2003 Air Toxics Summary

New Jersey Department of Environmental Protection

INTRODUCTION

Air pollutants can be divided into two categories: the 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 for many years. 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 NJDEP 2003 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 to address 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.state.nj.us/dep/airmon/airtoxics.

HEALTH EFFECTS

People exposed to significant amounts of air toxics may have an increased chance of getting cancer or experiencing other serious health effects. The non-cancer health effects can range from respiratory, neurological, reproductive, developmental, or immune system damage, to irritation and effects on specific organs. In addition to inhalation exposure, there can be risks from the deposition of toxic pollutants onto soils or surface waters. There, they can be taken up by plants and animals, which are later consumed by humans.

The effects on human health resulting from exposure to specific air toxics can be estimated by using chemical-specific "health benchmarks." These are developed by the USEPA and other agencies by looking at numerous health studies for a chemical. For carcinogens, the health benchmark is set at 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 non-carcinogens is set at a concentration not expected to have any adverse health effects, also known as the reference concentration. Health benchmarks for each of the air toxics are listed in Table 4. If ambient air concentrations exceed the set benchmarks then further action is warranted.

SOURCES OF AIR TOXICS

A few years ago, USEPA began a national study of air toxics, the National-Scale Air Toxics Assessment (NATA). To determine people's exposure to air toxics around the country, USEPA first prepared a comprehensive inventory of air toxics emissions from all man-made sources in 1996. The 1996 emissions inventory for New Jersey was briefly reviewed and revised by NJDEP before being finalized. Although there are likely to be some errors in the details of such a massive undertaking, the emissions inventory still can give us an indication of the most important sources of air toxic emissions in our state. The pie chart in Figure 1 (see page 2), based on the 1996 NATA emissions estimates, shows that mobile sources are the largest contributors of air toxics emissions in New Jersey.

On-road mobile sources (cars, and trucks) account for 35% of the emissions, and off-road mobile sources (airplanes, trains, construction equipment, lawnmowers, boats, dirt bikes, etc.) contribute 33%. Area sources (residential, commercial, and small industrial sources) represent 25% of the inventory, and major point sources (such as factories and power plants) account for the remaining 7%.

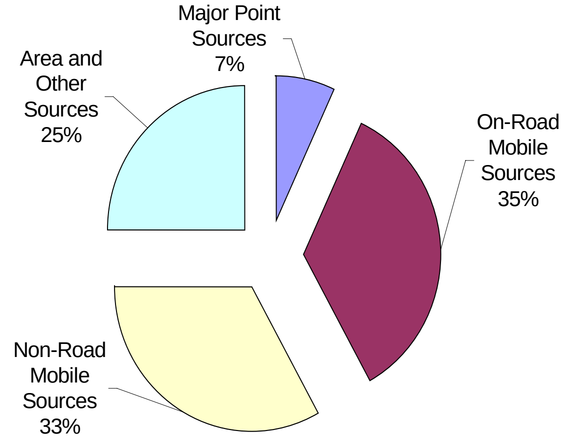
Air toxics come from so many different sources - not only manufacturing, but also other kinds of human activity. When New Jersey's emissions estimates are broken down by county (see Figure 2) it is evident that the areas with the largest air toxic emissions are generally those with the largest populations. This is directly related to high levels of vehicle use, solvent use, heating, and other population-related activities in those counties.

Estimating Air Toxics Exposure

The next step in USEPA's NATA project was to use the emissions information in an air dispersion model. The model estimates the concentrations of air toxics that people may be exposed to in different parts of the country. The map in Figure 3 shows the predicted concentrations of benzene throughout New Jersey. The high concentration areas tend to overlap the more densely populated areas of the state, following the pattern of emissions. Not all air toxics follow this pattern, as some are more closely associated with individual point sources, but in general, larger populations result in greater emissions of, and exposure to, air toxics.

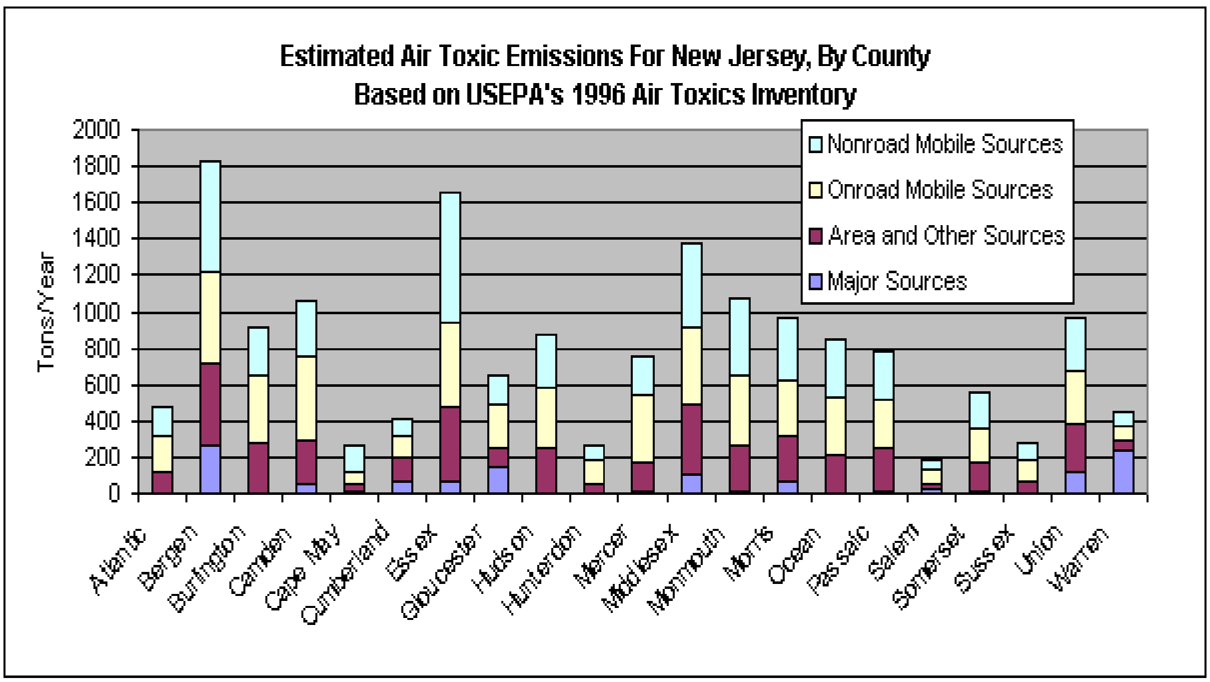
Our preliminary analysis of the state and county

Figure 1
1996 Air Toxics Emissions Estimates for New Jersey



Source: USEPA's National Air Toxics Assessment, 1996

Figure 2



average air toxics concentrations generated by NATA indicates that nineteen chemicals were predicted to exceed their health benchmarks, or level of concern, in one or more counties in 1996. Eighteen of these are considered to be cancer causing (carcinogenic) chemicals, and one (acrolein) is not. Estimated air concentrations of these 19 pollutants vary around the state, depending on the type of sources that emit them. This is summarized in Table 1.

Figure 3

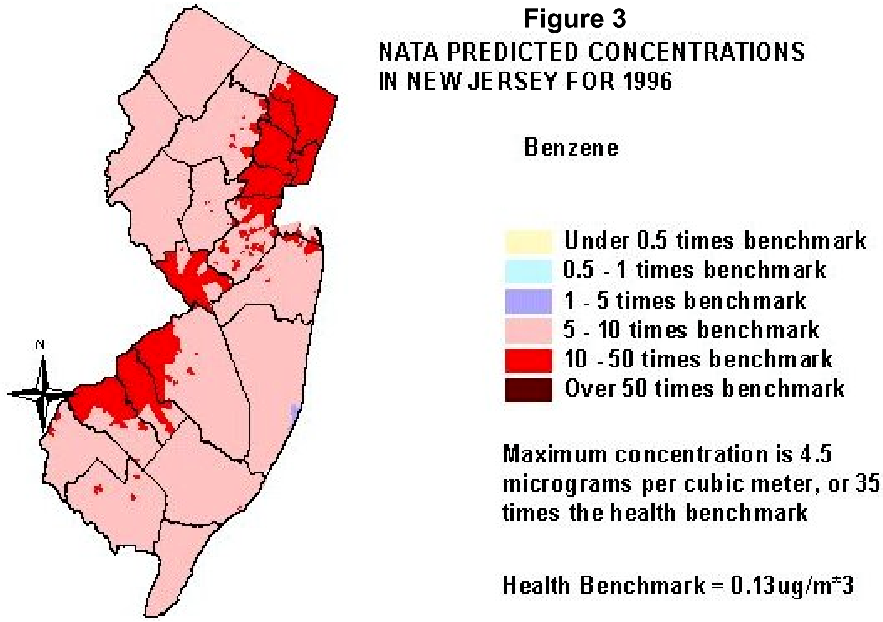


Table 1

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
Tetrachloroethylene	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 TOXICS MONITORING PROGRAM

NJDEP has established four air toxics monitoring sites around the state. They are located in Camden, Elizabeth, New Brunswick and Chester (see Figure 4). The Camden Lab site has been measuring several toxic volatile organic compounds (VOCs) since 1989. The Elizabeth Lab site began measuring VOCs in 2000, and the New Brunswick and Chester sites became operational in July 2001. Analysis of toxic metals at all four sites also began in 2001.

A comparison of the concentrations predicted by NATA and actual monitored levels can be made for the Camden Lab site. In 1996, thirteen of the compounds evaluated in NATA were measured in Camden. Table 2 compares the NATA predictions with the measured concentrations for 1996. Measured 2003 levels, and the percent of change from 1996, are also shown. Of the thirteen air toxics measured, three of them fell below detection limits in 1996, so no concentration can be reported for that year. For the remaining ten compounds, the comparisons are shown in Figure 5. It appears from this analysis that the agreement between predicted and monitored concentrations is remarkably good. Also, for most of the thirteen air toxics in Table 2, the 2003 levels measured at the Camden Lab were substantially lower than the concentrations measured in 1996.

Figure 4
2003 Air Toxics Monitoring Network

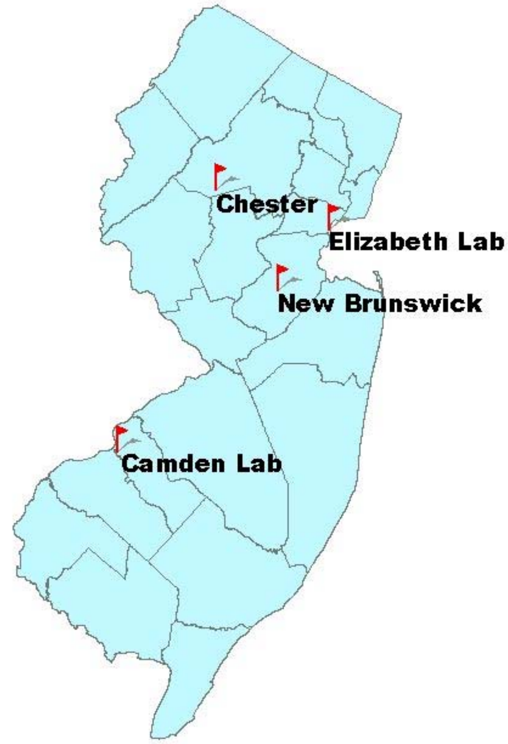


Figure 5
Air Toxics Levels Measured in 1996 at Camden, New Jersey Compared to NATA Predicted Levels

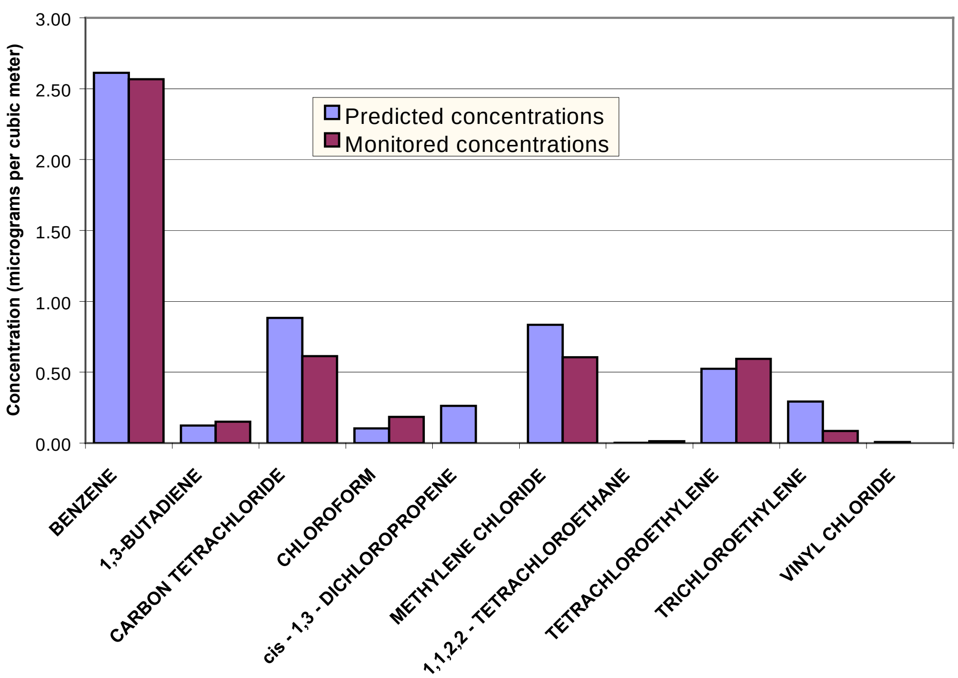


Table 2
Comparison of NATA Predicted to Measured Levels in Camden, NJ

NA – Not Available
$\mu g/m^3$ - Micrograms Per Cubic Meter

Pollutant (HAP)	NATA Predicted 1996, $\mu g/m^3$	Measured 1996 Level, $\mu g/m^3$	Measured 2003 Level, $\mu g/m^3$	Percent Change in Measured Levels in 1996 and 2003
Acetaldehyde	1.74	4.53	NA	NA
Acrylonitrile	0.003	NA	0.02*	NA
Benzene	2.61	2.57	0.50	-80.5%
1,3-Butadiene	0.12	0.15	0.03*	-80.0%
Carbon Tetrachloride	0.88	0.61	0.08	-86.9%
Chloroform*	0.10	0.18*	0.00*	-100%
cis-1,3-Dichloropropene*	0.26	0.00*	0.00*	0.0%
Formaldehyde	2.20	14.63	NA	NA
Methylene Chloride	0.83	0.61	0.11	-82.0%
1,1,2,2-Tetrachloroethane*	0.00	0.01*	0.00*	-100%
Tetrachloroethylene	0.52	0.59	0.02*	-96.6%
Trichloroethylene	0.29	0.09*	0.00*	-100%
Vinyl Chloride *	0.01	0.00*	0.00*	0.0%

***** Measurement fell below detection limits.

Negative values for percent change mean measured levels went down from 1996 to 2003

AIR TOXICS MONITORING RESULTS FOR 2003

The results of the air toxics monitoring program for 2003 are shown in Table 3. This table shows the average concentration for each air toxic measured at the four New Jersey monitoring sites. All values are in parts per billion by volume (ppbv). More detailed tables (Tables 4-7) that show additional statistics, detection limit information, health benchmarks used by NJDEP, and levels in ppbv and micrograms per cubic meter ($\mu g/m^3$) can be found at the end of this section. The ppbv units are more common for monitoring results, while $\mu g/m^3$ 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. Concentrations below the detection limit, including zero values, were used in the calculation of the annual average concentrations.

Reported averages for which 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 value when the results are ranked) are reported 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 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.

The Elizabeth Lab site has the highest concentrations for the majority of the prevalent air toxics and also had the highest number of compounds (nine) with average concentrations that exceeded their health benchmark. New Brunswick also had nine compounds exceeding health benchmarks. It is also important to note that instrumental malfunction caused unusually low readings for a portion of compounds at Camden from September 2002 through July 2003. This group of compounds are called carbonyls and are noted as not available (NA) in Tables 2-4. The toxic air pollutants that exceeded the health benchmark included acetaldehyde, benzene, carbon tetrachloride, chloromethane, and formaldehyde.

Figure 6
Selected Toxic Volatile Organics
2003 Annual Averages
New Jersey

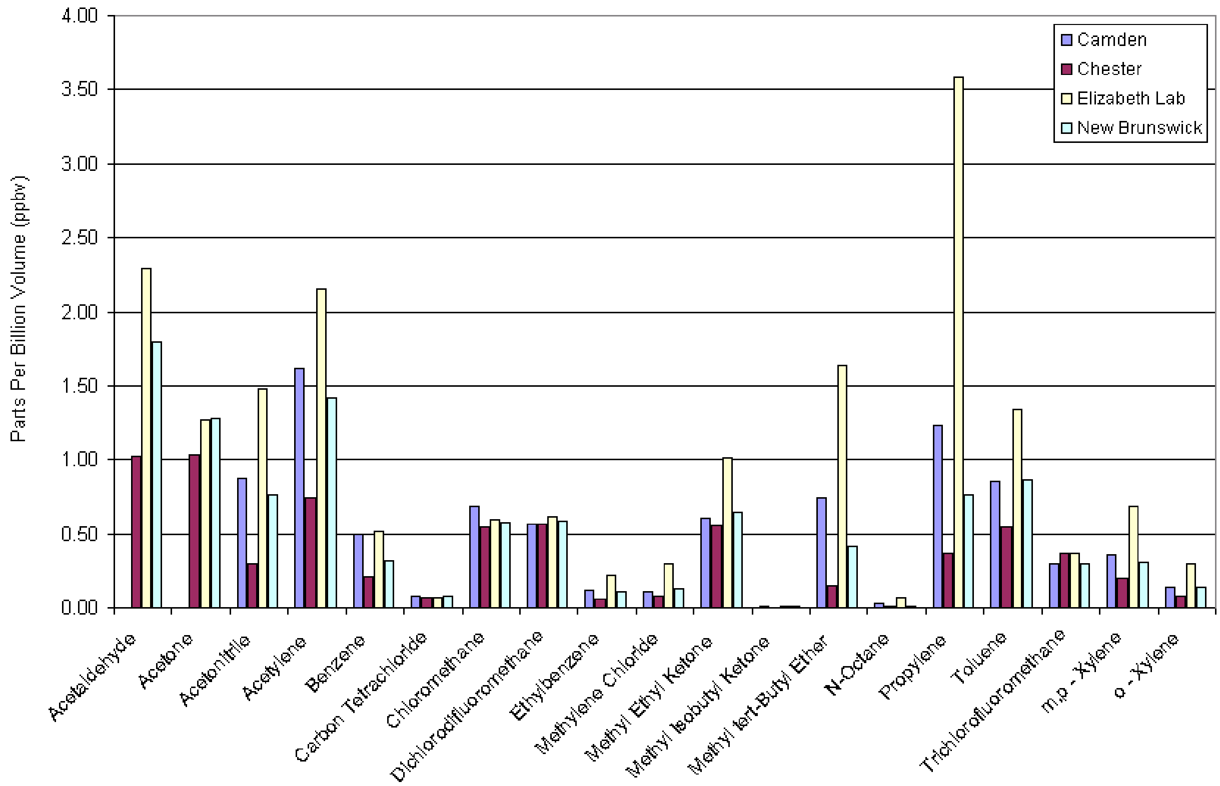


Table 3
New Jersey Air Toxics Summary – 2003

Annual Average Concentration
ppbv – Parts Per Billion by Volume

Pollutant	Camden Lab[a]	Chester	Elizabeth Lab	New Brunswick
Acetaldehyde	NA	1.02	2.30	1.80
Acetone	NA	1.04	1.27	1.28
Acetonitrile	0.88	0.30	1.48	0.77
Acetylene	1.61	0.74	2.15	1.42
Acrylonitrile	0.02	0.02	0.01	0.01
tert-Amyl Methyl Ether	0.00	0.00	0.02	0.00
Benzaldehyde	NA	0.03	0.06	0.03
Benzene	0.50	0.21	0.51	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	0.43	0.00	0.00	0.00
1,3-Butadiene	0.03	0.01	0.08	0.02
Butyr/Isobutyraldehyde	NA	0.11	0.18	0.17
Carbon Tetrachloride	0.08	0.07	0.07	0.08
Chlorobenzene	0.00	0.00	0.00	0.00
Chloroethane	0.00	0.00	0.00	0.00
Chloroform	0.00	0.00	0.01	0.01
Chloromethane	0.68	0.55	0.60	0.57
Chloromethylbenzene	0.00	0.00	0.00	0.00
Chloroprene	0.00	0.00	0.00	0.00
Crotonaldehyde	NA	0.07	0.09	0.10
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	0.01	0.00	0.01	0.00
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	0.01
trans - 1,2 - Dichloroethylene	0.00	0.00	0.00	0.00
Dichlorodifluoromethane	0.57	0.57	0.61	0.58
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	NA	0.00	0.01	0.00
Ethyl Acrylate	0.00	0.00	0.00	0.00
Ethylbenzene	0.12	0.06	0.22	0.11
Ethyl tert-Butyl Ether	0.00	0.00	0.00	0.00
Formaldehyde	NA	2.68	3.23	2.82

Table 3 (Continued)
New Jersey Air Toxics Summary – 2003

Annual Average Concentration
ppbv – Parts Per Billion by Volume

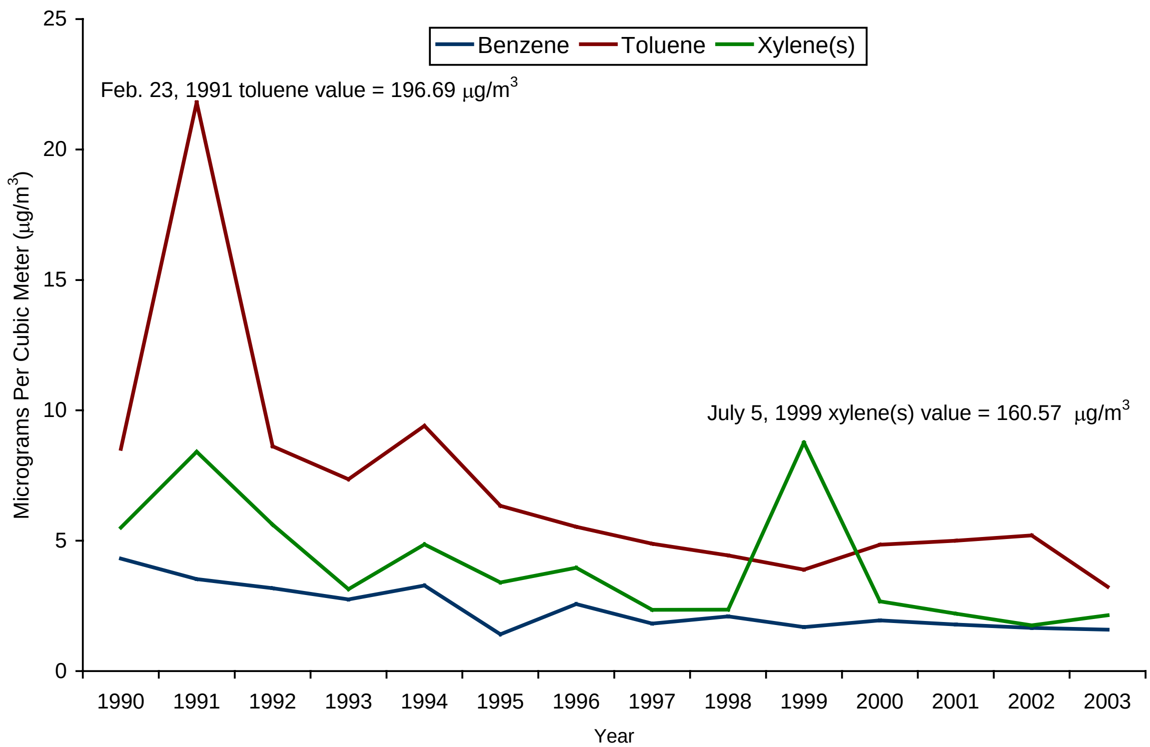
Pollutant	Camden Lab[a]	Chester	Elizabeth Lab	New Brunswick
Hexachloro-1,3-Butadiene	0	0.00	0.00	0.00
Hexaldehyde	NA	0.02	0.17	0.04
Isovaleraldehyde	NA	0.00	0.00	0.01
Methylene Chloride	0.11	0.08	0.30	0.13
Methyl Ethyl Ketone	0.60	0.56	1.02	0.65
Methyl Isobutyl Ketone	0.01	0.00	0.01	0.01
Methyl Methacrylate	0.00	0.00	0.03	0.00
Methyl tert-Butyl Ether	0.74	0.15	1.64	0.42
N-Octane	0.03	0.01	0.07	0.01
Propionaldehyde	NA	0.08	0.18	0.15
Propylene	1.23	0.37	3.58	0.76
Styrene	0.02	0.02	0.06	0.02
1,1,2,2 - Tetrachloroethane	0.00	0.00	0.00	0.00
Tetrachloroethylene	0.02	0.02	0.04	0.03
Tolualdehydes	NA	0.02	0.06	0.03
Toluene	0.86	0.55	1.34	0.86
1,2,4-Trichlorobenzene	0	0.00	0.00	0.00
1,1,1 - Trichloroethane	0.01	0.01	0.02	0.01
1,1,2 - Trichloroethane	0.00	0.00	0.00	0.00
Trichloroethylene	0.00	0.00	0.02	0.00
Trichlorofluoromethane	0.30	0.36	0.37	0.30
Trichlorotrifluoroethane	0.10	0.09	0.10	0.10
1,2,4-Trimethylbenzene	0.12	0.04	0.17	0.09
1,3,5-Trimethylbenzene	0.03	0.01	0.05	0.02
Valeraldehyde	NA	0.02	0.12	0.05
Vinyl Chloride	0.00	0.00	0.00	0.00
m,p - Xylene	0.35	0.19	0.68	0.30
o - Xylene	0.14	0.08	0.29	0.13

[a] Data not available for the 4th quarter of 2003

TRENDS

The site in Camden is the only monitoring location that has been measuring air toxics for an extended period. The graph in Figure 7 shows the change in concentrations for three of the most prevalent air toxics (benzene, toluene, and xylene) from 1990 to 2003. 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 significantly over the last ten years. Because air toxics comprise such a large and diverse group of compounds, however, these general trends may not hold for other pollutants in different areas of the state.

Figure 7
Annual Averages for Selected Hazardous Air Pollutants (HAPs) at Camden Lab from 1990-2003



[a]Data not available for 4th quarter of 2003

Table 4
Air Toxics Data 2003
January – September
Camden Lab, 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[1] μg/m³	Mean[2,3] μg/m³	Mean ppbv	Max. ppbv	Median ppbv
Acetaldehyde	**0.005**	**100**	**0.45**	**NA**	**NA**	**2.91**	**NA**
Acetone	0.002	100	30881	NA	NA	1.02	NA
Acetonitrile	0.25	24	60	1.47	0.88	8.83	0.00
Acetylene	0.13	100		1.72	1.61	4.65	1.45
Acrylonitrile	**0.21**	**11**	**0.015**	**0.05**	**0.02**	**0.34**	**0.00**
tert-Amyl Methyl Ether	0.12	3		0.00	0.00	0.03	0.00
Benzaldehyde	0.003	97		NA	NA	0.05	NA
Benzene	**0.04**	**100**	**0.13**	**1.59**	**0.50**	**1.30**	**0.43**
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	0.91	0.00	0.00	0.00	0.00
Bromomethane	0.09	41	5	1.67	0.43	11.09	0.00
1,3-Butadiene	**0.07**	**35**	**0.033**	**0.07**	**0.03**	**0.21**	**0.00**
Butyr/Isobutyraldehyde	0.011	100		NA	NA	0.44	NA
Carbon Tetrachloride	**0.08**	**89**	**0.067**	**0.50**	**0.08**	**0.12**	**0.09**
Chlorobenzene	0.06	0	1000	0.00	0.00	0.00	0.00
Chloroethane	0.08	0		0.00	0.00	0.00	0.00
Chloroform	0.05	11	0.043	0.01	0.00	0.04	0.00
Chloromethane	**0.05**	**100**	**0.56**	**1.40**	**0.68**	**1.03**	**0.65**
Chloromethylbenzene	0.07	0		0.00	0.00	0.00	0.00
Chloroprene	0.01	3	7	0.00	0.00	0.05	0.00
Crotonaldehyde	0.005	94		NA	NA	0.31	NA
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	22	0.091	0.08	0.01	0.14	0.00
Dichlorodifluoromethane	0.04	100	200	2.25	0.57	0.90	0.57
1,1 – Dichloroethane	0.08	0	0.63	0.00	0.00	0.00	0.00
1,2 – Dichloroethane	0.06	0	0.000053	0.00	0.00	0.00	0.00
1,1-Dichloroethene	0.1	0	200	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
1,2 – Dichloropropane	0.07	0	0.1	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	0		0.00	0.00	0.00	0.00
2,5-Dimethylbenzaldehyde	0.004	3		NA	NA	0.00	NA

Table 4 (Continued)
Air Toxics Data – 2003
January - September
Camden Lab, New Jersey

$\mu g/m^3$ – 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[1] $\mu g/m^3$	Mean[2,3] $\mu g/m^3$	Mean ppbv	Max. Ppbv	Median Ppbv
Ethyl Acrylate	0.16	0	2	0.00	0.00	0.00	0.00
Ethylbenzene	0.04	89		0.50	0.12	0.29	0.10
Ethyl tert-Butyl Ether	0.15	0		0.00	0.00	0.00	0.00
Formaldehyde	**0.016**	**100**	**0.077**	**NA**	**NA**	**4.11**	**NA**
Hexachloro-1,3-Butadiene	0.06	0	0.0455	0.00	0.00	0.00	0.00
Hexaldehyde	0.003	100		NA	NA	0.07	NA
Isovaleraldehyde	0.004	3		NA	NA	0.02	NA
Methylene Chloride	0.06	65	2.1	0.39	0.11	0.62	0.09
Methyl Ethyl Ketone	0.15	46		1.77	0.60	6.34	0.00
Methyl Isobutyl Ketone	0.15	11	80	0.04	0.01	0.23	0.00
Methyl Methacrylate	0.18	0	700	0.00	0.00	0.00	0.00
Methyl tert-Butyl Ether	0.18	78	3.8	2.68	0.74	2.41	0.55
N-Octane	0.06	38		0.16	0.03	0.21	0.00
Propionaldehyde	0.005	94		NA	NA	0.18	NA
Propylene	0.05	100	3000	2.12	1.23	4.76	0.83
Styrene	0.07	30	1.8	0.07	0.02	0.12	0.00
1,1,2,2 – Tetrachloroethane	0.06	0	0.017	0.00	0.00	0.00	0.00
Tetrachloroethylene	0.06	30	0.17	0.13	0.02	0.11	0.00
Tolualdehydes	0.009	100		NA	NA	0.08	NA
Toluene	0.06	100	400	3.23	0.86	1.90	0.68
1,2,4-Trichlorobenzene	0.06	0	200	0.00	0.00	0.00	0.00
1,1,1 – Trichloroethane	0.06	35	1000	0.08	0.01	0.19	0.00
1,1,2 – Trichloroethane	0.06	0	0.063	0.00	0.00	0.00	0.00
Trichloroethylene	0.07	8	0.5	0.02	0.00	0.07	0.00
Trichlorofluoromethane	0.04	100	700	1.67	0.30	0.47	0.28
Trichlorotrifluoroethane	0.07	95		0.80	0.10	0.17	0.10
1,2,4-Trimethylbenzene	0.07	92		0.58	0.12	0.31	0.10
1,3,5-Trimethylbenzene	0.07	51		0.15	0.03	0.11	0.02
Valeraldehyde	0.05	94		NA	NA	0.06	NA
Vinyl Chloride	0.06	3	0.11	0.00	0.00	0.06	0.00
m,p - Xylene	0.05	97	100	1.53	0.35	0.87	0.28
o - Xylene	0.05	95	100	0.61	0.14	0.33	0.12

[1,2,3] See table end notes on Air Toxics page 18

Table 5
Air Toxics Data – 2003
Chester, 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[1] μg/m³	Mean[2,3] μg/m³	Mean Ppbv	Max. Ppbv	Median ppbv
Acetaldehyde	**0.005**	**100**	**0.45**	**1.84**	**1.02**	**2.39**	**0.92**
Acetone	0.002	100	30881	2.46	1.04	1.97	1.03
Acetonitrile	0.25	30	60	0.50	0.30	5.11	0.00
Acetylene	0.13	96		0.79	0.74	1.96	0.70
Acrylonitrile	**0.21**	**9**	**0.015**	**0.03**	**0.02**	**0.33**	**0.00**
tert-Amyl Methyl Ether	0.12	0		0.00	0.00	0.00	0.00
Benzaldehyde	0.003	100		0.12	0.03	0.07	0.02
Benzene	**0.04**	**98**	**0.13**	**0.68**	**0.21**	**0.45**	**0.20**
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	0.91	0.00	0.00	0.00	0.00
Bromomethane	0.09	4	5	0.00	0.00	0.02	0.00
1,3-Butadiene	0.07	12	0.033	0.02	0.01	0.26	0.00
Butyr/Isobutyraldehyde	0.011	100		0.33	0.11	0.24	0.10
Carbon Tetrachloride	**0.08**	**86**	**0.067**	**0.44**	**0.07**	**0.15**	**0.08**
Chlorobenzene	0.06	0	1000	0.00	0.00	0.00	0.00
Chloroethane	0.08	4		0.00	0.00	0.02	0.00
Chloroform	0.05	14	0.043	0.01	0.00	0.03	0.00
Chloromethane	**0.05**	**98**	**0.56**	**1.14**	**0.55**	**0.74**	**0.57**
Chloromethylbenzene	0.07	2		0.01	0.00	0.12	0.00
Chloroprene	0.01	0	7	0.00	0.00	0.00	0.00
Crotonaldehyde	0.005	96		0.20	0.07	0.45	0.05
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	2	0.091	0.00	0.00	0.02	0.00
Dichlorodifluoromethane	0.04	98	200	2.25	0.57	1.19	0.57
1,1 - Dichloroethane	0.08	0	0.63	0.00	0.00	0.00	0.00
1,2 - Dichloroethane	0.06	0	0.000053	0.00	0.00	0.00	0.00
1,1-Dichloroethene	0.1	0	200	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	2		0.01	0.00	0.10	0.00
1,2 - Dichloropropane	0.07	0	0.1	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	0		0.00	0.00	0.00	0.00
2,5-Dimethylbenzaldehyde	0.004	2		0.00	0.00	0.01	0.00
Ethyl Acrylate	0.16	0	2	0.00	0.00	0.00	0.00

Table 5 – (Continued)
Air Toxics Data – 2003
Chester, 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[1] μg/m³	Mean[2,3] μg/m³	Mean Ppbv	Max. Ppbv	Median ppbv
Ethylbenzene	0.04	61		0.25	0.06	0.75	0.04
Ethyl tert-Butyl Ether	0.15	0		0.00	0.00	0.00	0.00
Formaldehyde	**0.016**	**100**	**0.077**	**3.29**	**2.68**	**11.35**	**2.20**
Hexachloro-1,3-Butadiene	0.06	0	0.0455	0.00	0.00	0.00	0.00
Hexaldehyde	0.003	100		0.08	0.02	0.06	0.02
Isovaleraldehyde	0.004	20		0.01	0.00	0.04	0.00
Methylene Chloride	0.06	65	2.1	0.28	0.08	0.48	0.06
Methyl Ethyl Ketone	0.15	54		1.65	0.56	3.84	0.31
Methyl Isobutyl Ketone	0.15	4	80	0.01	0.00	0.14	0.00
Methyl Methacrylate	0.18	2	700	0.02	0.00	0.25	0.00
Methyl tert-Butyl Ether	0.18	61	3.8	0.54	0.15	0.73	0.12
N-Octane	0.06	16		0.06	0.01	0.37	0.00
Propionaldehyde	0.005	100		0.19	0.08	0.21	0.07
Propylene	0.05	96	3000	0.63	0.37	1.18	0.31
Styrene	0.07	18	1.8	0.07	0.02	0.61	0.00
1,1,2,2 - Tetrachloroethane	0.06	0	0.017	0.00	0.00	0.00	0.00
Tetrachloroethylene	0.06	25	0.17	0.13	0.02	0.49	0.00
Tolualdehydes	0.009	98		0.12	0.02	0.06	0.02
Toluene	0.06	100	400	2.06	0.55	10.62	0.30
1,2,4-Trichlorobenzene	0.06	0	200	0.00	0.00	0.00	0.00
1,1,1 - Trichloroethane	0.06	37	1000	0.06	0.01	0.05	0.00
1,1,2 - Trichloroethane	0.06	0	0.063	0.00	0.00	0.00	0.00
Trichloroethylene	0.07	2	0.5	0.00	0.00	0.01	0.00
Trichlorofluoromethane	0.04	98	700	2.03	0.36	3.50	0.28
Trichlorotrifluoroethane	0.07	95		0.69	0.09	0.14	0.10
1,2,4-Trimethylbenzene	0.07	61		0.19	0.04	0.56	0.03
1,3,5-Trimethylbenzene	0.07	26		0.04	0.01	0.21	0.00
Valeraldehyde	0.05	98		0.05	0.02	0.04	0.01
Vinyl Chloride	0.06	0	0.11	0.00	0.00	0.00	0.00
m,p - Xylene	0.05	93	100	0.84	0.19	1.19	0.17
o - Xylene	0.05	75	100	0.35	0.08	0.74	0.07

[1,2,3] See table end notes on Air Toxics page 18

Table 6
Air Toxics Data – 2003
Elizabeth Lab, New Jersey

$\mu g/m^3$ – 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[1] $\mu g/m^3$	Mean[2,3] $\mu g/m^3$	Mean Ppbv	Max. Ppbv	Median ppbv
Acetaldehyde	**0.005**	**100**	**0.45**	**4.13**	**2.30**	**7.18**	**1.80**
Acetone	0.002	100	30881	3.02	1.27	5.99	0.88
Acetonitrile	0.25	49	60	2.48	1.48	6.34	0.00
Acetylene	0.13	100		2.29	2.15	8.38	1.57
Acrylonitrile	0.21	6	0.015	0.01	0.01	0.13	0.00
tert-Amyl Methyl Ether	0.12	25		0.10	0.02	0.23	0.00
Benzaldehyde	0.003	98		0.27	0.06	0.38	0.05
Benzene	**0.04**	**100**	**0.13**	**1.63**	**0.51**	**1.31**	**0.45**
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	0.91	0.00	0.00	0.00	0.00
Bromomethane	0.09	11	5	0.02	0.00	0.07	0.00
1,3-Butadiene	**0.07**	**70**	**0.033**	**0.17**	**0.08**	**0.30**	**0.07**
Butyr/Isobutyraldehyde	0.011	98		0.54	0.18	0.92	0.15
Carbon Tetrachloride	**0.08**	**89**	**0.067**	**0.46**	**0.07**	**0.12**	**0.08**
Chlorobenzene	0.06	0	1000	0.00	0.00	0.00	0.00
Chloroethane	0.08	2		0.00	0.00	0.05	0.00
Chloroform	**0.05**	**25**	**0.043**	**0.05**	**0.01**	**0.06**	**0.00**
Chloromethane	**0.05**	**100**	**0.56**	**1.23**	**0.60**	**0.83**	**0.61**
Chloromethylbenzene	0.07	0		0.00	0.00	0.00	0.00
Chloroprene	0.01	0	7	0.00	0.00	0.00	0.00
Crotonaldehyde	0.005	98		0.25	0.09	0.37	0.06
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	0.01	0.00
p - Dichlorobenzene	0.09	28	0.091	0.07	0.01	0.08	0.00
Dichlorodifluoromethane	0.04	100	200	2.43	0.61	0.77	0.62
1,1 - Dichloroethane	0.08	0	0.63	0.00	0.00	0.00	0.00
1,2 - Dichloroethane	0.06	0	0.000053	0.00	0.00	0.00	0.00
1,1-Dichloroethene	0.1	2	200	0.01	0.00	0.17	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
1,2 - Dichloropropane	0.07	0	0.1	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	0		0.00	0.00	0.00	0.00
2,5-Dimethylbenzaldehyde	0.004	31		0.04	0.01	0.08	0.00
Ethyl Acrylate	0.16	0	2	0.00	0.00	0.00	0.00

Table 6 – (Continued)
Air Toxics Data – 2003
Elizabeth Lab, 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[1] μg/m³	Mean[2,3] μg/m³	Mean Ppbv	Max. Ppbv	Median ppbv
Ethylbenzene	0.04	91		0.93	0.22	0.59	0.20
Ethyl tert-Butyl Ether	0.15	0		0.00	0.00	0.00	0.00
Formaldehyde	**0.016**	**100**	**0.077**	**3.96**	**3.23**	**7.38**	**3.22**
Hexachloro-1,3-Butadiene	0.06	0	0.0455	0.00	0.00	0.00	0.00
Hexaldehyde	0.003	98		0.69	0.17	2.62	0.04
Isovaleraldehyde	0.004	27		0.01	0.00	0.03	0.00
Methylene Chloride	0.06	94	2.1	1.03	0.30	3.90	0.20
Methyl Ethyl Ketone	0.15	79		2.99	1.02	5.85	0.86
Methyl Isobutyl Ketone	0.15	17	80	0.05	0.01	0.14	0.00
Methyl Methacrylate	0.18	8	700	0.10	0.03	0.53	0.00
Methyl tert-Butyl Ether	**0.18**	**94**	**3.8**	**5.90**	**1.64**	**6.38**	**1.31**
N-Octane	0.06	60		0.34	0.07	0.63	0.05
Propionaldehyde	0.005	98		0.42	0.18	1.46	0.08
Propylene	0.05	100	3000	6.16	3.58	47.50	1.82
Styrene	0.07	49	1.8	0.26	0.06	1.57	0.00
1,1,2,2 - Tetrachloroethane	0.06	0	0.017	0.00	0.00	0.00	0.00
Tetrachloroethylene	**0.06**	**53**	**0.17**	**0.27**	**0.04**	**0.32**	**0.03**
Tolualdehydes	0.009	100		0.28	0.06	0.28	0.04
Toluene	0.06	100	400	5.06	1.34	3.78	1.25
1,2,4-Trichlorobenzene	0.06	0	200	0.00	0.00	0.00	0.00
1,1,1 - Trichloroethane	0.06	49	1000	0.09	0.02	0.06	0.00
1,1,2 - Trichloroethane	0.06	0	0.063	0.00	0.00	0.00	0.00
Trichloroethylene	0.07	38	0.5	0.10	0.02	0.27	0.00
Trichlorofluoromethane	0.04	100	700	2.07	0.37	1.03	0.32
Trichlorotrifluoroethane	0.07	91		0.74	0.10	0.22	0.10
1,2,4-Trimethylbenzene	0.07	92		0.81	0.17	0.34	0.16
1,3,5-Trimethylbenzene	0.07	72		0.24	0.05	0.13	0.05
Valeraldehyde	0.05	98		0.41	0.12	1.49	0.04
Vinyl Chloride	0.06	2	0.11	0.00	0.00	0.02	0.00
m,p - Xylene	0.05	100	100	2.96	0.68	2.29	0.62
o - Xylene	0.05	94	100	1.27	0.29	0.82	0.27

[1,2,3] See table end notes on Air Toxics page 18

Table 7
Air Toxics Data – 2003
New Brunswick, 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[1] μg/m³	Mean[2,3] μg/m³	Mean Ppbv	Max. Ppbv	Median ppbv
Acetaldehyde	**0.005**	**100**	**0.45**	**3.24**	**1.80**	**4.43**	**1.50**
Acetone	0.002	100	30881	3.03	1.28	6.15	1.15
Acetonitrile	0.25	48	60	1.29	0.77	8.78	0.00
Acetylene	0.13	100		1.51	1.42	5.57	1.20
Acrylonitrile	**0.21**	**8**	**0.015**	**0.03**	**0.01**	**0.24**	**0.00**
tert-Amyl Methyl Ether	0.12	4		0.00	0.00	0.03	0.00
Benzaldehyde	0.003	100		0.15	0.03	0.10	0.03
Benzene	**0.04**	**100**	**0.13**	**1.02**	**0.32**	**0.80**	**0.29**
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	0.91	0.00	0.00	0.00	0.00
Bromomethane	0.09	4	5	0.00	0.00	0.01	0.00
1,3-Butadiene	**0.07**	**32**	**0.033**	**0.05**	**0.02**	**0.15**	**0.00**
Butyr/Isobutyraldehyde	0.011	100		0.51	0.17	0.46	0.13
Carbon Tetrachloride	**0.08**	**90**	**0.067**	**0.49**	**0.08**	**0.13**	**0.08**
Chlorobenzene	0.06	0	1000	0.00	0.00	0.00	0.00
Chloroethane	0.08	4		0.01	0.00	0.09	0.00
Chloroform	**0.05**	**28**	**0.043**	**0.05**	**0.01**	**0.06**	**0.00**
Chloromethane	**0.05**	**100**	**0.56**	**1.18**	**0.57**	**0.78**	**0.56**
Chloromethylbenzene	0.07	2		0.01	0.00	0.07	0.00
Chloroprene	0.01	0	7	0.00	0.00	0.00	0.00
Crotonaldehyde	0.005	100		0.29	0.10	0.55	0.04
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	10	0.091	0.01	0.00	0.05	0.00
Dichlorodifluoromethane	0.04	100	200	2.31	0.58	0.71	0.60
1,1 - Dichloroethane	0.08	0	0.63	0.00	0.00	0.00	0.00
1,2 - Dichloroethane	0.06	0	0.000053	0.00	0.00	0.00	0.00
1,1-Dichloroethene	0.1	0	200	0.00	0.00	0.00	0.00
cis-1,2-Dichloroethylene	0.1	4		0.05	0.01	0.34	0.00
trans - 1,2 - Dichloroethylene	0.06	0		0.00	0.00	0.00	0.00
1,2 - Dichloropropane	0.07	0	0.1	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	2		0.00	0.00	0.02	0.00
2,5-Dimethylbenzaldehyde	0.004	11		0.01	0.00	0.03	0.00
Ethyl Acrylate	0.16	0	2	0.00	0.00	0.00	0.00

Table 7 – (Continued)
Air Toxics Data – 2003
New Brunswick, New Jersey

$\mu g/m^3$ – 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[1] $\mu g/m^3$	Mean[2,3] $\mu g/m^3$	Mean Ppbv	Max. ppbv	Median ppbv
Ethylbenzene	0.04	88		0.48	0.11	0.26	0.12
Ethyl tert-Butyl Ether	0.15	0		0.00	0.00	0.00	0.00
Formaldehyde	**0.016**	**100**	**0.077**	**3.46**	**2.82**	**12.31**	**1.75**
Hexachloro-1,3-Butadiene	0.06	0	0.0455	0.00	0.00	0.00	0.00
Hexaldehyde	0.003	100		0.16	0.04	0.27	0.02
Isovaleraldehyde	0.004	48		0.03	0.01	0.05	0.00
Methylene Chloride	0.06	82	2.1	0.43	0.13	0.55	0.10
Methyl Ethyl Ketone	0.15	56		1.91	0.65	4.31	0.34
Methyl Isobutyl Ketone	0.15	8	80	0.04	0.01	0.20	0.00
Methyl Methacrylate	0.18	0	700	0.00	0.00	0.00	0.00
Methyl tert-Butyl Ether	0.18	78	3.8	1.51	0.42	1.57	0.38
N-Octane	0.06	20		0.06	0.01	0.15	0.00
Propionaldehyde	0.005	100		0.36	0.15	0.57	0.09
Propylene	0.05	100	3000	1.31	0.76	2.12	0.62
Styrene	0.07	42	1.8	0.06	0.02	0.08	0.00
1,1,2,2 - Tetrachloroethane	0.06	0	0.017	0.00	0.00	0.00	0.00
Tetrachloroethylene	**0.06**	**46**	**0.17**	**0.18**	**0.03**	**0.19**	**0.00**
Tolualdehydes	0.009	100		0.13	0.03	0.11	0.02
Toluene	0.06	98	400	3.24	0.86	2.61	0.79
1,2,4-Trichlorobenzene	0.06	0	200	0.00	0.00	0.00	0.00
1,1,1 - Trichloroethane	0.06	40	1000	0.08	0.01	0.07	0.00
1,1,2 - Trichloroethane	0.06	0	0.063	0.00	0.00	0.00	0.00
Trichloroethylene	0.07	12	0.5	0.02	0.00	0.06	0.00
Trichlorofluoromethane	0.04	98	700	1.70	0.30	0.59	0.28
Trichlorotrifluoroethane	0.07	96		0.76	0.10	0.38	0.10
1,2,4-Trimethylbenzene	0.07	84		0.44	0.09	0.22	0.09
1,3,5-Trimethylbenzene	0.07	54		0.12	0.02	0.09	0.02
Valeraldehyde	0.05	100		0.18	0.05	0.29	0.03
Vinyl Chloride	0.06	0	0.11	0.00	0.00	0.00	0.00
m,p - Xylene	0.05	98	100	1.32	0.30	0.67	0.29
o - Xylene	0.05	94	100	0.58	0.13	0.30	0.14

[1,2,3] See table end notes on Air Toxics page 18

End Notes for Tables 4-7

[1] The Heath 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.

[2] Individual 24-hour pollutant concentrations were reported by the analyzing laboratory in ppbv (parts per billion by volume) and were converted to $\mu g/m^3$ using the following formula:

$$\mu g / m^3 = \frac{(ppbv)(MolecularWeight)}{24.45}$$

where Molecular Weight is the molecular weight of a pollutant in grams, and 24.45 is the molar volume of an ideal gas in liters at the standard temperature of $25^{o}C$.

[3] 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.

REFERENCES

Air Pollution and Health Risk, EPA-450/3-90-022, USEPA , Office of Air and Radiation, Research Triangle Park, NC, March 1991, URL: http://www.epa.gov/ttn/atw/3_90_022.html.

Clean Air Act Amendments of 1990, Title III – Hazardous Air Pollutants, 101st Congress 2nd Session, Report 101-952, US Government Printing Office, Washington DC, October 1990.

Evaluating Exposures to Toxic Air Pollutants: A Citizen's Guide, EPA-450/3-90-023, USEPA, Office of Air and Radiation, Research Triangle Park, NC, March 1991, URL: http://www.epa.gov/ttn/atw/3_90_023.html.

National Air Quality and Emissions Trend Report, 1999, EPA-454/R-01-004, USEPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 2001, URL: http://www.epa.gov/oar/aqtrnd99.

National-Scale Air Toxics Assessment for 1996: Estimated Emissions, Concentrations and Risk Technical Fact Sheet, USEPA, Office of Air and Radiation, Research Triangle Park, NC, May 2002, URL: http://epa.gov/ttn/atw/nata/natafs5-31.pdf.

Taking Toxics Out of the Air, EPA-452/K-00-002, USEPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC, August 2000, URL: http://www.epa.gov/oar/oaqps/takingtoxics/airtox.pdf.

Reference Concentrations for Inhalation, NJDEP, Division of Air Quality, Bureau of Air Quality Evaluation, Trenton, NJ, April 2003, URL:http://www.state.nj.us/dep/aqpp/downloads/risk/RfCs2005.pdf.

Reference Concentrations for Short-Term Inhalation Exposure, NJDEP, Division of Air Quality, Bureau of Air Quality Evaluation, Trenton, NJ, April 2003, URL: http://www.state.nj.us/dep/aqpp/downloads/risk/Acute2005.pdf.

Unit Risk Factors for Inhalation, NJDEP, Division of Air Quality, Bureau of Air Quality Evaluation, Trenton, NJ, April 2003, URL: http://www.state.nj.us/dep/aqpp/downloads/risk/URFs2005.pdf.

1996 National Air Toxics Assessment Results, USEPA, Office of Air and Radiation, Research Triangle Park, NC, September 2002, URL: http://www.epa.gov/ttn/atw/nata/nsata1.html.