quality Standards (NAAQS), and another larger group of pollutants, known as air toxics. The criteria pollutants have been addressed throughout the country using a standard planning process, and have nationally consistent monitoring and reporting requirements. Their control has been the focus of air pollution control efforts for many years, and there is a section on each of these pollutants in this report.

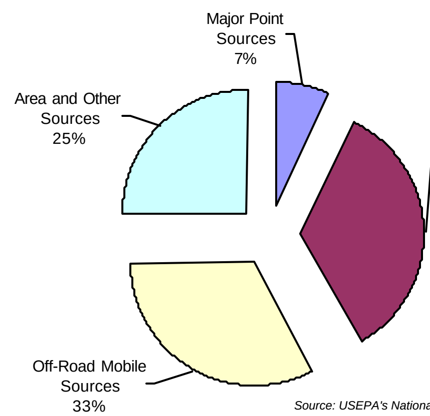
Air toxics are pollutants that can be emitted into the air in quantities that are large enough to cause adverse health effects. These effects cover a wide range of conditions from lung irritation to birth defects to cancer. There are no NAAQS for these pollutants, but in 1990 the U.S. Congress directed the USEPA to begin to address a list of almost 200 air toxics by developing control technology standards. This particular group of air toxics are known as the Hazardous Air Pollutants (HAPS). You can get more information about HAPs at the USEPA Air Toxics Website at www.epa.gov/ttn/atw. The NJDEP also has several web pages dedicated to air toxics. The pages can be accessed at www.state.nj.us/dep/airmon/airtoxics.

Health and Environmental Effects

People exposed to toxic air pollutants at sufficient concentrations and duration may have an increased chance of getting cancer or experiencing other serious health effects. These health effects can include damage to the immune system, as well as neurological, reproductive (e.g., reduced fertility), developmental, respiratory and other health problems. In addition to breathing air toxics, risks also are associated with the deposition of toxic pollutants onto soils or surface waters, where they are taken up by plants and ingested by animals. Like humans, animals may experience health problems if exposed to sufficient quantities of air toxics over time.

Sources of Air Toxics

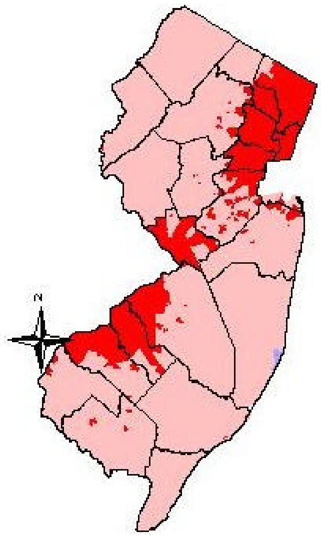
Figure 1
1996 Air Toxics Emissions Estimates for New Jersey



Source: USEPA's National Air Toxics Assessment

The USEPA conducted a national assessment of air toxics, originally based on 1990 emission estimates, and later revised the assessment with emissions estimates for 1996. The first effort was called the Cumulative Exposure Project or CEP and the second was termed the National-Scale Air Toxics Assessment (NATA). As part of these assessments, EPA prepared a comprehensive inventory of air toxics emissions for the entire country. The 1996 emissions inventory for New Jersey was briefly reviewed and revised by NJDEP before being finalized. Although there are bound to be some errors in the details of such a massive undertaking as this, a summary of the emissions inventory can give us some indication of what may be the most important sources of air toxic emissions in our state. As can be seen from the pie chart above (Figure 1), which is based on the 1996 estimates, mobile sources are the largest contributors to air toxics emissions in New Jersey. On-road mobile sources account for 35% of the emissions, and off-road mobile sources (airplanes, trains, construction equipment, lawnmowers, boats, dirt bikes, etc.) contribute 33%. Area sources represent 25% of the inventory (USEPA refers to this category as "Area and Other" because it includes residential, commercial, and small industrial sources), and major point sources account for the remaining 7% of the inventory. Major point sources are defined by the Clean Air Act as facilities that emit more than 10 tons per year of a single hazardous air pollutant (HAP), or 25 tons per year of all HAPs combined.

Figure 2

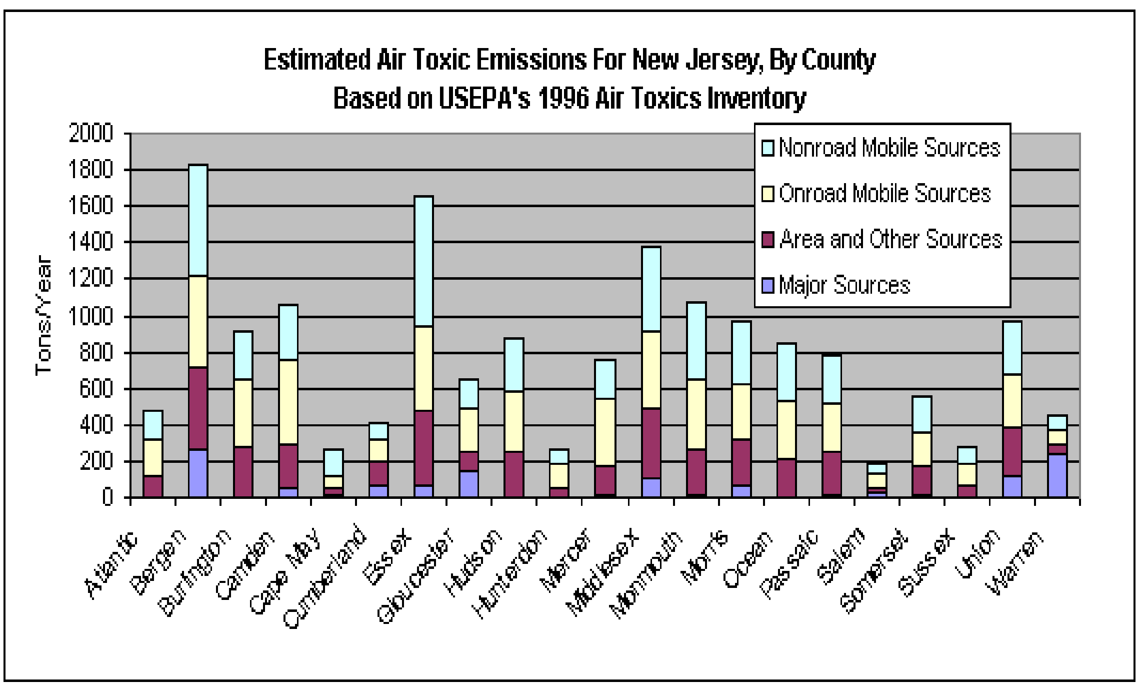


Nature of the Problem

Because of the number and diversity of toxic air pollutants, it is difficult to generalize about them as a class. Most air toxics, however, are associated with basic human activities. This can be seen by looking at the emissions estimates geographicially. When the emissions estimates are broken down by county (see Figure 3), it is evident that the areas with higher air toxic emissions are generally those with higher population density. This is directly related to high levels of vehicle use, solvent use, and other population-related types of activities in those counties.

This pattern can also be seen in the estimates of ambient air toxics concentrations. The map above (Figure 2) shows the predicted concentrations of benzene throughout the state. Again the high concentration areas tend to overlap the more densely populated areas of the state. Not all air toxics will follow this pattern as some will tend to be more closely associated with individual point sources, but in general larger populations result in greater emissions of, and exposure to, air toxics.

Figure 3



AIR TOXICS OF CONCERN

Our preliminary analysis of the state and county average air toxics concentrations generated by NATA indicates that 19 of the chemicals were predicted to exceed their health benchmarks in one or more counties in 1996. 18 of these are cancer-causing (carcinogenic) chemicals, and one (acrolein) is not carcinogenic. Predicted concentrations of these 19 pollutants vary around the state, depending on the type of sources that emit them. This is summarized in Table 1 below.

Table 1

Air Toxics of Greatest Concern in New Jersey
Based on 1996 National Air Toxics Assessment

Pollutant of Concern	Extent	Primary Source of Emissions
Benzene	Statewide	Mobile; Background Concentration
1,3-Butadiene	Statewide	On-Road Mobile
Carbon tetrachloride	Statewide	Background Concentration
Chloroform	Statewide	Background Concentration; Point
Diesel particulate matter	Statewide	Off-Road Mobile
Ethylene dibromide	Statewide	Background Concentration
Ethylene dichloride	Statewide	Background Concentration
Formaldehyde	Statewide	Mobile
Acrolein	20 Counties	Mobile
Polycylic organic matter	20 Counties	Area
Chromium compounds	17 Counties	Area
Acetaldehyde	13 Counties	Mobile
Perchloroethylene	11 Counties	Area; Background Concentration
7-PAH	5 Counties	Area
Arsenic compounds	4 Counties	Area; Point
Cadmium compounds	4 Counties	Area
Nickel compounds	4 Counties	Area
Beryllium compounds	1 County	Area
Hydrazine	1 County	Area

Air Toxcs Monitoring Program

The NJDEP has established 4 comprehensive air toxics monitoring sites. They are located in Camden, Elizabeth, New Brunswick and Chester (see Figure 4). The Camden site has been measuring several toxic volatile organic compounds (VOCs) since 1989. The Elizabeth site began measuring VOCs in 2000, and the New Brunswick and Chester sites became operational in July 2001. In May 2001, analysis for toxic metals began at all 4 sites.

A direct comparison of the concentrations predicted by NATA and actual monitored levels can be made for the Camden site. Camden was operational in 1996, the year on which the NATA estimates are based, and 13 of the compounds evaluated in NATA were measured at the site. The following table compares the predictions and the actual measured concentrations (Table 2). Actual 2001 levels, and the amount they've changed since 1996 are also shown. Of the thirteen air toxics for which data were available, 2 of them fell below detection limits in 1996, so no measured level is reported that year. The comparison of some of the key compounds are shown in the graph to the right (Figure 5). It appears from this analysis that the agreement between predicted and monitored concentrations are remarkably good. (For the majority of these pollutants the predicted and observed values are within a factor of 2 of each other.) For most of the 13 toxics shown, the 2001 levels measured at Camden were substantially lower than the concentrations found in 1996.

Figure 4
Toxics Monitoring Network

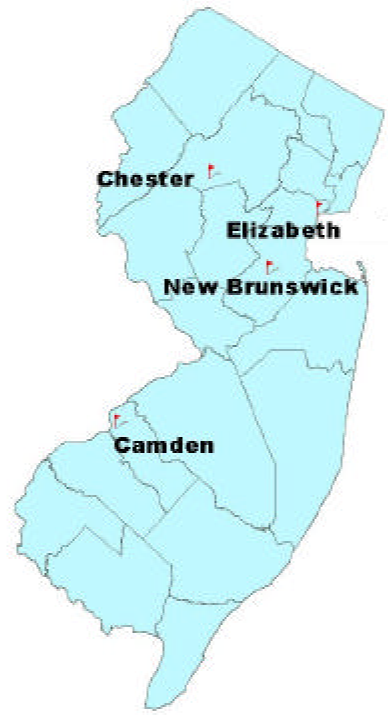


Figure 5
Air Toxics Levels Measured in 1996 at Camden, New Jersey Compared to NATA Predicted Levels

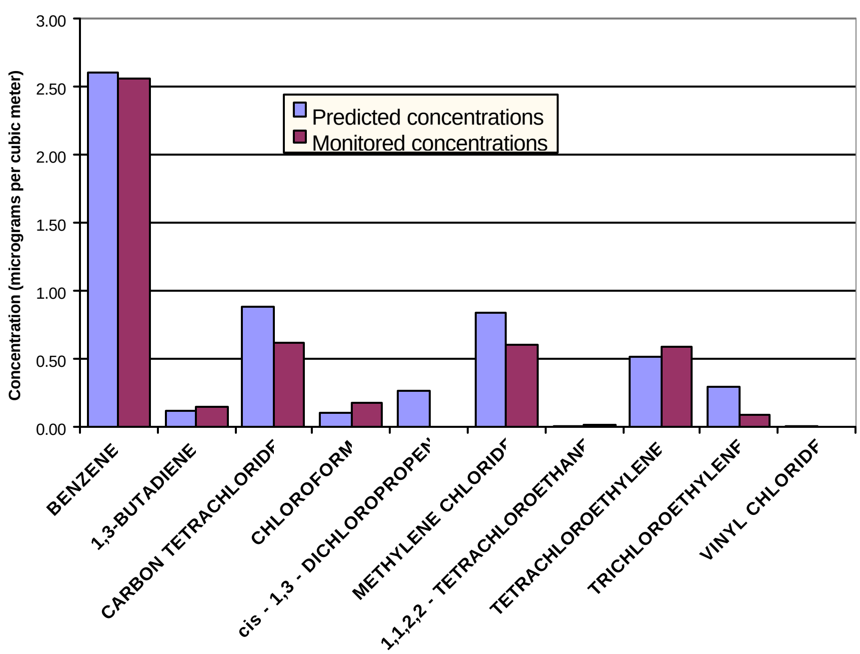


Table 2
Comparison of NATA Predicted to Measured Levels in Camden, NJ

NA – Not Available
µg/m³ - Micrograms Per Cubic Meter

Pollutant (HAP)	NATA Predicted 1996, µg/m³	Measured 1996 Level, µg/m³	Measured 2001 Level, µg/m³	Percent Change in Measured Levels
Acetaldehyde	1.74	4.53	1.92	-57.6
Acrylonitrile	0.003	NA	0.00**	NA
Benzene	2.61	2.57	1.78	-30.6
1,3-Butadiene	0.12	0.15	0.19	25.9
Carbon Tetrachloride	0.88	0.61	0.60	-2.0
Chloroform	0.10	0.18	0.02	-89.2
cis-1,3-Dichloropropene *	0.26	0.00**	0.00**	NA
Formaldehyde	2.20	14.63	3.37	-77.0
Methylene Chloride	0.83	0.61	0.65	7.5
1,1,2,2-Tetrachloroethane	0.00	0.01	0.00**	NA
Tetrachloroethylene	0.52	0.59	0.36	-39.3
Trichloroethylene	0.29	0.09	0.05	-41.1
Vinyl Chloride *	0.01	0.00**	0.00**	NA

***** Measurements for 1996 and 2001 were below detection limits.
****** Measurement fell below detection limits.
Negative values for percent change mean measured levels went down from 1996 to 2001.

AIR TOXICS MONITORING RESULTS FOR 2001

The results of the air toxics monitoring program for 2001 are shown in Table 3 below. This table shows the average concentration for each air toxic measured at the four New Jersey sites. All values are in part per billion by volume (ppbv). More detailed tables (Tables 4-7) that show additional statistics, detection limit information, health benchmarks when they have been accepted by the NJDEP, and levels in both ppbv and micrograms per cubic meter (µg/m³) can be found at the end of this section. The ppbv units are more common for monitoring results while µg/m³ units are generally used in modeling and health studies. Note that many of the compounds that were tested were often below the detection limit of the method used. Values reported by the laboratory as "not detected" were averaged in as zeros. Averages reported where a significant portion of the data (more than 50%) was below the detection limit should be viewed with extreme caution. Median values (the value of the middle sample when the results are ranked) are reported along with the mean or 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 concentration significantly but would have less effect on the median value. In such cases, the median value may be a better indicator of long term exposures, on which most of the health benchmarks for air toxics are based. The average concentrations for some of the more prevalent air toxics are graphed in Figure 6. Note that the Chester and New Brunswick sites did not begin operation until May of 2001 so their average concentrations may not be strictly comparable to the data from Camden and Elizabeth.

Figure 6

Selected Toxic Volatile Organics
2001 Annual Averages
New Jersey

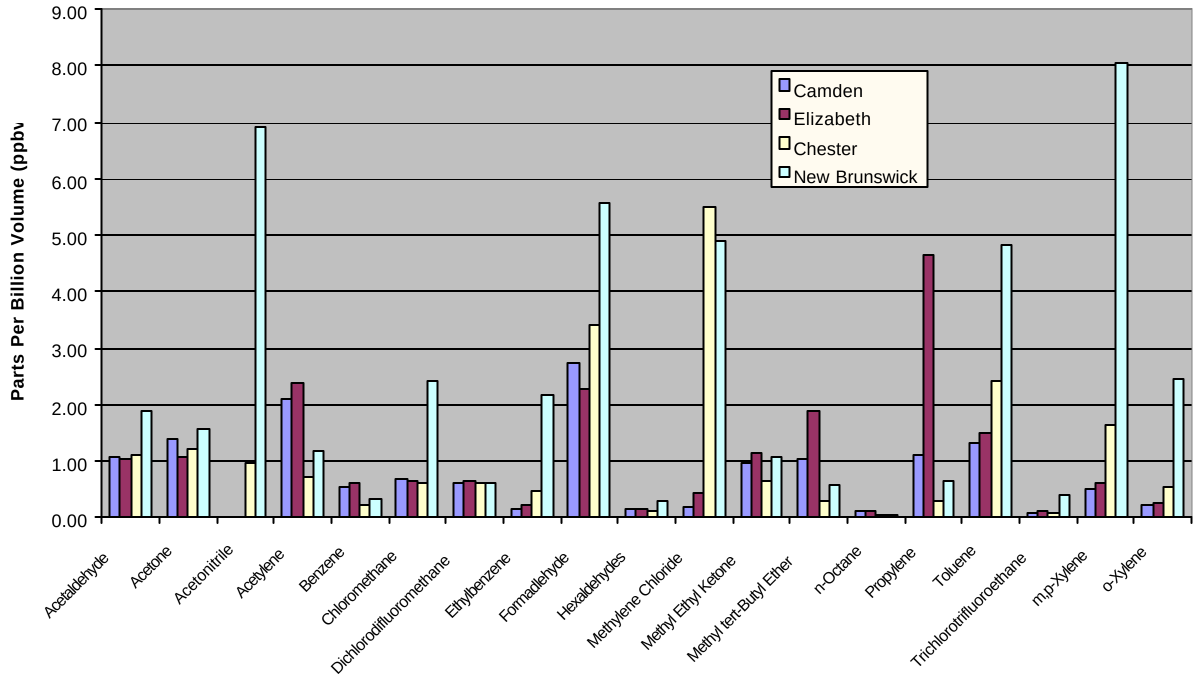


Table 3
New Jersey Air Toxics Summary – 2001

Annual Average Concentration
ppbv - Parts Per Billion by Volume

Pollutant	Camden	Chester	Elizabeth	New Brunswick
Acetaldehyde	1.07	1.15	1.05	1.89
Acetone	1.40	1.27	1.11	1.58
Acetonitrile	0.00	0.97	0.00	6.90
Acetylene	2.11	0.73	2.39	1.19
Acrylonitrile	0.01	0.00	0.00	0.00
tert-Amyl Methyl Ether	0.01	0.00	0.02	0.00
Benzaldehyde	0.06	0.03	0.04	0.06
Benzene	0.56	0.24	0.62	0.32
Bromochloromethane	0.00	0.00	0.00	0.00
Bromodichloromethane	0.00	0.00	0.00	0.00
Bromoform	0.00	0.00	0.00	0.00
Bromomethane	0.02	0.00	0.01	0.01
1,3-Butadiene	0.09	0.00	0.13	0.03
Butyr/Isobutyraldehyde	0.09	0.08	0.08	0.19
Carbon Tetrachloride	0.10	0.09	0.09	0.09
Chlorobenzene	0.00	0.00	0.00	0.00

Table 3 (Continued)
New Jersey Air Toxics Summary – 2001

Annual Average Concentration
ppbv - Parts Per Billion by Volume

Pollutant	Camden	Chester	Elizabeth	New Brunswick
Chloroethane	0.01	0.00	0.00	0.00
Chloroform	0.00	0.00	0.01	0.02
Chloromethane	0.70	0.60	0.65	2.40
Chloromethylbenzene	0.00	0.00	0.00	0.00
Chloroprene	0.00	0.00	0.00	0.00
Crotonaldehyde	0.03	0.04	0.02	0.04
Dibromochloromethane	0.00	0.00	0.00	0.00
1,2-Dibromoethane	0.00	0.00	0.00	0.00
m-Dichlorobenzene	0.00	0.00	0.00	0.00
o-Dichlorobenzene	0.00	0.00	0.00	0.00
p-Dichlorobenzene	0.05	0.00	0.02	0.01
1,1-Dichloroethane	0.00	0.00	0.00	0.00
1,1-Dichloroethene	0.00	0.00	0.00	0.00
cis-1,2-Dichloroethylene	0.00	0.00	0.00	0.00
trans-1,2-Dichloroethylene	0.00	0.00	0.00	0.00
Dichlorodifluoromethane	0.63	0.60	0.66	0.60
1,2-Dichloroethane	0.00	0.00	0.00	0.00
1,2-Dichloropropane	0.00	0.00	0.00	0.00
cis-1,3-Dichloropropene	0.00	0.00	0.00	0.00
trans-1,3-Dichloropropene	0.00	0.00	0.00	0.00
Dichlorotetrafluoroethane	0.00	0.00	0.00	0.00
2,5-Dimethylbenzaldehyde	0.01	0.00	0.01	0.01
Ethyl Acrylate	0.00	0.00	0.00	0.00
Ethylbenzene	0.17	0.47	0.21	2.16
Ethyl tert-Butyl Ether	0.00	0.00	0.00	0.00
Formadlehyde	2.75	3.52	2.31	5.55
Hexachloro-1,3-Butadiene	0.00	0.00	0.00	0.00
Hexaldehydes	0.17	0.14	0.14	0.28
Isovaleraldehyde	0.01	0.00	0.01	0.02
Methylene Chloride	0.19	5.48	0.44	4.90
Methyl Ethyl Ketone	0.98	0.65	1.16	1.09
Methyl Isobutyl Keytone	0.02	0.00	0.03	0.00
Methyl Methacrylate	0.01	0.00	0.00	0.00
Methyl tert-Butyl Ether	1.05	0.29	1.90	0.59
n-Octane	0.12	0.05	0.12	0.04
Propionaldehyde	0.07	0.07	0.09	0.20
Propylene	1.12	0.30	4.64	0.66
Styrene	0.04	0.01	0.03	0.04
1,1,2,2-Tetrachloroethane	0.00	0.00	0.00	0.00
Tetrachloroethylene	0.05	0.01	0.06	0.04
Toluadehydes	0.05	0.03	0.04	0.06
Toluene	1.33	2.43	1.50	4.82
1,2,4-Trichlorobenzene	0.00	0.00	0.00	0.00

Table 3 (Continued)
New Jersey Air Toxics Summary – 2001

Annual Average Concentration
ppbv - Parts Per Billion by Volume

Pollutant	Camden	Chester	Elizabeth	New Brunswick
1,1,1-Trichloroethane	0.04	0.03	0.04	0.04
1,1,2-Trichloroethane	0.00	0.00	0.00	0.00
Trichloroethylene	0.01	0.00	0.02	0.01
Trichlorofluoromethane	0.35	0.33	0.35	0.34
Trichlorotrifluoroethane	0.10	0.10	0.12	0.39
1,2,4-Trimethylbenzene	0.20	0.08	0.22	0.15
1,3,5-Trimethylbenzene	0.07	0.02	0.08	0.05
Valeraldehyde	0.02	0.02	0.02	0.09
Vinyl Chloride	0.00	0.00	0.00	0.00
m,p-Xylene	0.51	1.63	0.60	8.05
o-Xylene	0.23	0.55	0.27	2.45

TRENDS

The site in Camden is the only monitoring location that has been measuring air toxics for an extended period. The graph below (Figure 7) shows the change in concentrations for three of the most prevalent air toxics (benzene, toluene and xylene) from 1990 to 2001. The graph shows that while average concentrations can vary significantly from year to year, the overall trend is downward. High individual samples may also result in high annual averages in some years. Concentrations of most air toxics have declined signficantly over the last ten years. Because air toxics encompass such a large and diverse group of compounds, however, these general trends may not hold for pollutants in all areas of the state.

Figure 7
Annual Averages for Selected HAPS at Camden

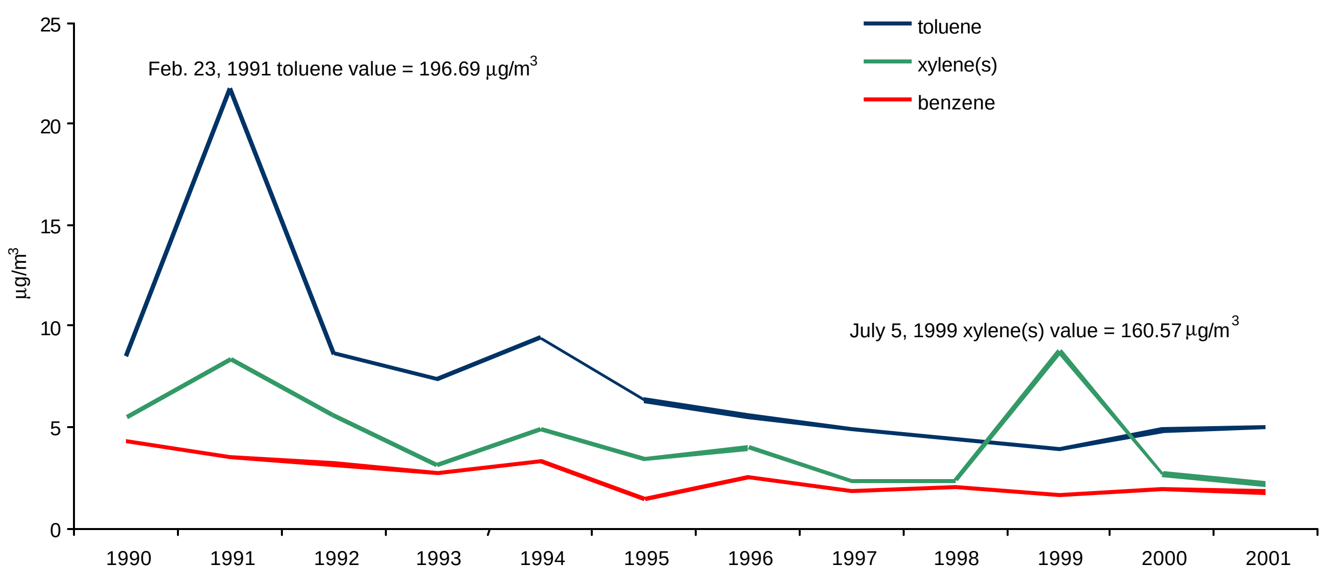


Table 4
Air Toxics Data – 2001
Camden, New Jersey

μg/m^3 – Micrograms Per Cubic Meter
ppbv – Parts Per Billion by Volume

Compounds in Bold had Annual Mean Concentrations Greater Then Their Accepted Health Benchmark

Pollutant	Detection Limit ppbv	% Detects	Benchmark μg/m^3	Mean μg/m^3	Mean ppbv	Max. ppbv	Median ppbv
Acetaldehyde	**0.005**	**100%**	**0.45**	**1.92**	**1.07**	**3.56**	**0.88**
Acetone	0.002	100%	30881	3.31	1.40	4.81	1.22
Acetonitrile	0.25	0%	60	0.00	0.00	0.00	0.00
Acetylene	0.13	100%		2.25	2.11	10.36	1.38
Acrylonitrile	**0.21**	**2%**	**0.015**	**0.02**	**0.01**	**0.35**	**0.00**
tert-Amyl Methyl Ether	0.12	4%		0.03	0.01	0.22	0.00
Benzaldehyde	0.003	98%		0.26	0.06	0.60	0.04
Benzene	**0.04**	**100%**	**0.13**	**1.78**	**0.56**	**2.53**	**0.39**
Bromochloromethane	0.12	0%		0.00	0.00	0.00	0.00
Bromodichloromethane	0.06	0%		0.00	0.00	0.00	0.00
Bromoform	0.08	0%	0.909	0.00	0.00	0.00	0.00
Bromomethane	0.09	18%	5	0.08	0.02	0.37	0.00
1,3-Butadiene	**0.07**	**69%**	**0.0036**	**0.19**	**0.09**	**0.59**	**0.06**
Butyr/Isobutyraldehyde	0.011	91%		0.26	0.09	0.81	0.08
Carbon Tetrachloride	**0.08**	**100%**	**0.067**	**0.60**	**0.10**	**0.14**	**0.10**
Chlorobenzene	0.06	0%	20	0.00	0.00	0.00	0.00
Chloroethane	0.08	2%	10000	0.02	0.01	0.26	0.00
Chloroform	0.05	9%	0.043	0.02	0.00	0.06	0.00
Chloromethane	**0.05**	**100%**	**0.556**	**1.42**	**0.70**	**1.11**	**0.69**
Chloromethylbenzene	0.07	0%		0.00	0.00	0.00	0.00
Chloroprene	0.1	0%	7	0.00	0.00	0.00	0.00
Crotonaldehyde	0.005	84%		0.09	0.03	0.20	0.02
Dibromochloromethane	0.08	0%		0.00	0.00	0.00	0.00
1,2-Dibromoethane	0.08	0%	0.0045	0.00	0.00	0.00	0.00
m-Dichlorobenzene	0.05	0%		0.00	0.00	0.00	0.00
o-Dichlorobenzene	0.06	2%	200	0.00	0.00	0.03	0.00
p-Dichlorobenzene	**0.09**	**69%**	**0.091**	**0.30**	**0.05**	**0.32**	**0.04**
1,1-Dichloroethane	0.08	0%	500	0.00	0.00	0.00	0.00
1,1-Dichloroethene	0.1	0%	0.02	0.00	0.00	0.00	0.00
cis-1,2-Dichloroethylene	0.1	0%		0.00	0.00	0.00	0.00
trans-1,2-Dichloroethylene	0.06	0%		0.00	0.00	0.00	0.00
Dichlorodifluoromethane	0.04	100%	200	3.10	0.63	0.92	0.60
1,2-Dichloroethane	0.06	0%	0.038	0.00	0.00	0.00	0.00
1,2-Dichloropropane	0.07	0%	0.056	0.00	0.00	0.00	0.00
cis-1,3-Dichloropropene	0.1	0%	0.25	0.00	0.00	0.00	0.00
trans-1,3-Dichloropropene	0.11	0%	0.25	0.00	0.00	0.00	0.00
Dichlorotetrafluoroethane	0.05	7%		0.01	0.00	0.02	0.00
2,5-Dimethylbenzaldehyde	0.004	34%		0.05	0.01	0.10	0.00
Ethyl Acrylate	0.16	0%	2	0.00	0.00	0.00	0.00

Table 4 (Continued)
Air Toxics Data - 2001
Camden, New Jersey

µg/m^3 – Micrograms Per Cubic Meter
ppbv – Parts Per Billion by Volume

Compounds in Bold had Annual Mean Concentrations Greater Then Their Accepted Health Benchmark

Pollutant	Detection Limit ppbv	% Detects	Benchmark µg/m^3	Mean µg/m^3	Mean ppbv	Max. ppbv	Median ppbv
Ethylbenzene	0.04	100%	1000	0.75	0.17	1.11	0.12
Ethyl tert-Butyl Ether	0.15	0%		0.00	0.00	0.00	0.00
Formadlehyde	**0.016**	**100%**	**0.77**	**3.37**	**2.75**	**13.86**	**2.11**
Hexachloro-1,3-Butadiene	0.06	0%	0.0455	0.00	0.00	0.00	0.00
Hexaldehydes	0.003	98%		0.68	0.17	0.95	0.03
Isovaleraldehyde	0.004	11%		0.04	0.01	0.18	0.00
Methylene Chloride	0.06	100%	2.1	0.65	0.19	0.66	0.13
Methyl Ethyl Ketone	0.15	93%	1000	2.88	0.98	7.20	0.78
Methyl Isobutyl Keytone	0.15	7%	80	0.07	0.02	0.41	0.00
Methyl Methacrylate	0.18	2%	700	0.04	0.01	0.46	0.00
Methyl tert-Butyl Ether	0.18	98%	3000	3.78	1.05	4.49	0.67
n-Octane	0.06	76%		0.56	0.12	1.15	0.08
Propionaldehyde	0.005	89%		0.16	0.07	0.18	0.06
Propylene	0.05	100%	3000	1.92	1.12	4.79	0.80
Styrene	0.07	47%	1.75	0.16	0.04	0.45	0.00
1,1,2,2-Tetrachloroethane	0.06	0%	0.017	0.00	0.00	0.00	0.00
Tetrachloroethylene	**0.06**	**67%**	**0.169**	**0.36**	**0.05**	**0.27**	**0.04**
Toluadehydes	0.009	93%		0.22	0.05	0.20	0.04
Toluene	0.06	100%	400	4.99	1.33	11.20	0.86
1,2,4-Trichlorobenzene	0.06	2%	200	0.02	0.00	0.12	0.00
1,1,1-Trichloroethane	0.06	91%	1000	0.22	0.04	0.13	0.04
1,1,2-Trichloroethane	0.06	0%	0.0625	0.00	0.00	0.00	0.00
Trichloroethylene	0.07	18%	0.5	0.05	0.01	0.11	0.00
Trichlorofluoromethane	0.04	100%	700	1.95	0.35	1.40	0.32
Trichlorotrifluoroethane	0.07	100%		0.80	0.10	0.16	0.10
1,2,4-Trimethylbenzene	0.07	100%		0.97	0.20	1.23	0.14
1,3,5-Trimethylbenzene	0.07	98%		0.34	0.07	0.46	0.05
Valeraldehyde	0.005	73%		0.07	0.02	0.09	0.01
Vinyl Chloride	0.06	0%	0.11	0.00	0.00	0.00	0.00
m,p-Xylene	0.05	100%	700	2.19	0.51	3.21	0.34
o-Xylene	0.05	100%	700	1.00	0.23	1.33	0.16

Table 5
Air Toxics Data – 2001
Chester, New Jersey

µg/m^3 – Micrograms Per Cubic Meter
ppbv – Parts Per Billion by Volume

Compounds in Bold had Annual Mean Concentrations Greater Then Their Accepted Health Benchmark

Pollutant	Detection Limit ppbv	% Detects	Benchmark µg/m^3	Mean µg/m^3	Mean ppbv	Max. ppbv	Median ppbv
Acetaldehyde	**0.005**	**97%**	**0.45**	**2.07**	**1.15**	**2.54**	**1.03**
Acetone	0.002	97%	30881	3.02	1.27	2.58	1.19
Acetonitrile	0.25	19%	60	1.62	0.97	16.78	0.00
Acetylene	0.13	100%		0.78	0.73	2.44	0.64
Acrylonitrile	0.21	0%	0.015	0.00	0.00	0.00	0.00
tert-Amyl Methyl Ether	0.12	0%		0.00	0.00	0.00	0.00
Benzaldehyde	0.003	97%		0.13	0.03	0.07	0.03
Benzene	**0.04**	**100%**	**0.13**	**0.77**	**0.24**	**0.63**	**0.23**
Bromochloromethane	0.12	0%		0.00	0.00	0.00	0.00
Bromodichloromethane	0.06	0%		0.00	0.00	0.00	0.00
Bromoform	0.08	0%	0.909	0.00	0.00	0.00	0.00
Bromomethane	0.09	0%	5	0.00	0.00	0.00	0.00
1,3-Butadiene	**0.07**	**3%**	**0.0036**	**0.01**	**0.00**	**0.08**	**0.00**
Butyr/Isobutyraldehyde	0.011	94%		0.23	0.08	0.19	0.06
Carbon Tetrachloride	**0.08**	**100%**	**0.067**	**0.60**	**0.09**	**0.12**	**0.10**
Chlorobenzene	0.06	0%	20	0.00	0.00	0.00	0.00
Chloroethane	0.08	0%	10000	0.00	0.00	0.00	0.00
Chloroform	0.05	6%	0.043	0.01	0.00	0.03	0.00
Chloromethane	**0.05**	**100%**	**0.556**	**1.23**	**0.60**	**0.76**	**0.60**
Chloromethylbenzene	0.07	0%		0.00	0.00	0.00	0.00
Chloroprene	0.1	0%	7	0.00	0.00	0.00	0.00
Crotonaldehyde	0.005	58%		0.11	0.04	0.50	0.00
Dibromochloromethane	0.08	0%		0.00	0.00	0.00	0.00
1,2-Dibromoethane	0.08	0%	0.0045	0.00	0.00	0.00	0.00
m-Dichlorobenzene	0.05	0%		0.00	0.00	0.00	0.00
o-Dichlorobenzene	0.06	0%	200	0.00	0.00	0.00	0.00
p-Dichlorobenzene	0.09	0%	0.091	0.00	0.00	0.00	0.00
1,1-Dichloroethane	0.08	0%	500	0.00	0.00	0.00	0.00
1,1-Dichloroethene	0.1	0%	0.02	0.00	0.00	0.00	0.00
cis-1,2-Dichloroethylene	0.1	0%		0.00	0.00	0.00	0.00
trans-1,2-Dichloroethylene	0.06	0%		0.00	0.00	0.00	0.00
Dichlorodifluoromethane	0.04	100%	200	2.98	0.60	0.76	0.59
1,2-Dichloroethane	0.06	0%	0.038	0.00	0.00	0.00	0.00
1,2-Dichloropropane	0.07	0%	0.056	0.00	0.00	0.00	0.00
cis-1,3-Dichloropropene	0.1	0%	0.25	0.00	0.00	0.00	0.00
trans-1,3-Dichloropropene	0.11	0%	0.25	0.00	0.00	0.00	0.00
Dichlorotetrafluoroethane	0.05	6%		0.00	0.00	0.01	0.00
2,5-Dimethylbenzaldehyde	0.004	16%		0.02	0.00	0.04	0.00
Ethyl Acrylate	0.16	0%	2	0.00	0.00	0.00	0.00

Table 5 – (Continued)
Air Toxics Data – 2001
Chester, New Jersey

µg/m^3 - Micrograms Per Cubic Meter
ppbv - Parts Per Billion by Volume

Compounds in Bold had Annual Mean Concentrations Greater Then Their Accepted Health Benchmark

Pollutant	Detection Limit ppbv	% Detects	Benchmark µg/m^3	Mean µg/m^3	Mean ppbv	Max. ppbv	Median ppbv
Ethylbenzene	0.04	100%	1000	2.04	0.47	1.09	0.44
Ethyl tert-Butyl Ether	0.15	0%		0.00	0.00	0.00	0.00
Formadlehyde	**0.016**	**100%**	**0.77**	**4.32**	**3.52**	**8.23**	**3.33**
Hexachloro-1,3-Butadiene	0.06	0%	0.0455	0.00	0.00	0.00	0.00
Hexaldehydes	0.003	100%		0.55	0.14	0.69	0.09
Isovaleraldehyde	0.004	3%		0.00	0.00	0.00	0.00
Methylene Chloride	**0.06**	**100%**	**2.1**	**19.03**	**5.48**	**22.19**	**2.36**
Methyl Ethyl Ketone	0.15	88%	1000	1.92	0.65	1.51	0.66
Methyl Isobutyl Keytone	0.15	0%	80	0.00	0.00	0.00	0.00
Methyl Methacrylate	0.18	0%	700	0.00	0.00	0.00	0.00
Methyl tert-Butyl Ether	0.18	97%	3000	1.05	0.29	0.57	0.29
n-Octane	0.06	63%		0.23	0.05	0.31	0.04
Propionaldehyde	0.005	94%		0.17	0.07	0.17	0.07
Propylene	0.05	100%	3000	0.52	0.30	0.86	0.29
Styrene	0.07	9%	1.75	0.03	0.01	0.19	0.00
1,1,2,2-Tetrachloroethane	0.06	0%	0.017	0.00	0.00	0.00	0.00
Tetrachloroethylene	0.06	25%	0.169	0.06	0.01	0.07	0.00
Toluadehydes	0.009	84%		0.13	0.03	0.07	0.03
Toluene	0.06	100%	400	9.15	2.43	17.07	1.43
1,2,4-Trichlorobenzene	0.06	0%	200	0.00	0.00	0.00	0.00
1,1,1-Trichloroethane	0.06	81%	1000	0.17	0.03	0.06	0.04
1,1,2-Trichloroethane	0.06	0%	0.0625	0.00	0.00	0.00	0.00
Trichloroethylene	0.07	0%	0.5	0.00	0.00	0.00	0.00
Trichlorofluoromethane	0.04	100%	700	1.87	0.33	0.99	0.30
Trichlorotrifluoroethane	0.07	100%		0.79	0.10	0.15	0.09
1,2,4-Trimethylbenzene	0.07	97%		0.37	0.08	0.28	0.07
1,3,5-Trimethylbenzene	0.07	66%		0.11	0.02	0.15	0.02
Valeraldehyde	0.005	65%		0.06	0.02	0.17	0.01
Vinyl Chloride	0.06	0%	0.11	0.00	0.00	0.00	0.00
m,p-Xylene	0.05	100%	700	7.08	1.63	3.41	1.59
o-Xylene	0.05	100%	700	2.40	0.55	1.14	0.51

Table 6
Air Toxics Data – 2001
Elizabeth, New Jersey

■g/m^3 – Micrograms Per Cubic Meter
ppbv – Parts Per Billion by Volume

Compounds in Bold had Annual Mean Concentrations Greater Then Their Accepted Health Benchmark

Pollutant	Detection Limit ppbv	% Detects	Benchmark ■g/m^3	Mean ■g/m^3	Mean ppbv	Max. ppbv	Median ppbv
Acetaldehyde	**0.005**	**98%**	**0.45**	**1.89**	**1.05**	**2.84**	**1.00**
Acetone	0.002	98%	30881	2.62	1.11	2.41	1.10
Acetonitrile	0.25	0%	60	0.00	0.00	0.00	0.00
Acetylene	0.13	100%		2.55	2.39	7.89	1.98
Acrylonitrile	0.21	0%	0.015	0.00	0.00	0.00	0.00
tert-Amyl Methyl Ether	0.12	13%		0.06	0.02	0.18	0.00
Benzaldehyde	0.003	100%		0.19	0.04	0.14	0.04
Benzene	**0.04**	**100%**	**0.13**	**1.97**	**0.62**	**1.56**	**0.55**
Bromochloromethane	0.12	0%		0.00	0.00	0.00	0.00
Bromodichloromethane	0.06	0%		0.00	0.00	0.00	0.00
Bromoform	0.08	0%	0.909	0.00	0.00	0.00	0.00
Bromomethane	0.09	6%	5	0.02	0.01	0.11	0.00
1,3-Butadiene	**0.07**	**90%**	**0.0036**	**0.28**	**0.13**	**0.47**	**0.13**
Butyr/Isobutyraldehyde	0.011	100%		0.24	0.08	0.16	0.08
Carbon Tetrachloride	**0.08**	**100%**	**0.067**	**0.56**	**0.09**	**0.12**	**0.09**
Chlorobenzene	0.06	0%	20	0.00	0.00	0.00	0.00
Chloroethane	0.08	2%	10000	0.00	0.00	0.09	0.00
Chloroform	0.05	17%	0.043	0.03	0.01	0.06	0.00
Chloromethane	**0.05**	**100%**	**0.556**	**1.32**	**0.65**	**1.05**	**0.66**
Chloromethylbenzene	0.07	0%		0.00	0.00	0.00	0.00
Chloroprene	0.1	0%	7	0.00	0.00	0.00	0.00
Crotonaldehyde	0.005	74%		0.06	0.02	0.11	0.01
Dibromochloromethane	0.08	0%		0.00	0.00	0.00	0.00
1,2-Dibromoethane	0.08	0%	0.0045	0.00	0.00	0.00	0.00
m-Dichlorobenzene	0.05	0%		0.00	0.00	0.00	0.00
o-Dichlorobenzene	0.06	0%	200	0.00	0.00	0.00	0.00
p-Dichlorobenzene	**0.09**	**52%**	**0.091**	**0.13**	**0.02**	**0.12**	**0.01**
1,1-Dichloroethane	0.08	0%	500	0.00	0.00	0.00	0.00
1,1-Dichloroethene	0.1	0%	0.02	0.00	0.00	0.00	0.00
cis-1,2-Dichloroethylene	0.1	0%		0.00	0.00	0.00	0.00
trans-1,2-Dichloroethylene	0.06	0%		0.00	0.00	0.00	0.00
Dichlorodifluoromethane	0.04	100%	200	3.28	0.66	1.06	0.65
1,2-Dichloroethane	0.06	0%	0.038	0.00	0.00	0.00	0.00
1,2-Dichloropropane	0.07	0%	0.056	0.00	0.00	0.00	0.00
cis-1,3-Dichloropropene	0.1	0%	0.25	0.00	0.00	0.00	0.00
trans-1,3-Dichloropropene	0.11	0%	0.25	0.00	0.00	0.00	0.00
Dichlorotetrafluoroethane	0.05	13%		0.01	0.00	0.02	0.00
2,5-Dimethylbenzaldehyde	0.004	23%		0.03	0.01	0.09	0.00
Ethyl Acrylate	0.16	0%	2	0.00	0.00	0.00	0.00

Table 6 – (Continued)
Air Toxics Data – 2001
Elizabeth, New Jersey

µg/m³ – Micrograms Per Cubic Meter
ppbv – Parts Per Billion by Volume

Compounds in Bold had Annual Mean Concentrations Greater Then Their Accepted Health Benchmark

Pollutant	Detection Limit ppbv	% Detects	Benchmark µg/m³	Mean µg/m³	Mean ppbv	Max. ppbv	Median ppbv
Ethylbenzene	0.04	100%	1000	0.92	0.21	0.48	0.20
Ethyl tert-Butyl Ether	0.15	0%		0.00	0.00	0.00	0.00
Formadlehyde	**0.016**	**100%**	**0.77**	**2.84**	**2.31**	**5.75**	**2.01**
Hexachloro-1,3-Butadiene	0.06	0%	0.0455	0.00	0.00	0.00	0.00
Hexaldehydes	0.003	96%		0.57	0.14	0.79	0.03
Isovaleraldehyde	0.004	13%		0.03	0.01	0.15	0.00
Methylene Chloride	0.06	100%	2.1	1.54	0.44	1.92	0.36
Methyl Ethyl Ketone	0.15	96%	1000	3.41	1.16	4.69	1.00
Methyl Isobutyl Keytone	0.15	10%	80	0.13	0.03	0.48	0.00
Methyl Methacrylate	0.18	0%	700	0.00	0.00	0.00	0.00
Methyl tert-Butyl Ether	0.18	96%	3000	6.83	1.90	7.05	1.42
n-Octane	0.06	88%		0.55	0.12	0.31	0.11
Propionaldehyde	0.005	96%		0.21	0.09	0.30	0.07
Propylene	0.05	100%	3000	7.93	4.64	19.18	2.35
Styrene	0.07	56%	1.75	0.12	0.03	0.10	0.03
1,1,2,2-Tetrachloroethane	0.06	0%	0.017	0.00	0.00	0.00	0.00
Tetrachloroethylene	**0.06**	**67%**	**0.169**	**0.40**	**0.06**	**0.23**	**0.05**
Toluadehydes	0.009	98%		0.22	0.04	0.13	0.04
Toluene	0.06	100%	400	5.66	1.50	3.68	1.28
1,2,4-Trichlorobenzene	0.06	0%	200	0.00	0.00	0.00	0.00
1,1,1-Trichloroethane	0.06	94%	1000	0.22	0.04	0.07	0.04
1,1,2-Trichloroethane	0.06	0%	0.0625	0.00	0.00	0.00	0.00
Trichloroethylene	0.07	29%	0.5	0.09	0.02	0.12	0.00
Trichlorofluoromethane	0.04	98%	700	1.97	0.35	0.86	0.32
Trichlorotrifluoroethane	0.07	100%		0.89	0.12	0.53	0.10
1,2,4-Trimethylbenzene	0.07	98%		1.09	0.22	0.57	0.20
1,3,5-Trimethylbenzene	0.07	98%		0.39	0.08	0.21	0.07
Valeraldehyde	0.005	83%		0.07	0.02	0.11	0.01
Vinyl Chloride	0.06	0%	0.11	0.00	0.00	0.00	0.00
m,p-Xylene	0.05	100%	700	2.59	0.60	1.39	0.56
o-Xylene	0.05	98%	700	1.17	0.27	0.62	0.26

Table 7
Air Toxics Data – 2001
New Brunswick, New Jersey

µg/m^3 – Micrograms Per Cubic Meter
ppbv – Parts Per Billion by Volume

Compounds in Bold had Annual Mean Concentrations Greater Then Their Accepted Health Benchmark

Pollutant	Detection Limit ppbv	% Detects	Benchmark µg/m^3	Mean µg/m^3	Mean ppbv	Max. ppbv	Median ppbv
Acetaldehyde	**0.005**	**100%**	**0.45**	**3.40**	**1.89**	**4.31**	**1.82**
Acetone	0.002	100%	30881	3.75	1.58	4.01	1.35
Acetonitrile	0.25	33%	60	11.52	6.90	183.61	0.00
Acetylene	0.13	100%		1.28	1.19	3.71	1.13
Acrylonitrile	0.21	0%	0.015	0.00	0.00	0.00	0.00
tert-Amyl Methyl Ether	0.12	0%		0.00	0.00	0.00	0.00
Benzaldehyde	0.003	97%		0.26	0.06	0.18	0.04
Benzene	**0.04**	**100%**	**0.13**	**1.02**	**0.32**	**0.67**	**0.31**
Bromochloromethane	0.12	0%		0.00	0.00	0.00	0.00
Bromodichloromethane	0.06	0%		0.00	0.00	0.00	0.00
Bromoform	0.08	0%	0.909	0.00	0.00	0.00	0.00
Bromomethane	0.09	11%	5	0.05	0.01	0.23	0.00
1,3-Butadiene	**0.07**	**50%**	**0.0036**	**0.06**	**0.03**	**0.13**	**0.01**
Butyr/Isobutyraldehyde	0.011	100%		0.57	0.19	0.38	0.19
Carbon Tetrachloride	**0.08**	**100%**	**0.067**	**0.58**	**0.09**	**0.12**	**0.09**
Chlorobenzene	0.06	0%	20	0.00	0.00	0.00	0.00
Chloroethane	0.08	0%	10000	0.00	0.00	0.00	0.00
Chloroform	**0.05**	**44%**	**0.043**	**0.11**	**0.02**	**0.08**	**0.00**
Chloromethane	**0.05**	**100%**	**0.556**	**4.90**	**2.40**	**66.00**	**0.59**
Chloromethylbenzene	0.07	0%		0.00	0.00	0.00	0.00
Chloroprene	0.1	0%	7	0.00	0.00	0.00	0.00
Crotonaldehyde	0.005	75%		0.11	0.04	0.24	0.01
Dibromochloromethane	0.08	0%		0.00	0.00	0.00	0.00
1,2-Dibromoethane	0.08	0%	0.0045	0.00	0.00	0.00	0.00
m-Dichlorobenzene	0.05	0%		0.00	0.00	0.00	0.00
o-Dichlorobenzene	0.06	0%	200	0.00	0.00	0.00	0.00
p-Dichlorobenzene	0.09	28%	0.091	0.05	0.01	0.05	0.00
1,1-Dichloroethane	0.08	0%	500	0.00	0.00	0.00	0.00
1,1-Dichloroethene	0.1	0%	0.02	0.00	0.00	0.00	0.00
cis-1,2-Dichloroethylene	0.1	3%		0.02	0.00	0.17	0.00
trans-1,2-Dichloroethylene	0.06	0%		0.00	0.00	0.00	0.00
Dichlorodifluoromethane	0.04	100%	200	2.98	0.60	0.84	0.61
1,2-Dichloroethane	0.06	0%	0.038	0.00	0.00	0.00	0.00
1,2-Dichloropropane	0.07	0%	0.056	0.00	0.00	0.00	0.00
cis-1,3-Dichloropropene	0.1	0%	0.25	0.00	0.00	0.00	0.00
trans-1,3-Dichloropropene	0.11	0%	0.25	0.00	0.00	0.00	0.00
Dichlorotetrafluoroethane	0.05	3%		0.00	0.00	0.01	0.00
2,5-Dimethylbenzaldehyde	0.004	25%		0.04	0.01	0.09	0.00
Ethyl Acrylate	0.16	0%	2	0.00	0.00	0.00	0.00

Table 7 – (Continued)
Air Toxics Data – 2001
New Brunswick, New Jersey

µg/m^3 – Micrograms Per Cubic Meter
ppbv – Parts Per Billion by Volume

Compounds in Bold had Annual Mean Concentrations Greater Then Their Accepted Health Benchmark

Pollutant	Detection Limit ppbv	% Detects	Benchmark µg/m^3	Mean µg/m^3	Mean ppbv	Max. ppbv	Median ppbv
Ethylbenzene	0.04	100%	1000	9.37	2.16	8.34	1.68
Ethyl tert-Butyl Ether	0.15	0%		0.00	0.00	0.00	0.00
Formadlehyde	**0.016**	**100%**	**0.77**	**6.82**	**5.55**	**16.46**	**4.41**
Hexachloro-1,3-Butadiene	0.06	0%	0.0455	0.00	0.00	0.00	0.00
Hexaldehydes	0.003	100%		1.13	0.28	1.17	0.08
Isovaleraldehyde	0.004	39%		0.05	0.02	0.15	0.00
Methylene Chloride	**0.06**	**100%**	**2.1**	**17.01**	**4.90**	**41.18**	**1.05**
Methyl Ethyl Ketone	0.15	94%	1000	3.20	1.09	3.20	1.13
Methyl Isobutyl Keytone	0.15	3%	80	0.01	0.00	0.07	0.00
Methyl Methacrylate	0.18	0%	700	0.00	0.00	0.00	0.00
Methyl tert-Butyl Ether	0.18	86%	3000	2.13	0.59	1.92	0.46
n-Octane	0.06	56%		0.21	0.04	0.36	0.04
Propionaldehyde	0.005	100%		0.49	0.20	0.43	0.22
Propylene	0.05	100%	3000	1.13	0.66	1.74	0.59
Styrene	0.07	69%	1.75	0.19	0.04	0.11	0.04
1,1,2,2-Tetrachloroethane	0.06	0%	0.017	0.00	0.00	0.00	0.00
Tetrachloroethylene	**0.06**	**56%**	**0.169**	**0.26**	**0.04**	**0.17**	**0.03**
Toluadehydes	0.009	97%		0.28	0.06	0.32	0.04
Toluene	0.06	100%	400	18.14	4.82	19.37	3.54
1,2,4-Trichlorobenzene	0.06	0%	200	0.00	0.00	0.00	0.00
1,1,1-Trichloroethane	0.06	86%	1000	0.21	0.04	0.20	0.04
1,1,2-Trichloroethane	0.06	0%	0.0625	0.00	0.00	0.00	0.00
Trichloroethylene	0.07	17%	0.5	0.06	0.01	0.13	0.00
Trichlorofluoromethane	0.04	100%	700	1.92	0.34	0.69	0.33
Trichlorotrifluoroethane	0.07	100%		2.97	0.39	10.08	0.10
1,2,4-Trimethylbenzene	0.07	100%		0.72	0.15	0.30	0.14
1,3,5-Trimethylbenzene	0.07	94%		0.25	0.05	0.09	0.05
Valeraldehyde	0.005	100%		0.32	0.09	0.19	0.09
Vinyl Chloride	0.06	0%	0.11	0.00	0.00	0.00	0.00
m,p-Xylene	0.05	100%	700	34.87	8.05	29.55	6.06
o-Xylene	0.05	100%	700	10.61	2.45	8.10	2.18