



District of Columbia 2017 Annual Ambient Air Monitoring Network Plan

June 2016



Monitoring and Assessment Branch
Air Quality Division
Department of Energy & Environment
1200 First Street, NE, Fifth Floor
Washington, DC 20002

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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 – used for continuous measurements of particulate matter
CAA	Clean Air Act
C.F.R.	Code of Federal Regulations
CSN	PM _{2.5} Chemical Speciation Network
CO	Carbon Monoxide
DOEE	Department of Energy and 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
TSP	Total Suspended Particles
TEOM	Tapered Element Oscillating Microbalance – used for continuous measurements of PM ₁₀ or PM _{2.5}
UV	Ultraviolet (radiation)
VOCs	Volatile Organic Compounds

Executive Summary

The Clean Air Act mandates an ambient air quality surveillance system in state and local jurisdictions including the District of Columbia (District). The U.S. Environmental Protection Agency (EPA) codified the national ambient air monitoring regulations in Title 40 Code of Federal Regulations (C.F.R.) Part 58. The regulations require state and local monitoring agencies to conduct a periodic assessment of ambient air monitoring networks and propose any changes in an annual ambient air monitoring network plan. Annual network plans need to be submitted to EPA by July 1st of every year. This document is the District's Annual Ambient Air Network Plan (Network Plan) for calendar year 2017.

DOEE is proposing changes to the District's ambient air monitoring network in calendar year 2017. Since the CO maintenance period is over, the District plans to remove the CO monitors at the Verizon Center and River Terrace station to avoid redundancy. In addition, since monitoring requirements have been revised, the District plans to remove the TSP-Pb monitor and discontinue the Lead (Pb) measurement at the McMillan station. Finally, the Federal Reference Monitors (FRMs) at the McMillan, River Terrace, and Hains Point stations will be replaced with continuous Federal Equivalent Method (FEM) monitors. The rest of the existing network will be maintained as described in the subsequent sections of this Network Plan.

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 that threaten human health and welfare. Primary standards are set according to criteria designed to protect public health, including sensitive populations such as children and the elderly. Secondary standards are set to minimize harm to public welfare and the environment (*e.g.*, decreased visibility, damage to crops, vegetation, and buildings).

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 “criteria” air pollutants. When air quality does not meet the NAAQS for one of the criteria pollutants, the area is said to be in “nonattainment” of the standard for that pollutant.

Air pollution comes from many sources including on-road vehicles (cars, trucks, buses, and motorcycles), off-road equipment (locomotives, boats, construction equipment, lawn mowers), area sources (small stationary sources that cumulatively impact air quality such as gas stations, auto maintenance facilities, painting operations, consumer products usage), large stationary sources (factories, power plants), and even fires. The CAA requires that state and local air agencies operate and maintain ambient air surveillance networks to measure pollutant concentrations. DOEE uses its ambient monitoring network to track changes in the District’s ambient air and to evaluate the District’s compliance with the NAAQS.

Ambient air quality monitoring in the District began in the late 1950s, prior to the establishment of 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 the late 1970s and early 1980s to operate monitoring systems and collect air data was critical to the development of the core monitoring network that exists today.

Over the years, monitoring goals have shifted based on changes in the NAAQS. As required by federal air monitoring regulations, the District’s monitoring network is designed to study expected high pollutant concentrations, high population density, significant sources, general background concentrations, and regional transport.

In October 2006, EPA issued final regulations that require periodic assessment of monitoring networks. As described in 40 C.F.R. § 58.10, the following information for existing and proposed site(s) must be included in a Network Plan:

1. Air Quality System (AQS) site identification number;
2. Site location, including street address and geographical coordinates;
3. Sampling and analysis method(s) for each measured parameter;
4. Operating schedules for each monitor;
5. Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal;
6. Monitoring objective and spatial scale of representativeness for each monitor;

7. The identification of any sites that are suitable and sites that are not suitable for comparison against the annual PM_{2.5} NAAQS or 24-hour PM_{10-2.5} NAAQS as described in § 58.30;
8. Metropolitan Statistical Area (MSA), Core Based Statistical Area (CBSA), Combined Statistical Area (CSA), or other area represented by the monitor;
9. The designation of any Pb monitors as either source-oriented or non-source-oriented according to Appendix D to 40 C.F.R. Part 58;
10. Any source-oriented monitors for which a waiver has been requested or granted by the EPA Regional Administrator as allowed for under § 4.5(a)(ii) of Appendix D to 40 C.F.R. Part 58;
11. Any source-oriented or non-source-oriented site for which a waiver has been requested or granted by the EPA Regional Administrator for the use of Pb-PM₁₀ monitoring in lieu of Pb-TSP monitoring as allowed in § 2.10 of Appendix C to 40 C.F.R. Part 58; and
12. The identification of required NO₂ monitors as either near-road or area-wide sites in accordance with Appendix D, Section 4.3 of 40 C.F.R. Part 58.

This Annual Ambient Air Monitoring Network Plan for the District for calendar year 2017 contains a description of the District's monitoring program, various parameters within the network, and additional monitoring station information. It also confirms that the District's air monitoring program continues to meet federally established monitoring and data assessment criteria.

To meet EPA requirements at 40 C.F.R. § 58.10(a)(1), revised in April 2016, the Network Plan was made available for public inspection and comment for at least 30 days prior to submission to the EPA.

1.1 The District's Ambient Air Monitoring Strategy

Ambient air monitoring systems are a critical part of the District's air quality management program. Air quality management involves a cycle of monitoring the quality of the ambient air, setting air quality standards and objectives, identifying and implementing control strategies, and measuring progress. Air monitoring data is used throughout this process to help:

- Determine compliance with the NAAQS;
- Characterize air quality and pollutant trends;
- Estimate health risks and ecosystem impacts;
- Develop and evaluate emission control strategies;
- Evaluate source-receptor relationships;
- Provide input data for models and evaluating models;
- Measure overall progress of air pollution control programs; and
- Inform air quality forecasts and other public outreach air quality reports.

Over the last 25 years, ambient levels of criteria pollutants have decreased significantly in the District due to the implementation of various control measures. In the 1980s, the introduction of automobiles equipped with catalytic converters resulted in significant reductions in NO₂, carbon monoxide (CO), and volatile organic compounds (VOCs). The phasing out of leaded gasoline led to a significant drop in ambient lead (Pb) levels. Since then, various control strategies for stationary sources, on-road and off-road vehicles, and non-point area sources have reduced sulfur

dioxide (SO₂), nitrogen oxide (NO_x), PM_{2.5}, and PM₁₀ levels in the ambient air. There is also less formation of problematic ozone, although the District still remains in nonattainment of 8-hour ground-level ozone standards.

2.0 District’s Ambient Air Network

The Monitoring and Assessment Branch (MAB) in DOEE’s Air Quality Division operates, maintains, and performs all functions of the ambient air monitoring program required by the CAA. The District’s network currently consists of six (6) monitoring sites. Sampling covers criteria air pollutants, PM_{2.5} mass and chemical speciation, and enhanced monitoring for ozone and its precursor pollutants with a photochemical assessment monitoring station (PAMS) for measuring speciated VOCs, NO_x, carbonyls, air toxics, and surface and meteorological parameters.

One of the significant elements of the October 2006 monitoring regulations was the establishment of a multi-pollutant National Core (NCore) monitoring network to provide trace-level air quality measurements. The District launched an NCore station at its McMillan site (11-001-0043) in January 2011. Then, to fulfill the monitoring requirements of the 2008 Pb NAAQS, DOEE established an ambient Pb monitor at the NCore site in January 2012.

During the calendar year 2015, the District’s network expanded with the addition of a new Anacostia Freeway Near-Road air monitoring station. Also, in early 2015, an experimental Village Green park bench air monitoring station with low-cost emerging air sensor technology was established in the District. The park bench air monitoring station is primarily for technology demonstration and public education purposes and it is not part of the District’s regulatory network of air monitoring stations.

Tables 2-1 through Table 2-5 and Figure 2-1 below include information about the District’s six air monitoring sites used for regulatory purposes and the measured pollutant parameters.

Table 2-1: 2016 Ambient Air Monitoring Network and Monitor Details

Site Name, AQS ID	Street Address	City, County, ZIP	Latitude, Longitude	Location Setting	Nearest Road	Traffic Count	Traffic Count Year	Distance From nearest road (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	7,400	2010	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.	43,100	2010	100	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.	14,100	2010	5	DC- Arlington- Alexandria
Hains Point 11-001-0042	1100 Ohio Drive, S.W.	Washington, DC 20242	38°52'34.40"N 77° 2'3.78"W	Urban	I-395	175,400	2010	250	DC- Arlington- Alexandria
Takoma Recreation Center 11-001-0050	301 Van Buren St., N.W.	Washington, DC 20012	38°.970092"N 77°.016715W	Urban	Blair Rd., N.W.	15,200	2010	200	DC- Arlington- Alexandria

Site Name, AQS ID	Street Address	City, County, ZIP	Latitude, Longitude	Location Setting	Nearest Road	Traffic Count	Traffic Count Year	Distance From nearest road (m)	Metro Statistical Area (MSA)
Anacostia Freeway Near-Road Station 11-001-0051	3600 Benning Road NE @ Anacostia Freeway	Washington, DC 20019	38°53'41.2"N 76°57' 12.3"W	Urban	Anacostia Freeway I-295	121,300	2013	10	DC-Arlington-Alexandria

Table 2-2: Monitoring Sites and Parameters of Each Monitor

Site Name, AQS ID	Parameter	Start Date	Method Code	Probe Height (m)	Measurement Scale	Monitoring Objective	Type	Sample Schedule
McMillan 11-001-0043	Nitrogen Dioxide, Nitric Oxide	6/1/1994	074	3	Urban	Population Exposure/Max Precursor	PAMS/SLAMS	Hourly
	NOy (Total reactive nitrogen oxides)	1/1/2011	691	3	Urban	General/Background	NCore/PAMS	Hourly
	SO2 (trace)	1/1/2011	592	3	Urban	General/Background	NCore	Hourly
	CO (trace)	1/1/2011	588	3	Urban	General/Background	NCore/PAMS	Hourly
	PM10-2.5 coarse	1/1/2011	185	3	Urban	General/Background	NCore	Hourly
	Type 2 PAMS	6/1/1994	000	3	Urban	General/Background	PAMS	Hourly
	Ozone	6/1/1994	047	3	Urban	Population Exposure/Max Precursor	PAMS/SLAMS/NCore	Hourly
	PM2.5 Continuous	1/1/2003	170	4	Urban	Population Exposure/Max Precursor	SLAMS	Hourly
	PM10 Continuous	1/1/2013	170	4	Urban	Population Exposure/Max Precursor	SLAMS	Hourly
	PM10-2.5 Continuous	1/1/2003	170	4	Urban	Population Exposure/Max Precursor	NCore/SLAMS	Hourly
	PM2.5	1/1/1999	170	4	Urban	Population Exposure/Max Precursor	NCore/SLAMS	Daily
	PM2.5 Chemical Speciation	1/1/2002	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
	PM10 High-Vol	1/1/2001	162	4	Urban	Population Exposure/Trends	NATTS	Every 6 Days
Black Carbon	1/1/2001	862	4	Urban	Population Exposure/Trends	SLAMS	Hourly	
Organic/Elemental Carbon	2/2/2012	867	4	Urban	Population Exposure/Trends	Special Study	Hourly	
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	1/1/1999	170	10	Neighborhood	Population Exposure	SLAMS	Daily
	Sulfur Dioxide	5/1/1993	060	10	Neighborhood	Population Exposure	SLAMS	Hourly
Verizon	Carbon Monoxide	10/1/1980	054	3	Urban	Population Exposure	SLAMS/NAMS	Hourly

11-001-0023								
Hains Point 11-001-0042	PM2.5	3/1/1999	170	10	Urban	Population Exposure	SLAMS	Every 3 Days
Takoma Recreation Center 11-001-0050	Nitric Oxide	1/1/2013	074	4	Neighborhood	Population Exposure	SLAMS	Hourly
	Nitrogen Dioxide	1/1/2013	074	4	Neighborhood	Population Exposure	SLAMS	Hourly
	Oxides of Nitrogen	1/1/2013	074	4	Neighborhood	Population Exposure	SLAMS	Hourly
	Ozone	1/1/2013	047	4	Neighborhood	Population Exposure	SLAMS	Hourly
Anacostia Freeway Near-Road Station 11-001-0051	Nitric Oxide	1/1/2015	599	4	Microscale	Population Exposure	Near-Road SLAMS	Hourly
	Nitrogen Dioxide	1/1/2015	599	4	Microscale	Population Exposure	Near-Road SLAMS	Hourly
	Oxides of Nitrogen	1/1/2015	599	4	Microscale	Population Exposure	Near-Road SLAMS	Hourly
	Carbon Monoxide	1/1/2015	593	4	Microscale	Population Exposure	Near-Road SLAMS	Hourly
	PM2.5	1/1/2015	170	4	Microscale	Population Exposure	Near-Road SLAMS	Hourly

Table 2-3: Monitor Count for the District's Network

Pollutant Parameter/ Pollutant Group	Site Name						Monitor Count Totals
	McMillan Reservoir	River Terrace School	Verizon Building	Takoma Recreation Center	Hains Point	Anacostia Freeway Near-Road	
CO		1				1	2
O3		1		1			3
PM2.5 (FRM)	1						1
NO	1	1		1		1	4
NO2	1	1		1		1	4
NOx	1	1		1		1	4
NOy	1						1
SO2		1					1
Trace CO	1						1
Trace SO2	1						1
PM2.5 (Continuous)	1	1			1	1	4
PM10 (continuous)	1						1
PM10-2.5 (Continuous) PM _{coarse}	1						1
Speciated PM2.5	1						1
PM2.5 Black Carbon (OC/EC)-URG	1						1
Air Toxics	1						1
PAH Compounds (Air Toxics)	1						1
Air Toxics Metals (PM10)	1						1
OC/EC - Aethalometer	1						1
OC/EC - Sunset semi-continuous	1						1
PAMS VOCs /Carbonyls	1						1
PAMS VOCs Continuous (Auto-GC)	1						1
Surface Meteorology	1					1	2
Total	21	7		4	1	6	39

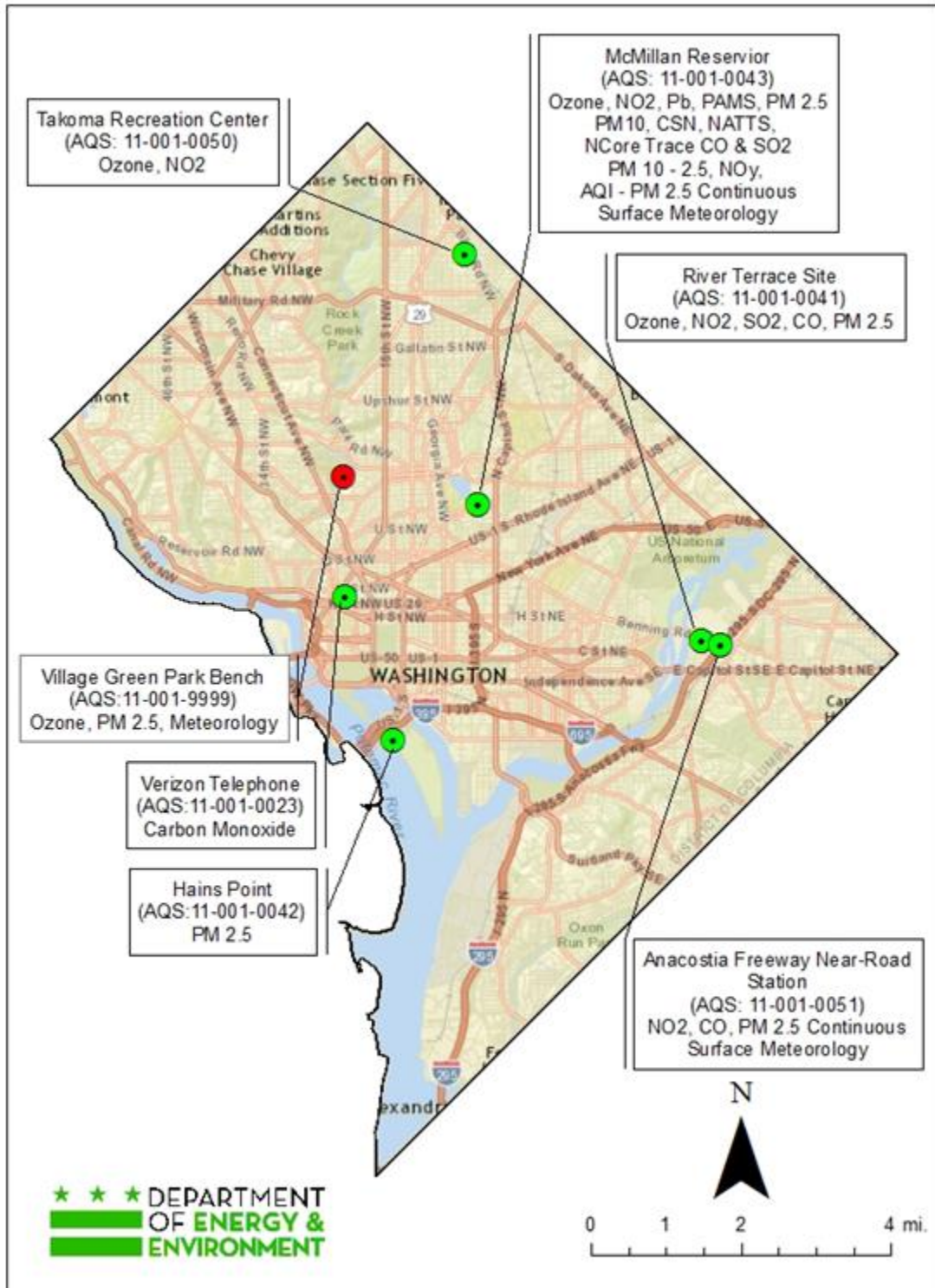
Table 2-4: Monitoring Methods and AQS Codes

Parameter	Method Code	Sample Analysis Description
Air Toxics	150	Cryogenic Pre-concentration: GC/MS Solid Phase Micro Extraction: GC/MS
Carbon Monoxide	054	Nondispersive Infrared Photometry
Carbon Monoxide, Trace	588	Gas Filter correlation EcoTech EC9830T
Carbon Monoxide, Trace	593	Gas Filter correlation API T300U
Nitric Oxide and Nitrogen Dioxide	074	Chemiluminescence
Nitric Oxide and Nitrogen Dioxide	599	Chemiluminescence
Total Reactive Nitrogen Oxides	691	Chemiluminescence EcoTech EC9843
PAMS VOCs	128	Gas Chromatograph with Flame; GC FID
PAMS Carbonyls	102	High Performance Liquid Chromatography
PAMS VOCs	126	Cryogenic Pre-concentration Trap GC/FID
Ozone	047	Ultra Violet Photometry
PM10 Continuous	170	Beta Attenuation Mass Monitor – PM10 FEM with glass fiber filter tape
PM10 High-Vol	162	Gravimetric Hi Vol SSI EcoTech 3000
PM2.5	145	Gravimetric R&P Model 2025
PM2.5 Speciation: 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	Thermo-Optical Transmittance using Quartz Filter
PM10-2.5 Coarse	185	Paired Gravimetric difference, MET ONE BAM-1020 system
PM2.5 Continuous	170	Met One BAM-1020 Monitor – PM2.5 FEM
PM2.5 - Elemental and Organic Carbon	862	BC/EC, Self-contained Non-dispersive Infrared (NDIR) Detector System
Sulfur Dioxide	060	Pulsed Fluorescence
Sulfur Dioxide, Trace	592	Ultraviolet Pulsed Fluorescence EC9850T

Table 2-5: Constituent Compounds and Species Measured in the District

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
PAMS Carbonyls	Acetaldehyde, Formaldehyde, Acetone, Acrolein, Methyl Isobutyl Ketone, Methyl Ethyl Ketone, Propionaldehyde, Benzaldehyde
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, PyroC, 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: The District’s Ambient Air Monitoring Network



2.1 Ambient Air Monitoring Networks

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

State and Local Air Monitoring Station (SLAMS):

SLAMS measure ambient levels of gaseous and particulate air pollutants. SLAMS 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 federal equivalent methods (FRM/FEM) for direct comparison to the NAAQS to determine whether areas are in attainment or nonattainment of 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 to meet State Implementation Plan (SIP) requirements.

The District's network consists of six (6) SLAMS.

National Air Monitoring Station (NAMS) Network:

The NAMS network, developed in the 1970s, is a subset of the SLAMS network. NAMS stations use 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 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 design value sites for Metropolitan Statistical Areas (MSAs).

The CO monitor at the District's Verizon station is part of the NAMS network.

Near-Roadway Monitoring Network:

The 2010 NO₂ NAAQS required establishment of a network with at least two (2) near-roadway NO₂ monitors in the Washington DC-MD-VA-WV MSA. Measurements for pollutants such as NO₂, CO, PM_{2.5} and surface meteorological measurements for wind direction and wind speed are required at primary near-road sites.

The District established a near-road station along the Anacostia Freeway in River Terrace community (site ID: 11-001-0051) in April 2015. The near-road station consists of NO₂ and CO trace gas analyzers, BMM FEM continuous monitor to measure PM_{2.5}, and surface meteorological measurements for wind speed, wind direction, relative humidity, barometric pressure and ambient temperature.

NCore Monitoring Network:

In October 2006, EPA revised the national air quality monitoring regulations (40 C.F.R. Part 58). The most significant element of the revised regulations was to establish an NCore multi-pollutant

monitoring network by January 1, 2011. Measurements for pollutants such as ozone, trace SO₂, trace CO, total reactive nitrogen oxides (NO_y) and PM_{coarse} (PM_{10-2.5}; PM between 10 microns and 2.5 microns in diameter), and surface meteorological measurements for wind speed, wind direction, relative humidity, and ambient temperature are required at NCore sites. Ambient Pb monitoring was also required at NCore sites beginning in January 2012.

In April 2016, EPA revised the national air quality monitoring regulations (40 C.F.R. Part 58 Appendix D) section 3(b) and section 4.5(b)(c) to remove the requirements for NCore sites to measure Lead (Pb) as well as the speciated components of PM_{coarse} (PM_{10-2.5}).

The District established an NCore station at the McMillan site (11-001-0043) in January 2011. The NCore station consists of SO₂ and CO trace gas analyzers, a NO_y analyzer, and a BAMB FEM monitor to measure PM_{10-2.5}. A TSP-Pb FRM monitor was added at the McMillan NCore station in January 2012. DOEE plans to shut down the Pb monitor under the provisions of the revised 40 C.F.R. Part 58, at the end of 2016 monitoring period.

Photochemical Assessment Monitoring Stations 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. The measured parameters include ozone, VOCs, carbonyls and NO_x. The national PAMS network consists of seventy-five (75) sites in twenty-five (25) metropolitan areas. PAMS was a major addition to state and local networks, with near-research grade measurements for over 56 VOC compounds during the core part of the ozone season (June to August).

The District operates one (1) PAMS Type 2 station at the McMillan site. In 2011, DOEE deployed Viasala WXT 520 meteorological monitoring sensors on a new 10-meter tower at the McMillan PAMS/NCore site.

The 2015 ozone NAAQS requires state and local air pollution control agencies to comply with enhanced monitoring regulations by 2019. These requirements will be addressed in the 2018 Network Plan.

Special Purpose Monitoring Networks:

Special Purpose Monitoring (SPM) networks include National Air Toxic Trends Stations (NATTS), PM_{2.5} Chemical Speciation Network (CSN), and other special purpose monitors.

Currently, the District's SPM network consists of: one (1) NATTS, one (1) CSN station, and one (1) OC/EC Sunset semi-continuous carbon analyzer at the McMillan site.

Through a partnership with DOEE, EPA installed a Village Green station at the Smithsonian National Zoological Park (National Zoo) in the District in 2015. The Village Green park bench stations are intended for research and education on air quality and they are not meant for use as regulatory monitors.

Interagency Monitoring of Protected Visual Environments Network:

The Interagency Monitoring of Protected Visual Environments (IMPROVE) program was established in 1985 to help implement plans to reduce visibility impairment in Class I areas (large federally-protected national parks and wilderness areas) as stipulated in the CAA. 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 (NPS) operated one (1) IMPROVE site along with a nephelometer at the Hains Point station in the District until June of 2015.

DOEE operates a PM_{2.5} FRM monitor at the Hains Point location that will be replaced with a FEM monitor prior to calendar year 2017.

2.2 Pollutant Parameters

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

Fine Particulate Matter (PM_{2.5})

PM_{2.5} FEM Monitors: DOEE operates four (4) BAMM 1022 PM_{2.5} monitors in its air monitoring network – one (1) each at the Anacostia Freeway Near Road, River Terrace, Hains Point stations and McMillan site. The McMillan, Anacostia Freeway Near-Road and River Terrace primary monitors are daily sampling sites while the Hains Point monitor is on a 1-in-3 day sampling schedule. The required collocated secondary PM_{2.5} FRM monitor at McMillan is operated on a 1-in-6 day sampling schedule.

DOEE plans to replace the PM_{2.5} network FRM monitors from McMillan, River Terrace, and Hains Point air monitoring stations with continuous FEM monitors before calendar year 2017.

PM_{2.5} Chemical Speciation Network (CSN): DOEE currently operates one PM_{2.5} CSN (MetOne SASS) monitor at the McMillan site. The District implemented the carbon channel upgrade (URG 3000N) for the CSN monitor during 2007. The CSN monitor at the McMillan site operates on a 1-in-3 day sampling schedule to measure PM_{2.5} chemical species.

Particulate Matter (PM₁₀)

DOEE operates one (1) continuous BAMM PM₁₀ FEM sampler at the McMillan site for reporting PM₁₀ mass measurements. In 2013, EPA approved co-designation of the McMillan NCore station's BAMM PM₁₀ FEM automated sampler for PM₁₀ network to fulfill the PM₁₀ NAAQS monitoring requirements in the District. Subsequent to receiving EPA's approval, DOEE decommissioned the two (2) very old and aging filter-based manual PM₁₀ FRM samplers (primary and secondary monitors), in January 2014.

Additionally, DOEE operates a High-Vol PM₁₀ sampler for NATTS toxic metals analysis.

Ozone (O₃)

DOEE currently operates Thermo-49i series ozone analyzers at three (3) sites in the District: River Terrace, McMillan Reservoir, and Takoma Recreation Center.

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.

The 2015 Ozone NAAQS adds one month to the ozone season in the District. Starting in 2017, ozone season will begin on March 1 and continue through October 31. DOEE already conducts year-round ozone measurements and collects ozone data on an hourly basis, so no additional changes are necessary.

Carbon Monoxide/Trace-CO

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. The CO trace analyzer is designed to measure background concentrations of CO with a lower detection limit less than 4 ppb and uses a high performance modified vacuum pump. CO concentrations are highest along heavily traveled roadways and decreases significantly with distance from traffic. Therefore, CO monitors are usually located close to roadways or in urban areas.

One CO monitor is required to be collocated with a near-road NO₂ monitor. DOEE operates two (2) Thermo-48i series CO analyzers year-round in our SLAMS network station, one each at the River Terrace and Verizon sites. In January 2011, DOEE deployed an Ecotech EC9830T trace-CO analyzer at the McMillan Reservoir NCore station and in April 2015 deployed an API T300U trace CO analyzer at the Anacostia Freeway Near-Road station.

EPA revised the minimum monitoring requirements for CO on August 12, 2011. Since one (1) CO monitor is collocated with a near-road NO₂ monitor as required, DOEE is proposing to discontinue two CO monitors at the end of 2016: one at the River Terrace station and one at the Verizon station. See Appendix A for details. DOEE will continue maintaining two remaining CO monitors: one at the NCore station and one at the near-road station.

Nitrogen Dioxide (NO₂)

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 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.

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

DOEE currently operates NO₂ monitors at three (3) sites collocated with ozone measurement sensors. The NO-NO₂-NO_x Thermo-42i analyzers are operated year-round and are located at the River Terrace, McMillan, and Takoma Recreation Center sites.

RA-40: The monitoring regulations for the 2010 NO₂ NAAQS say that the EPA Regional Administrator can require a minimum of forty (40) monitors to be sited inside or outside of CBSAs nationwide in locations with “susceptible and vulnerable” populations. The community-

level NO₂ network monitors are called “RA-40” designated monitors. DOEE and EPA assigned a RA-40 designation to the NO₂ monitor at the River Terrace station.

Total Reactive Nitrogen Oxides (NO_y): In January 2011, DOEE installed an Ecotech EC9843 model NO_y analyzer at the McMillan NCore station. This is a chemiluminescence-based analyzer that uses a high-performance NO_y converter to measure trace levels of NO_y and NO.

Near-Road NO₂ Network: In January 2015, DOEE established one (1) NO₂ near-road monitoring station collocated with trace CO measurement along the Anacostia Freeway (Site: 11-001-0051). Valid data collection began in June 2015. Data is uploaded to EPA’s AQS.

Sulfur Dioxide/Trace-SO₂

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 SO₂ 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 SO₂ trace analyzer is a high performance UV fluorescence analyzer designed to measure background concentration of SO₂ with a lower detection limit less than 200 parts per trillion.

DOEE operates one (1) Thermo 43i continuous SO₂ monitor at the River Terrace station and collects hourly data year-round. In January 2011, DOEE deployed an Ecotech EC9850T trace-SO₂ analyzer at the McMillan NCore station.

Air Toxics

DOEE operates one (1) NATTS station at the McMillan site. 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 capture PAH (Tisch Puf+ analyzer), toxic heavy metals (PM₁₀ High-Vol), and VOCs and carbonyls (Model 910A, Environmental Systems Inc). The sampled canisters and carbonyls sep-paks are returned to the laboratory for analysis on an Entech/Agilent gas chromatograph (GC) mass spectrometer system. The District’s NATTS site also includes an Aethalometer (Magee Scientific) for continuous sampling of black carbon (OC/EC).

PAMS Ozone Precursors

DOEE operates one (1) PAMS Type 2 station at the McMillan site. The parameters measured are O₃, NO, NO_x, NO₂, speciated VOCs, carbonyls and surface meteorology.

During the peak ozone season (June to August), three-hour canister air samples are collected on a 1-in-3 day schedule by using a XonTech Model 910A sampler. Additionally, 24-hour canister air samples are collected on a 1-in-6 day sampling schedule with a XonTech Model 910A sampler. The canisters are returned to the laboratory for analysis on an EnTech/Agilent GC/FID system for speciated VOCs. During core ozone season, hourly measurements for a set of 56

target hydrocarbons are made on-site using a Perkin Elmer VOC Air Analyzer with dual flame ionization detector (Perkin-Elmer 350ATD ozone precursor sampler and Clarus 500 PAMS Gas Chromatograph sampling system). The measurement method for carbonyls is based on EPA's Compendium Method TO-11A, which incorporates the use of sorbent cartridges coated with 2,4-dinitrophenylhydrazine for sample collection. The analyses are performed with high performance liquid chromatography.

DOEE also operates continuous O₃ and NO_x analyzers complemented with surface meteorological measurements at the McMillan PAMS site. In 2011, DOEE deployed Viasala WXT 520 meteorological monitoring sensors on a new 10-meter tower at the McMillan PAMS/NCORE site.

Lead (Pb)

In January 2012, DOEE began operating a TSP-Pb monitor at its McMillan NCore site on a 1-in-6 day sampling schedule. Samples are sent to the West Virginia Department of Environmental Protection's Air Monitoring Laboratory for chemical analysis. Four years of data have been collected with low concentrations recorded.

DOEE plans to discontinue the Pb monitor at the end of 2016, under the provisions of 40 C.F.R. Part 58.14, Appendix D Section 4.5(b) and 4.5 (c). Please see Appendix B for details.

3.0 District of Columbia's Air Monitoring Stations

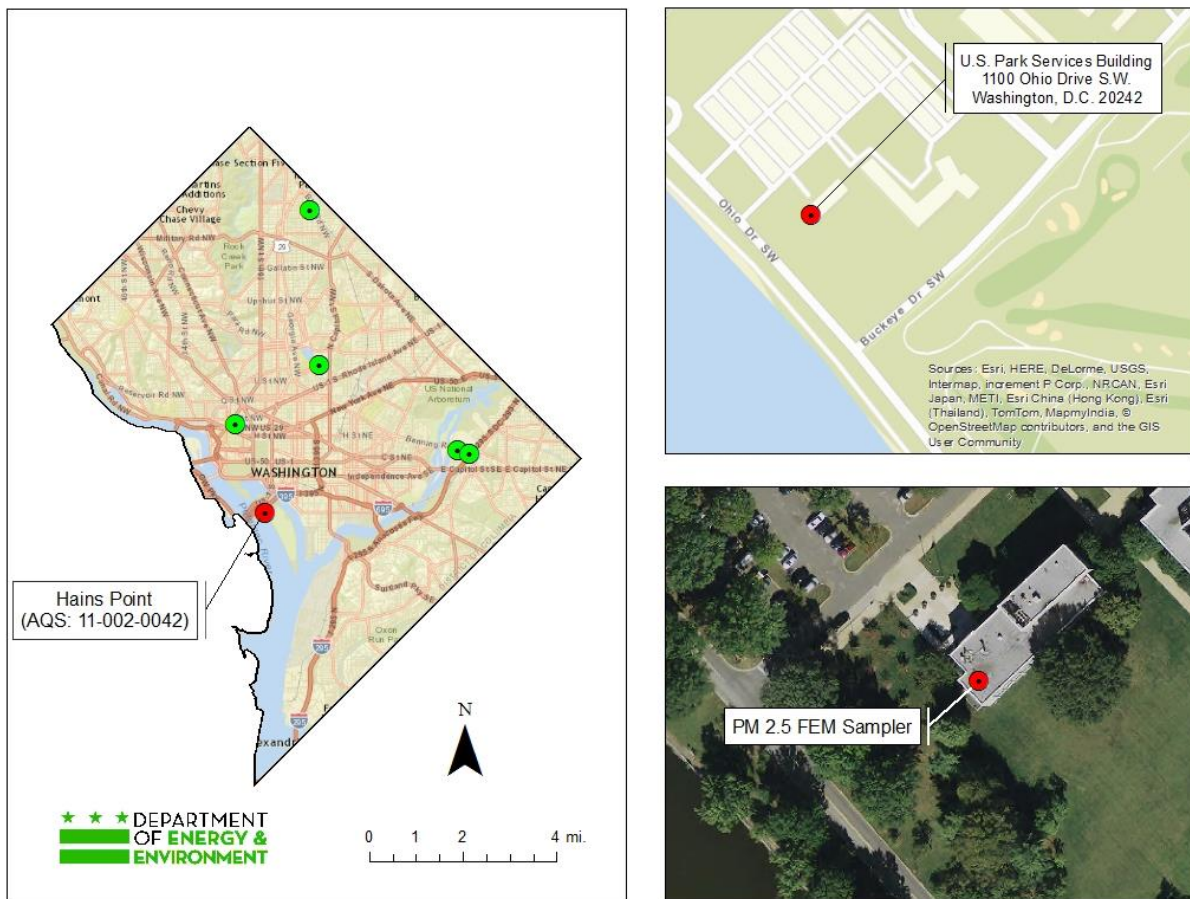
DOEE currently maintains a network of six (6) ambient air monitoring stations: Hains Point, McMillan, River Terrace, Takoma Recreation Center, Verizon, and Anacostia Freeway near-road station. This will be changed to five (5) stations in calendar year 2017 after the Regional Administrator's approval to shut down the Verizon station. The following sections provide additional information. Maps for the individual sites are shown in Figures 3-1 to 3-6.

3.1 Hains Point Station

The Hains Point monitoring station has been operational since January 1988, and the measurement sensors are perched on the rooftop of a NPS Park Police building. NPS operated IMPROVE PM_{2.5} mass and speciation and PM₁₀ monitors at this site until June of 2015. DOEE operates a PM_{2.5} FEM monitor at this location. This is also one of the very few urban IMPROVE sites in the nation.

Before calendar year 2017, the PM_{2.5} FRM monitor will be replaced with a FEM monitor.

Figure 3-1: Hains Point Monitoring Station Locator Maps



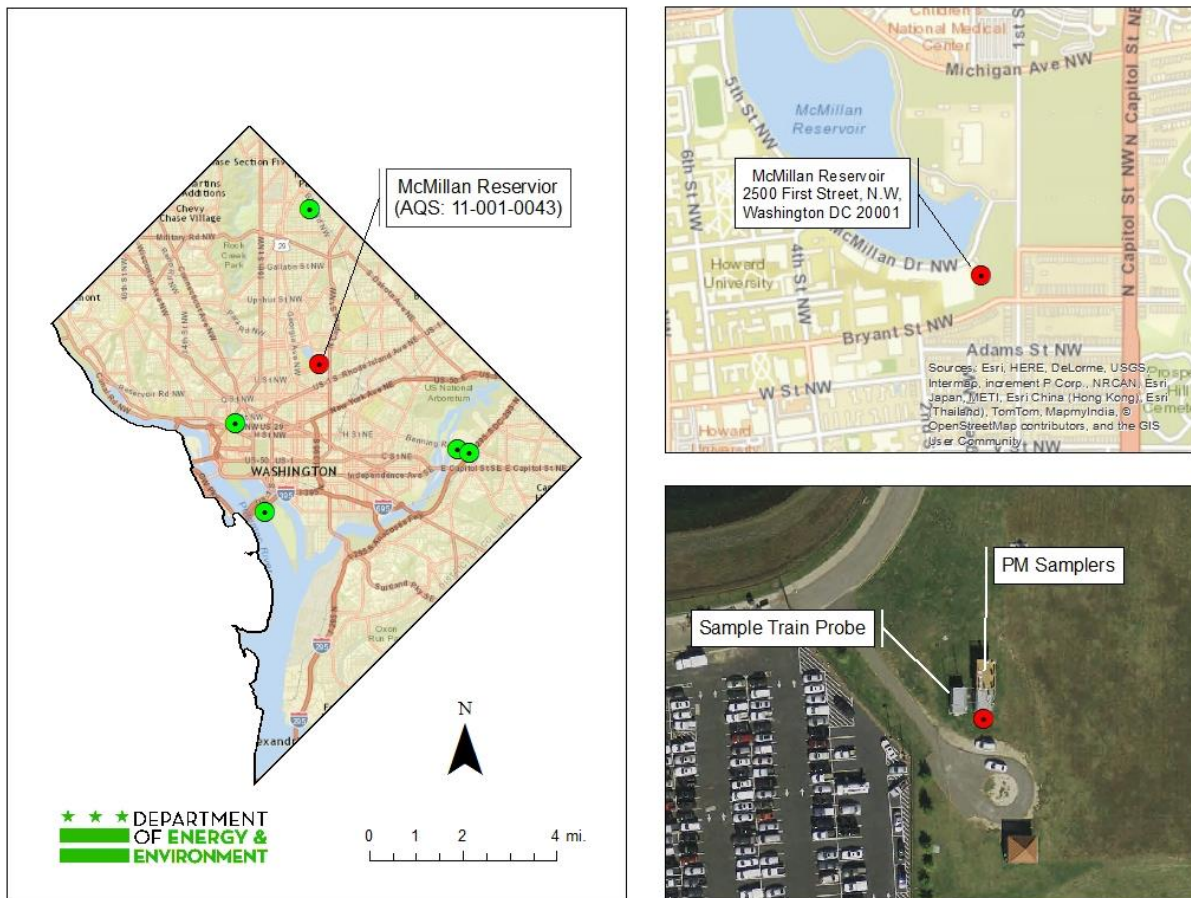
3.2 McMillan Station

The McMillan monitoring station is the most comprehensive ambient air station in the District. It was launched in 1994 as a PAMS Type 2 station. Measurements for 56 target hydrocarbons are conducted with a PAMS automatic GC ambient air sampling system. The station was expanded in 2000 and 2001 with the addition of PM_{2.5} FRM, PM_{2.5} 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 PAMS monitoring.

Also, the McMillan was the first NATTS site in EPA Region III. In January 2011, the McMillan site has expanded into an NCore network monitoring station. A TSP-Pb monitor was added in January 2012. Additionally, as part of the EPA Office of Air Quality Planning and Standards (OAQPS) national pilot study, a Sunset Model 4 Semi-Continuous OC/EC monitor was deployed at McMillan station.

Before calendar year 2017, the PM_{2.5} FRM monitor will be replaced with a FEM monitor. DOEE plans to discontinue the NCore Pb monitor at the site beginning January 1, 2017, as well as measurement of the speciated components of PM_{coarse}.

Figure 3-2: McMillan Reservoir Site Locator Maps

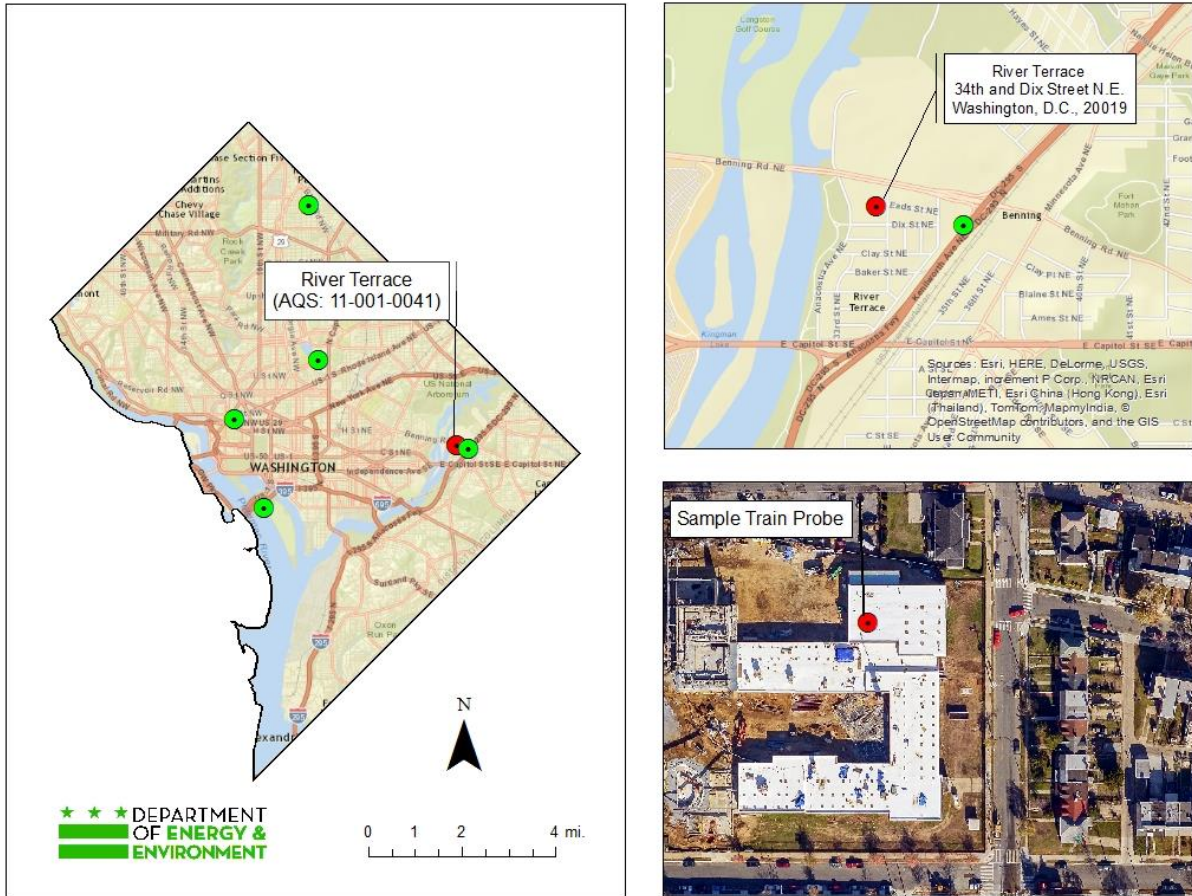


3.3 River Terrace Station

The River Terrace monitoring station has been in operation since 1993. The site consists of measurement analyzers for O₃, SO₂, CO, NO_x, and PM_{2.5}.

Before calendar year 2017, the PM_{2.5} FRM monitor will be replaced with a FEM monitor. In 2017, the CO monitor will be discontinued.

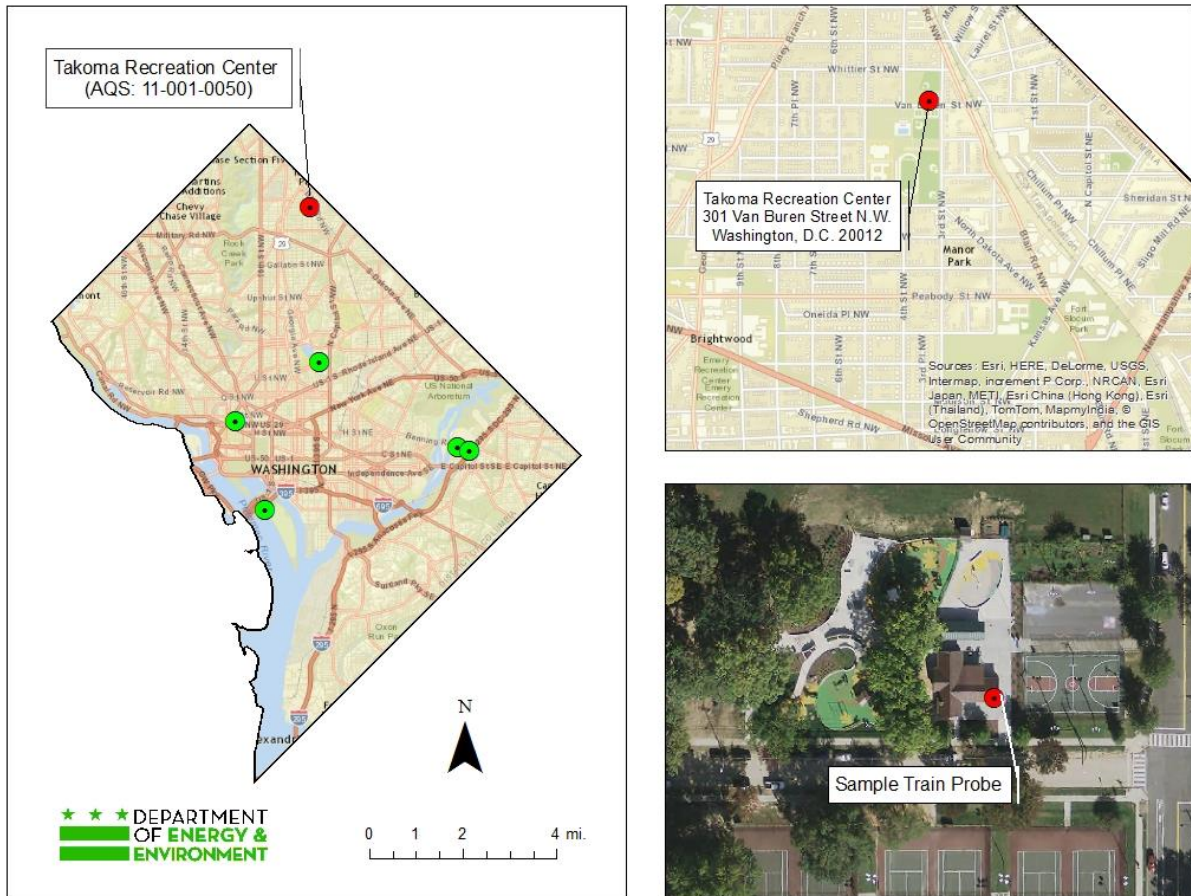
Figure 3-3: River Terrace Site Locator Maps



3.4 Takoma Recreation Center Station

The Takoma Recreation Center monitoring station has been in operation since January 2013. The station consists of measurement analyzers for O₃ and NO_x. This station was established as a replacement site for Takoma School station (11-001-0025), where operations ceased in 2011 because of a fire incident.

Figure 3-4: Takoma Recreation Center Site Locator Maps

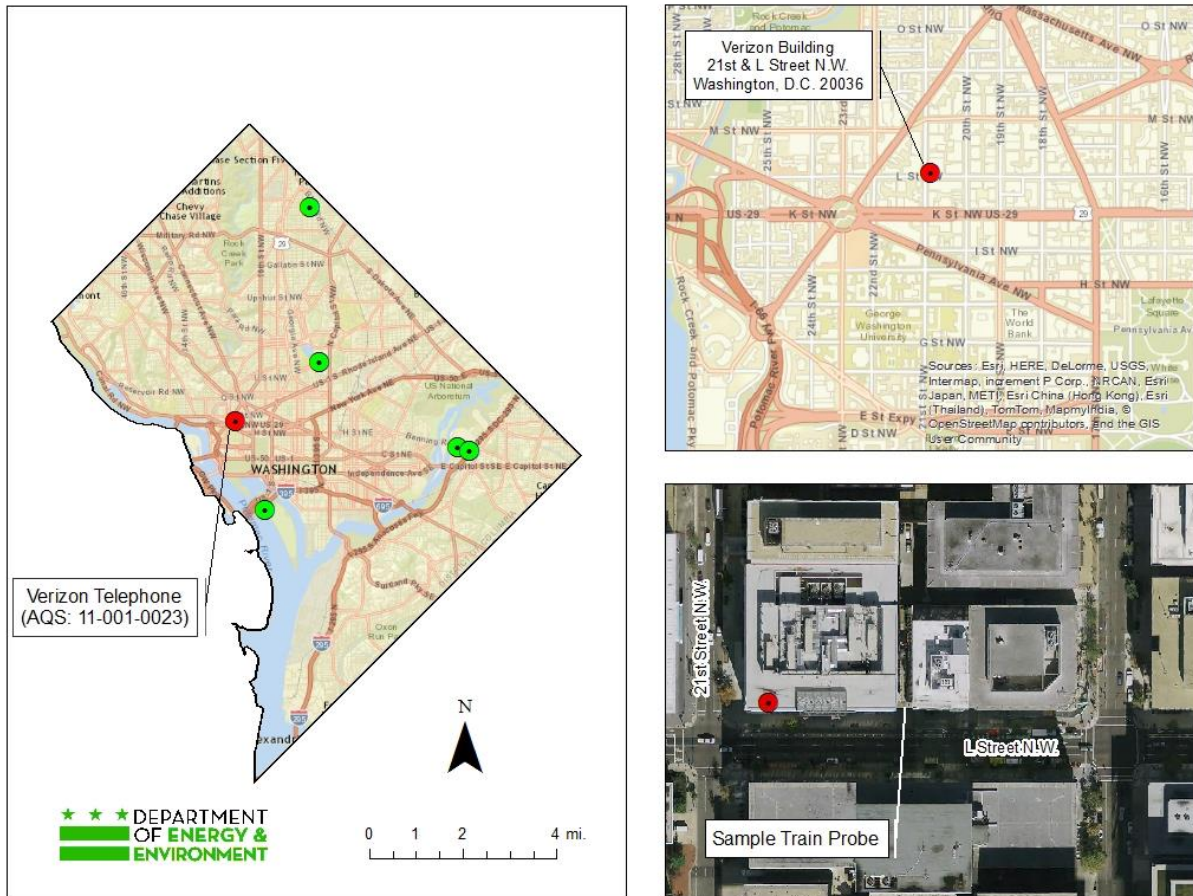


3.5 Verizon Station

The Verizon station was launched in 1980 and it houses a CO measurement sensor. Classified as a “micro-scale” site, the Verizon station is in a “city canyon” type of environment.

DOEE plans to discontinue CO monitor at this site beginning January 1, 2017.

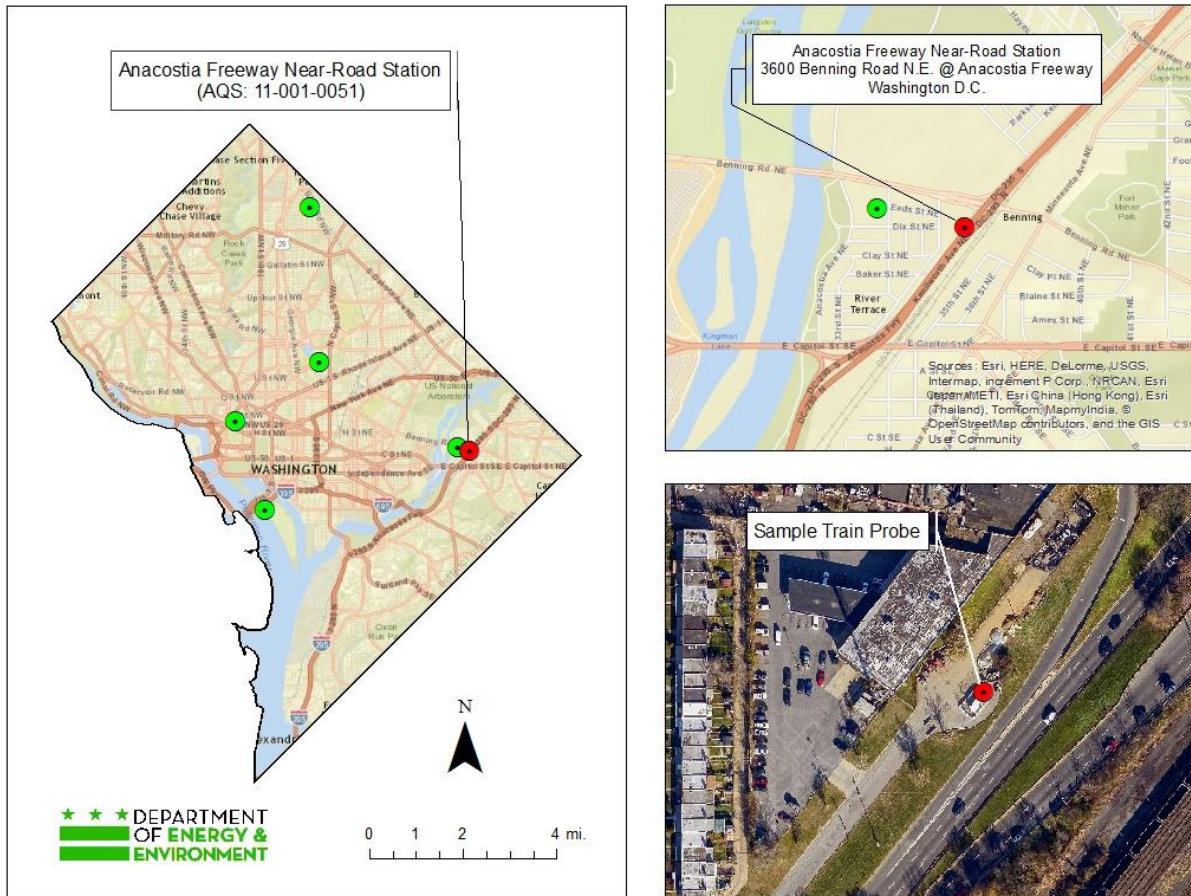
Figure 3-5: Verizon Monitoring Site Locator Maps



3.6 Anacostia Freeway Near-Road station

The Anacostia Freeway Near-Road Station was launched in January 2015 and it houses NO₂, CO and PM_{2.5} continuous measurement sensors. This station is going to be important in the metropolitan area and the District because of its location for capturing peak 1-hour NO₂ and CO concentrations expected in the near-road environment.

Figure 3-6: Anacostia Freeway Near-Road Station Locator Maps



4.0 Ozone and PM_{2.5} Air Quality

Ambient data for criteria pollutants as given by design value concentrations are used to determine if the monitored air quality in the District is in compliance with the NAAQS. Design values are defined in CAA guidance and are often based on multiple years of data to ensure a stable indicator. Design value data is used to classify nonattainment areas, assess progress towards meeting the NAAQS, and develop control strategies. Design values are computed and published annually by EPA's OAQPS and reviewed in conjunction with the regional offices.

4.1 Annual PM_{2.5} Design Concentrations

Figure 4-1 below gives the design concentrations for PM_{2.5} at the District's sites for the recent period. The annual PM_{2.5} design values were calculated using the average of the annual arithmetic mean for a consecutive three-year period. Design values based on 2009 to 2014 data indicate that the District is in attainment for the 2012 annual PM_{2.5} NAAQS of 12 µg/m³.

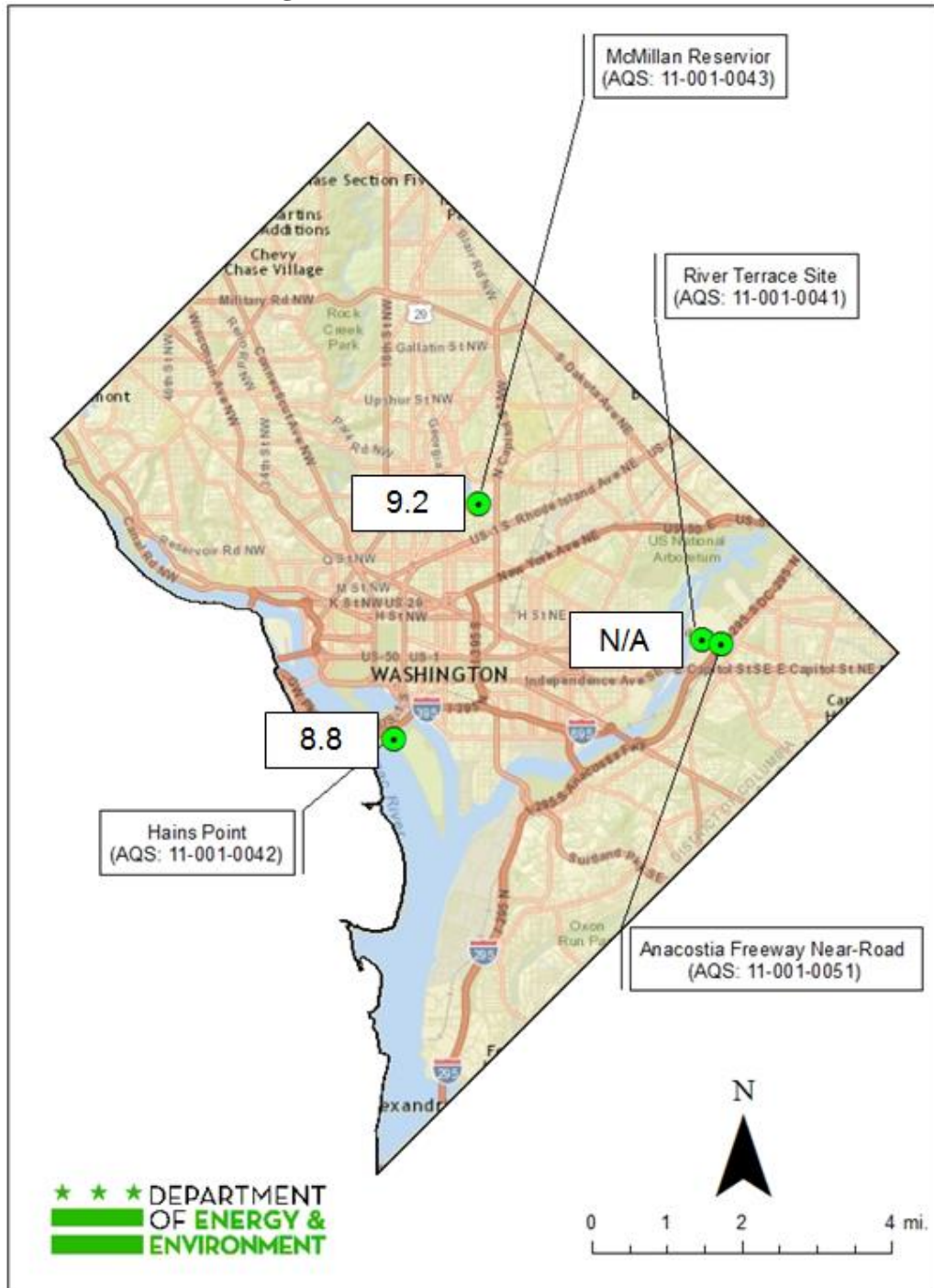
4.2 Daily PM_{2.5} Design Concentrations

Daily PM_{2.5} design concentrations are calculated using the 98th percentile ambient concentration value from each year for a given consecutive three-year period. The design value is the average of the three 98th percentile data. Figure 4-2 gives the design values for daily PM_{2.5} using data from 2008 to 2012. Design values based on the recent data indicate that the District is in attainment for the 2006 daily PM_{2.5} NAAQS of 35 µg/m³.

4.3 Ozone Design Concentrations

Figure 4-3 includes current design values for ground-level ozone using data from 2007 to 2014. The ozone design values are calculated by taking the three-year average of the annual 4th highest daily maximum 8-hr average concentrations. The 2015 8-hr ozone NAAQS is 0.070 ppm, or 70 ppb. Monitored data indicate that the ambient air quality is in violation of the NAAQS at O₃ monitoring sites in the District. Monitoring at the Takoma School (11-001-0025) station was discontinued in 2011 because of a fire incident, so the design value for Takoma School is based on two years of data. The Takoma Recreation Center O₃ monitoring site (11-001-0050) was deployed in January 2013.

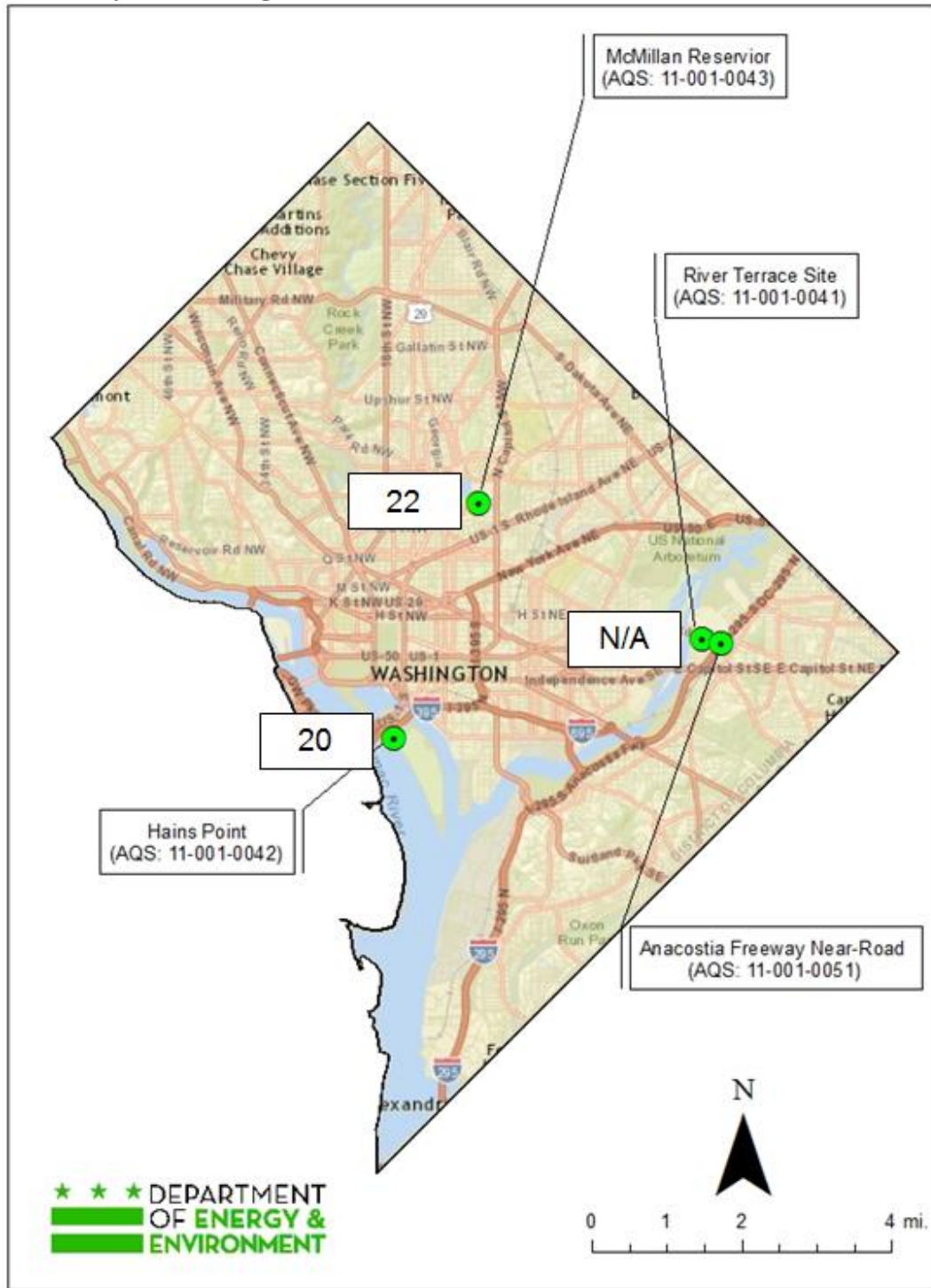
Figure 4-1: Annual PM_{2.5} Design Values



Annual PM _{2.5} Design Values (µg/m ³)								
Site	AIRS ID	2009	2010	2011	2012	2013	2014	2015
Hains Point	11-001-0042	12.0	11.2	10.5	10.3	9.4	8.9	8.8
McMillan	11-001-0043	11.6	10.8	10.3	10.1	9.7	9.4	9.2
River Terrace	11-001-0041	12.1	11.2	10.6	10.4	9.8	9.8*	N/A

*River Terrace temporarily shut down from March 2014 to May 2016 for school renovation. The 2014 Design Value was based on two years of data (2012 and 2013).

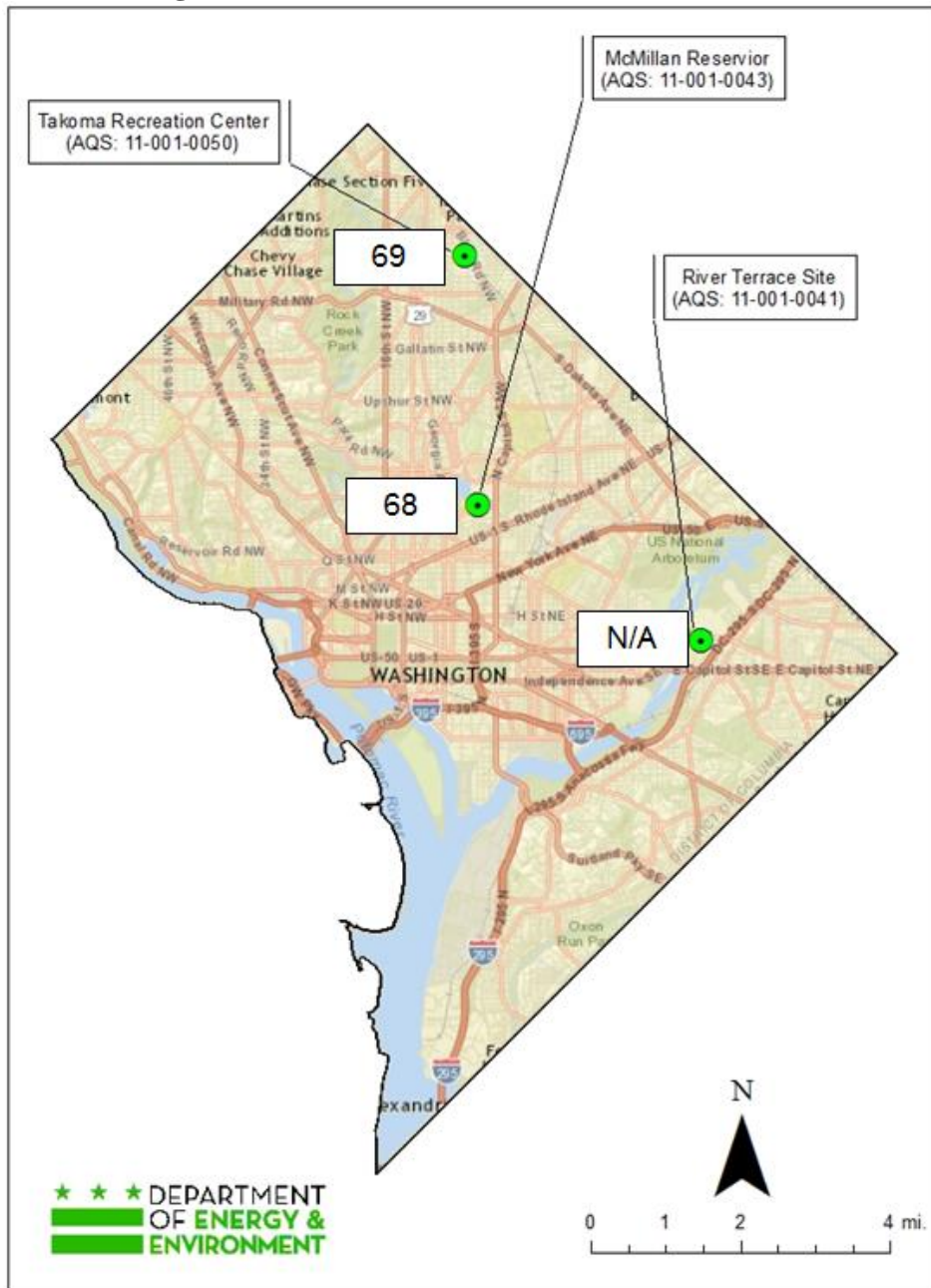
Figure 4-2: Daily PM_{2.5} Design Values



Daily PM _{2.5} Design Values (µg/m ³)								
Site	AIRS ID	2009	2010	2011	2012	2013	2014	2015
Hains Point	11-001-0042	28	26	24	25	23	20	20
McMillan	11-001-0043	29	26	25	25	24	22	22
River Terrace	11-001-0041	29	27	26	27	25	25*	N/A

*River Terrace temporarily shut down from March 2014 to May 2016 for school renovation. The 2014 Design Value was based on two years of data (2012 and 2013).

Figure 4-3: Ozone Design Values



Ground-level Ozone Design Values (ppb)								
Site	AIRS ID	2009	2010	2011	2012	2013	2014	2015
McMillan	11-001-0043	80	79	79	84	79	73	68
River Terrace*	11-001-0041	78	77	76	80	72	61	N/A
Takoma**	11-001-0025	77	75	78	N/A	N/A	N/A	N/A
Takoma Recreation Center***	11-001-0050	-	-	-	N/A	N/A	67	69

*River Terrace temporarily shut down from March 2014 to May 2016 for school renovation.

**Takoma School monitor shut down in 2011 because of a fire incident. The 2011 design value for Takoma School monitor was based on two years (2009 and 2010) data.

***Takoma Recreation Center station started in January 2013. The 2014 Design Value was based on two years of data (2013 and 2014).

5.0 Network Changes and Upgrades

The District supports EPA's efforts to protect public health and natural resources under the CAA. DOEE is working with EPA Region III and EPA's OAQPS to evaluate potential modifications to the District's network, including changes to the monitoring sites, sampling schedules, sampling equipment, and technologies, to ensure that the District's ambient air monitoring program meets all regulatory requirements.

The sections below describe proposed changes to the District's monitoring network in calendar year 2017. DOEE seeks EPA's concurrence and Region III Regional Administrator's approval for these proposed changes, if any.

5.1 McMillan (Site ID 11-001-0043)

- PAMS monitors: No changes planned
- NATTS monitors: No changes planned
- NCore monitors: Discontinue measurement of the speciated components of PM_{10-2.5}
- Pb monitors: Discontinued
- PM_{2.5} FRM monitors: Change all three primary PM_{2.5} FRM to FEM, except for the colocated monitor
- PM_{2.5} CSN: No changes planned
- PM₁₀ FEM Monitors: No changes planned

5.2 River Terrace School (Site ID 11-001-0041)

- PM_{2.5} FRM monitors: Change to PM_{2.5} FEM
- Plan to shutdown CO monitor

5.3 Takoma Recreation Center (Site ID 11-001-0050)

- No changes are planned

5.4 Hains Point (Site ID 11-001-0042)

- PM_{2.5} FRM monitors: Change to PM_{2.5} FEM

5.5 Verizon (Site ID 11-001-0023)

- Plan to shutdown CO monitor

5.6 Anacostia Freeway Near-Road station (Site ID 11-001-0051)

- No changes are planned

6.0 Air Monitoring Program and Data Contacts

The Monitoring and Assessment Branch in DOEE's Air Quality Division maintains the District's ambient air monitoring network and quality assures and quality controls the ambient air quality data. Data is stored locally for use by staff and for preparation of special reports, data charts, and special requests such as Freedom of Information Act requests.

Data is delivered to EPA's AQS database and reported on a schedule set forth in 40 C.F.R. Part 58. EPA controls access to the raw ambient air quality data that DOEE transmits to the national database. Ambient air quality monitoring data must be certified on an annual basis as accurate and complete. The certification process begins with the complete submittal of all SLAMS data to the federal AQS for the calendar year. State and local air monitoring agencies are required to transmit and certify the collected data for the previous calendar year by May 1.

DOEE has developed ambient monitoring guidelines in order to ensure that ambient air quality data collected, at regulated facilities in the State, are of the highest quality and conform to federal requirements for quality assurance under 40 C.F.R. 58.3.

DOEE uploaded fully quality assured calendar year 2015 data for the District's network to EPA's AQS national database. Submittal of precise and accurate data into AQS for calendar year 2015 was accomplished by February 2016. A formal certification of calendar year 2015 data was transmitted to EPA on April 29, 2016.

Annual data reports are generated from AQS and data certifications are prepared by DOEE, according to the reporting requirements in 40 C.F.R. Part 58. Data requests can be directed via email to: robert.day@dc.gov.

The main contact for the District's air monitoring program is:

Dr. Rama Seshu Tangirala
Branch Chief, Monitoring and Assessment Branch
Air Quality Division
Department of Energy & Environment
1200 First Street, N.E., Fifth Floor
Washington, D.C. 20002
Phone: (202) 535-2989
E-mail: rama.tangirala@dc.gov

Appendix A

District of Columbia Carbon Monoxide (CO) Monitoring Network

District Nonattainment/Maintenance Status

The Washington DC-MD-VA region was designated as a nonattainment area for the 1971 primary CO national ambient air quality standards (NAAQS). Once the standards were attained, the region submitted a redesignation request and maintenance plan to the U.S. Environmental Protection Agency (EPA) to meet State Implementation Plan (SIP) requirements, and the region was officially designated as being in attainment of the 1971 NAAQS on March 15, 1996 (61 Fed. Reg. 2931). After redesignation, the region was required to demonstrate maintenance with the 1971 NAAQS for twenty years. In accordance with the Clean Air Act (CAA) Section 175A(b), the area submitted a second maintenance plan in March 2004, which was approved by EPA and became effective on June 3, 2005 (70 Fed. Reg. 16958). On March 16, 2016, the area completed the requirements to demonstrate maintenance. It is no longer necessary for the region to meet SIP requirements related to the CO NAAQS.

Compliance with the CO Network Design Criteria and Other Requirements

DOEE's Air Quality Division operates, maintains, and performs all functions of the ambient air monitoring program required by the CAA. EPA revised the minimum monitoring requirements for CO on August 12, 2011. According to the CO monitoring network design criteria stipulated in Appendix D of 40 CFR Part 58 Section 4.2.1, one CO monitor is required to be collocated with a near-road NO₂ monitor in urban areas having a population of one million or more. There are additional federal PAMS and NCore network requirements that involve CO monitors, as indicated in Table A-1 below:

Table A-1. CO Monitors in the District that Meet Federal Requirements

Requirement	Appendix D 40 C.F.R. Part 58	Required in DC	Number of monitors active in DC
One CO monitor collocated with Near-Road NO ₂ in urban area with a population >= 1 million	4.2.1	1	1
One CO monitor at each Type 2 PAMS site	5.3 (Table D-6)	1	1*
One CO monitor at each NCore site	3(b)	1	1*

*The District's McMillan monitoring station monitor meets both PAMS and NCore requirements for CO, so there is only one active CO monitor at the McMillan station.

The District's CO network currently consists of four monitors, as described in Table A-2. The monitors at both the River Terrace and Verizon stations are SLAMS sites. A third CO monitor measures trace levels as part of the McMillan station's NCore and PAMS networks. A fourth CO monitor is located at the District's near-road Anacostia Freeway station that was established in 2015.

Table A-2. CO Monitor Descriptions

Site Name	AQS ID	Monitor Scale	Monitor Objective	Type	2014 Design Value 1-hr (ppm)	2014 Design Value 8-hr (ppm)
Verizon	11-001-0023	Urban	Population Exposure	SLAMS	2.0	1.5
River Terrace	11-001-0041	Neighborhood	Population Exposure	SLAMS	2.5	2.0
McMillan	11-001-0043	Urban	General/Background	NCore/PAMS	1.7	1.2
Anacostia Freeway Near-Road	11-001-0051	Microscale	Population Exposure	Near-Road SLAMS	*	*

*Site operation started in 2015 and there is not enough data for a valid 2014 design value.

While the District is permitted to reduce the number of monitors as long as the CO monitoring network design criteria and other requirements are met, operation of the existing CO sites in the District is required until DOEE requests closure of a site in its Annual Network Plan. This Appendix constitutes the District’s request to discontinue the operation of two CO monitors.

With the exception of the Anacostia Freeway near-road site, the CO concentrations at all of the District’s sites are well below the NAAQS. Figures A-1 through A-4 and Tables A-3 and A-4 show that monitored concentrations at the CO monitors at the Verizon and River Terrace stations have been well below 80 percent of the NAAQS since 2005.

All CO network requirements are met by the one near-road CO monitor at the Anacostia Freeway station. It is collated with a required near-road NO₂ monitor. Additionally, the near-road site classification is microscale, which is one of the two most useful site classifications for CO since most people have the potential for exposure at this scale. The District is requesting EPA approval to remove the Verizon and River Terrace stations CO monitor by the end of 2016 because both sites are highly redundant. The monitor at the McMillan station will remain in place to continue meeting NCore and PAMs requirements.

Figure A-1. Monitored CO Levels at the Verizon Station Compared to the 1-Hour NAAQS

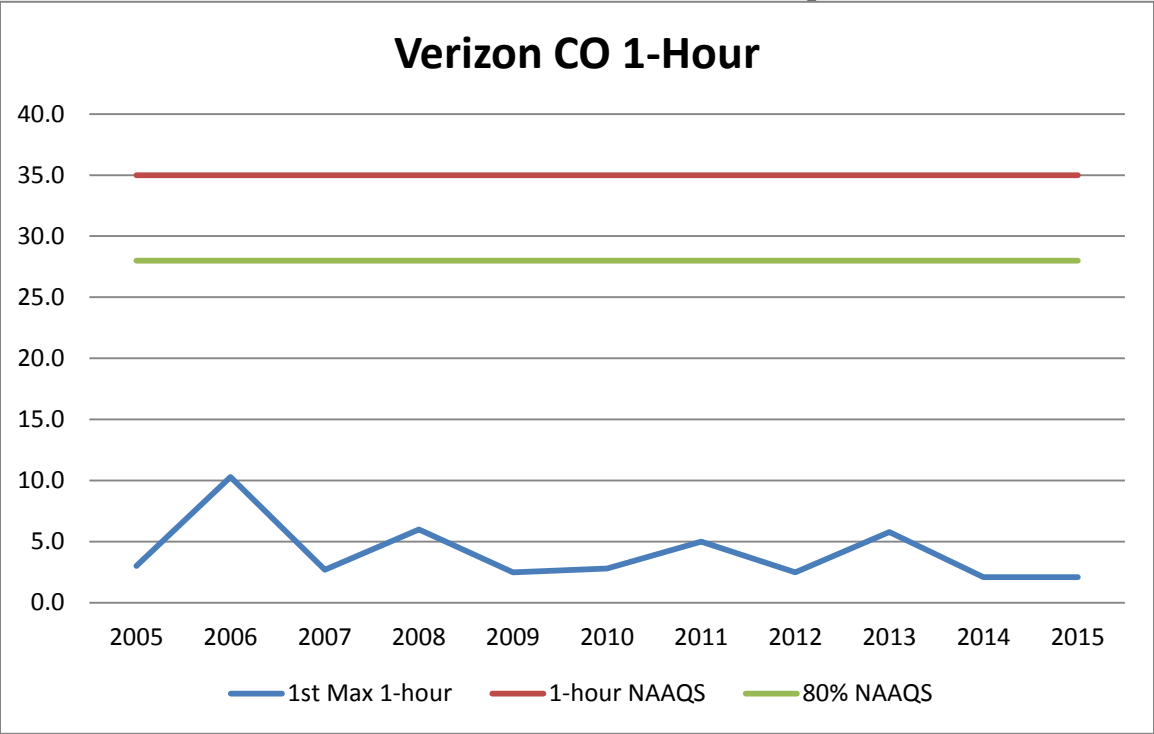


Figure A-2. Monitored CO Levels at the Verizon Station Compared to the 8-Hour NAAQS

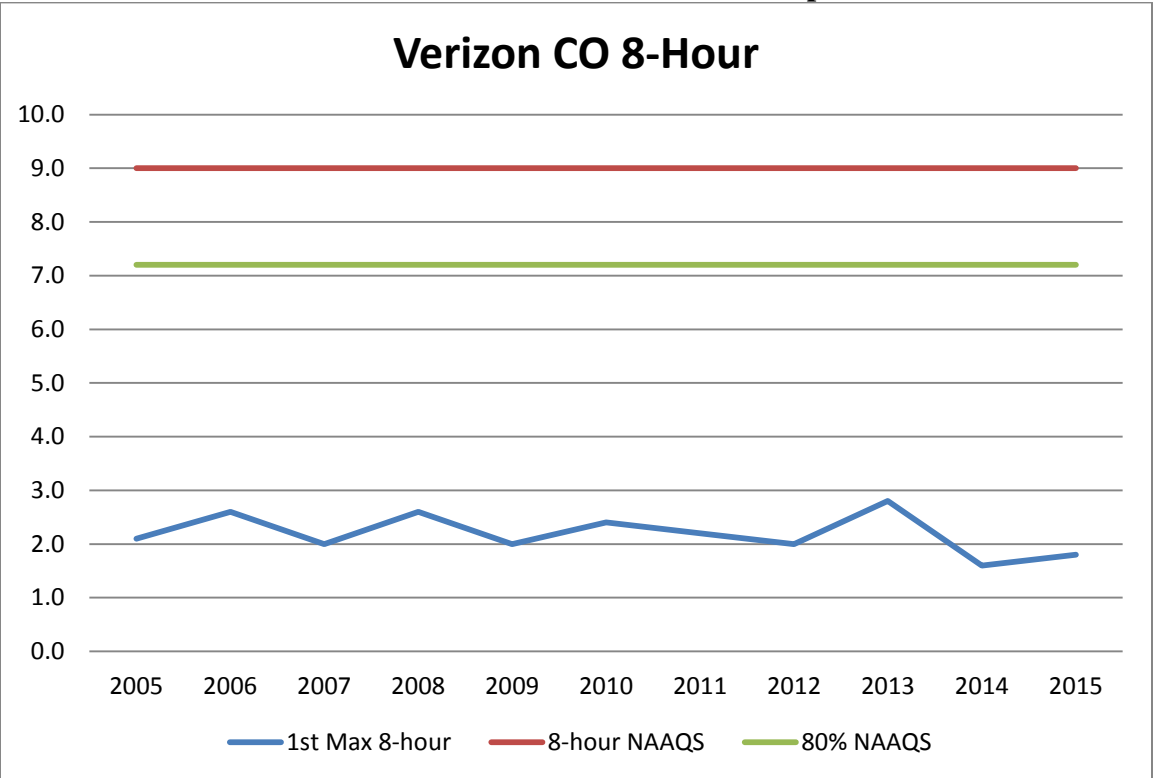


Table A-3. Verizon CO Summary Data

Comparison of Verizon CO with NAAQS (ppm)						
Year	1st Max 1-hour	2nd Max 1-hour	1-hour NAAQS	1st Max 8-hour	2nd Max 8-hour	8-hour NAAQS
2005	3.0	2.9	35.0	2.1	1.9	9.0
2006	10.3	3.2	35.0	2.6	2.3	9.0
2007	2.7	2.7	35.0	2.0	1.9	9.0
2008	6.0	4.0	35.0	2.6	1.8	9.0
2009	2.5	2.5	35.0	2.0	1.9	9.0
2010	2.8	2.7	35.0	2.4	2.0	9.0
2011	5.0	4.2	35.0	2.2	1.9	9.0
2012	2.5	2.2	35.0	2.0	1.9	9.0
2013	5.8	4.4	35.0	2.8	2.5	9.0
2014	2.1	2.0	35.0	1.6	1.5	9.0
2015	2.1	2.0	35.0	1.8	1.7	9.0

Figure A-3. Monitored CO Levels at the River Terrace Station Compared to the 1-Hour NAAQS

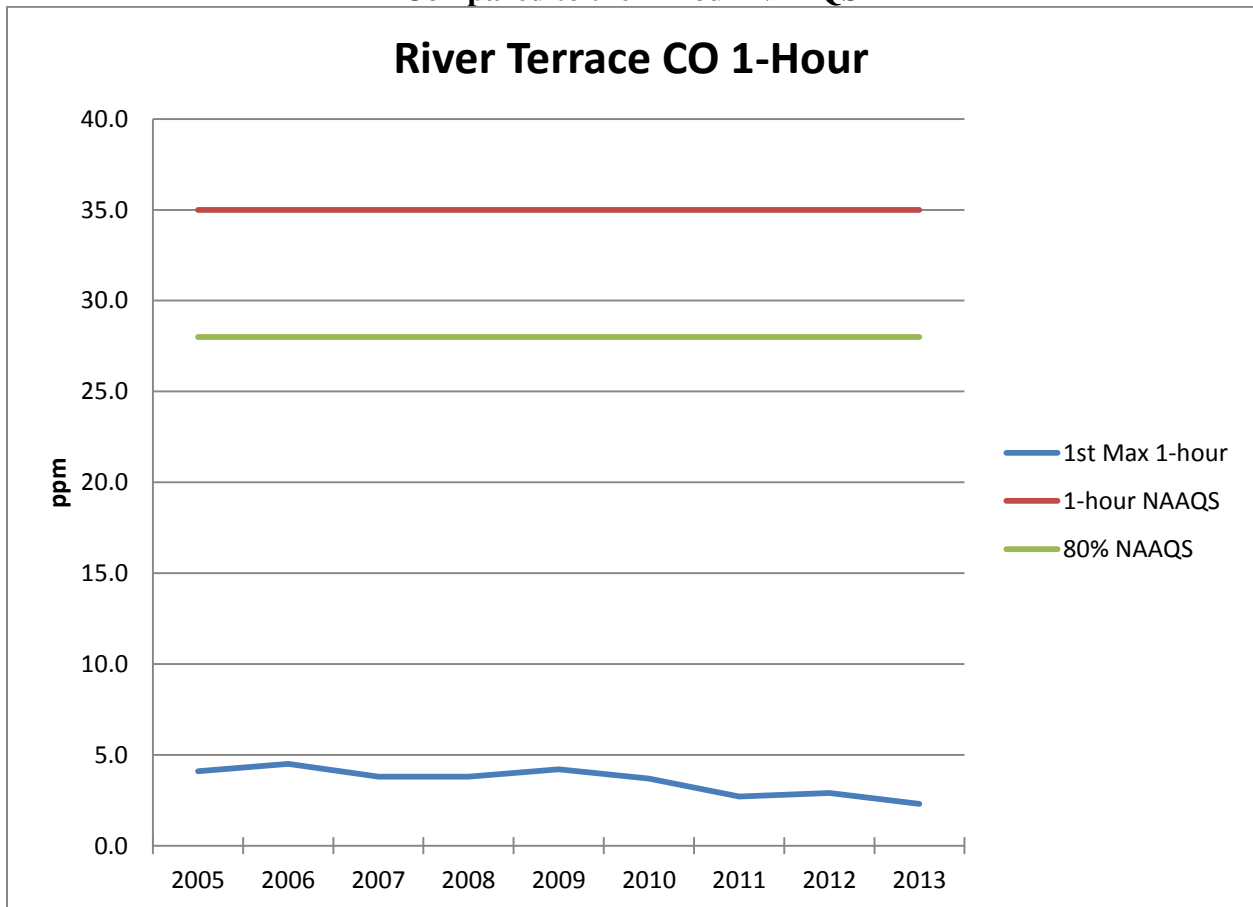


Figure A-4. Monitored CO Levels at the River Terrace Station Compared to the 1-Hour NAAQS

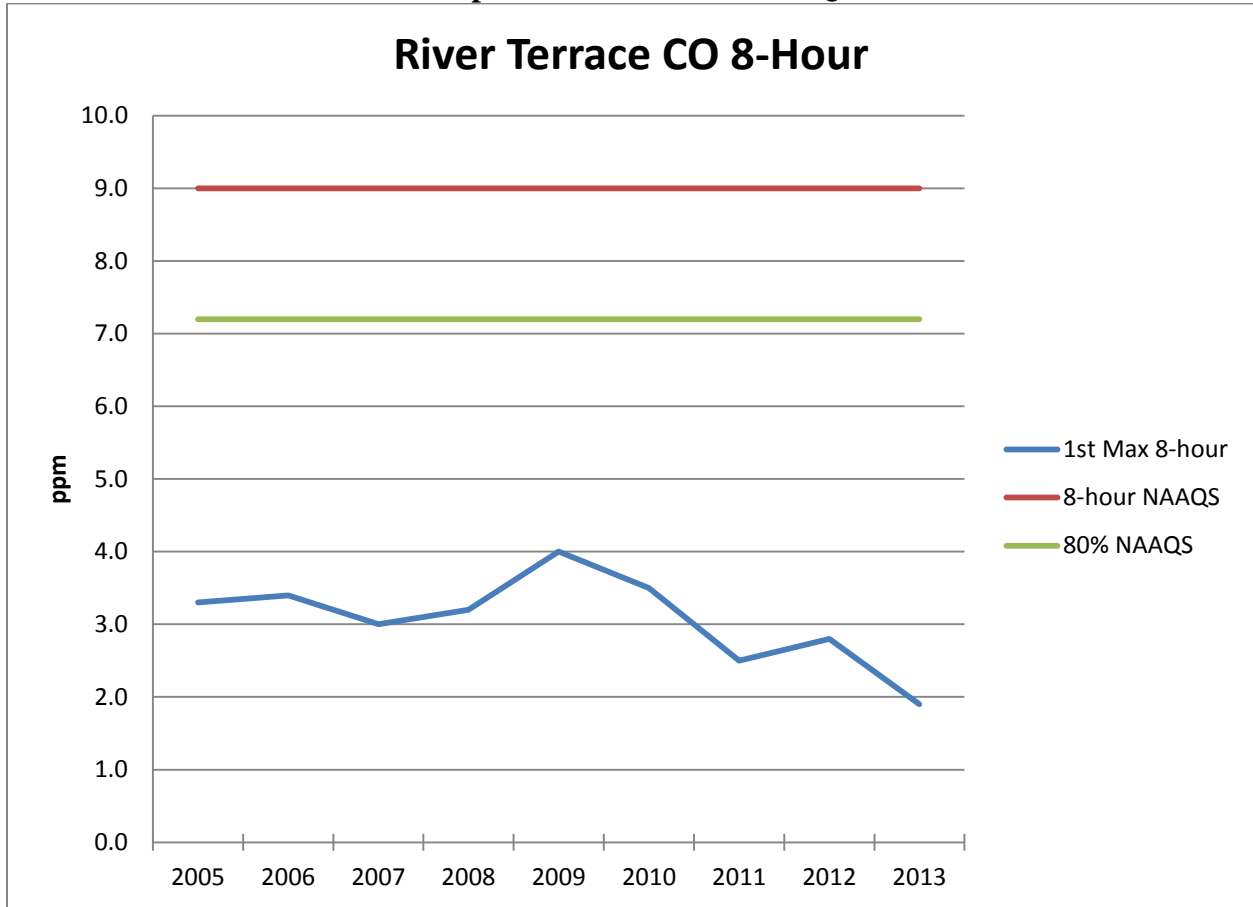


Table A-4. River Terrace Summary Data

Comparison of River Terrace CO with NAAQS (ppm)						
Year	1st Max 1-hour	2nd Max 1-hour	1-hour NAAQS	1st Max 8-hour	2nd Max 8-hour	8-hour NAAQS
2005	4.1	3.8	35.0	3.3	3.2	9.0
2006	4.5	4.0	35.0	3.4	3.3	9.0
2007	3.8	3.8	35.0	3.0	2.7	9.0
2008	3.8	3.7	35.0	3.2	3.1	9.0
2009	4.2	4.2	35.0	4.0	3.8	9.0
2010	3.7	3.7	35.0	3.5	3.1	9.0
2011	2.7	2.7	35.0	2.5	2.3	9.0
2012	2.9	2.9	35.0	2.8	2.5	9.0
2013	2.3	2.2	35.0	1.9	1.9	9.0

Appendix B

District of Columbia Lead Monitoring Network

Compliance with Pb Network Design Criteria

EPA revised the monitoring requirements for Lead (Pb) on December 27, 2010 as follows:
A summary of the monitoring requirements is provided in Table B-1.

Table B-1. Pb Monitors in the District that Meet Federal Requirements

Requirement	Appendix D 40 C.F.R. Part 58	Required in DC	Number of monitors active in DC
One source-oriented SLAMS site located to measure the maximum Pb concentration resulting from each non-airport Pb source which emits 0.50 or more tons per year	4.5(a)	0	0
One source-oriented SLAMS site located to measure the maximum Pb concentration resulting from airport which emits 1.0 or more tons per year	4.5(a)	0	0
Non-source oriented Pb monitoring at each required NCore site in a CBSA having a population of 5000,000 or more	4.5(b)	1	1

Beginning in January 2012, DOEE has operated a TSP-Pb monitor at the McMillan NCore site on a 1-in-6 day sampling schedule, as required by 40 C.F.R. Part 58.11 and Appendix D. Samples are sent to the West Virginia Department of Environmental Protection’s Air Monitoring Laboratory for chemical analysis. DOEE’s Pb monitor is not associated with any stationary point source of Pb and is not required as part of any attainment or maintenance plan.

EPA revised the national air quality monitoring regulations (40 C.F.R. Part 58 Appendix D Section 4.5(b)(c)) to remove the requirements for NCore sites to measure Lead (Pb), effective on April 27, 2016.

Since monitoring began at the McMillan NCore station, monitored Pb concentrations have been close to the minimum detection limit (MDL), as demonstrated in Table B-2. Figure B-1 shows the continued low ambient concentration. The design values (all rolling 3-month averages over a 3-year period) are less than 3.5% of the national ambient air quality standards (NAAQS). The trend demonstrates essentially no probability of exceeding the NAAQS in the next three years.

DOEE is requesting Regional Administrator approval to discontinue Pb monitoring at McMillan NCore site beginning January 1, 2017.

Table B-2: Comparison of McMillan Lead Values with NAAQS ($\mu\text{g}/\text{m}^3$)

Month/Year	3 Mo. Rolling Average	NAAQS	Percent of NAAQS
Jan '12 - Mar	0.00455	0.15	3.03%
Feb - Apr	0.00431	0.15	2.87%
Mar - May	0.00366	0.15	2.44%
Apr - Jun	0.00326	0.15	2.17%
May - July	0.00273	0.15	1.82%
Jun - Aug	0.00293	0.15	1.95%
Jul - Sept	0.00328	0.15	2.19%
Aug - Oct	0.00419	0.15	2.79%
Sept - Nov	0.00475	0.15	3.17%
Oct - Dec	0.00438	0.15	2.92%
Nov - Jan	0.00384	0.15	2.56%
Dec - Feb	0.00325	0.15	2.17%
Jan '13 - Mar	0.00391	0.15	2.60%
Feb - Apr	0.00412	0.15	2.74%
Mar - May	0.00458	0.15	3.05%
Apr - Jun	0.00423	0.15	2.82%
May - July	0.00412	0.15	2.75%
Jun - Aug	0.00381	0.15	2.54%
Jul - Sept	0.00345	0.15	2.30%
Aug - Oct	0.00394	0.15	2.63%
Sept - Nov	0.00405	0.15	2.70%
Oct - Dec	0.00373	0.15	2.48%
Nov - Jan	0.00350	0.15	2.33%
Dec - Feb	0.00390	0.15	2.60%
Jan '14 - Mar	0.00469	0.15	3.13%
Feb - Apr	0.00412	0.15	2.74%
Mar - May	0.00411	0.15	2.74%
Apr - Jun	0.00391	0.15	2.61%
May - July	0.00414	0.15	2.76%
Jun - Aug	0.00503	0.15	3.35%
Jul - Sept	0.00496	0.15	3.30%
Aug - Oct	0.00542	0.15	3.62%
Sept - Nov	0.00487	0.15	3.24%
Oct - Dec	0.00417	0.15	2.78%
Nov - Jan	0.00297	0.15	1.98%
Dec - Feb	0.00286	0.15	1.91%
Jan '15 - Mar	0.00396	0.15	2.64%
Feb - Apr	0.00432	0.15	2.88%
Mar - May	0.00454	0.15	3.03%

Month/Year	3 Mo. Rolling Average	NAAQS	Percent of NAAQS
Apr - Jun	0.00326	0.15	2.17%
May - July	0.00318	0.15	2.12%
Jun - Aug	0.00297	0.15	1.98%
Jul - Sept	0.00342	0.15	2.28%
Aug - Oct	0.00428	0.15	2.85%
Sept - Nov	0.00450	0.15	3.00%
Oct - Dec	0.00461	0.15	3.07%
Nov - Jan	*	0.15	*
Dec - Feb	*	0.15	*

* Denotes rolling averages uses 2016 data

Figure B-1: Measured Lead Levels Compared to the NAAQS

