

4.6 Ozone

Ozone is a molecule made up of three oxygen atoms (O_3), a very reactive gas, and even at low concentrations it is irritating and toxic. It occurs naturally in small amounts in the earth's upper atmosphere, and in the air of the lower atmosphere after a lightning storm. In the stratosphere, between 10km and 50km above the earth's surface it forms the Ozone Layer. This is an important protective layer which filters out most of the high energy ultra-violet radiation from the sun which would damage much of the life on earth. When ozone is present at ground level and in the troposphere (10-18 km above earth's surface) it is considered a pollutant and a greenhouse gas. Ozone is used both industrially and commercially due mainly to its reactivity. It is used as a clean way of purifying water both in industry and in the home in hot-tubs and fish tanks. It is also used to disinfect laundry both in hospitals and in the home.

Ground-level O_3 remains a pervasive pollution problem in the United States. Ozone is readily formed in the atmosphere by the reaction of volatile organic compounds (VOCs) and NO_x in the presence of heat and sunlight, which are most abundant in the summer. VOCs are emitted from a variety of sources, including motor vehicles, chemical plants, refineries, factories, consumer and commercial products, other industries, and natural (biogenic) sources. Nitrogen oxides (a precursor to ozone) are emitted from motor vehicles, power plants, and other sources of combustion, as well as natural sources including lightning and biological processes in soil. Changing weather patterns contribute to yearly differences in O_3 concentrations. Ozone and the precursor pollutants that cause O_3 also can be transported into an area from pollution sources located hundreds of miles upwind.

Ozone occurs naturally in the stratosphere and provides a protective layer high above the earth. However, at ground level, it is the prime ingredient of smog. Short-term (1- to 3-hour) and prolonged (6- to 8-hour) exposures to ambient O_3 concentrations have been linked to a number of health effects of concern. For example, increased hospital admissions and emergency room visits for respiratory causes have been associated with ambient O_3 exposures.

Exposures to O_3 result in lung inflammation, aggravate preexisting respiratory diseases such as asthma, and may make people more susceptible to respiratory infection. Other health effects attributed to short-term and prolonged exposures to O_3 , generally while individuals are engaged in moderate or heavy exertion, include significant decreases in lung function and increased respiratory symptoms such as chest pain and cough. Children active outdoors during the summer when O_3 levels are at their highest are most at risk of experiencing such effects. Other at-risk groups include adults who are active outdoors, such as outdoor workers, and individuals with preexisting respiratory disorders such as asthma and chronic obstructive lung disease. Within each of these groups are individuals who are unusually sensitive to O_3 . In addition, repeated long-term exposure to O_3 presents the possibility of irreversible changes in the lungs, which could lead to premature aging of the lungs and/or chronic respiratory illnesses.

Ozone also affects sensitive vegetation and ecosystems. Specifically, O₃ can lead to reductions in agricultural and commercial forest yields, reduced survivability of sensitive tree seedlings, and increased plant susceptibility to disease, pests, and other environmental stresses such as harsh weather. In long-lived species, these effects may become evident only after several years or even decades. As these species are out-competed by others, long-term effects on forest ecosystems and habitat quality for wildlife and endangered species become evident. Furthermore, O₃ injury to the foliage of trees and other plants can decrease the aesthetic value of ornamental species as well as the natural beauty of our national parks and recreation areas.

EPA initially established primary and secondary NAAQS for photochemical oxidants on April 30, 1971. Both primary and secondary standards were set at an hourly average of 0.08 parts per million (ppm), total photochemical oxidants, not to be exceeded more than one hour per year.

On February 8, 1979, EPA completed its first periodic review of the criteria and standards for O₃ and other photochemical oxidants and made significant revisions to the original standard: the level of the primary and secondary NAAQS was changed to 0.12 ppm; the indicator was changed to O₃; and the form of the standards was changed to be based on the expected number of days per calendar year with a maximum hourly average concentration above 0.12 ppm (i.e., attainment of the standard occurs when that number is equal to or less than one).

In July, 1997 EPA revised the primary and secondary O₃ standards on the basis of the then latest scientific evidence linking exposures to ambient O₃ to adverse health and welfare effects at levels allowed by the 1-hr average standards. The O₃ standards were revised by replacing the existing primary 1-hr average standard with an 8-hr average O₃ standard set at a level of 0.08 ppm. The form of the primary standard was changed to the annual fourth-highest daily maximum 8-hr average concentration, averaged over three years. The secondary O₃ standard was changed by making it identical in all respects to the revised primary standard. These standards were challenged in the courts and the litigation lasted until March, 2002 when the D.C. Circuit Court issued its final decision, finding the 1997 O₃ NAAQS to be “neither arbitrary nor capricious,” and denying the remaining petitions for review. As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone nonattainment Early Action Compact (EAC) Areas (none in NY).

After the most recent review of the ozone NAAQS, EPA revised the 8 hr ozone standard (primary and secondary) to 0.075 ppm, which went into effect on May 27, 2008.

The number of ozone monitors and concentration trends for both the 1 hr, and 8 hr standards in New York State for the past three decades are shown in Figures 4.15 and 4.16, respectively.

At present NYSDEC operates 34 TEI Model 49C ozone monitors statewide, which use the UV photometric method for detection. The site locations are depicted in Figure 4.17 below.

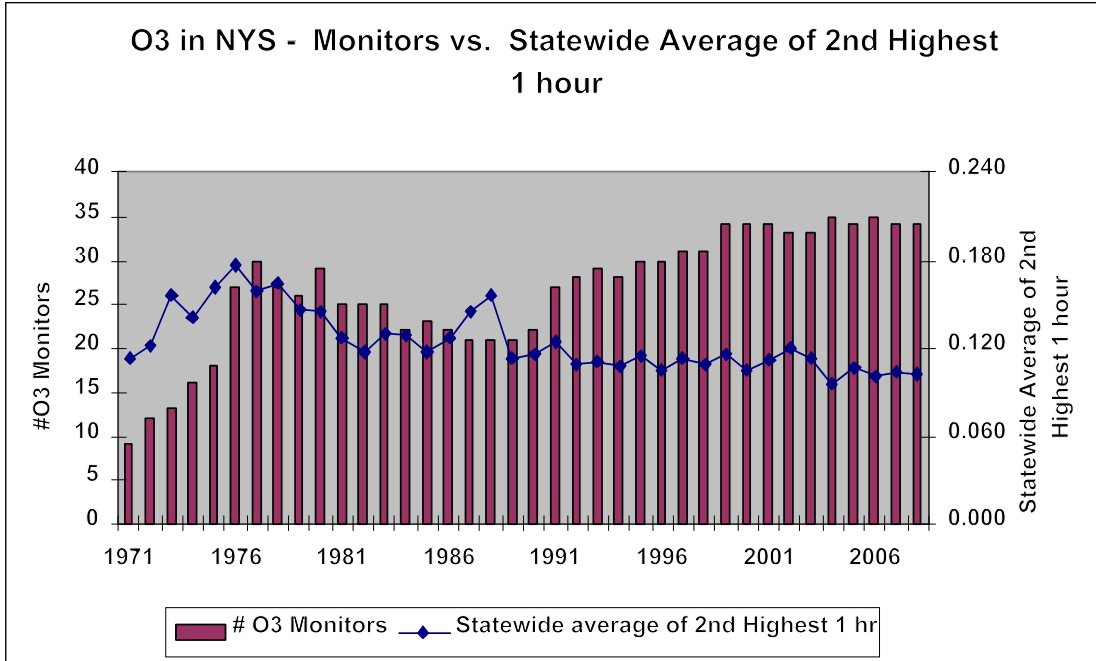


Figure 4.15 Ozone Monitors and 1 hr Concentration Trends

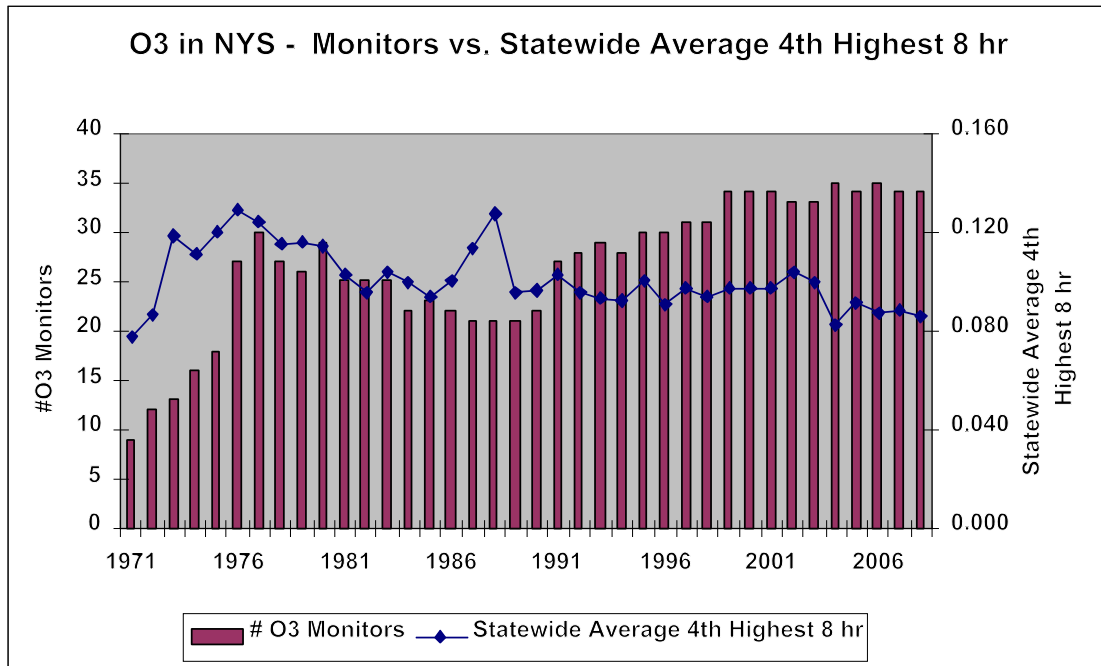



Figure 4.16 Ozone Monitors and 8 hr Concentration Trends

 New York State Dept of Environmental Conservation
2009 Ambient Air Monitoring Network

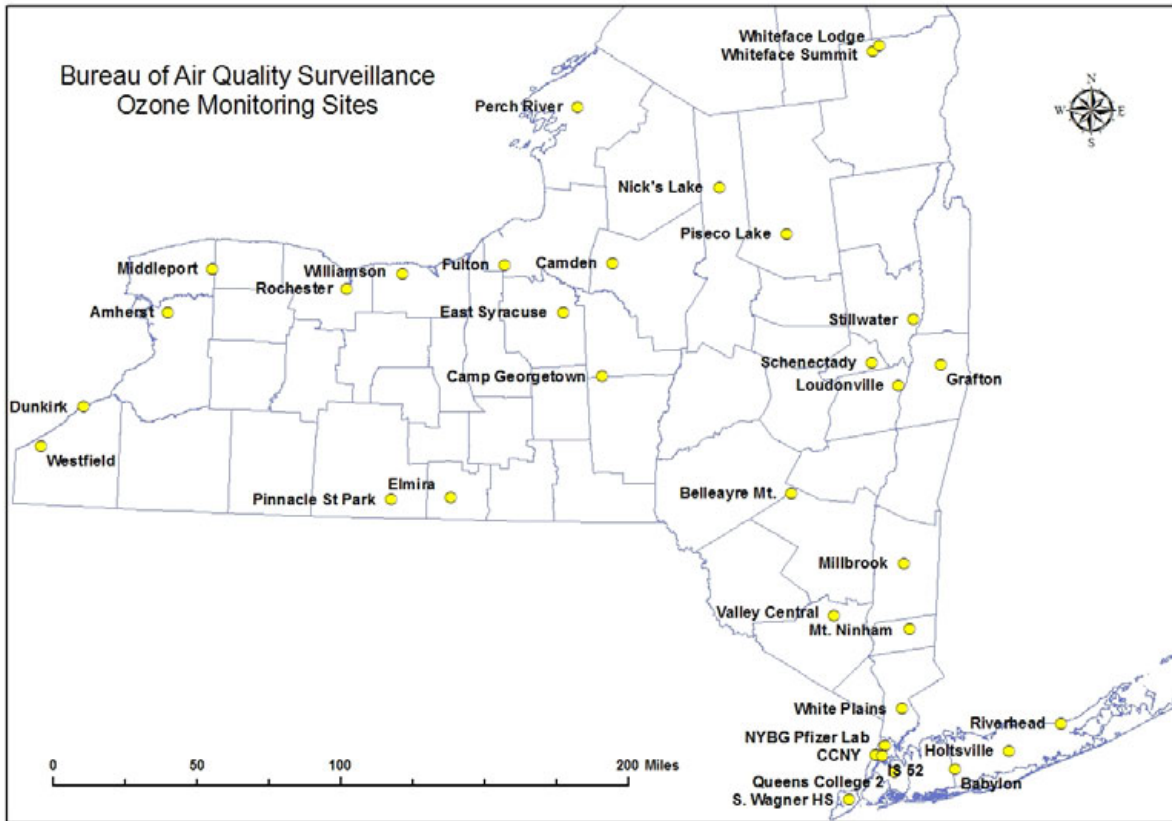


Figure 4.17 Location Map for Ozone Monitoring Sites

5. EPA's National Toxics Program

In general, EPA plans to use ambient air toxics monitoring to support the air toxics program's efforts to reduce human exposure and health risks from air toxics. The monitoring data provided by the ambient air toxics monitoring program is intended to support four major objectives:

- Establish trends and evaluate the effectiveness of air toxics emissions reduction strategies.
- Characterize ambient concentrations (and deposition) in local areas. Air toxics originate from local sources and can concentrate in relatively small geographical areas, producing the greatest risks to human health.
- Provide data to support, evaluate, and improve air quality models. Air quality models are used to develop emission control strategies, perform exposure assessments, and assess program effectiveness.
- Provide data to support scientific studies to better understand the relationship between ambient air toxics concentrations, human exposure, and health effects from these exposures.

EPA's national air toxics monitoring program is comprised of four different monitoring efforts:

- National Air Toxics Trends Stations (NATTS)
- EPA funded local-scale projects to assess conditions at the local level
- Existing State and local program monitoring
- Persistent bio-accumulative toxics monitoring

The objective for the NATTS network is to provide long-term monitoring data for certain priority air toxics across representative areas of the country in order to establish overall trends for these pollutants. Currently there are 23 NATTS established in 22 cities. The two New York NATTS sites are located in the Bronx, and Rochester, respectively.

EPA's initial ambient air toxics monitoring pilot studies disclosed that significant variations in pollutant concentrations occurred across a city and that these variations cannot be characterized by a single monitoring site. As a result, EPA decided that local-scale projects consisting of several monitors operated for a period of 1 to 2 years should be incorporated into the national air toxics monitoring strategy. Last year New York was awarded a grant for a community air quality air study in Tonawanda which began in July 2007. Hazardous air pollutants (HAPs) and fine particulate matter are measured at 4 locations in the Tonawanda community to address citizen concerns. The scheduled one year sampling will be completed this July.

New York State has been operating a toxics monitoring network since 1990, funded entirely by State monies. Currently there are 12 sites statewide collecting 24 hr canister samples for VOC analysis in a 1 in 6 days interval. See section on NY Toxics Monitoring Network

The monitoring program for persistent bio-accumulative toxics primarily consists of deposition monitoring, not ambient air monitoring. Several monitoring programs operated by various Federal agencies have been established to measure the presence of toxics in various media. Recently New York has been awarded an EPA grant for “New York State Ambient Mercury Baseline Study” for the measurement of speciated mercury in ambient air, as well as mercury in wet deposition. This project is began in early 2008, and instrument deployment is under way.

In addition to air toxic-specific monitoring activities, several other monitoring programs that are primarily intended to address other air pollution concerns incorporate some aspects of air toxics monitoring. For example, the Photochemical Assessment Monitoring Stations (PAMS) collect data on certain volatile organic compound and carbonyl air toxics. Further, the results of some particulate matter monitoring is speciated (i.e., the individual compounds comprising the particulate matter are analyzed) to identify certain air toxics compounds.

5.1 National Air Toxics Trends Stations (NATTS)

EPA’s Urban Air Toxics Program identified 33 high-priority urban air toxics. From these 33 air toxics EPA developed a list of 19 “core” air toxics representing the pollutants for which EPA eventually wants to develop trends information. However, because of limitations in available methodologies, EPA decided that at a minimum, in starting the network, each of the NATTS should monitor for at least 6 of these 19 pollutants. These six pollutants are considered national air toxics “drivers” (i.e., pollutants of concern in all areas of the country).

Table 5.1 NATTS Pollutants of Concern

Required Monitoring	Desired Monitoring
1,3-butadiene	trichloroethylene
acrolein	tetrachloroethylene
arsenic	beryllium
formaldehyde	nickel
benzene	cadmium
hexavalent chromium	acetaldehyde
	1,2-dichloropropene
	carbon tetrachloride
	lead
	chloroform
	manganese
	methylene chloride
	vinyl chloride

For the two NATTS sites, New York will perform analysis of 42 VOCs (Table 5.2), and 12 carbonyls (Table 5.6). More details on the sampling and analysis are provided in the NY Toxics

Monitoring, and Photochemical Assessment Monitoring Stations sections, respectively. In addition, low volume PM₁₀ teflon filters are collected for trace metals analysis using ICP-MS. The targeted metals include: arsenic, beryllium, cadmium, lead, manganese, nickel, antimony, cobalt, and selenium, with the last three being potential future HAPs. Hexavalent chromium sampling commenced in November 2007 at the Rochester and Bronx sites. The cellulose filter samples are shipped to EPA/ERG for laboratory analysis.

Polycyclic Aromatic Hydrocarbons (PAHs) sampling is scheduled to begin later this year at the Rochester and IS 52 sites. The collection media consists of one 110mm diameter glass microfiber filter and a tubular glass cartridge containing a combination of Polyurethane Foam (PUF) and XAD-2 resin. The exposed samples will be shipped to an EPA contract laboratory (ERG) for analysis.

5.2 NY Toxics Monitoring Network

The NY ambient air toxics monitoring program was first established in 1985 as part of the Governor's Air Monitoring Modernization Capital Budget Program. This monitoring network measures Volatile Organic Compounds (VOCs) across the State. The initial development of the network and analytical capabilities was part of a joint Staten Island/New Jersey Urban Air Toxics Assessment Project (SI/NJ Study) coordinated with U.S. EPA Region II from 1987 through 1989. The network expanded in 1990 to a statewide network.

The goal is to monitor air quality related to toxics in the State's urban, industrial, residential, and rural areas. Implementation of this program starts the development of a long-term toxics air quality database for New York State. The database will be used to define, attain, and preserve good air quality in New York State. The data defines actual air quality impacts of the VOCs. The data is used in the design and management of New York's air quality, including risk assessment, modeling, planning and trend analysis.

Initially only seventeen VOCs were monitored until 1995, when the number of analytes was increased to nineteen. In 2002 the list of VOCs was expanded to include 42 compounds as shown in Table 5.1 below:

Table 5.2 Target List of Volatile Organic Compounds

CHEMICAL	CAS #
Methylene Chloride	75-09-2
Chloroform	67-66-3
1,2 Dichloroethane	107-06-2
1,1,1 Trichloroethane	71-55-6
Carbon Tetrachloride	56-23-5
Trichloroethylene	79-01-6
1,1,2 Trichloroethane	79-00-5
Tetrachloroethylene	127-18-4
Acrolein	107-02-8
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
M,P-Xylene	1330-20-7
O-Xylene	95-47-6
Chlorobenzene	108-90-7
1,2 Dichlorobenzene	95-50-1
1,3 Dichlorobenzene	541-73-1
1,4 Dichlorobenzene	106-46-7
Vinyl Chloride	75-01-4
1,2 Dichloropropane	78-87-5
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
1,1-Dichloroethylene	75-35-4
Hexachloro-1,3-Butadiene	87-68-3
1,1-Dichloroethane	75-34-3
Chloromethane	74-87-3
Chloroethane	75-00-3
cis1,2-Dichloroethylene	156-59-2
cis 1,3-Dichloropropene	542-75-6
trans 1,3-Dichloropropene	542-75-6
Dichlorodifluoromethane	75-71-8
Trichlorofluoromethane	75-69-4
Trichlorotrifluoroethane	76-13-1
Dichlorotetrafluoroethane	76-14-2
1,2-Dibromoethane	106-93-4
A-chlorotoluene (Benzylchloride)	100-44-7
1,1,2,2 Tetrachloroethane	79-34-5
Bromomethane	74-83-9
Styrene	100-42-5
Bromodichloromethane	75-27-4
1,3 Butadiene	106-99-0
Methyl Tert Butyl Ether	1634-04-4
1,2,4 Trichlorobenzene	120-82-1

Volatile organic compounds are collected in stainless steel canisters contained in a sampler known as an ambient air canister sampler. The sampler is an air flow calibrated sampling device that pumps ambient air into the canister. A special stainless steel diaphragm pump provides a constant pressure to push the sample through the sampler. A relief valve is used to maintain a steady pressure for the sample flow controller. Samples are collected at a one in six days frequency and shipped back to the Rensselaer laboratory facility for analysis.

The analysis methodology is a modified version of EPA method TO-15. An aliquot of air sample is taken from the canister at a controlled flow and temperature onto an Entech Model 7100A preconcentrator. The preconcentration process involves a series of steps. The first trap consists of glass beads/Tenax held at -110 °C which is then heated to room temperature in order to remove water/moisture in the sample. The next trap in line consists of Tenax held at - 30 °C. The contaminants of interest are then desorbed at 150 °C and collected on the cryofocuser held at - 150 °C. The sample is then rapidly heated for column injection using a Varian GC coupled with a Saturn MS detection. This method of analysis allows positive identification by retention time and molecular mass.

Concentration trends charts for some ubiquitous VOCs are provided below.

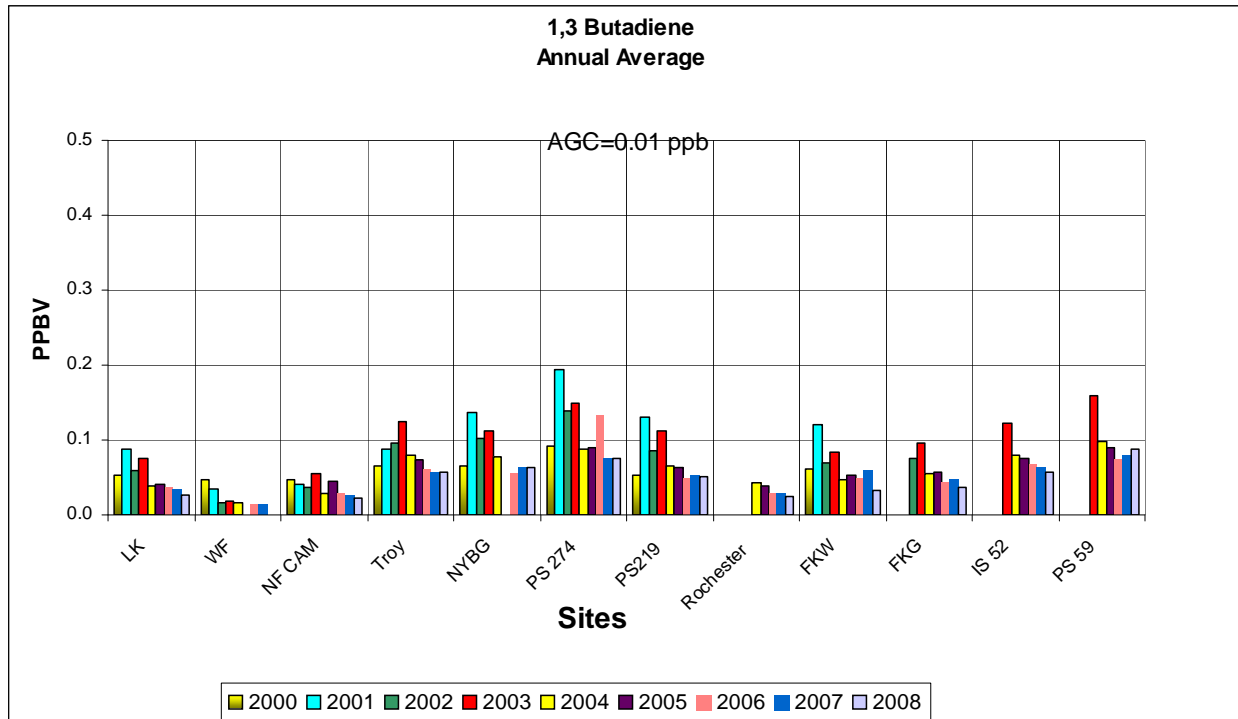


Figure 5.1 Annual Averages for 1,3-Butadiene

Legends:

- AGC Annual Guideline Concentration
- LK Lakawanna
- WF Whiteface
- NF Niagara Falls
- NYBG New York Botanical Gardens
- FKW Fresh Kills West
- FKG La Tourette Golf Course

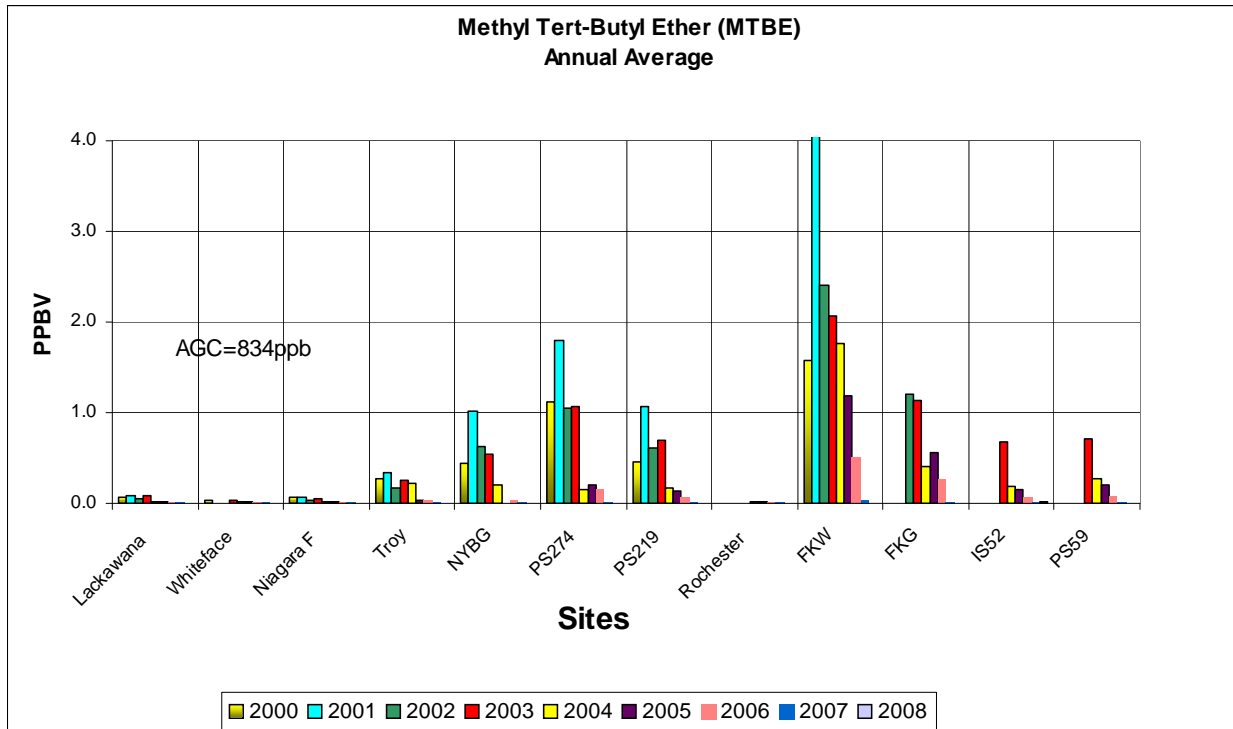


Figure 5.2 Annual Averages for Methyl Tertiary-Butyl Ether

Legends:

- AGC Annual Guideline Concentration
- LK Lakawanna
- WF Whiteface
- NF Niagara Falls
- NYBG New York Botanical Gardens
- FKW Fresh Kills West
- FKG La Tourette Golf Course

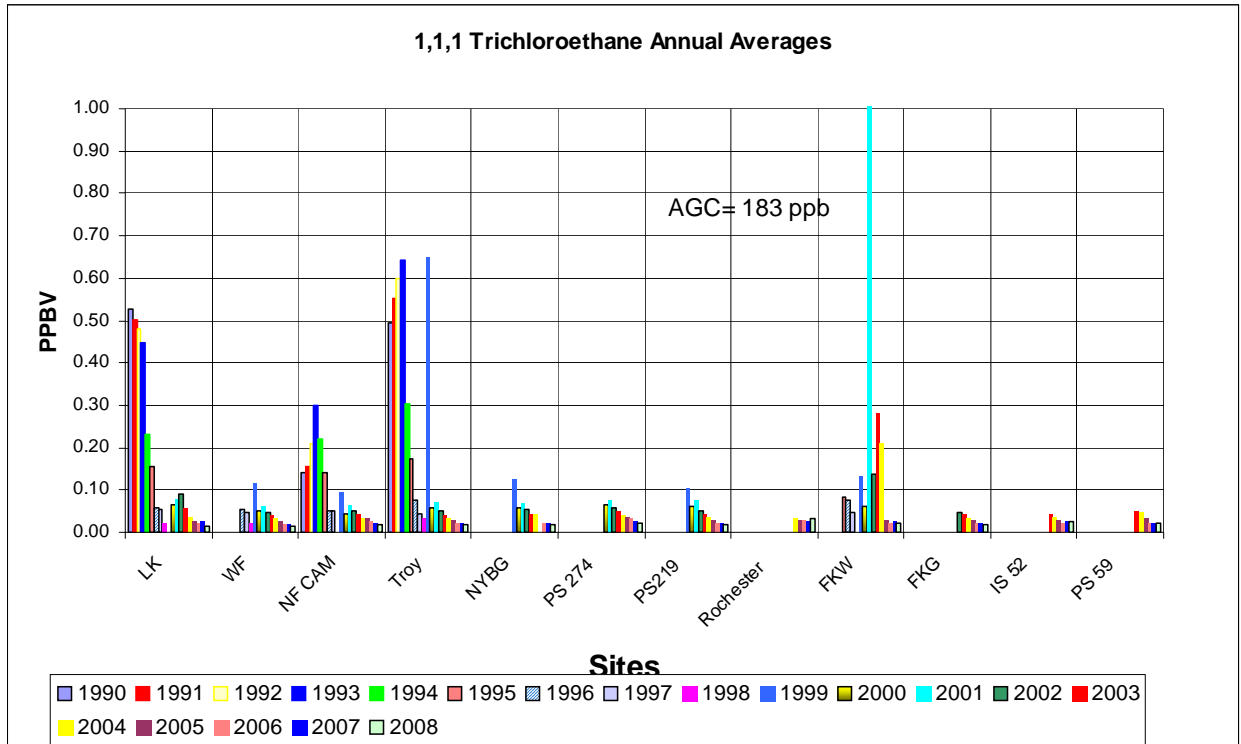


Figure 5.3 Annual Averages for 1,1,1-Trichloroethane

Legends:

- AGC Annual Guideline Concentration
- LK Lakawanna
- WF Whiteface
- NF Niagara Falls
- NYBG New York Botanical Gardens
- FKW Fresh Kills West
- FKG La Tourette Golf Course

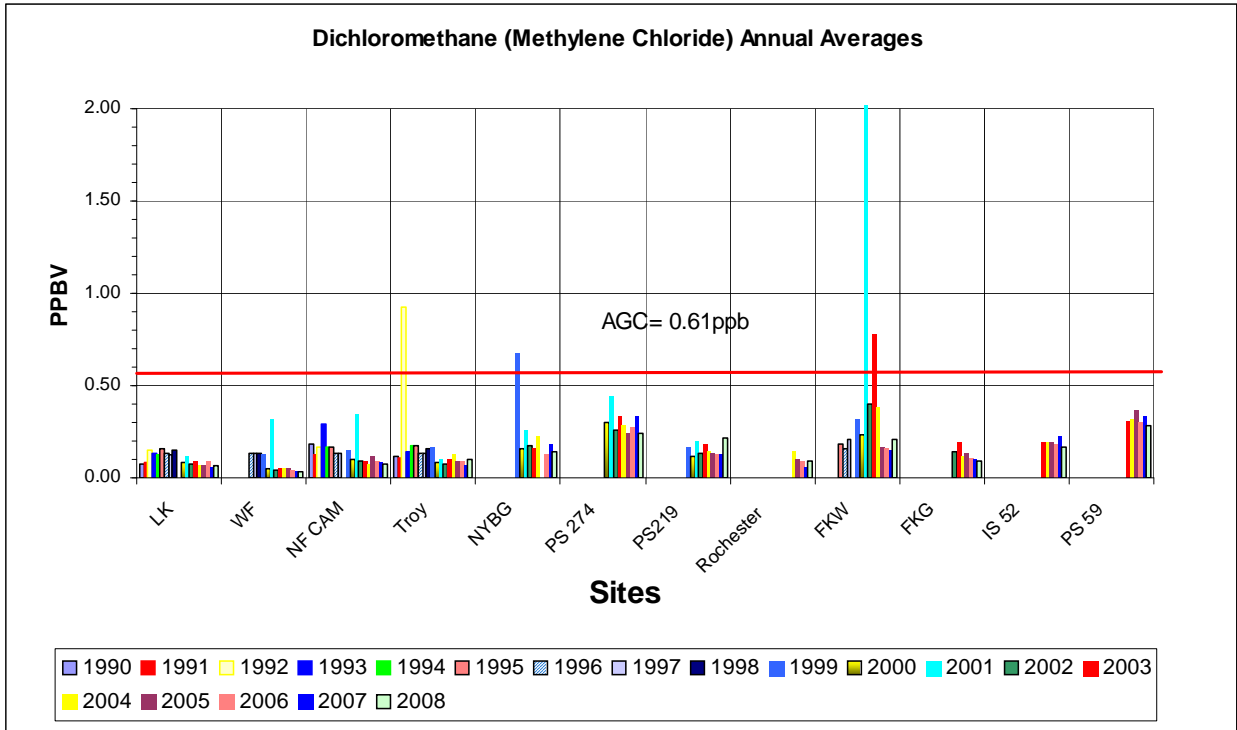


Figure 5.4 Annual Averages for Methylene Chloride

Legends:

- AGC Annual Guideline Concentration
- LK Lakawanna
- WF Whiteface
- NF Niagara Falls
- NYBG New York Botanical Gardens
- FKW Fresh Kills West
- FKG La Tourette Golf Course

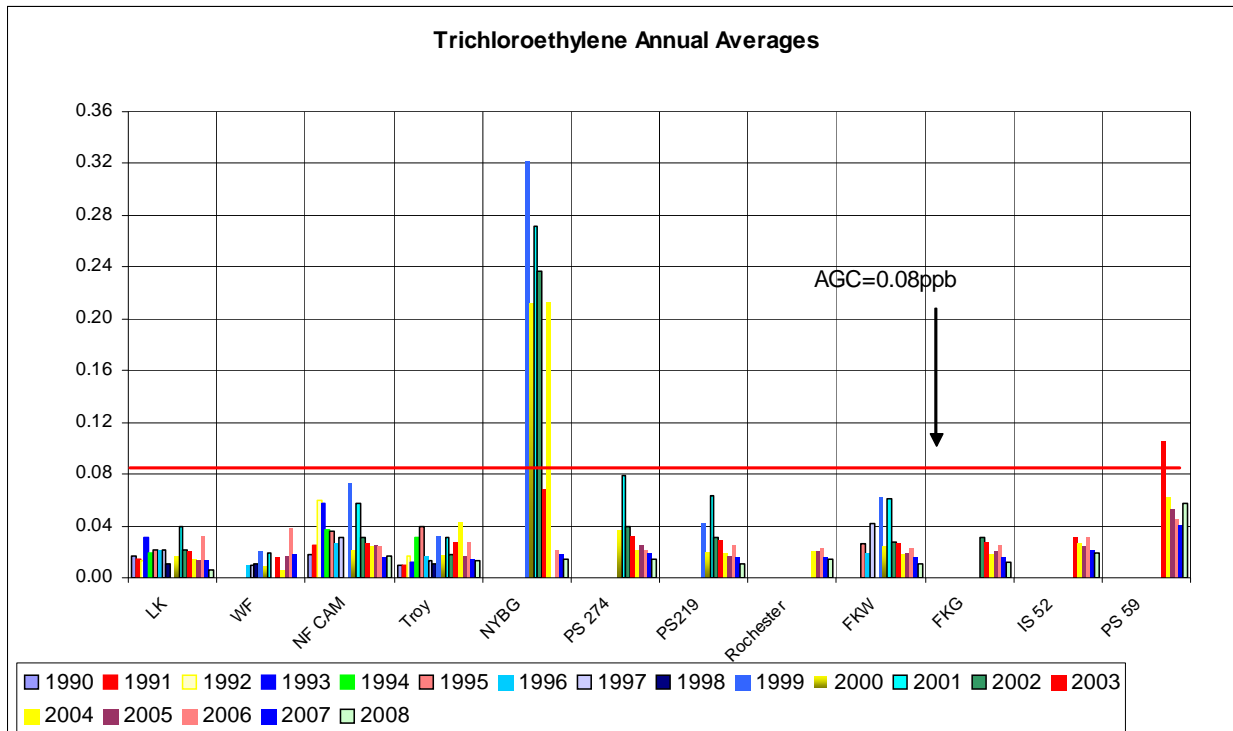


Figure 5.5 Annual Averages for Trichloroethylene

Legends:

- AGC Annual Guideline Concentration
- LK Lakawanna
- WF Whiteface
- NF Niagara Falls
- NYBG New York Botanical Gardens
- FKW Fresh Kills West
- FKG La Tourette Golf Course

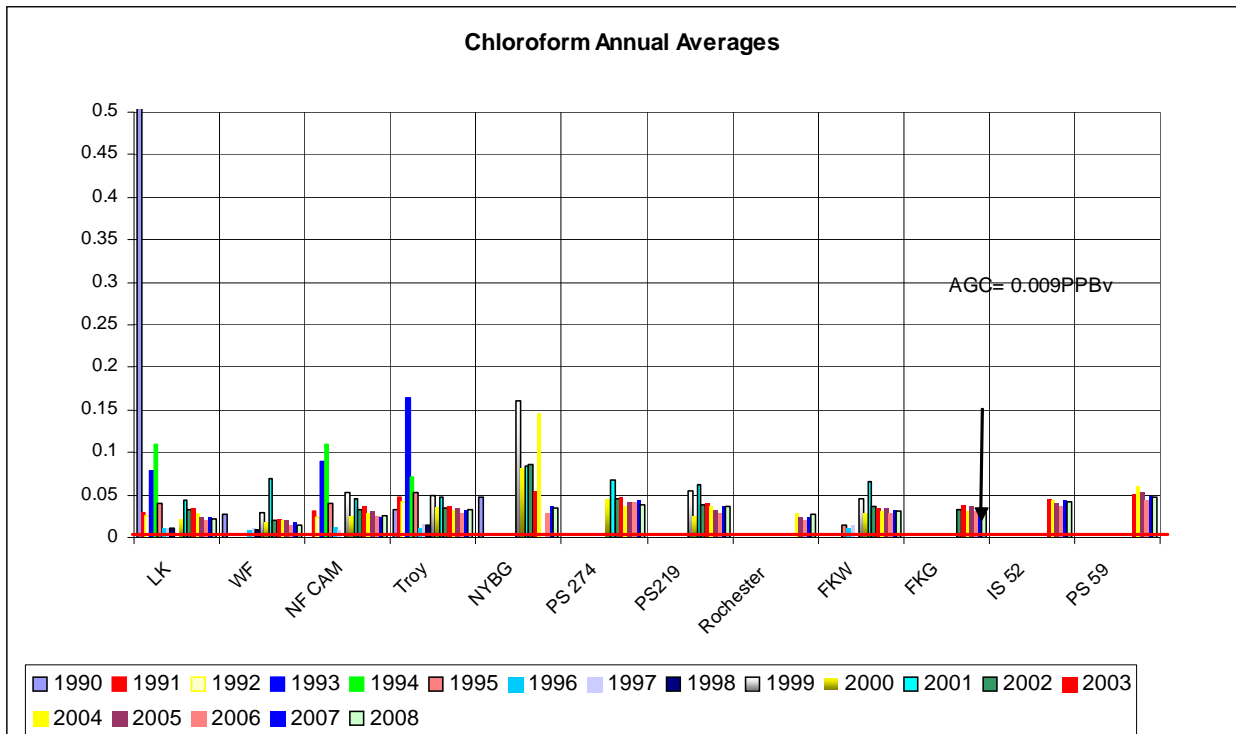


Figure 5.6 Annual Averages for Chloroform

Legends:

- AGC Annual Guideline Concentration
- LK Lakawanna
- WF Whiteface
- NF Niagara Falls
- NYBG New York Botanical Gardens
- FKW Fresh Kills West
- FKG La Tourette Golf Course

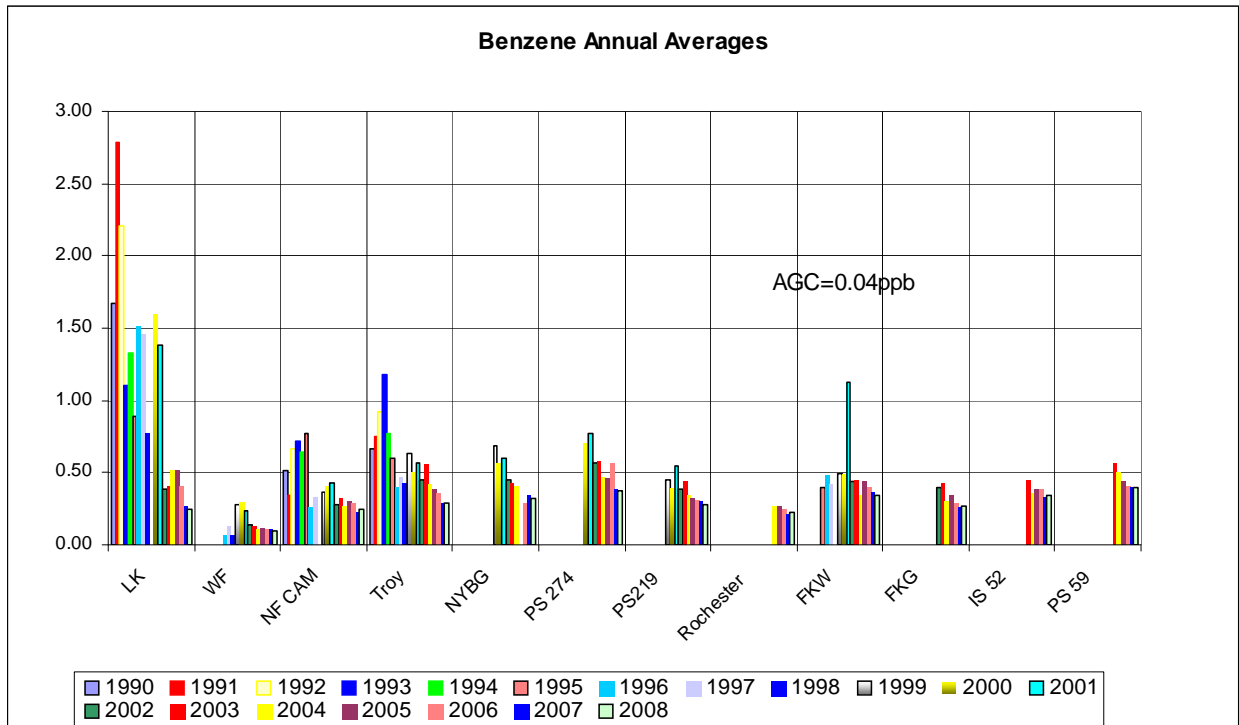


Figure 5.7 Annual Averages for Benzene

Legends:

- AGC Annual Guideline Concentration
- LK Lakawanna
- WF Whiteface
- NF Niagara Falls
- NYBG New York Botanical Gardens
- FKW Fresh Kills West
- FKG La Tourette Golf Course

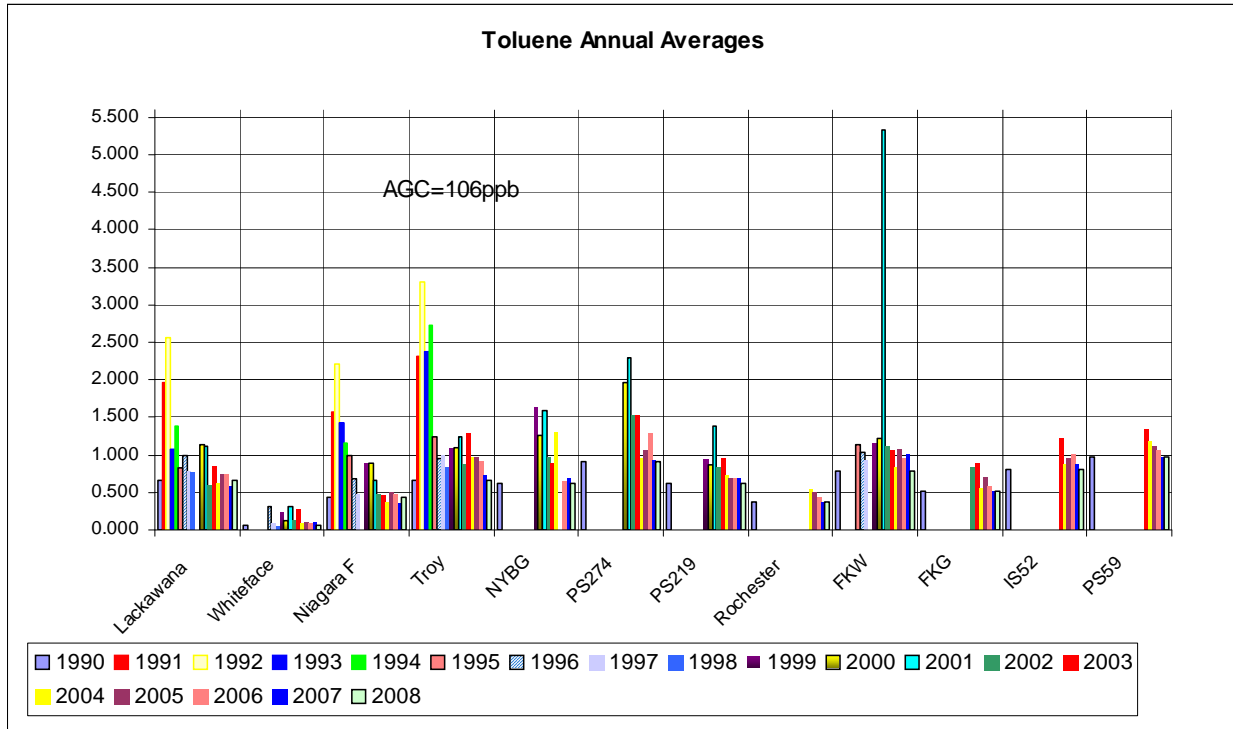


Figure 5.8 Annual Averages for Toluene

Legends:

- AGC Annual Guideline Concentration
- LK Lakawanna
- WF Whiteface
- NF Niagara Falls
- NYBG New York Botanical Gardens
- FKW Fresh Kills West
- FKG La Tourette Golf Course

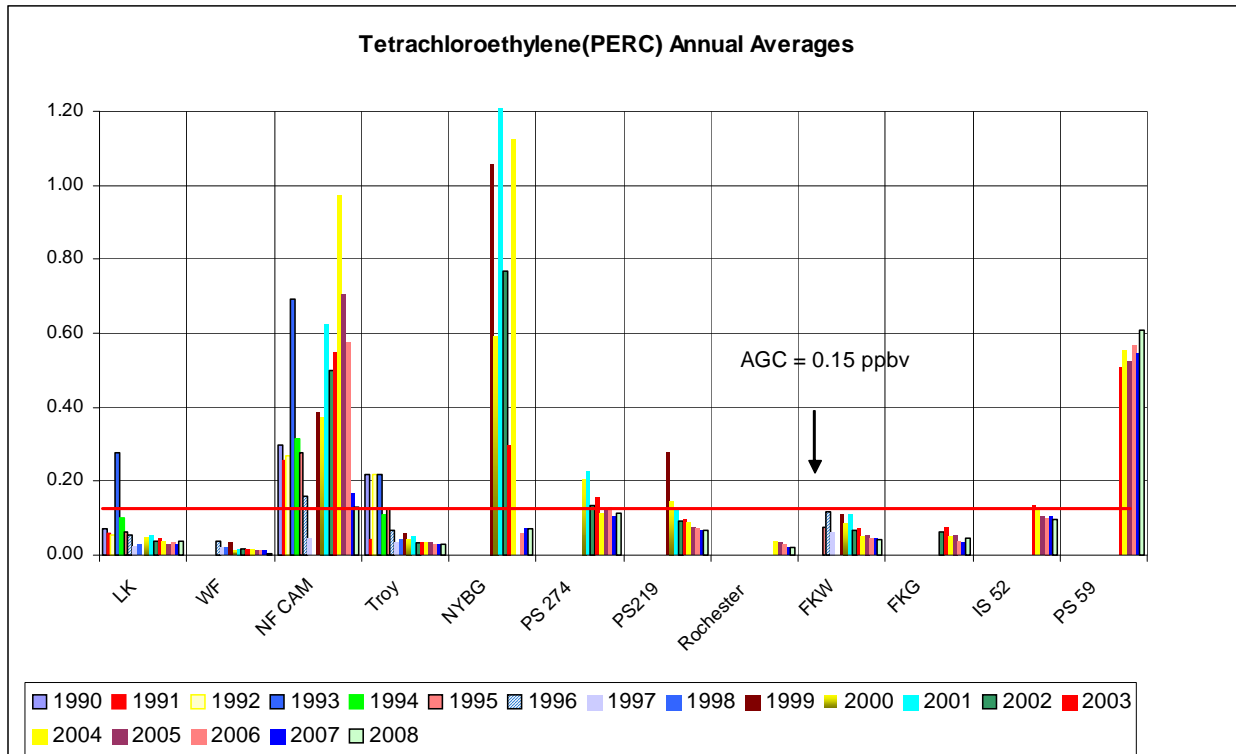


Figure 5.9 Annual Averages for Tetrachloroethene

Legends:

- AGC Annual Guideline Concentration
- LK Lakawanna
- WF Whiteface
- NF Niagara Falls
- NYBG New York Botanical Gardens
- FKW Fresh Kills West
- FKG La Tourette Golf Course

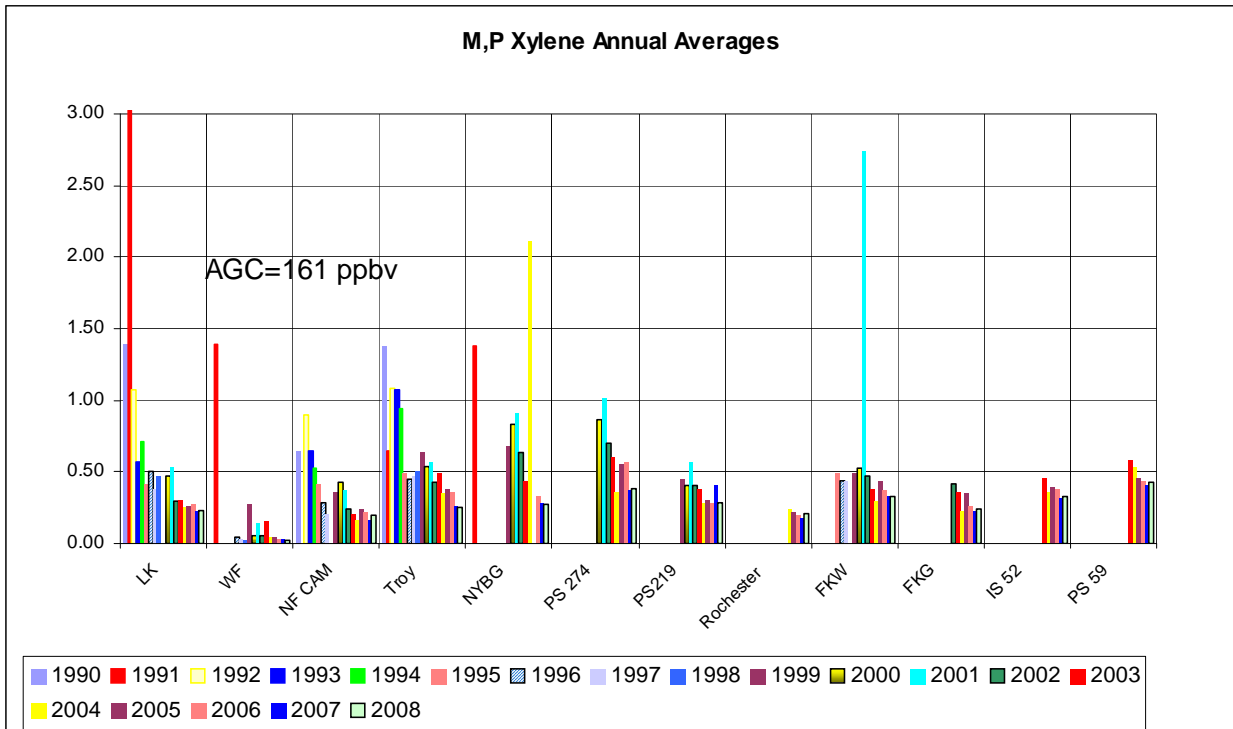


Figure 5.10 Annual Averages for m/p-Xylene

Legends:

- AGC Annual Guideline Concentration
- LK Lakawanna
- WF Whiteface
- NF Niagara Falls
- NYBG New York Botanical Gardens
- FKW Fresh Kills West
- FKG La Tourette Golf Course

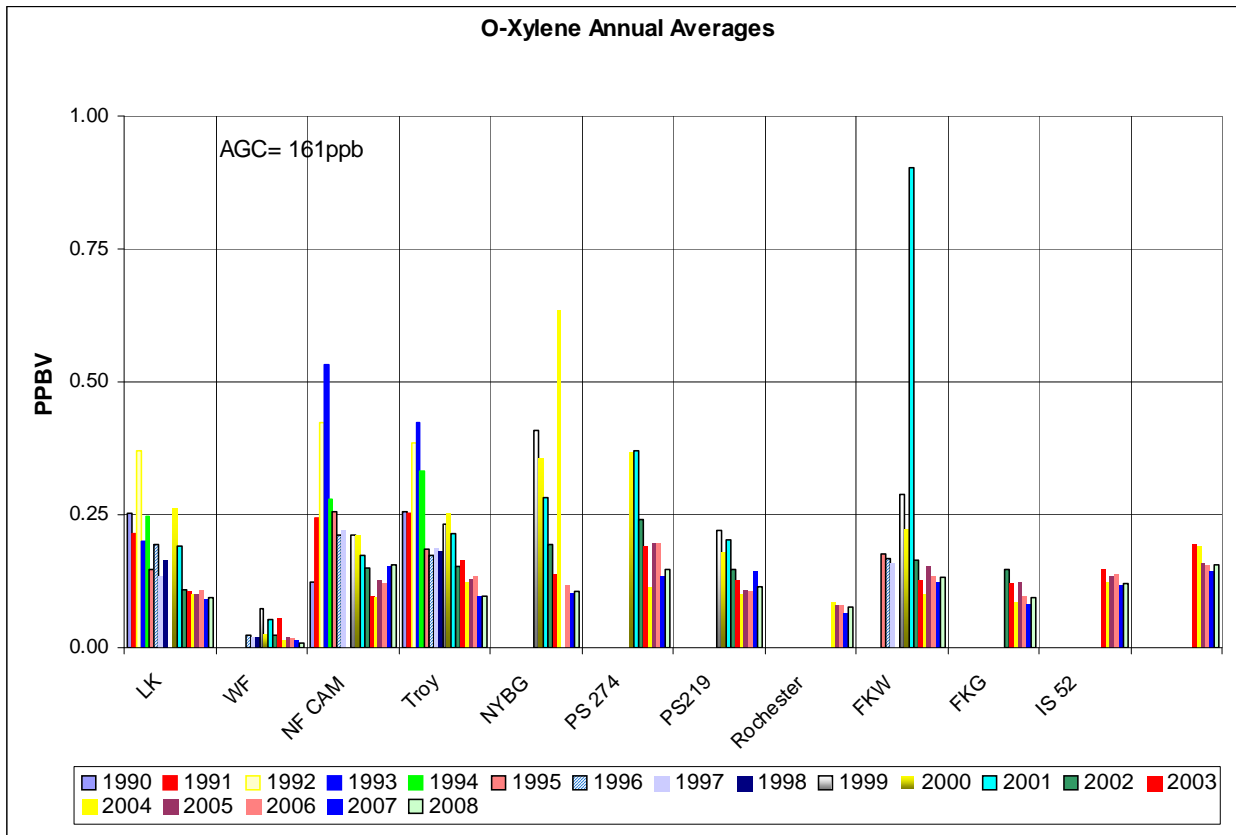


Figure 5.11 Annual Averages for o-Xylene

Legends:

- AGC Annual Guideline Concentration
- LK Lakawanna
- WF Whiteface
- NF Niagara Falls
- NYBG New York Botanical Gardens
- FKW Fresh Kills West
- FKG La Tourette Golf Course

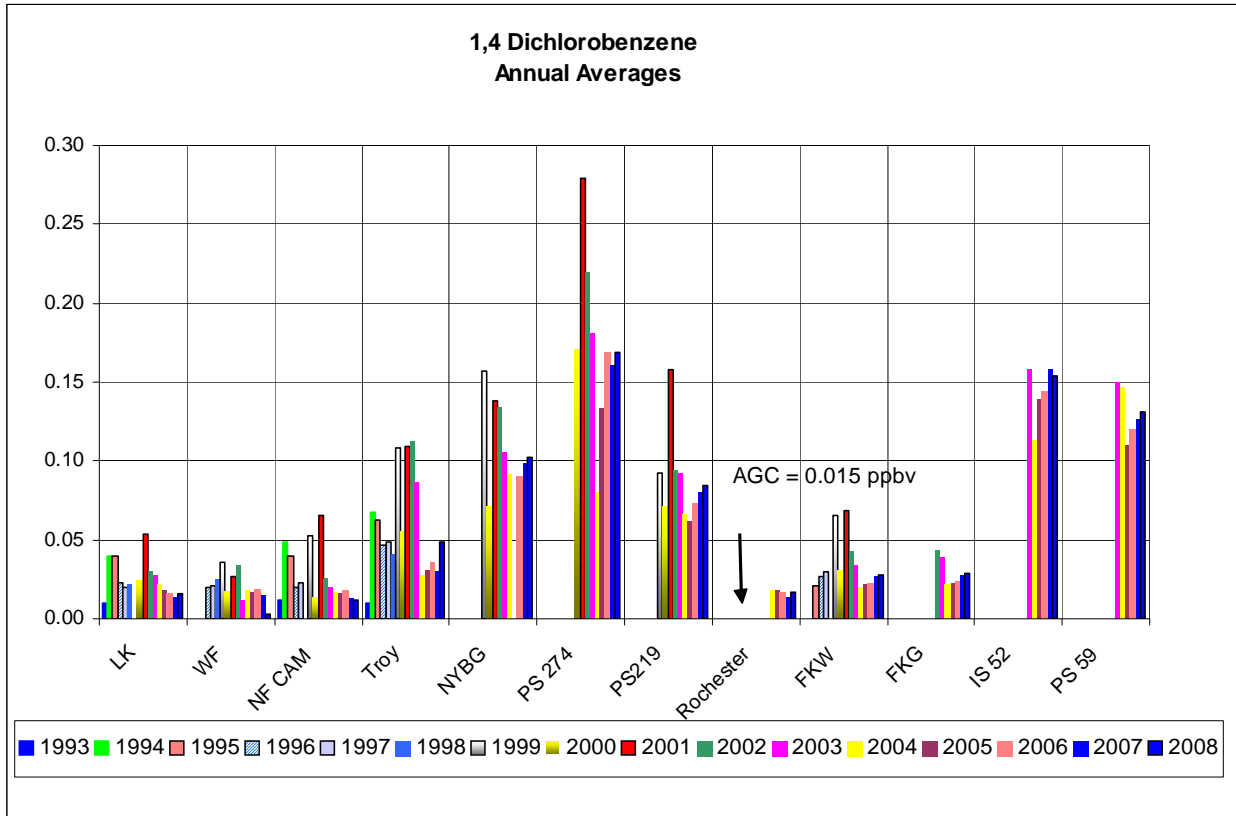


Figure 5.12 Annual Averages for 1,4-Dichlorobenzene

Legends:

- AGC Annual Guideline Concentration
- LK Lakawanna
- WF Whiteface
- NF Niagara Falls
- NYBG New York Botanical Gardens
- FKW Fresh Kills West
- FKG La Tourette Golf Course

Currently there are 11 toxics monitoring sites in operation for the measurement of VOCs

statewide. These locations are shown in Figure 5.12 below.

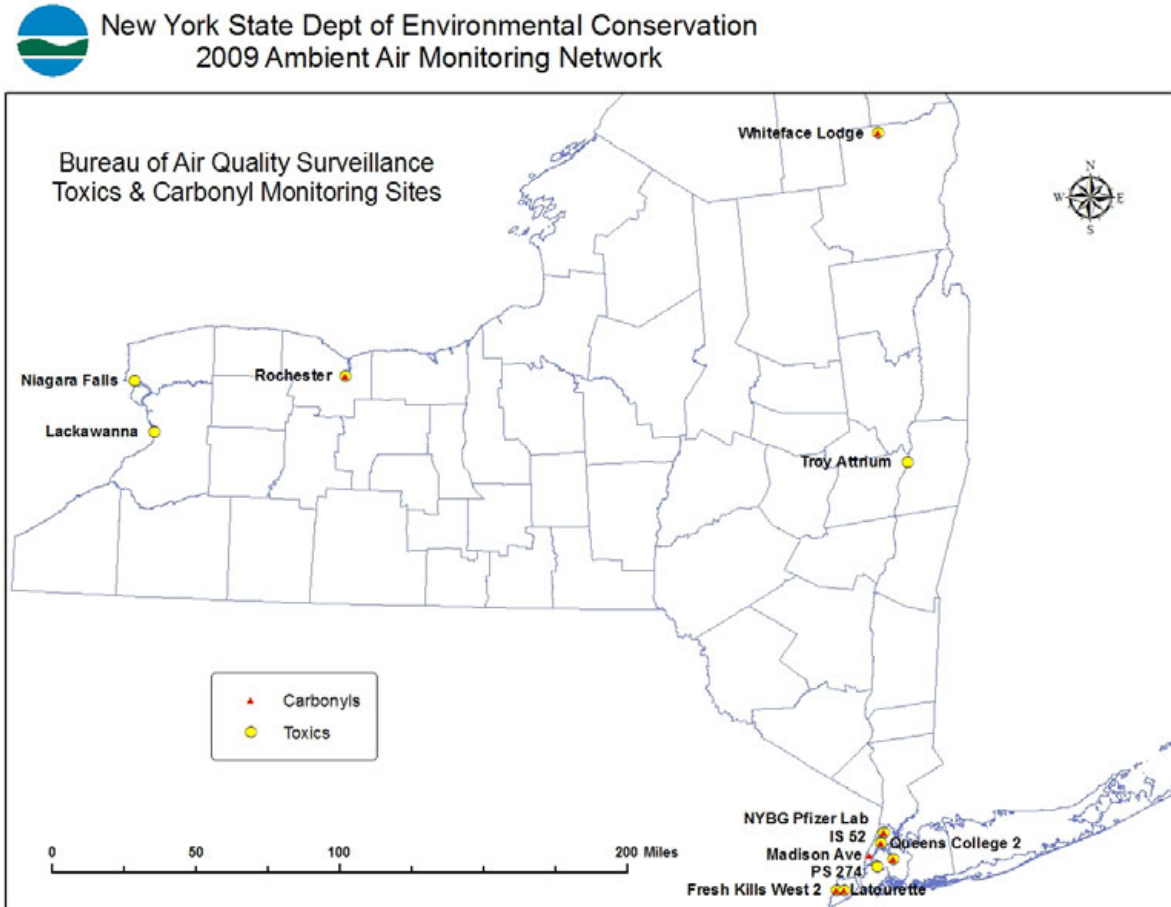


Figure 5.13 Location Map of Toxics Monitoring Sites

5.3 Photochemical Assessment Monitoring Stations (PAMS)

The 1993 revisions to 40 CFR Part 58 provide for the establishment and maintenance of network of air monitoring stations called Photochemical Assessment Monitoring Stations (PAMS) which will supplement the existing State and Local Air Monitoring Stations (SLAMS) network. The selection of parameters to be measured at a PAMS site varies with the site's ozone nonattainment designation and whether a site is upwind or downwind from O₃ precursor source areas. These parameters are O₃, total oxides of nitrogen (NO_x), nitric oxide (NO), nitrogen dioxide (NO₂), speciated volatile organic compounds (VOCs) and specific meteorological measurements.

The purpose of the PAMS program is to provide an air quality database that will assist in evaluating and modifying control strategies for attaining the O₃ National Ambient Air Quality Standard (NAAQS). PAMS data will also be used to better characterize the nature and extent of the O₃ problem, track VOC and NO_x emission inventory reductions, assess air quality trends and determine whether areas of New York remain in nonattainment of the O₃ NAAQS.

NYSDEC is required to operate and maintain two sites for metropolitan New York. The New York Botanical Gardens PAMS site (located in Northern Bronx) has been operational since 1994. The Queensborough Community College PAMS station (located in Queens) began monitoring of some species in late 1997. The Queens site was fully operational for the 1998 ozone monitoring season. This site moved to Queens College in the spring of 2001 as the QBCC building was undergoing a major renovation and the equipment had to be removed from the site. The Table 5.3 lists the chronology of monitoring at these sites.

Table 5.3 Information on PAMS Sites

Site Name	Parameters	Implementation Date
New York Botanical Garden	NOx	Jun-94
	CO	Jun-94
	O ₃	Jun-94
	VOCs	Jun-94
	Carbonyls	Jun-94
	NMOC	Jun-99
	Meteorology	Jun-94
Queens Community College closed 12/2001	NMOC	Sep-99
	NOx	May-98
	CO	May-98
	O ₃	May-98
	SO ₂	May-98
	VOCs	Jun-98

Site Name	Parameters	Implementation Date
Queens College	Carbonyls	Sep-97
	NMOC	Aug-98
	NO _x	Jun-01
	CO	Jun-01
	O ₃	Jun-01
	SO ₂	Jun-01
	Carbonyls	Jun-01
	NMOC	Jun-01

For gaseous parameters, Table 5.4 lists the sampling instruments and analysis methods.

Table 5.4 Instrumentation for Gaseous Pollutants

Parameter	Instrument	Analysis Method	Frequency
NO	TECO 42C	Chemiluminescent	Continuous
NO ₂	TECO 42C	Chemiluminescent	Continuous
NO _x	TECO 42C	Chemiluminescent	Continuous
O ₃	TECO 49C	Ultraviolet	Continuous
CO	TECO 48C	Infrared	Continuous
NMOC	Horiba APHA-360	Method 3000	Continuous

The following applies to meteorological measurements.

Table 5.5 Equipment for Meteorological Measurements

Parameter	Instrument or Sampling Method	Frequency
Wind Speed	SONIC	Continuous
Wind Direction	SONIC	Continuous
Temperature	Thermistor	Continuous
Relative Humidity	Hydroscopic Capacitor	Continuous
Barometric Pressure	Piezoresistive Sensor	Continuous

Carbonyls are sampled using DNPH cartridges and analyzed with HPLC according to EPA Method TO-11a. The target compound list is provided in Table 5.6 below.

Table 5.6 Target Compound List for Carbonyl Sampling

Compound	AIRS Code
acetaldehyde	43503
acetone	43551
acrolein	43505
benzaldehyde	45501
crotonaldehyde	43516
formaldehyde	43502
hexanal	43511
methacrolein	43515
m-tolualdehyde	45504
n-butyraldehyde	43510
propionaldehyde	43504
valeraldehyde	43518

Volatile organic compounds are monitored using Summa canisters samples followed by laboratory GCMS analysis as well as by an on-site realtime GC. The methods and sampling frequencies are provided in Table 5.7 below.

Table 5.7 VOC Methods and Sampling Frequencies

Sampling Method	Analytical Method	Frequency
Method TO-14a	GC/FID	Hourly
TO-15 (24-hr)	GC/MS	Every 6 day
TO-15 (40 min)	GC/MS	Once a week

The targeted compounds are listed below:

Table 5.8 PAMS Target Compounds List

Compound	AIRS #
ethene	43203
acetylene	43206

Compound	AIRS #
ethane	43202
propene	43205
propane	43204
isobutane	43214
1-butene	43280
n-butane	43212
trans-2-butene	43216
cis-2-butene	43217
3-methyl-1-butene	dropped 1995 43282
isopentane	43221
1-pentene	43224
n-pentane	43220
isoprene	43220
trans-2-pentene	43226
cis-2-pentene	43227
2-methyl-2-butene	dropped 1995 43227
2,2-dimethylbutane	43227
cyclopentane	43242
4-methyl-1-pentene	dropped 1995 43234
cyclopentene	dropped 1995 43283
2-,3-dimethylbutane	43284
2-methylpentane	43285
3-methylpentane	43230
2-methyl-1-pentene	dropped 1997 43246
n-hexane	43231
trans-2-hexene	dropped 1995 43289
cis-2-hexene	dropped 1995 43290
n-hexene	added 1997 43245
methylcyclopentane	43262
2,4-dimethylpentane	43247
benzene	45201
cyclohexane	43248
2-methylhexane	43263
2,3-dimethylpentane	43291

Compound	AIRS #
3-methylhexane	43249
2,2,4-trimethylpentane	43250
n-heptane	43232
methylcyclohexane	43261
2,3,4-trimethylpentane	43252
toluene	45202
2-methylheptane	43960
3-methylheptane	43253
n-octane	43233
ethylbenzene	45203
p/m-xylene	45109
styrene	45220
o-xylene	45204
nonane	43235
isopropylbenzene	45210
n-propylbenzene	45209
m-ethyltoluene	added 1995 45212
p-ethyltoluene	added 1995 45213
1,3,5-trimethylbenzene	45207
o-ethyltoluene	added 1995 45211
1,2,4-trimethylbenzene	45208
n-decane	43238
1,2,3 trimethylbenzene	added 1995 45225
1,3-diethylbenzene	added 1995 45218
1,4 diethylbenzene	added 1995 45219
n-undecane	43954
dodecane	added 1997 45218
tnmoc	43102
pamshc	43000

All parameters except for the summer intensive VOCs and carbonyls are run on a continuous basis year round. VOC system startup is scheduled for May 15th each year. The carbonyl's schedule of eight (3 hour) samples every third day ended in September 2005 as the requirement was dropped by EPA to reduce overall cost of the PAMS program. The VOC intensive sampling

ends in September after the final system audit. Twenty-four hour carbonyl and canister samples are continued on a six day schedule throughout the year.

The on-site GC system consists of a Markes Unity Air Server-Thermal Desorber System integrated with an Agilent GC. The Summa canisters are shipped to the Rensselaer laboratory facility and analyzed with an Entech preconcentrator with a Varian GCMS System.