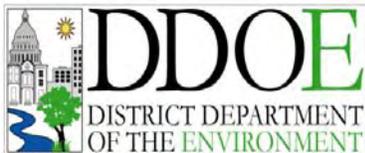




District of Columbia 2010 Annual Ambient Air Monitoring Network Plan

June 28, 2010



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Acronyms and Definitions

AQI	Air Quality Index
AQS	Air Quality Subsystem
AQD	Air Quality Division
BAM/BAMM	Beta Attenuation (Mass) Monitor - typically used for measuring continuous particulate matter
CAA	Clean Air Act
CFR	Code of Federal Regulations
CSN	Chemical Speciation Network
CO	Carbon Monoxide
DC	District of Columbia
DDOE	District Department of the Environment
EPA	U.S. Environmental Protection Agency
FEM	Federal Equivalent Method
FID	Flame Ionization Detector
FRM	Federal Reference Method
GC	Gas Chromatograph
HAPS	Hazardous Air Pollutants
IMPROVE	Interagency Monitoring of Protected Visual Environments
IR	Infrared (radiation)
MAB	Monitoring and Assessment Branch, Air Quality Division
MSA	Metropolitan Statistical Area
NAA	Non-attainment Area
NAAQS	National Ambient Air Quality Standard
NATTS	National Air Toxic Trends Stations
NAMS	National Air Monitoring Station
NCore	National Core Monitoring Network
NO	Nitrogen Oxide
NO ₂	Nitrogen Dioxide
NO _x	Oxides of Nitrogen (ozone precursor)
NO _y	Total Reactive Nitrogen Species (ozone precursor)
O ₃	Ozone
OC/EC	Organic Carbon/Elemental Carbon
PAHs	Polycyclic Aromatic Hydrocarbons
PAMS	Photochemical Assessment Monitoring network Stations
Pb	Lead
PM _{2.5}	Particulate matter with an equivalent diameter less than or equal to 2.5 μm
PM ₁₀	Particulate matter with an equivalent diameter less than or equal to 10 μm
QA	Quality Assurance
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Stations
SO ₂	Sulfur Dioxide
STN	PM _{2.5} Speciation Trends Network
TEOM	Tapered Element Oscillating Microbalance
UV	Ultraviolet
VOCs	Volatile Organic Compounds

1.0 Introduction

In 1970, Congress passed the Clean Air Act (CAA) and authorized the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for pollutants shown to threaten human health and welfare. Primary standards were set according to criteria designed to protect public health, including an adequate margin of safety to protect sensitive populations such as children and elderly. Secondary standards were set to protect public welfare (decreased visibility, damage to crops, vegetation, and buildings, etc). As part of the CAA, state and local air agencies are required to operate and maintain ambient air monitoring networks. Six pollutants currently have NAAQS: ozone (O₃), carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), particulate matter (less than 10 microns, PM₁₀, and less than 2.5 microns aerodynamic diameter, PM_{2.5}) and lead (Pb). These are commonly known as the "criteria" air pollutants. When air quality does not meet the NAAQS for one of the criteria pollutants, the area is said to be in "non-attainment" for that pollutant.

Air pollution comes from many sources. On-road vehicles (cars, trucks, buses and motorcycles), off-road equipment (locomotives, boats, construction equipment, lawn mowers etc), area sources (gas stations, auto maintenance facilities, painting operations, and consumer products usage, etc.) factories, power plants and even fires can create pollution that will harm our environment. Determining the ambient air quality through monitoring is essential to effective control of air pollution. Control measures implemented by the federal and state/local governments, subsequent to 1970 CAA and the 1990 CAA Amendments, resulted in major improvements in air quality.

The District Department of the Environment (DDOE) regulates air pollution sources in the District of Columbia (DC) to protect public health and the environment. DDOE uses its ambient network to track changes in air quality in DC and to evaluate compliance with NAAQS. Ambient air quality monitoring in DC began in the late 1950s, prior to the establishment of the EPA. The first monitors were simple mechanisms or passive collectors such as dust-fall buckets and tape samplers. These were followed in the 1960s by wet-chemistry instruments, which were soon replaced by more advanced electronic automated instruments. The addition of computer technology in operating monitoring systems and air pollution data collection in the late 1970s and early 1980s was critical to the development of the core monitoring network that exists today.

Over the years, monitoring goals shifted to include measuring high pollution concentrations in population centers, detecting trends, and determining compliance with the new national and state air quality standards, as well as establishing background levels and measuring pollution transported from areas outside. As required by the federal air monitoring regulation, DC follows the guidance for air monitoring in areas of 1) expected high concentrations, 2) high population density, 3) significant sources, 4) general background concentrations, and 5) regional transport.

In October 2006, the U.S. EPA issued final regulations concerning state and local agency ambient air monitoring networks. These regulations require periodic assessments of the monitoring networks. The annual monitoring network plan and periodic network assessment as described in §58.10 must contain the following information for existing and proposed site(s):

- Air Quality System (AQS) site identification number;
- Location, including street address and geographical coordinates;

- Sampling and analysis method(s) for each measured parameter;
- Operating schedules for each monitor;
- Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal;
- Monitoring objective and spatial scale of representative for each monitor;
- Identification of suitable and non-suitable for comparison against the annual PM2.5 NAAQS as described in §58.30; and
- Metropolitan Statistical Area (MSA), Core Based Statistical Area (CBSA), Combined Statistical Area (CSA) or other area represented by the monitor.

This document is an annual revision to DC's Ambient Air Monitoring Network Plan and Periodic Network Assessment and contains a description of the District of Columbia's air monitoring network, various parameters within the network, monitoring station and data information. This annual review document also confirms that DC's air monitoring network continues to meet federally established monitoring and data assessment criteria. The annual network review, as required by 40 CFR 58.10, was made available to the public on the DDOE website for a 30-day comment period and no comments were received. The network plan will be submitted to EPA Region 3 offices by July 1st.

1.1 District of Columbia's Ambient Air Monitoring Strategy

Ambient air monitoring systems are a critical part of the DC's air quality management program. Air quality management involves a cycle of air quality monitoring, setting standards and objectives, designing and implementing control strategies, assessing the results of those control strategies, and measuring progress. Ambient air monitoring data provide accountability for emission strategy progress through tracking long-term trends of criteria and non-criteria pollutants and their precursors. The data also form the basis for air quality forecasting and other public outreach air quality reports. Ambient monitoring data have many uses throughout this process, such as:

- determining compliance with the NAAQS;
- characterizing air quality and trends;
- estimating health risks and ecosystem impacts;
- developing and evaluating emission control strategies;
- evaluating source-receptor relationships;
- providing data for input to run and to evaluate models; and
- to measure overall progress of air pollution control programs.

Over the last 20 years, monitored levels of the criteria pollutants have decreased significantly in DC due to the implementation of various control measures. The decade of the 1980's was a transition for air quality with the introduction of automobiles equipped with catalytic converters and the accompanying air pollution reductions for NO₂, CO and volatile organic compounds (VOCs). Ozone and PM₁₀ have been greatly reduced, although DC still remains in non-attainment for ozone. Pollution reduction strategies for stationary sources, off-road vehicles and disperse area source categories have reduced sulfur dioxide, NO_x and VOCs. The phasing out of leaded gasoline in the 1980s led to significant drop in ambient Pb levels.

2.0 District of Columbia's Ambient Air Monitoring

The Monitoring and Assessment Branch in DDOE's Air Quality Division operates, maintains, and performs all functions of the ambient air monitoring required in DC by the Clean Air Act. DC's network currently consists of five air monitoring sites. Sampling covers criteria air pollutants, air toxics, PM_{2.5} mass and speciation, and enhanced monitoring for ozone with a photochemical assessment monitoring station (PAMS) for measuring speciated VOCs, nitrogen oxides (NO_x), carbonyls, and meteorological parameters.

One of the significant elements of the October 2006 monitoring regulations is the establishment of new multi-pollutant National Core (NCore) monitoring network to provide more real-time air quality data. DC will establish an NCore station at its McMillan Reservoir site (11-001-0043) to be operational by January 1, 2011. Also, DDOE will establish an ambient Pb monitor at the NCore site for population-based monitoring by January 1, 2011 to fulfill the monitoring requirements of the recently adopted new and more stringent NAAQS.

Figure 2-1 and Tables 2-1 through Table 2-5 below show DC's air monitoring network and additional information related to the sites and the measured pollutant parameters.

Table 2-1 District of Columbia 2010 Ambient Air Monitoring Network and Monitor Details

Site Name, AQS ID	Street Address	City, County	Zip Code	Latitude, Longitude	Location Setting	Nearest Road	Traffic Count	Traffic Count Year	Distance (m)	Metro Statistical Area (MSA)
McMillan 11-001-0043	2500 1st St., N.W.	Washington DC	20001	38°55'18.81"N 77° 0'47.58"W	Urban	First Street NW	7600	2008	50	DC- Arlington- Alexandria
River Terrace 11-001-0041	420 34th Street N.E.,	Washington, DC	20019	38°53'44.06"N 76°57'29.06"W	Urban	Benning Rd.	45700	2008	100	DC- Arlington- Alexandria
Takoma 11-001-0025	7010 Piney Branch Rd. N.W.,	Washington, DC	20012	8°58'32.09"N 77° 1'21.45"W	Urban	Piney Branch Rd.	15800	2008	50	DC- Arlington- Alexandria
Verizon 11-001-0023	2055 L St., N.W.,	Washington, DC	20036	38°54'13.94"N 77° 2'45.03"W	City Center	L St.	11200	2008	5	DC- Arlington- Alexandria
Hains Point 110010042	1100 Ohio Drive S.W.,	Washington, DC	20242	8°52'34.40"N 77° 2'3.78"W	Urban	I-395	209200	2008	250	DC- Arlington- Alexandria

Table 2-2 Parameter information for DC ambient air monitoring sites

Site Name, AQS ID	Parameter	Start Date	Method Code	Probe Height (m)	Scale of Representative	Monitoring Objective	Type*	Sample Schedule
McMillan 11-001-0043	Nitrogen Dioxide, Nitric Oxide	06/01/1994	074	3	Urban	Population Exposure/Max Precursor	PAMS/SLAMS	Hourly
	Nitrogen Dioxide, Nitric Oxide	1/1/2011	075	3	Urban	General/Background	NCORE	Hourly
	SO2 (trace)	1/1/2011	560	3	Urban	General/Background	NCORE	Hourly
	CO (trace)	1/1/2011	554	3	Urban	General/Background	NCORE	Hourly
	PMcoarse	1/1/2011		3	Urban	General/Background	NCORE	Hourly
	Type 2 PAMS	06/01/1994	128	3	Urban	General/Background	NCORE	Hourly
	Ozone	06/01/1994	047	3	Urban	Population Exposure/Max Precursor	PAMS/SLAMS	Hourly
	PM2.5 Continuous	01/01/2003	701	4	Urban	Population Exposure/Max Precursor	SLAMS	Hourly
	PM2.5	01/01/1999	120	4	Urban	Population Exposure/Max Precursor	SLAMS	Daily
	PM2.5 Chemical Speciation	01/01/2002	810	4	Urban	Population Exposure/Trends	CSN	Every 3 days
	Air Toxics	1/1/2001	150	4	Urban	Population Exposure/Trends	NATTS	Every 6 Days
River Terrace 11-001-0041	Carbon Monoxide	5/1/1993	054	10	Neighborhood	Population Exposure	SLAMS	Hourly
	Nitric Oxide	5/1/1993	074	10	Neighborhood	Population Exposure	SLAMS	Hourly
	Nitrogen Dioxide	5/1/1993	074	10	Neighborhood	Population Exposure	SLAMS	Hourly
	Oxides of Nitrogen	5/1/1993	074	10	Neighborhood	Population Exposure	SLAMS	Hourly
	Ozone	5/1/1993	047	10	Neighborhood	Population Exposure	SLAMS	Hourly
	PM2.5	01/01/1999	120	10	Neighborhood	Population Exposure	SLAMS	Daily
	Sulfur Dioxide	5/1/1993	060	10	Neighborhood	Population Exposure	SLAMS	Hourly
	PM10	5/1/1993	063	10	Neighborhood	Population Exposure	SLAMS	Every 6 Days
Takoma 11-001-0025	Nitric Oxide	1/1/1980	074	10	Urban	Population Exposure	SLAMS/NAMS	Hourly
	Nitrogen Dioxide	1/1/1980	074	10	Urban	Population Exposure	SLAMS/NAMS	Hourly
	Oxides of Nitrogen	1/1/1980	074	10	Urban	Population Exposure	SLAMS/NAMS	Hourly
	Ozone	1/1/1980	047	10	Urban	Population Exposure	SLAMS/NAMS	Hourly
Verizon 11-001-0023	Carbon Monoxide	10/1/1980	054	3	Urban	Population Exposure	SLAMS/NAMS	Hourly
Hains Point 11-001-0042	PM2.5	03/01/1999	120	10	Urban	Population Exposure	SLAMS	Every 3 Days

*NCORE monitors at McMillan station will be operational by January 1, 2011

Table 2-3 Parameter counts by site (cross-reference to Table 2-2).

Site Name	Pollutant parameter / Pollutant group																TOTALS						
	Air Toxics	Chromium-6 (Air Toxics)	PAH compounds (Air Toxics)	CO	NO	NO2	NOx	NOy	O3	PAMS VOCs	PAMS VOCs continuous (Auto-GC)	PM2.5	PM2.5 Elemental/Organic Carbon	PM2.5 (Continuous)	Air Toxics Metals (PM10)	PM10 (Continuous)		Speciated PM2.5	SO2	Trace CO	Trace SO2	PAMS-Surface meteorology	
McMillan Reservoir	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	19
River Terrace School				1	1	1	1	1	1			2			2			1					10
Takoma School					1	1	1	1	1														4
Verizon Building				1																			1
Hains Point												1					1						2

Table 2-4 Monitoring methods and associated AQS codes used in the DC ambient air monitoring network.

Parameter	Method Code	Sample Analysis Description
Air Toxics	150	Capillary GC ITD Mass Spectrometer
Carbon Monoxide	054	Nondispersive Infrared Photometry
Carbon Monoxide, Trace	554	
Nitric Oxide and Nitrogen Dioxide	074	Chemiluminescence
Nitric Oxide, Nitrogen Dioxide, and Reactive Oxides of Nitrogen	075	Chemiluminescence
Oxides of Nitrogen	074	Chemiluminescence
PAMS VOCs	128	Gas Chromatograph with Flame; GC/FID
PAMS VOCs	126	Cryogenic Pre-concentration Trap GC/FID
Ozone	047	Ultra Violet Photometry
PM2.5	120	Gravimetrics
PM2.5 Species Constituents: Trace Elements	821	Energy Dispersive XRF using Teflon Filter
PM2.5 Species Constituents: Ions	812	Ion Chromatography using Nylon Filter
PM2.5 Species Constituents: Organics	813	Using quartz filter – Thermo-Optical Transmittance
PM2.5 Continuous	701	Non-corrected TEOM
PM2.5 - Elemental and Organic Carbon	861	BC/EC, Self-contained Non-dispersive Infrared (NDIR) Detector System
Sulfur Dioxide	060	Pulsed Fluorescence
Sulfur Dioxide, trace	560	Pulsed Fluorescence

Table 2-5 Constituent compounds and species measured in DC.

Constituent Group	Compounds in the Constituent Group
Air Toxics	Dichlorodifluoromethane, Chloromethane, 1,2-Dichloro-1,1,2,2,tetrafluoroeth, Chloroethene, 1,3-Butadiene, Bromomethane, Chloroethane, Trichlorofluoromethane, Acrolein, Acetone, 1,1-Dichloroethene, Methylene Chloride, Carbon disulfide, Isopropyl Alcohol, 1,1,2-Trichloro-1,2,2-trifluoroethane, Trans-1,2-Dichloroethene, 1,1-Dichloroethane, 2-methoxy-2-methyl-Propane, Methyl ethyl Ketone (2-butanone), Cis-1,2-Dichloroethene, Hexane, Chloroform, Ethyl Acetate, Tetrahydrofuran, 1,2-Dichloroethane, 1,1,1-Trichloroethane, Benzene, Carbon tetrachloride, Cyclohexane, 1,2-Dichloropropane, Bromodichloromethane, Trichloroethylene, Heptane, Cis-1,3-Dichloro-1-Propene, Methyl Isobutyl Ketone, Trans-1,3-Dichloro-1-Propene, 1,1,2-Trichloroethane, Toluene, Dibromochloromethane, Methyl butyl Ketone, (2-Hexanone), 1,2-Dibromoethane, Tetrachloroethylene, Chlorobenzene, Ethyl benzene, m & p- Xylene, Bromoform (Tribromomethane), Styrene, 1,1,2,2-Tetrachloroethane, o-Xylene, 1-Ethyl-4-Methylbenzene, 1,3,5-Trimethylbenzene, 1,2,4-Trimethylbenzene, Benzyl Chloride, 1,3-dichlorobenzene, 1,4-Dichlorobenzene, 1,2-Dichlorobenzene, 1,2,4-Trichlorobenzene, and Hexachloro-1,3-Butadiene
PAMS VOCs	Acetone, Ethane, Acetylene, Propane, 2,2-dimethylbutane, Benzene, i-Butane, n-Butane, i-Pentane, n-Pentane, 2,2,4-trimethylpentane, i-Propylbenzene, n-hexane, 2-methylpentane, 2,3-dimethylbutane, Cyclopentane, Ethylbenzene, n-Propylbenzene, 3-methylpentane, Toluene, Styrene, n-Heptane, 2-methylhexane, 2,4-dimethylpentane, 2,3,4-trimethylpentane, o-Xylene, 3-methylhexane, 2,3-dimethylpentane, Formaldehyde, n-Octane, 2-methylheptane, Cyclohexane, 3-methylheptane, n-Nonane, m&p-Xylenes, Methylcyclohexane, Methylcyclopentane, n-Decane, n-Undecane, Acetaldehyde, 1,2,3-Trimethylbenzene, 1,2,4-Trimethylbenzene, 3-methyl-1-butene, 1-Butene, Propene, 1-Pentene, 1,3,5-Trimethylbenzene, 2-methyl-1-pentene, 2-methyl-2-butene, c-2-hexene, c-2-pentene, c-2-Butene, Cyclopentene, 4-methyl-1-pentene, t-2-hexene, t-2-Butene, t-2-pentene, Isoprene
Speciated PM2.5 Mass	Aluminum, Ammonium, Antimony, Arsenic, Barium, Bromine, Cadmium, Calcium, Carbonate carbon, Cerium, Cesium, Chlorine, Chromium, Cobalt, Copper, Elemental carbon, Europium, Gallium, Gold, Hafnium, Indium, Iridium, Iron, Lanthanum, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Niobium, Nitrate, OCX, OCX2, Organic carbon, Phosphorus, Pk1_OC, Pk2_OC, Pk3_OC, Pk4_OC, Potassium, PyroIC, Rubidium, Samarium, Scandium, Selenium, Silicon, Silver, Sodium, Strontium, Sulfate, Sulfur, Tantalum, Terbium, Tin, Titanium, Total carbon, Vanadium, Wolfram, Yttrium, Zinc, and Zirconium

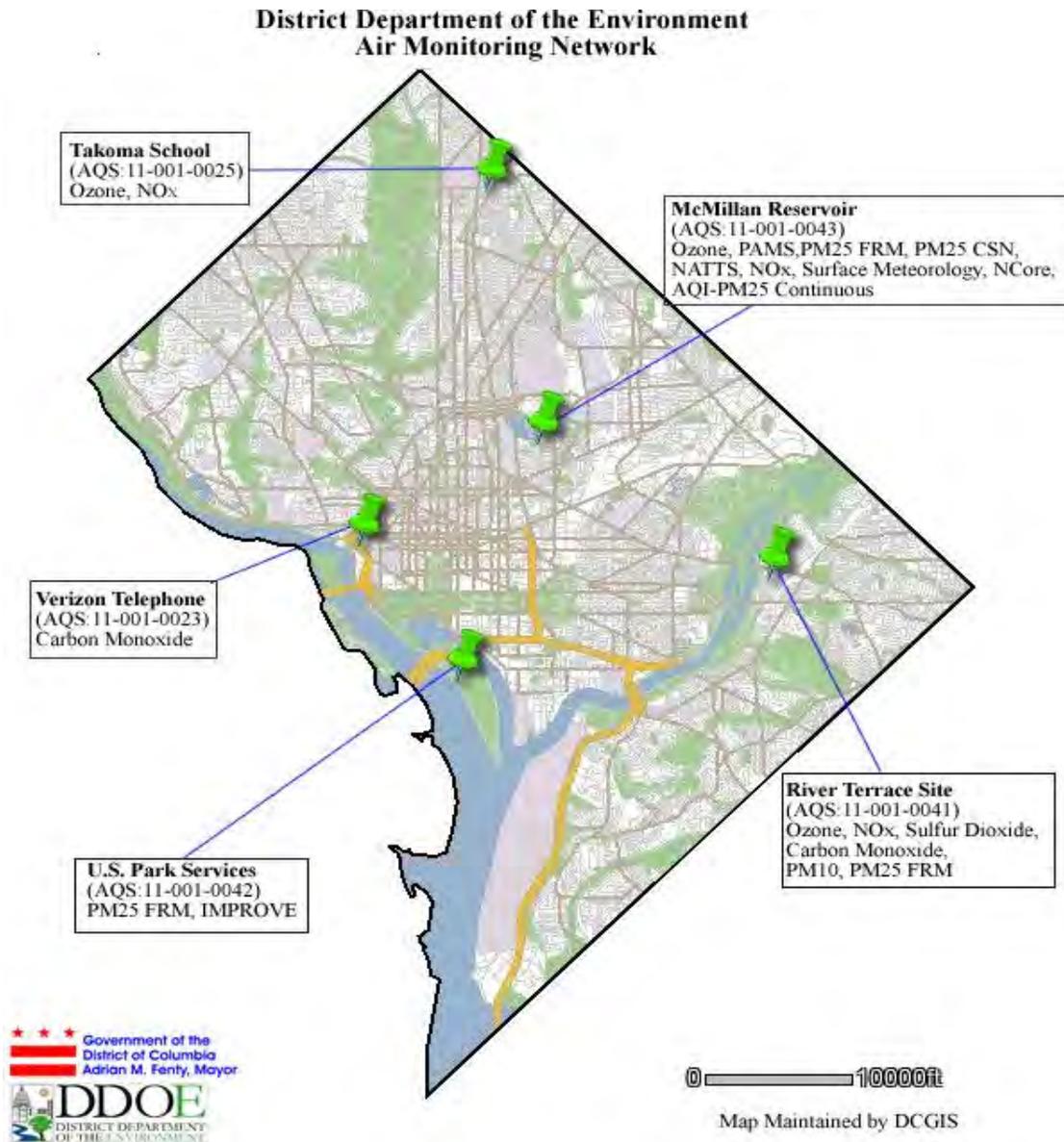


Figure 2-1

2.1 Air Monitoring Networks

DC's monitoring stations individually are part of one or more of the national ambient air monitoring networks. The following sections describe each monitoring network type.

2.1.1 State and Local Air Monitoring Station

The state and local ambient monitoring stations (SLAMS) measure ambient levels of gaseous and particulate air pollutants. SLAMS and national ambient monitoring stations (NAMS) represent the majority of all criteria pollutant (SO₂, NO₂, CO, O₃, Pb, PM_{2.5}, PM₁₀) monitoring across the nation. These stations use federal reference or equivalent methods (FRM/FEM) for direct comparison to the NAAQS to determine whether areas are in attainment or non-attainment for the air quality standards. There are approximately 4,000 SLAMS monitoring stations

nationwide. The distribution of stations in the SLAMS Network is determined in large part by the needs of state and local air pollution control agencies State Implementation Plan (SIP) requirements. DC's network consists of five SLAMS.

2.1.2 National Air Monitoring Station Network

The NAMS network is a subset of the SLAMS network and was developed in the 1970s. These stations use federal reference or equivalent methods (FRM/FEM) for direct comparison to the NAAQS. In the early 1980s, the networks began to add PM₁₀ monitors, and then expanded to include PM_{2.5} monitors, beginning in 1999, to assess attainment with the 1997 PM_{2.5} NAAQS. The PM_{2.5} network consists of ambient monitoring sites that measure PM_{2.5} mass. The NAMS are designated as national trends sites and, in some cases, also serve as the design value sites for a Metropolitan Statistical Area (MSA). DDOE operates two NAMS in DC.

2.1.3 Photochemical Assessment Monitoring Network

The Photochemical Assessment Monitoring Stations (PAMS) network was developed in the 1990s to provide an air quality database that will assist in evaluating and modifying control strategies for attaining the ozone NAAQS. Parameters to be measured at a PAMS site varies with the ozone nonattainment designation of the area (moderate, serious, severe or extreme) and whether the site is upwind or downwind of ozone precursor source areas. The parameters to measure are ozone (O₃), volatile organic compounds (VOC), and NO_x. The national PAMS network consists of 75 sites in 25 metropolitan areas. The PAMS was a major addition to the state/local networks introducing near research grade measurements for over 50 VOC compounds during core part of the ozone season (June-August). DC operates one PAMS Type 2 monitoring station at the McMillan Reservoir site.

2.1.4 Special Purpose Monitoring

Special Purpose Monitoring (SPM) includes National Air Toxic Trends Stations (NATTS) Monitoring, PM_{2.5} Chemical Speciation Network (CSN) monitoring, Air Quality Index Monitoring and any other special purpose short-term monitoring. Currently, DC's network consists of: one NATTS, one CSN station, and one continuous PM_{2.5} AQI station at the McMillan Reservoir site.

2.1.5 NCore Monitoring

In October 2006, EPA revised the national air quality monitoring regulations (40 CFR, Part 58). The most significant element of the revised regulations is to establish a new National Core multi-pollutant network of monitoring stations (NCore). Trace-gas measurements for pollutants such as ozone, sulfur dioxide, carbon monoxide and nitrogen oxides will be required at NCore sites. Although PM_{coarse} (PM_{10-2.5}; PM between 10 microns and 2.5 microns in diameter) standards were not put in place at this time, PM_{10-2.5} monitoring is expected at the NCore sites to gather data for future rule-making efforts. Wind speed, wind direction, relative humidity, and ambient temperature are also required at NCore sites.

In November 2009, EPA approved establishing an NCore station at the McMillan Reservoir site in DC. DDOE recently completed procurement of the monitoring equipment and is in the process of deploying the new NCore network that will be operational by January 1, 2011.

2.1.6 Interagency Monitoring of Protected Visual Environments Network

The Interagency Monitoring of Protected Visual Environments (IMPROVE) program was established in 1985 to aid with the implementation plans for the protection of visibility in Class I areas (national parks and wilderness areas) as stipulated in the Clean Air Act. There are about 110 IMPROVE sites in Class I visibility protection areas. These sites collect aerosol samples and analyze the filters for trace elements, major ions, and carbon fractions. Most of the IMPROVE sites are operated by federal agencies within the U.S. Department of the Interior.

The U.S. National Park Service operates one IMPROVE site along with a nephelometer at the Hains Point location in DC. IMPROVE sites provide data to assess PM_{2.5} mass and chemical speciation concentrations from rural areas that may impact urban areas. DDOE operates a PM_{2.5} FRM monitor at DC's IMPROVE site.

2.2 Pollutant Parameter Network

DDOE operates a comprehensive air monitoring network covering a range of pollutants. This section presents descriptions segregated by pollutant parameter.

2.2.1 PM_{2.5} Continuous Monitoring

DDOE currently operates one continuous PM_{2.5} station equipped with Tapered Element Oscillating Microbalance (TEOM) at the McMillan Reservoir site. This continuous PM_{2.5} station operates year-round and hourly data is sent to EPA's AirNow real-time air quality information web portal and to the AQS national database. DDOE is in the process of adding a PM_{2.5} Beta Attenuation Mass Monitor (BAMM) 1020 FEM at the McMillan Reservoir site.

2.2.2 PM_{2.5} FRM Network

DDOE operates four PM_{2.5} FRM monitors in its air monitoring network. Two FRM monitors are located at McMillan and Hains Point. The remaining two PM_{2.5} FRMs are co-located at the River Terrace station. The McMillan and River Terrace primary monitors are daily sampling sites while the Hains Point site is on a 1-in-3 day sample schedule. The co-located monitor at River Terrace is operated on a 1-in-6 day sampling schedule.

2.2.3 PM_{2.5} Chemical Speciation Network

DDOE currently operates one PM_{2.5} chemical speciation network (CSN) monitor at the McMillan Reservoir site. DC implemented the carbon channel upgrade (URG 3000N) for the CSN monitor during 2007. The CSN monitor at the McMillan Reservoir site operates on a 1-in-3 day sampling schedule to measure PM_{2.5} chemical species. The U.S. National Park Service operates an IMPROVE PM_{2.5} speciation monitor and a nephelometer at the Hains Point site.

2.2.4 PM₁₀ Monitoring

DDOE operates two PM₁₀ Hi-Vol manual gravimetric method monitors in its air monitoring network. Both primary and co-located monitors are operated at the River Terrace site and the measurements are made on a 1-in-6 day sampling schedule.

2.2.5 Ozone Monitoring Network

DDOE operates three ozone monitors at the Takoma, River Terrace and McMillan sites. DDOE phased-in the Thermo-49i series analyzers at the Takoma and River Terrace stations. The monitor at the McMillan site will also be replaced with a 49i analyzer during 2010.

Ozone is measured by ultraviolet absorption photometry. Air is drawn continuously through a sample cell where ultraviolet light passes through it. Ozone molecules in the air absorb part of the ultraviolet light, reducing the intensity of the light reaching a light sensor. The light is converted into an electric signal related to the concentration of ozone in the sample cell. Even though 40 CFR Part 58 Appendix D requires ozone monitoring during the ozone season (April 1-September 30) only, DDOE is committed to year-round measurements and collects ozone data on an hourly basis.

Ozone is not emitted directly from a pollution source but is formed in the lower atmosphere by the reaction of NO_x and VOCs in the presence of sunlight and warm temperatures. Sources of nitrogen oxides include automobiles, power plants and other combustion activities. VOCs can come from automobiles, gasoline vapors, and a variety of large and small commercial and industrial sources that use chemical solvents, paint thinners, and other chemical compounds. These compounds or “precursors of ozone” can travel for many miles before chemical reactions in the atmosphere form ozone.

2.2.6 Carbon Monoxide Monitoring Network

DDOE operates two carbon monoxide monitoring stations in year-round at the River Terrace and Verizon sites. DDOE deployed Thermo-48i CO analyzers during 2009.

CO is measured by infrared absorption photometry. Air is drawn continuously through a sample cell where infrared light passes through it. CO molecules in the air absorb part of the infrared light, reducing the intensity of the light reaching a light sensor. The light is converted into an electric signal related to the CO concentration in the sample cell. CO concentrations are highest along heavily traveled roadways and decrease significantly the further away the monitor is from traffic. Therefore, CO monitors are usually located close to roadways or in urban areas.

2.2.7 Nitrogen Dioxide Monitoring Network

DDOE currently operates three NO₂ monitors co-located with ozone measurement sensors. DC’s NO-NO₂-NO_x monitors are operated year-round and are located at the Takoma Park, River Terrace and McMillan sites.

NO₂ is measured indirectly. First, nitrogen oxide (NO) is measured using the chemiluminescence reaction of NO with O₃. Air is drawn into a reaction chamber where it is mixed with a high concentration of ozone from an internal ozone generator. Any NO in the air reacts with the ozone to produce NO₂. Light emitted from this reaction is detected with a photomultiplier tube and converted to an electrical signal proportional to the NO concentration. Next, NO_x is measured by passing the air through a converter where any NO₂ in the air is reduced to NO before the air is passed to the reaction chamber. By alternately passing the air directly to the reaction chamber, and through the converter before the reaction chamber, the analyzer alternately measures NO and NO_x. The NO₂ concentration is equal to the difference between NO_x and NO.

Oxides of nitrogen are produced during high-temperature burning of fuels. Sources of NO_x include motor vehicles and stationary sources that burn fossil fuels such as power plants and industrial boilers.

2.2.8 SO₂ Monitoring Network

DDOE operates one SO₂ monitor in its air monitoring network. An automated continuous SO₂ monitor is located at the River Terrace station and it collects hourly data year-round.

Sulfur dioxide (SO₂) is measured with a fluorescence analyzer. Air is drawn through a sample cell where it is subjected to high intensity ultraviolet light. This causes the sulfur dioxide molecules in the air to fluoresce and release light. The fluorescence is detected with a photo multiplier tube and converted to an electrical signal proportional to the SO₂ concentration. The main sources of SO₂ are combustion of coal and oil (mostly from electrical generating units, refineries, smelters and industrial boilers).

2.2.9 Air Toxics

DDOE operates one NATTS monitoring station at the McMillan Reservoir site. Air toxics, or hazardous air pollutants (HAPS), are those pollutants which are known or suspected to cause cancer or other serious health effects, such as reproductive or birth defects, or adverse environmental effects. Air toxics samples are collected for 24 hours with a model 910A Environmental Systems Inc. canister sampler on a 1-in-6 day schedule.

NATTS monitors at the McMillan site include: hexavalent chromium (ERG Cr+6 analyzer), PAH (Tisch Puff+ analyzer), heavy metals (PM₁₀ High-Vol), and VOCs and carbonyls (canister sampler Model 910A, Environmental Systems Inc). The sampled canisters are returned to the laboratory for analysis on an Entech/Agilent gas chromatograph (GC) mass spectrometer system. DC's NATTS site also includes an Aethalometer (Magee Scientific) for continuous hourly sampling of black carbon (OC/EC).

Toxics can come from automobiles, gasoline vapors, and large variety of large and small commercial and industrial sources that use chemical solvents, paint thinner and other chemical compounds.

2.2.10 Photochemical Monitoring for Ozone Precursors

DDOE operates one PAMS Type 2 station at the McMillan Reservoir site. The parameters measured are O₃, NO, NO_x, NO₂, and speciated VOCs.

During the core ozone season (June-August), eight 3-hour canister air samples are collected on a 1-in-3 day schedule by using a XonTech Model 910A sampler. Additionally, on a 1-in-6 day sampling schedule, 24-hour canister air samples are collected with a XonTech Model 910A canister sampler. The canisters are returned to the laboratory for analysis on an EnTech/Agilent GC/FID system for speciated VOCs.

Measurements for the 56 target hydrocarbons are analyzed on-site every hour (June–August) using a Perkin Elmer VOC Air Analyzer with dual flame ionization detectors (Perkin-Elmer 350ATD Ozone Precursor Sampler and Clarus 500 PAMS Gas Chromatograph air sampling system).

DDOE also operates ozone and oxides of nitrogen continuous analyzers (Thermo) complemented with surface meteorological measurements at this site.

PAMS VOCs can come from automobiles, gasoline vapors, and vast variety of large and small commercial and industrial sources that use chemical solvents, paint thinner and other chemical compounds.

2.2.11 Lead Monitoring Network

DDOE does not operate FRM monitors for measuring ambient Pb at this time. However, PM_{2.5} CSN and NATTS monitoring at the McMillan Reservoir site currently measure Pb through the PM_{2.5} and PM₁₀ (Hi-Vol) metals analysis.

On October 15, 2008 EPA substantially strengthened NAAQS for Pb (73 FR 66934). In conjunction with strengthening the lead NAAQS, EPA identified the need for states to improve existing lead monitoring networks by requiring monitors to be placed in areas with sources that emit one ton per year (tpy) or more of lead and in urban areas with a population of 500,000 or greater. DDOE, in conjunction with EPA Region 3, reviewed the 2007 lead emissions inventory and found no sources with emissions of one tpy or greater. Hence, source-oriented Pb monitors are not required. DC will, however, establish a population-based Pb monitor at the McMillan Reservoir NCore site.

3.0 District of Columbia’s Air Monitoring Sites

DDOE currently maintains a network of *five* ambient air monitoring stations. Hains Point, McMillan Reservoir, River Terrace, Takoma, and Verizon are the descriptive names of these stations. The sections below give additional information and maps for the five individual sites are shown in Figures 3-1 to Figure 3-5.

3.1 Hains Point Station

The Hains Point monitoring station has been operational since January 1988 and houses measurement sensors on the rooftop of U.S National Park Police building. DDOE operates a PM_{2.5} FRM monitor at this location. This is also one of the very few urban IMPROVE sites in the nation. The U.S. National Park Service operates IMPROVE PM_{2.5} mass and speciation and PM₁₀ monitors at this site.

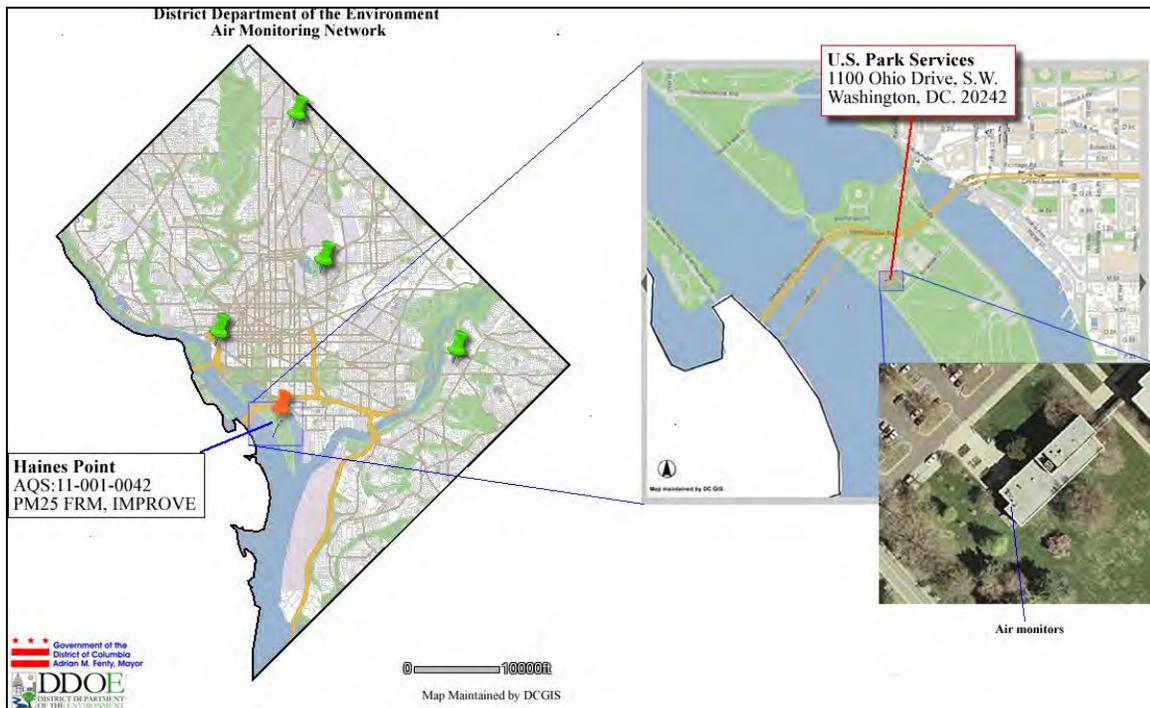


Figure 3-1: Hains Point Monitoring Station Locator Maps

3.2 McMillan Reservoir Station

The McMillan Reservoir air monitoring site was established in 1994 as a PAMS Type 2 station. Measurements for 56 target hydrocarbons are conducted with a PAMS GC ambient air sampling system. The station was expanded during 2000 and 2001 with the addition of PM_{2.5} FRM, PM_{2.5} Chemical Speciation Network (CSN) monitoring, PM_{2.5} continuous, NATTS and BC/EC sensors. Surface meteorological measurements are carried out at the McMillan Reservoir site as part of the PAMS monitoring. Also, McMillan station was the first NATTS site in EPA Region 3. By January 2011, the McMillan site will expand to include an NCore network monitoring station.

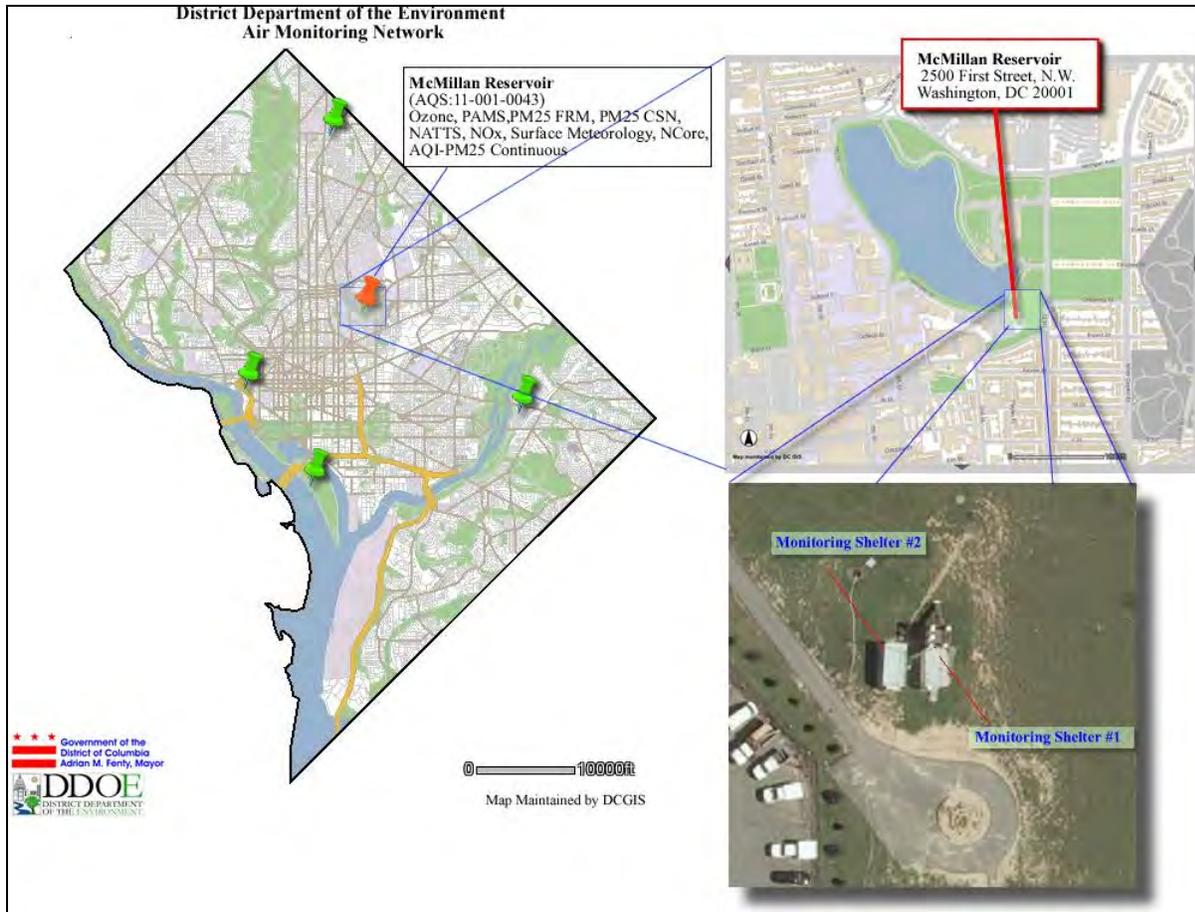


Figure 3-2: McMillan Reservoir Site Locator Maps

3.3 River Terrace Station

The River Terrace monitoring station has been operational since May of 1993. This location has measurement analyzers for ground-level ozone, sulfur dioxide, carbon monoxide, nitrogen oxides, and particulate matter (PM_{2.5} and PM₁₀).

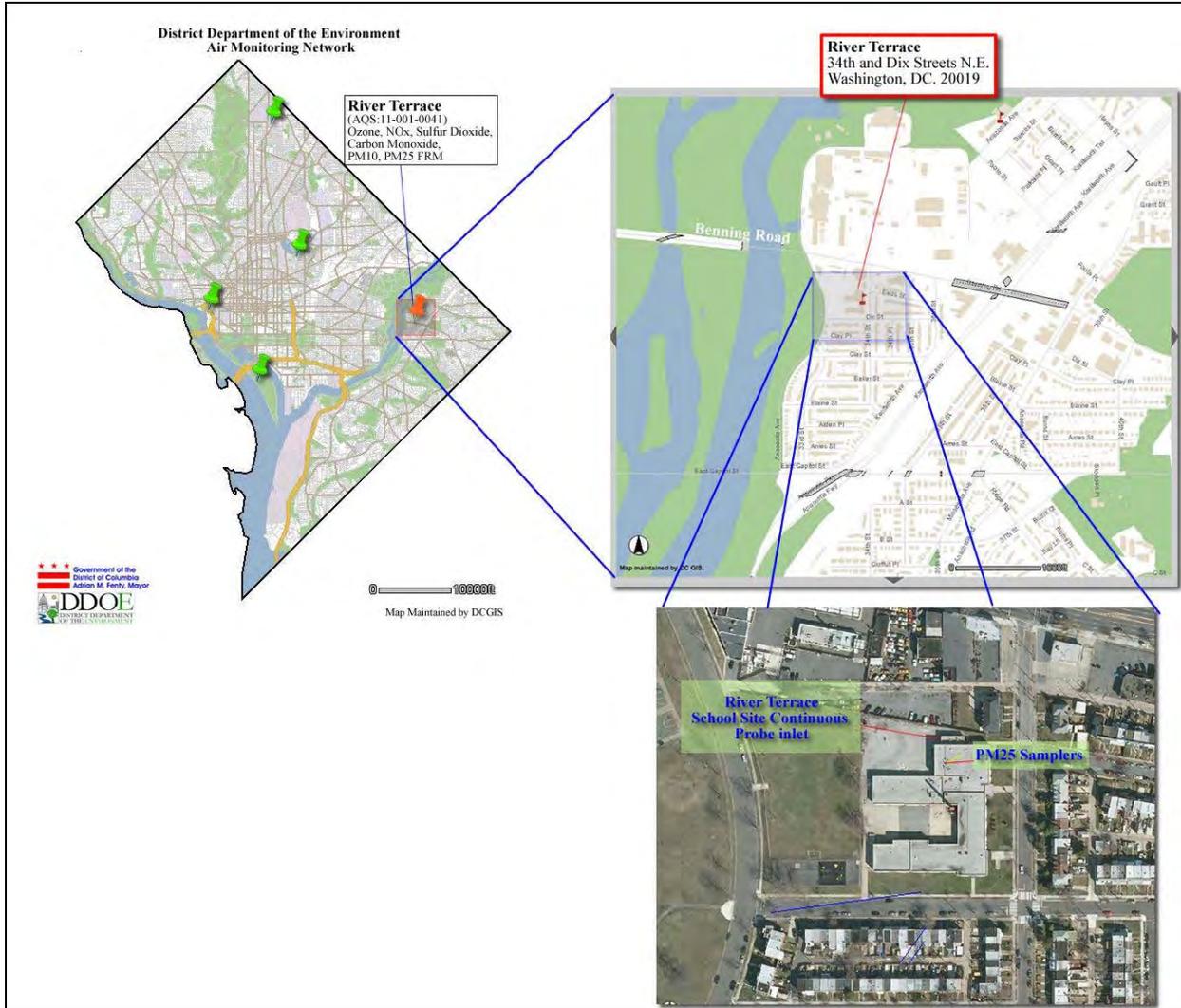


Figure 3-3: River Terrace Site Locator Maps

3.4 Takoma School

The Takoma School station has been operational since January 1980. This monitoring station is located on the roof top of a school building in DC's Takoma Park neighborhood. Ground-level ozone and nitrogen oxides are measured with automated continuous analyzers at this location.

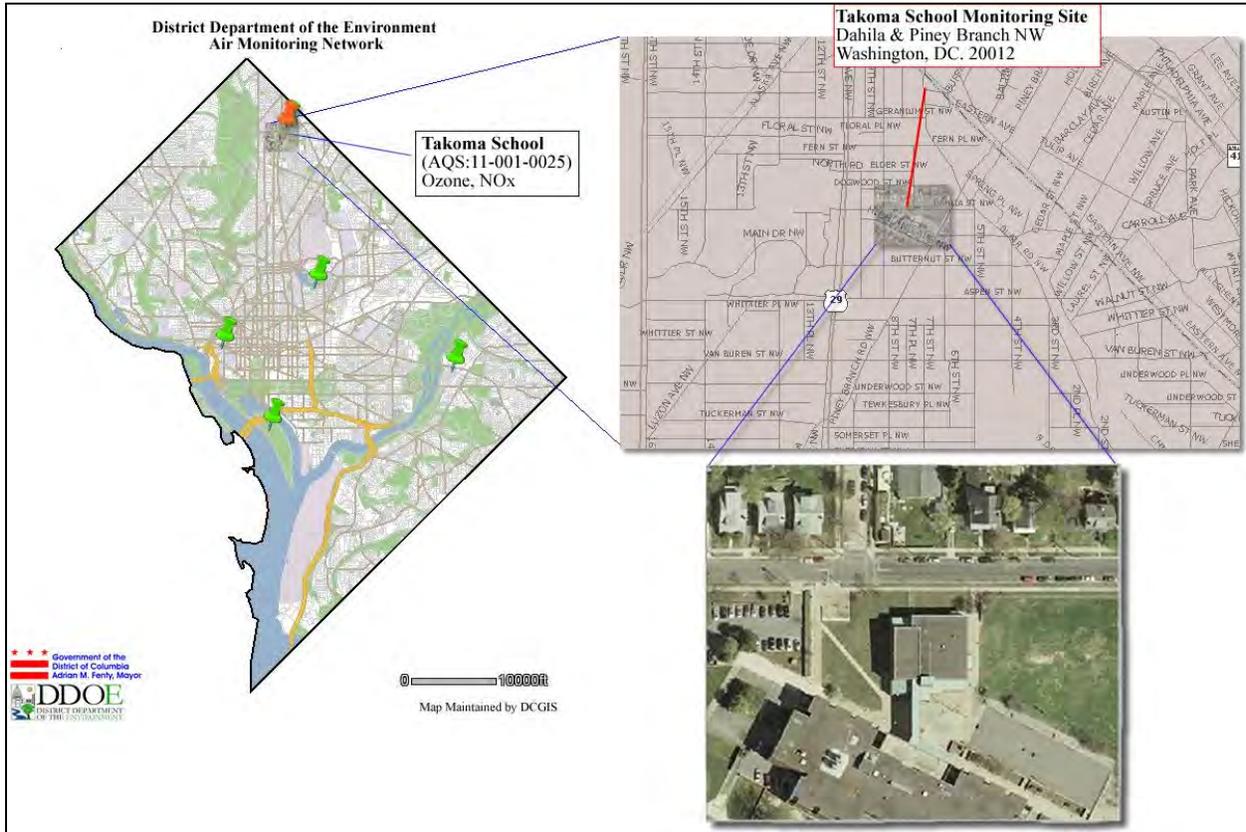


Figure 3-4: Takoma School Site Locator Maps

3.5 Verizon Station

The Verizon station was initiated in October 1980 and houses a carbon monoxide measurement sensor. This measuring component is important for DC because it is located in the heart of downtown DC where there are a lot of pedestrians as well as traffic congestion. Classified as a “Micro-scale” site, the Verizon station is in a city canyon type of environment.



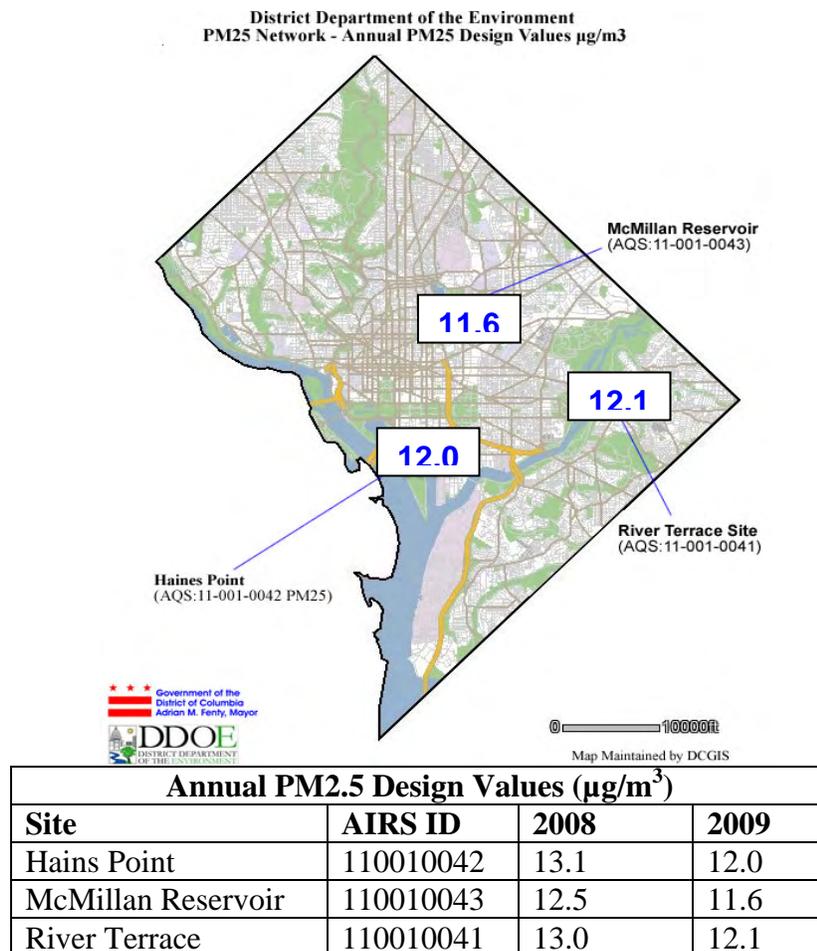
Figure 3-5: Verizon Monitoring Site Locator Maps

4.0 Ozone and PM_{2.5} Design Values

DDOE uses design value calculations for criteria air pollutants to determine if the monitored air quality is in compliance with the NAAQS. Design values are defined in the Clean Air Act guidance and they are often based on multiple years of data, ensuring a stable indicator. Design values are typically used to classify non-attainment areas, assess progress towards meeting the NAAQS, and develop control strategies. Design values are computed and published annually by EPA's Office of Air Quality Planning and Standards (OAQPS) and reviewed in conjunction with the EPA Regional Offices.

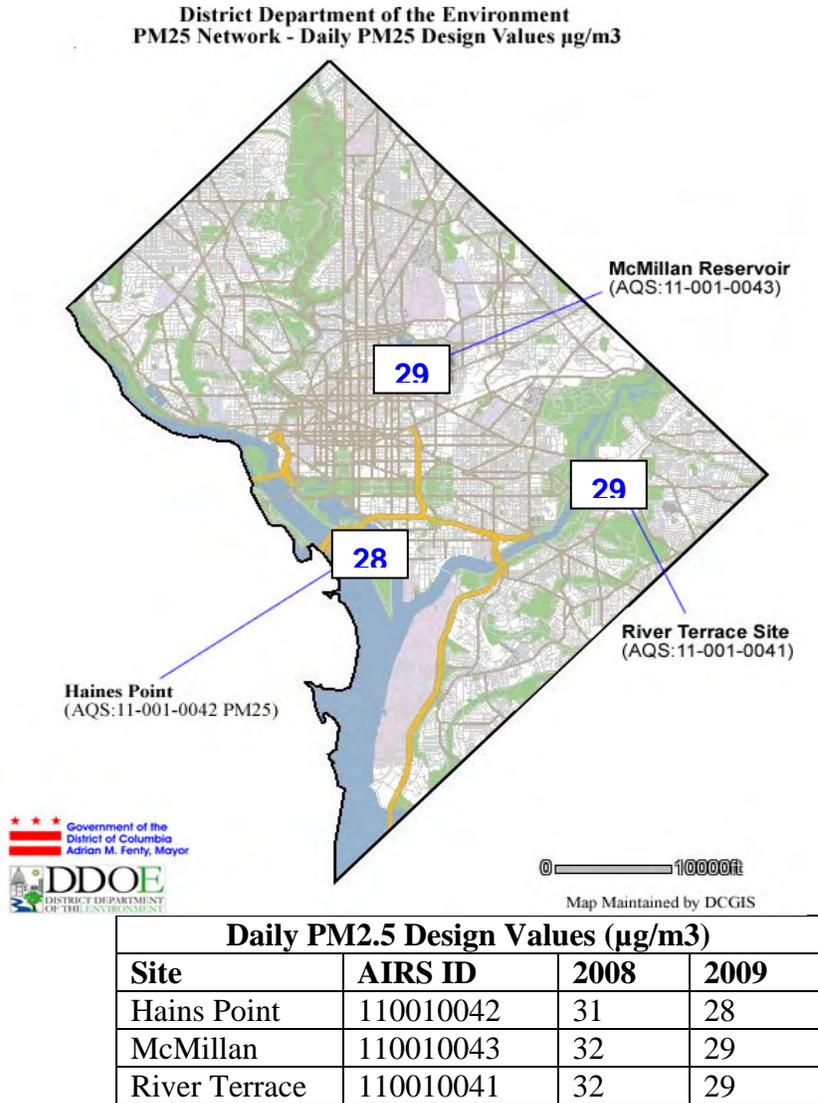
4.1 Annual PM_{2.5} Design Values

The figure and table below show the annual design values for PM_{2.5} at DC's sites for the recent period, 2007-2009. The PM_{2.5} annual design values were calculated using the average of the respective annual averages for a consecutive three-year period. The Annual PM_{2.5} NAAQS is 15 $\mu\text{g}/\text{m}^3$. The design values based on the 2007-2009 data indicate that DC's monitors show attainment for the Annual PM_{2.5} NAAQS.



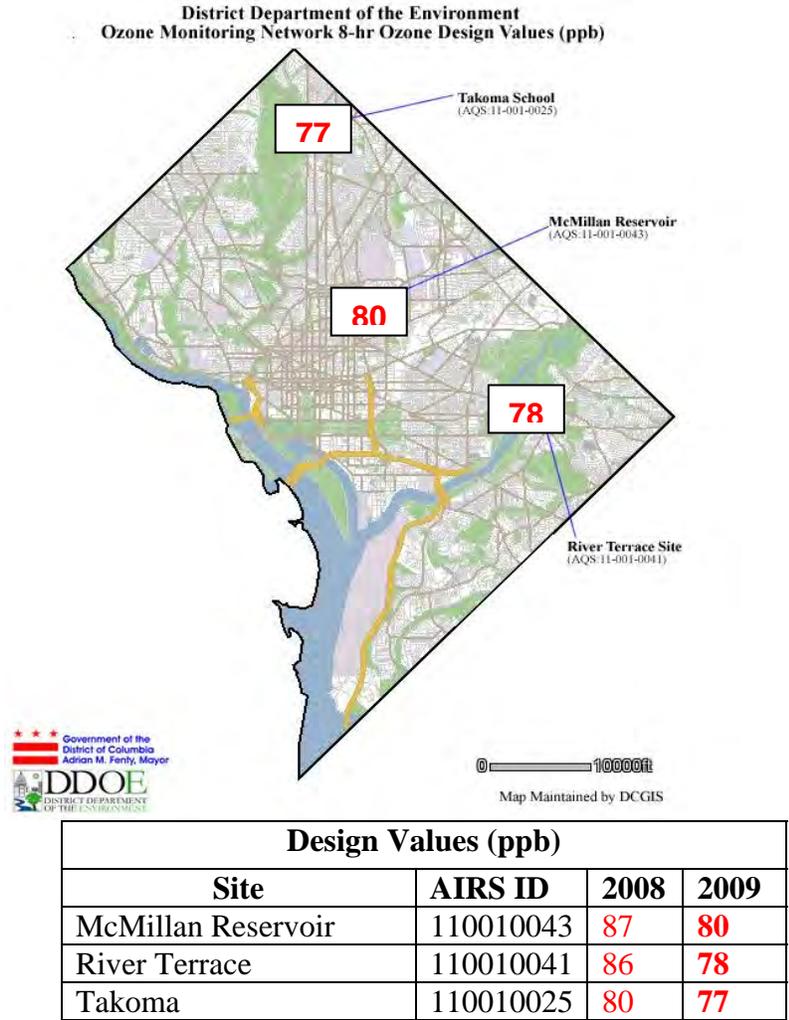
4.2 Daily PM_{2.5} Design Values

Daily PM_{2.5} design values are calculated from the 98th percentile concentration value from each year for a given consecutive three-year period. The design value is the average of the three 98th percentile concentration values. The table below gives the design values for daily PM_{2.5} using data from 2007-2009. The current daily design value threshold for PM_{2.5} in the 98th percentile at a monitoring site is less than or equal to 35 µg/m³. The design values based on the 2007-2009 data indicate that DC's monitors show attainment for the Daily PM_{2.5} NAAQS.



4.3 Ozone Design Values

In the table shown below are the current design values for ground-level ozone using the data from 2007-2009. The ozone design values are calculated by taking the 3-year average of the annual 4th highest daily maximum 8-hr average concentrations. The current 8-hr ozone NAAQS is 0.075 ppm or 75 ppb. Monitored data indicate that the air quality levels are in violation of the NAAQS at all three stations in DC.



5.0 Network Changes and Monitor Upgrades

The District of Columbia supports EPA project goals for the national monitoring strategies and the national networks. DDOE is working with the EPA Region 3 and EPA's OAQPS in determining changes or modifications to the monitoring sites, sampling schedules, sampling equipment and technologies to ensure ambient air monitoring for public health and natural resources protection, and to meet the regulatory requirements. In order to meet the national and the jurisdictional monitoring goals, the District will be partnering with the neighboring jurisdictions, MD and VA, for meeting the air monitoring requirements in the Washington, DC metropolitan area.

In November 2009, DC received EPA's approval for establishing an NCore station at the McMillan Reservoir site (11-001-0043). Field testing of the NCore suite of monitors is expected to begin by the summer of 2010 and the station is expected to be operational by January 1, 2011.

DDOE is working with the regional partners, Maryland Department of the Environment and Virginia Department of Environmental Quality, on the new NO₂ NAAQS monitoring requirements, specifically near-roadway NO₂ monitoring requirements in the Washington, DC metropolitan area.

DDOE has deployed ESC-8832 data-logger systems throughout the network and expects to fully implement the data transfers with the ESC-8832 data-loggers by the end of 2010.

DDOE is performing a five-year network assessment. The existing (three-station) PM_{2.5}, O₃ and NO_x measurement networks, (two-station) CO network, and the (one-station) SO₂ network will be evaluated for redundancies and possible optimization opportunities. The network reduction and/or monitor re-location proposals, if any, will be presented in the annual plans for future years.

DDOE procured new analyzers and implemented a few upgrades since July 2009. As part of this annual plan, DC is proposing some more upgrades to the instrumentation in its network. The subsequent sections give additional details of the changes that have taken place since the last review and the anticipated changes in the coming year.

5.1 McMillan Reservoir – Site ID 11-001-0043

- **NCore:** In November 2009, DC received EPA's approval for establishing an NCore station at the McMillan Reservoir site (11-001-0043). Purchase orders were issued to American Ecotech for SO₂ and CO trace gas analyzers, and NO_y analyzer. Field testing of the NCore suite of monitors is expected to begin by July 2010.
- **Continuous PM Monitors:** DDOE recently acquired two MetOne BAMM 1020 FEM continuous automated PM monitors. Work is underway for deploying these two BAMMs at the McMillan Reservoir site for continuous measurements of PM_{2.5} and PM₁₀ with the purpose of deriving PM_{coarse} (PM_{10-2.5}) as a difference method. DDOE will continue to operate the existing non-FEM PM_{2.5} TEOM 1402 automated sampler at the site.

- **Lead:** As part of the revised Pb NAAQS and the monitoring requirements, DC needs to establish population-based ambient Pb monitors by January 1, 2011. DDOE will establish a population-based Pb monitor at the McMillan Reservoir NCore site.
- **PM_{2.5} CSN:** DDOE operated Andersen RASS at its McMillan PM_{2.5} CSN station. As part of the national CSN realignment, EPA's OAQPS supplied a MetOne SASS monitor to replace Andersen RASS and the new monitor went into operation in April 2009. URG3000N carbon channel at the DC's PM_{2.5}CSN station has had problems during cold weather. No changes are planned at DC's CSN, other than preventive maintenance and repairs for URG3000N and MetOne SASS samplers.
- **Ozone:** DDOE currently operates a Thermo-49c series O₃ analyzer at the McMillan Reservoir station. As part of the phase-in of i-series analyzers, the 49c series analyzer will be replaced with a Thermo-49i analyzer during the year 2010.
- **PM_{2.5} FRM:** DDOE has been operating Andersen PM_{2.5} FRM samplers since the inception of the program. As part of the PM_{2.5} FRM monitor equipment upgrades, DDOE acquired Thermo 2025 PM_{2.5} FRM monitors to replace the aging Anderson monitors. One of these new monitors has been deployed at the McMillan Reservoir station during the early part of 2010 and it is expected to become operational as and when the existing Anderson monitor fails to meet the performance standards.

5.2 River Terrace School – Site ID 11-001-0041

- During 2009, the Thermo c-series CO, O₃, NO_x and SO₂ analyzers were replaced with i-series analyzers at the River Terrace site.
- As part of the PM_{2.5} FRM monitor upgrades, two Thermo 2025 PM_{2.5} FRM monitors are deployed at the River Terrace site and these new PM_{2.5} FRM samplers will become operational when the existing Anderson monitors fail to meet the performance standards.
- An evaluation of DC's existing ambient monitoring network is currently underway. Proposals for reduction and/or monitor re-location, particularly for the O₃, PM_{2.5}, NO_x and CO measurement networks as they relate to the River Terrace site, will be presented in the annual plans in the future.

5.3 Takoma School – Site ID 11-001-0025

- During 2009, the Thermo c-series O₃ and NO_x analyzers at the Takoma station were replaced with i-series analyzers.
- An evaluation of DC's existing ambient monitoring network is currently underway. Proposals for reduction and/or monitor re-location, particularly for the O₃ and NO_x measurement networks as they relate to the Takoma site, will be presented in the annual plans in the future.

5.4 Verizon Building – Site ID 11-001-0023

- During 2009, the CO analyzer at the Verizon site was replaced with an i-series analyzer.
- An evaluation of the DC's existing ambient monitoring network is currently underway. Proposals for reduction and/or monitor re-location, particularly for the CO measurement network as they relate to the Verizon site, will be presented in the annual plans in the future.

5.5 Hains Point - Site ID 11-001-0042

- As part of the PM_{2.5} FRM monitor upgrades, a Thermo 2025 PM_{2.5} FRM monitor will be deployed at the Hains Point site during the later part of the year 2010. The new PM_{2.5} FRM sampler will become operational when the existing Anderson monitor fails to meet the performance standards.
- An evaluation of DC's existing ambient monitoring network is currently underway. Proposals for reduction and/or monitor re-location, particularly for the PM_{2.5} FRM network as they relate to the Hains Point site, will be presented in the annual plans in the future.

6.0 Air Monitoring Program and Data Contacts

The Monitoring and Assessment Branch in DDOE's Air Quality Division monitors the ambient air quality and performs quality assurance and quality control on all air pollution data recorded at the various monitoring stations in the District of Columbia. DDOE is modifying the data acquisition system so that all communication between the continuous analyzers, the remote data logger, and central office are transmitted via digital format over internet protocol TCP/IP. Data is stored locally for use by staff and for preparation of special reports and data charts or special Freedom of Information Act requests.

Data is delivered to the EPA Air Quality Subsystem (AQS) and reported on a schedule set forth in 40 CFR Part 58 of the Clean Air Act. EPA controls the access to the raw ambient air quality data DDOE submits to the national database. Annual SLAMS Reports are generated from AQS and data certifications are prepared by DDOE according to the data reporting requirements in 40 CFR Part 58. Data requests can be directed via email to: robert.day@dc.gov

District of Columbia's air monitoring program main contact:

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District Department of the Environment

DDOE HOME

Public Notice: Input welcomed on District of Columbia's 2010 Ambient Air Monitoring Network Assessment and Network Plan

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REQUESTS

The US Environmental Protection Agency (EPA) revised ambient air monitoring regulations in October 2006. The revisions are expected to help the EPA, states, tribes and local air quality agencies improve public health protection and better inform the public about air quality in their communities. The requirements are outlined in 40 CFR § 58.10. The monitoring regulations require the District of Columbia to adopt and to submit to the EPA an annual monitoring network plan which provides for establishing and/or maintaining an air quality surveillance system.

The annual monitoring network plan must be made available for public inspection for at least 30 days prior to submission to EPA. The District's annual ambient air quality monitoring network assessment and NCore monitoring network plans are available on DDOE's website for a 30 day public inspection. The review period begins on **Wednesday, May 5, 2010** and ends on **Friday, June 4, 2010**.

- [Review the draft plans*](#)

Submit comments or input on DC's monitoring network plans to:

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Monitoring and Assessment Branch
Air Quality Division
District Department of the Environment
51 N St., NE, 5th Floor
Washington, DC 20002
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Background Information

In 1970, Congress passed the Clean Air Act, which authorized the EPA to establish National Ambient Air Quality Standards (NAAQS) for pollutants shown to threaten human health and welfare. Primary standards were set according to criteria designed to protect public health, including an adequate margin of safety to protect sensitive populations such as children and asthmatics. Secondary standards were set according to criteria designed to protect public welfare (decreased visibility, damage to crops, vegetation, and buildings).

EPA established NAAQS for six pollutants- ozone (O3), carbon monoxide (CO), sulfur dioxide (SO2), nitrogen dioxide (NO2), lead (Pb), and particulate matter less than 10 microns aerodynamic diameter, (PM10) and less than 2.5 microns (PM2.5). These are commonly called the "criteria" pollutants. When air quality does not meet the NAAQS, the area is said to be in "non-attainment" with the NAAQS. For more information on air quality and the federal NAAQS, please visit [EPA's website](#) or [DDOE's website](#).

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