AIR QUALITY TECHNICAL REPORT

AUGUST 2013

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1. Introduction and Project Description

1.1 Introduction

This technical report of the *Purple Line Final Environmental Impact Statement* (FEIS) presents the detailed analysis of air quality for the Preferred Alternative for the Purple Line Light Rail Transit (LRT). The purpose of the *Air Quality Technical Report* is to identify pollutants of concern, review applicable standards, summarize existing air quality in the study area, and analyze the project's potential impacts on air quality in the study area. The Preferred Alternative's impacts were evaluated against the No Build Alternative for Base Year 2014, Interim Year 2020, and Design Year 2040. The purpose of this analysis is to determine whether the Preferred Alternative would cause or contribute to a violation of the Clean Air Act requirements and standards.

1.2 Project Description

The Purple Line is a proposed 16.2-mile transit line located north and northeast of Washington DC, inside the circumferential I-95/I-495 Capital Beltway. The Purple Line would extend between Bethesda in Montgomery County and New Carrollton in Prince George's County. The "Purple Line corridor" includes five major activity centers: Bethesda, Silver Spring, Takoma/Langley Park, College Park, and New Carrollton.

The purposes of the Purple Line project are the following:

- Provide faster, more direct, and more reliable east-west transit service connecting the major activity centers in the Purple Line corridor at Bethesda, Silver Spring, Takoma/Langley Park, College Park, and New Carrollton,
- Provide better connections to Metrorail services located in the corridor, and
- Improve connectivity to the communities in the corridor located between the Metrorail lines.

There are two Alternatives discussed herein: the No Build Alternative and the Preferred Alternative.

1.2.1 No Build Alternative

The No Build Alternative represents the future conditions of transportation facilities and services in 2040 in the corridor if the Purple Line were not built. The No Build Alternative includes the existing highway network and transit service, plus those transportation projects listed within the Purple Line corridor for which funding sources have been identified and have been included in the National Capital Region Transportation Planning Board's (TPB) *Financially Constrained Long-Range Transportation Plan* (CLRP) for implementation by 2040. The No Build Alternative provides the basis against which the Preferred Alternative is compared.

1.2.2 Preferred Alternative

The Preferred Alternative would be at grade except for one short tunnel section and three sections elevated on structures. The Preferred Alternative would operate mainly in dedicated or exclusive lanes, providing fast, reliable transit operations.

The following 21 stations are planned for the Preferred Alternative:

- Bethesda
- Chevy Chase Lake
- Lyttonsville
- Woodside/16th Street
- Silver Spring Transit Center
- Silver Spring Library
- Dale Drive
- Manchester Place
- Long Branch
- Piney Branch Road
- Takoma/Langley Transit Center
- Riggs Road
- Adelphi Road/West Campus
- UM Campus Center
- East Campus
- College Park
- M Square
- Riverdale Park
- Beacon Heights
- Annapolis Road/Glenridge
- New Carrollton

Stations would include ticket vending machines, weather shelters for passengers, lighting, wayfinding and informational signage, trash receptacles, seating, and security equipment such as emergency telephones and closed circuit television cameras. Most riders would walk to the stations or transfer from other transit services. Access plans for each station have been developed to enhance pedestrian and transit access for nearby communities. The stations would have either side or center platforms depending on the site characteristics and space availability.

Two storage and maintenance facilities are proposed: one at Lyttonsville in Montgomery County and the other at Glenridge in Prince George's County. Additionally, traction power substations, used to convert electric power to appropriate voltage and type to power the light rail vehicles, would be required approximately every mile.

As part of the Preferred Alternative the permanent Capital Crescent Trail would be constructed within the Georgetown Branch right-of-way for a distance of 3.3 miles between Bethesda and the CSXT Metropolitan Branch. At the junction with the CSXT the trail is planned to continue on the north side of the CSXT corridor to the SSTC. The permanent Capital Crescent Trail would replace the existing Georgetown Branch Interim Trail which currently extends from Bethesda to Stewart Avenue within the Georgetown Branch right-of-way. The completion of the trail along the CSXT corridor is contingent on agreement with CSXT on the use of their property on the north side of the CSXT tracks for the trail. If agreement is not reached by the time the Purple Line construction occurs, MTA would construct the trail from Bethesda to Talbot Avenue. From Talbot Avenue to Silver Spring an interim signed bike route on local streets would be used. MTA will plan, design, and construct the permanent Capital Crescent Trail between Bethesda and Silver Spring concurrently with the Purple Line. The Capital Crescent Trail will be owned and operated by Montgomery County, which will be responsible for providing the funds to construct it.

2. Regulatory Context and Methodology

2.1 Overview

Air pollution is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants can cause acute respiratory illnesses, contribute to the development of chronic ailments, reduce visibility, and inhibit the growth and resilience of crops. Air pollutants are regulated by the Clean Air Act (CAA) to protect public and environmental well-being. The purpose of this analysis is to determine whether the Preferred Alternative would cause or contribute to a violation of the CAA requirements.

2.2 Legal and Regulatory Context

2.2.1 Clean Air Act

The CAA is the overarching statute regulating air quality in the United States. Among other things, it requires the U.S. Environmental Protection Agency (EPA) to set the National Ambient Air Quality Standards (NAAQS), designate areas that are not in attainment of the NAAQS, and subsequently approve state plans for achieving those standards. The CAA Amendments of 1990 and the Final Transportation Conformity Rule [40 CFR Parts 51 and 93] direct the EPA to implement environmental policies and regulations that ensure acceptable levels of air quality.

Transportation conformity is a process mandated by the USEPA and US Department of Transportation (DOT) and required by the CAA section 176(c) (42 U.S.C. 7506 (c)) to ensure that federally-supported highway and transit projects are consistent with the state's air quality goals. The CAA and Final Transportation Conformity Rule affect proposed transportation projects in the following way, according to the CAA Title I, Section 176 (c) 2:

"No federal agency may approve, accept, or fund any transportation plan, program, or project unless such plan, program, or project has been found to conform to any applicable State Implementation Plan in effect under this act."

According to Section 176 (c) 2 (A) of the CAA, conformity to an implementation plan means eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards, and ensuring that such activities will not:

- Cause or contribute to any new violation of any NAAQS in any area;
- Increase the frequency or severity of any existing violation of any NAAQS in any area; or
- Delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in any area.

2.2.2 National and State Ambient Air Quality Standards

As required by the CAA, the USEPA sets NAAQS for airborne pollutants that have adverse impacts on human health and the environment. The NAAQS are a set of baseline standards over which state governments can choose to impose stricter standards.

The EPA has established NAAQS for six pollutants, which are commonly known as "criteria pollutants": ozone, carbon monoxide (CO), particulate matter ($PM_{2.5}$ and PM_{10}), nitrogen dioxide, sulfur dioxide, and lead. Within the NAAQS are primary and secondary standards. The primary standards were established at levels sufficient to protect public health with an adequate margin of safety. The secondary standards were established to protect the public welfare from the adverse effects associated with pollutants in the ambient air. The NAAQS as of March 2013 are summarized in Table 1. Information regarding the specific health impacts of the six criteria pollutants follows in Section 2.3.1.

Table 1. National Ambient Air Quality Standards for Criteria Pollutants

Pollutant		Averaging Period	National Standards	
			Primary Standard	Secondary Standard
Ozone (O_3)		Eight Hour[1]	0.075 ppm	Same as primary standard
		One Hour[2]	*0.012 ppm* / Revoked	No secondary standard
Particulate Matter (PM)	PM_{10}	24 Hour[3]	150 µg/m³	Same as primary standard
	$PM_{2.5}$	Annual[11]	12 µg/m³	15 µg/m³
		24 Hour[5]	35 µg/m³	Same as primary standard
Carbon Monoxide (CO)		Eight Hour[6]	9 ppm	No secondary standard
		One Hour[6]	35 ppm	No secondary standard
Nitrogen Dioxide (NO_2)		One Hour[7]	0.010 ppm	No secondary standard
		Annual[8]	0.053 ppm	Same as primary standard
Sulfur Dioxide (SO_2)		One Hour[9]	75 ppb	No secondary standard
		Three Hours[6]	No primary standard	0.5 ppm
Lead (Pb)		Rolling Three Month Average[10]	0.15 µg/m³	Same as primary standard

Abbreviations: ppm = parts per million, ppb = parts per billion, µg/m³ = micrograms per cubic meter

[1] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentration measured at each monitor within an area must not exceed the standard.

[2] As of June 15, 2005, the EPA revoked the one-hour ozone standard in all areas except the 14 eight-hour ozone nonattainment Early Action Compact areas. The project is not located in one of these areas.

[3] Not to be exceeded more than once per year on average over three years.

[4] To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed the standard.

[5] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations of $PM_{2.5}$ from single or multiple community-oriented monitors must not exceed the standard.

[6] Not to be exceeded more than once per year.

[7] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed the standard.

[8] Annual mean, arithmetic average.

[9] To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed the standard.

[10] Not to be exceeded.

[11] New annual standard effective as of March 18, 2013.

Source: EPA, March 2013. http://www.epa.gov/air/criteria.html

2.2.3 Attainment Status/Regional Air Quality Conformity

Attainment Status

The EPA is required by the CAA to publish a list of all geographic areas in compliance with the NAAQS. Attainment status is determined on a pollutant by pollutant basis. Areas that routinely exceed a NAAQS for a particular pollutant are designated as “nonattainment areas.” Areas that have succeeded in improving from “nonattainment” to “attainment” are called “maintenance areas.” Table 2 provides the definition for each attainment classification. Ozone nonattainment areas can be further broken down into varying degrees of severity, ranging from marginal, serious, severe, or extreme based on the degree of nonattainment. Stricter controls and deadlines apply in the more severe nonattainment areas.

Table 2. Attainment Classifications and Definitions

Attainment	Nonattainment	Maintenance	Unclassified
Area is in compliance with the NAAQS for a given pollutant.	Area is not in compliance with the NAAQS for a given pollutant.	Area previously identified as nonattainment, but has since demonstrated compliance with the NAAQS for a given pollutant.	Insufficient data is available for determination, so area is treated as in compliance for a given pollutant.

The project corridor encompasses both Prince George’s County and Montgomery County. Both counties are in the Metropolitan Washington DC-MD-VA region. The region is currently classified as “nonattainment” for the 1997 PM2.5 and 1997 8-hour ozone standards, as “maintenance” (formerly nonattainment) areas for the 1990 CO standard, and as an attainment area for all other criteria pollutants.

Regional Air Quality Conformity

The CAA requires states to submit an air quality plan, known as the State Implementation Plan (SIP), for each individual pollutant of concern, in which an area routinely exceeds the NAAQS. The SIP includes an inventory of all man-made emissions in the region, as well as a discussion of reasonably available emission control technology to decrease these emissions. The SIP also provides Reasonable Further Progress emission budgets, benchmark dates, agreements, and supporting technical documentation to meet CAA standards and requirements.

A SIP is developed for each individual pollutant of concern for which the region is not in attainment. Conformity to a SIP requires that a proposed project will not cause a violation, worsen an existing violation, or delay timely attainment of the NAAQS. A transportation project conforms to the SIP if it comes from a conforming metropolitan transportation improvement plan (TIP).

The criteria and procedures required for a conformity determination by the rule differ according to the type of action (i.e., project from or not from a conforming transportation plan and TIP), in addition to the pollutant for which an area is designated as in nonattainment or maintenance.

Conformity determinations of transportation plans and TIPs require a regional emissions analysis. All regionally significant highway and transit projects, regardless of funding source, must either come from a conforming transportation plan and TIP that has included a regional emissions analysis supporting the plan's or TIP's conformity determination, or be included in a newly-performed regional emissions analysis. A project is considered to be from a conforming transportation plan and TIP if the project is specifically included in the conforming plan and TIP, is included in the regional emissions analysis associated with the conforming plan and TIP, and the project's design concept and scope have not changed significantly from those which were described in the transportation plan and TIP. The conformity determination for a project that is not identified on a conforming plan and TIP will have to demonstrate that the project does not interfere with the implementation of any emissions control measures previously committed to in the SIP.

Montgomery County and Prince George's County are part of the Metropolitan Washington Council of Governments (MWCOG). MWCOG was founded in 1957 and is a regional organization of 22 local governments surrounding the nation's capital, plus members of the Maryland and Virginia legislatures and the US Congress. Through MWCOG, the Metropolitan Washington Air Quality Committee (MWAQC) prepares the air quality plan for the Washington, DC–Maryland-Virginia metropolitan area, as regulated under Section 174 of the CAA.

The National Capital Region Transportation Planning Board (TPB) is housed within and staffed by MWCOG. TPB brings together key decision-makers to coordinate planning and funding for the region's transportation system. One responsibility of the TPB is to meet federal metropolitan planning requirements for transportation. TPB is required to produce two planning documents, one detailing the long-term and one detailing the near-term transportation needs.

The long-term document is the *Financially Constrained Long-Range Transportation Plan* (CLRP), which includes all planned and regionally significant transportation projects and programs for the next 25 years. A new proposed definition of "regionally significant" was developed to meet the transportation conformity requirements and maintain the same scale as past analyses with the advent of the more fine-tuned *Travel Demand Model Version 2.3*. This new definition was introduced in the analysis of the 2011 CLRP and will be used for all future air quality conformity analyses; "regionally significant" is now defined as follows:

- Any project on a facility that is included in the coded regional network that adds or removes at least one continuous vehicular lane from one major road to the next, or adds a new access/egress location or capacity; or,
- Any transit project that adds or modifies fixed-guideway transit facilities (heavy rail, light rail, streetcar, and bus rapid transit).

According to the second item, the Purple Line is classified as a regionally significant project.

TPB also produces a near-term document called the *Transportation Improvement Plan* (TIP), which includes all regionally significant projects and programs within a 6-year horizon that are intended to be constructed and implemented. The TIP must conform to the goals of the SIPs. In order to receive federal funding, transportation projects must be included in both the TIP and the CLRP. Preliminary Engineering and completion of the NEPA documentation for the Purple Line are included in the Fiscal Year 2013-2018 TIP (approved on July 18, 2012).

The construction of the Purple Line by Fiscal Year 2020 is accounted for in MWCOG's 2012 CLRP. The *Air Quality Conformity Determination of the 2011 CLRP for the Washington Metropolitan Region* indicates that mobile source emissions for each analysis year (base year 2002 and forecast years 2017, 2020, 2030, and 2040) adhere to all carbon monoxide, ozone precursor VOC and NO_X, and fine particle pollutants emissions budgets established by the MWAQC. Because the Purple Line project comes from a conforming CLRP and TIP, it is not necessary to conduct a regional emissions analysis as part of this FEIS.

However, emissions burdens for NO_x and VOC (precursors of O_3), CO, and $PM_{2.5}$ within Montgomery County and Prince George's County areas where the project corridor is located were calculated on a mesoscale basis, representing a network within the area of interest surrounding the project corridor. Such an analysis provides a comparison of mesoscale emissions among alternatives for purposes of environmental consequence disclosure according to the National Environmental Policy Act (NEPA).

2.3 Pollutants and Effects

2.3.1 Criteria Pollutants

Pollutants for which the EPA has established NAAQS are referred to as criteria pollutants. These criteria pollutants are ozone, carbon monoxide, particulate matter, nitrogen dioxide, sulfur dioxide, and lead. These pollutants have varying effects on human health and the general environment and differ also in how they disperse and are deposited in the atmosphere. A description of each criteria pollutant is provided below.

Ozone

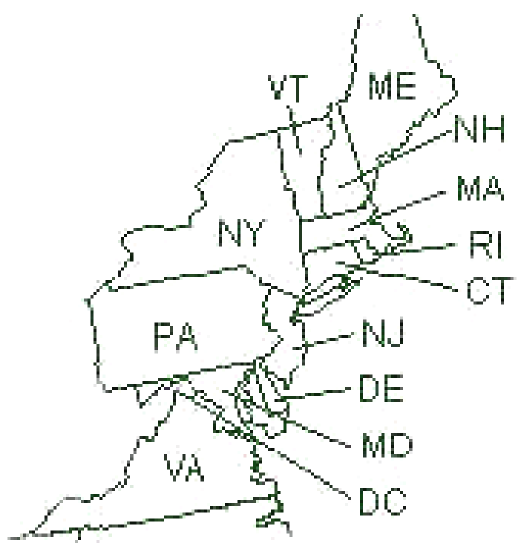
Ozone is a colorless toxic gas. Its effects on human health vary depending on its location in the atmosphere. Ozone can be found in two locations: the protective ozone layer in the stratosphere and at ground level. Both types of ozone have the same chemical composition (O_3). The EPA uses the slogan "Good up High, Bad Nearby" to differentiate the effects of ozone on human health.

The layer closest to the Earth's surface is the troposphere. This is where ground-level or "bad" ozone exists, and it is harmful to breathe and has adverse effects on vegetation, crops, and buildings. Ground-level ozone is not emitted directly into the air, but is created by chemical reactions between precursor molecules Volatile Organic Compounds (VOC) and Nitrogen Oxides (NO_X) in the presence of sunlight. According to EPA, major sources of precursor molecules VOC and NO_X include emissions from industrial facilities, electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents.

Ground-level ozone causes respiratory illness and is the main contributor of urban smog. Ozone enters the bloodstream through the lungs and interferes with the transfer of oxygen to sensitive tissues in the heart and brain. Breathing high concentrations of ozone can induce chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and trigger asthma attacks by inflaming the linings of the lungs. Repeated exposure may permanently scar lung tissue. Ground-level ozone also creates frailty in vegetation and crops by inhibiting growth, reducing yield, and decreasing resistance to disease and stress. Ozone also can have adverse impacts on the ecosystem, including loss of species diversity and changes to habitat quality and water and nutrient cycles.

Pollution transported across state boundaries via wind is a primary contributor to exceeding ozone standards. The Ozone Transport Commission (OTC) was created by the 1990 CAA Amendments. The OTC implements programs in the Ozone

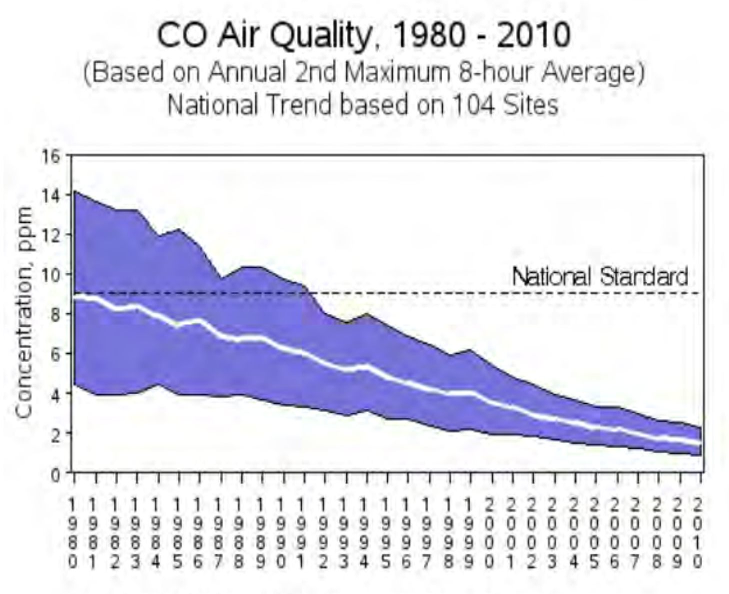
Figure 1. Ozone Transport Region



Source: Ozone Transport Commission, 2012. http://www.otcair.org/about.asp

Transport Region (shown in Figure 1). The region includes Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, and the Washington D.C. Metropolitan Statistical Area, including the northern Virginia suburbs. These states are required to submit a SIP for the entire state to meet the 1997 ozone Reasonably Available Control Technology requirement, regardless of their attainment status of the 1997 ozone standard. The OTC functions to help states like Maryland attain its clean air goals while maintaining economic vitality by avoiding stricter local regulations to make up for regional effects.

Figure 2. CO Air Quality 1980 – 2010



Source: EPA, 2012. http://www.epa.gov/airtrends/carbon.html

Carbon Monoxide

Carbon Monoxide (CO) is a colorless gas that harms the human body by reducing the oxygen-carrying capacity of the blood to vital organs such as the brain, heart, and other tissues. People with several types of existing heart conditions and heart disease are most at risk for developing adverse symptoms in response to CO exposure, including chest pain and decreased oxygen to the heart. Short-term CO exposure amplifies a human body's compromised ability to respond to the increased oxygen demands of exercise or exertion. At high levels, CO can cause asphyxiation and death.

CO is emitted directly from engines due to the incomplete combustion of fuel. Motor vehicles emit the highest amounts of CO when they are at low speeds or idling. These idle emissions are typically exhibited at congested intersections.

From the year 1980 to 2010, there has been an 82% decrease in the national average CO concentration. In Figure 2, the national average CO concentration is represented by a white line, and the National Standard as a dotted line. According to EPA, as of the year 2012, every region in the United States has demonstrated attainment or is maintaining the current CO standards. This can be attributed to the fact that significant improvements have been made in motor vehicle emission control systems, drastically reducing emissions of CO.

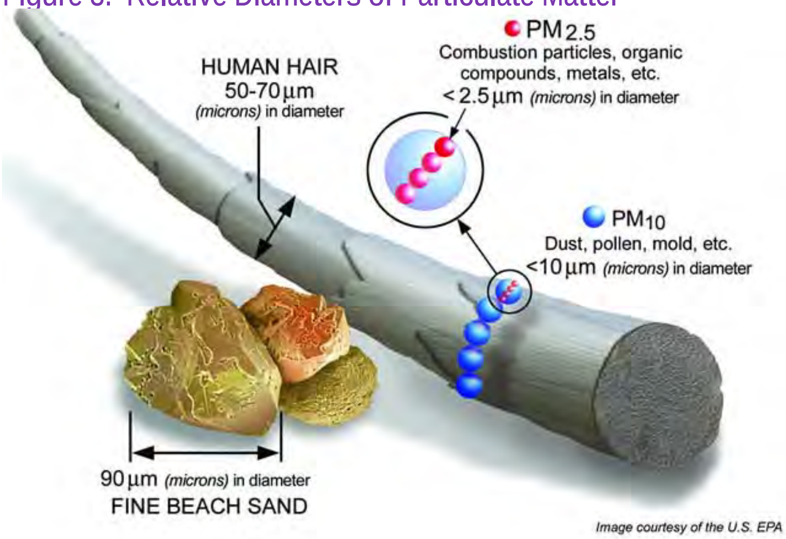
Particulate Matter

Particulate matter is composed of solid or liquid droplets of various substances that are small enough to remain suspended in the air. Particulates often consist of smoke, soot, dust, salts, acids, and metals, some of which can be highly toxic to humans. They are emitted through both on-road and off-road sources.

There are two main classifications of particulate matter that are of concern to human health: fine and coarse. Fine particulate matter ($PM_{2.5}$) consists of particles with a diameter of less than 2.5 microns, while coarse particulate matter (PM_{10}) consists of particles with a diameter between 2.5 and 10 microns. The relative diameters of $PM_{2.5}$, PM_{10}, a human hair, and beach sand are shown in Figure 3.

PM_{10} is often associated with fugitive dust, wind erosion, and agricultural sources. Particles of this size can be inhaled and affect the upper respiratory system. The main contributors of $PM_{2.5}$ are motor vehicles and power generation processes. The fuel combustion process in an internal combustion engine releases hydrocarbons in the form of VOC which react to form particulate matter in the atmosphere. SO_2 and NO_X also contribute to the secondary formation of $PM_{2.5}$. $PM_{2.5}$ is generally regarded as a greater health concern because it is small enough to bypass the upper respiratory system and travel deep into the lungs where it may damage tissue. Once in the lungs, particulate matter can cause a variety of ailments. Exposure can cause increased respiratory distress, decreased lung function, development of chronic bronchitis, nonfatal heart attacks, and premature death in people with heart or lung disease. $PM_{2.5}$ is partially responsible for decreased visibility in congested urban areas. Suspended particulates carried by wind may cause environmental damage far from the source.

Figure 3. Relative Diameters of Particulate Matter



Source: EPA Particulate Matter Basic Information, 2013. http://www.epa.gov/pm/basic.html

Nitrogen dioxide

Nitrogen dioxide (NO_2) is a brown colored gas that irritates the lungs. It is one of a class of highly reactive combinations of nitrogen and oxygen, known as nitrogen oxides, or NO_X.

NO_X is a precursor molecule to the secondary formation of both ozone and $PM_{2.5}$ pollution. NO_X in the air damages the leaves of plants, inhibiting photosynthesis and decreasing growth. NO_X can acidify and over-fertilize sensitive ecosystems when deposited on land and in estuaries, lakes, and streams. This results in a range of harmful deposition-related effects on the environment, including damage to water quality, soils, fish, and wildlife.

According to the EPA, NO_X levels in the air have decreased over 40% since 1980. The EPA also expects NO_2 concentrations to decrease in the future as a result of engine regulations and emissions standards for vehicles. Federal Tier II standards for light-duty vehicles began with Model Year 2004 vehicles, as well as new NO_X standards for heavy-duty engines began with Model Year 2007 through 2010 vehicles. As the vehicle fleet is replaced with these newer, cleaner engines, NO_X emissions are expected to continue to decrease.

Sulfur dioxide

Sulfur dioxide (SO_2) is in a class of highly reactive combinations of sulfur and oxygen called sulfur oxides, or SO_X. They are regulated closely with NO_X, as they are both highly reactive and harm human health and the environment. SO_X are emitted mainly at stationary power generation sources, such as coalfueled power plants. Deposition related effects of SO_X include the acidification of rivers, lakes, and streams.

Lead

Lead is a metal found naturally in the environment as well as in manufactured products. Exposure to lead at early stages in life has been linked to effects on learning, memory, and behavior. The EPA promulgated a Final Rule in the 1990's to ban leaded gasoline. This rule has resulted in a 95% decrease in lead emissions from the transportation sector between 1980 and 1999. While mobile source lead has been drastically reduced, there are still areas which are of primary concern for lead pollution. Major sources of lead today can be found in areas near lead smelters, ore and metals processing plants, utility plants, lead-acid battery manufacturers, and in piston-engine aircraft operating on leaded aviation gasoline.

2.3.2 Mobile Source Air Toxics

In addition to the criteria pollutants for which there are NAAQS, EPA also regulates Mobile Source Air Toxics (MSATs). Regulation of hazardous air toxics was first mandated by Congress with the passage of the CAA Amendments in 1990. The EPA developed the National-Scale Air Toxics Assessment as an ongoing comprehensive research tool for air toxics.

The qualification for a compound to be classified as an MSAT is a mobile source emission compound that poses a potential cancer hazard according to EPA's Integrated Risk Information System. The seven priority MSATs include acrolein, benzene, 1,3-butidiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. According to EPA, national emissions from all air toxics are projected to decrease from 5,030,000 tons in 1999 to 4,010,000 tons in 2020, as a result of existing and planned emission controls on major, area, and mobile sources. Emissions are projected to increase slightly between 2020 and 2030, but are not anticipated to return to the levels seen today. For further information on MSAT analysis, refer to Section 4.1.3.

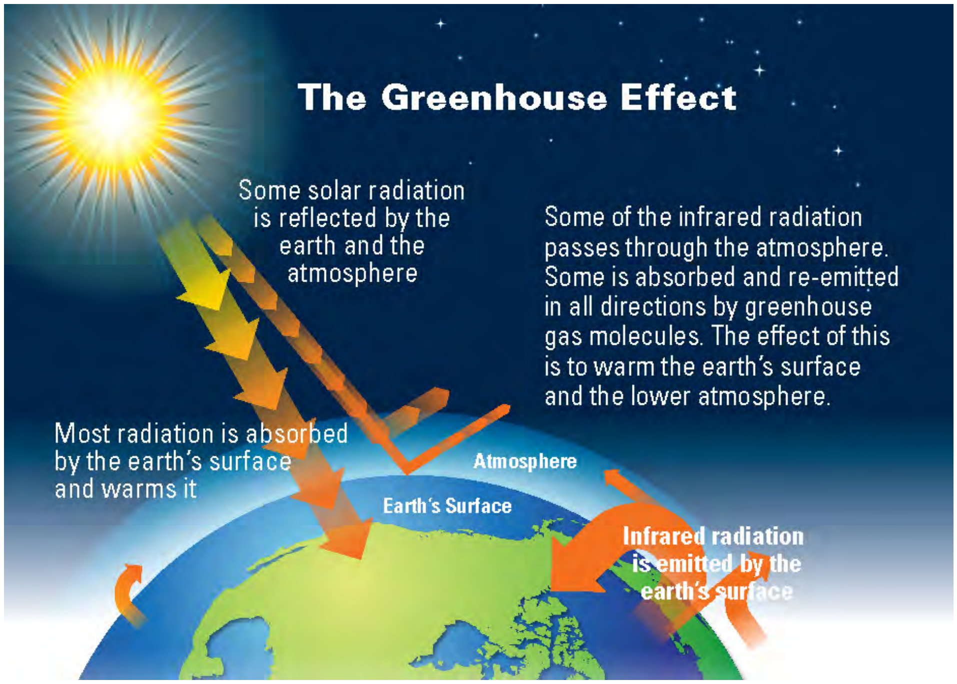
2.3.3 Greenhouse Gases

Greenhouse gases (GHGs) are another pollutant regulated by EPA. GHGs are critical to life on Earth, as they trap heat from the sun in the atmosphere and warm the planet to acceptable temperatures to support liquid water and life. An illustration of the greenhouse effect is provided in Figure 4. Without GHGs, the average temperature of the earth would be around 0° F (-18° C), instead of its present 57° F (14° C). [1]

The combustion of coal, oil, and gas by humans has been increasing the amount of GHGs in the atmosphere, mostly in the form of CO_2. According to the NOAA, pre-industrial levels of CO_2 in the atmosphere were approximately 280 parts per million by volume (ppmv). Current levels are over 380 ppmv and have been steadily increasing at a rate of 1.9 ppmv per year since the year 2000. This level exceeds the natural range of the past 650,000 years of 180 to 300 ppmv.

[1] National Oceanic and Atmospheric Administration, 2012. *Climate Data Online* < http://www.ncdc.noaa.gov/cmb-faq/globalwarming.html>

Figure 4. The Greenhouse Effect



Source: Penn State University, 2006.

The principal greenhouse gases that enter the atmosphere because of human activities are carbon dioxide, methane, nitrous oxide, and fluorinated gases.

Carbon Dioxide (CO_2). Carbon dioxide is the most prevalent of the four GHGs. CO_2 is emitted primarily from the burning of fossil fuels (oil, natural gas, coal) by power plants and motor vehicles, the burning of solid waste, trees, and wood products, and as a result of chemical reactions such as the manufacture of cement. CO_2 is removed from the atmosphere (sequestered) when it is absorbed by plants as part of the biological carbon cycle.

Methane (CH_4). Methane is emitted during the production and transport of various energy sources, including coal, natural gas, and oil. Methane also comes from agricultural practices and from landfills as waste decays.

Nitrous Oxide (N_2O). Nitrous Oxide is emitted during various agricultural and manufacturing activities as well as during combustion of fossil fuels and solid waste.

Fluorinated Gases. Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic gases that are emitted from a variety of industrial processes. Fluorinated gases may be used in place of ozone-depleting gases such as chlorofluorocarbons (CFC's). While these gases may be emitted in smaller quantities than the others, they are very potent and have a High Global Warming Potential.

For mobile source analyses based on fossil fuel consumption, CO_2 is the predominant greenhouse gas emitted; therefore, this analysis focuses on CO_2 to represent greenhouse gas emissions.

Regulation of greenhouse gas emissions is a focal point of the Maryland Clean Car Program, which was introduced to reduce GHG emissions from vehicular sources and improve air quality in its densely populated counties. In 2007, Maryland became the 12th state to adopt the California Low Emission Vehicle Tier II (Cal LEV II) standards, a set of tailpipe emission standards more stringent than the federal Tier II standards at that time. In 2009, the federal government announced that the federal standards will be fully merged with the stricter California standards by Vehicle Model Year 2016.

2.4 Pollutants for Analysis

Pollutants that can be traced principally to the operation of motor vehicles are relevant to the evaluation of the project's impacts; these pollutants include CO, ozone precursor molecules (VOC and NO_X), fine particulate matter, MSATs, and GHGs. Transportation sources account for a small percentage of regional emissions of SO_X and Pb; thus, a detailed analysis is not required.

For NEPA disclosure and alternative comparison purposes, a quantitative mesoscale emissions burden analysis was conducted in Prince George's and Montgomery Counties for the criteria pollutants for which the region is designated as non-attainment or maintenance. The criteria pollutants ozone and fine particulate matter form through a series of reactions that occur in the atmosphere in the presence of sunlight. Elevated pollutant levels are often found miles from the source. Thus, it is appropriate to predict these pollutant levels at a mesoscale level. The criteria pollutants that were quantitatively analyzed at the mesoscale level include CO, ozone precursor molecules VOC and NO_X, and fine particulate matter and fine particulate matter precursor NO_X.

CO impacts are generally localized. Even under the worst meteorological conditions and most congested traffic conditions, high concentrations are limited to a relatively short distance of heavily-traveled roadways. Vehicle emissions are the major sources of CO. The Purple Line project could change traffic patterns within the project study corridor. Consequently, it is appropriate to predict concentrations of CO on both the mesoscale and a microscale level.

MSATs are discussed qualitatively for the mesoscale and local levels. MSAT analysis is in need of more extensive research. A quantitative analysis of GHG impacts was performed to predict changes between the No Build and Preferred Alternative on a mesoscale level, due to the global nature of GHG impacts.

2.5 Mesoscale Pollutant Emissions Methodology

As described in Chapter 2.2, for purposes of NEPA disclosure and alternative comparison, a mesoscale emission burden analysis was performed for this project. Analysis was conducted for the criteria pollutants for which the Prince George's and Montgomery Counties are designated as nonattainment or maintenance status—namely, ozone, fine particulate matter ($PM_{2.5}$), and carbon monoxide.

The analysis estimated air pollutant levels for 2014 Base Year, 2020 Interim Year, and 2040 Design Year. Using the average weekday loaded network from the Maryland Alternatives Analysis Phase II (MDAA II M80) Travel Demand Model, in combination with emission factors (developed using Mobile6.2[2]), an evaluation of emissions for both the Preferred Alternative and the No Build Alternative was completed to determine how each would affect the Prince George's County and Montgomery County seasonal daily ozone (precursor VOC and NOx), as well as winter daily CO and annual $PM_{2.5}$ emissions.

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[2] Mobile6.2 is an emission factor model used for predicting gram per mile emissions under various conditions. It was used for emission factor development in this air quality analysis in an effort to demonstrate consistency with related planning documents such as the 2012 CLRP. The Mobile6.2 emission factors were also used for the Microscale CO hot analysis for the same reason. Note that MOVES is a new model being phased in by USEPA. CO analyses started before 12/20/12 are allowed to continue using the Mobile6.2 software.

2.5.1 Emissions Estimating Software

Mobile6.2 emission factors for this analysis were provided by MWCOG. The rates were developed using all available federal and local approved control measures and 2011 VIN vehicle data. Information regarding development of the Mobile6.2 emission factors can be found in Appendix D of MWCOG's *Air Quality Conformity Determination of the 2011 Constrained Long Range Plan for the Washington Metropolitan Region*.

Mobile6.2 is an emission factor model for predicting grams per mile emissions of hydrocarbons (VOC), CO, NO_X, CO_2, particulate matter, and air toxics from cars, trucks, and motorcycles under various conditions. It was used for emission factor development of CO, $PM_{2.5}$, VOC, and NO_X in this air quality analysis in an effort to demonstrate consistency with related planning documents such as the 2012 CLRP and the 2008 *Purple Line DEIS Air Quality Technical Report*. The Mobile6.2 CO emission factor was also used for CO hot spot analyses.

The EPA announced Motor Vehicle Emissions Simulator (MOVES) as the required software for conformity analyses on December 20, 2010. A two-year period was granted for project-level $PM_{2.5}$ and CO hot spot analyses to transition from Mobile6.2 to MOVES2010 (ending December 20, 2012 per 75 FR 79370). The EPA updated the MOVES2010 model with MOVES2010b and issued an extension for regional air quality conformity analyses (ending March 2, 2013 per 77 FR 11394). Although MOVES is a new generation model being phased in to replace Mobile 6.2 by the EPA, using Mobile 6.2 to predict CO, $PM_{2.5}$, VOC, and NO_X emission factors for this EIS is still valid given that the start date for the analysis of these pollutants is well before the 12/20/12 deadline[3]. The GHG emission factors were estimated using MOVES, however, because it accounts for revisions to GHG emissions and fuel economy standards, as well as incorporates new GHG emissions test data.

The process used to calculate emissions for the Purple Line analysis replicates the post-processing performed by MWCOG in the *Air Quality Conformity Determination of the 2011 Constrained Long-Range Plan for the Washington Metropolitan Region*. Mobile6.2 emission rates (grams per vehicle mile traveled) in speed intervals of one mph were combined with VMT from the travel demand model to get actual on-road running emissions for CO, $PM_{2.5}$, VOC, and NO_X. The combination was performed in the post-processing program Cube Voyager. A brief description of each of the eight post-processing programs can be found in Table 3.

The mesoscale analysis includes the effect of cold start emissions (higher emissions occur from a cold start because the emissions control technology has not yet reached optimal operating temperature), on-road vehicle emissions (including running and idling), and hot soak emissions (consisting of fuel vapors released when a hot engine is turned off).

Emissions associated with auto access to transit were not covered, as there are no additional parking facilities related to the development of the Purple Line. Most riders would walk to the stations or transfer from other transit services. Emissions associated with transit buses and school buses will not be covered

[3] Federal Transit Administration. March 1, 2012. *Transition to Quantitative Air Quality Hot-spot Analysis Methods Using MOVES and EMFAC Models for Transportation Conformity Purposes.*

since they remain the same for the Preferred Alternative and No Build Alternative. Further information on the mesoscale analysis can be found in Appendix C.

Table 3. List of Post-Processing Programs Ran through Cube Voyager

Seq#	One-Season Program Name	Three-Season Program Name	Program Description
1	AQTRIP.S	AQTRIP.S	Summarizes jurisdiction level vehicle trip distribution
2	ZONESPRD.S	ZONESPRD.S	Distributes daily vehicle trip ends among hourly periods
3	PEAK_SPREAD.S	PEAK_SPREAD_Seasonal.S	Distributes time period link volumes, among hourly periods and develop hourly speeds
4	RUNNING.S	RUNNING_Seasonal.S	Computes running emissions
5	STRT_SKR.S	STRT_SKR_Seasonal.S	Computes trip start and soaking emissions
6	PRE_LOCAL.S	PRE_LOCAL.S	Estimates forecasted local VMT by jurisdiction
7	LOCAL.S	LOCAL_Seasonal.S	Computes local emissions by jurisdiction
8	Report.S	Report.S	Summarizes jurisdiction level emissions for the MSA

Mesoscale emissions analyses are based on VMT and speed data from the MDAA II M80 travel demand model, along with emission factors for future years provided by MWCOG and following the MWCOG air quality conformity process; the mesoscale emissions analyses include the on-network running emissions, start emissions, soaking emissions, and local (off-network) running emissions. Including only these components considers the fact that diurnal evaporative losses, resting losses, auto access to transit, school and transit bus-related emissions will be the same for both the No Build Alternative and Preferred Alternative.

On-Network Running Emissions

The travel demand model provided average annual weekday traffic data (AAWT) for freeways, expressways, and arterial roadways. A seasonal conversion factor in the table labeled "Conversion Factors for Converting AAWT to Seasonal Travel" in Appendix C was applied to the AAWT loaded network to get seasonal daily loading for the analysis of different mesoscale pollutants. The seasonal daily loading was distributed to 24 hours using the factors listed in the table "Hourly Distribution of Daily Traffic by Link Orientation and Facility Type" in Appendix C. If the volume of traffic exceeded the capacity of the link for the assigned hour, the excess volume was accounted for by the peak spreading procedure. The peak spreading procedure involves adding the excess volume to the hours directly preceding or following according to guidance outlined by MWCOG in Appendix E - Table 7 of the *Air Quality Conformity Determination of the 2011 Constrained Long Range Plan for the Washington Metropolitan Region*; certain hours shift traffic forward and backward 50/50 and other hours will shift traffic to one time period only. As a basis, there is no volume spreading at hour 1 and hour 13, which handle all traffic volumes without exceeding capacity.

Freeway capacity was adjusted based on V/C ratio according to the table labeled "Freeway Through-Put capacities under Congested Conditions" in Appendix C. Travel speeds for each link during each one-hour period were calculated based on the table labeled "Speed Delay Function by Facility Type and Area Type" in Appendix C. Emission rates were assigned to the link by the link's facility type and travel speed. Hourly link emissions were calculated by multiplying the length of the link with the hourly traffic volume and the corresponding emission rate; this was then summarized to get total daily mesoscale on-network running emissions.

Start and Soaking Emissions

Trips that start and end within the two counties in the study area were summarized to the county level based on the traffic analysis zone (TAZ) traffic data and then distributed to a 24-hour period based on the table labeled "Distribution of AM, PM and Off-Peak Period Auto Trips starts among Hourly Periods" in Appendix C. Each start was further defined between cold starts and hot starts according to the table "Distribution of Cold/Hot Transient Vehicle Starts by Hour." Cold start, hot start, and soaking emission rates were applied to each start to get the total start and soaking emissions.

Local (Off-Network) Running Emissions

Total VMT for collector and local roads was forecasted based upon base year 2007 HPMS VMT and a growth factor which was derived from the MDAA II M80 travel demand model. The total VMT was subdivided into urban/local miles traveled by applying the base year urban/rural percentage. Urban local pollutants were computed using a single local emission factor with urban local VMT. Rural local emissions were computed by first allocating the total rural VMT among speed bins with the table labeled "Rural Local Road Speed bin Fraction" in Appendix C; then, the rural local emission rates at different speeds were applied to VMT on the basis of speed to get the total off-network running emissions.

2.6 Microscale Pollutant Emissions Methodology

Both CO and $PM_{2.5}$ can have major localized impacts on air quality, in addition to their mesoscale impacts, which contribute to the nonattainment or maintenance designation for the region. The microscale analysis methodology used for these two pollutants is discussed below.

2.6.1 Microscale CO

A microscale CO analysis is performed according to 40 CFR Part 93.123a(1) when any of the following criteria are satisfied:

- (i) For projects in or affecting locations, areas, or categories of sites which are identified in the applicable implementation plan as sites of violation or possible violation;
- (ii) For projects affecting intersections that are at Level-of-Service D, E, or F, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes related to the project;
- (iii) For any project affecting one or more of the top three intersections in the nonattainment or maintenance area with highest traffic volumes, as identified in the applicable implementation plan; and
- (iv) For any project affecting one or more of the top three intersections in the nonattainment or maintenance area with the worst level of service, as identified in the applicable implementation plan.

Criteria (ii) is met; therefore, the CO microscale analysis was performed as a means to quantify the emission changes relating to changes in Level of Service and delay between the No Build and Preferred Alternatives. Microscale CO modeling was performed using Mobile6.2 emission factors, Synchro7 traffic data, and the CAL3QHC Version 2.0 carbon monoxide dispersion model according to the methodology outlined in EPA's *Guidelines for Modeling Carbon Monoxide from Roadway Intersections (1992*). Carbon monoxide concentrations were estimated for all milestone years for the No Build Alternative and Preferred Alternative at strategically selected intersections along the Purple Line corridor.

Dispersion Model

The dispersion modeling program used in this analysis was CAL3QHC Version 2.0. Mobile source models are the basic analytical tools used to estimate CO concentrations expected under given traffic, roadway geometry, and meteorological conditions. The mathematical expressions involved in the various models attempt to describe complex physical phenomenon as closely as possible. CAL3QHC is a Gaussian model; Gaussian models assume that the dispersion of pollutants downwind of a pollution source follows a normal distribution from the center of the source. CAL3QHC simplifies different types of emission rates into two categories:

- **Idle Emissions** – emissions produced when vehicles are stopped and idling during the red phase of a signalized intersection
- **Running Emissions** – emissions produced when vehicles are in motion during the green phase of a signalized intersection

A complete description of this model is provided in EPA's *User's Guide to CAL3QHC (Version 2.0): A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections (1992)*.

Vehicular Emission Rates

Mobile6.2 emission factors for this analysis were provided by MWCOG. The rates were developed using all available federal and local approved control measures and 2011 VIN vehicle data. Information regarding development of the emission factors can be found in Appendix D of MWCOG's *Air Quality Conformity Determination of the 2011 Constrained Long Range Plan for the Washington Metropolitan Region*.

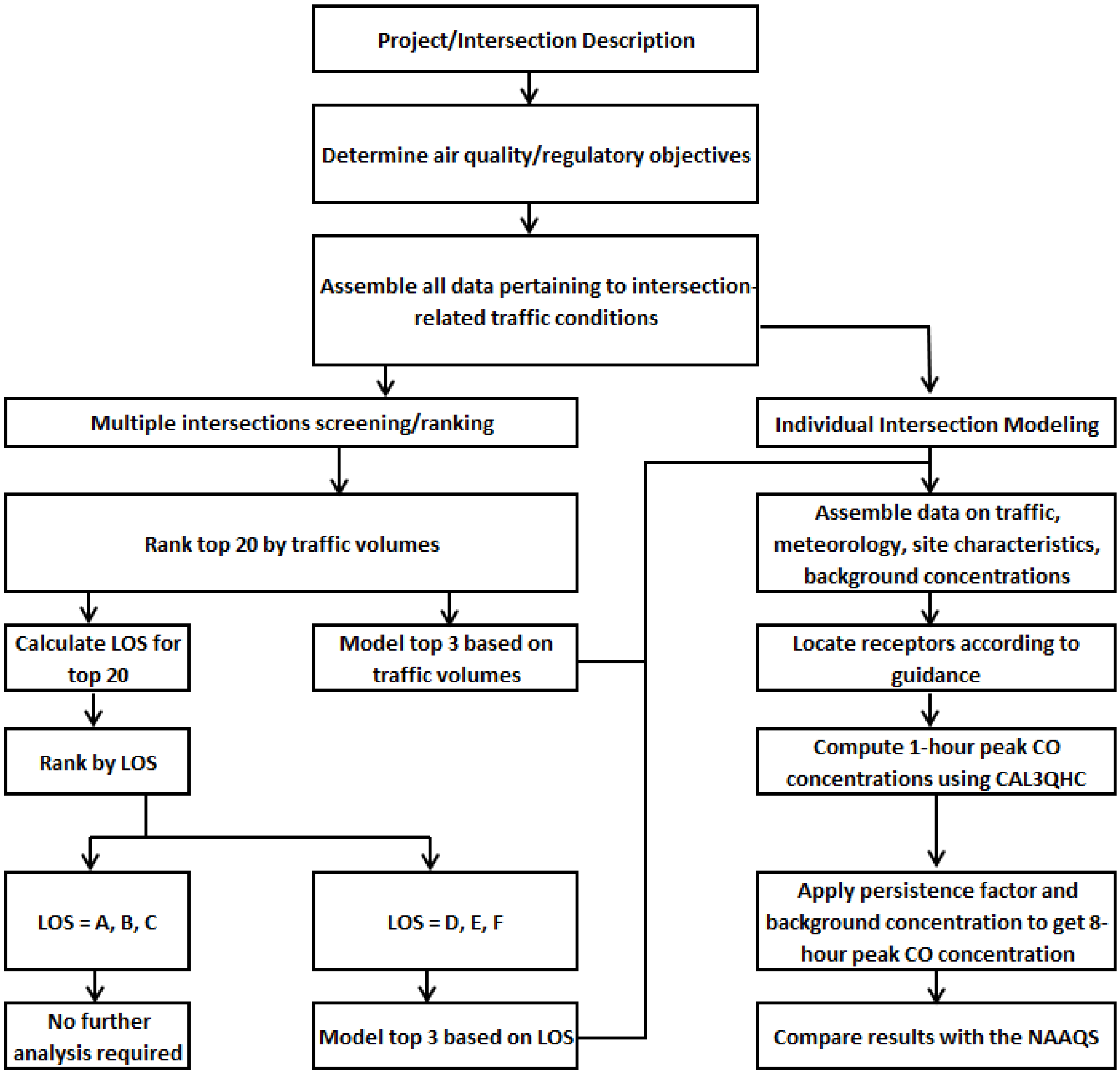
Site Selection

The flowchart in Figure 5 is an excerpt from EPA's *Guideline for Modeling Carbon Monoxide from Roadway Intersections* and presents the methodology for screening intersections for an in-depth microscale analysis.

Fifty-two intersections affected by the Purple Line were screened for microscale CO analysis. These were screened for each scenario: 2014 Existing, 2020 No Build, 2020 Preferred Alternative, 2040 No Build, and 2040 Preferred Alternative. The ranking spreadsheet can be found in Appendix D. The intersections were ranked by the maximum peak hour traffic volume entering the intersection from all approaches. The top 20 signalized intersections by volume were then ranked by Level of Service (LOS). LOS is a letter-based ranking system based upon total delay time at intersections, so the worst LOS is represented by the highest delay. A LOS "A" is assigned if the signalized intersection has less than 10 seconds of average delay, which represents optimal operating conditions; and a LOS "F" is assigned if the intersection has over 80 seconds of average delay, which represents saturated or failing conditions. The top three intersections with the highest entering traffic volume were selected. The top three intersections with the highest delay were selected from the intersections whose Level of Service was a "D" or worse and were in the top twenty by volume.

This screening method is recommended by EPA, as the intersections with the highest volumes and worst LOS represent a cross section of the "worst case" intersections. It is assumed that if these "worst case" intersections do not violate the NAAQS, then all other intersections in the study area with lower volumes and a better LOS should also not violate the NAAQS.

Figure 5. CO Intersection Screening Flowchart



Receptor Locations

Receptors are points within the CAL3QHC dispersion model that represent an assumed breathing height of a standing human (5') to experience concentrations of CO emitted from vehicles idling at an intersection. Following EPA's guidance, receptors were located at the intersection corner, 3 meters away from the edge of the road, 1.8 meters above ground, at 25 meters and at 50 meters away from the corner.

Meteorological Conditions

Wind direction and speed are important factors in CO dispersion. Maximum CO concentrations are found when the wind blows parallel to the roadway adjacent to a receptor location. Each receptor location was tested with all wind angles from 0 to 360 degrees in 5 degree increments to find the wind angle that produced the maximum concentration. Maximum CO concentrations are found at very low wind speeds. A wind speed of 1 meter per second (2.2 mph) was chosen to predict CO concentrations under worst-case conditions. A temperature inversion layer prohibits CO from dispersing upward into the atmosphere, so cold temperatures with a Class D (neutral) atmospheric stability class were chosen to represent the worst case meteorological scenario. Ambient conditions and traffic parameters utilized for the dispersion modeling are shown in Table 4.

Table 4. Input Parameters for Microscale CO Modeling

Parameter	Value
Temperature	Min 33F, Max 53F
Wind speed	1 meter per second
Wind direction	5-degree interval for 360-degree wind angles
Atmospheric stability class	Class D
Mixing heights	1000 meters
Surface roughness	321 centimeters
Signal type	Varies by intersection
Intersection arrival rate	Varies by intersection
Saturation flow rate	Varies by intersection
Clearance lost time	3 seconds

Persistence Factor

The CO 8-hr concentration is predicted by applying a persistence factor to the maximum predicted 1-hr concentration to account for meteorological variability and fluctuations in traffic volumes and speeds during various hours of the day. A persistence factor of 0.79 was developed by taking the proportion of maximum monitored 8-hr to 1-hr CO concentrations from 2009, 2010, and 2011 (see Appendix H). This factor is more conservative than the default persistence factor of 0.7 that was recommended by MWCOG and approved by EPA for the *Purple Line DEIS Air Quality Technical Report*.

Background Concentrations

A background concentration is developed from air quality monitoring data and added to the maximum modeled CO concentration to account for ambient CO concentrations according to the EPA guidance. In accordance with the form of the CO standard, which is “not to be exceeded more than once per year,” the average 2nd maximum CO concentrations were compiled for the years of complete data prior to this study: 2009, 2010, and 2011. To be conservative, the representative monitor was chosen as the one exhibiting the highest concentrations of CO. This monitor is located in Washington, DC at 2500 1st Street. The 2nd maximum 1-hour CO concentration was 3 ppm. The 2nd maximum 8-hour concentration was 2.4 ppm. These background concentrations were approved by the MDE. Background concentrations for future years were adjusted according to the ratio of the 2011 CO emission factors to future year 2020 and 2040 CO emission factors (found in Appendix C), and the ratio of 2011 traffic volumes to 2020 and 2040 future year traffic volumes (found in Appendix D). For further detail on monitoring information, refer to Section 3.2.

Traffic Information

Peak hour traffic volume, lane configurations, intersection geometry, saturation flow rates, signal type, arrival rate, and signal phasing information were referenced from the Synchro7 traffic simulation model for the AM and PM peak travel periods for years 2014 Existing, 2020 Interim Year, and 2040 Design Year.

Intersection geometry was referenced from Synchro and FEIS alignment drawings. Signal type was referenced from the fully-actuated, semi-actuated, and pre-timed settings in Synchro. The dispersion model is sensitive to time spent idling on an approach during the red phase of a cycle; when analyzing actuated signals, the actuated effective green and actuated cycle length were input to provide a more realistic model of green and red time in response to forecasted traffic demand. Arrival type was assumed to be “above average” for coordinated movements, and a default “average” random arrival type was applied for all other movements. Saturation flow rates were referenced from the Synchro model. A default Clearance Lost Time of 3 seconds was used for all approaches. Idle emission rates and running emission rates according to approach and departure vehicle speed were input in CAL3QHC.

Analysis Years

Microscale CO concentrations were predicted for the AM and PM peaks for Base Year 2014, Interim Year 2020, and Design Year 2040 for the No Build Alternative and Preferred Alternative.

2.6.2 Microscale $PM_{2.5}$

Particulate matter is a pollutant of concern for many projects. A $PM_{2.5}$ “hot-spot” or microscale analysis should be conducted according to qualitative guidance only if the project is a project of air quality concern, as defined in 40 CFR Part 93.123(b)(1):

- i. New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;
- ii. Projects affecting intersections that are at level of service (LOS) D, E or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles;
- iii. New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;
- iv. Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and
- v. Projects in or affecting locations, areas, or categories of sites which are identified in the $PM_{2.5}$ or PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

Examples of projects of air quality concern that would be covered by 40 CFR Part 93.123(b)(1)(i) and (ii) include the following:

- A project on a new highway or expressway that serves a significant volume of diesel truck traffic, such as facilities with greater than 125,000 annual average daily traffic (AADT) where 8 percent or more of such AADT is diesel truck traffic;
- New exit ramps and other highway facility improvements to connect a highway or expressway to a major freight, bus or intermodal terminal;
- Expansion of an existing highway or other facility that affects a congested intersection (operated at LOS D, E or F) that has a significant increase in the number of diesel trucks; and
- Similar highway projects that involve a significant increase in the number of diesel transit buses and/or diesel trucks.

Examples of projects of air quality concern that would be covered by 40 CFR Part 93.123(b)(1)(iii) and (iv) include the following:

- A major new bus or intermodal terminal that is considered to be a "regionally significant project" under 40 CFR Part 93.101; and
- An existing bus or intermodal terminal that has a large vehicle fleet where the number of diesel buses increases by 50 percent or more, as measured by bus arrivals.

Electrically-powered light rail vehicles are proposed for the Preferred Alternative; therefore, the Preferred Alternative is not predicted to affect $PM_{2.5}$ levels in the study area, nor increase the number of diesel vehicles or buses in the study area. No microscale analysis of particulate matter is required as light rail transit projects are not of air quality concern, according to 40 CFR Part 93.123(b) (1) and *Transportation Conformity Guidance for Qualitative Hot-spot Analyses in* $PM_{2.5}$ *and* PM_{10} *Nonattainment and Maintenance Areas* (EPA, 2006).

2.7 MSAT Methodology

2.7.1 Analysis of MSATs in NEPA Documents

The Federal Highway Administration (FHWA) has developed a tiered approach for analyzing MSATs, as indicated in the *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents*. Three levels of analysis have been indicated in this guidance:

- Tier I: No analysis for projects with no potential for meaningful MSAT effects;
- Tier II: Qualitative analysis for projects with low potential MSAT effects; or
- Tier III: Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

Tier I includes projects which have no meaningful effects on MSAT levels. Tier II covers a broad range of projects, including those that serve to improve operations of highway, transit, or freight without adding substantial new capacity or without creating a facility that is likely to meaningfully increase MSAT emissions. Tier III standards cover projects that increase diesel vehicles at intermodal freight facilities or add significant capacity to urban highways.

It was determined that the Purple Line falls into the Tier II category. Therefore, since the Purple Line project has a low potential for MSAT effects, a qualitative (not quantitative) analysis approach based on changes in VMT was followed. The qualitative analysis is based on changes in VMT between the Preferred Alternative and No Build Alternatives to determine their impact on MSATs emissions.

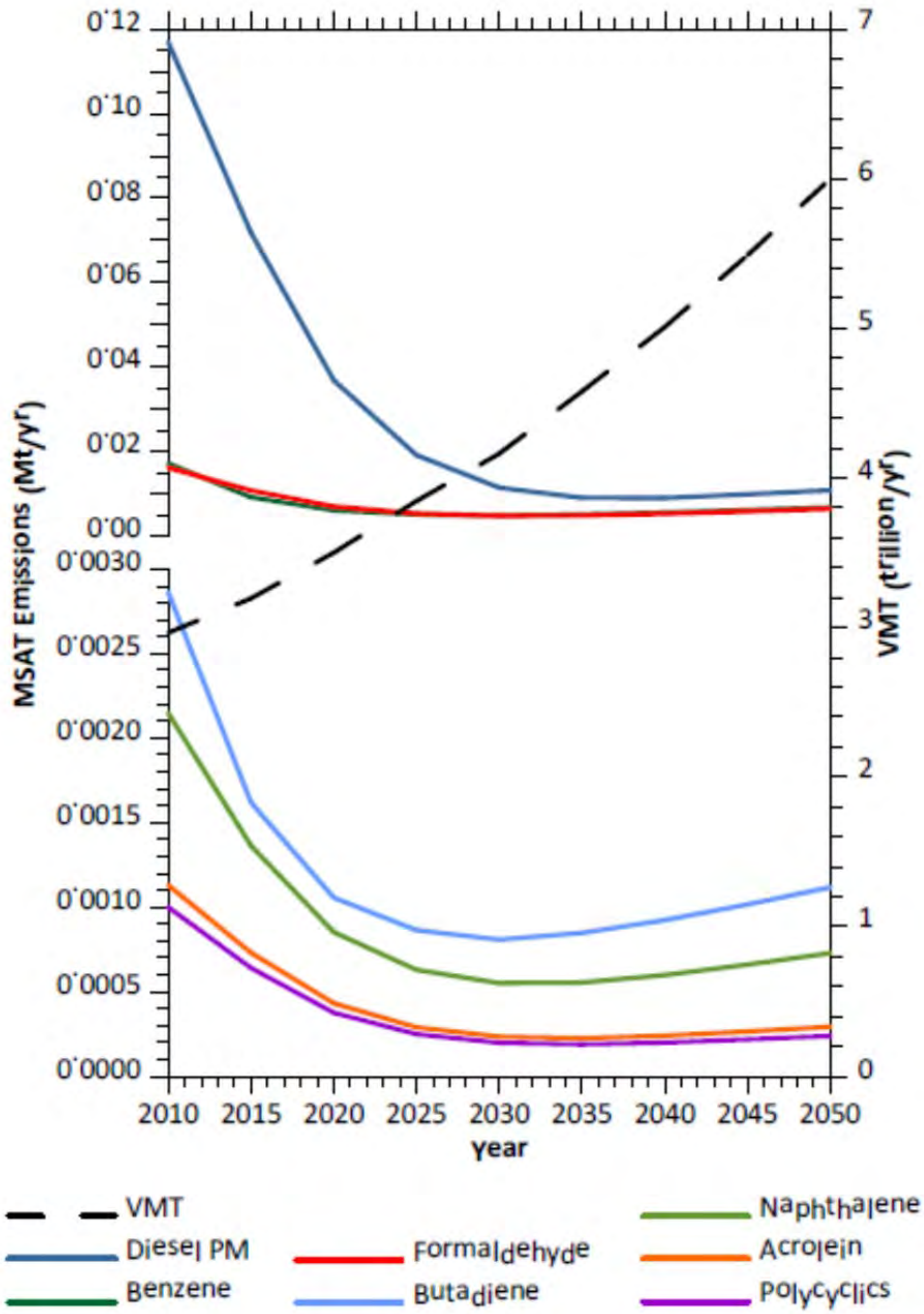
2.7.2 National Trends and Regional National Air Toxics Trends Stations

On February 26, 2007, EPA finalized a rule to reduce hazardous air pollutants from mobile sources. The purpose of this rule is to significantly decrease priority MSAT emissions through cleaner fuels. Effective December 15, 2008, the rule requires that refiners and importers produce gasoline with an annual average benzene content of 0.62 volume percent or less. The rule also sets a maximum benzene level of 1.3 volume percent of gasoline. This restriction began in 2011.

These regulations detail four operational and technological changes that decrease gasoline benzene content at the refinery level. In October 2008, EPA issued a revision to include benzene alkylation to the four allowable changes, and allows refineries to request approval of alternate methods. The EPA estimates that this rule would reduce total emissions of MSATS by 330,000 tons and VOC emissions (precursors to ozone and fine particulates) by over 1 million tons.

Figure 6 shows a projected reduction of 83 percent in annual emission rate for the priority MSATs from 2010 to 2050, while simultaneously showing an increase in VMT of over 102 percent.

Figure 6. Projected National MSAT Emission Trends (2010-2050) using MOVES2010b



Source: FHWA, 2012.

In 1999, based on the National Emissions Inventory, mobile sources accounted for 44% of total emissions of 188 hazardous air pollutants. Of the mobile source tons in this inventory, 65% were attributable to highway mobile sources, and the remainder to non-road sources. Over 90% of MSAT emissions are attributable to gasoline vehicles and equipment.

Overall, projected emissions of all air toxics decrease from 5,030,000 tons in 1999 to 4,010,000 tons in 2020, as a result of existing and planned emission controls on major, area, and mobile sources. If higher estimates of cold temperature hydrocarbon emissions and vehicles and evaporative emissions from non-road gasoline equipment are accounted for, air toxic emissions emitted from mobile sources are projected to be reduced 46% between 1999 and 2020 without EPA's control, from 2.38 million to 1.29 million tons. The EPA anticipates MSAT emissions will begin to increase slightly after 2020, from about 1.29 million tons in 2020 to 1.42 million tons in 2030.

Table 5 shows projected nationwide emissions of individual air toxics from highway vehicles from 1999 to 2030, which decreases from 1.49 million tons to 0.78 million tons in 2020 and then increases to 0.90 million tons in 2030.

Table 5. National Emission (tons) of Individual Air Toxic Pollutants from Highway Vehicles

Pollutant	1999	2010	2015	2020	2030
1,3-Butadiene	23,876	11,473	10,763	11,355	13,378
2,2,4-Trimethylpentane	182,120	101,880	94,469	96,315	111,783
Acetaldehyde	29,821	17,169	16,149	16,893	19,879
Acrolein	3,845	1,824	1,650	1,704	1,981
Benzene	183,661	110,526	105,956	110,317	129,290
Chromium III	8	10	11	12	15
Chromium IV	5	7	8	8	10
Ethyl Benzene	73,439	40,732	37,528	38,080	44,055
Formaldehyde	80,458	38,885	35,857	37,153	43,404
Hexane	66,267	39,801	33,481	30,727	33,468
MTBE	57,801	29,886	23,089	18,372	17,957
Manganese	5	6	6	7	9
Naphthalene	4,056	2,261	2,022	1,986	2,259
Nickel	10	13	14	16	19
POM	497	255	234	239	278
Propionaldehyde	4,288	2,327	2,154	2,222	2,574
Styrene	14,284	7,652	7,368	7,814	9,253
Toluene	489,873	268,871	250,646	257,367	299,677
Xylenes	277,285	152,046	141,710	145,473	169,369
Total	1,491,599	825,624	763,115	776,060	898,658

Source: Page 2-47, "Control of Hazardous Air Pollutants from Mobile Sources - Regulatory Impact Analysis, EPA, February 2007"

2.7.3 Unavailable Information for Project Specific MSAT Health Impacts Analysis

This report includes a qualitative analysis of MSATs based on the FHWA Tier II analysis. Project-specific health impacts of the project alternatives are not quantified since air toxics analysis is an emerging field and current scientific techniques, tools, and data are not sufficient to accurately estimate health impacts. The following section discusses this lack of information as required by the CEQ provisions (NEPA regulation 40 CFR 1502.22) and described in FHWA's Interim Guidance on MSATs.

Incomplete or Unavailable Information

The EPA is the lead authority responsible for public health and welfare and for assessing impacts of air pollutants, including health effects, exposure and risks posed by air pollutants. The Integrated Risk Information System, maintained by EPA contains assessments of individual compounds and their cancerous and non-cancerous affects and quantitative estimates of risk levels from lifetime oral and inhalation exposures. Other organizations such as the Health Effects Institute (HEI) are also active in the research and analyses of the human health effects of MSATs. Studies carried out by the HEI have linked high MSATs exposure to cancer in animals, in humans in occupational settings, and respiratory tract irritation, such as exacerbation of asthma.[4] However, human health effects at current MSAT concentration levels and future levels with decreased vehicle emissions are still an unknown. According to FHWA, predicting project-level health impacts with incomplete or unavailable information may lead to assumption and speculation about MSAT health impacts.

Exposure and Risk Assessment

Evaluating the health impacts due to MSATs exposure includes emissions modeling; dispersion modeling; exposure modeling; and final determination of health impacts. Each step builds from the previous step but technical shortcomings and uncertain science prevent a clear evaluation of health impacts of MSATs between project alternatives. Additionally, vehicle technology and travel patterns over lifetime (70-yr) assessments are an unknown and can have a significant change in emissions.

In particular, forecasting MSAT concentrations and exposures adjacent to roadways over a 70-year lifetime can be unreliable. Determining time of exposure at specific locations and establishing the extent of that impact from a specific action is particularly difficult, given unavailability of needed information.

In addition, there is unclear guidance on estimating toxicity of MSATs. The HEI has expressed a concern on lack of national consensus on air dose-response values for MSAT compounds, particularly diesel PM. Further, acceptable level of risk has also not gained national consensus and EPA's currently accepted two-step decision framework is not applicable to even the largest of highway projects because of the incomplete or unavailable information.

Because of the limitations in the methodologies for forecasting health impacts, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts, and results of these predictions are not useful to decision makers. The National Cooperative Highway Research Program (NCHRP) is conducting research on best practices in applying models and other technical methods in the analysis of MSATs. NCHRP Project 25-25 (Task 18), *Analyzing, Documenting, and Communicating the Impacts of Mobile Source Air Toxic Emissions in the NEPA Process* (March, 2007), documents comparisons of the various models being used to evaluate MSATs.

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[4] Two HEI studies are summarized in Appendix D of FHWA's Interim Guidance Update on Mobile source Air Toxic Analysis in NEPA Documents: (1) Estimating the Transportation Contribution to Particulate Matter Pollution (Air Toxics Supersite Study); (2) Investigation of Consistency Between Ambient Monitoring Data and MOBILE6.2 Emissions Predictions for Air Toxics Monitoring and Modeling Study)

2.8 Greenhouse Gas Emissions Methodology

In accordance with EPA guidance, the most up-to-date version of MOVES (MOVES2010b, released in April 2012) was used to generate GHG emission factors. MOVES is preferred over Mobile6.2 for GHG analysis as the MOVES model accounts for revisions to GHG emissions and fuel economy standards, as well as incorporates new emissions test data. More information can be found in *Using MOVES for Estimating State and Local Inventories of On-Road Greenhouse Gas Emissions and Energy Consumption*, released as a public draft by EPA in January 2012.

For the mesoscale analysis of greenhouse gases, the following data serves as inputs for the MOVES model. The following list is an excerpt from the FHWA document *Greenhouse Gas Emissions Analysis of Regional Transportation Plans with EPA's MOVES Model:*

- Age Distribution
- Fuel Supply
- Fuel Formulation
- Meteorology
- Inspection/Maintenance Programs
- Average Speed Distribution
- Ramp Fraction
- Road Type Distribution
- Vehicle Type VMT
- Month, Day, Hour VMT Fraction
- Source Type Population

MWCOG provided MOVES input tables with the above mentioned data for the years 2007, 2017, and 2025 which were used in the $PM_{2.5}$*Redesignation Request & Maintenance Plan*. Based on methodologies provided by MWCOG, the appropriate values were extracted from the data provided to develop the input tables for the 2014, 2020 No Build, 2020 Build, 2040 No Build, and 2040 Build scenarios. VHT speed bin data regarding weekday and weekend distributions and for each vehicle type and road type distribution were derived from the MDAA II M80 travel demand model following MWCOG's mobile source emissions post processor documentation. Further information on the greenhouse gas analysis can be found in Appendix F.

The sources for the GHG analyses include on-road mobile sources and include components such as carbon dioxide, methane, nitrous oxide, elemental carbon particulate matter, hydrocarbons, total energy, and total distance traveled. Total energy includes the amount of energy consumed to power the running, start, and extended idle processes for all vehicle types on all roadway types in the study area. The total distance traveled is referenced from the MDA II M80 travel demand model. The criteria on which the No Build Alternative is compared to the Preferred Alternative are the outputs of the greenhouse gas emissions analysis in tons of CO_2, CH_4, N_2O, elemental carbon $PM_{2.5}$, hydrocarbons, and BTU of total energy.

3. Ambient Air Quality in the Study Area

Air pollutant concentrations vary significantly based on weather conditions. An especially hot and dry summer may allow precursor molecules to linger in the air longer, forming more ground-level ozone than a typical year. Wind conditions also affect regional air pollutant dispersion. Rain can have a short-term cleansing effect on air quality.

3.1 Local Meteorology

Understanding the nature of the atmosphere surrounding Montgomery and Prince George's Counties is important in assessing air quality. The state of Maryland is located in the middle latitudes, where the general atmospheric flow is from west to east. It has a continental climate with mild winters, hot humid summers, and a generally moderate fall and spring.

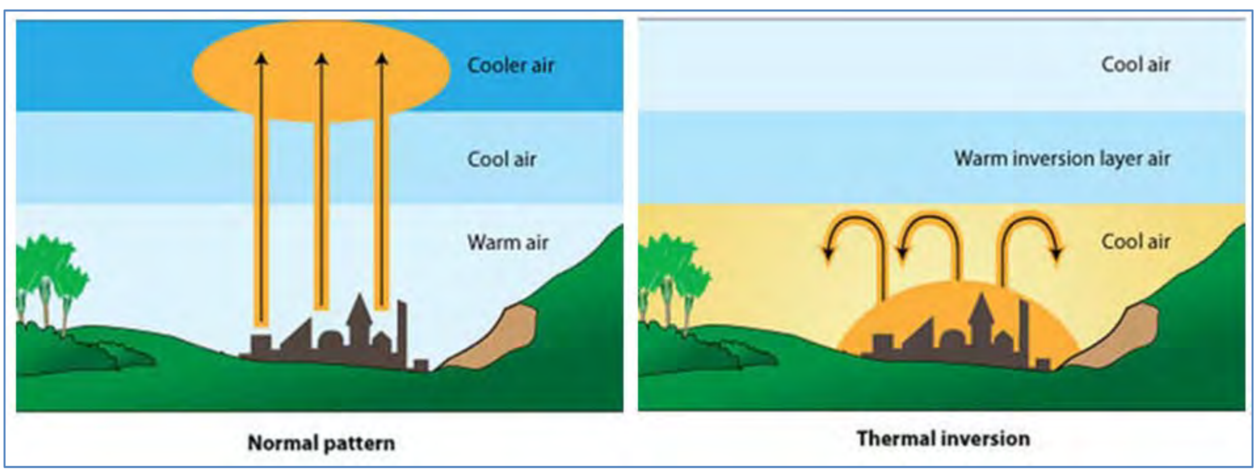
The study area's terrain is mostly low rolling hills. It is approximately 35 miles west of the Chesapeake Bay, and 120 miles west of the Atlantic Ocean. Its proximity to the ocean makes it susceptible to tropical storms and severe summer thunderstorms with brief periods of heavy precipitation.

Precipitation helps alleviate air quality issues in a few ways. Air pollution particles serve as the nucleus on which condensation forms, so precipitation events bring these particles out of the air. Precipitation can prevent fugitive dust formation by moistening the ground. This may be an immediate relief for air quality concerns; however, the air pollutants NO_X and SO_X can combine with water molecules to form acid rain.

Wind speed, direction, and variability have a large influence on the dispersion of atmospheric pollutants. The windiest seasons are late winter and early spring. Winds are generally calm overnight and peak during afternoon hours.

Temperature inversion layers occur when cool air is trapped beneath a pocket of warmer air. Temperature inversion typically occurs in the winter season on a large scale but can also occur on a smaller scale on a day-to-day basis. This inversion layer acts as a barrier and keeps pollutants low to the ground, inhibiting their dispersion. Figure 7 illustrates this natural occurrence.

Figure 7. Temperature Inversion Layer



Source: The University of Waikato, 2008. http://www.sciencelearn.org.nz/Contexts/Enviro-imprints/Sci-Media/Images/Temperature-inversion

In Maryland, ground-level ozone exhibits a diurnal pattern, with the lowest concentrations exhibited before sunrise and highest concentrations occurring between noon and early evening. Night-time temperature inversion layers keep ozone aloft (not mixing at the ground level). The pollutants aloft originate primarily outside of Maryland and include ozone and its precursor molecules in high concentrations.

3.2 Monitored Air Quality

The Air and Radiation Management Administration within the MDE is responsible for implementing and enforcing air quality regulations in Maryland. One of their functions is to operate a statewide network of air quality monitors that continuously measure air quality. This data is made available through EPA's AirData website (http://www.epa.gov/airdata/). There are six monitors closest to the project area. These monitors range in distance from the project area from approximately 4 to 12 miles:

- Montgomery County - Rockville
- Prince George's County - Beltsville
- Prince George's County - Upper Marlboro
- District of Columbia - L & 20th
- District of Columbia – 420 34th St N.E.
- District of Columbia - 2500 1st St N.W.

The locations of these six monitors are shown in Figure 8. The maximum reported air quality data is presented for the years 2009 through 2011 in Table 6. Refer to Appendix G for monitor data.

The project corridor encompasses both Prince George's County and Montgomery County. Both counties are in the Metropolitan Washington DC-MD-VA region. The region is currently classified as "nonattainment" for the $PM_{2.5}$ and 8-hour ozone standards; as "maintenance" (formerly nonattainment) areas for the CO standard; and as an attainment area for all other criteria pollutants.

Figure 9 shows this graphically for the Washington metropolitan planning area.

As noted above, a SIP is developed for each criteria pollutant for which the region is in nonattainment or maintenance status. The most recent SIPs in place for the region are the 8-hour ozone SIP (May 2007), the fine particulate matter ($PM_{2.5}$) SIP (March 2008), and the carbon monoxide maintenance plan (September 1995).

Figure 8. Air Quality Monitor Locations

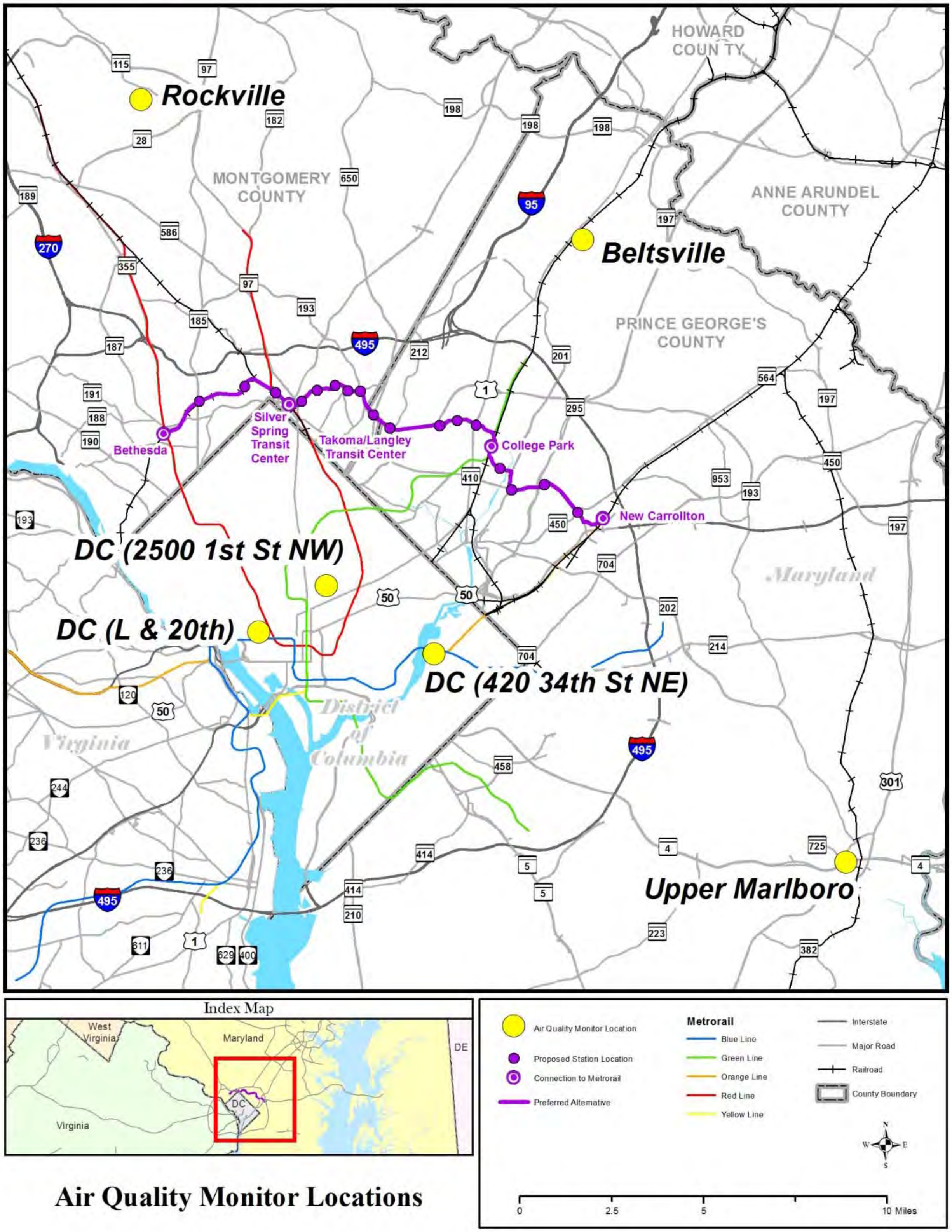
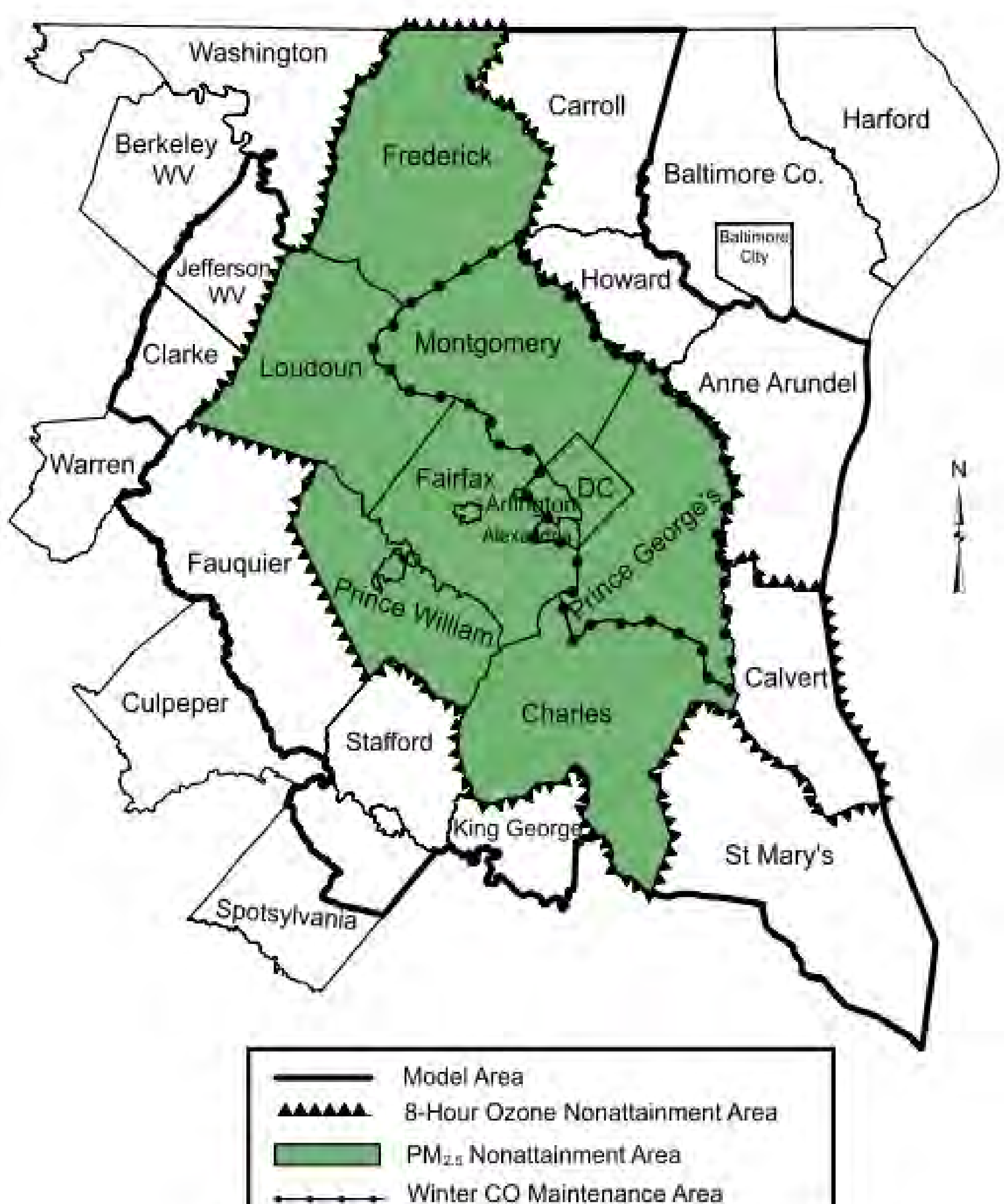


Table 6. Ambient Air Quality Monitored Data 2009-2011

Pollutant and Averaging Period			Rockville 5110 Meadowside			Upper Marlboro 14900 Pennsylvania			Beltsville 12003 Old Baltimore			Washington, D.C. L Street and 20th			Washington, D.C. 420 34th Street N.E.			Washington, D.C. 2500 1st Street N.W.		
			2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Carbon Monoxide (CO) ppm	1-Hr	Maximum							1.1	1.5	1.7	2.5	2.8	5	4.2	3.7	2.7			3.1
		Second Maximum							1.1	1.3	1.3	2.5	2.7	4.2	4.2	3.7	2.7			3
	8-Hr	Maximum							0.9	1	1.1	2	2.4	2.2	4	3.5	2.5			2.5
		Second Maximum							0.9	1	0.8	1.9	2	1.9	3.8	3.1	2.3			2.4
Particulate Matter ug/m3	PM10	Maximum 24-Hour								30	33				69	91		60	99	45
		Second Maximum 24-Hour								27	25				47	85		41	51	40
	PM2.5	24-Hour 98th Percentile	22	19		19	21	21	18	20	24				26	28	25	24	26	25
		Maximum 24-Hour	29.2	18.6		27.7	21.4	28.8	21.7	34.4	24.3				37.7	62.2	34	36.6	34.1	30.6
		Mean Annual	9.4	9.1		8.9	10.1	8.9	8.7	9.8	8.7				10.5	11.4	10.4	10.2	10.5	10.3
Ozone (O3) ppm	8-Hr	First Highest	0.074	0.081	0.088	0.071	0.09	0.095	0.076	0.094	0.094				0.08	0.096	0.085	0.085	0.1	0.092
		Second Highest	0.072	0.08	0.085	0.068	0.09	0.092	0.073	0.091	0.091				0.078	0.09	0.084	0.076	0.088	0.087
		Third Highest	0.071	0.079	0.082	0.068	0.088	0.09	0.071	0.087	0.088				0.067	0.089	0.082	0.074	0.086	0.086
		Fourth Highest	0.07	0.077	0.081	0.067	0.085	0.086	0.07	0.085	0.083				0.064	0.086	0.08	0.071	0.082	0.085
Nitrogen Dioxide (NO2) ppb		One-Hour Max													83	86	62	80	92	72
		One-Hour Second Max													76	82	61	72	83	59
		One-Hour 98th Percentile													63	59	55	62	57	52
Sulfur Dioxide (SO2) ppm		One-Hour Max							42	16	14				58	50	34			6
		One-Hour 99th Percentile							24	10	12				39	21	20			5
		24-Hour Max							15	8	5				33	14	10			4
		24-Hour Second Max							8	7	4				17	11	8			3

Source: EPA, AirData Monitor Values Report, 2012. http://www.epa.gov/airdata/ad_rep_mon.html

Figure 9. Attainment Statuses of Criteria Pollutants in Washington, DC Planning Area



Source: MWCOG, 2011.

4. Environmental Consequences

4.1 Long-term Operational Effects

This section summarizes the Preferred Alternative's long-term and short-term impacts. Long-term impacts include changes in mesoscale pollutant emissions (including $PM_{2.5}$, CO, ozone precursors VOC and NOx) for which the area is in nonattainment or maintenance. Microscale CO emissions are also presented for the representative intersections in the corridor. A qualitative discussion of the anticipated changes in mesoscale MSAT emissions is presented. Finally, GHG emissions are quantified and discussed. Short-term impacts associated with construction of the light rail also are discussed.

4.1.1 Mesoscale $PM_{2.5}$, CO, Ozone (VOC and NOx) Emissions

Results for the criteria pollutants are presented for different time intervals depending on how meteorology affects their secondary formation and dispersion. As ozone formation peaks during the summer months in the presence of long periods of sunlight, precursor NO_X and VOC emission results are presented as a seasonal daily rate. As carbon monoxide may be trapped in an inversion layer in the winter, it is presented as a winter daily date. Fine particulate matter, $PM_{2.5}$, along with its precursor NO_X, is presented as an annual rate. To summarize, the following emissions were calculated for the noted time periods.

- Annual $PM_{2.5}$ and $PM_{2.5}$-precursor NO_X emissions
- Winter daily CO emissions
- Peak season daily ozone-precursor VOC and NO_X emissions

Mesoscale emissions analyses are based on VMT and speed data from the MDAA II M80 travel demand model along with emission factors for future years provided by MWCOG as was discussed in Section 2.5. Pollutant levels for the Interim Year 2020 and Design Year 2040 Preferred Alternative are presented in Table 7, as are comparison levels for Base Year 2014 and No Build for years 2020 and 2040. The year of peak emission burden is anticipated to be the nearest year, Base Year 2014, after which emission control technology is expected to reduce mesoscale emissions, despite the expected increase in overall VMT in the future. The mesoscale emissions analysis and emission rates can be found in Appendix C.

As discussed previously, for NEPA disclosure and alternative comparison purposes, the mesoscale emissions burdens predicted indicate that the Preferred Alternative would yield slightly higher $PM_{2.5}$ pollutant levels (0.2 percent), slightly lower ozone precursor NO_x (0.1 percent) levels, and virtually no change in other mesoscale pollutant levels compared to the No Build Alternative in Interim Year 2020. The Preferred Alternative is predicted to decrease all emissions burdens (between 0.1 to 0.3 percent) compared to the No Build Alternative in Design Year 2040 within the mesoscale study area in Prince George's and Montgomery Counties.

Table 7. Mesoscale Pollutant Emissions

Pollutant	Season	Baseline	2014	2020 Alternatives			2040		
			Base	No Build	Preferred	% Change Between Alternatives	No Build	Preferred	% Change Between Alternatives
$PM_{2.5}$ (Tons)	Annual	605	321.6	270.9	271.4	0.2%	270.7	270.4	-0.1%
$PM_{2.5}$ Precursor NO_x (Tons)	Annual	33,762	12,089	6,154	6,155	0%	4,002	3,995	-0.2%
Ozone precursor VOC (Tons)	Ozone season daily	43.8	16.54	12.67	12.67	0%	12.19	12.18	-0.1%
Ozone precursor NO_x (Tons)	Ozone season daily	102.32	32.72	16.87	16.86	-0.1%	10.94	10.91	-0.3%
CO (Tons)	Winter season daily	1702.90	230.23	209.7	209.7	0%	212.0	211.6	-0.2%

Note: CO = carbon monoxide; VOC = volatile organic compounds; NO_x = nitrogen oxides; $PM_{2.5}$ = fine particulate matter.
The baseline year for the 1997 $PM_{2.5}$ standard and 1997 8-hr ozone standard is 2002. The baseline year for the 1990 CO standard is 1990.

Source: MDAA II M80 Travel Demand Model; emission factors referenced from MWCOG

4.1.2 Microscale CO Emissions

Fifty-two intersections affected by the Purple Line were screened for microscale CO analysis following the EPA's 1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections. The intersection screening data is presented in Table 8 and Appendix D.

Each scenario produced a minimum of 3 and a maximum of 6 intersections for analysis. All scenarios had the same top three intersections by volume. There were minor differences in LOS ranking across the scenarios. To be conservative, if an intersection was ranked in the top 3 for any scenario, it was analyzed for all scenarios. No details regarding geometric design at the proposed intersection of Rossborough Lane at Paint Branch Parkway were available from the developer for modeling purposes, so this intersection was excluded from the analysis. Kenilworth Avenue at East West Highway was included in the analysis, even though the Purple Line is proposed to operate on an aerial structure at this intersection. This intersection was included to assess the potential air quality CO impacts from project related changes in the intersection geometry. The proposed geometric changes to this intersection are related to the placement of support columns for the Purple Line aerial structure.

Seven intersections from the screening evaluation were selected for CO microscale analysis (see Figure 10). Table 9 lists the intersections selected for microscale analysis and identifies the predicted maximum CO concentrations at each intersection for Base Year 2014, Interim Year 2020, and Design Year 2040. The CO microscale analysis revealed maximum 1-hour CO concentrations below the NAAQS of 35 ppm, and maximum 8-hour CO concentrations below the NAAQS of 9 ppm for all scenarios. No violations of the NAAQS are predicted for either the Preferred Alternative or the No Build Alternative. A CAL3QHC input and output file and summary calculations can be found in Appendix E. Additional CAL3QHC input and output files are available upon request.

Table 8. Synchro Ranking Data

INTERSECTION			2014 EXISTING AM			2014 EXISTING PM			2020 NO BUILD AM			2020 NO BUILD PM			2020 BUILD AM			2020 BUILD PM			2040 NO BUILD AM			2040 NO BUILD PM			2040 BUILD AM			2040 BUILD PM		
#	Major Approach	Minor Approach	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)
1	Bonifant St	Dixon Ave	546	A	9.3	655	A	9.6	584	A	9.4	701	A	9.8	584	A	9.4	701	A	9.8	706	A	9.9	847	B	10.5	706	A	9.9	847	B	10.5
2	Bonifant St	Georgia Ave	3312	A	7.4	3099	A	6.2	3546	A	8.0	3318	A	6.6	3546	A	5.5	3318	A	8.8	4287	A	6.3	4011	A	8.4	4287	A	6.3	4011	A	9.0
3	Wayne Ave	Fenton St	1900	C	23.5	2415	C	27.8	2011	C	23.9	2556	C	28.9	2011	C	28.6	2556	E	70.6	2454	C	27.1	3119	D	40.3	2454	C	34.4	3119	F	135.3
4	Wayne Ave	Cedar St	1344	B	20.0	1587	B	13.9	1422	B	19.9	1680	B	14.0	1422	B	14.0	1680	B	17.9	1736	C	20.0	2050	B	14.9	1736	B	15.1	2050	B	19.7
5	Wayne Ave	Dale Dr	1886	B	17.6	2145	C	21.3	1996	B	17.8	2270	C	26.3	1996	D	35.6	2270	C	31.9	2435	C	22.4	2770	F	119.7	2435	E	62.3	2770	E	75.1
6	Wayne Ave	Mansfield Rd	1436	A	2.7	1382	A	2.0	1519	A	3.1	1463	A	2.0	1519	A	3.1	1463	A	2.0	1854	A	4.0	1785	A	2.4	1854	A	3.7	1785	A	2.2
7	Wayne Ave	Sligo Creek Pkwy	1880	D	36.1	2250	C	32.8	1989	E	67.9	2381	E	78.6	1989	C	31.2	2381	F	96.0	2427	F	165.5	2905	F	220.6	2427	D	37.2	2905	F	141.0
8*	Wayne Ave	Manchester Rd	985	E	5.6 (37.8)	1050	E	4.2 (36.6)	1042	E	6.9 (47.9)	1111	E	5.4 (48.3)	1042	C	24.1	1111	B	19.8	1271	F	25.6 (202.2)	1355	F	25.0 (268.6)	1271	C	30.1	1355	F	86.8
9	Wayne Ave	Plymouth Tunnel	N/A	-	N/A	N/A	-	N/A	N/A	-	N/A	N/A	-	N/A	858	A	1.8	930	A	2.1	N/A	-	N/A	N/A	-	N/A	1047	A	2.0	1134	A	2.3
10	Arliss St	Garland Ave (No Info)	N/A	-	N/A	N/A	-	N/A	N/A	-	N/A	N/A	-	N/A	N/A	-	N/A	N/A	-	N/A	N/A	-	N/A	N/A	-	N/A	N/A	-	N/A	N/A	-	N/A
11	Piney Branch Rd (MD 320)	Arliss St	1755	B	12.6	2008	C	21.8	1807	B	13.2	2067	C	22.3	1860	B	14.3	2203	C	24.3	1996	B	13.7	2284	C	23.5	2052	B	15.9	2431	C	26.8
12	Piney Branch Rd (MD 320)	Garland Ave	1883	B	0.8 (11.6)	2032	B	1.0 (12.5)	1938	B	0.8 (11.7)	2092	B	1.0 (12.6)	1990	A	8.9	2163	A	5.8	2141	B	0.8 (12.1)	2311	B	1.0 (13.1)	2196	B	10.0	2387	A	5.9
13	Piney Branch Rd (MD 320)	Barron St	1938	B	11.8	2110	A	8.4	1995	B	11.9	2110	A	8.6	1983	B	11.7	2146	A	7.9	2204	B	12.9	2400	A	9.5	2188	B	12.5	2368	A	8.3
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)	4973	D	39.1	4833	D	46.5	5119	D	40.6	4975	D	47.4	4961	E	72.1	4913	E	67.7	5655	D	49.8	5496	D	52.4	5516	F	93.6	5452	F	86.6
15*	University Blvd (MD 193)	Seek Ln	3111	A	0.4 (9.6)	3118	B	0.5 (11.0)	3203	A	0.4 (9.7)	3210	B	0.5 (10.9)	2549	A	3.0	2991	A	4.6	3538	A	0.4 (9.9)	3546	B	0.5 (11.1)	2850	A	4.2	3326	A	4.7
16	University Blvd (MD 193)	Carroll Ave (MD 195)	3703	D	42.5	3736	C	26.2	3812	D	44.7	3846	C	27.0	3481	C	35.0	3596	C	27.8	4211	E	62.5	4249	C	28.9	3880	D	37.3	3995	C	34.1
17*	University Blvd (MD 193)	Merrimac Dr	2941	D	1.5 (28.1)	3051	F	2.9 (136.0)	3027	D	1.7 (32.7)	3141	F	3.5 (180.4)	2694	A	4.0	2917	A	7.7	3344	F	2.7 (61.7)	3470	F	203.7 (614.8)	3010	A	4.8	3246	A	7.6
18*	University Blvd (MD 193)	Lebanon St	2870	B	0.2 (12.3)	2944	C	0.3 (16.2)	2955	B	0.2 (11.6)	3030	C	0.3 (16.7)	2632	A	1.3	2803	A	2.5	3264	B	0.2 (12.4)	3348	C	0.3 (18.6)	2941	A	1.8	3120	A	2.6
19	University Blvd (MD 193)	Takoma-Langley Crossroads (WEST SC)	2963	A	4.1	3220	B	10.5	3050	A	4.2	3315	B	11.3	2707	A	6.3	2934	B	12.1	3370	A	4.8	3662	B	16.3	3024	A	8.2	3263	B	14.4
20	University Blvd (MD 193)	Takoma-Langley Transit Center	2840	B	12.3	2885	A	4.1	2923	B	12.4	2969	A	4.2	2575	A	1.4	2653	A	4.5	3229	B	12.9	3280	A	4.6	2879	A	1.4	2954	A	4.4

*Unsignalized intersection under existing and No Build conditions. LOS is based on delay of worst approach. Delay is provided for the overall intersection, with delay for the worst approach in parentheses.

Table 8. Synchro Ranking Data (continued)

INTERSECTION			2014 EXISTING AM			2014 EXISTING PM			2020 NO BUILD AM			2020 NO BUILD PM			2020 BUILD AM			2020 BUILD PM			2040 NO BUILD AM			2040 NO BUILD PM			2040 BUILD AM			2040 BUILD PM		
#	Major Approach	Minor Approach	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)	5344	D	35.8	5545	E	57.9	5501	D	36.5	5708	E	61.7	5174	D	39.8	5412	D	53.5	6077	D	43.7	6306	F	80.7	5751	D	54.8	6004	E	68.5
22	University Blvd (MD 193)	Langley Park Plaza Driveway (EAST SC)	2760	B	13.0	3673	B	19.7	2841	B	13.4	3781	B	19.6	2571	A	8.8	3583	B	14.0	3139	B	14.7	4177	C	20.4	2875	A	9.9	3983	B	16.5
23*	University Blvd (MD 193)	14th Ave	2804	C	0.6 (16.6)	3575	C	0.8 (17.5)	2886	C	0.6 (17.1)	3663	C	0.8 (17.9)	3041	B	13.0	3915	B	19.9	3189	C	0.7 (18.6)	4066	C	0.8 (18.1)	3354	B	14.4	4319	C	22.8
24	University Blvd (MD 193)	15th Ave	3075	B	12.7	4090	D	35.6	3166	B	13.1	4211	D	37.4	2904	B	10.6	4112	D	43.7	3497	B	14.3	4652	D	44.7	3242	B	11.2	4565	E	77.9
25	University Blvd (MD 193)	Riggs Road (MD 212)	4383	D	53.0	5490	E	67.0	4512	E	55.6	5651	E	70.2	4421	E	62.2	5733	E	67.4	4985	E	64.9	6243	F	89.9	4919	E	71.9	6358	F	84.1
26*	University Blvd (MD 193)	Guilford Rd	2578	C	0.5 (17.3)	3212	F	4.4 (92.8)	2653	C	0.5 (16.2)	3306	F	4.4 (93.3)	2355	B	11.1	3109	B	11.5	2931	B	0.4 (13.8)	3653	F	5.3 (112.0)	2630	A	8.5	3450	B	12.1
27	University Blvd (MD 193)	23rd Ave	2717	A	6.6	3415	B	15.3	2797	A	6.6	3515	B	15.7	2572	A	7.2	3410	C	20.8	3090	A	6.8	3884	B	17.0	2869	A	8.4	3783	C	23.4
28*	University Blvd (MD 193)	24th Ave N	2547	A	0.0 (9.1)	3040	A	0.1 (9.2)	2622	A	0.0 (9.2)	3126	A	0.1 (9.0)	2391	A	2.4	3082	A	6.0	2897	A	0.0 (9.7)	3457	A	0.1 (9.5)	2670	A	3.2	3421	A	6.0
29	University Blvd (MD 193)	W Park Dr	2666	B	10.6	3167	A	8.8	2745	B	11.1	3260	A	9.2	2486	B	11.3	3056	B	14.7	3032	B	12.8	3602	B	10.6	2775	B	13.4	3393	B	16.5
30	University Blvd (MD 193)	Campus Drive	2656	B	15.9	2510	C	34.0	2641	B	17.1	2539	C	32.4	2589	B	19.0	2489	D	38.1	3222	C	20.1	3098	D	37.3	3161	C	23.9	3038	E	63.1
31	Campus Dr	Adelphi Rd	3186	E	56.7	3973	E	60.6	3001	D	53.9	3833	E	62.9	2984	D	52.3	3812	E	73.2	3664	E	68.2	4676	F	82.6	3642	E	70.2	4650	F	96.7
32	Campus Dr	Presidential Dr	1309	A	4.7	1392	A	5.2	1394	A	4.8	1483	A	5.3	1260	B	15.0	1335	B	18.3	1700	A	4.9	1808	A	5.4	1393	B	15.4	1477	C	20.1
33	Presidential Drive	Valley Drive	N/A	-	N/A	N/A	-	N/A	N/A	-	N/A	N/A	-	N/A	881	B	11.9	646	B	10.6	N/A	-	N/A	N/A	-	N/A	975	B	12.6	714	B	11.0
34	Campus Dr	Regents Dr	1104	D	N/A	1465	F	N/A	1176	D	N/A	1561	F	N/A	1182	D	46.9	1444	D	46.8	1434	F	N/A	1903	F	N/A	1308	E	57.4	1597	E	65.4
35	Rossborough Ln	Baltimore Ave (US 1)	2148	A	5.6	2561	A	8.0	2551	B	10.7	3180	B	14.9	2355	B	17.7	2942	C	33.5	3083	B	12.3	3845	B	17.9	2771	B	19.1	3253	D	37.2
36	Rossborough Ln	Paint Branch Pkwy	N/A	-	N/A	N/A	-	N/A	2396	C	20.1	2877	C	30.3	2365	B	11.6	2815	B	16.1	4320	F	233.2	5186	F	266.5	4264	B	11.3	5075	E	62.5
37	Paint Branch Pkwy	MFRI Building Entrance	1974	B	11.0	2325	B	11.6	2359	B	11.2	2778	B	11.9	2359	B	11.2	2778	B	11.9	4253	F	88.9	5009	F	85.7	4253	C	24.7	5009	B	10.7
38	Paint Branch Pkwy	Metro Parking	2369	A	9.3	2649	B	14.1	2831	A	9.8	3166	B	17.3	2852	C	29.7	3191	C	24.9	5104	E	74.3	5708	F	140.0	5149	F	109.1	5753	F	176.9
39*	River Rd	Rivertech Ct	985	E	9.4 (43.0)	1230	F	41.6 (206.6)	1042	F	11.6 (59.3)	1301	F	62.1 (317.7)	1147	C	23.8	1433	C	24.6	1271	F	44.8 (309.8)	1588	F	>1000 (>1000)	1702	D	44.9	2125	D	35.9
40*	River Rd	Haig Dr	990	C	0.3 (23.4)	1003	F	0.2 (18.3)	1047	D	0.3 (25.4)	1062	C	0.2 (19.4)	1153	A	1.7	1169	A	2.0	1278	E	0.4 (36.5)	1295	D	0.2 (25.2)	1711	A	2.0	1734	A	1.9

*Unsignalized intersection under existing and No Build conditions. LOS is based on delay of worst approach. Delay is provided for the overall intersection, with delay for the worst approach in parentheses.

Table 8. Synchro Ranking Data (continued)

INTERSECTION			2014 EXISTING AM			2014 EXISTING PM			2020 NO BUILD AM			2020 NO BUILD PM			2020 BUILD AM			2020 BUILD PM			2040 NO BUILD AM			2040 NO BUILD PM			2040 BUILD AM			2040 BUILD PM		
#	Major Approach	Minor Approach	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)	PHV	LOS	Delay (sec.)
41	River Rd	Kenilworth Ave	3346	B	15.8	3310	C	23.0	3541	B	17.3	3503	C	23.9	3541	B	16.2	3503	C	23.1	4321	C	23.8	4275	C	27.7	4321	C	24.5	4275	C	27.0
42	Kenilworth Ave (MD 201)	Rittenhouse St (Shopping)	2906	A	5.5	2974	A	8.0	3075	A	5.5	3147	A	8.6	3075	A	6.8	3147	A	7.6	3752	A	6.4	3840	A	9.7	3752	A	6.2	3840	A	9.7
43	Kenilworth Ave (MD 201)	E-W Highway (MD 410)	6216	F	102.6	7153	F	139.8	6578	F	121.8	7570	F	167	6578	F	120.1	7570	F	166.3	8027	F	187.1	9237	F	273.4	8027	F	187.2	9237	F	273.5
44	Riverdale Rd	62nd Place	3120	B	14.9	3394	B	16.9	3215	B	11.7	3499	B	17.7	3150	A	6.8	3512	C	20.0	3553	B	13.8	3864	C	20.7	3461	A	7.4	3859	C	20.8
45	Riverdale Rd	64th Ave / Eastpine Dr	3168	A	6.5	3389	A	3.7	3264	A	6.4	3493	A	5.0	3261	B	10.4	3571	A	9.1	3607	A	7.6	3861	A	4.9	3583	B	11.1	3924	A	9.8
46	Riverdale Rd	BW Pkwy SB Ramps	3442	B	12.8	3828	B	12.9	3545	B	13.2	3944	B	16.5	3477	C	20.5	3953	C	22.8	3919	B	16.6	4357	B	19.2	3821	C	24.6	4344	C	26.9
47	Riverdale Rd	BW Pkwy NB Ramps	3302	B	15.0	3663	B	15.9	3401	B	13.6	3774	B	16.2	3364	B	15.7	3783	B	19.2	3758	B	15.9	4170	B	19.4	3697	B	17.8	4157	C	22.0
48	Riverdale Rd	67th Ave	2814	B	14.8	3096	A	7.9	2901	B	14.7	3191	A	8.2	3078	C	22.6	3461	C	22.9	3205	B	16.0	3530	A	9.4	3382	C	23.3	3803	C	26.3
49*	Veterans Pkwy (MD 410)	Glenridge Yard	1677	E	1.8 (43.0)	1854	F	7.5 (122.1)	1743	E	2.0 (49.7)	1928	F	10.0 (163.5)	2031	A	2.2	1986	A	3.5	1926	F	3.2 (80.9)	2130	F	20.7 (340.2)	2260	A	3.1	2184	A	3.6
50	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)	4399	E	63.1	4657	E	56.6	4573	E	66.5	4842	E	60.4	4983	D	53.7	5165	E	70.7	5052	E	77.4	5349	E	72.0	5502	E	61.8	5696	F	91.6
51	Veterans Pkwy (MD 410)	Ellin Rd	3373	B	10.4	3326	C	22.7	3507	B	11.2	3458	C	23.6	3474	B	11.1	3425	C	22.5	3874	B	12.9	3820	C	25.7	3707	B	12.1	3655	C	23.5
52*	Ellin Rd	Hanson Oaks Dr	856	B	0.7 (14.7)	974	B	0.5 (13.1)	890	C	0.8 (15.2)	1012	B	0.5 (13.4)	882	A	7.4	1003	A	6.2	984	C	0.8 (16.7)	1118	B	0.5 (14.4)	941	A	7.5	1070	A	6.9

*Unsignalized intersection under existing and No Build conditions. LOS is based on delay of worst approach. Delay is provided for the overall intersection, with delay for the worst approach in parentheses.

Figure 10. Carbon Monoxide Microscale Analysis Locations

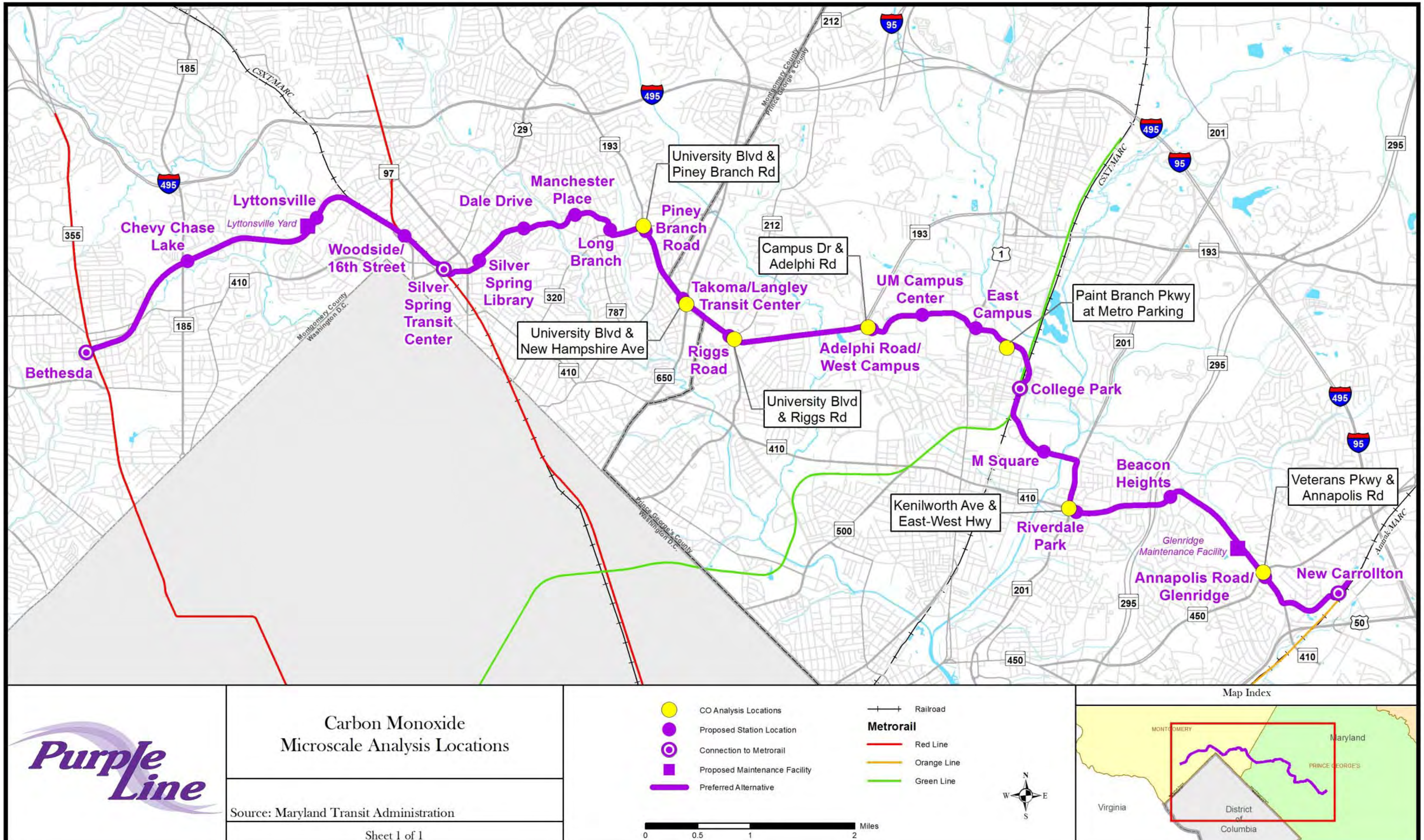


Table 9. Microscale CO Emissions

Intersection	NAAQS	2014	2020		2040	
		Base	No Build Alternative	Preferred Alternative	No Build Alternative	Preferred Alternative
Maximum 1-hour CO Concentrations (ppm)						
University Blvd (MD 193) at Piney Branch Rd (MD 320)	35	4.4	4.5	4.4	4.0	4.5
University Blvd (MD 193) at New Hampshire Ave (MD 650)	35	4.7	4.0	4.3	4.1	4.5
University Blvd (MD 193) at Riggs Rd (MD 212)	35	4.9	4.2	4.1	4.3	4.1
Campus Dr at Adelphi Rd	35	4.8	5.3	4.3	4.7	4.8
Paint Branch Pkwy at Metro Parking	35	3.8	3.9	4.3	6.6	6.5
Kenilworth Ave (MD 201) at E-W Highway (MD 410)	35	4.7	4.1	4.8	4.7	5.2
Veterans Pkwy (MD 410) at Annapolis Rd (MD 450)	35	4.4	3.9	4.4	3.5	3.6
Maximum 8-hour CO Concentrations (ppm)						
University Blvd (MD 193) at Piney Branch Rd (MD 320)	9	3.5	3.6	3.5	3.2	3.6
University Blvd (MD 193) at New Hampshire Ave (MD 650)	9	3.7	3.2	3.4	3.3	3.6
University Blvd (MD 193) at Riggs Rd (MD 212)	9	3.9	3.4	3.2	3.4	3.3
Campus Dr at Adelphi Rd	9	3.8	4.2	3.4	3.7	3.8
Paint Branch Pkwy at Metro Parking	9	3.1	3.1	3.4	5.2	5.2
Kenilworth Ave (MD 201) at E-W Highway (MD 410)	9	3.8	3.3	3.8	3.7	4.1
Veterans Pkwy (MD 410) at Annapolis Rd (MD 450)	9	3.5	3.1	3.5	2.8	2.8

Concentrations include a background concentration of 3 ppm and 2.4 ppm for the 1-hour and 8-hour concentrations, respectively, as recommended by the Maryland Department of the Environment.

Source: CAL3QHC Version 2.0; Synchro7 traffic model; emission factors referenced from MWCOG

4.1.3 Mobile Source Air Toxics Emissions

The amount of MSATs emitted along the project corridor in the future would be proportional to the total VMT predicted under each alternative, assuming the vehicle mix is the same for all alternatives. Vehicle mix pertains to the distribution of vehicle classifications on the roadway network (e.g., the percent of VMT by light duty gasoline vehicle, heavy duty diesel trucks, etc.).

Table 10 presents the annual VMT for each alternative for each analyzed year. VMT estimates predict that the Preferred Alternative would have a slight increase in VMT in the study area of Prince George's and Montgomery Counties when compared to the No Build Alternative in 2020 and a slight decrease in VMT compared to the No Build Alternative in 2040. As such, MSAT levels within the studied region under the Preferred Alternative compared to the No Build Alternative may be expected to slightly increase in 2020 and decrease in 2040.

Table 10. Annual Vehicle Miles Traveled under the No Build and Preferred Alternatives

	2014	2020			2040		
Parameter	Base	No Build Alternative	Preferred Alternative	% Change Between Alternatives	No Build Alternative	Preferred Alternative	% Change Between Alternatives
VMT (in millions)	17,863	19,821	19,825	0.02%	21,117	21,082	-0.17%

Regardless of the alternative retained, MSAT emissions are projected to decrease in the future as compared to present levels as a result of the EPA's national control programs, which are projected to reduce annual priority MSAT emissions by 83 percent between 2010 and 2050, despite the anticipated 102 percent increase in VMT over that time period[5].

There may be localized areas where ambient concentrations of MSATs could be higher or lower under the Preferred Alternative than under the No Build Alternative. However, the magnitude and duration of these potential increases in health effects compared to the No Build Alternative cannot be accurately quantified because of the limitation of current modeling tools. Along with these general limitations of modeling tools, there is also a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.

4.1.4 Greenhouse Gas Emissions

Greenhouse gas emissions were generated for various pollutants and processes, which include the following:

- Carbon Dioxide
- Methane
- Nitrous Oxide
- Elemental Carbon Particulate Matter 2.5
- Hydrocarbons
- Total Energy
- Total Distance

These components are presented on an annual level. CO_2 and total energy are the two most common measures of a project's impacts on greenhouse gas emissions. Mesoscale CO_2 levels and total energy consumption are expected to remain relatively unchanged (within 0.02 percent) in 2020 between the No Build Alternative and the Preferred Alternative. Mesoscale CO_2 levels and total energy consumption are expected to decrease with the Preferred Alternative in the year 2040 (see Table 11).

[5] Federal Highway Administration, Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents (December 6, 2012).

Table 11. Annual Greenhouse Gas Emissions

Pollutants/Processes	2014	2020			2040		
	Base	No Build Alternative	Preferred Alternative	% Change between Alternatives*	No Build Alternative	Preferred Alternative	% Change between Alternatives*
CO2 (Tons)	10,327,270	10,362,829	10,360,877	-0.02%	10,325,356	10,302,836	-0.22%
CH4 (Tons)	628	639	639	-0.01%	747	746	-0.10%
N2O (Tons)	261	182	182	0.00%	159	159	-0.06%
Elemental Carbon PM2.5 (Tons)	337	134	134	0.00%	51	51	-0.08%
Hydrocarbons (Tons)	9,849	6,888	6,888	0.00%	6,151	6,147	-0.07%
Total Energy (BTU Billions)	123,046	123,413	123,421	0.01%	122,928	122,678	-0.20%
Total Distance (Million Miles)	17,863	19,821	19,825	0.02%	21,117	21,082	-0.17%

Source: MOVES 2010b; MDAA II M80 Travel Demand Model; MOVES input tables referenced from MWCOG.
**Percent change based upon calculations of totals before rounding – refer to Appendix F*

4.1.5 Mitigation

Since the project is included in a conforming TIP and the Preferred Alternative would not cause or contribute to a violation of the NAAQS, no long-term adverse impacts to either localized or regional air quality are anticipated. Therefore, no mitigation is proposed for long-term operational effects.

4.2 Short-term Construction Effects

The construction duration of the project is not anticipated to exceed five years in any single location; thus, any impact incurred during construction would be considered a temporary impact. According to 40 CFR Part 93.123(c)(5), CO, PM_{10}, and $PM_{2.5}$ hot-spot analyses are not required for construction-related activities which cause temporary increases in emissions. The primary air quality concerns during construction would be a localized increase in the concentration of fugitive dust (including airborne particulate matter, $PM_{2.5}$ and PM_{10}), as well as mobile source emissions both on and off the construction site from on- and off-road construction equipment and vehicles.

Disruption of traffic during construction (such as temporary reduction of roadway capacity and increased queue lengths) could result in short-term elevated concentrations of localized pollutants such as CO and PM.

4.2.1 Avoidance and Minimization

MTA would make an effort to minimize the amount of emissions generated by traffic disruptions during construction, especially during peak hours.

4.2.2 Mitigation

MTA will require the construction contractor to implement dust control measures in accordance with MDE requirements and required that construction equipment complies with EPA's Tier 2 engine emission standards. Possible dust and emission control measures include the following:

- Minimizing land disturbance
- Constructing stabilized construction site entrances per construction standard specifications
- Covering trucks when hauling soil, stone, and debris
- Using water trucks or calcium chloride to minimize dust
- Stabilizing or covering stockpiles
- Minimization of dirt tracking by washing or cleaning trucks before leaving the construction site
- Using ultra-low sulfur diesel fuel for diesel equipment
- Equipping some construction equipment with emission control devices such as diesel particulate filters
- Permanently stabilize and seed any remaining disturbed areas as soon as practical after construction activities are completed.

4.3 Conformity Determination

The Transportation Conformity Rule provides criteria and procedures for determining the conformity determinations to the SIP of transportation plans, programs, and projects funded or approved under Title 23 U.S.C. or the Federal Transit Act. The attainment status of this area is as follows (Prince George's and Montgomery Counties share the same attainment statuses):

- Maintenance area for CO
- Nonattainment area for $PM_{2.5}$
- Moderate nonattainment area for ozone

As such, a SIP conformity determination with the following items is required:

- The project must originate from a conforming transportation plan and program;
- The project must eliminate or reduce the severity and number of violations of the NAAQS.

Transportation projects that originate from a conforming transportation plan and program are considered to conform to the rule. The Purple Line project is listed as Project ID #2795 in the 2013-2018 Transportation Improvement Plan (TIP), and as Project ID #1042 in the 2012 CLRP, both approved by the National Capital Region Transportation Planning Board on July 18, 2012. Inclusion of the Purple Line in the conforming TIP and CLRP designates the Purple Line as a conforming transportation project and precludes the need for a separate regional analysis. A mesoscale analysis of Prince George's and Montgomery Counties was performed for full disclosure of air quality impacts.

The project's CO microscale analysis predicts that CO levels for all future years would be below the one-hour and eight-hour NAAQS of 35 ppm and 9 ppm, respectively. According to guidance, light rail projects are not of air quality concern for $PM_{2.5}$. As such, the project is not expected to create or worsen violations of the $PM_{2.5}$ NAAQS. Therefore, this project would comply with the conformity requirements on both regional and local levels established by the Clean Air Act.

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Appendix A – List of Acronyms and Abbreviations

APPENDIX A

List of Acronyms and Abbreviations

CAA	Clean Air Act
CFR	Code of Federal Regulations
CH_4	Methane
CLRP	Constrained Long Range Plan
CO	Carbon Monoxide
CO_2	Carbon Dioxide
DC	Washington, DC
DEIS	Draft Environmental Impact Statement
DOT	United States Department of Transportation
EGR	Exhaust Gas Recirculation
EPA	United States Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FTA	Federal Transit Administration
GHG	Greenhouse Gas
I/M	Inspection & Maintenance
LOS	Level of Service
LRT	Light Rail Transit
MARC	Maryland Area Regional Commuter
MDE	Maryland Department of the Environment
MDOT	Maryland Department of Transportation
MPO	Metropolitan Planning Organization
MSAT	Mobile Source Air Toxics
MSOD	Mobile Source Observational Database
MTA	Maryland Transit Administration
MWAQC	Metropolitan Washington Air Quality Committee
MWCOG	Metropolitan Washington Council of Governments
NAAQS	National Ambient Air Quality Standards
NATA	National Air Toxics Assessment
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NO	Nitric Oxide
N_2O	Nitrous Oxide
NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxides
O_3	Ozone
OTC	Ozone Transport Commission
Pb	Lead
PERE	Physical Emission Rate Estimator
$PM_{2.5}$	Fine Particulate Matter
PM_{10}	Coarse Particulate Matter

SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SOx	Sulfur Oxides
TIGER	Transportation Investment Generating Economic Recovery
TIP	Transportation Improvement Plan
TPB	Transportation Planning Board
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
VSP	Vehicle Specific Power

Appendix B – Glossary/Terminology

APPENDIX B

Glossary/Terminology

Attainment Area: An area that has achieved the National Ambient Air Quality Standards for a particular pollutant

CAL3QHC: EPA program for carbon monoxide dispersion modeling

Capital Crescent Trail: the existing paved trail between Bethesda and Georgetown. When the trail alongside the Purple Line is built, the Capital Crescent Trail will extend all the way from Silver Spring to Georgetown.

Carbon Monoxide: a colorless, odorless gas emitted from combustion processes

Constrained Long Range Plan: Transportation plan outlining regionally significant projects that are planned in the region for the next 25 years; the CLRP must conform to the state's air quality plan

Cold Start Emissions: emissions released from starting a cold engine which has not reached optimal operating temperature

Clean Air Act: overarching statute regulating air quality in the United States

Criteria Pollutants: Six primary pollutants governed by the NAAQS (ozone, carbon monoxide, particulate matter, nitrogen dioxide, sulfur dioxide, lead)

Dispersion: the spread of pollutants downwind of a pollution source

Emission: a product (such as a gas, particle, or compound) released by the exhaust of an internal combustion engine

Exclusive Lane: a lane which carries Purple Line traffic only and is separated from vehicular travel lanes by a physical barrier

Fugitive Dust: particulate matter generated from construction, wind, erosion, and agricultural sources

Greenhouse Gas: One of four gases that can be attributed to global warming, including carbon dioxide as the most prevalent, methane, nitrous oxide, and fluorinated gases.

Hot-Soak Emissions: emissions consisting of fuel vapors released when a hot engine is turned off

Inversion Layer: a natural occurrence (prevalent in the winter months) when a layer of cold air traps warm air near the ground, inhibiting the dispersion of air pollutants such as carbon monoxide

Lead: a metal which occurs naturally and in manufactured products

Level of Service: ranking scheme from A-F based on vehicular delay at signalized intersections

Maintenance Area: Area previously identified as nonattainment, but has since demonstrated compliance with the National Ambient Air Quality Standards for a particular pollutant

Maryland Area Regional Commuter: a regional/commuter rail system consisting of three lines in the Baltimore-Washington Metropolitan Area

Maryland Transit Administration: the state-operated mass transit agency in Maryland; part of the Maryland Department of Transportation

Mesoscale: A scale of analysis at the intermediate level.

Metropolitan Washington Council of Governments: a regional organization of consisting of 21 local governments in the Washington Metropolitan Area, as well as members of the Maryland and Virginia state legislatures, the US Senate, and the US House of Representatives

Metropolitan Washington Air Quality Committee: an organization within MWCOG responsible for air quality conformity analysis and documentation

Metrorail: the rapid transit system in Washington, DC, and its surrounding suburbs

Microscale: A scale of analysis at the intersection level

Mitigation: efforts to reduce or compensate for adverse impacts

Mixed-use Lane: lane that is shared between the Purple Line and vehicular traffic

Mobile6.2: EPA program used to predict gram per mile emissions of various pollutants from mobile sources

Mobile Source Air Toxics: A group of hazardous air pollutants and compounds emitted by mobile sources

MOVES2010: program used to estimate emissions from mobile sources, will replace Mobile6.2 as EPA's official model

National Ambient Air Quality Standards: a set of federal air quality standards that applies to all states and the criteria pollutants

National Environmental Policy Act: a United States environmental law that established a national policy promoting the enhancement of the environment; also established the President's Council on Environmental Quality (CEQ)

Nitrogen Dioxide: one of a group of highly reactive gases known as nitrogen oxides or NOx

No Build: the baseline against which the environmental and community impacts of the Preferred Alternative are compared; consists of the transit service levels, highway networks, traffic volumes, and demographics forecasted for horizon year 2040.

Nonattainment Area: An area that has not achieved the National Ambient Air Quality Standards for a particular pollutant

On-road Vehicle Emissions: emissions released during running and idling

Ozone: ground-level ozone is formed through secondary reactions from volatile organic compounds and nitrogen oxides in the presence of sunlight

Particulate Matter: particle pollution is a mixture of extremely small particles and liquid droplets and may include acids, organic chemicals, metals, and soil or dust particles

Peak Season: the season which presents the most favorable conditions for high concentrations of pollutants to form and remain in the air

Precursor: a molecule that is a precursor in the formation of a secondary molecule; for example, volatile organic compounds and nitrogen oxides are precursor molecules to ozone

Preferred Alternative: the build alternative that is studied in detail in the FEIS (this alternative is a modified/refined/updated version of the Locally Preferred Alternative)

Purple Line corridor: the general area between Bethesda and New Carrollton

Receptor: a virtual point in the CAL3QHC dispersion model used to determine carbon monoxide concentrations at an assumed breathing height of a standing human

Right-of-way: legally granted access for the use of property

State Implementation Plan: A plan developed for criteria pollutants for which an area is in nonattainment and details how the state will meet its air quality goals by a specific deadline

Study area: the geographic extent that is examined to assess impacts

Sulfur Dioxide: one of a group of highly reactive gases known as oxides of sulfur or SOx

Transportation Conformity: a process in which it is determined whether a transportation project meets and conforms to the State Implementation Plan

Transit Center: a sheltered waiting area where multiple mass transportation routes converge; there are two on the alignment, the Silver Spring Transit Center and the Takoma/Langley Transit Center

Travel Demand Model: A model used to determine VMT within the region

Appendix C – Mesoscale Emissions

Hourly Distribution of Daily Traffic by Link Orientation and Facility Type

Hour	AM			PM			EVEN		
	Freeway	Arterial	Collector	Freeway	Arterial	Collector	Freeway	Arterial	Collector
1	0.0081	0.0053	0.0043	0.0103	0.0072	0.0057	0.0095	0.0062	0.0056
2	0.0060	0.0032	0.0027	0.0063	0.0040	0.0033	0.0062	0.0037	0.0031
3	0.0056	0.0028	0.0023	0.0047	0.0030	0.0025	0.0051	0.0031	0.0025
4	0.0082	0.0040	0.0031	0.0045	0.0027	0.0025	0.0059	0.0039	0.0032
5	0.0245	0.0121	0.0130	0.0066	0.0050	0.0059	0.0125	0.0095	0.0082
6	0.0576	0.0370	0.0411	0.0184	0.0144	0.0195	0.0324	0.0269	0.0250
7	0.0790	0.0659	0.0776	0.0354	0.0320	0.0400	0.0529	0.0502	0.0502
8	0.0889	0.0890	0.0944	0.0498	0.0513	0.0549	0.0664	0.0690	0.0661
9	0.0772	0.0835	0.0792	0.0507	0.0537	0.0549	0.0656	0.0667	0.0659
10	0.0615	0.0616	0.0555	0.0444	0.0464	0.0465	0.0570	0.0557	0.0550
11	0.0490	0.0492	0.0459	0.0425	0.0436	0.0420	0.0494	0.0490	0.0471
12	0.0453	0.0485	0.0464	0.0442	0.0475	0.0446	0.0495	0.0510	0.0511
13	0.0455	0.0507	0.0491	0.0480	0.0523	0.0495	0.0515	0.0537	0.0541
14	0.0455	0.0499	0.0484	0.0519	0.0538	0.0517	0.0529	0.0535	0.0532
15	0.0494	0.0527	0.0515	0.0663	0.0615	0.0600	0.0601	0.0588	0.0583
16	0.0546	0.0587	0.0605	0.0809	0.0767	0.0777	0.0656	0.0670	0.0688
17	0.0575	0.0630	0.0675	0.0915	0.0895	0.0953	0.0691	0.0741	0.0798
18	0.0587	0.0677	0.0713	0.0934	0.0965	0.1014	0.0715	0.0778	0.0823
19	0.0495	0.0594	0.0583	0.0771	0.0818	0.0804	0.0616	0.0667	0.0684
20	0.0372	0.0459	0.0441	0.0555	0.0604	0.0569	0.0474	0.0514	0.0513
21	0.0301	0.0347	0.0335	0.0414	0.0446	0.0418	0.0369	0.0395	0.0398
22	0.0261	0.0272	0.0257	0.0337	0.0352	0.0317	0.0313	0.0308	0.0307
23	0.0210	0.0179	0.0159	0.0253	0.0230	0.0196	0.0238	0.0200	0.0192
24	0.0139	0.0101	0.0088	0.0174	0.0138	0.0116	0.0158	0.0117	0.0110
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Distribution of AM,PM and Off-Peak Period Auto Trips Starts among Hourly Periods

HOUR	AM	PM	Off-Peak
1	0	0	0.002
2	0	0	0.003
3	0	0	0.002
4	0	0	0.001
5	0	0	0.007
6	0	0	0.03
7	0.205	0	0
8	0.378	0	0
9	0.417	0	0
10	0	0	0.119
11	0	0	0.1
12	0	0	0.109
13	0	0	0.119
14	0	0	0.113
15	0	0	0.113
16	0	0.207	0
17	0	0.249	0
18	0	0.294	0
19	0	0.25	0
20	0	0	0.115
21	0	0	0.073
22	0	0	0.053
23	0	0	0.029
24	0	0	0.012
Total	1.000	1.000	1.000

Distribution of Cold/Hot Transient Vehicle Starts by Hour

HOUR	Cold	Hot	Total
1	0.847	0.153	1.00
2	0.838	0.162	1.00
3	0.929	0.071	1.00
4	0.912	0.088	1.00
5	0.894	0.106	1.00
6	0.93	0.07	1.00
7	0.884	0.116	1.00
8	0.829	0.171	1.00
9	0.73	0.27	1.00
10	0.615	0.385	1.00
11	0.554	0.446	1.00
12	0.551	0.449	1.00
13	0.505	0.495	1.00
14	0.512	0.488	1.00
15	0.562	0.438	1.00
16	0.583	0.417	1.00
17	0.605	0.395	1.00
18	0.599	0.401	1.00
19	0.552	0.448	1.00
20	0.57	0.43	1.00
21	0.616	0.384	1.00
22	0.664	0.336	1.00
23	0.711	0.289	1.00
24	0.73	0.27	1.00

Speed Delay Function by Facility Type and Area Type

V/C	Freeway			MAJOR ARTERIAL				MINOR ARTERIAL				COLLECTOR				EXPRESSWAY		
Area Type-->	**1-2**	**3-4**	**5-7**	**1-2**	**3-4**	**5**	**6-7**	**1-2**	**3-4**	**5**	**6-7**	**1-2**	**3-4**	**5**	**6-7**	**1-2**	**3-5**	**6-7**
0	55.00	60.00	67.00	25.00	35.00	40.00	45.00	20.00	30.00	35.00	40.00	15.00	20.00	25.00	30.00	45.00	50.00	55.00
0.1	54.78	59.76	66.74	24.77	34.68	39.64	44.59	19.76	29.64	34.58	39.52	14.63	19.51	24.38	29.26	44.65	49.61	54.57
0.2	54.48	59.43	66.37	24.46	34.25	39.14	44.04	19.44	29.16	34.02	38.88	14.17	18.90	23.62	28.34	44.17	49.07	53.98
0.3	54.17	59.10	65.99	24.16	33.82	38.65	43.48	19.12	28.68	33.46	38.24	13.71	18.28	22.86	27.43	43.68	48.54	53.39
0.4	53.65	58.52	65.35	23.65	33.11	37.83	42.56	18.61	27.92	32.57	37.22	13.09	17.46	21.82	26.19	42.88	47.64	52.41
0.5	53.12	57.95	64.71	23.14	32.39	37.02	41.65	18.10	27.15	31.68	36.20	12.47	16.63	20.79	24.95	42.07	46.75	51.42
0.6	51.98	56.70	63.32	22.17	31.03	35.47	39.90	17.19	25.79	30.09	34.39	11.63	15.51	19.39	23.26	40.49	44.98	49.48
0.7	50.84	55.46	61.93	21.19	29.67	33.91	38.15	16.29	24.43	28.50	32.57	10.79	14.39	17.98	21.58	38.90	43.22	47.54
0.8	48.33	52.72	58.87	19.43	27.20	31.08	34.97	14.79	22.18	25.88	29.58	9.76	13.02	16.27	19.52	35.88	39.87	43.85
0.9	42.73	46.62	52.05	16.60	23.23	26.55	29.87	12.67	19.00	22.17	25.34	8.64	11.52	14.41	17.29	30.70	34.11	37.52
1	27.50	30.00	33.50	12.50	17.50	20.00	22.50	10.00	15.00	17.50	20.00	7.50	10.00	12.50	15.00	22.50	25.00	27.50
1.1	22.61	24.67	27.54	11.20	15.68	17.92	20.16	9.16	13.73	16.02	18.31	7.14	9.52	11.90	14.28	19.89	22.10	24.31
1.17	19.19	20.93	23.37	10.29	14.41	16.47	18.52	8.56	12.85	14.99	17.13	6.89	9.19	11.48	13.78	18.07	20.08	22.08
1.2	17.72	19.33	21.59	9.90	13.86	15.84	17.82	8.31	12.47	14.54	16.62	6.78	9.04	11.30	13.56	17.29	19.21	21.13
1.3	12.83	14.00	15.63	8.60	12.04	13.76	15.48	7.47	11.20	13.07	14.93	6.42	8.56	10.70	12.85	14.68	16.31	17.94
1.4	12.83	14.00	15.63	8.60	12.04	13.76	15.48	7.47	11.20	13.07	14.93	6.42	8.56	10.70	12.85	14.68	16.31	17.94
1.5	12.83	14.00	15.63	8.60	12.04	13.76	15.48	7.47	11.20	13.07	14.93	6.42	8.56	10.70	12.85	14.68	16.31	17.94
1.6	12.83	14.00	15.63	8.60	12.04	13.76	15.48	7.47	11.20	13.07	14.93	6.42	8.56	10.70	12.85	14.68	16.31	17.94
1.8	12.83	14.00	15.63	8.60	12.04	13.76	15.48	7.47	11.20	13.07	14.93	6.42	8.56	10.70	12.85	14.68	16.31	17.94
2	12.83	14.00	15.63	8.60	12.04	13.76	15.48	7.47	11.20	13.07	14.93	6.42	8.56	10.70	12.85	14.68	16.31	17.94
2.25	12.83	14.00	15.63	8.60	12.04	13.76	15.48	7.47	11.20	13.07	14.93	6.42	8.56	10.70	12.85	14.68	16.31	17.94
99.99	12.83	14.00	15.63	8.60	12.04	13.76	15.48	7.47	11.20	13.07	14.93	6.42	8.56	10.70	12.85	14.68	16.31	17.94

Freeway Through-Put Capacities under Congested Conditions

V/C	Area Type 1	Area Type 2	Area Type 3	Area Type 4	Area Type 5	Area Type 6	Area Type 7
1	1900	1900	2000	2000	2000	2000	2000
1.2	1815	1815	1910	1910	1910	1910	1910
1.4	1729	1729	1820	1820	1820	1820	1820
1.6	1729	1729	1820	1820	1820	1820	1820
1.8	1729	1729	1820	1820	1820	1820	1820
2	1729	1729	1820	1820	1820	1820	1820
2.2	1729	1729	1820	1820	1820	1820	1820
9.99	1729	1729	1820	1820	1820	1820	1820

Conversion Factors for Converting AAWT to Seasonal Travel

Pollutants analyzed	Duration of Seasonal Period	Seasonal Conversion Factor
Daily VOC/Nox	**May to September**	1.0262
Daily CO	**December to February**	0.9573
Annual PM2.5 Nox	**January to April**	0.9177
	May to September	0.9451
	October to December	0.9212

Forecasted Local Weekday Daily VMT

Year	Network VMT		Local VMT	
	Montgomery	Prince George	Montgomery	Prince George
2007 HPMS VMT	**19,889,589**	**23,315,753**	**1,602,329**	**1,866,986**
2005	20,829,678	21,399,965	1,577,179	1,837,344
2007	21,161,827	21,745,210	1,602,329	1,866,986
2014	22,324,350	22,953,570	1,690,353	1,970,733
2020 No-Build	24,419,687	25,680,972	1,849,007	2,204,900
2020 Build	24,447,328	25,669,372	1,851,100	2,203,904
2040 No-Build	26,197,242	27,185,477	1,983,600	2,334,073
2040 Build	26,140,135	27,151,792	1,979,276	2,331,181

Urban/Rural Local Weekday Daily VMT Split

Year	Montgomery			Prince George		
	Local Total	Urban Local	Rural Local	Local Total	Urban Local	Rural Local
2007 HPMS Percent	**100%**	**93.95%**	**6.05%**	**100%**	**95.11%**	**4.89%**
2014	1,690,353	1,588,086	102,266	1,970,733	1,874,364	96,369
2020 No-Build	1,849,007	1,737,142	111,865	2,184,667	2,077,837	106,830
2020 Build	1,851,100	1,739,109	111,992	2,180,334	2,073,715	106,618
2040 No-Build	1,983,600	1,863,592	120,008	2,334,073	2,219,937	114,136
2040 Build	1,979,276	1,859,530	119,746	2,329,854	2,215,924	113,930

Rural Local Road Speedbin Fraction

Speedbin	Fraction
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0.5
11	0.69
12	0.99
13	0.6
14	2.98
15	6.15
16	8.53
17	6.45
18	3.57
19	2.78
20	3.77
21	6.25
22	8.13
23	11.41
24	7.44
25	7.44
26	5.65
27	5.56
28	5.75
29	4.76
30	0.6

Appendix D – Intersection Ranking Data

INTERSECTION			2014 EXISTING AM			2014 PM EXISTING AM		
#	MAJOR APPROACH	MINOR APPROACH	PHV	LOS	DELAY (S)	PHV	LOS	DELAY (S)
1	Bonifant St	Dixon Ave	546	A	9.3	655	A	9.6
2	Bonifant St	Georgia Ave	3312	A	7.4	3099	A	6.2
3	Wayne Ave	Fenton St	1900	C	23.5	2415	C	27.8
4	Wayne Ave	Cedar St	1344	B	20	1587	B	13.9
5	Wayne Ave	Dale Dr	1886	B	17.6	2145	C	21.3
6	Wayne Ave	Mansfield Rd	1436	A	2.7	1382	A	2
7	Wayne Ave	Sligo Creek Pkwy	1880	D	36.1	2250	C	32.8
8	Wayne Ave	Manchester Rd	-	-	5.6	-	-	4.2
9	Wayne Ave	Plymouth Tunnel	-	-	-	-	-	-
10	Arliss St	Garland Ave (No Info)	-	-	-	-	-	-
11	Piney Branch Rd (MD 320)	Arliss St	1755	B	12.6	2008	C	21.8
12	Piney Branch Rd (MD 320)	Garland Ave	-	-	0.8	-	-	1
13	Piney Branch Rd (MD 320)	Barron St	1938	B	11.8	2110	A	8.4
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)	4973	D	39.1	4833	D	46.5
15	University Blvd (MD 193)	Seek Ln	-	-	0.4	-	-	0.5
16	University Blvd (MD 193)	Carroll Ave (MD 195)	3703	D	42.5	3736	C	26.2
17	University Blvd (MD 193)	Merrimac Dr	-	-	1.5	-	-	2.9
18	University Blvd (MD 193)	Lebanon St	-	-	0.2	-	-	0.3
19	University Blvd (MD 193)	Takoma-Langley Crossroads (WEST SC)	2963	A	4.1	3220	B	10.5
20	University Blvd (MD 193)	Takoma-Langley Transit Center	2840	B	12.3	2885	A	4.1
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)	5344	D	35.8	5545	E	57.9
22	University Blvd (MD 193)	Langley Park Plaza Driveway (EAST SC)	2760	B	13	3673	B	19.7
23	University Blvd (MD 193)	14th Ave	-	-	0.6	-	-	0.8
24	University Blvd (MD 193)	15th Ave	3075	B	12.7	4090	D	35.6
25	University Blvd (MD 193)	Riggs Road (MD 212)	4383	D	53	5490	E	67
26	University Blvd (MD 193)	Guilford Rd	-	-	0.5	-	-	4.4
27	University Blvd (MD 193)	23rd Ave	2717	A	6.6	3415	B	15.3
28	University Blvd (MD 193)	24th Ave N	-	-	0	-	-	0.1
29	University Blvd (MD 193)	W Park Dr	2666	B	10.6	3167	A	8.8
30	University Blvd (MD 193)	Campus Drive	2656	B	15.9	2510	C	34
31	Campus Dr	Adelphi Rd	3186	E	56.7	3973	E	60.6
32	Campus Dr	Presidential Dr	1309	A	4.7	1392	A	5.2
33	Presidential Drive	Valley Drive	-	-	-	-	-	-
34	Campus Dr	Regents Dr	-	-	-	-	-	-
35	Rossborough Ln	Baltimore Ave (US 1)	2148	A	5.6	2561	A	8
36	Rossborough Ln	Paint Branch Pkwy	-	-	-	-	-	-
37	Paint Branch Pkwy	MFRI Building Entrance	1974	B	11	2325	B	11.6
38	Paint Branch Pkwy	Metro Parking	2369	A	9.3	2649	B	14.1
39	River Rd	Rivertech Ct	-	-	9.4	-	-	41.6
40	River Rd	Haig Dr	-	-	0.3	-	-	0.2
41	River Rd	Kenilworth Ave	3346	B	15.8	3310	C	23
42	Kenilworth Ave (MD 201)	Rittenhouse St (Shopping)	2906	A	5.5	2974	A	8
43	Kenilworth Ave (MD 201)	E-W Highway (MD 410)	6216	F	102.6	7153	F	139.8
44	Riverdale Rd	62nd Place	3120	B	14.9	3394	B	16.9
45	Riverdale Rd	64th Ave / Eastpine Drive	3168	A	6.5	3389	A	3.7
46	Riverdale Rd	BW Pkwy SB Ramps	3442	B	12.8	3828	B	12.9
47	Riverdale Rd	BW Pkwy NB Ramps	3302	B	15	3663	B	15.9
48	Riverdale Rd	67th Ave	2814	B	14.8	3096	A	7.9
49	Veterans Pkwy (MD 410)	Glenridge Yard	-	-	1.8	-	-	7.5
50	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)	4399	E	63.1	4657	E	56.6
51	Veterans Pkwy (MD 410)	Ellin Rd	3373	B	10.4	3326	C	22.7
52	Ellin Rd	Hanson Oaks Dr	-	-	0.7	-	-	0.5

INTERSECTION			2020 BUILD AM			2020 BUILD PM		
#	MAJOR APPROACH	MINOR APPROACH	PHV	LOS	DELAY (S)	PHV	LOS	DELAY (S)
1	Bonifant St	Dixon Ave	584	A	9.4	701	A	9.8
2	Bonifant St	Georgia Ave	3546	A	5.5	3318	A	8.8
3	Wayne Ave	Fenton St	2011	C	28.6	2556	E	70.6
4	Wayne Ave	Cedar St	1422	B	14.0	1680	B	17.9
5	Wayne Ave	Dale Dr	1996	D	35.6	2270	C	31.9
6	Wayne Ave	Mansfield Rd	1519	A	3.1	1463	A	2.0
7	Wayne Ave	Sligo Creek Pkwy	1989	C	31.2	2381	F	96.0
8	Wayne Ave	Manchester Rd	1042	C	24.1	1111	B	19.8
9	Wayne Ave	Plymouth Tunnel	858	A	1.8	930	A	2.1
10	Arliss St	Garland Ave (No Info)	-	-	-	-	-	-
11	Piney Branch Rd (MD 320)	Arliss St	1860	B	14.3	2203	C	24.3
12	Piney Branch Rd (MD 320)	Garland Ave	1990	A	8.9	2163	A	5.8
13	Piney Branch Rd (MD 320)	Barron St	1983	B	11.7	2146	A	7.9
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)	4961	E	72.1	4913	E	67.7
15	University Blvd (MD 193)	Seek Ln	2549	A	3.0	2991	A	4.6
16	University Blvd (MD 193)	Carroll Ave (MD 195)	3481	C	35.0	3596	C	27.8
17	University Blvd (MD 193)	Merrimac Dr	2694	A	4.0	2917	A	7.7
18	University Blvd (MD 193)	Lebanon St	2632	A	1.3	2803	A	2.5
19	University Blvd (MD 193)	Takoma-Langley Crossroads (WEST SC)	2707	A	6.3	2934	B	12.1
20	University Blvd (MD 193)	Takoma-Langley Transit Center	2575	A	1.4	2653	A	4.5
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)	5174	D	39.8	5412	D	53.5
22	University Blvd (MD 193)	Langley Park Plaza Driveway (EAST SC)	2571	A	8.8	3583	B	14.0
23	University Blvd (MD 193)	14th Ave	3041	B	13.0	3915	B	19.9
24	University Blvd (MD 193)	15th Ave	2904	B	10.6	4112	D	43.7
25	University Blvd (MD 193)	Riggs Road (MD 212)	4421	E	62.2	5733	E	67.4
26	University Blvd (MD 193)	Guilford Rd	2355	B	11.1	3109	B	11.5
27	University Blvd (MD 193)	23rd Ave	2572	A	7.2	3410	C	20.8
28	University Blvd (MD 193)	24th Ave N	2391	A	2.4	3082	A	6.0
29	University Blvd (MD 193)	W Park Dr	2486	B	11.3	3056	B	14.7
30	University Blvd (MD 193)	Campus Drive	2589	B	19	2489	D	38.1
31	Campus Dr	Adelphi Rd	2984	D	52.3	3812	E	73.2
32	Campus Dr	Presidential Dr	1260	B	15.0	1335	B	18.3
33	Presidential Drive	Valley Drive	881	B	11.9	646	B	10.6
34	Campus Dr	Regents Dr	1182	D	46.9	1444	D	46.8
35	Rossborough Ln	Baltimore Ave (US 1)	2355	B	17.7	2942	C	33.5
36	Rossborough Ln	Paint Branch Pkwy	2365	B	11.6	2815	B	16.1
37	Paint Branch Pkwy	MFRI Building Entrance	2359	B	11.2	2778	B	11.9
38	Paint Branch Pkwy	Metro Parking	2852	C	29.7	3191	C	24.9
39	River Rd	Rivertech Ct	1147	C	23.8	1433	C	24.6
40	River Rd	Haig Dr	1153	A	1.7	1169	A	2.0
41	River Rd	Kenilworth Ave	3541	B	16.2	3503	C	23.1
42	Kenilworth Ave (MD 201)	Rittenhouse St (Shopping)	3075	A	6.8	3147	A	7.6
43	Kenilworth Ave (MD 201)	E-W Highway (MD 410)	6578	F	120.1	7570	F	166.3
44	Riverdale Rd	62nd Place	3150	A	6.8	3512	C	20.0
45	Riverdale Rd	64th Ave / Eastpine Drive	3261	B	10.4	3571	A	9.1
46	Riverdale Rd	BW Pkwy SB Ramps	3477	C	20.5	3953	C	22.8
47	Riverdale Rd	BW Pkwy NB Ramps	3364	B	15.7	3783	B	19.2
48	Riverdale Rd	67th Ave	3078	C	22.6	3461	C	22.9
49	Veterans Pkwy (MD 410)	Glenridge Yard	2031	A	2.2	1986	A	3.5
50	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)	4983	D	53.7	5165	E	70.7
51	Veterans Pkwy (MD 410)	Ellin Rd	3474	B	11.1	3425	C	22.5
52	Ellin Rd	Hanson Oaks Dr	882	A	7.4	1003	A	6.2

INTERSECTION			2020 NO BUILD AM			2020 NO BUILD PM		
#	MAJOR APPROACH	MINOR APPROACH	PHV	LOS	DELAY (S)	PHV	LOS	DELAY (S)
1	Bonifant St	Dixon Ave	584	A	9.4	701	A	9.8
2	Bonifant St	Georgia Ave	3546	A	8	3318	A	6.6
3	Wayne Ave	Fenton St	2011	C	23.9	2556	C	28.9
4	Wayne Ave	Cedar St	1422	B	19.9	1680	B	14
5	Wayne Ave	Dale Dr	1996	B	17.8	2270	C	26.3
6	Wayne Ave	Mansfield Rd	1519	A	3.1	1463	A	2
7	Wayne Ave	Sligo Creek Pkwy	1989	E	67.9	2381	E	78.6
8	Wayne Ave	Manchester Rd	-	-	6.9	-	-	5.4
9	Wayne Ave	Plymouth Tunnel	-	-	-	-	-	-
10	Arliss St	Garland Ave (No Info)	-	-	-	-	-	-
11	Piney Branch Rd (MD 320)	Arliss St	1807	B	13.2	2067	C	22.3
12	Piney Branch Rd (MD 320)	Garland Ave	-	-	0.8	-	-	1
13	Piney Branch Rd (MD 320)	Barron St	1995	B	11.9	2110	A	8.6
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)	5119	D	40.6	4975	D	47.4
15	University Blvd (MD 193)	Seek Ln	-	-	0.4	-	-	0.5
16	University Blvd (MD 193)	Carroll Ave (MD 195)	3812	D	44.7	3846	C	27
17	University Blvd (MD 193)	Merrimac Dr	-	-	1.7	-	-	3.5
18	University Blvd (MD 193)	Lebanon St	-	-	0.2	-	-	0.3
19	University Blvd (MD 193)	Takoma-Langley Crossroads (WEST SC)	3050	A	4.2	3315	B	11.3
20	University Blvd (MD 193)	Takoma-Langley Transit Center	2923	B	12.4	2969	A	4.2
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)	5501	D	36.5	5708	E	61.7
22	University Blvd (MD 193)	Langley Park Plaza Driveway (EAST SC)	2841	B	13.4	3781	B	19.6
23	University Blvd (MD 193)	14th Ave	-	-	0.6	-	-	0.8
24	University Blvd (MD 193)	15th Ave	3166	B	13.1	4211	D	37.4
25	University Blvd (MD 193)	Riggs Road (MD 212)	4512	E	55.6	5651	E	70.2
26	University Blvd (MD 193)	Guilford Rd	-	-	0.5	-	-	4.4
27	University Blvd (MD 193)	23rd Ave	2797	A	6.6	3515	B	15.7
28	University Blvd (MD 193)	24th Ave N	-	-	0	-	-	0.1
29	University Blvd (MD 193)	W Park Dr	2745	B	11.1	3260	A	9.2
30	University Blvd (MD 193)	Campus Drive	2641	B	17.1	2539	C	32.4
31	Campus Dr	Adelphi Rd	3001	D	53.9	3833	E	62.9
32	Campus Dr	Presidential Dr	1394	A	4.8	1483	A	5.3
33	Presidential Drive	Valley Drive	-	-	-	-	-	-
34	Campus Dr	Regents Dr	-	-	-	-	-	-
35	Rossborough Ln	Baltimore Ave (US 1)	2551	B	10.7	3180	B	14.9
36	Rossborough Ln	Paint Branch Pkwy	2396	C	20.1	2877	C	30.3
37	Paint Branch Pkwy	MFRI Building Entrance	2359	B	11.2	2778	B	11.9
38	Paint Branch Pkwy	Metro Parking	2831	A	9.8	3166	B	17.3
39	River Rd	Rivertech Ct	-	-	11.6	-	-	62.1
40	River Rd	Haig Dr	-	-	0.3	-	-	0.2
41	River Rd	Kenilworth Ave	3541	B	17.3	3503	C	23.9
42	Kenilworth Ave (MD 201)	Rittenhouse St (Shopping)	3075	A	5.5	3147	A	8.6
43	Kenilworth Ave (MD 201)	E-W Highway (MD 410)	6578	F	121.8	7570	F	167
44	Riverdale Rd	62nd Place	3215	B	11.7	3499	B	17.7
45	Riverdale Rd	64th Ave / Eastpine Drive	3264	A	6.4	3493	A	5
46	Riverdale Rd	BW Pkwy SB Ramps	3545	B	13.2	3944	B	16.5
47	Riverdale Rd	BW Pkwy NB Ramps	3401	B	13.6	3774	B	16.2
48	Riverdale Rd	67th Ave	2901	B	14.7	3191	A	8.2
49	Veterans Pkwy (MD 410)	Glenridge Yard	-	-	2	-	-	10
50	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)	4573	E	66.5	4842	E	60.4
51	Veterans Pkwy (MD 410)	Ellin Rd	3507	B	11.2	3458	C	23.6
52	Ellin Rd	Hanson Oaks Dr	-	-	0.8	-	-	0.5

INTERSECTION			2040 NO BUILD AM			2040 NO BUILD PM		
#	MAJOR APPROACH	MINOR APPROACH	PHV	LOS	DELAY (S)	PHV	LOS	DELAY (S)
1	Bonifant St	Dixon Ave	706	A	9.9	847	B	10.5
2	Bonifant St	Georgia Ave	4287	A	6.3	4011	A	8.4
3	Wayne Ave	Fenton St	2454	C	27.1	3119	D	40.3
4	Wayne Ave	Cedar St	1736	C	20	2050	B	14.9
5	Wayne Ave	Dale Dr	2435	C	22.4	2770	F	119.7
6	Wayne Ave	Mansfield Rd	1854	A	4	1785	A	2.4
7	Wayne Ave	Sligo Creek Pkwy	2427	F	165.5	2905	F	220.6
8	Wayne Ave	Manchester Rd	-	-	25.6	-	-	25
9	Wayne Ave	Plymouth Tunnel	-	-	-	-	-	-
10	Arliss St	Garland Ave (No Info)	-	-	-	-	-	-
11	Piney Branch Rd (MD 320)	Arliss St	1996	B	13.7	2284	C	23.5
12	Piney Branch Rd (MD 320)	Garland Ave	-	-	0.8	-	-	1
13	Piney Branch Rd (MD 320)	Barron St	2204	B	12.9	2400	A	9.5
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)	5655	D	49.8	5496	D	52.4
15	University Blvd (MD 193)	Seek Ln	-	-	0.4	-	-	0.5
16	University Blvd (MD 193)	Carroll Ave (MD 195)	4211	E	62.5	4249	C	28.9
17	University Blvd (MD 193)	Merrimac Dr	-	-	2.7	-	-	203.7
18	University Blvd (MD 193)	Lebanon St	-	-	0.2	-	-	0.3
19	University Blvd (MD 193)	Takoma-Langley Crossroads (WEST SC)	3370	A	4.8	3662	B	16.3
20	University Blvd (MD 193)	Takoma-Langley Transit Center	3229	B	12.9	3280	A	4.6
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)	6077	D	43.7	6306	F	80.7
22	University Blvd (MD 193)	Langley Park Plaza Driveway (EAST SC)	3139	B	14.7	4177	C	20.4
23	University Blvd (MD 193)	14th Ave	-	-	0.7	-	-	0.8
24	University Blvd (MD 193)	15th Ave	3497	B	14.3	4652	D	44.7
25	University Blvd (MD 193)	Riggs Road (MD 212)	4985	E	64.9	6243	F	89.9
26	University Blvd (MD 193)	Guilford Rd	-	-	0.4	-	-	5.3
27	University Blvd (MD 193)	23rd Ave	3090	A	6.8	3884	B	17
28	University Blvd (MD 193)	24th Ave N	-	-	0	-	-	0.1
29	University Blvd (MD 193)	W Park Dr	3032	B	12.8	3602	B	10.6
30	University Blvd (MD 193)	Campus Drive	3222	C	20.1	3098	D	37.3
31	Campus Dr	Adelphi Rd	3664	E	68.2	4676	F	82.6
32	Campus Dr	Presidential Dr	1700	A	4.9	1808	A	5.4
33	Presidential Drive	Valley Drive	-	-	-	-	-	-
34	Campus Dr	Regents Dr	-	-	-	-	-	-
35	Rossborough Ln	Baltimore Ave (US 1)	3083	B	12.3	3845	B	17.9
36	Rossborough Ln	Paint Branch Pkwy	4320	F	233.2	5186	F	266.5
37	Paint Branch Pkwy	MFRI Building Entrance	4253	F	88.9	5009	F	85.7
38	Paint Branch Pkwy	Metro Parking	5104	E	74.3	5708	F	140
39	River Rd	Rivertech Ct	-	-	44.8	-	-	1679.7
40	River Rd	Haig Dr	-	-	0.4	-	-	0.2
41	River Rd	Kenilworth Ave	4321	C	23.8	4275	C	27.7
42	Kenilworth Ave (MD 201)	Rittenhouse St (Shopping)	3752	A	6.4	3840	A	9.7
43	Kenilworth Ave (MD 201)	E-W Highway (MD 410)	8027	F	187.1	9237	F	273.4
44	Riverdale Rd	62nd Place	3553	B	13.8	3864	C	20.7
45	Riverdale Rd	64th Ave / Eastpine Drive	3607	A	7.6	3861	A	4.9
46	Riverdale Rd	BW Pkwy SB Ramps	3919	B	16.6	4357	B	19.2
47	Riverdale Rd	BW Pkwy NB Ramps	3758	B	15.9	4170	B	19.4
48	Riverdale Rd	67th Ave	3205	B	16	3530	A	9.4
49	Veterans Pkwy (MD 410)	Glenridge Yard	-	-	3.2	-	-	20.7
50	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)	5052	E	77.4	5349	E	72
51	Veterans Pkwy (MD 410)	Ellin Rd	3874	B	12.9	3820	C	25.7
52	Ellin Rd	Hanson Oaks Dr	-	-	0.8	-	-	0.5

INTERSECTION			2040 BUILD AM			2040 BUILD PM		
#	MAJOR APPROACH	MINOR APPROACH	PHV	LOS	DELAY (S)	PHV	LOS	DELAY (S)
1	Bonifant St	Dixon Ave	706	A	9.9	847	B	10.5
2	Bonifant St	Georgia Ave	4287	A	6.3	4011	A	9
3	Wayne Ave	Fenton St	2454	C	34.4	3119	F	135.3
4	Wayne Ave	Cedar St	1736	B	15.1	2050	B	19.7
5	Wayne Ave	Dale Dr	2435	E	62.3	2770	E	75.1
6	Wayne Ave	Mansfield Rd	1854	A	3.7	1785	A	2.2
7	Wayne Ave	Sligo Creek Pkwy	2427	D	37.2	2905	F	141.0
8	Wayne Ave	Manchester Rd	1271	C	30.1	1355	F	86.8
9	Wayne Ave	Plymouth Tunnel	1047	A	2.0	1134	A	2.3
10	Arliss St	Garland Ave (No Info)	-	-	-	-	-	-
11	Piney Branch Rd (MD 320)	Arliss St	2052	B	15.9	2431	C	26.8
12	Piney Branch Rd (MD 320)	Garland Ave	2196	B	10.0	2387	A	5.9
13	Piney Branch Rd (MD 320)	Barron St	2188	B	12.5	2368	A	8.3
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)	5516	F	93.6	5452	F	86.6
15	University Blvd (MD 193)	Seek Ln	2850	A	4.2	3326	A	4.7
16	University Blvd (MD 193)	Carroll Ave (MD 195)	3880	D	37.3	3995	C	34.1
17	University Blvd (MD 193)	Merrimac Dr	3010	A	4.8	3246	A	7.6
18	University Blvd (MD 193)	Lebanon St	2941	A	1.8	3120	A	2.6
19	University Blvd (MD 193)	Takoma-Langley Crossroads (WEST SC)	3024	A	8.2	3263	B	14.4
20	University Blvd (MD 193)	Takoma-Langley Transit Center	2879	A	1.4	2954	A	4.4
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)	5751	D	54.8	6004	E	68.5
22	University Blvd (MD 193)	Langley Park Plaza Driveway (EAST SC)	2875	A	9.9	3983	B	16.5
23	University Blvd (MD 193)	14th Ave	3354	B	14.4	4319	C	22.8
24	University Blvd (MD 193)	15th Ave	3242	B	11.2	4565	E	77.9
25	University Blvd (MD 193)	Riggs Road (MD 212)	4919	E	71.9	6358	F	84.1
26	University Blvd (MD 193)	Guilford Rd	2630	A	8.5	3450	B	12.1
27	University Blvd (MD 193)	23rd Ave	2869	A	8.4	3783	C	23.4
28	University Blvd (MD 193)	24th Ave N	2670	A	3.2	3421	A	6.0
29	University Blvd (MD 193)	W Park Dr	2775	B	13.4	3393	B	16.5
30	University Blvd (MD 193)	Campus Drive	3161	C	23.9	3038	E	63.1
31	Campus Dr	Adelphi Rd	3642	E	70.2	4650	F	96.7
32	Campus Dr	Presidential Dr	1393	B	15.4	1477	C	20.1
33	Presidential Drive	Valley Drive	975	B	12.6	714	B	11.0
34	Campus Dr	Regents Dr	1308	E	57.4	1597	E	65.4
35	Rossborough Ln	Baltimore Ave (US 1)	2771	B	19.1	3253	D	37.2
36	Rossborough Ln	Paint Branch Pkwy	4264	B	11.3	5075	E	62.5
37	Paint Branch Pkwy	MFRI Building Entrance	4253	C	24.7	5009	B	10.7
38	Paint Branch Pkwy	Metro Parking	5149	F	109.1	5753	F	176.9
39	River Rd	Rivertech Ct	1702	D	44.9	2125	D	35.9
40	River Rd	Haig Dr	1711	A	2.0	1734	A	1.9
41	River Rd	Kenilworth Ave	4321	C	24.5	4275	C	27.0
42	Kenilworth Ave (MD 201)	Rittenhouse St (Shopping)	3752	A	6.2	3840	A	9.7
43	Kenilworth Ave (MD 201)	E-W Highway (MD 410)	8027	F	187.2	9237	F	273.5
44	Riverdale Rd	62nd Place	3461	A	7.4	3859	C	20.8
45	Riverdale Rd	64th Ave / Eastpine Drive	3583	B	11.1	3924	A	9.8
46	Riverdale Rd	BW Pkwy SB Ramps	3821	C	24.6	4344	C	26.9
47	Riverdale Rd	BW Pkwy NB Ramps	3697	B	17.8	4157	C	22.0
48	Riverdale Rd	67th Ave	3382	C	23.3	3803	C	26.3
49	Veterans Pkwy (MD 410)	Glenridge Yard	2260	A	3.1	2184	A	3.6
50	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)	5502	E	61.8	5696	F	91.6
51	Veterans Pkwy (MD 410)	Ellin Rd	3707	B	12.1	3655	C	23.5
52	Ellin Rd	Hanson Oaks Dr	941	A	7.5	1070	A	6.9

Appendix E – Sample CAL3QHC Input & Output Files

CAL3QHC INPUT FILE
INT 25 - University Blvd at Riggs Rd
(MD 193 at MD 650)
2020 AM Preferred Alternative

'PLINT25	2020BDAN	60	321	0	0	53	0.3048	1	1
'NE	1'	1318968	479668.2	5					
'NE	2'	1318700	479640.1	5					
'NE	3'	1318433	479685.7	5					
'NE	4'	1318400	479698.5	5					
'NE	5'	1318381	479728.9	5					
'NE	6'	1318348	479744.8	5					
'NE	7'	1318316	479760.7	5					
'NE	8'	1318285	479779.7	5					
'NE	9'	1318276	479814.4	5					
'NE	10'	1318294	479845.5	5					
'NE	11'	1318503	480015.4	5					
'NE	12'	1318726	480168.5	5					
'NE	13'	1318948	480321.6	5					
'NW	1'	1318893	480346.8	5					
'NW	2'	1318666	480200.9	5					
'NW	3'	1318439	480055.1	5					
'NW	4'	1318232	479881.1	5					
'NW	5'	1318207	479855.9	5					
'NW	6'	1318182	479829.8	5					
'NW	7'	1318146	479830.4	5					
'NW	8'	1318116	479850.4	5					
'NW	9'	1317901	480013.1	5					
'NW	10'	1317687	480177.6	5					
'NW	11'	1317472	480342.1	5					
'SE	1'	1318346	478847.3	5					
'SE	2'	1318304	479114	5					
'SE	3'	1318273	479382.2	5					
'SE	4'	1318269	479418	5					
'SE	5'	1318273	479453.8	5					
'SE	6'	1318270	479489.7	5					
'SE	7'	1318268	479525.6	5					
'SE	8'	1318281	479559.4	5					
'SE	9'	1318308	479583.4	5					

'SE	10'	1318340	479599.1	5					
'SE	11'	1318375	479590	5					
'SE	12'	1318641	479545.9	5					
'SE	13'	1318911	479566.8	5					
'SE	14'	1319179	479597.1	5					
'SW	1'	1317372	480274.3	5					
'SW	2'	1317578	480099.8	5					
'SW	3'	1317793	479936.1	5					
'SW	4'	1318008	479772.5	5					
'SW	5'	1318037	479750.7	5					
'SW	6'	1318065	479728.8	5					
'SW	7'	1318094	479707	5					
'SW	8'	1318122	479684.8	5					
'SW	9'	1318147	479658.5	5					
'SW	10'	1318158	479624.4	5					
'SW	11'	1318166	479589.2	5					
'SW	12'	1318168	479553.3	5					
'SW	13'	1318170	479517.4	5					
'SW	14'	1318191	479248.1	5					
'SW	15'	1318225	478980.3	5					
'PLINT25	2020BDAM	40	1	0	'C'				
1									
'EBA'	'AG'	1317384	480293.2	1317569	480156.3	1045	3.822	0	44
1									
'EBDEP'	'AG'	1318198	479683.4	1318346	479620.4	533	3.822	0	44
1									
'EBDEP'	'AG'	1318346	479620.4	1319193	479620.9	636	3.822	0	44
2									
'EBL'	'AG'	1318106	479764.2	1318059	479801.3	0	12	1	
		180	168	3	86	35.405	1787	2	3
1									
'EBLT'	'AG'	1317569	480156.3	1317857	479941.8	495	3.822	0	44
1									
'EBR'	'AG'	1317555	480138	1318190	479554.9	550	3.822	0	32

2									
'EBR'	'AG'	1318088	479731.1	1318038	479768.9	0	12	1	
		180	96.1	3	550	35.405	1518	2	3
1									
'EBT'	'AG'	1317862	479950.9	1318195	479700.3	409	3.822	0	44
1									
'EBT'	'AG'	1317857	479941.8	1318198	479683.4	409	3.822	0	44
2									
'EBT'	'AG'	1318098	479749.6	1318050	479786.3	0	24	2	
		180	130	4	409	35.405	1725	2	4
1									
'NBA'	'AG'	1318349	478723.8	1318283	479141	920	3.822	0	32
1									
'NBDEP'	'AG'	1318231	479708	1318235	479764.1	313	3.822	0	32
1									
'NBDEP'	'AG'	1318259	479817.3	1318952	480343.7	433	3.822	0	32
1									
'NBDEP'	'AG'	1318235	479764.1	1318259	479817.3	313	3.822	0	32
1									
'NBL'	'AG'	1318273	479141.1	1318216	479711.7	592	3.822	0	44
2									
'NBL'	'AG'	1318226	479609.9	1318230	479548.3	0	24	2	
		180	142	3	592	35.405	1660	2	3
1									
'NBR'	'AG'	1318258	479430.2	1318332	479605	101	3.822	0	32
2									
'NBR'	'AG'	1318252	479524.2	1318256	479462.2	0	12	1	
		180	0	3	101	35.405	0	2	3
1									
'NBT'	'AG'	1318251	479432.2	1318231	479708	227	3.822	0	32
2									
'NBT'	'AG'	1318241	479609	1318243	479546	0	12	1	
		180	116	3	227	35.405	1494	2	3
1									

'NBTR'	'AG'	1318283	479141	1318251	479432.2	328	3.822	0	32
1									
'SBA'	'AG'	1318946	480354.6	1318229	479843.1	617	3.822	0	44
1									
'SBDEP'	'AG'	1318190	479554.9	1318287	478728.9	1528	3.822	0	44
1									
'SBDEP'	'AG'	1318173	479745.5	1318190	479554.9	978	3.822	0	44
1									
'SBL'	'AG'	1318375	479979.3	1318190	479712.1	124	3.822	0	44
2									
'SBL'	'AG'	1318246	479833.2	1318279	479883.5	0	24	2	
		180	167.2	3	124	35.405	1542	2	3
1									
'SBR'	'AG'	1318219	479845.6	1318152	479814.3	82	3.822	0	32
2									
'SBR'	'AG'	1318219	479845.6	1318251	479896.6	0	24	2	
		180	0	3	82	35.405	0	2	3
1									
'SBT'	'AG'	1318229	479843.1	1318173	479745.5	411	3.822	0	44
2									
'SBT'	'AG'	1318229	479841.9	1318260	479893.4	0	12	1	
		180	142	3	617	35.405	1386	2	3
1									
'WBA'	'AG'	1319195	479672.6	1319078	479657.5	1841	3.822	0	44
1									
'WBDEP'	'AG'	1318217	479766.4	1318145	479804.3	1744	3.822	0	44
1									
'WBDEP'	'AG'	1318145	479804.3	1317415	480358.1	1826	3.822	0	44
2									
'WBL'	'AG'	1318292	479707.7	1318346	479681.3	0	12	1	
		180	143.4	3	569	35.405	1691	2	3
1									
'WBR'	'AG'	1318399	479702.1	1318259	479817.3	120	3.822	0	32
2									

'WBR'	'AG'	1318303	479749.8	1318357	479722.2	0	12	1	
		180	106.5	3	120	35.405	1493	2	3
1									
'WBT'	'AG'	1318389	479678.8	1318217	479766.4	1152	3.822	0	44
1									
'WBT'	'AG'	1319078	479646	1318213	479750.8	1152	3.822	0	44
2									
'WBT'	'AG'	1318297	479730.2	1318351	479702.6	0	24	2	
		180	103.5	3	1152	35.405	1689	2	3
1									
'WBTR'	'AG'	1319078	479657.5	1318389	479678.8	1272	3.822	0	44
1	0	4	1000	0	'Y'	5	0	72	

CAL3QHC OUTPUT FILE
INT 25 - University Blvd at Riggs Rd
(MD 193 at MD 650)
2020 AM Preferred Alternative

```
♀                          CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221
  PAGE  1

      JOB: PLINT25      2020BDAM                                      RUN: PLINT25       2020BDAM


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         The MODE flag has been set to C for calculating CO averages.

       SITE & METEOROLOGICAL VARIABLES
       -------------------------------
       VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 321. CM
        U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  0.0 PPM

       LINK VARIABLES
       --------------
         LINK DESCRIPTION     *         LINK COORDINATES (FT)          *    LENGTH  BRG TYPE   VPH    EF
 H   W    V/C QUEUE
                              *   X1        Y1        X2        Y2     *     (FT)  (DEG)           (G/MI)
(FT) (FT)       (VEH)

------------------------*----------------------------------------*-------------------------------------------
----------------
       1. EBA                 * ********  480293.2  ********  480156.3 *     231.   126. AG   1045.   3.8
0.0 44.0
       2. EBDEP               * ********  479683.4  ********  479620.4 *     161.   113. AG    533.   3.8
0.0 44.0
       3. EBDEP               * ********  479620.4  ********  479620.9 *     847.    90. AG    636.   3.8
0.0 44.0
       4. EBL                 * ********  479764.2  ********  479939.5 *     283.   308. AG     89. 100.0
0.0 12.0 1.25  14.4
       5. EBLT                * ********  480156.3  ********  479941.8 *     359.   127. AG    495.   3.8
0.0 44.0
       6. EBR                 * ********  480138.0  ********  479554.9 *     862.   133. AG    550.   3.8
0.0 32.0
       7. EBR                 * ********  479731.2  ********  479906.1 *     289.   307. AG     51. 100.0
0.0 12.0 0.83  14.7
       8. EBT                 * ********  479950.9  ********  479700.3 *     417.   127. AG    409.   3.8
0.0 44.0
       9. EBT                 * ********  479941.8  ********  479683.4 *     428.   127. AG    409.   3.8
0.0 44.0
      10. EBT                 * ********  479749.6  ********  479838.3 *     145.   308. AG    137. 100.0
0.0 24.0 0.48   7.4
      11. NBA                 * ********  478723.8  ********  479141.0 *     422.   351. AG    920.   3.8
0.0 32.0
      12. NBDEP               * ********  479708.1  ********  479764.1 *      56.     5. AG    313.   3.8
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0.0 32.0
      13. NBDEP                * ********  479817.3  ********  480343.7 *     870.    53. AG    433.   3.8
0.0 32.0
      14. NBDEP                * ********  479764.1  ********  479817.3 *      58.    24. AG    313.   3.8
0.0 32.0
      15. NBL                  * ********  479141.1  ********  479711.6 *     573.   354. AG    592.   3.8
0.0 44.0
      16. NBL                  * ********  479609.9  ********  479340.6 *     270.   176. AG    150. 100.0
0.0 24.0 0.97  13.7
      17. NBR                  * ********  479430.2  ********  479605.0 *     190.    23. AG    101.   3.8
0.0 32.0
      18. NBR                  * ********  479524.2  ********  479524.2 *       0.    90. AG      0. 100.0
0.0 12.0 0.06   0.0
      19. NBT                  * ********  479432.2  ********  479708.1 *     277.   356. AG    227.   3.8
0.0 32.0
      20. NBT                  * ********  479609.0  ********  479465.0 *     144.   178. AG     61. 100.0
0.0 12.0 0.46   7.3
      21. NBTR                 * ********  479141.0  ********  479432.2 *     293.   354. AG    328.   3.8
0.0 32.0
      22. SBA                  * ********  480354.6  ********  479843.1 *     881.   235. AG    617.   3.8
0.0 44.0
      23. SBDEP                * ********  479554.9  ********  478728.9 *     832.   173. AG   1528.   3.8
0.0 44.0
      24. SBDEP                * ********  479745.5  ********  479554.9 *     191.   175. AG    978.   3.8
0.0 44.0
      25. SBL                  * ********  479979.3  ********  479712.1 *     325.   215. AG    124.   3.8
0.0 44.0
      26. SBL                  * ********  479833.2  ********  479894.0 *      73.    33. AG    176. 100.0
0.0 24.0 0.91   3.7
      27. SBR                  * ********  479845.5  ********  479814.3 *      74.   245. AG     82.   3.8
0.0 32.0
      28. SBR                  * ********  479845.5  ********  479845.5 *       0.    90. AG      0. 100.0
0.0 24.0 0.03   0.0
      29. SBT                  * ********  479843.1  ********  479745.5 *     112.   210. AG    411.   3.8
0.0 44.0
      30. SBT                  * ********  479841.9  ********  483426.1 *    4175.    31. AG     75. 100.0
0.0 12.0 2.43 212.1
      31. WBA                  * ********  479672.6  ********  479657.5 *     119.   263. AG   1841.   3.8
0.0 44.0
      32. WBDEP                * ********  479766.4  ********  479804.3 *      81.   298. AG   1744.   3.8
0.0 44.0
      33. WBDEP                * ********  479804.3  ********  480358.1 *     916.   307. AG   1826.   3.8
0.0 44.0
      34. WBL                  * ********  479707.8  ********  478307.6 *    3194.   116. AG     75. 100.0
0.0 12.0 1.90 162.3
      35. WBR                  * ********  479702.1  ********  479817.3 *     181.   309. AG    120.   3.8
0.0 32.0
      36. WBR                  * ********  479749.8  ********  479718.4 *      70.   117. AG     56. 100.0
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0.0 12.0 0.21   3.5
      37. WBT                    * ********  479678.8  ********  479766.4 *     194.   297. AG   1152.   3.8
0.0 44.0
      38. WBT                    * ********  479646.0  ********  479750.9 *     871.   277. AG   1152.   3.8
0.0 44.0
      39. WBT                    * ********  479730.2  ********  479583.8 *     324.   117. AG    109. 100.0
0.0 24.0 0.85  16.5
      40. WBTR                   * ********  479657.5  ********  479678.8 *     688.   272. AG   1272.   3.8
0.0 44.0
♀
   PAGE  2
      JOB: PLINT25      2020BDAM                                RUN: PLINT25      2020BDAM


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ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
4. EBL	180	168	3.0	86	1787	35.40	2	3
7. EBR	180	96	3.0	550	1518	35.40	2	3
10. EBT	180	130	4.0	409	1725	35.40	2	4
16. NBL	180	142	3.0	592	1660	35.40	2	3
18. NBR	180	0	3.0	101	1600	35.40	2	3
20. NBT	180	116	3.0	227	1494	35.40	2	3
26. SBL	180	167	3.0	124	1542	35.40	2	3
28. SBR	180	0	3.0	82	1600	35.40	2	3
30. SBT	180	142	3.0	617	1386	35.40	2	3
34. WBL	180	143	3.0	569	1691	35.40	2	3
36. WBR	180	106	3.0	120	1493	35.40	2	3
39. WBT	180	103	3.0	1152	1689	35.40	2	3

RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. NE 1	********	479668.2	5.0
2. NE 2	********	479640.1	5.0
3. NE 3	********	479685.7	5.0
4. NE 4	********	479698.5	5.0
5. NE 5	********	479728.9	5.0

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  6. NE      6                   *    ********  479744.8        5.0   *
  7. NE      7                   *    ********  479760.7        5.0   *
  8. NE      8                   *    ********  479779.7        5.0   *
  9. NE      9                   *    ********  479814.4        5.0   *
 10. NE      10                  *    ********  479845.5        5.0   *
 11. NE      11                  *    ********  480015.4        5.0   *
 12. NE      12                  *    ********  480168.5        5.0   *
 13. NE      13                  *    ********  480321.6        5.0   *
 14. NW      1                   *    ********  480346.8        5.0   *
 15. NW      2                   *    ********  480200.9        5.0   *
 16. NW      3                   *    ********  480055.1        5.0   *
 17. NW      4                   *    ********  479881.1        5.0   *
 18. NW      5                   *    ********  479855.9        5.0   *
 19. NW      6                   *    ********  479829.8        5.0   *
 20. NW      7                   *    ********  479830.4        5.0   *
 21. NW      8                   *    ********  479850.4        5.0   *
 22. NW      9                   *    ********  480013.1        5.0   *
 23. NW      10                  *    ********  480177.6        5.0   *
 24. NW      11                  *    ********  480342.1        5.0   *
 25. SE      1                   *    ********  478847.3        5.0   *
 26. SE      2                   *    ********  479114.0        5.0   *
 27. SE      3                   *    ********  479382.2        5.0   *
 28. SE      4                   *    ********  479418.0        5.0   *
 29. SE      5                   *    ********  479453.8        5.0   *
 30. SE      6                   *    ********  479489.7        5.0   *
 31. SE      7                   *    ********  479525.6        5.0   *
 32. SE      8                   *    ********  479559.4        5.0   *
 33. SE      9                   *    ********  479583.4        5.0   *

PAGE  3
   JOB: PLINT25      2020BDAM                                      RUN: PLINT25       2020BDAM


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    RECEPTOR LOCATIONS
    ------------------
                           *          COORDINATES (FT)          *
     RECEPTOR              *      X          Y          Z       *
  -------------------------*------------------------------------*
 34. SE      10                  *    ********  479599.1        5.0   *
 35. SE      11                  *    ********  479590.0        5.0   *
 36. SE      12                  *    ********  479545.9        5.0   *
 37. SE      13                  *    ********  479566.8        5.0   *
 38. SE      14                  *    ********  479597.1        5.0   *
 39. SW      1                   *    ********  480274.3        5.0   *
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     40. SW     2                 *     ********   480099.8        5.0   *
     41. SW     3                 *     ********   479936.1        5.0   *
     42. SW     4                 *     ********   479772.5        5.0   *
     43. SW     5                 *     ********   479750.7        5.0   *
     44. SW     6                 *     ********   479728.8        5.0   *
     45. SW     7                 *     ********   479707.0        5.0   *
     46. SW     8                 *     ********   479684.8        5.0   *
     47. SW     9                 *     ********   479658.5        5.0   *
     48. SW     10                *     ********   479624.4        5.0   *
     49. SW     11                *     ********   479589.2        5.0   *
     50. SW     12                *     ********   479553.3        5.0   *
     51. SW     13                *     ********   479517.4        5.0   *
     52. SW     14                *     ********   479248.1        5.0   *
     53. SW     15                *     ********   478980.3        5.0   *
♀
   PAGE  4
      JOB: PLINT25      2020BDAM                                RUN: PLINT25       2020BDAM


       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:   0.-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC1  REC2  REC3  REC4  REC5  REC6  REC7  REC8  REC9  REC10 REC11 REC12 REC13 REC14 REC15 REC16
REC17 REC18 REC19 REC20

------*---------------------------------------------------------------------------------------------------
-------------------
   0.  *   0.2   0.3   0.2   0.2   0.2   0.1   0.1   0.3   0.6   0.4   0.2   0.2   0.0   0.0   0.1   0.1
0.0   0.0   0.0   0.0
   5.  *   0.2   0.2   0.2   0.2   0.2   0.2   0.1   0.2   0.6   0.3   0.2   0.2   0.0   0.0   0.1   0.1
0.0   0.0   0.0   0.0
  10.  *   0.2   0.2   0.3   0.2   0.2   0.2   0.1   0.2   0.5   0.3   0.2   0.3   0.0   0.0   0.1   0.1
0.0   0.0   0.0   0.0
  15.  *   0.2   0.2   0.3   0.2   0.2   0.1   0.1   0.2   0.5   0.4   0.2   0.3   0.0   0.0   0.1   0.1
0.1   0.1   0.0   0.0
  20.  *   0.2   0.2   0.3   0.2   0.2   0.1   0.1   0.1   0.5   0.4   0.2   0.3   0.0   0.0   0.1   0.1
0.1   0.1   0.1   0.0
  25.  *   0.2   0.2   0.2   0.2   0.2   0.1   0.1   0.1   0.4   0.3   0.2   0.2   0.0   0.0   0.1   0.1
0.2   0.1   0.1   0.1
```

30.	*	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.4	0.3	0.2	0.2	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.1
35.	*	0.2	0.3	0.2	0.1	0.1	0.0	0.0	0.1	0.3	0.3	0.2	0.2	0.0	0.0	0.0	0.1	0.3	0.2	0.2	0.1
40.	*	0.2	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.3	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.3	0.2	0.3	0.1
45.	*	0.2	0.3	0.2	0.1	0.1	0.1	0.0	0.0	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.3	0.4	0.4	0.1
50.	*	0.2	0.3	0.2	0.2	0.1	0.1	0.0	0.0	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.1
55.	*	0.2	0.3	0.2	0.2	0.1	0.1	0.0	0.0	0.1	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.5	0.4	0.5	0.3
60.	*	0.2	0.3	0.2	0.2	0.2	0.1	0.0	0.0	0.1	0.1	0.2	0.2	0.0	0.0	0.1	0.0	0.4	0.5	0.4	0.3
65.	*	0.2	0.3	0.2	0.3	0.2	0.1	0.0	0.0	0.1	0.1	0.2	0.2	0.0	0.0	0.1	0.1	0.4	0.5	0.4	0.3
70.	*	0.3	0.3	0.4	0.3	0.2	0.1	0.0	0.0	0.1	0.1	0.2	0.1	0.0	0.1	0.1	0.1	0.5	0.6	0.4	0.3
75.	*	0.3	0.4	0.4	0.3	0.2	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.5	0.6	0.4	0.2
80.	*	0.5	0.4	0.5	0.4	0.3	0.2	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.5	0.6	0.3	0.2
85.	*	0.5	0.4	0.5	0.4	0.3	0.2	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.6	0.6	0.2	0.1
90.	*	0.5	0.4	0.4	0.4	0.4	0.4	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.6	0.5	0.1	0.1
95.	*	0.6	0.3	0.4	0.6	0.4	0.4	0.3	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.6	0.5	0.1	0.1
100.	*	0.6	0.2	0.5	0.5	0.4	0.4	0.3	0.2	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.7	0.5	0.2	0.2
105.	*	0.5	0.2	0.7	0.6	0.4	0.4	0.4	0.2	0.2	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.7	0.6	0.1	0.3
110.	*	0.5	0.1	0.6	0.7	0.6	0.6	0.6	0.5	0.2	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.7	0.5	0.3	0.4
115.	*	0.5	0.2	0.7	0.7	0.5	0.6	0.6	0.6	0.4	0.3	0.1	0.0	0.0	0.1	0.1	0.1	0.9	0.6	0.3	0.5
120.	*	0.5	0.2	0.9	0.9	0.6	0.7	0.7	0.7	0.4	0.3	0.1	0.0	0.0	0.1	0.1	0.1	0.9	0.6	0.4	0.5
125.	*	0.5	0.2	0.8	0.8	0.6	0.6	0.7	0.8	0.4	0.4	0.1	0.0	0.0	0.1	0.1	0.1	1.0	0.5	0.4	0.7
130.	*	0.5	0.2	0.9	0.9	0.5	0.6	0.9	0.6	0.3	0.3	0.1	0.0	0.0	0.1	0.1	0.1	1.0	0.4	0.4	0.7
135.	*	0.6	0.2	0.9	0.9	0.6	0.8	0.8	0.7	0.4	0.3	0.1	0.0	0.0	0.1	0.1	0.1	1.0	0.5	0.5	0.7
140.	*	0.5	0.2	0.8	0.9	0.6	0.9	0.8	0.7	0.5	0.3	0.1	0.0	0.0	0.1	0.1	0.1	0.9	0.4	0.5	0.3
145.	*	0.4	0.2	0.7	0.9	0.6	0.8	0.9	0.6	0.5	0.3	0.1	0.0	0.0	0.1	0.1	0.1	0.9	0.4	0.3	0.3

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 150.  *   0.3   0.2   0.7   0.8   0.6   0.8   0.9   0.6   0.5   0.3   0.1   0.0   0.0   0.1   0.1   0.1
0.9   0.3   0.3   0.4
 155.  *   0.3   0.2   0.6   0.7   0.6   0.7   0.9   0.6   0.4   0.3   0.1   0.0   0.0   0.1   0.1   0.1
0.9   0.2   0.2   0.4
 160.  *   0.3   0.2   0.6   0.7   0.6   0.7   0.8   0.5   0.4   0.4   0.1   0.0   0.0   0.1   0.1   0.1
0.8   0.3   0.2   0.5
 165.  *   0.3   0.2   0.6   0.7   0.7   0.7   0.8   0.4   0.4   0.4   0.1   0.0   0.0   0.1   0.1   0.1
0.6   0.3   0.3   0.6
 170.  *   0.3   0.2   0.5   0.7   0.6   0.6   0.7   0.4   0.3   0.3   0.1   0.0   0.0   0.1   0.1   0.1
0.7   0.3   0.5   0.6
 175.  *   0.3   0.2   0.5   0.7   0.5   0.6   0.7   0.4   0.4   0.4   0.1   0.0   0.0   0.1   0.1   0.1
0.5   0.4   0.5   0.5
 180.  *   0.3   0.2   0.5   0.7   0.5   0.6   0.8   0.5   0.4   0.4   0.1   0.0   0.0   0.1   0.1   0.1
0.4   0.4   0.5   0.4
 185.  *   0.3   0.2   0.5   0.5   0.5   0.6   1.0   0.4   0.4   0.4   0.1   0.0   0.0   0.1   0.1   0.1
0.4   0.4   0.5   0.3
 190.  *   0.3   0.2   0.5   0.6   0.5   0.8   1.0   0.4   0.4   0.5   0.2   0.0   0.0   0.1   0.1   0.1
0.2   0.3   0.3   0.3
 195.  *   0.3   0.2   0.5   0.5   0.7   0.8   0.8   0.4   0.4   0.4   0.2   0.0   0.0   0.1   0.1   0.1
0.2   0.2   0.2   0.3
 200.  *   0.3   0.2   0.5   0.9   0.7   0.8   0.8   0.3   0.3   0.4   0.1   0.1   0.0   0.1   0.1   0.1
0.2   0.1   0.2   0.2
 205.  *   0.3   0.2   0.5   0.9   0.7   0.8   0.6   0.3   0.3   0.4   0.1   0.1   0.0   0.2   0.1   0.1
0.1   0.1   0.2   0.3
♀
   PAGE  5
      JOB: PLINT25      2020BDAM                                     RUN: PLINT25       2020BDAM


 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC1  REC2  REC3  REC4  REC5  REC6  REC7  REC8  REC9  REC10 REC11 REC12 REC13 REC14 REC15 REC16
REC17 REC18 REC19 REC20
 REC21 REC22 REC23 REC24 REC25 REC26 REC27 REC28 REC29 REC30 REC31 REC32 REC33 REC34 REC35 REC36 REC37 REC38
REC39 REC40
 REC41 REC42 REC43 REC44 REC45 REC46 REC47 REC48 REC49 REC50 REC51 REC52 REC53

------*-------------------------------------------------------------------------------------------------
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 ------*-------------------------------------------------------------------------------
 210.  *   0.3   0.2   0.6   0.9   0.6   0.7   0.5   0.3   0.2   0.1   0.1   0.1   0.0   0.2   0.1   0.1
0.1   0.1   0.2   0.3
 215.  *   0.4   0.2   0.6   0.7   0.6   0.7   0.5   0.2   0.2   0.1   0.1   0.1   0.0   0.2   0.1   0.1
0.1   0.1   0.1   0.4
 220.  *   0.4   0.2   0.6   0.7   0.6   0.8   0.6   0.2   0.2   0.1   0.2   0.1   0.1   0.2   0.1   0.0
```

0.1	0.1	0.1	0.4														
225.	*	0.4	0.2	0.6	0.7	0.6	0.9	0.5	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1
0.1	0.2	0.3	0.4														
230.	*	0.5	0.2	0.7	0.7	0.7	0.8	0.4	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1
0.1	0.3	0.3	0.4														
235.	*	0.5	0.2	0.7	0.8	0.7	0.7	0.4	0.2	0.1	0.3	0.2	0.2	0.2	0.1	0.1	0.1
0.2	0.2	0.4	0.4														
240.	*	0.5	0.3	0.7	0.8	0.6	0.7	0.4	0.2	0.1	0.3	0.2	0.2	0.2	0.1	0.0	0.1
0.2	0.3	0.4	0.5														
245.	*	0.6	0.3	0.7	0.8	0.6	0.7	0.3	0.2	0.1	0.5	0.2	0.2	0.2	0.1	0.0	0.1
0.3	0.3	0.4	0.5														
250.	*	0.6	0.3	0.8	0.7	0.7	0.7	0.3	0.2	0.2	0.5	0.3	0.2	0.2	0.0	0.0	0.1
0.3	0.3	0.4	0.6														
255.	*	0.7	0.3	0.8	0.7	0.7	0.6	0.3	0.3	0.2	0.4	0.2	0.2	0.2	0.0	0.0	0.1
0.3	0.3	0.3	0.6														
260.	*	0.7	0.4	0.8	0.7	0.6	0.5	0.3	0.4	0.2	0.6	0.2	0.2	0.2	0.0	0.0	0.1
0.3	0.3	0.4	0.5														
265.	*	0.7	0.4	0.8	0.7	0.6	0.5	0.3	0.3	0.4	0.6	0.2	0.2	0.2	0.0	0.0	0.1
0.2	0.3	0.4	0.5														
270.	*	0.6	0.4	0.8	0.8	0.7	0.5	0.4	0.2	0.4	0.7	0.2	0.2	0.2	0.0	0.0	0.1
0.2	0.3	0.4	0.5														
275.	*	0.6	0.6	0.9	0.8	0.6	0.5	0.4	0.4	0.3	0.7	0.2	0.2	0.2	0.0	0.0	0.1
0.1	0.2	0.4	0.5														
280.	*	0.6	0.5	0.9	0.8	0.6	0.5	0.6	0.4	0.2	0.7	0.2	0.2	0.2	0.0	0.0	0.1
0.1	0.2	0.4	0.6														
285.	*	0.6	0.5	0.7	0.8	0.7	0.6	0.6	0.4	0.2	0.7	0.2	0.2	0.2	0.0	0.0	0.1
0.1	0.1	0.3	0.5														
290.	*	0.4	0.4	0.7	0.9	0.5	0.5	0.3	0.3	0.2	0.7	0.2	0.1	0.2	0.0	0.0	0.1
0.1	0.1	0.3	0.5														
295.	*	0.4	0.3	0.6	0.8	0.4	0.2	0.1	0.1	0.2	0.7	0.2	0.1	0.2	0.0	0.0	0.1
0.1	0.1	0.2	0.5														
300.	*	0.2	0.3	0.6	0.7	0.4	0.2	0.1	0.1	0.3	0.7	0.2	0.1	0.2	0.0	0.0	0.1
0.1	0.1	0.2	0.4														
305.	*	0.2	0.3	0.5	0.6	0.4	0.3	0.2	0.1	0.4	0.7	0.2	0.1	0.2	0.0	0.0	0.1
0.1	0.1	0.2	0.4														
310.	*	0.2	0.3	0.3	0.6	0.4	0.3	0.2	0.2	0.6	0.6	0.2	0.1	0.2	0.0	0.0	0.1
0.0	0.1	0.1	0.3														
315.	*	0.2	0.3	0.2	0.6	0.3	0.2	0.1	0.1	0.5	0.6	0.2	0.1	0.2	0.0	0.0	0.1
0.0	0.0	0.1	0.3														
320.	*	0.2	0.3	0.2	0.3	0.2	0.2	0.1	0.1	0.5	0.6	0.2	0.1	0.2	0.0	0.0	0.1
0.0	0.0	0.1	0.2														
325.	*	0.2	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.5	0.6	0.2	0.1	0.2	0.0	0.0	0.1
0.0	0.0	0.0	0.1														
330.	*	0.2	0.3	0.2	0.2	0.2	0.1	0.2	0.3	0.6	0.6	0.2	0.1	0.2	0.0	0.0	0.1
0.0	0.0	0.0	0.1														
335.	*	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.3	0.7	0.5	0.2	0.1	0.2	0.0	0.0	0.1
0.0	0.0	0.0	0.1														
340.	*	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.3	0.7	0.5	0.2	0.1	0.2	0.0	0.0	0.1

```
0.0   0.0   0.0   0.0
 345.  *   0.2   0.2   0.2   0.1   0.2   0.2   0.2   0.3   0.7   0.5   0.2   0.1   0.2   0.0   0.1   0.1
0.0   0.0   0.0   0.0
 350.  *   0.2   0.2   0.2   0.1   0.2   0.1   0.2   0.3   0.7   0.4   0.2   0.1   0.0   0.0   0.1   0.1
0.0   0.0   0.0   0.0
 355.  *   0.2   0.2   0.2   0.1   0.2   0.1   0.2   0.3   0.7   0.4   0.2   0.1   0.0   0.0   0.1   0.1
0.0   0.0   0.0   0.0
 360.  *   0.2   0.3   0.2   0.2   0.2   0.1   0.1   0.3   0.6   0.4   0.2   0.2   0.0   0.0   0.1   0.1
0.0   0.0   0.0   0.0

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 MAX   *   0.7   0.6   0.9   0.9   0.7   0.9   1.0   0.8   0.7   0.7   0.3   0.3   0.2   0.2   0.1   0.1
1.0   0.6   0.5   0.7
 DEGR. *  255   275   120   120   165   140   185   125   335   270   250    10   225   205     0     0
125    70    55   125

♀
   PAGE  6
      JOB: PLINT25      2020BDAM                                      RUN: PLINT25       2020BDAM


       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:   0.-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC21 REC22 REC23 REC24 REC25 REC26 REC27 REC28 REC29 REC30 REC31 REC32 REC33 REC34 REC35 REC36
REC37 REC38 REC39 REC40

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-------------------
   0.  *   0.0   0.0   0.0   0.0   0.1   0.2   0.3   0.3   0.2   0.1   0.0   0.0   0.2   0.4   0.3   0.1
0.3   0.2   0.0   0.2
   5.  *   0.0   0.0   0.0   0.0   0.1   0.0   0.1   0.1   0.0   0.0   0.0   0.1   0.4   0.4   0.4   0.1
0.3   0.2   0.0   0.2
  10.  *   0.0   0.0   0.0   0.0   0.1   0.0   0.1   0.1   0.1   0.1   0.1   0.2   0.4   0.4   0.4   0.1
0.3   0.2   0.0   0.2
  15.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.2   0.2   0.2   0.2   0.4   0.4   0.4   0.1
0.3   0.2   0.0   0.2
  20.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.2   0.2   0.2   0.2   0.3   0.3   0.5   0.1
```

```
0.3   0.1   0.0   0.2
  25.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.2   0.2   0.3   0.3   0.4   0.4   0.1
0.3   0.1   0.1   0.2
  30.  *   0.1   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.2   0.2   0.4   0.4   0.1
0.3   0.0   0.2   0.2
  35.  *   0.1   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.2   0.2   0.4   0.4   0.1
0.3   0.0   0.2   0.2
  40.  *   0.1   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.2   0.2   0.5   0.5   0.1
0.3   0.0   0.2   0.2
  45.  *   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.2   0.2   0.5   0.5   0.1
0.3   0.0   0.2   0.2
  50.  *   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.2   0.3   0.5   0.5   0.1
0.3   0.0   0.2   0.2
  55.  *   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.3   0.4   0.5   0.5   0.1
0.3   0.0   0.2   0.2
  60.  *   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.3   0.3   0.5   0.5   0.5   0.1
0.1   0.0   0.2   0.2
  65.  *   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.3   0.3   0.5   0.5   0.5   0.1
0.1   0.0   0.2   0.2
  70.  *   0.2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.3   0.4   0.5   0.5   0.5   0.1
0.1   0.0   0.2   0.3
  75.  *   0.2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.2   0.4   0.4   0.5   0.5   0.0
0.0   0.0   0.2   0.3
  80.  *   0.2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.4   0.4   0.4   0.4   0.0
0.0   0.0   0.2   0.3
  85.  *   0.2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.2   0.4   0.4   0.4   0.0
0.0   0.0   0.3   0.3
  90.  *   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.3   0.4   0.3   0.1
0.0   0.0   0.3   0.3
  95.  *   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.3   0.3   0.1
0.0   0.0   0.3   0.3
 100.  *   0.3   0.1   0.1   0.1   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.3   0.2   0.2
0.0   0.0   0.3   0.3
 105.  *   0.3   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.2   0.1   0.3
0.0   0.0   0.3   0.3
 110.  *   0.4   0.2   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.4
0.0   0.0   0.3   0.3
 115.  *   0.5   0.2   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.4
0.0   0.0   0.3   0.3
 120.  *   0.5   0.4   0.3   0.3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.5
0.1   0.0   0.3   0.2
 125.  *   0.7   0.4   0.3   0.3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.5
0.1   0.0   0.3   0.1
 130.  *   0.5   0.4   0.4   0.4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.5
0.1   0.0   0.1   0.1
 135.  *   0.5   0.6   0.4   0.4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.5
0.1   0.0   0.1   0.1
 140.  *   0.3   0.6   0.4   0.4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.4
```

```
0.1   0.0   0.1   0.1
 145.  *   0.3   0.6   0.4   0.4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.4
0.1   0.0   0.1   0.1
 150.  *   0.4   0.6   0.4   0.4   0.0   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.4
0.1   0.0   0.0   0.1
 155.  *   0.4   0.6   0.4   0.3   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.4
0.1   0.0   0.0   0.0
 160.  *   0.5   0.5   0.3   0.3   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.3
0.1   0.0   0.0   0.0
 165.  *   0.5   0.4   0.3   0.4   0.1   0.1   0.0   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.3
0.1   0.0   0.0   0.0
 170.  *   0.5   0.4   0.3   0.4   0.1   0.2   0.3   0.3   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.3
0.1   0.0   0.0   0.0
 175.  *   0.4   0.4   0.3   0.4   0.1   0.3   0.3   0.4   0.3   0.3   0.3   0.2   0.0   0.0   0.0   0.3
0.1   0.0   0.0   0.0
 180.  *   0.2   0.4   0.3   0.4   0.2   0.3   0.3   0.4   0.3   0.3   0.4   0.2   0.1   0.0   0.0   0.3
0.1   0.0   0.0   0.0
 185.  *   0.3   0.4   0.2   0.3   0.2   0.3   0.3   0.4   0.3   0.4   0.4   0.4   0.2   0.0   0.0   0.3
0.1   0.0   0.0   0.0
 190.  *   0.4   0.3   0.2   0.3   0.2   0.3   0.3   0.5   0.4   0.4   0.6   0.4   0.2   0.1   0.0   0.3
0.1   0.0   0.0   0.0
 195.  *   0.4   0.2   0.2   0.3   0.2   0.3   0.4   0.5   0.4   0.5   0.6   0.4   0.2   0.2   0.1   0.3
0.1   0.0   0.0   0.0
 200.  *   0.4   0.2   0.2   0.3   0.2   0.3   0.4   0.6   0.5   0.5   0.6   0.6   0.3   0.2   0.1   0.3
0.1   0.0   0.0   0.0
 205.  *   0.4   0.2   0.2   0.3   0.3   0.3   0.4   0.6   0.5   0.5   0.7   0.6   0.3   0.2   0.2   0.3
0.1   0.0   0.0   0.0
♀
   PAGE  7
      JOB: PLINT25      2020BDAM                                        RUN: PLINT25       2020BDAM


 WIND ANGLE RANGE:   0.-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC21 REC22 REC23 REC24 REC25 REC26 REC27 REC28 REC29 REC30 REC31 REC32 REC33 REC34 REC35 REC36
REC37 REC38 REC39 REC40

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 210.  *   0.4   0.2   0.2   0.3   0.3   0.3   0.5   0.6   0.5   0.6   0.7   0.6   0.3   0.2   0.2   0.3
0.1   0.0   0.0   0.0
 215.  *   0.5   0.2   0.2   0.3   0.2   0.3   0.5   0.7   0.5   0.6   0.7   0.6   0.4   0.3   0.2   0.3
0.1   0.0   0.0   0.0
 220.  *   0.5   0.2   0.2   0.3   0.2   0.2   0.5   0.7   0.5   0.7   0.7   0.6   0.4   0.3   0.2   0.3
0.1   0.0   0.0   0.0
 225.  *   0.5   0.2   0.2   0.2   0.2   0.2   0.5   0.7   0.5   0.7   0.7   0.6   0.4   0.3   0.2   0.3
```

```
0.1   0.0   0.0   0.0
 230.  *    0.5   0.2   0.2   0.2   0.2   0.2   0.5   0.6   0.5   0.6   0.6   0.6   0.4   0.4   0.2   0.3
0.1   0.0   0.0   0.0
 235.  *    0.5   0.2   0.2   0.2   0.2   0.2   0.5   0.6   0.5   0.6   0.6   0.6   0.4   0.4   0.2   0.3
0.1   0.0   0.0   0.0
 240.  *    0.5   0.2   0.2   0.2   0.2   0.2   0.5   0.6   0.5   0.6   0.6   0.6   0.4   0.3   0.1   0.3
0.1   0.0   0.0   0.0
 245.  *    0.5   0.2   0.2   0.2   0.2   0.2   0.5   0.6   0.5   0.6   0.6   0.6   0.4   0.3   0.1   0.3
0.1   0.0   0.0   0.0
 250.  *    0.5   0.3   0.3   0.2   0.2   0.2   0.5   0.6   0.5   0.6   0.6   0.6   0.3   0.2   0.1   0.3
0.1   0.0   0.0   0.0
 255.  *    0.5   0.3   0.3   0.2   0.2   0.2   0.5   0.6   0.5   0.6   0.6   0.6   0.3   0.1   0.1   0.5
0.1   0.0   0.0   0.0
 260.  *    0.5   0.3   0.3   0.2   0.2   0.2   0.5   0.6   0.5   0.6   0.6   0.6   0.3   0.1   0.1   0.5
0.1   0.1   0.0   0.0
 265.  *    0.5   0.3   0.3   0.2   0.2   0.2   0.5   0.6   0.5   0.6   0.6   0.5   0.3   0.1   0.1   0.5
0.1   0.1   0.0   0.0
 270.  *    0.5   0.3   0.3   0.2   0.2   0.2   0.6   0.6   0.5   0.6   0.6   0.5   0.3   0.1   0.1   0.4
0.1   0.3   0.0   0.0
 275.  *    0.5   0.3   0.4   0.2   0.2   0.2   0.6   0.6   0.5   0.6   0.6   0.5   0.3   0.1   0.1   0.5
0.2   0.3   0.0   0.0
 280.  *    0.5   0.4   0.4   0.2   0.2   0.2   0.6   0.6   0.5   0.6   0.6   0.5   0.2   0.1   0.1   0.6
0.2   0.3   0.0   0.0
 285.  *    0.5   0.4   0.4   0.2   0.2   0.2   0.6   0.6   0.5   0.6   0.6   0.5   0.1   0.0   0.0   0.7
0.4   0.3   0.0   0.0
 290.  *    0.5   0.4   0.4   0.2   0.2   0.2   0.6   0.6   0.6   0.6   0.6   0.5   0.1   0.1   0.0   0.6
0.3   0.3   0.0   0.0
 295.  *    0.5   0.4   0.4   0.2   0.2   0.2   0.6   0.6   0.6   0.6   0.5   0.5   0.1   0.1   0.1   0.6
0.3   0.4   0.0   0.0
 300.  *    0.4   0.4   0.4   0.2   0.2   0.2   0.6   0.6   0.6   0.6   0.5   0.5   0.0   0.1   0.2   0.5
0.3   0.4   0.0   0.0
 305.  *    0.4   0.4   0.3   0.2   0.2   0.2   0.6   0.6   0.6   0.6   0.6   0.5   0.1   0.2   0.2   0.5
0.3   0.2   0.0   0.2
 310.  *    0.4   0.4   0.3   0.1   0.3   0.2   0.7   0.6   0.7   0.7   0.6   0.6   0.2   0.2   0.2   0.5
0.3   0.2   0.0   0.2
 315.  *    0.3   0.3   0.2   0.1   0.3   0.2   0.7   0.6   0.7   0.6   0.7   0.6   0.1   0.2   0.1   0.4
0.3   0.2   0.0   0.2
 320.  *    0.2   0.2   0.2   0.1   0.3   0.3   0.7   0.6   0.8   0.6   0.7   0.4   0.1   0.2   0.1   0.3
0.3   0.2   0.0   0.2
 325.  *    0.2   0.2   0.1   0.1   0.3   0.3   0.7   0.7   0.8   0.7   0.7   0.3   0.1   0.1   0.4   0.3
0.3   0.2   0.0   0.3
 330.  *    0.1   0.1   0.1   0.0   0.3   0.3   0.6   0.7   0.6   0.7   0.6   0.2   0.0   0.2   0.4   0.1
0.3   0.2   0.0   0.3
 335.  *    0.1   0.1   0.1   0.0   0.3   0.4   0.6   0.7   0.5   0.5   0.4   0.0   0.0   0.2   0.4   0.1
0.3   0.2   0.0   0.3
 340.  *    0.1   0.1   0.1   0.0   0.3   0.4   0.7   0.6   0.5   0.4   0.4   0.0   0.0   0.4   0.4   0.1
0.3   0.2   0.0   0.3
 345.  *    0.0   0.0   0.0   0.0   0.3   0.4   0.5   0.5   0.4   0.4   0.3   0.0   0.0   0.4   0.4   0.1
```

																	0.3	0.2	0.0	0.3
350. *	0.0	0.0	0.0	0.0	0.3	0.4	0.5	0.5	0.4	0.3	0.2	0.0	0.0	0.4	0.4	0.1	0.3	0.2	0.0	0.3
355. *	0.0	0.0	0.0	0.0	0.2	0.4	0.4	0.4	0.3	0.2	0.1	0.0	0.2	0.4	0.4	0.1	0.3	0.2	0.0	0.2
360. *	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.3	0.2	0.1	0.0	0.0	0.2	0.4	0.3	0.1	0.3	0.2	0.0	0.2
MAX *	0.7	0.6	0.4	0.4	0.3	0.4	0.7	0.7	0.8	0.7	0.7	0.6	0.5	0.5	0.5	0.7	0.4	0.4	0.3	0.3
DEGR. *	125	135	130	130	205	335	310	215	320	220	205	200	60	40	20	285	285	295	85	70

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JOB: PLINT25 2020BDAM RUN: PLINT25 2020BDAM

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE * CONCENTRATION (PPM)

(DEGR)*	REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53
0. *	0.1	0.6	0.6	0.6	0.4	0.1	0.0	0.1	0.2	0.3	0.2	0.3	0.3
5. *	0.1	0.6	0.6	0.6	0.3	0.1	0.1	0.1	0.2	0.3	0.2	0.4	0.3
10. *	0.1	0.6	0.6	0.6	0.3	0.0	0.2	0.1	0.2	0.3	0.2	0.4	0.2
15. *	0.1	0.6	0.6	0.6	0.3	0.0	0.3	0.2	0.3	0.4	0.4	0.4	0.2
20. *	0.1	0.6	0.6	0.6	0.2	0.2	0.3	0.2	0.3	0.4	0.4	0.4	0.2
25. *	0.1	0.6	0.6	0.7	0.2	0.2	0.4	0.2	0.3	0.4	0.4	0.4	0.2
30. *	0.1	0.6	0.7	0.7	0.1	0.2	0.3	0.2	0.3	0.5	0.5	0.3	0.2
35. *	0.1	0.7	0.7	0.7	0.2	0.3	0.3	0.2	0.3	0.4	0.5	0.3	0.2
40. *	0.1	0.7	0.7	0.6	0.2	0.3	0.2	0.2	0.1	0.3	0.5	0.3	0.2
45. *	0.1	0.7	0.7	0.5	0.3	0.4	0.1	0.1	0.1	0.4	0.5	0.2	0.3
50. *	0.1	0.7	0.7	0.5	0.3	0.1	0.2	0.2	0.2	0.4	0.6	0.2	0.3
55. *	0.1	0.7	0.7	0.6	0.2	0.1	0.2	0.3	0.2	0.5	0.6	0.2	0.3
60. *	0.1	0.7	0.7	0.4	0.1	0.2	0.2	0.3	0.3	0.5	0.6	0.2	0.2
65. *	0.1	0.6	0.5	0.3	0.0	0.2	0.4	0.3	0.4	0.6	0.6	0.2	0.2

70.	*	0.1	0.6	0.5	0.3	0.1	0.3	0.3	0.4	0.4	0.6	0.6	0.2	0.2
75.	*	0.1	0.6	0.6	0.3	0.1	0.4	0.3	0.4	0.5	0.8	0.6	0.2	0.2
80.	*	0.1	0.6	0.5	0.2	0.2	0.3	0.4	0.5	0.6	0.8	0.5	0.2	0.3
85.	*	0.2	0.6	0.4	0.2	0.3	0.4	0.5	0.4	0.5	0.6	0.6	0.2	0.3
90.	*	0.2	0.7	0.4	0.3	0.4	0.5	0.5	0.4	0.6	0.6	0.6	0.2	0.2
95.	*	0.2	0.7	0.5	0.4	0.4	0.4	0.3	0.4	0.5	0.5	0.6	0.2	0.2
100.	*	0.2	0.8	0.5	0.3	0.4	0.3	0.3	0.3	0.5	0.5	0.6	0.2	0.2
105.	*	0.2	0.7	0.5	0.2	0.3	0.3	0.3	0.3	0.5	0.5	0.6	0.2	0.3
110.	*	0.4	0.5	0.4	0.2	0.3	0.2	0.3	0.4	0.5	0.6	0.5	0.2	0.3
115.	*	0.5	0.3	0.2	0.1	0.2	0.2	0.3	0.5	0.5	0.5	0.4	0.2	0.3
120.	*	0.4	0.3	0.2	0.1	0.3	0.3	0.2	0.4	0.5	0.5	0.4	0.2	0.3
125.	*	0.4	0.2	0.2	0.1	0.2	0.2	0.2	0.4	0.5	0.5	0.4	0.2	0.3
130.	*	0.3	0.2	0.1	0.1	0.2	0.2	0.3	0.4	0.7	0.6	0.5	0.2	0.3
135.	*	0.2	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.7	0.5	0.5	0.2	0.3
140.	*	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.5	0.8	0.5	0.5	0.2	0.3
145.	*	0.1	0.2	0.1	0.1	0.1	0.3	0.3	0.4	0.7	0.6	0.5	0.2	0.2
150.	*	0.1	0.3	0.2	0.2	0.2	0.4	0.4	0.4	0.7	0.5	0.5	0.2	0.2
155.	*	0.1	0.3	0.3	0.2	0.2	0.2	0.4	0.4	0.7	0.5	0.5	0.2	0.2
160.	*	0.1	0.2	0.2	0.3	0.2	0.2	0.4	0.5	0.6	0.5	0.4	0.2	0.2
165.	*	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.6	0.6	0.4	0.4	0.2	0.2
170.	*	0.1	0.1	0.1	0.2	0.1	0.2	0.3	0.5	0.5	0.4	0.4	0.2	0.1
175.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.5	0.4	0.3	0.1	0.1
180.	*	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.2	0.4	0.2	0.2	0.1	0.1
185.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.1	0.0
190.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.0	0.0
195.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0
200.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0
205.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0

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JOB: PLINT25 2020BDAM RUN: PLINT25 2020BDAM

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53
210.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
215.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
220.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
225.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
230.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
235.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
240.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
245.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
250.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0

255.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
260.	*	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
265.	*	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
270.	*	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
275.	*	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
280.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
285.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
290.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
295.	*	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
300.	*	0.1	0.2	0.2	0.2	0.3	0.3	0.1	0.1	0.2	0.1	0.0	0.0	0.0
305.	*	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.0	0.0	0.0
310.	*	0.1	0.2	0.3	0.4	0.4	0.4	0.4	0.2	0.2	0.1	0.0	0.0	0.0
315.	*	0.2	0.4	0.5	0.5	0.6	0.5	0.4	0.3	0.3	0.1	0.0	0.0	0.0
320.	*	0.2	0.5	0.5	0.6	0.6	0.5	0.4	0.3	0.3	0.2	0.1	0.0	0.0
325.	*	0.3	0.5	0.6	0.6	0.7	0.5	0.4	0.3	0.4	0.3	0.2	0.0	0.0
330.	*	0.3	0.5	0.6	0.7	0.6	0.5	0.3	0.3	0.4	0.3	0.3	0.0	0.0
335.	*	0.2	0.6	0.7	0.7	0.6	0.4	0.3	0.3	0.4	0.3	0.3	0.0	0.0
340.	*	0.2	0.6	0.7	0.7	0.6	0.4	0.3	0.3	0.3	0.4	0.3	0.0	0.1
345.	*	0.2	0.6	0.7	0.7	0.6	0.3	0.2	0.2	0.3	0.3	0.2	0.1	0.1
350.	*	0.2	0.6	0.7	0.7	0.6	0.3	0.1	0.2	0.1	0.2	0.3	0.2	0.1
355.	*	0.2	0.7	0.7	0.7	0.5	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.3
360.	*	0.1	0.6	0.6	0.6	0.4	0.1	0.0	0.1	0.2	0.3	0.2	0.3	0.3
MAX	*	0.5	0.8	0.7	0.7	0.7	0.5	0.5	0.6	0.8	0.8	0.6	0.4	0.3
DEGR.	*	115	100	30	25	325	90	85	165	140	75	50	5	0

THE HIGHEST CONCENTRATION OF 1.00 PPM OCCURRED AT RECEPTOR REC17.

PERSISTENCE FACTOR CALCULATIONS

Pollutant and Averaging Period			Rockville 5110 Meadowside Lane			Upper Marlboro 14900 Pennsylvania Avenue			Beltsville 12003 Old Baltimore Pike			Washington, D.C. L Street and 20th Street			Washington, D.C. 420 34th Street N.E.			Washington, D.C. 2500 1st Street N.W.		
			2009	**2010**	**2011**	**2009**	**2010**	**2011**	**2009**	**2010**	**2011**	**2009**	**2010**	**2011**	**2009**	**2010**	**2011**	**2009**	**2010**	**2011**
Carbon Monoxide (CO) ppm	**1-Hour**	Maximum							1.1	1.5	1.7	2.5	2.8	5	4.2	3.7	2.7			3.1
		Second Maximum							1.1	1.3	1.3	2.5	2.7	4.2	4.2	3.7	2.7			3
		# Exceedances							0	0	0	0	0	0	0	0	0			0
	8-Hour	Maximum							0.9	1	1.1	2	2.4	2.2	4	3.5	2.5			2.5
		Second Maximum							0.9	1	0.8	1.9	2	1.9	3.8	3.1	2.3			2.4
		# Exceedances							0	0	0	0	0	0	0	0	0			0
		Ratio of 1-hr Max to 8-hr Max							0.82	0.67	0.65	0.80	0.86	0.44	0.95	0.95	0.93			0.81
		Persistence Factor by using these 6 monitors (3 with complete data, 1 incomplete, 2 no data)							**0.79**											
		Ratio of 1-hr 2nd Max to 8-hr 2nd Max							0.82	0.77	0.62	0.76	0.74	0.45	0.90	0.84	0.85			0.80
		Persistence Factor by using these 6 monitors (3 with complete data, 1 incomplete, 2 no data)							0.755037											

CARBON MONOXIDE EMISSION FACTORS

2011 PG County		2014 PG County			2020 PG County			2040 PG County		
Spd mph	CO Jan-Apr	Spd mph	CO Jan-Apr	Ratio 2014 to 2011	Spd mph	CO Jan-Apr	Ratio 2020 to 2011	Spd mph	CO Jan-Apr	Ratio 2040 to 2011
---	------	---	------		---	------		---	------	
1	20.41	1	18.39	0.90	1	15.24	0.75	1	14.27	0.70
2	20.41	2	18.39	0.90	2	15.24	0.75	2	14.27	0.70
2.5	18.94	2.5	17.08	0.90	2.5	14.162	0.75	2.5	13.27	0.70
3	17.47	3	15.76	0.90	3	13.084	0.75	3	12.26	0.70
4	13.80	4	12.48	0.90	4	10.388	0.75	4	9.75	0.71
5	11.60	5	10.50	0.91	5	8.771	0.76	5	8.24	0.71
6	10.15	6	9.20	0.91	6	7.691	0.76	6	7.23	0.71
7	9.11	7	8.27	0.91	7	6.919	0.76	7	6.50	0.71
8	8.34	8	7.57	0.91	8	6.34	0.76	8	5.96	0.71
9	7.73	9	7.03	0.91	9	5.89	0.76	9	5.54	0.72
10	7.25	10	6.59	0.91	10	5.53	0.76	10	5.20	0.72
11	6.87	11	6.25	0.91	11	5.242	0.76	11	4.93	0.72
12	6.56	12	5.96	0.91	12	5.002	0.76	12	4.70	0.72
13	6.29	13	5.72	0.91	13	4.798	0.76	13	4.51	0.72
14	6.06	14	5.51	0.91	14	4.624	0.76	14	4.34	0.72
15	5.87	15	5.33	0.91	15	4.473	0.76	15	4.20	0.72
16	5.69	16	5.17	0.91	16	4.338	0.76	16	4.07	0.72
17	5.53	17	5.03	0.91	17	4.218	0.76	17	3.95	0.72
18	5.39	18	4.90	0.91	18	4.111	0.76	18	3.85	0.71
19	5.26	19	4.79	0.91	19	4.016	0.76	19	3.76	0.71
20	5.15	20	4.68	0.91	20	3.93	0.76	20	3.68	0.71
21	5.05	21	4.60	0.91	21	3.857	0.76	21	3.61	0.71
22	4.97	22	4.52	0.91	22	3.79	0.76	22	3.55	0.71
23	4.89	23	4.45	0.91	23	3.728	0.76	23	3.49	0.71
24	4.82	24	4.38	0.91	24	3.672	0.76	24	3.43	0.71
25	4.75	25	4.32	0.91	25	3.621	0.76	25	3.38	0.71
26	4.71	26	4.29	0.91	26	3.594	0.76	26	3.36	0.71
27	4.67	27	4.25	0.91	27	3.57	0.76	27	3.34	0.71
28	4.64	28	4.23	0.91	28	3.548	0.76	28	3.31	0.71
29	4.61	29	4.20	0.91	29	3.526	0.77	29	3.29	0.71
30	4.58	30	4.17	0.91	30	3.507	0.77	30	3.28	0.72
31	4.59	31	4.18	0.91	31	3.513	0.77	31	3.28	0.72
32	4.59	32	4.19	0.91	32	3.519	0.77	32	3.28	0.71
33	4.60	33	4.19	0.91	33	3.524	0.77	33	3.29	0.72
34	4.61	34	4.20	0.91	34	3.529	0.77	34	3.29	0.72
35	4.61	35	4.20	0.91	35	3.534	0.77	35	3.30	0.71
36	4.69	36	4.27	0.91	36	3.598	0.77	36	3.36	0.72
37	4.75	37	4.34	0.91	37	3.658	0.77	37	3.41	0.72
38	4.82	38	4.40	0.91	38	3.716	0.77	38	3.47	0.72
39	4.88	39	4.46	0.91	39	3.77	0.77	39	3.52	0.72
40	4.95	40	4.52	0.91	40	3.822	0.77	40	3.57	0.72
41	5.02	41	4.59	0.91	41	3.887	0.77	41	3.63	0.72
42	5.09	42	4.66	0.92	42	3.949	0.78	42	3.69	0.72
43	5.16	43	4.73	0.92	43	4.009	0.78	43	3.74	0.72
44	5.23	44	4.79	0.92	44	4.065	0.78	44	3.80	0.73
45	5.29	45	4.85	0.92	45	4.119	0.78	45	3.85	0.73
46	5.37	46	4.93	0.92	46	4.186	0.78	46	3.91	0.73
47	5.45	47	5.00	0.92	47	4.249	0.78	47	3.97	0.73
48	5.52	48	5.06	0.92	48	4.31	0.78	48	4.03	0.73
49	5.59	49	5.13	0.92	49	4.369	0.78	49	4.08	0.73
50	5.65	50	5.19	0.92	50	4.425	0.78	50	4.14	0.73
51	5.73	51	5.27	0.92	51	4.493	0.78	51	4.20	0.73
52	5.81	52	5.34	0.92	52	4.558	0.78	52	4.26	0.73
53	5.89	53	5.41	0.92	53	4.621	0.79	53	4.32	0.73
54	5.96	54	5.48	0.92	54	4.681	0.79	54	4.38	0.73
55	6.03	55	5.55	0.92	55	4.74	0.79	55	4.43	0.74
56	6.12	56	5.63	0.92	56	4.814	0.79	56	4.50	0.74
57	6.20	57	5.71	0.92	57	4.886	0.79	57	4.57	0.74
58	6.28	58	5.79	0.92	58	4.956	0.79	58	4.64	0.74
59	6.36	59	5.86	0.92	59	5.023	0.79	59	4.70	0.74
60	6.44	60	5.93	0.92	60	5.088	0.79	60	4.76	0.74
61	6.53	61	6.02	0.92	61	5.165	0.79	61	4.84	0.74
62	6.62	62	6.11	0.92	62	5.24	0.79	62	4.91	0.74
63	6.71	63	6.19	0.92	63	5.312	0.79	63	4.98	0.74
64	6.79	64	6.27	0.92	64	5.382	0.79	64	5.05	0.74
65	6.88	65	6.34	0.92	65	5.45	0.79	65	5.11	0.74
			AVERAGE	0.91		AVERAGE	0.77		AVERAGE	0.72
				2014 to 2011			2020 to 2011			2040 to 2011

CAL3QHC SUMMARY
MAXIMUM CO CONCENTRATIONS

VOLUMES	INTERSECTION ENTERING VOLUMES		2011		2014		2020 NB		2020 BD		2040 NB		2040 BD	
ID	Major Approach	Minor Approach	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)	4900	4762	4973	4833	5119	4975	4961	4913	5655	5496	5516	5452
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)	5265	5463	5344	5545	5501	5708	5174	5412	6077	6306	5751	6004
25	University Blvd (MD 193)	Riggs Road (MD 212)	4318	5409	4383	5490	4512	5651	4421	5733	4985	6243	4985	6243
30	Campus Dr	Adelphi Rd	3278	4043	3186	3973	3001	3833	2984	3812	3664	4676	3642	4650
37	Paint Branch Pkwy	Metro Parking	2138	2391	2369	2649	2831	3166	2852	3191	5104	5708	5149	5753
42	Kenilworth Ave (MD 201)	E-W Highway (MD 410)	6035	6945	6216	7153	6578	7570	6578	7570	8027	9237	8027	9237
49	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)	4312	4565	4399	4657	4573	4842	4983	5165	3874	3820	3707	3655

PHV RATIOS	INTERSECTION VOLUME RATIO TO 2011		2011		2014		2020 NB		2020 BD		2040 NB		2040 BD	
ID	Major Approach	Minor Approach	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)	-	-	1.01	1.01	1.04	1.04	1.01	1.03	1.15	1.15	1.13	1.14
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)	-	-	1.01	1.01	1.04	1.04	0.98	0.99	1.15	1.15	1.09	1.10
25	University Blvd (MD 193)	Riggs Road (MD 212)	-	-	1.01	1.01	1.04	1.04	1.02	1.06	1.15	1.15	1.15	1.15
30	Campus Dr	Adelphi Rd	-	-	0.97	0.98	0.92	0.95	0.91	0.94	1.12	1.16	1.11	1.15
37	Paint Branch Pkwy	Metro Parking	-	-	1.11	1.11	1.32	1.32	1.33	1.33	2.39	2.39	2.41	2.41
42	Kenilworth Ave (MD 201)	E-W Highway (MD 410)	-	-	1.03	1.03	1.09	1.09	1.09	1.09	1.33	1.33	1.33	1.33
49	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)	-	-	1.02	1.02	1.06	1.06	1.16	1.13	0.90	0.84	0.86	0.80

	2014 to 2011	2020 to 2011	2040 to 2011
EMISSION FACTOR RATIO	0.91	0.77	0.72
PERSISTENCE FACTOR	0.79		

EMISSION FACTOR RATIO BASED ON MOBILE6.2 EMISSION RATES PROVIDED BY MWCOG

PERSISTENCE FACTOR BASED ON 2009-2011 MONITORING DATA

MODELED	INTERSECTION 1 HR CONCENTRATIONS		2011		2014		2020 NB		2020 BD		2040 NB		2040 BD	
ID	Major Approach	Minor Approach	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)	-	-	1.40	1.60	2.10	1.40	1.90	2.00	1.50	1.40	1.80	2.00
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)	-	-	1.90	1.90	1.50	1.60	1.70	2.00	1.40	1.60	1.60	2.10
25	University Blvd (MD 193)	Riggs Road (MD 212)	-	-	1.40	2.10	1.30	1.80	1.00	1.60	1.30	1.80	1.00	1.60
30	Campus Dr	Adelphi Rd	-	-	1.80	2.10	1.50	3.10	1.40	2.10	1.80	2.20	2.10	2.30
37	Paint Branch Pkwy	Metro Parking	-	-	0.70	0.80	0.60	0.80	0.90	1.20	1.00	1.40	1.20	1.30
42	Kenilworth Ave (MD 201)	E-W Highway (MD 410)	-	-	1.50	1.90	1.20	1.60	1.80	2.30	1.30	1.80	1.70	2.30
49	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)	-	-	1.60	1.30	1.40	1.20	1.70	1.40	1.60	1.30	1.70	1.20

ADJUSTED	INTERSECTION 1 HR BACKGROUND CONCENTRATIONS		2011		2014		2020 NB		2020 BD		2040 NB		2040 BD	
ID	Major Approach	Minor Approach	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)			2.78	2.78	2.42	2.42	2.34	2.39	2.50	2.50	2.44	2.48
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)			2.78	2.78	2.42	2.42	2.27	2.29	2.50	2.50	2.36	2.38
25	University Blvd (MD 193)	Riggs Road (MD 212)			2.78	2.78	2.42	2.42	2.37	2.45	2.50	2.50	2.50	2.50
30	Campus Dr	Adelphi Rd	3.00		2.66	2.69	2.12	2.19	2.10	2.18	2.42	2.50	2.40	2.49
37	Paint Branch Pkwy	Metro Parking			3.03	3.03	3.06	3.06	3.08	3.09	5.16	5.16	5.21	5.21
42	Kenilworth Ave (MD 201)	E-W Highway (MD 410)			2.82	2.82	2.52	2.52	2.52	2.52	2.88	2.88	2.88	2.88
49	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)			2.79	2.79	2.45	2.45	2.67	2.62	1.94	1.81	1.86	1.73

3.0 PPM APPROVED BY MDE BASED ON 2011 MONITORING DATA

TOTAL	INTERSECTION 1 HR CONCENTRATIONS		2011		2014		2020 NB		2020 BD		2040 NB		2040 BD	
ID	Major Approach	Minor Approach	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)	-	-	4.18	4.38	4.52	3.82	4.24	4.39	4.00	3.90	4.24	4.48
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)	-	-	4.68	4.68	3.92	4.02	3.97	4.29	3.90	4.10	3.96	4.48
25	University Blvd (MD 193)	Riggs Road (MD 212)	-	-	4.18	4.88	3.72	4.22	3.37	4.05	3.80	4.30	3.50	4.10
30	Campus Dr	Adelphi Rd	-	-	4.46	4.79	3.62	5.29	3.50	4.28	4.22	4.70	4.50	4.79
37	Paint Branch Pkwy	Metro Parking	-	-	3.73	3.83	3.66	3.86	3.98	4.29	6.16	6.56	6.41	6.51
42	Kenilworth Ave (MD 201)	E-W Highway (MD 410)	-	-	4.32	4.72	3.72	4.12	4.32	4.82	4.18	4.68	4.58	5.18
49	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)	-	-	4.39	4.09	3.85	3.65	4.37	4.02	3.54	3.11	3.56	2.93

ADJUSTED	INTERSECTION 8 HR BACKGROUND CONCENTRATIONS		2011		2014		2020 NB		2020 BD		2040 NB		2040 BD	
ID	Major Approach	Minor Approach	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)			2.22	2.22	1.93	1.93	1.87	1.91	2.00	2.00	1.95	1.98
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)			2.22	2.22	1.93	1.93	1.82	1.83	2.00	2.00	1.89	1.90
25	University Blvd (MD 193)	Riggs Road (MD 212)			2.22	2.22	1.93	1.93	1.89	1.96	2.00	2.00	2.00	2.00
30	Campus Dr	Adelphi Rd	2.40		2.13	2.15	1.69	1.75	1.68	1.74	1.93	2.00	1.92	1.99
37	Paint Branch Pkwy	Metro Parking			2.43	2.43	2.45	2.45	2.47	2.47	4.13	4.13	4.17	4.16
42	Kenilworth Ave (MD 201)	E-W Highway (MD 410)			2.26	2.26	2.02	2.02	2.02	2.02	2.30	2.30	2.30	2.30
49	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)			2.24	2.24	1.96	1.96	2.14	2.09	1.55	1.45	1.49	1.39

2.40 PPM APPROVED BY MDE BASED ON 2011 MONITORING DATA

TOTAL	INTERSECTION 8 HR CONCENTRATIONS		2011		2014		2020 NB		2020 BD		2040 NB		2040 BD	
ID	Major Approach	Minor Approach	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)	-	-	3.33	3.49	3.59	3.04	3.37	3.49	3.18	3.10	3.37	3.56
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)	-	-	3.72	3.72	3.12	3.20	3.16	3.41	3.10	3.26	3.15	3.56
25	University Blvd (MD 193)	Riggs Road (MD 212)	-	-	3.33	3.88	2.96	3.35	2.68	3.22	3.02	3.42	2.79	3.26
30	Campus Dr	Adelphi Rd	-	-	3.55	3.81	2.88	4.20	2.79	3.40	3.36	3.74	3.58	3.81
37	Paint Branch Pkwy	Metro Parking	-	-	2.98	3.06	2.92	3.08	3.18	3.42	4.92	5.24	5.12	5.19
42	Kenilworth Ave (MD 201)	E-W Highway (MD 410)	-	-	3.44	3.76	2.96	3.28	3.44	3.83	3.33	3.72	3.64	4.12
49	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)	-	-	3.50	3.26	3.07	2.91	3.48	3.20	2.82	2.48	2.83	2.33

MAXIMUM	INTERSECTION 1 HR CONCENTRATIONS		NAAQS	2014	2020 NB	2020 BD	2040 NB	2040 BD
ID	Major Approach	Minor Approach						
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)	35.00	4.38	4.52	4.39	4.00	4.48
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)	35.00	4.68	4.02	4.29	4.10	4.48
25	University Blvd (MD 193)	Riggs Road (MD 212)	35.00	4.88	4.22	4.05	4.30	4.10
30	Campus Dr	Adelphi Rd	35.00	4.79	5.29	4.28	4.70	4.79
37	Paint Branch Pkwy	Metro Parking	35.00	3.83	3.86	4.29	6.56	6.51
42	Kenilworth Ave (MD 201)	E-W Highway (MD 410)	35.00	4.72	4.12	4.82	4.68	5.18
49	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)	35.00	4.39	3.85	4.37	3.54	3.56

MAXIMUM	INTERSECTION 8 HR CONCENTRATIONS		NAAQS	2014	2020 NB	2020 BD	2040 NB	2040 BD
ID	Major Approach	Minor Approach						
14	Piney Branch Rd (MD 320)	University Blvd (MD 193)	9.00	3.49	3.59	3.49	3.18	3.56
21	University Blvd (MD 193)	New Hampshire Ave (MD 650)	9.00	3.72	3.20	3.41	3.26	3.56
25	University Blvd (MD 193)	Riggs Road (MD 212)	9.00	3.88	3.35	3.22	3.42	3.26
30	Campus Dr	Adelphi Rd	9.00	3.81	4.20	3.40	3.74	3.81
37	Paint Branch Pkwy	Metro Parking	9.00	3.06	3.08	3.42	5.24	5.19
42	Kenilworth Ave (MD 201)	E-W Highway (MD 410)	9.00	3.76	3.28	3.83	3.72	4.12
49	Veterans Pkwy (MD 410)	Annapolis Rd (MD 450)	9.00	3.50	3.07	3.48	2.82	2.83

Appendix F – Greenhouse Gas Emissions

Montgomery County Annual Emission (Tons)

Month	2014			2020 No Build			2020 Build			2040 No Build			2040 Build		
	CO2	CH4	N20	CO2	CH4	N20	CO2	CH4	N20	CO2	CH4	N20	CO2	CH4	N20
1	410,563	34	11	400,139	31	8	399,930	31	8	404,156	36	7	403,446	36	7
2	382,106	39	10	374,786	33	7	375,006	33	7	380,668	36	7	379,195	36	7
3	420,309	28	11	414,469	29	8	414,323	29	8	417,932	34	7	416,674	34	7
4	419,081	25	11	408,957	26	8	408,802	26	8	411,181	32	7	411,162	32	7
5	441,250	21	11	432,106	23	8	432,061	23	8	437,313	29	8	434,311	29	8
6	444,729	20	11	435,413	22	8	436,052	22	8	437,884	27	7	437,618	27	7
7	467,750	20	11	455,255	23	8	455,100	23	8	457,759	28	8	456,357	28	8
8	464,139	20	11	456,357	23	8	456,803	23	8	462,134	29	8	458,562	29	8
9	429,301	20	11	417,776	23	8	418,467	23	8	417,886	28	7	419,981	28	7
10	430,711	22	11	418,878	24	8	419,357	24	8	424,648	30	8	421,083	30	7
11	398,039	27	11	392,423	27	8	393,169	27	8	398,474	33	7	395,730	33	7
12	337,120	33	11	328,489	29	8	328,436	29	8	330,712	34	7	331,796	34	7
Total	**5,045,100**	**309**	**130**	**4,935,048**	**314**	**93**	**4,937,505**	**314**	**93**	**4,980,748**	**377**	**88**	**4,965,912**	**377**	**88**

Prince George's County Annual Emission (Tons)

Month	2014			2020 No Build			2020 Build			2040 No Build			2040 Build		
	CO2	CH4	N20	CO2	CH4	N20	CO2	CH4	N20	CO2	CH4	N20	CO2	CH4	N20
1	429,499	37	11	436,515	31	7	436,515	31	7	430,605	34	6	430,003	34	6
2	396,902	32	10	408,957	33	7	408,957	33	7	403,100	33	6	402,540	33	6
3	444,529	30	11	454,152	29	8	454,152	29	8	447,274	33	6	446,643	33	6
4	438,115	25	11	448,641	27	7	448,641	27	7	441,796	32	6	441,169	32	6
5	461,355	23	11	476,198	25	8	475,096	25	8	468,057	29	6	467,374	29	6
6	468,717	22	11	482,812	24	7	482,812	24	7	475,181	28	6	474,480	28	6
7	491,784	23	11	503,756	25	8	502,654	25	8	495,475	29	6	494,742	29	6
8	487,668	23	11	504,859	25	8	504,859	25	8	497,523	29	6	496,784	29	6
9	446,403	22	11	461,868	24	7	460,766	24	7	454,121	28	6	453,454	28	6
10	446,514	25	11	461,868	25	8	461,868	25	8	454,579	30	6	453,922	30	6
11	420,889	27	11	431,004	28	7	429,901	28	7	424,053	32	6	423,455	32	6
12	349,795	30	11	357,149	29	7	357,149	29	7	352,845	31	6	352,357	31	6
Total	**5,282,170**	**319**	**131**	**5,427,781**	**325**	**89**	**5,423,372**	**325**	**89**	**5,344,608**	**369**	**71**	**5,336,924**	**369**	**71**

Montgomery County Particulate Matter Emissions (Tons)

Month	2014		2020 No Build		2020 Build		2040 No Build		2040 Build	
	ElementC_PM10	ElementC_PM25	ElementC_PM10	ElementC_PM25	ElementC_PM10	ElementC_PM25	ElementC_PM10	ElementC_PM25	ElementC_PM10	ElementC_PM25
1	15	14	7	6	7	6	4	3	3	3
2	15	15	8	7	8	7	5	5	4	4
3	14	14	6	6	6	6	3	3	3	2
4	14	13	6	5	6	5	2	2	2	2
5	13	13	5	5	5	5	1	1	1	1
6	13	13	5	5	5	5	1	1	1	1
7	13	13	5	5	5	5	1	1	1	1
8	13	13	5	5	5	5	1	1	1	1
9	13	12	5	4	5	4	1	1	1	1
10	13	13	5	5	5	5	2	2	2	1
11	14	13	6	6	6	6	3	3	3	2
12	13	12	6	6	6	6	3	3	3	3
Total	**164**	**157**	**67**	**64**	**67**	**64**	**28**	**26**	**27**	**25**

Prince George's County Particulate Matter Emissions (Tons)

Month	2014		2020 No Build		2020 Build		2040 No Build		2040 Build	
	ElementC_PM10	ElementC_PM25	ElementC_PM10	ElementC_PM25	ElementC_PM10	ElementC_PM25	ElementC_PM10	ElementC_PM25	ElementC_PM10	ElementC_PM25
1	18	17	7	7	7	7	3	3	3	3
2	16	15	8	8	8	8	4	4	4	4
3	17	16	7	6	7	6	3	2	3	2
4	16	15	6	6	6	6	2	2	2	2
5	16	15	6	5	6	5	1	1	1	1
6	15	15	5	5	5	5	1	1	1	1
7	16	15	5	5	5	5	1	1	1	1
8	16	15	5	5	5	5	1	1	1	1
9	15	14	5	5	5	5	1	1	1	1
10	16	15	6	5	6	5	2	1	2	1
11	16	15	6	6	6	6	3	2	3	2
12	14	13	6	6	6	6	3	3	3	3
Total	**191**	**180**	**74**	**70**	**73**	**70**	**27**	**25**	**26**	**24**

Montgomery County Totals (Energy in Million BTU, HC in Tons, Distance in Miles)

	2014			2020 No Build			2020 Build			2040 No Build			2040 Build		
Month	**Total Energy**	**Total HC**	**Total Distance**	**Total Energy**	**Total HC**	**Total Distance**	**Total Energy**	**Total HC**	**Total Distance**	**Total Energy**	**Total HC**	**Total Distance**	**Total Energy**	**Total HC**	**Total Distance**
1	4,894,743	485	718,018,416	4,762,996	318	783,989,952	4,766,424	318	784,877,568	4,815,347	281	840,418,816	4,806,383	281	839,224,448
2	4,555,595	524	663,168,912	4,466,368	340	727,400,704	4,469,549	340	728,224,512	4,535,714	271	781,616,514	4,515,441	270	778,648,192
3	5,010,763	420	743,757,824	4,934,185	294	820,781,824	4,937,775	294	821,711,552	4,979,244	277	879,859,160	4,969,820	277	878,609,600
4	4,996,018	380	745,283,280	4,868,307	270	814,909,696	4,871,872	270	815,832,256	4,898,671	266	872,169,624	4,897,958	266	872,322,560
5	5,260,153	346	773,075,056	5,145,071	256	848,596,608	5,148,886	257	849,557,312	5,209,762	257	914,516,004	5,169,458	256	908,382,656
6	5,301,568	341	762,688,134	5,192,516	255	838,532,992	5,196,378	255	839,482,624	5,216,479	253	897,452,778	5,214,845	253	897,610,688
7	5,575,973	362	790,344,464	5,419,322	270	862,961,024	5,423,342	270	863,937,920	5,453,210	266	925,074,056	5,442,073	266	923,759,552
8	5,532,946	362	782,408,208	5,439,598	273	863,434,880	5,443,638	273	864,412,800	5,505,346	271	930,507,256	5,463,152	270	924,267,392
9	5,117,679	346	742,044,068	4,983,147	258	811,367,616	4,986,854	258	812,286,208	4,978,306	254	863,596,300	5,006,587	256	868,531,392
10	5,134,561	364	760,220,396	4,993,863	268	830,068,480	4,997,548	268	831,008,448	5,058,957	264	894,548,788	5,019,716	263	888,550,016
11	4,745,308	400	702,928,840	4,682,307	280	777,110,784	4,685,706	280	777,990,912	4,747,470	265	836,295,136	4,718,037	264	831,860,800
12	4,019,322	455	581,736,816	3,911,758	301	635,186,688	3,914,536	301	635,905,984	3,940,522	266	677,282,248	3,956,833	268	679,937,472
Total	**60,144,628**	**4,785**	**8,765,674,414**	**58,799,437**	**3,381**	**9,614,341,248**	**58,842,510**	**3,381**	**9,625,228,096**	**59,339,029**	**3,191**	**10,313,336,680**	**59,180,303**	**3,189**	**10,291,704,768**

Prince George's County Totals (Energy in Million BTU, HC in Tons, Distance in Miles)

	2014			2020 No Build			2020 Build			2040 No Build			2040 Build		
Month	**Total Energy**	**Total HC**	**Total Distance**	**Total Energy**	**Total HC**	**Total Distance**	**Total Energy**	**Total HC**	**Total Distance**	**Total Energy**	**Total HC**	**Total Distance**	**Total Energy**	**Total HC**	**Total Distance**
1	5,114,970	546	741,834,048	5,202,366	324	832,254,784	5,199,687	324	831,698,624	5,123,616	257	881,011,712	5,116,450	257	879,919,808
2	4,726,677	466	688,287,552	4,866,030	342	772,181,824	4,863,545	342	771,665,984	4,796,556	245	817,419,328	4,789,908	245	816,406,528
3	5,293,695	455	776,648,064	5,407,742	305	871,312,320	5,404,943	305	870,730,560	5,321,735	256	922,357,440	5,314,233	256	921,214,784
4	5,217,149	404	771,091,456	5,344,107	282	865,078,336	5,341,325	282	864,500,480	5,256,414	247	915,758,208	5,248,965	247	914,623,296
5	5,493,768	379	802,966,848	5,662,333	271	900,838,464	5,659,229	271	900,236,864	5,568,619	241	953,613,248	5,560,511	240	952,431,744
6	5,581,334	376	793,444,288	5,747,028	270	890,155,712	5,743,821	270	889,561,344	5,653,273	239	942,305,216	5,644,944	239	941,137,280
7	5,855,969	397	816,558,720	5,991,639	286	916,087,616	5,988,289	286	915,475,648	5,894,680	251	969,755,776	5,885,965	251	968,553,984
8	5,806,970	397	817,007,872	6,015,693	288	916,590,592	6,012,310	288	915,979,136	5,919,046	254	970,288,768	5,910,269	254	969,086,784
9	5,315,688	372	767,739,904	5,492,545	270	861,317,888	5,489,492	270	860,742,912	5,402,772	240	911,777,728	5,394,846	239	910,648,320
10	5,317,164	400	785,435,648	5,499,399	280	881,170,176	5,496,442	280	880,582,272	5,408,335	245	932,793,088	5,400,523	245	931,637,440
11	5,012,175	420	735,324,992	5,126,330	287	824,952,256	5,123,676	287	824,401,152	5,045,476	243	873,281,216	5,038,374	243	872,199,232
12	4,165,846	452	601,031,872	4,258,376	302	674,290,944	4,256,206	302	673,840,256	4,198,612	241	713,793,280	4,192,806	241	712,908,608
Total	**62,901,405**	**5,064**	**9,097,371,264**	**64,613,588**	**3,507**	**10,206,230,912**	**64,578,965**	**3,507**	**10,199,415,232**	**63,589,134**	**2,960**	**10,804,155,008**	**63,497,794**	**2,958**	**10,790,767,808**

GHG Analyses for Montgomery County: Annual Emissions Results							
Pollutants/Processes	**2014 Base**	**2020 No Build**	**2020 Preferred Alternative**	**2020 % Change**	**2040 No Build**	**2040 Preferred Alternative**	**2040 % Change**
CO2 (Tons)	5,045,100	4,935,048	4,937,505	0.05%	4,980,748	4,965,912	-0.30%
CH4 (Tons)	309	314	314	0.01%	377	377	-0.09%
N2O (Tons)	130	93	93	0.00%	88	88	-0.07%
Elemental Carbon PM 2.5 (Tons)	157	64	64	0.07%	26	26	-0.11%
Hydrocarbons (Tons)	4,785	3,381	3,381	0.01%	3,191	3,189	-0.08%
Total Energy (BTU Millions)	60,144,628	58,799,437	58,842,510	0.07%	59,339,029	59,180,303	-0.27%
Total Distance (Miles)	8,765,674,414	9,614,341,248	9,625,228,096	0.11%	10,313,336,680	10,291,704,768	-0.21%

GHG Analyses for Prince George's County: Annual Emissions Results							
Pollutants/Processes	**2014 Base**	**2020 No Build**	**2020 Preferred Alternative**	**2020 % Change**	**2040 No Build**	**2040 Preferred Alternative**	**2040 % Change**
CO2 (Tons)	5,282,170	5,427,781	5,423,372	-0.08%	5,344,608	5,336,924	-0.14%
CH4 (Tons)	319	325	325	-0.02%	369	369	-0.12%
N2O (Tons)	131	89	89	0.00%	71	71	-0.05%
Elemental Carbon PM 2.5 (Tons)	180	70	70	-0.07%	25	25	-0.06%
Hydrocarbons (Tons)	5,064	3,507	3,507	-0.01%	2,960	2,958	-0.07%
Total Energy (BTU Millions)	62,901,405	64,613,588	64,578,965	-0.05%	63,589,134	63,497,794	-0.14%
Total Distance (Miles)	9,097,371,264	10,206,230,912	10,199,415,232	-0.07%	10,804,155,008	10,790,767,808	-0.12%

GHG Analyses for Total Combined: Annual Emissions Results							
Pollutants/Processes	**2014 Base**	**2020 No Build**	**2020 Preferred Alternative**	**2020 % Change**	**2040 No Build**	**2040 Preferred Alternative**	**2040 % Change**
CO2 (Tons)	10,327,270	10,362,829	10,360,877	-0.02%	10,325,356	10,302,836	-0.22%
CH4 (Tons)	628	639	639	-0.01%	747	746	-0.10%
N2O (Tons)	261	182	182	0.00%	159	159	-0.06%
Elemental Carbon PM 2.5 (Tons)	337	134	134	0.00%	51	51	-0.08%
Hydrocarbons (Tons)	9,849	6,888	6,888	0.00%	6,151	6,147	-0.07%
Total Energy (BTU Millions)	123,046,033	123,413,025	123,421,475	0.01%	122,928,163	122,678,097	-0.20%
Total Distance (Miles)	17,863,045,678	19,820,572,160	19,824,643,328	0.02%	21,117,491,688	21,082,472,576	-0.17%

Appendix G – Air Quality Monitoring Data

AIR QUALITY MONITORING DATA

CARBON MONOXIDE (CO)

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: CO
Year: 2009
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	8649	2.5	2.5	0	None	1	110010023	Verizon Phone Co.2055 L St. N.W.	Washington	District of Columbia	DC	03
1 HOUR	8584	4.2	4.2	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
1 HOUR	8452	1.1	1.1	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
1 HOUR	8637	1.7	1.7	0	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
1 HOUR	2849	1.2	1.1	0	None	1	510590005	Cub Run Lee Rd Chant.(Cubrun Treat Plant	Not in a city	Fairfax	VA	03
1 HOUR	2094	1.4	1.3	0	None	1	510590030	Sta. 46-B9, Lee Park, Telegraph Road	Groveton	Fairfax	VA	03
1 HOUR	2837	1.1	1.1	0	None	1	510591005	6507 Columbia Pike	Annandale	Fairfax	VA	03
1 HOUR	2858	1.8	1.7	0	None	1	510595001	Lewinsville 1437 Balls Hill Rd	McLean	Fairfax	VA	03
1 HOUR	8581	1.8	1.7	0	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

Get detailed information about this report, including column descriptions, at http://www.epa.gov/airquality/airdata/ad_about_reports.html#mon

AirData reports are produced from a direct query of the AQS Data Mart. The data represent the best and most recent information available to EPA from state agencies. However, some values may be absent due to incomplete reporting, and some values may change due to quality assurance activities. The AQS database is updated daily by state, local, and tribal organizations who own and submit the data. Please contact the appropriate air quality monitoring agency to report any data problems. <http://www.epa.gov/airquality/airdata/ad_contacts.html>

Readers are cautioned not to rank order geographic areas based on AirData reports. Air pollution levels measured at a particular monitoring site are not necessarily representative of the air quality for an entire county or urban area.

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 12, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: CO
Year: 2009
Exceptional Events: Included (if any)

Duration Description=8-HR RUN AVG END HOUR

Duration Description	Obs	First Max	Second Max	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8-HR RUN AVG END HOUR	8705	2	1.9	0	None	1	110010023	Verizon Phone Co.2055 L St. N.W.	Washington	District of Columbia	DC	03
8-HR RUN AVG END HOUR	8638	4	3.8	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
8-HR RUN AVG END HOUR	8539	0.9	0.9	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
8-HR RUN AVG END HOUR	8742	1.6	1.3	0	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
8-HR RUN AVG END HOUR	2869	0.9	0.9	0	None	1	510590005	Cub Run Lee Rd Chant.(Cubrun Treat Plant	Not in a city	Fairfax	VA	03
8-HR RUN AVG END HOUR	2118	1.1	1	0	None	1	510590030	Sta. 46-B9, Lee Park, Telegraph Road	Groveton	Fairfax	VA	03
8-HR RUN AVG END HOUR	2871	0.9	0.8	0	None	1	510591005	6507 Columbia Pike	Annandale	Fairfax	VA	03
8-HR RUN AVG END HOUR	2875	1.4	1.3	0	None	1	510595001	Lewinsville 1437 Balls Hill Rd	McLean	Fairfax	VA	03
8-HR RUN AVG END HOUR	8611	1.4	1.4	0	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 12, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: CO
Year: 2010
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	8688	2.8	2.7	0	None	1	110010023	Verizon Phone Co.2055 L St. N.W.	Washington	District of Columbia	DC	03
1 HOUR	8568	3.7	3.7	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
1 HOUR	8107	1.5	1.3	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
1 HOUR	8516	2.3	2.2	0	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
1 HOUR	8524	2.3	2	0	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 12, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: CO
Year: 2010
Exceptional Events: Included (if any)

Duration Description=8-HR RUN AVG END HOUR

Duration Description	Obs	First Max	Second Max	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8-HR RUN AVG END HOUR	8755	2.4	2	0	None	1	110010023	Verizon Phone Co.2055 L St. N.W.	Washington	District of Columbia	DC	03
8-HR RUN AVG END HOUR	8608	3.5	3.1	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
8-HR RUN AVG END HOUR	8103	1	1	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
8-HR RUN AVG END HOUR	8559	1.8	1.7	0	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
8-HR RUN AVG END HOUR	8561	1.8	1.6	0	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 12, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: CO
Year: 2011
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	8680	5	4.2	0	None	1	110010023	Verizon Phone Co.2055 L St. N.W.	Washington	District of Columbia	DC	03
1 HOUR	8561	2.7	2.7	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
1 HOUR	2734	3.1	3	0	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
1 HOUR	8183	1.7	1.3	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
1 HOUR	8675	4.2	1.9	0	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
1 HOUR	8527	5.7	1.7	0	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 12, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: CO
Year: 2011
Exceptional Events: Included (if any)

Duration Description=8-HR RUN AVG END HOUR

Duration Description	Obs	First Max	Second Max	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8-HR RUN AVG END HOUR	8748	2.2	1.9	0	None	1	110010023	Verizon Phone Co.2055 L St. N.W.	Washington	District of Columbia	DC	03
8-HR RUN AVG END HOUR	8590	2.5	2.3	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
8-HR RUN AVG END HOUR	2730	2.5	2.4	0	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
8-HR RUN AVG END HOUR	8145	1.1	0.8	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
8-HR RUN AVG END HOUR	8704	1.4	1.4	0	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
8-HR RUN AVG END HOUR	8540	1.4	1.4	0	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

Get detailed information about this report, including column descriptions, at http://www.epa.gov/airquality/airdata/ad_about_reports.html#mon

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 12, 2012

AIR QUALITY MONITORING DATA

PARTICULATE MATTER ($PM_{2.5}$)

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: PM2.5
Year: 2009
Exceptional Events: Included (if any)

Duration Description=24 HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	98th Percentile	Weighted Annual Mean	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24 HOUR	360	37.3	31.4	29.4	28.6	24	10.5	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
24 HOUR	62	37.7	26.4	20	18	26	10.3	None	2	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
24 HOUR	117	40.9	25.2	22.7	20.6	23	10.1	None	1	110010042	Park Services Office 1100 Ohio Drive	Washington	District of Columbia	DC	03
24 HOUR	349	36.6	31.7	29.2	28.4	24	10.2	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
24 HOUR	117	29.2	22.7	21.5	20.5	22	9.4	None	1	240313001	Lathrop E. Smith Environmental Education Center, 5110 Meadowside Lane	Rockville	Montgomery	MD	03
24 HOUR	118	28.1	23.5	21.2	20.4	21	10.7	None	1	240330025	Bladensburg Volunteer Fire Department, 4213 Edmondson Road	Bladensburg	Prince George's	MD	03
24 HOUR	112	21.7	19	17.7	17.3	18	8.7	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	117	27.7	20.9	18.6	16.8	19	8.9	None	1	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
24 HOUR	32	15	14.9	14.7	14.2	15	8.8	None	2	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
24 HOUR	117	40.7	23.7	23.2	20.8	23	10.1	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
24 HOUR	118	40.5	24.4	23.1	20.5	23	10.1	None	2	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: PM2.5
Year: 2009
Exceptional Events: Included (if any)

Duration Description=24 HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	98th Percentile	Weighted Annual Mean	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24 HOUR	347	35.4	28.2	28	26.6	24	9.8	None	1	510590030	Sta. 46-B9, Lee Park, Telegraph Road	Groveton	Fairfax	VA	03
24 HOUR	118	36.6	21.7	20.8	20.8	21	9.5	None	1	510591005	6507 Columbia Pike	Annandale	Fairfax	VA	03
24 HOUR	117	33.5	24.2	21.2	21.1	21	9.7	None	1	510595001	Lewinsville 1437 Balls Hill Rd	McLean	Fairfax	VA	03
24 HOUR	120	28.4	21.6	20	20	20	9.2	None	1	511071005	38-I, Broad Run High School, Ashburn	Not in a city	Loudoun	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: PM2.5
Year: 2009
Exceptional Events: Included (if any)

Duration Description=24-HR BLK AVG

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	98th Percentile	Weighted Annual Mean	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24-HR BLK AVG	349	31	27.9	24.8	23.9	23	10.2	None	3	240313001	Lathrop E. Smith Environmental Education Center, 5110 Meadowside Lane	Rockville	Montgomery	MD	03
24-HR BLK AVG	354	31	27.8	27	26.7	24	10.5	None	3	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: PM2.5
Year: 2010
Exceptional Events: Included (if any)

Duration Description=24 HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	98th Percentile	Weighted Annual Mean	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24 HOUR	339	62.2	36.8	35.9	35.1	28	11	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
24 HOUR	59	37.1	25.8	20.1	19.3	26	11.4	None	2	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
24 HOUR	116	35.1	25.2	23.2	22.5	23	11	None	1	110010042	Park Services Office 1100 Ohio Drive	Washington	District of Columbia	DC	03
24 HOUR	336	34.1	33	31.1	30.3	26	10.5	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
24 HOUR	50	18.6	17.7	17.2	16.9	19	9.1	None	1	240313001	Lathrop E. Smith Environmental Education Center, 5110 Meadowside Lane	Rockville	Montgomery	MD	03
24 HOUR	115	35.7	32.4	24.9	24.9	25	11.5	None	1	240330025	Bladensburg Volunteer Fire Department, 4213 Edmondson Road	Bladensburg	Prince George's	MD	03
24 HOUR	107	34.4	20.3	19.8	18.6	20	9.4	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	12	17.2	14.4	14	13.8	17	9.8	None	2	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	112	21.4	21.3	20.9	19.9	21	9.5	None	1	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
24 HOUR	27	19.3	18.6	15.1	14.2	19	10.1	None	2	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
24 HOUR	108	34.1	23	21.8	20.5	22	10.3	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: PM2.5
Year: 2010
Exceptional Events: Included (if any)

Duration Description=24 HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	98th Percentile	Weighted Annual Mean	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24 HOUR	101	34.6	23.4	22.1	20.4	22	10.4	None	2	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
24 HOUR	358	35.5	33.7	31.8	30.7	24	9.9	None	1	510590030	Sta. 46-B9, Lee Park, Telegraph Road	Groveton	Fairfax	VA	03
24 HOUR	55	20.4	18.9	17.1	16.2	19	9.7	None	1	510591005	6507 Columbia Pike	Annandale	Fairfax	VA	03
24 HOUR	56	20	19.8	19.4	18.9	20	10.5	None	1	510595001	Lewinsville 1437 Balls Hill Rd	McLean	Fairfax	VA	03
24 HOUR	117	36.9	23.4	19.6	19.6	20	10.3	None	1	511071005	38-I, Broad Run High School, Ashburn	Not in a city	Loudoun	VA	03
24 HOUR	116	36.2	28.6	24	23.2	24	11.3	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: PM2.5
Year: 2010
Exceptional Events: Included (if any)

Duration Description=24-HR BLK AVG

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	98th Percentile	Weighted Annual Mean	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24-HR BLK AVG	352	35.8	33.8	33.1	29.6	28	11.1	None	3	240313001	Lathrop E. Smith Environmental Education Center, 5110 Meadowside Lane	Rockville	Montgomery	MD	03
24-HR BLK AVG	352	39.5	38.7	38.1	32.6	27	12.1	None	3	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: PM2.5
Year: 2011
Exceptional Events: Included (if any)

Duration Description=24 HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	98th Percentile	Weighted Annual Mean	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24 HOUR	340	34	28.1	27.8	26.8	25	10.4	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
24 HOUR	60	29.2	25	20.7	18.1	25	9.4	None	2	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
24 HOUR	124	30.7	26.9	26.2	24.7	26	10.2	None	1	110010042	Park Services Office 1100 Ohio Drive	Washington	District of Columbia	DC	03
24 HOUR	336	30.6	30.2	27.4	27.3	25	10.3	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
24 HOUR	108	27	25.4	22.6	21.6	23	10.1	None	1	240330025	Bladensburg Volunteer Fire Department, 4213 Edmondson Road	Bladensburg	Prince George's	MD	03
24 HOUR	123	24.7	22	21.8	21	22	8.7	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	37	24.3	15.1	12.7	12.7	24	8.2	None	2	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	118	28.8	25.8	21.1	20.4	21	8.9	None	1	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
24 HOUR	28	15	13.9	12.7	11.9	15	7.8	None	2	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
24 HOUR	56	23.5	21.2	18.1	16.3	21	10.1	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
24 HOUR	53	23.6	21.9	17.8	16.6	22	10.4	None	2	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: PM2.5
Year: 2011
Exceptional Events: Included (if any)

Duration Description=24 HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	98th Percentile	Weighted Annual Mean	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24 HOUR	353	29	27.8	27.3	26.5	24	9.2	None	1	510590030	Sta. 46-B9, Lee Park, Telegraph Road	Groveton	Fairfax	VA	03
24 HOUR	118	23.7	23.1	20.5	20.4	21	9.1	None	1	511071005	38-I, Broad Run High School, Ashburn	Not in a city	Loudoun	VA	03
24 HOUR	112	26.4	25.7	22.4	21.5	22	10.2	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: PM2.5
Year: 2011
Exceptional Events: Included (if any)

Duration Description=24-HR BLK AVG

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	98th Percentile	Weighted Annual Mean	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24-HR BLK AVG	305	32.4	30.1	30	26.3	24	10.8	None	4	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
24-HR BLK AVG	331	31.8	30.5	30.2	29.9	25	10.9	None	3	240313001	Lathrop E. Smith Environmental Education Center, 5110 Meadowside Lane	Rockville	Montgomery	MD	03
24-HR BLK AVG	344	76.1	35.3	31.5	29.5	27	11.8	Included	3	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 19, 2012

AIR QUALITY MONITORING DATA

PARTICULATE MATTER (PM_{10})

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: PM10
Year: 2009
Exceptional Events: Included (if any)

Duration Description=24 HOUR

Duration Description	Obs	First Max	Second Max	Actual Exc	Est Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24 HOUR	62	61	46	0	0.00	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
24 HOUR	60	69	47	0	0.00	None	2	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
24 HOUR	62	60	41	0	0.00	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
24 HOUR	15	29	20	0	0.00	None	1	510590005	Cub Run Lee Rd Chant.(Cubrun Treat Plant	Not in a city	Fairfax	VA	03
24 HOUR	15	45	27	0	0.00	None	1	510590018	Mt.Vernon 2675 Sherwood Hall Lane	Hybla Valley	Fairfax	VA	03
24 HOUR	15	47	28	0	0.00	None	2	510590018	Mt.Vernon 2675 Sherwood Hall Lane	Hybla Valley	Fairfax	VA	03
24 HOUR	60	31	24	0	0.00	None	1	511870004	1000 Shenandoah Avenue	Front Royal	Warren	VA	03
24 HOUR	57	50	36	0	0.00	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03
24 HOUR	116	40	30	0	0.00	None	1	515100020	435 Ferdinand Day Drive, Alexandria, Va	Alexandria	Alexandria City	VA	03
24 HOUR	60	30	28	0	0.00	None	1	516300004	Hugh Mercer Elem. School 2100 Cowan Blvd	Fredericksburg	Fredericksburg City	VA	03

Get detailed information about this report, including column descriptions, at http://www.epa.gov/airquality/airdata/ad_about_reports.html#mon

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: PM10
Year: 2010
Exceptional Events: Included (if any)

Duration Description=24 HOUR

Duration Description	Obs	First Max	Second Max	Actual Exc	Est Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24 HOUR	59	91	85	0	0.00	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
24 HOUR	58	87	75	0	0.00	None	2	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
24 HOUR	62	99	51	0	0.00	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
24 HOUR	42	30	27	0	0.00	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	9	21	17	0	0.00	None	2	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	59	42	28	0	0.00	None	1	511870004	1000 Shenandoah Avenue	Front Royal	Warren	VA	03
24 HOUR	51	42	32	0	0.00	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03
24 HOUR	112	48	35	0	0.00	None	1	515100020	435 Ferdinand Day Drive, Alexandria, Va	Alexandria	Alexandria City	VA	03
24 HOUR	58	45	40	0	0.00	None	1	516300004	Hugh Mercer Elem. School 2100 Cowan Blvd	Fredericksburg	Fredericksburg City	VA	03

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Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: PM10
Year: 2011
Exceptional Events: Included (if any)

Duration Description=24 HOUR

Duration Description	Obs	First Max	Second Max	Actual Exc	Est Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24 HOUR	60	45	40	0	0.00	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
24 HOUR	119	27	25	0	0.00	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	34	33	22	0	0.00	None	2	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	57	31	31	0	0.00	None	1	511870004	1000 Shenandoah Avenue	Front Royal	Warren	VA	03
24 HOUR	48	43	41	0	0.00	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03
24 HOUR	109	44	35	0	0.00	None	1	515100020	435 Ferdinand Day Drive, Alexandria, Va	Alexandria	Alexandria City	VA	03
24 HOUR	56	36	28	0	0.00	None	1	516300004	Hugh Mercer Elem. School 2100 Cowan Blvd	Fredericksburg	Fredericksburg City	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 19, 2012

AIR QUALITY MONITORING DATA

OZONE (O_3)

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: Ozone
Year: 2009
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	8323	0.101	0.093	0.092	0.087	0	0.00	214	196	92	9	None	1	110010025	Takoma Sc. 7010 Piney Branch Rd. N.W., Washington, Dc 20012	Washington	District of Columbia	DC	03
1 HOUR	8554	0.093	0.093	0.078	0.077	0	0.00	214	211	99	1	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
1 HOUR	8628	0.097	0.095	0.087	0.085	0	0.00	214	213	100	1	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
1 HOUR	4946	0.095	0.079	0.078	0.076	0	0.00	214	205	96	1	None	1	240090011	350 Stafford Road	Not in a city	Calvert	MD	03
1 HOUR	5111	0.086	0.078	0.078	0.073	0	0.00	214	214	100	0	None	1	240170010	Oaks Road	Hughesville	Charles	MD	03
1 HOUR	5056	0.083	0.082	0.081	0.077	0	0.00	214	208	97	3	None	1	240210037	Frederick County Airport ,180 E Airport Drive	Frederick	Frederick	MD	03
1 HOUR	5057	0.087	0.084	0.084	0.08	0	0.00	214	212	99	2	None	1	240313001	Lathrop E. Smith Environmental Education Center, 5110 Meadowside Lane	Rockville	Montgomery	MD	03
1 HOUR	8150	0.091	0.091	0.084	0.08	0	0.00	214	191	89	2	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
1 HOUR	5121	0.089	0.088	0.078	0.077	0	0.00	214	214	100	0	None	1	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
1 HOUR	5062	0.086	0.085	0.083	0.083	0	0.00	214	213	100	1	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03

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Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: Ozone
Year: 2009
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	8684	0.077	0.077	0.076	0.072	0	0.00	214	213	100	1	None	1	510590005	Cub Run Lee Rd Chant.(Cubrun Treat Plant	Not in a city	Fairfax	VA	03
1 HOUR	8670	0.088	0.084	0.082	0.081	0	0.00	214	214	100	0	None	1	510590018	Mt.Vernon 2675 Sherwood Hall Lane	Hybla Valley	Fairfax	VA	03
1 HOUR	5055	0.091	0.088	0.085	0.082	0	0.00	214	212	99	2	None	1	510590030	Sta. 46-B9, Lee Park, Telegraph Road	Groveton	Fairfax	VA	03
1 HOUR	8647	0.095	0.086	0.084	0.083	0	0.00	214	214	100	0	None	1	510591005	6507 Columbia Pike	Annandale	Fairfax	VA	03
1 HOUR	8687	0.085	0.083	0.083	0.077	0	0.00	214	214	100	0	None	1	510595001	Lewinsville 1437 Balls Hill Rd	McLean	Fairfax	VA	03
1 HOUR	5060	0.075	0.07	0.07	0.069	0	0.00	214	214	100	0	None	1	510610002	Rt651 C Phelps Wildlife Management Area	Not in a city	Fauquier	VA	03
1 HOUR	5087	0.079	0.077	0.077	0.077	0	0.00	214	214	100	0	None	1	511071005	38-I, Broad Run High School, Ashburn	Not in a city	Loudoun	VA	03
1 HOUR	5085	0.075	0.073	0.07	0.07	0	0.00	214	213	100	1	None	1	511530009	James S. Long Park	Not in a city	Prince William	VA	03
1 HOUR	5098	0.078	0.076	0.075	0.071	0	0.00	214	213	100	1	None	1	511790001	Widewater Elem. Sch., Den Rich Road	Aquia Harbour	Stafford	VA	03
1 HOUR	5003	0.079	0.079	0.078	0.076	0	0.00	214	209	98	3	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: Ozone
Year: 2009
Exceptional Events: Included (if any)

Duration Description=8-HR RUN AVG BEGIN HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8-HR RUN AVG BEGIN HOUR	8341	0.082	0.074	0.073	0.072	1	1.10	214	189	88	0	None	1	110010025	Takoma Sc. 7010 Piney Branch Rd. N.W., Washington, Dc 20012	Washington	District of Columbia	DC	03
8-HR RUN AVG BEGIN HOUR	8605	0.08	0.078	0.067	0.064	2	2.00	214	211	99	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
8-HR RUN AVG BEGIN HOUR	8683	0.085	0.076	0.074	0.071	2	2.00	214	213	100	0	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
8-HR RUN AVG BEGIN HOUR	4921	0.076	0.072	0.069	0.068	1	1.10	214	201	94	0	None	1	240090011	350 Stafford Road	Not in a city	Calvert	MD	03
8-HR RUN AVG BEGIN HOUR	5121	0.072	0.071	0.068	0.066	0	0.00	214	214	100	0	None	1	240170010	Oaks Road	Hughesville	Charles	MD	03
8-HR RUN AVG BEGIN HOUR	5049	0.073	0.072	0.072	0.069	0	0.00	214	208	97	0	None	1	240210037	Frederick County Airport ,180 E Airport Drive	Frederick	Frederick	MD	03
8-HR RUN AVG BEGIN HOUR	5044	0.074	0.072	0.071	0.07	0	0.00	214	209	98	0	None	1	240313001	Lathrop E. Smith Environmental Education Center, 5110 Meadowside Lane	Rockville	Montgomery	MD	03

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Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: Ozone
Year: 2009
Exceptional Events: Included (if any)

Duration Description=8-HR RUN AVG BEGIN HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8-HR RUN AVG BEGIN HOUR	8143	0.076	0.073	0.071	0.07	1	1.10	214	189	88	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
8-HR RUN AVG BEGIN HOUR	5121	0.071	0.068	0.068	0.067	0	0.00	214	214	100	0	None	1	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
8-HR RUN AVG BEGIN HOUR	5120	0.078	0.077	0.069	0.067	2	2.00	214	213	100	0	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
8-HR RUN AVG BEGIN HOUR	8740	0.068	0.067	0.065	0.065	0	0.00	214	213	100	0	None	1	510590005	Cub Run Lee Rd Chant.(Cubrun Treat Plant	Not in a city	Fairfax	VA	03
8-HR RUN AVG BEGIN HOUR	8755	0.075	0.074	0.071	0.069	0	0.00	214	214	100	0	None	1	510590018	Mt.Vernon 2675 Sherwood Hall Lane	Hybla Valley	Fairfax	VA	03
8-HR RUN AVG BEGIN HOUR	5118	0.08	0.073	0.071	0.07	1	1.00	214	212	99	0	None	1	510590030	Sta. 46-B9, Lee Park, Telegraph Road	Groveton	Fairfax	VA	03
8-HR RUN AVG BEGIN HOUR	8750	0.077	0.073	0.072	0.07	1	1.00	214	214	100	0	None	1	510591005	6507 Columbia Pike	Annandale	Fairfax	VA	03
8-HR RUN AVG BEGIN HOUR	8755	0.074	0.072	0.068	0.068	0	0.00	214	214	100	0	None	1	510595001	Lewinsville 1437 Balls Hill Rd	McLean	Fairfax	VA	03

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Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: Ozone
Year: 2009
Exceptional Events: Included (if any)

Duration Description=8-HR RUN AVG BEGIN HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8-HR RUN AVG BEGIN HOUR	5114	0.065	0.065	0.063	0.063	0	0.00	214	213	100	0	None	1	510610002	Rt651 C Phelps Wildlife Management Area	Not in a city	Fauquier	VA	03
8-HR RUN AVG BEGIN HOUR	5121	0.069	0.068	0.068	0.068	0	0.00	214	214	100	0	None	1	511071005	38-I, Broad Run High School, Ashburn	Not in a city	Loudoun	VA	03
8-HR RUN AVG BEGIN HOUR	5120	0.068	0.065	0.065	0.064	0	0.00	214	213	100	0	None	1	511530009	James S. Long Park	Not in a city	Prince William	VA	03
8-HR RUN AVG BEGIN HOUR	5120	0.069	0.068	0.065	0.064	0	0.00	214	213	100	0	None	1	511790001	Widewater Elem. Sch., Den Rich Road	Aquia Harbour	Stafford	VA	03
8-HR RUN AVG BEGIN HOUR	4974	0.069	0.067	0.067	0.066	0	0.00	214	208	97	0	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: Ozone
Year: 2010
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	8563	0.104	0.097	0.092	0.091	0	0.00	214	214	100	0	None	1	110010025	Takoma Sc. 7010 Piney Branch Rd. N.W., Washington, Dc 20012	Washington	District of Columbia	DC	03
1 HOUR	8610	0.113	0.109	0.101	0.101	0	0.00	214	212	99	2	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
1 HOUR	8656	0.109	0.109	0.102	0.099	0	0.00	214	213	100	1	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
1 HOUR	5019	0.114	0.107	0.099	0.096	0	0.00	214	210	98	1	None	1	240090011	350 Stafford Road	Not in a city	Calvert	MD	03
1 HOUR	5111	0.104	0.103	0.102	0.091	0	0.00	214	213	100	1	None	1	240170010	Oaks Road	Hughesville	Charles	MD	03
1 HOUR	5117	0.106	0.099	0.097	0.096	0	0.00	214	214	100	0	None	1	240210037	Frederick County Airport ,180 E Airport Drive	Frederick	Frederick	MD	03
1 HOUR	4782	0.102	0.102	0.098	0.094	0	0.00	214	200	93	0	None	1	240313001	Lathrop E. Smith Environmental Education Center, 5110 Meadowside Lane	Rockville	Montgomery	MD	03
1 HOUR	8373	0.122	0.102	0.101	0.1	0	0.00	214	205	96	2	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
1 HOUR	5076	0.108	0.108	0.105	0.103	0	0.00	214	210	98	4	None	1	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
1 HOUR	5073	0.113	0.103	0.1	0.099	0	0.00	214	211	99	3	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03

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Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: Ozone
Year: 2010
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	4120	0.094	0.086	0.085	0.079	0	0.00	214	85	40	0	None	1	510590018	Mt.Vernon 2675 Sherwood Hall Lane	Hybla Valley	Fairfax	VA	03
1 HOUR	5073	0.112	0.109	0.103	0.102	0	0.00	214	212	99	0	None	1	510590030	Sta. 46-B9, Lee Park, Telegraph Road	Groveton	Fairfax	VA	03
1 HOUR	4971	0.088	0.079	0.078	0.078	0	0.00	214	210	98	0	None	1	510610002	Rt651 C Phelps Wildlife Management Area	Not in a city	Fauquier	VA	03
1 HOUR	5045	0.107	0.095	0.093	0.091	0	0.00	214	210	98	2	None	1	511071005	38-I, Broad Run High School, Ashburn	Not in a city	Loudoun	VA	03
1 HOUR	5064	0.119	0.089	0.086	0.084	0	0.00	214	212	99	0	None	1	511530009	James S. Long Park	Not in a city	Prince William	VA	03
1 HOUR	5085	0.098	0.097	0.096	0.093	0	0.00	214	213	100	1	None	1	511790001	Widewater Elem. Sch., Den Rich Road	Aquia Harbour	Stafford	VA	03
1 HOUR	5025	0.108	0.105	0.103	0.097	0	0.00	214	211	99	3	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: Ozone
Year: 2010
Exceptional Events: Included (if any)

Duration Description=8-HR RUN AVG BEGIN HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8-HR RUN AVG BEGIN HOUR	8621	0.087	0.085	0.08	0.079	6	6.00	214	213	100	0	None	1	110010025	Takoma Sc. 7010 Piney Branch Rd. N.W., Washington, Dc 20012	Washington	District of Columbia	DC	03
8-HR RUN AVG BEGIN HOUR	8666	0.096	0.09	0.089	0.086	15	15.20	214	211	99	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
8-HR RUN AVG BEGIN HOUR	8714	0.1	0.088	0.086	0.082	16	16.10	214	213	100	0	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
8-HR RUN AVG BEGIN HOUR	5010	0.098	0.097	0.09	0.087	8	8.20	214	208	97	0	None	1	240090011	350 Stafford Road	Not in a city	Calvert	MD	03
8-HR RUN AVG BEGIN HOUR	5112	0.093	0.087	0.087	0.082	7	7.00	214	213	100	0	None	1	240170010	Oaks Road	Hughesville	Charles	MD	03
8-HR RUN AVG BEGIN HOUR	5114	0.093	0.085	0.084	0.083	7	7.00	214	213	100	0	None	1	240210037	Frederick County Airport ,180 E Airport Drive	Frederick	Frederick	MD	03
8-HR RUN AVG BEGIN HOUR	4773	0.081	0.08	0.079	0.077	5	5.40	214	197	92	0	None	1	240313001	Lathrop E. Smith Environmental Education Center, 5110 Meadowside Lane	Rockville	Montgomery	MD	03

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Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: Ozone
Year: 2010
Exceptional Events: Included (if any)

Duration Description=8-HR RUN AVG BEGIN HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8-HR RUN AVG BEGIN HOUR	8366	0.094	0.091	0.087	0.085	16	16.80	214	204	95	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
8-HR RUN AVG BEGIN HOUR	5072	0.09	0.09	0.088	0.085	9	9.30	214	208	97	0	None	1	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
8-HR RUN AVG BEGIN HOUR	5091	0.092	0.089	0.088	0.087	13	13.20	214	211	99	0	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
8-HR RUN AVG BEGIN HOUR	4133	0.075	0.075	0.069	0.068	0	0.00	214	85	40	0	None	1	510590018	Mt.Vernon 2675 Sherwood Hall Lane	Hybla Valley	Fairfax	VA	03
8-HR RUN AVG BEGIN HOUR	5103	0.095	0.091	0.089	0.089	13	13.10	214	213	100	0	None	1	510590030	Sta. 46-B9, Lee Park, Telegraph Road	Groveton	Fairfax	VA	03
8-HR RUN AVG BEGIN HOUR	5020	0.072	0.071	0.069	0.066	0	0.00	214	208	97	0	None	1	510610002	Rt651 C Phelps Wildlife Management Area	Not in a city	Fauquier	VA	03
8-HR RUN AVG BEGIN HOUR	5056	0.092	0.084	0.083	0.078	5	5.10	214	209	98	0	None	1	511071005	38-I, Broad Run High School, Ashburn	Not in a city	Loudoun	VA	03
8-HR RUN AVG BEGIN HOUR	5087	0.093	0.079	0.075	0.073	2	2.00	214	211	99	0	None	1	511530009	James S. Long Park	Not in a city	Prince William	VA	03

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Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: Ozone
Year: 2010
Exceptional Events: Included (if any)

Duration Description=8-HR RUN AVG BEGIN HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8-HR RUN AVG BEGIN HOUR	5121	0.088	0.086	0.08	0.078	5	5.00	214	214	100	0	None	1	511790001	Widewater Elem. Sch., Den Rich Road	Aquia Harbour	Stafford	VA	03
8-HR RUN AVG BEGIN HOUR	4996	0.092	0.085	0.082	0.081	10	10.20	214	209	98	0	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Generated: June 19, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: Ozone
Year: 2011
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	8570	0.101	0.099	0.096	0.095	0	0.00	214	209	98	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
1 HOUR	8434	0.107	0.101	0.101	0.096	0	0.00	214	204	95	0	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
1 HOUR	5031	0.109	0.107	0.107	0.095	0	0.00	214	210	98	2	None	1	240090011	350 Stafford Road	Not in a city	Calvert	MD	03
1 HOUR	4964	0.108	0.098	0.096	0.095	0	0.00	214	206	96	0	None	1	240170010	Oaks Road	Hughesville	Charles	MD	03
1 HOUR	5117	0.09	0.089	0.084	0.083	0	0.00	214	214	100	0	None	1	240210037	Frederick County Airport ,180 E Airport Drive	Frederick	Frederick	MD	03
1 HOUR	5084	0.097	0.097	0.096	0.092	0	0.00	214	211	99	2	None	1	240313001	Lathrop E. Smith Environmental Education Center, 5110 Meadowside Lane	Rockville	Montgomery	MD	03
1 HOUR	7989	0.114	0.109	0.093	0.093	0	0.00	214	190	89	3	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
1 HOUR	5107	0.11	0.11	0.106	0.105	0	0.00	214	213	100	1	None	1	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
1 HOUR	5840	0.113	0.102	0.097	0.095	0	0.00	214	185	86	3	None	1	240339991	Powder Mill Rd, Laurel, Md 20708	Not in a city	Prince George's	MD	03
1 HOUR	5104	0.109	0.103	0.102	0.098	0	0.00	214	212	99	2	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03

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Year: 2011
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	5115	0.11	0.106	0.1	0.096	0	0.00	214	212	99	2	None	1	510590030	Sta. 46-B9, Lee Park, Telegraph Road	Groveton	Fairfax	VA	03
1 HOUR	5095	0.077	0.076	0.074	0.069	0	0.00	214	213	100	1	None	1	510610002	Rt651 C Phelps Wildlife Management Area	Not in a city	Fauquier	VA	03
1 HOUR	5104	0.098	0.086	0.085	0.084	0	0.00	214	212	99	2	None	1	511071005	38-I, Broad Run High School, Ashburn	Not in a city	Loudoun	VA	03
1 HOUR	5007	0.083	0.08	0.078	0.077	0	0.00	214	209	98	0	None	1	511530009	James S. Long Park	Not in a city	Prince William	VA	03
1 HOUR	5107	0.097	0.097	0.085	0.084	0	0.00	214	214	100	0	None	1	511790001	Widewater Elem. Sch., Den Rich Road	Aquia Harbour	Stafford	VA	03
1 HOUR	5054	0.109	0.103	0.102	0.096	0	0.00	214	212	99	2	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Monitor Values Report

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Pollutant: Ozone
Year: 2011
Exceptional Events: Included (if any)

Duration Description=8-HR RUN AVG BEGIN HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8-HR RUN AVG BEGIN HOUR	8620	0.085	0.084	0.082	0.08	6	6.20	214	207	97	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
8-HR RUN AVG BEGIN HOUR	8466	0.092	0.087	0.086	0.085	11	11.60	214	203	95	0	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
8-HR RUN AVG BEGIN HOUR	5023	0.093	0.092	0.087	0.082	6	6.20	214	206	96	0	None	1	240090011	350 Stafford Road	Not in a city	Calvert	MD	03
8-HR RUN AVG BEGIN HOUR	4957	0.098	0.087	0.086	0.085	7	7.30	214	205	96	0	None	1	240170010	Oaks Road	Hughesville	Charles	MD	03
8-HR RUN AVG BEGIN HOUR	5121	0.085	0.082	0.078	0.077	6	6.00	214	214	100	0	None	1	240210037	Frederick County Airport ,180 E Airport Drive	Frederick	Frederick	MD	03
8-HR RUN AVG BEGIN HOUR	5079	0.088	0.085	0.082	0.081	5	5.10	214	210	98	0	None	1	240313001	Lathrop E. Smith Environmental Education Center, 5110 Meadowside Lane	Rockville	Montgomery	MD	03
8-HR RUN AVG BEGIN HOUR	7946	0.094	0.091	0.088	0.083	7	8.20	214	182	85	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03

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Monitor Values Report

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Pollutant: Ozone
Year: 2011
Exceptional Events: Included (if any)

Duration Description=8-HR RUN AVG BEGIN HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8-HR RUN AVG BEGIN HOUR	5087	0.095	0.092	0.09	0.086	14	14.10	214	213	100	0	None	1	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
8-HR RUN AVG BEGIN HOUR	5845	0.092	0.086	0.085	0.084	7	8.30	214	181	85	0	None	1	240339991	Powder Mill Rd, Laurel, Md 20708	Not in a city	Prince George's	MD	03
8-HR RUN AVG BEGIN HOUR	5101	0.1	0.093	0.089	0.087	8	8.10	214	212	99	0	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
8-HR RUN AVG BEGIN HOUR	5119	0.099	0.096	0.09	0.087	11	11.10	214	212	99	0	None	1	510590030	Sta. 46-B9, Lee Park, Telegraph Road	Groveton	Fairfax	VA	03
8-HR RUN AVG BEGIN HOUR	5118	0.067	0.065	0.065	0.063	0	0.00	214	212	99	0	None	1	510610002	Rt651 C Phelps Wildlife Management Area	Not in a city	Fauquier	VA	03
8-HR RUN AVG BEGIN HOUR	5113	0.086	0.081	0.08	0.075	3	3.00	214	212	99	0	None	1	511071005	38-I, Broad Run High School, Ashburn	Not in a city	Loudoun	VA	03
8-HR RUN AVG BEGIN HOUR	5017	0.079	0.073	0.071	0.071	1	1.00	214	208	97	0	None	1	511530009	James S. Long Park	Not in a city	Prince William	VA	03

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Generated: June 19, 2012

Monitor Values Report

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Pollutant: Ozone
Year: 2011
Exceptional Events: Included (if any)

Duration Description=8-HR RUN AVG BEGIN HOUR

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Actual Exc	Est Exc	Required Days	Valid Days	Percent Days	Missing Days	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8-HR RUN AVG BEGIN HOUR	5127	0.086	0.08	0.075	0.074	2	2.00	214	214	100	0	None	1	511790001	Widewater Elem. Sch., Den Rich Road	Aquia Harbour	Stafford	VA	03
8-HR RUN AVG BEGIN HOUR	5065	0.1	0.095	0.09	0.084	7	7.10	214	212	99	0	None	1	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Generated: June 19, 2012

AIR QUALITY MONITORING DATA

NITROGEN DIOXIDE (NO_2)

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: NO2
Year: 2009
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	98th Percentile	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	8400	61	60	53	0	None	1	110010025	Takoma Sc. 7010 Piney Branch Rd. N.W., Washington, Dc 20012	Washington	District of Columbia	DC	03
1 HOUR	8572	83	76	63	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
1 HOUR	8601	80	72	62	0	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
1 HOUR	8611	59	55	49	0	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
1 HOUR	2778	40	38	38	0	None	1	510590005	Cub Run Lee Rd Chant.(Cubrun Treat Plant	Not in a city	Fairfax	VA	03
1 HOUR	2834	53	50	50	0	None	1	510591005	6507 Columbia Pike	Annandale	Fairfax	VA	03
1 HOUR	2858	61	59	55	0	None	1	510595001	Lewinsville 1437 Balls Hill Rd	McLean	Fairfax	VA	03
1 HOUR	8356	52	48	40	0	None	1	511071005	38-I, Broad Run High School, Ashburn	Not in a city	Loudoun	VA	03
1 HOUR	8597	34	32	26	0	None	1	511530009	James S. Long Park	Not in a city	Prince William	VA	03
1 HOUR	8539	60	57	53	0	None	3	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 21, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: NO2
Year: 2010
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	98th Percentile	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	8525	66	58	55	0	None	1	110010025	Takoma Sc. 7010 Piney Branch Rd. N.W., Washington, Dc 20012	Washington	District of Columbia	DC	03
1 HOUR	8564	86	82	59	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
1 HOUR	8646	92	83	57	0	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
1 HOUR	8523	67	61	52	0	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
1 HOUR	8592	51	50	44	0	None	1	511071005	38-I, Broad Run High School, Ashburn	Not in a city	Loudoun	VA	03
1 HOUR	8632	34	33	30	0	None	1	511530009	James S. Long Park	Not in a city	Prince William	VA	03
1 HOUR	8075	63	62	57	0	None	3	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 21, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: NO2
Year: 2011
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	98th Percentile	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	8490	62	61	55	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
1 HOUR	8404	72	59	52	0	None	1	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
1 HOUR	8668	55	47	46	0	None	1	510130020	S 18th And Hayes St	Arlington	Arlington	VA	03
1 HOUR	8664	43	43	38	0	None	1	511071005	38-I, Broad Run High School, Ashburn	Not in a city	Loudoun	VA	03
1 HOUR	8556	34	33	29	0	None	1	511530009	James S. Long Park	Not in a city	Prince William	VA	03
1 HOUR	8550	54	53	47	0	None	3	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 21, 2012

AIR QUALITY MONITORING DATA

SULFUR DIOXIDE (SO_2)

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: SO2
Year: 2009
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	99th Percentile	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	8565	58	44	39	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
1 HOUR	8614	42	36	24	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
1 HOUR	2852	31	28	28	0	None	1	510590005	Cub Run Lee Rd Chant.(Cubrun Treat Plant	Not in a city	Fairfax	VA	03
1 HOUR	2838	36	35	35	0	None	1	510591005	6507 Columbia Pike	Annandale	Fairfax	VA	03
1 HOUR	2857	77	31	31	1	None	1	510595001	Lewinsville 1437 Balls Hill Rd	McLean	Fairfax	VA	03
1 HOUR	8368	65	63	36	0	None	2	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 21, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: SO_2
Year: 2009
Exceptional Events: Included (if any)

Duration Description=24-HR BLK AVG

Duration Description	Obs	First Max	Second Max	99th Percentile	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24-HR BLK AVG	360	33	17	13	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
24-HR BLK AVG	360	15	8	7	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24-HR BLK AVG	120	16	9	9	0	None	1	510590005	Cub Run Lee Rd Chant.(Cubrun Treat Plant	Not in a city	Fairfax	VA	03
24-HR BLK AVG	120	21	17	17	0	None	1	510591005	6507 Columbia Pike	Annandale	Fairfax	VA	03
24-HR BLK AVG	120	18	17	17	0	None	1	510595001	Lewinsville 1437 Balls Hill Rd	McLean	Fairfax	VA	03
24-HR BLK AVG	353	25	16	11	0	None	2	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 21, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: SO2
Year: 2010
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	99th Percentile	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	8586	50	25	21	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
1 HOUR	8325	16	15	10	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
1 HOUR	8305	30	25	17	0	None	2	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>
Generated: June 21, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: SO2
Year: 2010
Exceptional Events: Included (if any)

Duration Description=24-HR BLK AVG

Duration Description	Obs	First Max	Second Max	99th Percentile	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24-HR BLK AVG	359	14	11	10	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
24-HR BLK AVG	346	8	7	5	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24-HR BLK AVG	350	10	10	7	0	None	2	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Generated: June 21, 2012

Monitor Values Report

Geographic Area: Washington-Arlington-Alexandria, DC-VA-MD-WV
Pollutant: SO2
Year: 2011
Exceptional Events: Included (if any)

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	99th Percentile	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	8556	34	23	20	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
1 HOUR	4898	6	5	5	0	None	2	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
1 HOUR	7938	14	14	12	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
1 HOUR	8626	51	20	14	0	None	2	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Generated: June 21, 2012

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Pollutant: SO2
Year: 2011
Exceptional Events: Included (if any)

Duration Description=24-HR BLK AVG

Duration Description	Obs	First Max	Second Max	99th Percentile	Actual Exc	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24-HR BLK AVG	359	10	8	8	0	None	1	110010041	420 34th Street N.E.,Washington, Dc 20019	Washington	District of Columbia	DC	03
24-HR BLK AVG	197	4	3	3	0	None	2	110010043	2500 1st Street, N.W. Washington Dc	Washington	District of Columbia	DC	03
24-HR BLK AVG	330	5	4	3	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24-HR BLK AVG	365	6	5	5	0	None	2	515100009	517 N Saint Asaph St, Alexandria Health	Alexandria	Alexandria City	VA	03

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Generated: June 21, 2012

Appendix H – Persistence Factor Documentation

Pollutant and Averaging Period			Rockville 5110 Meadowside Lane			Upper Marlboro 14900 Pennsylvania Avenue			Beltsville 12003 Old Baltimore Pike			Washington, D.C. L Street and 20th Street			Washington, D.C. 420 34th Street N.E.			Washington, D.C. 2500 1st Street N.W.		
			2009	**2010**	**2011**	**2009**	**2010**	**2011**	**2009**	**2010**	**2011**	**2009**	**2010**	**2011**	**2009**	**2010**	**2011**	**2009**	**2010**	**2011**
Carbon Monoxide (CO) ppm	1-Hour	Maximum							1.1	1.5	1.7	2.5	2.8	5	4.2	3.7	2.7			3.1
		Second Maximum							1.1	1.3	1.3	2.5	2.7	4.2	4.2	3.7	2.7			3
		# Exceedances							0	0	0	0	0	0	0	0	0			0
	8-Hour	Maximum							0.9	1	1.1	2	2.4	2.2	4	3.5	2.5			2.5
		Second Maximum							0.9	1	0.8	1.9	2	1.9	3.8	3.1	2.3			2.4
		# Exceedances							0	0	0	0	0	0	0	0	0			0
		Ratio of 1-hr Max to 8-hr Max							0.82	0.67	0.65	0.80	0.86	0.44	0.95	0.95	0.93			0.81
		Persistence Factor by using these 6 monitors (3 with complete data, 1 incomplete, 2 no data)							**0.79**											
		Ratio of 1-hr 2nd Max to 8-hr 2nd Max							0.82	0.77	0.62	0.76	0.74	0.45	0.90	0.84	0.85			0.80
		Persistence Factor by using these 6 monitors (3 with complete data, 1 incomplete, 2 no data)							0.76											