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June 29, 2010

Mr. Shawn M. Garvin, Regional Administrator
U.S. Environmental Protection Agency (3RA00)
Region 3
1650 Arch Street
Philadelphia, PA 19103-2029

Dear Mr. Garvin:

Re: 2010 WV 5-Year Air Monitoring Network Assessment

Enclosed is the 2010 Ambient Air Monitoring Network Assessment for the West Virginia Department of Environmental Protection Division of Air Quality. This assessment is required every 5 years under 40 CFR Part 58, Subpart B, §58.10(d). The first assessment is due July 1, 2010.

Should you have any question or comments regarding this matter please feel free to contact John Benedict, DAQ Director, at 304-926-0499, ext. 1238.

Sincerely,

Randy C. Huffman
Cabinet Secretary

Enclosure

cc: John A. Benedict, DAQ Director



west virginia department of environmental protection

**West Virginia
Department of Environmental Protection
Division of Air Quality**

**Ambient Air Monitoring
Network Assessment**

2010

Prepared by:
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EXECUTIVE SUMMARY

The monitoring sites operated by the West Virginia Department of Environmental Protection, Division of Air Quality (DAQ) have gone through several revisions over the last decade. The revisions were necessary to accommodate the monitoring required for the new PM_{2.5} National Ambient Air Quality Standards (NAAQS), additional ozone and air toxics monitors. Currently, the DAQ has EPA approved PM_{2.5} monitoring established in every major MSA, city and populated area in the state. We also have ozone monitoring in all major MSA's including seven of the top thirteen populated areas. For the most part, the DAQ primarily monitors to assess an area's compliance with the NAAQS. All of the state's PM_{2.5}, ozone, PM₁₀ and SO₂ sites (especially maintenance plan sites) has been previously approved by EPA. In fact some sites have been installed or expanded at the recommendation of EPA.

Due to the presence of large sources of sulfur dioxide, the DAQ continues to maintain a comprehensive network of SO₂ monitors at key locations throughout the state and in SO₂ Maintenance Plan areas. The DAQ operates PM₁₀ monitors in PM₁₀ maintenance plan areas of the Northern Panhandle and in the state's largest metro area of Charleston. In the past, large industrial sources of CO emissions in Hancock County have caused elevated levels of ambient CO sources in the area requiring that we continue to monitor for CO even though the operational status of the sources has changed.

Over the past several years the DAQ has established three air toxics monitoring sites at existing locations as required by EPA. In addition the state operated three School Air Toxics (SAT) sites to assist the EPA in their assessment of toxics around key schools. Two of the SAT locations were new sites. While monitoring is completed at the sites and EPA will begin determining if additional monitoring may be requested of the state, the DAQ is continuing to aid the EPA analysis by collecting metrological data at the sites for at least a one year period. The DAQ also has had some involvement in a special long term air toxics health benchmark study that includes EPA Regions 5 and 3 and the Agency for Toxics Substances and Disease Registry. See http://www.atsdr.cdc.gov/sites/washington_marietta/index.html for additional details.

The WV monitoring sites meet the requirements of 40CFR Part 58 Appendix D. With the exception of establishing a required NCore site and one source oriented lead (Pb) monitoring site, no additional sites are considered as a result of this assessment. Since DAQ has continually assessed, modified and removed (with EPA approval) sites over the past several years, the DAQ anticipates that no complete sites or monitors will be terminated as a result of this review. Because of the geographically spatial coverage of the network and extended resources, removal of a single monitor at a multi-monitor site or a even a statistically well correlated single PM_{2.5} monitor from a nearby site does not necessarily yield highly measurable savings or allow for shifting of significant resources for other uses. In fact, the public may feel that they are less protected because the state removed the single monitor regardless of the analysis. Therefore

discontinuance of a single monitor would not impact current data users since are not proposing to remove any monitors as a result of this assessment. However, as a result of ongoing NAAQS revisions, NCore or more prescriptive monitoring regulation, the DAQ may have to conduct an even more robust analysis that prioritizes the continuing operation of what may be considered *equally valuable* sites in the network in order to shift a finite level of capacity and resources to meet expanding federal monitoring initiatives.

Since the monitoring network is located in all the major MSA's and the largest of the cities, it sufficiently characterizes air quality in areas with large populations of susceptible individuals. WV is an aging state with a high incidence of asthma. While less populated counties also have susceptible populations, the monitoring network is optimized to be representative of broad regional areas of the state.

Finally, as will be shown, population levels in WV have remained essentially the same since 2000. While there has been a slight overall gain state wide (mostly driven by a few counties), some major metro areas have experienced measurable decline. However the major metro areas still retain the largest populations and there is limited or imperceptible "shifts" in population in these areas.

WV DAQ finds that its current monitoring sites are adequately situated and designed to monitor for compliance with the NAAQS. With pending changes in various NAAQS, no site or monitor should be candidates for removal. The DAQ is required to add a multi-pollutant NCore site that will consume resources and capacity traditionally dedicated to NAAQS monitoring activities. The NCore site will be the largest monitoring site ever operated by the agency (the number of instrument at NCore may equal or exceed 25% of the total state wide instruments now operating and over 80% of the number of units now operated out of the Charleston office) and one that utilizes instrumentation that will be challenging to learn and operate to achieve sustained recovery rates. Regardless of the outcome of the network assessment, new NAAQS monitoring and the NCore site will require significant unrealized resources that will exceed any resource savings provided by any minor network or site adjustments that may be expected to occur as a result of this assessment.

Table of Contents

Executive Summary	3
List of Tables	6
List of Figures	7
Background	11
Current Monitoring Network	13
Population	19
Metropolitan Statistical Areas	23
City Populations	26
Economy and Demographics	28
Emissions Trends	31
Air Quality Data and Trends	33
Monitoring Sites	46
Other WV Monitoring Site Locations	89
Population Served by the Monitoring Network	97
Statistical Correlation Between Monitors	101
Assessment of the Air Monitoring Network in WV	102

List of Tables

1 Type of Monitors Operated by DAQ	13
2 Current WV Air Monitoring Network	14
3 WV Counties and Population Change	22
4 Populations of WV Metropolitan Statistical Areas	25
5 WV City Populations	27
6 Census Quick Facts	30
7 CO Air Quality Data	33
8 SO ₂ Air Quality Data	36
9 PM ₁₀ Air Quality Data	38
10 PM _{2.5} Air Quality Data	41
11 O ₃ Air Quality Data	44
12 Weirton-Steubenville, WV-OH MSA Population Estimate	53
13 Monitors in Brooke and Hancock Counties	55
14 Wheeling, WV-OH MSA Population Estimate	61
15 Monitors in Ohio and Marshall Counties	62
16 Morgantown, WV MSA Population Estimate	66
17 Marion and Harrison County (μSA) Population Estimate	66
18 Monitors in Morgantown, WV MSA	68
19 Monitors in Fairmont-Clarksburg CSA	68
20 Hagerstown-Martinsburg, MD-WV MSA	73
21 Monitors in Hagerstown-Martinsburg, MD-WV MSA	74
22 Parkersburg-Marietta-Vienna, WV-OH MSA	77
23 Monitors in Parkersburg-Marietta-Vienna, WV-OH MSA	78

List of Tables (continued)

24 Charleston, WV MSA	81
25 Monitors in Charleston, WV MSA	82
26 Huntington-Ashland, WV-KY-OH MSA	85
27 Monitors in Huntington-Ashland, WV-KY-OH MSA	86
28 Beckley-Oak Hill Combined Statistical Area (CSA)	89
29 Monitors in Beckley-Oak Hill Combined Statistical Area (CSA)	90
30 Greenbrier and Summers County Populations	93
31 Monitors in Greenbrier County Sam Black Church	94
32 Groups at Risk in the Counties with Monitors	98

List of Figures

1 Map of WV Counties	20
2 Population Density Per Square Mile in 2007	21
3 Map of WV Metropolitan Statistical Areas	24
4 PM Emission Trends 2002-2007	32
5 SO ₂ Emission Trends 1990-2007	32
6 CO Air Quality Data 8 Hour Trends	34
7 CO Air Quality Data 1 Hour Trends	34
8 SO ₂ Air Quality Data Annual Average Trends	37
9 SO ₂ Air Quality Data 24 Hour Average Trends	37
10 PM ₁₀ Air Quality Data 24 Hour trends	39
11 PM _{2.5} Air Quality Data 24 Hour Average Trends	43
12 PM _{2.5} Air Quality Data 24 Annual Average Trends	43
13 O ₃ Air Quality Data 8 Hour Average Trends	45
14 WV SO ₂ Monitoring Site Locations	47
15 WV PM _{2.5} Monitoring Site Locations	48
16 WV PM ₁₀ Monitoring Site Locations	49
17 WV O ₃ Monitoring Site Locations	50
18 WV Carbon Monoxide Monitoring Site Locations	51
19 WV Speciation Monitoring Site Locations	52
20 WV Sites Weirton-Steubenville, WV-OH MSA	56
21 WV Sites Weirton-Steubenville, WV-OH MSA	57
22 WV Sites Northern Hancock County WV	58

List of Figures (continued)

23 WV Sites Southern Hancock County	59
24 WV Sites Brooke County WV Sites Weirton-Steubenville, WV-OH MSA	60
25 WV Sites Wheeling, WV-OH MSA	63
26 WV Sites Wheeling, WV-OH MSA	64
27 WV Sites Wheeling, WV-OH MSA	65
28 WV Sites Morgantown, WV MSA	69
29 WV Sites Morgantown, WV MSA	70
30 WV Sites Morgantown, WV MSA	71
31 WV Sites Morgantown, WV MSA	72
32 WV Sites Hagerstown-Martinsburg, MD-WV	75
33 WV Sites Hagerstown-Martinsburg, MD-WV	76
34 WV Sites Parkersburg-Marietta-Vienna, WV-OH MSA	79
35 WV Sites Parkersburg-Marietta-Vienna, WV-OH MSA	80
36 WV Sites Charleston, WV MSA	83
37 WV Sites Charleston, WV MSA	84
38 WV Sites Huntington-Ashland, WV-KY-OH MSA	87
39 WV Sites Huntington-Ashland, WV-KY-OH MSA	88
40 WV Sites Beckley-Oak Hill Combined Statistical Area (CSA)	91
41 WV Sites Beckley-Oak Hill Combined Statistical Area (CSA)	92
42 WV Sites Greenbrier County Sam Black Church	95
43 Greenbrier County Sam Black Church	96
44 Percent of WV Counties in Poverty 2008 (USDA)	99

List of Figures (continued)

45 Per Capita Income in WV by County 2007 (WVBPH) 100

BACKGROUND

On October 17, 2006, EPA promulgated the Revisions to the Ambient Air Monitoring Regulations which required state and local air agencies to submit an assessment of the air quality surveillance system under 40CFR Part 58 §58.10, (d) as follows:

“The State, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and where new technologies are appropriate for incorporation in the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby States and Tribes or health effects studies. For PM_{2.5}, the assessment also must identify needed changes to population-oriented sites. The State, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan to the Regional Administrator. The first assessment is due July 1, 2010.”

At a minimum, the five year air quality surveillance system assessment requires states to address:

- If the network meets the monitoring objectives defined in Appendix D
- Whether new monitoring sites are needed
- Whether existing sites are no longer needed and can be terminated
- Whether new technologies are appropriate for incorporation into the air monitoring network
- Whether the network sufficiently supports characterization of air quality in areas with large populations of susceptible individuals
- Whether discontinuance of a monitoring site would have an adverse impact on other data users or health studies.
- For PM_{2.5} the assessment must identify needed changes to population oriented sites

WV is a predominantly rural state with a total population of approximately 1.8 million people. The area of the state is 24,038 square miles yielding a state population average density of 75 people per square mile. The largest city is the state capital of Charleston with a population of 50,302 people. The smallest town is Thurmond with a population of 7 people. The largest Metropolitan Statistical Area (MSA) is the Charleston MSA with a combined population of 304,000 people. The Charleston MSA is comprised of 5 counties the largest (and most dominate in terms of contributing population) is Kanawha County, home to 191,000 residents. The smallest county in the

Charleston MSA is Clay with 10,000 people or roughly 50 people per square mile. Interestingly, the largest MSA contains almost 17% of the total state population. The smallest MSA is Cumberland, MD-WV that contains 2 counties; Allegany County, MD with the majority of the population at 72,238 and Mineral County, WV with 26,795 people or only 27% of the MSA total.

WV is a mountainous state with the highest mean elevation east of the Mississippi at 1,500 feet above mean sea level (MSL). The highest level is 4,863 MSL. The state is 80% forested and contains some of the most difficult and rugged terrain in the country. For the most part, populous areas are located along river valleys (Ohio River Valley, Kanawha River Valley, and Monongahela River). These areas are historically characterized and defined by the presence of heavy industry including steel and chemical manufacturing that were fueled by the presence of coal, oil, gas and salt brine. Rivers provide for efficient transport of raw material and finished product. Those same rivers and vast coal reserve in the state also allowed for construction of some of the largest coal fired Electrical Generating Units (EGU) in the country. Coal was first discovered in 1742 and seams can be found in 53 of the state's 55 counties. There are 14 coal fired operating EGU's in WV with a generating capacity of over 14,000 Megawatts.

Ambient air monitoring in WV has changed significantly over the last three decades. Early monitoring consisted of manual sampling methods usually collected over a 24 hour periods and requiring subsequent laboratory analysis. These included TSP/PM₁₀ filter based samples (plus sulfate, nitrate and ions), total dust fall, SO₂ bubblers and lead peroxide candles. With the advent of continuous gaseous and particulate monitoring technology and better ways to record the data (from strip chart recorders to data loggers to a PC based data acquisition system), the state could collect and retrieve data continuously.

CURRENT MONITORING NETWORK

The DAQ operates 22 monitoring sites throughout the state. The current network is a combination of both manual continuous monitoring. The type of monitors the DAQ operates is listed in Table 1. Table 2 is a summary of the current DAQ monitoring network.

Table 1: Type of Monitors Operated by DAQ

Continuous Monitors	Number of Units at Sites	Manual Monitors	Number of Units at Sites
Sulfur Dioxide	14	PM_{2.5}	16 (2 collocated)
Ozone	16 (8 sites)	PM₁₀	3 (1 collocated)
Carbon Monoxide	3	TSP (toxics)	3
PM₁₀	4	Cartridge (toxics)	3
PM_{2.5}	1	VOC (toxics)	3

Table 2: Current WV Air Monitoring Network

Site Name	Site ID	City, County	Date Site Established	Latitude Longitude	Location Setting	MSA Code	Monitor Type	Monitor Objective Type	Measurement Scale	Monitor Begin Date	Monitor Description
ALLISON ELEMENTARY	54-029-0008	Chester, Hancock	5/15/1991	40.6157 -80.56022	SUBURBAN	8080	SLAMS	POPULATION EXPOSURE	NEIGHBORHOOD	5/15/1991	Sulfur Dioxide
COMMUNITY PARK	54-029-0015	Lawrenceville, Hancock	1/20/1995	40.618333 -80.54083	URBAN	8080	SLAMS	POPULATION EXPOSURE	URBAN	1/20/1995	Sulfur Dioxide
NEW MANCHESTER ELEM SCHOOL	54-029-0005	New Manchester, Hancock	1/1/1972	40.529 -80.57628	SUBURBAN	8080	SLAMS	POPULATION EXPOSURE	URBAN	1/1/1982	Sulfur Dioxide
R D #1, CROTHERS ROAD	54-029-0007	New Cumberland, Hancock	1/5/1990	40.460117 -80.57678	RURAL	8080	SLAMS	POPULATION EXPOSURE	URBAN	4/1/1990	Sulfur Dioxide
SUMMIT CIRCLE	54-029-0009	Weirton, Hancock	1/1/1992	40.42735 -80.59253	SUBURBAN	8080	SLAMS	SOURCE ORIENTED	NEIGHBORHOOD	1/1/1992	Carbon Monoxide
								POPULATION EXPOSURE	NEIGHBORHOOD	2/1/1992	PM10 CONTINUOUS
OAK STREET	54-029-1004	Weirton, Hancock	1/1/1982	40.421517 -80.58093	SUBURBAN	8080	SLAMS	POPULATION EXPOSURE	NEIGHBORHOOD	8/1/1991	Carbon Monoxide
									URBAN	9/1/1987 1/3/1999	Ozone PM2.5 FRM
								HIGHEST CONCENTRATION	NEIGHBORHOOD	3/1/1982 1/6/2007 1/1/1985	Sulfur Dioxide PM10 CONTINUOUS PM10 HI-VOL
MARLAND HEIGHTS ELEMENTARY	54-009-0011	Weirton, Brooke	1/1/1992	40.394583 -80.61202	SUBURBAN	8080	SLAMS	POPULATION EXPOSURE	NEIGHBORHOOD	1/1/1992	Carbon Monoxide
									URBAN	11/1/1992 4/1/1992 1/3/1999	Sulfur Dioxide PM10 CONTINUOUS PM2.5 FRM
MCKIMS RIDGE	54-009-0007	Weirton, Brooke	1/1/1997	40.389633 -80.58645	RURAL	8080	SLAMS	POPULATION EXPOSURE	NEIGHBORHOOD	1/1/1997	Sulfur Dioxide
MAHAN LANE	54-009-0005	Follansbee, Brooke	1/1/1983	40.341 -80.59685	SUBURBAN		SLAMS	POPULATION EXPOSURE	NEIGHBORHOOD	1/1/1983	Sulfur Dioxide
										2/1/1985	PM10 HI-VOL
										1/3/1999	PM2.5 FRM

Site Name	Site ID	City, County	Date Site Established	Latitude Longitude	Location Setting	MSA Code	Monitor Type	Monitor Objective Type	Measurement Scale	Monitor Begin Date	Monitor Description
WARWOOD WATER PLANT	54-069-0010	Wheeling, Ohio	1/1/2005	40.11485 -80.70118	URBAN	9000	SPM	POPULATION EXPOSURE	NEIGHBORHOOD	3/29/2005	AIR TOXICS
							SLAMS		URBAN	4/1/2005 1/1/2005	Ozone PM2.5 FRM
							CSN			9/28/2009	SPECIATION
NG ARMORY	54-051-1002	Moundsville, Marshall	1/1/1983	39.915933 -80.73407	SUBURBAN	9000	SLAMS	POPULATION EXPOSURE	URBAN	1/1/1983 1/3/1999	Sulfur Dioxide PM2.5 FRM
							SPM		URBAN	1/1/2006	PM2.5 CONTINUOUS
							CSN			6/2/2004	SPECIATION
BALL FIELD	54-003-0003	Martinsburg, Berkeley	2/10/1999	39.448006 -77.96413	SUBURBAN	8840	SPM	POPULATION EXPOSURE	URBAN	4/11/2001	Ozone
							SLAMS			2/14/1999	PM2.5 FRM
AIRPORT	54-061-0003	Morgantown, Monongalia	1/1/1983	39.649367 -79.92087	SUBURBAN		SPM	POPULATION EXPOSURE	NEIGHBORHOOD	7/4/2006	AIR TOXICS
							SLAMS		URBAN	1/1/1983 4/1/2000 1/3/1999	Sulfur Dioxide Ozone PM2.5 FRM
WV DEPT OF HEALTH	54-049-0006	Fairmont, Marion	1/1/2000	39.481483 -80.13467	URBAN		SPM	POPULATION EXPOSURE	URBAN	1/1/2000	PM2.5 FRM
WASHINGTON IRVING MIDDLE SCHOOL	54-033-0003	Clarksburg, Harrison	11/19/1997	39.278117 -80.34225	URBAN		SPM	POPULATION EXPOSURE	URBAN	1/3/1999	PM2.5 FRM
NEALE ELEM SCHOOL	54-107-1002	Vienna, Wood	1/1/1975	39.323533 -81.55237	SUBURBAN	6020	SLAMS	POPULATION EXPOSURE	URBAN	1/1/1980 1/1/1983 1/3/1999	Sulfur Dioxide Ozone PM2.5 FRM
BAPTIST TEMPLE	54-039-0010	Charleston, Kanawha	4/1/1999	38.3456 -81.62832	URBAN	1480	SPM	POPULATION EXPOSURE	NEIGHBORHOOD	10/1/2005	AIR TOXICS
									URBAN	1/1/2002	PM10 CONTINUOUS
							SLAMS		URBAN	4/1/2000 4/1/2000 5/12/2000	Sulfur Dioxide Ozone PM2.5 FRM
AGRICULTURAL CENTER	54-039-0011	Guthrie, Kanawha	11/1/2003	38.448833 -81.68472	RURAL		STN	POPULATION EXPOSURE	URBAN	11/23/2003	SPECIATION

Site Name	Site ID	City, County	Date Site Established	Latitude Longitude	Location Setting	MSA Code	Monitor Type	Monitor Objective Type	Measurement Scale	Monitor Begin Date	Monitor Description
PUBLIC LIBRARY	54-039-1005	South Charleston, Kanawha	1/1/1974	38.366183 -81.69372	SUBURBAN	1480	SLAMS	POPULATION EXPOSURE	URBAN	1/3/1999	PM2.5 FRM
							CSN		NEIGHBORHOOD	11/23/2003	SPECIATION
MARSHALL UNIVERSITY	54-011-0006	Huntington, Cabell	1/1/1982	38.424133 -82.4259	SUBURBAN	3400	SLAMS	POPULATION EXPOSURE	NEIGHBORHOOD	2/8/1982	Sulfur Dioxide
									URBAN	1/1/1982 1/3/1999	Ozone PM2.5 FRM
DOH GARAGE	54-025-0003	Sam Black Church, Greenbrier	3/31/1999	37.908533 -80.63263	RURAL		SLAMS	POPULATION EXPOSURE	URBAN	3/31/1999	Ozone
MAXWELL HILL ELEMENTARY	54-081-0002	Beckley, Raleigh	1/5/1998	37.807767 -81.19743	URBAN		SPM	POPULATION EXPOSURE	URBAN	1/3/1999	PM2.5 FRM

The DAQ operates air monitors in nine of the 10 MSAs wholly or partially located within the state. The DAQ also monitors in 11 of the top 15 cities in the state. The most populated city being Charleston at 50,302 people and the smallest city in the network is Moundsville with 9,109 people.

The air monitoring network has changed over the past decade. The largest significant influence in altering the network (besides the promulgation of PM₁₀ NAAQS in 1981 and the 1997 O₃ standard) was the promulgation of the 1997 PM_{2.5} NAAQS and PM_{2.5} monitoring initiative by EPA. The PM_{2.5} monitoring network design was the catalyst in changing and reconfiguring the DAQ network. Working with Region 3, it was determined that WV would set up and operate 17 PM_{2.5} monitoring sites at approved locations throughout the state. Since representative and optimal monitoring had already been established in all most MSA's and WV largest cities at the time, the DAQ selected these existing sites for the PM_{2.5} monitoring. A few new sites were also added to assess PM_{2.5} in previously unmonitored areas and to establish background monitoring. The establishment of the PM_{2.5} network and the subsequent operating schedule and QA requirements were very demanding upon existing resources; therefore, the DAQ terminated operation of several low value TSP and PM₁₀ monitors that only partially offset the demands of PM_{2.5} monitoring. In order to establish a PM_{2.5} weigh lab, some wet chemistry analytical processes were terminated and those resources moved to operating the new weigh lab and operating a speciation site. All the network changes were performed in concert with and approved by Region 3 at the time. After collecting several years of PM_{2.5} data, three of the sites that were well below the NAAQS were terminated (with Region 3 approval). The other significant change to the network has been the addition of air toxics monitoring (metals, VOCs and carbonyls) to three existing sites. These sites were also approved by Region 3. Even with these additions and changes, the DAQ is operating the remainder of the PM_{2.5} sites and the entire monitoring network with fewer personnel than it had in the late 1990's.

The DAQ has complied with the EPA requirement to post for public comment and submit to Region 3 an annual network design. To date there have been no public comments and Region 3 has approved the designs as submitted. The 2010-2011 Network Design was posted for a 30 day public comment period on May 13, 2010.

Of the 22 monitoring sites in the state, 15 are at fenced in air monitoring shelters, five are located exclusively on rooftops and at two locations both a rooftop and a small room for continuous monitors are utilized. All site areas, including rooftops, require a lease agreement with the owner. Leases are executed by another state agency at the request of DEP. While the DEP renews leases for any period from one to five years, state law allows for a 30 day termination notice by either the lease or lessor. Several of DAQ's leased sites have been in place for decades. When originally leased, the agency would lease only enough area to accommodate the shelter and the fence. As current site leases become due, DAQ is assessing the location to determine if it may be necessary to attempt to expand the square footage to accommodate additional monitors or platforms. Also, at our older locations, the DAQ is determining if siting conditions will change prior to the next renewal (such as infringement of tree drip lines) requiring

shifting or relocation of the site. These lease alterations are contingent upon available funds and approval from both the owner and the state Real Estate Division. Neither the DAQ nor DEP is authorized to sign a lease agreement.

Sites with shelters and fences: All of Hancock, Brooke, Ohio, Marshall, Wood, Berkeley, Monongalia and Greenbrier Counties.

Sites that are only on rooftops: Kanawha County (South Charleston and Guthrie), Marion, Harrison and Raleigh Counties.

Site on rooftops and a room for continuous monitors: Charleston (Kanawha County) and Cabell County.

POPULATION

State and County Population

As of July 1, 2008, the population estimate for WV is 1,814,468 people. This is a slight gain from 2000 of 6,123 people or 0.3 of a percent. The majority of the population gain can be attributed to growth in both Berkeley and Jefferson Counties in the Eastern Panhandle whose populations have grown by 26,139 (34.4%) and 9,425 (22.3%) residents. Less expensive housing and lower tax rates in these counties has attracted former residents of the Greater Washington, DC Metro area to relocate in WV. These counties have a combined total population of 153,659 people. In general terms, population in WV has remained flat. Most of the larger cities continue to lose population. Figure 1 provides a map of Counties in WV. Figure 2 is a map of population densities in those counties. Table 3 provides a list of counties and population metadata. Thirty five of the fifty counties experienced a decline (red text) in population over the eight year period. The most significant decline was in the largest county in the state, Kanawha County that lost slightly over 9,000 residents.

Figure 1: Map of WV Counties

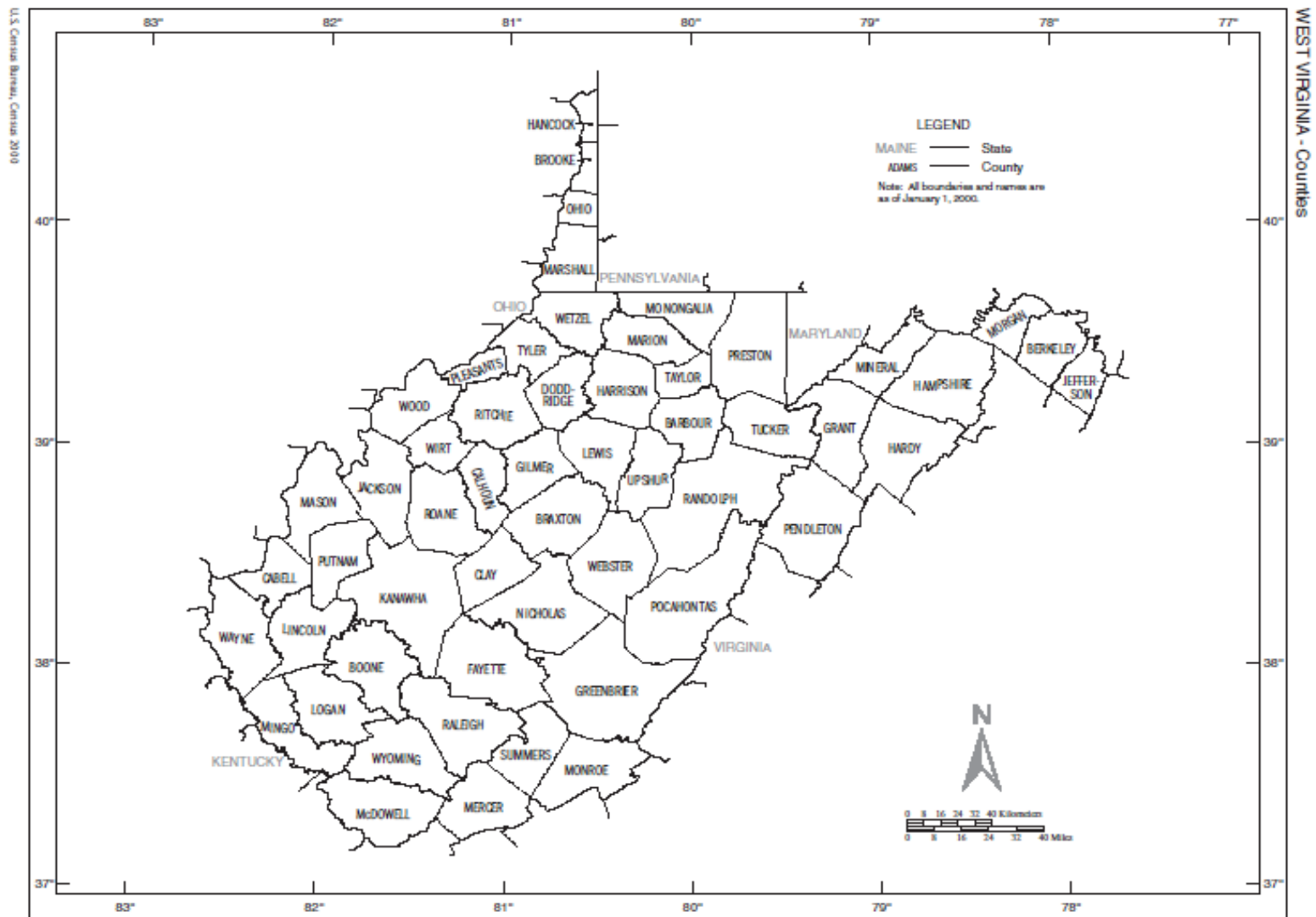


Figure 2: Population Density per square mile in 2007 (WV BPH Statistics)

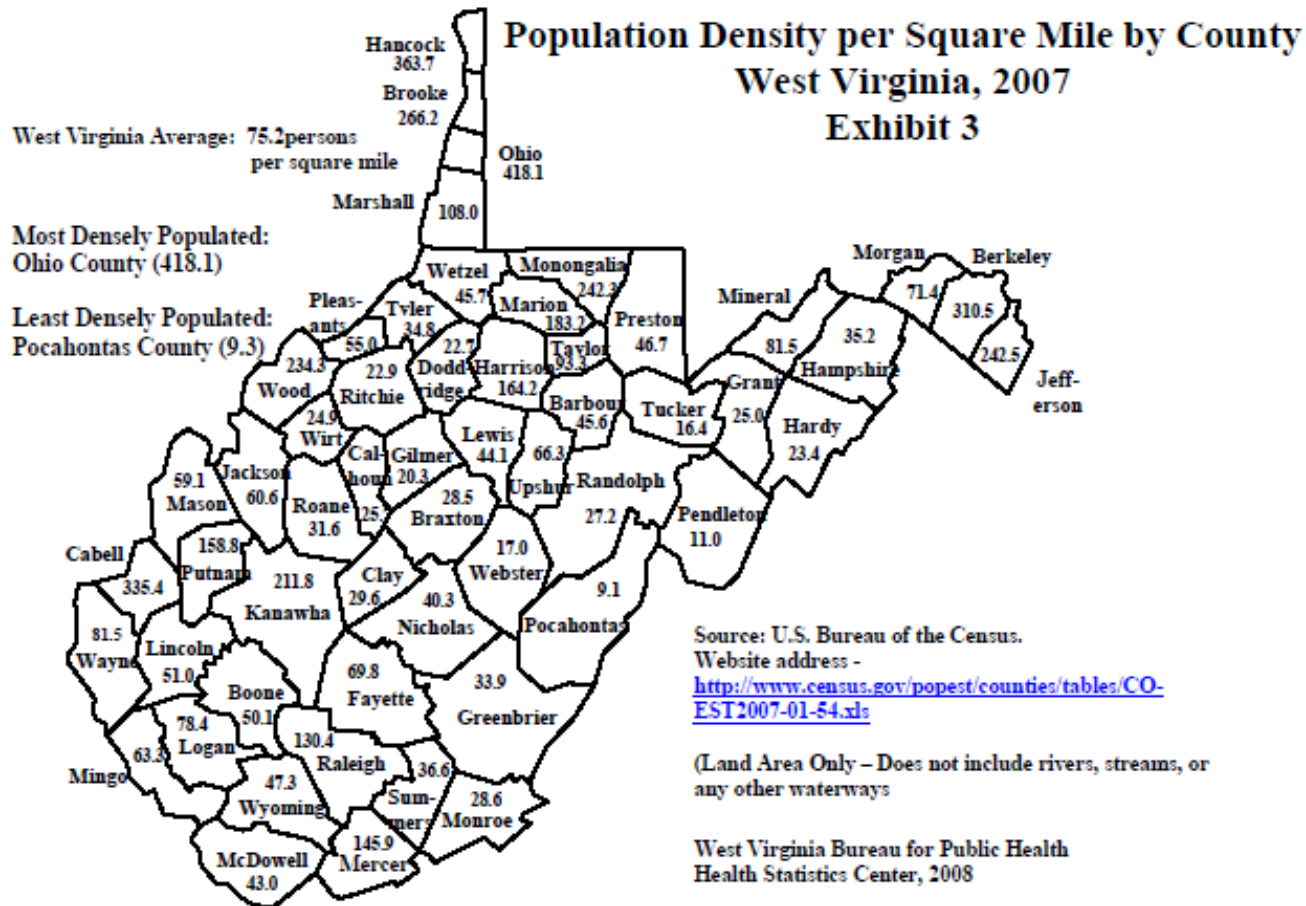


Table 3: WV Counties and Population Change

Geographic Area	Population		Change 2000 to 2008		Population Density	Area Sq. Mi.
	2008	2000	Number	Percent		
West Virginia	1,814,468	1,808,345	6,123	0.3	75.5	24,038
Barbour County	15,600	15,557	43	0.3	45.7	341
Berkeley County	102,044	75,905	26,139	34.4	317.7	321
Boone County	24,977	25,535	-558	-2.2	49.8	502
Braxton County	14,700	14,702	-2	0.0	28.8	511
Brooke County	23,520	25,447	-1,927	-7.6	264.7	89
Cabell County	94,631	96,785	-2,154	-2.2	336.7	281
Calhoun County	7,212	7,582	-370	-4.9	25.8	279
Clay County	10,075	10,330	-255	-2.5	29.5	342
Doddridge County	7,201	7,403	-202	-2.7	22.5	320
Fayette County	46,341	47,579	-1,238	-2.6	70.0	662
Gilmer County	6,873	7,160	-287	-4.0	20.3	339
Grant County	12,047	11,299	748	6.6	25.2	477
Greenbrier County	34,567	34,453	114	0.3	33.9	1,020
Hampshire County	22,574	20,202	2,372	11.7	35.3	640
Hancock County	30,008	32,667	-2,659	-8.1	361.7	83
Hardy County	13,591	12,669	922	7.3	23.3	582
Harrison County	68,853	68,651	202	0.3	165.5	416
Jackson County	28,157	28,000	157	0.6	60.6	464
Jefferson County	51,615	42,190	9,425	22.3	246.2	210
Kanawha County	191,018	200,076	-9,058	-4.5	211.9	902
Lewis County	17,281	16,919	362	2.1	44.9	385
Lincoln County	22,386	22,108	278	1.3	51.2	437
Logan County	35,525	37,710	-2,185	-5.8	78.3	454
McDowell County	22,707	27,329	-4,622	-16.9	42.6	533
Marion County	56,496	56,598	-102	-0.2	183.0	309
Marshall County	32,766	35,519	-2,753	-7.8	107.3	305
Mason County	25,678	25,959	-281	-1.1	59.6	431
Mercer County	61,500	62,980	-1,480	-2.3	146.8	419
Mineral County	26,795	27,078	-283	-1.0	81.7	328
Mingo County	26,352	28,253	-1,901	-6.7	62.3	423
Monongalia	88,221	81,867	6,354	7.8	245.0	360
Monroe County	13,739	13,194	545	4.1	29.1	473
Morgan County	16,325	14,943	1,382	9.2	71.3	229
Nicholas County	26,137	26,562	-425	-1.6	40.4	647
Ohio County	44,106	47,433	-3,327	-7.0	416.8	106
Pendleton County	7,582	8,196	-614	-7.5	10.9	696
Pleasants County	7,150	7,514	-364	-4.8	55.0	130
Pocahontas County	8,472	9,131	-659	-7.2	9.0	940
Preston County	30,285	29,334	951	3.2	46.7	649
Putnam County	55,488	51,586	3,902	7.6	160.5	346
Raleigh County	79,357	79,220	137	0.2	131.1	605
Randolph County	28,264	28,262	2	0.0	27.2	1,040
Ritchie County	10,308	10,343	-35	-0.3	22.8	452
Roane County	15,169	15,443	-274	-1.8	31.4	484
Summers County	13,017	14,388	-1,371	-9.5	36.1	360
Taylor County	16,158	16,089	69	0.4	93.5	173
Tucker County	6,877	7,321	-444	-6.1	16.4	419
Tyler County	8,841	9,592	-751	-7.8	34.5	256
Upshur County	23,582	23,404	178	0.8	66.5	355
Wayne County	41,082	42,903	-1,821	-4.2	81.2	506
Webster County	9,394	9,719	-325	-3.3	17.0	553
Wetzel County	16,329	17,693	-1,364	-7.7	45.6	358
Wirt County	5,757	5,873	-116	-2.0	24.8	233
Wood County	86,204	87,982	-1,778	-2.0	235.4	366
Wyoming County	23,534	25,708	-2,174	-8.5	47.1	499

Metropolitan Statistical Areas

There are 10 Metropolitan Statistical Areas (MSAs) in WV. Air quality monitors are operated in all but one of these MSA. The largest of the 10 MSAs (excluding Washington-Arlington-Alexandria, DC-VA-MD-WV part of the larger Washington-Baltimore-Northern Virginia DC-MD-VA-WV Combined Statistical Area having a population 4.5 times the total population of WV) is Charleston, WV with an estimated population of 303,944. The Charleston MSA is comprised of 5 counties having populations ranging from the smallest of 10,075 (Clay County) up to the largest population of 191,018 (Kanawha County). In the Charleston MSA, Kanawha County contains 63% of the total MSA population.

WV also shares MSA's with nearby states. WV does not operate any monitors in the Cumberland, MD-WV MSA. This MSA, having a total population of 99,033 contains 2 counties, Allegany County, MD (population 72,238) and Mineral County, WV (population 26,795). Allegany County, MD contains almost three times the population of the WV county of Mineral and the most populous area of 21,051 is Cumberland, MD. A map of the MSA's is shown in Figure 3. The population and change in population from 2000 to 2008 is provided in Table 4.

Figure 3: Map of WV Metropolitan Statistical Areas

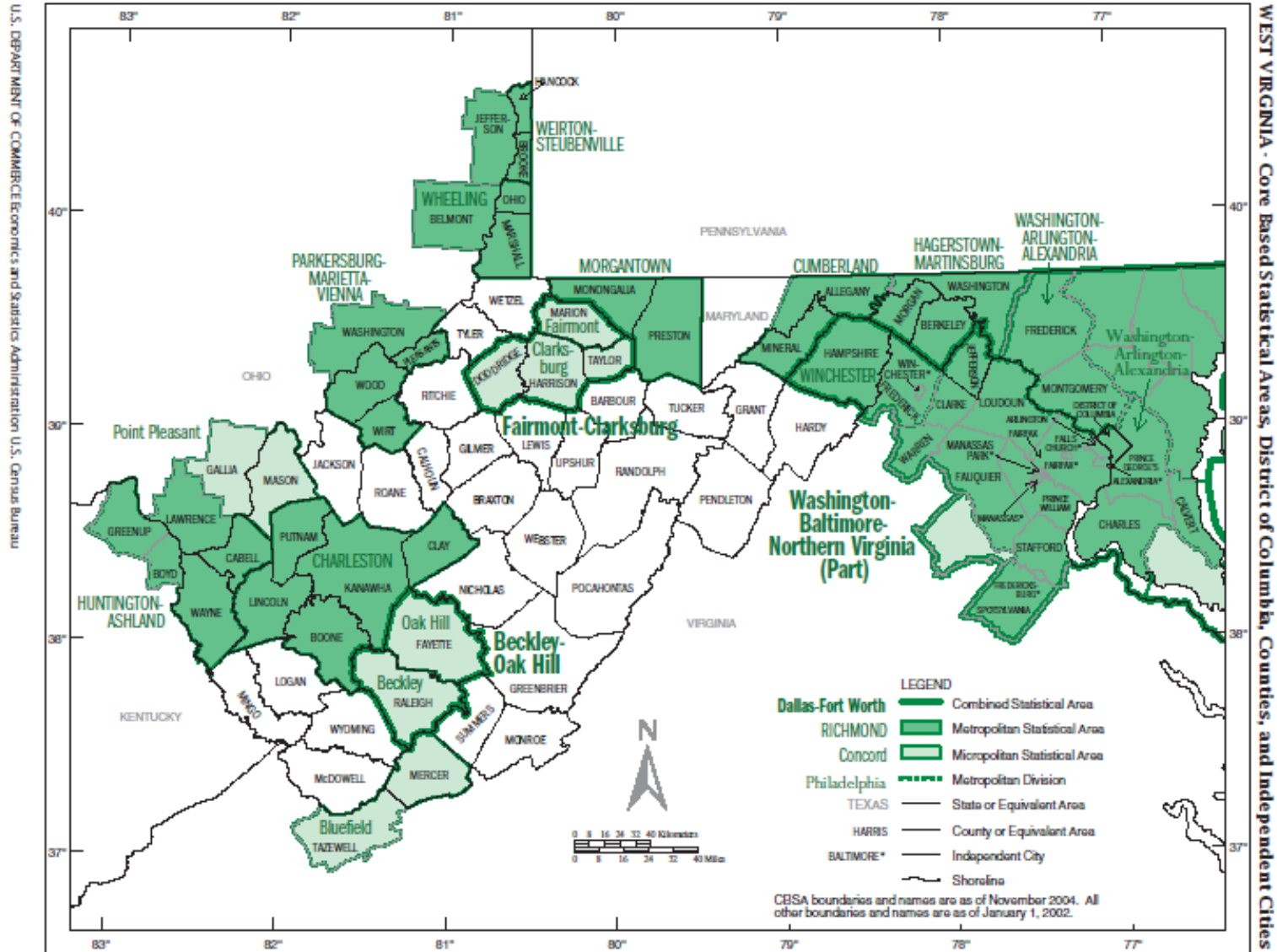


Table 4: Populations of WV Metropolitan Statistical Areas

Metropolitan Statistical Areas	Population estimate		2000 to 2008		Pop Density	Area (Mile ²)
	2008	2000	Number	Percent		
Charleston, WV	303,944	309,635	-5,691	-1.8		
Boone County, WV	24,977	25,535	-558	-2.2	50	502
Clay County, WV	10,075	10,330	-255	-2.5	29	342
Kanawha County, WV	191,018	200,076	-9,058	-4.5	212	902
Lincoln County, WV	22,386	22,108	278	1.3	51	437
Putnam County, WV	55,488	51,586	3,902	7.6	161	346
Cumberland, MD-WV	99,033	102,008	-2,975	-2.9		
Allegany County, MD	72,238	74,930	-2,692	-3.6	170	424
Mineral County, WV	26,795	27,078	-283	-1.0	82	328
Hagerstown-Martinsburg, MD-WV	263,753	222,771	40,982	18.4		
Berkeley County, WV	102,044	75,905	26,139	34.4	318	321
Morgan County, WV	16,325	14,943	1,382	9.2	71	229
Washington County, MD	145,384	131,923	13,461	10.2		
Huntington-Ashland, WV-KY-OH	284,234	288,651	-4,417	-1.5		
Boyd County, KY	48,560	49,752	-1,192	-2.4	304	160
Cabell County, WV	94,631	96,785	-2,154	-2.2	337	281
Greenup County, KY	37,388	36,888	500	1.4	109	345
Lawrence County, OH	62,573	62,323	250	0.4	138	453
Wayne County, WV	41,082	42,903	-1,821	-4.2	81	506
Morgantown, WV	118,506	111,201	7,305	6.6		
Monongalia County, WV	88,221	81,867	6,354	7.8	245	360
Preston County, WV	30,285	29,334	951	3.2	47	649
Parkersburg-Marietta-Vienna, WV-OH	160,678	164,620	-3,942	-2.4		
Pleasants County, WV	7,150	7,514	-364	-4.8	55	130
Washington County, OH	61,567	63,251	-1,684	-2.7	97	632
Wirt County, WV	5,757	5,873	-116	-2.0	25	233
Wood County, WV	86,204	87,982	-1,778	-2.0	235	366
Washington-Arlington-Alexandria, DC-VA-MD-WV	5,358,130	4,796,065	562,065	11.7		
Anne Arundel County, MD	512,790	489,664	23,126	4.7	1236	415
Calvert County, MD	88,698	74,563	14,135	19.0	416	213
Charles County, MD	140,764	120,546	20,218	16.8	308	458
Frederick County, MD	225,721	195,276	30,445	15.6	342	660
Howard County, MD	274,995	247,843	27,152	11.0	1097	251
Montgomery County, MD	950,680	873,341	77,339	8.9	1935	491
Prince George's County, MD	820,852	801,515	19,337	2.4	1701	483
St. Mary's County, MD	101,578	86,232	15,346	17.8	284	357
Arlington County, VA	209,969	189,444	20,525	10.8	8096	26
Clarke County, VA	14,458	12,652	1,806	14.3	82	176
Fairfax County, VA	1,015,302	969,682	45,620	4.7	2598	391
Fauquier County, VA	66,839	55,185	11,654	21.1	103	648
Loudoun County, VA	289,995	169,599	120,396	71.0	562	516
Prince William County, VA	364,734	280,813	83,921	29.9	1084	336
Spotsylvania County, VA	120,031	90,390	29,641	32.8	300	400
Stafford County, VA	121,736	92,446	29,290	31.7	453	269
Warren County, VA	36,663	31,422	5,241	16.7	172	213
Jefferson County, WV	51,615	42,190	9,425	22.3	246	210
Weirton-Steubenville, WV-OH	122,054	132,008	-9,954	-7.5		
Brooke County, WV	23,520	25,447	-1,927	-7.6	265	89
Hancock County, WV	30,008	32,667	-2,659	-8.1	362	83
Jefferson County, OH	68,526	73,894	-5,368	-7.3	168	408
Wheeling, WV-OH	144,847	153,178	-8,331	-5.4		
Belmont County, OH	67,975	70,226	-2,251	-3.2	128	532
Marshall County, WV	32,766	35,519	-2,753	-7.8	107	305
Ohio County, WV	44,106	47,433	-3,327	-7.0	417	106
Winchester, VA-WV	122,369	102,996	19,373	18.8		
Frederick County, VA	73,898	59,209	14,689	24.8	179	413
Hampshire County, WV	22,574	20,202	2,372	11.7	35	640

City Populations

The largest city in WV is the state capital of Charleston that has a population of 50,302 people. The smallest is Thurmond, a town with a population of 7 people. The combined average population of cities, towns and villages in WV is approximately 2,718 people. Table 5 provides the populations of cities in WV sorted from most to least populous.

Table 5: WV City Populations

Geographic Area	Population Estimates		Change 2000 to 2008		Geographic Area	Population Estimates		Change 2000 to 2008	
	7/1/08	4/1/00	Number	Percent		7/1/08	4/1/00	Number	Percent
Charleston city	50,302	53,483	-3,181	-6.32	Madison city	2,576	2,677	-101	-3.92
Huntington city	49,185	51,889	-2,704	-5.50	Hinton city	2,532	2,880	-348	-13.74
Parkersburg city	31,611	33,474	-1,863	-5.89	Bethlehem village	2,487	2,651	-164	-6.59
Morgantown city	29,642	26,702	2,940	9.92	Moorefield town	2,438	2,381	57	2.34
Wheeling city	28,913	31,380	-2,467	-8.53	Milton town	2,399	2,206	193	8.05
Fairmont city	19,024	19,320	-296	-1.56	Chester city	2,332	2,595	-263	-11.28
Weirton city	18,748	20,411	-1,663	-8.87	Richwood city	2,309	2,477	-168	-7.28
Martinsburg city	17,020	14,866	2,154	12.66	White Sulphur Springs	2,279	2,322	-43	-1.89
Beckley city	16,832	17,393	-561	-3.33	Shinnston city	2,243	2,295	-52	-2.32
Clarksburg city	16,441	16,756	-315	-1.92	Welch city	2,220	2,676	-456	-20.54
South Charleston city	12,427	13,423	-996	-8.01	Spencer city	2,156	2,352	-196	-9.09
Bluefield city	11,093	11,451	-358	-3.23	Mannington city	2,079	2,124	-45	-2.16
St. Albans city	10,996	11,567	-571	-5.19	Winfield town	2,055	1,903	152	7.40
Vienna city	10,536	10,792	-256	-2.43	Salem city	2,050	2,097	-47	-2.29
Moundsville city	9,109	10,003	-894	-9.81	St. Marys city	1,926	2,051	-125	-6.49
Bridgeport city	7,928	7,471	457	5.76	Montgomery city	1,921	1,942	-21	-1.09
Dunbar city	7,664	8,158	-494	-6.45	Romney city	1,912	1,940	-28	-1.46
Oak Hill city	7,211	7,598	-387	-5.37	Stonewood city	1,840	1,815	25	1.36
Elkins city	6,976	7,032	-56	-0.80	Harrisville town	1,817	1,842	-25	-1.38
Nitro city	6,784	6,923	-139	-2.05	Belington town	1,797	1,788	9	0.50
Hurricane city	6,335	5,480	855	13.50	McMechen city	1,724	1,937	-213	-12.35
Princeton city	6,261	6,389	-128	-2.04	Star City town	1,654	1,365	289	17.47
New Martinsville city	5,564	5,984	-420	-7.55	Nutter Fort town	1,633	1,686	-53	-3.25
Buckhannon city	5,505	5,768	-263	-4.78	Marmet city	1,605	1,693	-88	-5.48
Grafton city	5,315	5,489	-174	-3.27	Ronceverte city	1,603	1,657	-54	-3.37
Keyser city	5,230	5,303	-73	-1.40	Ceredo city	1,586	1,686	-100	-6.31
Charles Town city	4,765	3,060	1,705	35.78	Mullens city	1,584	1,779	-195	-12.31
Ranson corporation	4,692	3,570	1,122	23.91	Ansted town	1,577	1,576	1	0.06
Point Pleasant city	4,451	4,638	-187	-4.20	Eleanor town	1,555	1,362	193	12.41
Weston city	4,262	4,292	-30	-0.70	Chesapeake town	1,542	1,643	-101	-6.55
Westover city	4,088	3,941	147	3.60	New Haven town	1,528	1,561	-33	-2.16
Ravenswood city	3,935	4,031	-96	-2.44	Ierra Alta town	1,503	1,456	47	3.13
Lewisburg city	3,533	3,624	-91	-2.58	Logan city	1,501	1,630	-129	-8.59
Barboursville village	3,410	3,261	149	4.37	Rainelle town	1,470	1,545	-75	-5.10
Summersville town	3,303	3,294	9	0.27	Glennville town	1,456	1,544	-88	-6.04
Kenova city	3,272	3,526	-254	-7.76	Benwood city	1,431	1,585	-154	-10.76
Ripley city	3,241	3,261	-20	-0.62	Sistersville city	1,413	1,588	-175	-12.38
Pleasant Valley city	3,123	3,096	27	0.86	Oceana town	1,411	1,550	-139	-9.85
Williamson city	3,053	3,418	-365	-11.96	Glen Dale city	1,396	1,552	-156	-11.17
Williamstown city	2,982	2,996	-14	-0.47	Mount Hope city	1,381	1,487	-106	-7.68
Kingwood city	2,947	2,944	3	0.10	Parsons city	1,376	1,463	-87	-6.32
Follansbee city	2,855	3,115	-260	-9.11	Mabscott town	1,350	1,403	-53	-3.93
Philippi city	2,783	2,870	-87	-3.13	Barrackville town	1,289	1,288	1	0.08
Petersburg city	2,774	2,423	351	12.65	Sophia town	1,234	1,301	-67	-5.43
Fayetteville town	2,663	2,766	-103	-3.87	West Liberty town	1,233	1,259	-26	-2.11
Paden City city	2,599	2,860	-261	-10.04	Buffalo town	1,206	1,171	35	2.90
Wellsburg city	2,591	2,891	-300	-11.58	Marlinton town	1,190	1,206	-16	-1.34

ECONOMY and DEMOGRAPHICS

The information presented below is directly from the US Census Bureau, American Community Survey:

OCCUPIED HOUSING UNIT CHARACTERISTICS: In 2006-2008, West Virginia had 743,000 occupied housing units - 553,000 (74 percent) owner occupied and 190,000 (26 percent) renter occupied. Five percent of the households did not have telephone service and 9 percent of the households did not have access to a car, truck, or van for private use. Multi Vehicle households were not rare. Thirty-eight percent had two vehicles and another 19 percent had three or more.

HOUSING COSTS: The median monthly housing costs for mortgaged owners was \$899, nonmortgage owners \$261, and renters \$532. Twenty-five percent of owners with mortgages, 9 percent of owners without mortgages, and 46 percent of renters in West Virginia spent 30 percent or more of household income on housing.

HOUSEHOLDS AND FAMILIES: In 2006-2008 there were 743,000 households in West Virginia. The average household size was 2.4 people. Families made up 67 percent of the households in West Virginia. This figure includes both married-couple families (52 percent) and other families (15 percent). Nonfamily households made up 33 percent of all households in West Virginia. Most of the nonfamily households were people living alone, but some were composed of people living in households in which no one was related to the householder.

NATIVITY AND LANGUAGE: One percent of the people living in West Virginia in 2006-2008 were foreign born. Ninety-nine percent was native, including 71 percent who were born in West Virginia. Among people at least five years old living in West Virginia in 2006-2008, 2 percent spoke a language other than English at home. Of those speaking a language other than English at home, 46 percent spoke Spanish and 54 percent spoke some other language; 30 percent reported that they did not speak English "very well."

GEOGRAPHIC MOBILITY: In 2006-2008, 87 percent of the people at least one year old living in West Virginia were living in the same residence one year earlier; 7 percent had moved during the past year from another residence in the same county, 3 percent from another county in the same state, 3 percent from another state, and less than 0.5 percent from abroad.

EDUCATION: In 2006-2008, 82 percent of people 25 years and over had at least graduated from high school and 17 percent had a bachelor's degree or higher. Nineteen percent were dropouts; they were not enrolled in school and had not graduated from high school. The total school enrollment in West Virginia was 410,000 in 2006-2008. Nursery school and kindergarten enrollment was 43,000 and elementary or high school enrollment was 262,000 children. College or graduate school enrollment was 105,000.

DISABILITY: Data for this section cannot be displayed because the number of sample cases is too small. Displaying the data would risk disclosing information for individuals.

INDUSTRIES: In 2006-2008, for the employed population 16 years and older, the leading industries in West Virginia were Educational services, and health care, and social assistance, 24 percent, and Retail trade, 13 percent.

OCCUPATIONS AND TYPE OF EMPLOYER: Among the most common occupations were: Management, professional, and related occupations, 29 percent; Sales and office occupations, 25 percent; Service occupations, 18 percent; Production, transportation, and material moving occupations, 15 percent; and Construction, extraction, maintenance and repair occupations, 13 percent. Seventy-six percent of the people employed were Private wage and salary workers; 18 percent was Federal, state, or local government workers; and 5 percent was Self-employed in own not incorporated business workers.

TRAVEL TO WORK: Eighty-one percent of West Virginia workers drove to work alone in 2006-2008, 11 percent carpooled, 1 percent took public transportation, and 4 percent used other means. The remaining 3 percent worked at home. Among those who commuted to work, it took them on average 25.4 minutes to get to work.

INCOME: The median income of households in West Virginia was \$37,870. Seventy-one percent of the households received earnings and 24 percent received retirement income other than Social Security. Thirty-six percent of the households received Social Security. The average income from Social Security was \$14,736. These income sources are not mutually exclusive; that is, some households received income from more than one source.

POVERTY AND PARTICIPATION IN GOVERNMENT PROGRAMS: In 2006-2008, *17 percent of people were in poverty*. Twenty-three percent of related children under 18 were below the poverty level, compared with 11 percent of people 65 years old and over. Thirteen percent of all families and 36 percent of families with a female householder and no husband present had incomes below the poverty level.

An edited summary table of Quick Facts from the Census Bureau can be found in Table 6.

Table 6: Census Quick Facts

People QuickFacts	West Virginia	USA
Population, 2008 estimate	1,814,468	304,059,724
Population, percent change, April 1, 2000 to July 1, 2008	0.3%	8.0%
Population estimates base (April 1) 2000	1,808,345	281,424,602
Persons under 5 years old, percent, 2008	5.8%	6.9%
Persons under 18 years old, percent, 2008	21.3%	24.3%
Persons 65 years old and over, percent, 2008	15.7%	12.8%
Female persons, percent, 2008	51.0%	50.7%
White persons, percent, 2008 (a)	94.5%	79.8%
Black persons, percent, 2008 (a)	3.6%	12.8%
American Indian and Alaska Native persons, percent, 2008 (a)	0.2%	1.0%
Asian persons, percent, 2008 (a)	0.7%	4.5%
Native Hawaiian and Other Pacific Islander, percent, 2008 (a)	Z	0.2%
Persons reporting two or more races, percent, 2008	1.0%	1.7%
Persons of Hispanic or Latino origin, percent, 2008 (b)	1.1%	15.4%
White persons not Hispanic, percent, 2008	93.5%	65.6%
Living in same house in 1995 and 2000, pct 5 yrs old & over	63.3%	54.1%
Foreign born persons, percent, 2000	1.1%	11.1%
Language other than English spoken at home, pct age 5+, 2000	2.7%	17.9%
High school graduates, percent of persons age 25+, 2000	75.2%	80.4%
Bachelor's degree or higher, pct of persons age 25+, 2000	14.8%	24.4%
Persons with a disability, age 5+, 2000	410,781	49,746,248
Mean travel time to work (minutes), workers age 16+, 2000	26.2	25.5
Housing units, 2008	886,430	129,065,264
Homeownership rate, 2000	75.2%	66.2%
Housing units in multi-unit structures, percent, 2000	12.0%	26.4%
Median value of owner-occupied housing units, 2000	\$72,800	\$119,600
Households, 2000	736,481	105,480,101
Persons per household, 2000	2.4	2.59
Median household income, 2008	\$37,528	\$52,029
Per capita money income, 1999	\$16,477	\$21,587
Persons below poverty level, percent, 2008	17.4%	13.2%
Land area, 2000 (square miles)	24,077.73	3,537,438.44
Persons per square mile, 2000	75.1	79.6

EMISSIONS TRENDS

The DAQ Emissions Inventory Section provided emissions trends in WV for particulate matter (PM₁₀ and PM_{2.5}) and sulfur dioxide (SO₂). The data indicates that emissions of PM₁₀ have declined between 2002 and 2007 while PM_{2.5} emissions have remained relatively steady for the same period. Emissions of SO₂ have decreased significantly between 1990 and 2007. Figures 4 and 5 present the emission trends data.

Figure 4: PM Emission Trends 2002-2007

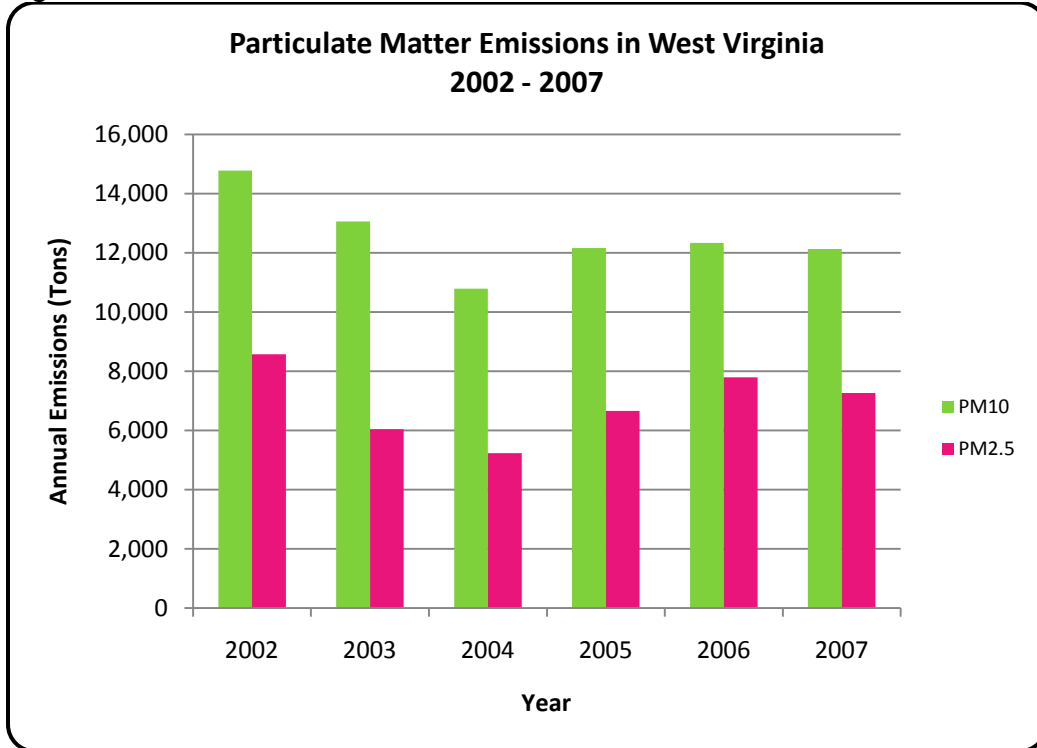
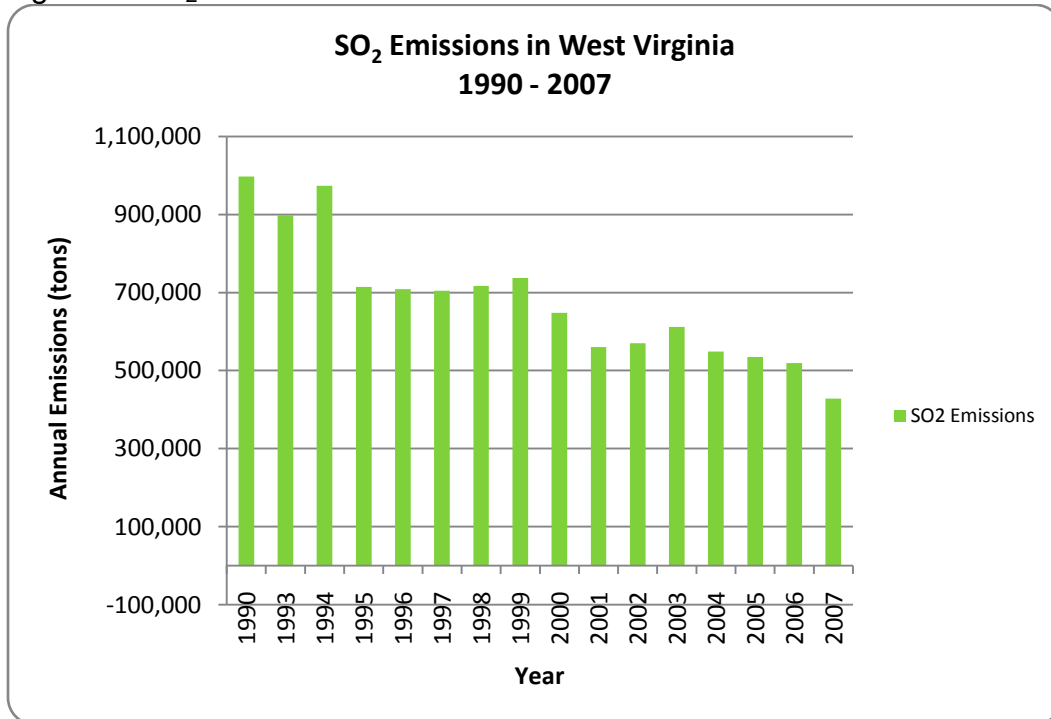


Figure 5: SO₂ Emission Trends 1990-2007



Air Quality Data and Trends

This section present air quality data for the criteria air pollutants monitored by the DAQ.

Carbon Monoxide (CO)

CO is monitored at three locations in the Northern Panhandle of the state; two in Hancock County and one in Brooke County. It should be noted that CO is monitored due to the presence of steel making facilities in both Ohio and WV and not because of vehicular activity which is minimal in those areas. Table 7 contains CO data and Figure 6 and 7 present the trends data.

Table 7: CO Air Quality Data

CO: Site Name	Site ID	Monitor Begin Date	Year	8-Hour Max2 (9 PPM)	1-Hour Max2 (35 PPM)
MARLAND HEIGHTS ELEMENTARY	54-009-0011	1/1/1992	2006	3.9	15.9
			2007	2.4	3.2
			2008	2.3	4.3
			2009	0.8	1.0
SUMMIT CIRCLE	54-029-0009	1/1/1992	2006	1.9	5.6
			2007	1.4	1.9
			2008	1.7	2.7
			2009	1.0	1.1
OAK STREET	54-029-1004	8/1/1991	2006	1.7	6.1
			2007	1.6	2.3
			2008	2.2	3.5
			2009	1.1	1.8

Figure 6: CO Air Quality Data 8 Hour Trends

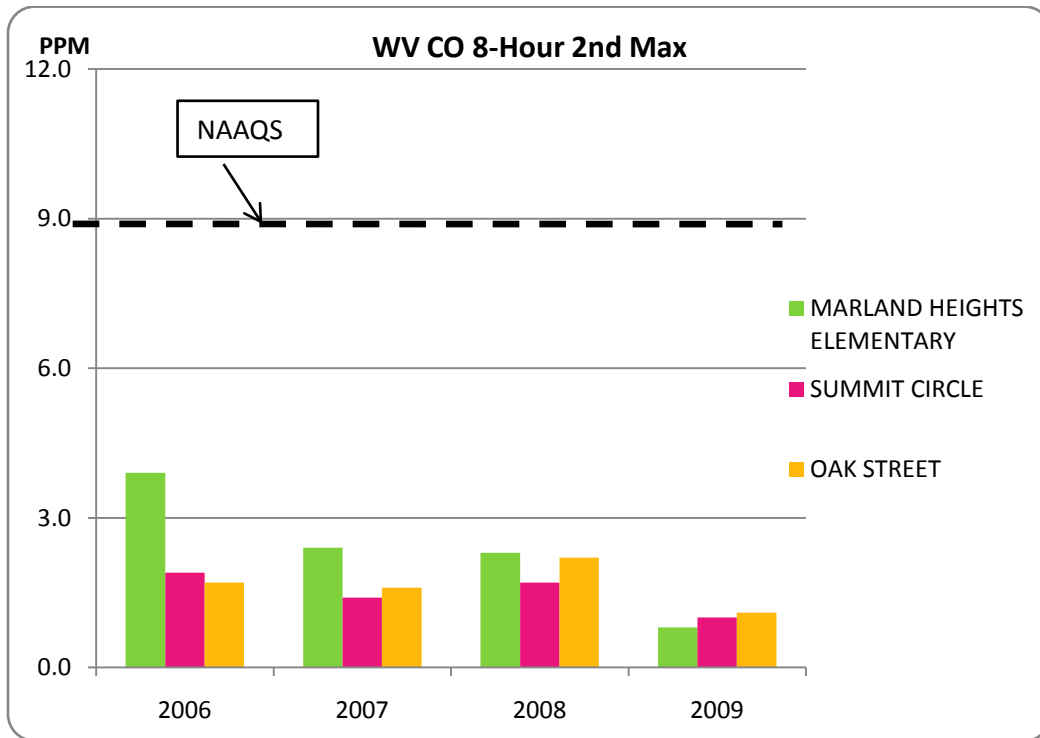
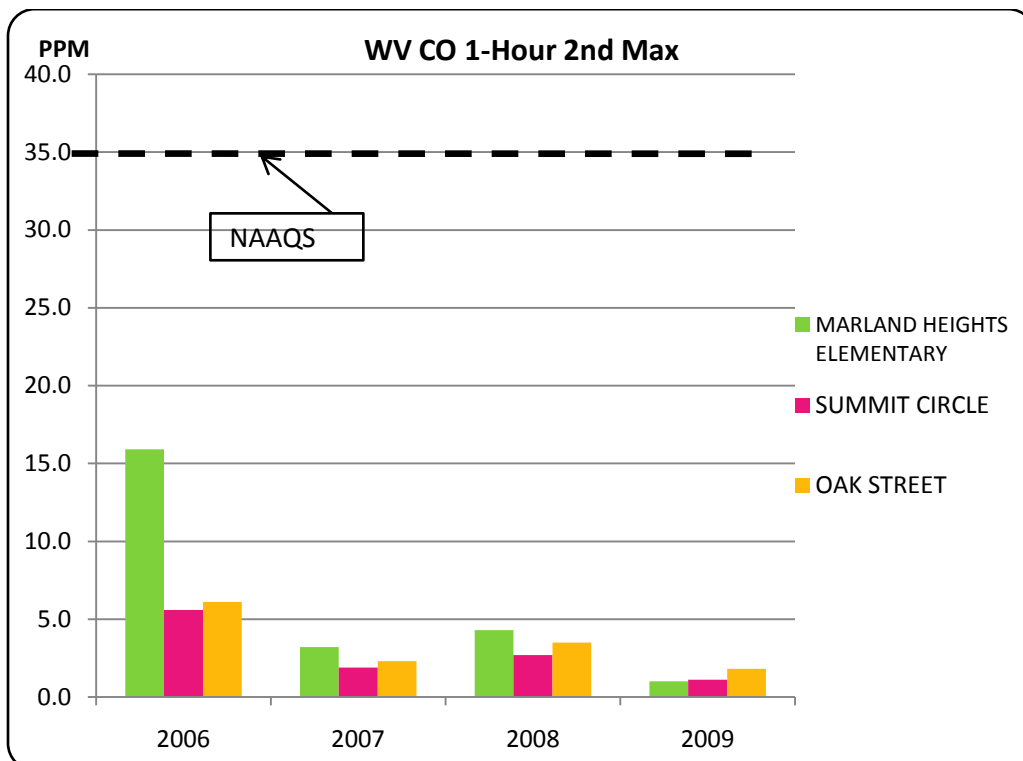


Figure 7: CO Air Quality Data 1 Hour Trends



Sulfur Dioxide (SO₂)

SO₂ is monitored at several locations throughout the state of WV. Table 8 contains SO₂ data and Figure 8 and 9 present the trends data.

Table 8: SO₂ Air Quality Data

SO ₂ : Site Name	Site ID	Monitor Begin Date	Year	24-Hour Max2 (.14 ppm)	3-Hour Max2 (.5 ppm)	Annual (.03 ppm)
MAHAN LANE	54-009-0005	1/1/1983	2006	0.036	0.091	0.0077
			2007	0.031	0.133	0.0092
			2008	0.028	0.107	0.0083
			2009	0.021	0.054	0.0063
MCKIMS RIDGE	54-009-0007	1/1/1997	2006	0.044	0.125	0.0122
			2007	0.044	0.117	0.0102
			2008	0.055	0.142	0.0102
			2009	0.035	0.069	0.0079
MARLAND HEIGHTS ELEMENTARY	54-009-0011	11/1/1992	2006	0.043	0.098	0.0123
			2007	0.041	0.134	0.0104
			2008	0.046	0.149	0.0108
			2009	0.096	0.212	0.0072
MARSHALL UNIVERSITY	54-011-0006	2/8/1982	2006	0.016	0.042	0.0045
			2007	0.017	0.037	0.0048
			2008	0.021	0.047	0.0076
			2009	0.013	0.021	0.0036
NEW MANCHESTER ELEM SCHOOL	54-029-0005	1/1/1982	2006	0.032	0.095	0.0108
			2007	0.060	0.178	0.0118
			2008	0.040	0.121	0.0099
			2009	0.029	0.099	0.0079
CROTHERS ROAD	54-029-0007	4/1/1990	2006	0.042	0.107	0.0100
			2007	0.048	0.141	0.0098
			2008	0.031	0.133	0.0088
			2009	0.032	0.094	0.0068
ALLISON ELEMENTARY	54-029-0008	5/15/1991	2006	0.042	0.085	0.0074
			2007	0.037	0.079	0.0078
			2008	0.031	0.103	0.0082
			2009	0.028	0.103	0.0066
SUMMIT CIRCLE	54-029-0009	1/13/1993	2006	0.049	0.097	0.0130
			2007	0.054	0.120	0.0113
			2008	0.043	0.152	0.0114
			2009	0.040	0.083	0.0076
COMMUNITY PARK	54-029-0015	1/20/1995	2006	0.040	0.085	0.0095
			2007	0.038	0.089	0.0098
			2008	0.034	0.110	0.0083
			2009	0.031	0.092	0.0075
OAK STREET	54-029-1004	3/1/1982	2006	0.035	0.099	0.0110
			2007	0.044	0.120	0.0106
			2008	0.042	0.141	0.0110
			2009	0.031	0.071	0.0083
BAPTIST TEMPLE	54-039-0010	4/1/2000	2006	0.051	0.110	0.0099
			2007	0.030	0.075	0.0088
			2008	0.028	0.071	0.0079
			2009	0.022	0.058	0.0056
NG ARMORY	54-051-1002	1/1/1983	2006	0.035	0.112	0.0106
			2007	0.039	0.098	0.0105
			2008	0.029	0.097	0.0088
			2009	0.022	0.052	0.0057
AIRPORT	54-061-0003	1/1/1983	2006	0.042	0.136	0.0073
			2007	0.038	0.168	0.0061
			2008	0.033	0.120	0.0053
			2009	0.052	0.180	0.0052
NEALE ELEM SCHOOL	54-107-1002	1/1/1980	2006	0.028	0.081	0.0078
			2007	0.026	0.080	0.0078
			2008	0.045	0.112	0.0090
			2009	0.025	0.084	0.0068

Figure 8: SO₂ Air Quality Data Annual Average Trends

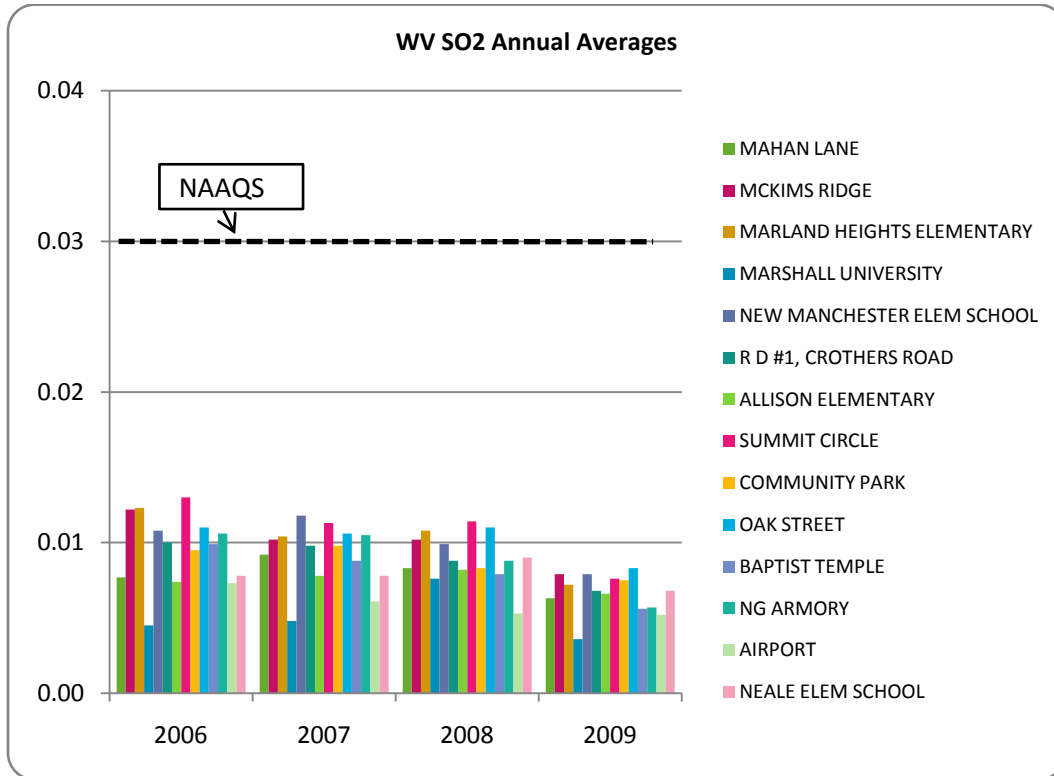
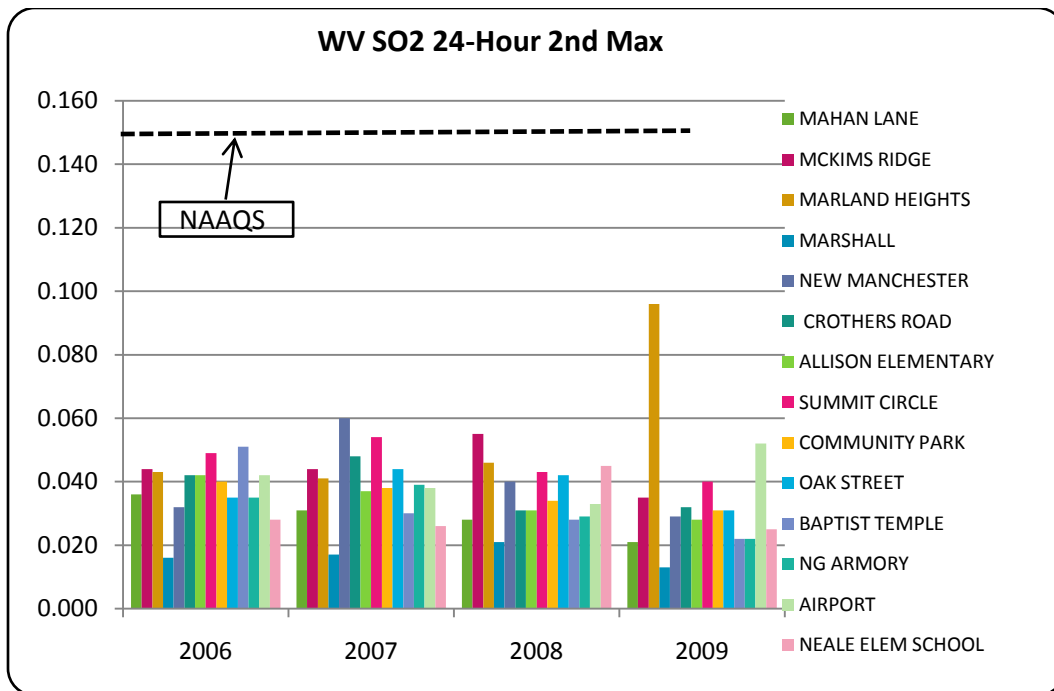


Figure 9: SO₂ Air Quality Data 24 Hour Average Trends



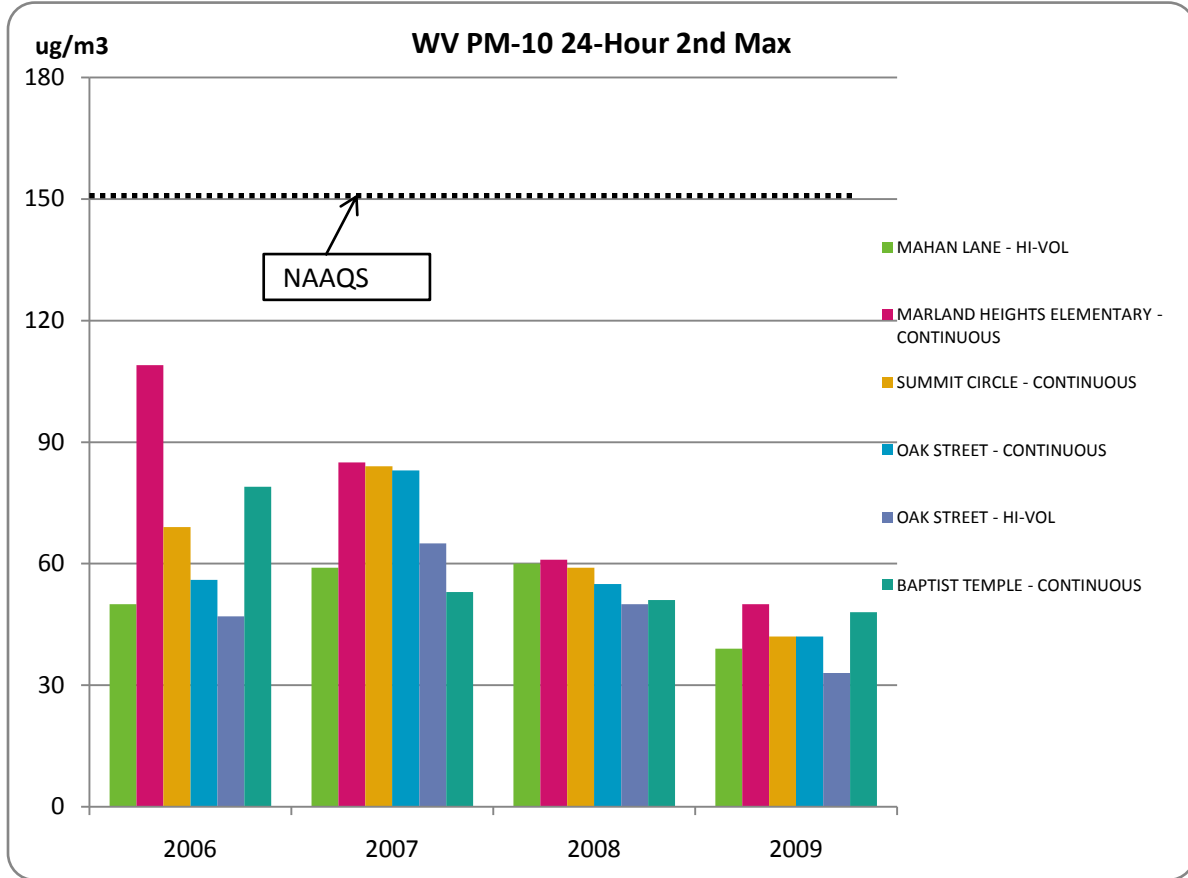
Particulate Matter ≤ 10 Microns (PM₁₀)

PM₁₀ is monitored at four locations in the Northern Panhandle of the state (three sites in Hancock County and one in Brooke County) and at one location in Charleston (Kanawha County). Table 9 contains PM₁₀ data and Figure 10 presents the 24 hour trends data.

Table 9: PM₁₀ Air Quality Data

PM ₁₀ : Site Name	Site ID	Monitor Begin Date	Year	24-Hour Max ² (150 ug/m ³)	Annual
MAHAN LANE - HI-VOL Follansbee	54-009-0005	2/1/1985	2006	50	24.5
			2007	59	25.0
			2008	60	21.9
			2009	39	18.6
MARLAND HEIGHTS ELEMENTARY CONTINUOUS Weirton	54-009-0011	4/1/1992	2006	109	25.4
			2007	85	25.2
			2008	61	19.4
			2009	50	16.7
SUMMIT CIRCLE CONTINUOUS Weirton	54-029-0009	2/1/1992	2006	69	25.3
			2007	84	30.4
			2008	59	20.5
			2009	42	17.3
OAK STREET CONTINUOUS Weirton	54-029-1004	1/6/2007	2006	56	19.9
			2007	83	23.3
			2008	55	18.7
			2009	42	15.9
OAK STREET - HI-VOL Weirton	54-029-1004	1/1/1985	2006	47	19.8
			2007	65	23.5
			2008	50	18.6
			2009	33	15.0
BAPTIST TEMPLE CONTINUOUS Charleston	54-039-0010	1/1/2002	2006	79	22.3
			2007	53	23.4
			2008	51	20.2
			2009	48	17.9

Figure 10: PM₁₀ Air Quality Data 24 Hour Average Trends



Particulate Matter \leq 2.5 Microns (PM_{2.5})

PM_{2.5} is monitored at 14 locations throughout the state. All sites use FRMs or FEM monitors. One site, Moundsville in Marshall County, also has a continuous PM_{2.5} monitors that is reported to Air Now. Table 10 provides the PM_{2.5} data and Figures 11 and 12 provide the trends information.

Table 10: PM_{2.5} Air Quality Data

PM _{2.5} Site Name	Site ID	Monitor Begin Date	Year	24-Hour Max1	98%	98% 3 Yr (35 ug/m3)	Annual (15 ug/m3)
BALL FIELD Martinsburg	54-003-0003	2/14/1999	2006	45.6	31.4	34	14.93
			2007	41.1	31.4	33	15.61
			2008	34.0	30.8	31	14.19
			2009	34.0	25.7	29	12.06
MAHAN LANE Follansbee	54-009-0005	1/3/1999	2006	48.7	32.2	40	15.24
			2007	46.0	40.0	37	16.40
			2008	39.8	38.9	37	14.68
			2009	38.3	23.2	34	12.15
MARLAND HEIGHTS ELEMENTARY Weirton	54-009-0011	1/3/1999	2006	45.1	36.9	43	14.64
			2007	50.5	49.7	44	16.35
			2008	37.4	34.9	41	13.79
			2009	48.6	26.3	37	11.88
MARSHALL UNIVERSITY Huntington	54-011-0006	1/3/1999	2006	45.1	30.1	34	14.97
			2007	43.2	39.4	37	16.65
			2008	31.1	27.4	32	14.14
			2009	32.5	22.5	30	12.00
OAK STREET Weirton	54-029-1004	1/3/1999	2006	51.6	33.7	40	13.70
			2007	52.8	44.9	41	15.73
			2008	39.4	35.8	38	13.33
			2009	29.6	25.2	35	11.25
WASHINGTON IRVING MIDDLE SCHOOL Clarksburg	54-033-0003	1/3/1999	2006	35.9	35.1	35	13.59
			2007	38.2	31.5	34	14.12
			2008	28.2	27.1	31	12.56
			2009	21.8	19.5	26	10.85
BAPTIST TEMPLE Charleston	54-039-0010	5/12/2000	2006	39.3	37.6	35	14.30
			2007	43.6	33.5	36	15.51
			2008	53.8	31.7	34	12.85
			2009	22.9	21.1	29	10.82
PUBLIC LIBRARY South Charleston	54-039-1005	1/3/1999	2006	41.1	37.3	37	15.64
			2007	42.7	36.5	38	16.50
			2008	49.7	33.8	36	14.19
			2009	28.4	26.0	32	12.50
WV DEPT OF HEALTH Fairmont	54-049-0006	1/1/2000	2006	42.7	33.8	34	14.56
			2007	39.7	33.5	34	15.30
			2008	30.7	28.0	32	13.69
			2009	26.3	22.5	28	11.73
NG ARMORY Moundsville	54-051-1002	1/3/1999	2006	37.7	34.7	34	14.48
			2007	47.5	37.9	35	14.99
			2008	40.4	29.1	34	13.08
			2009	29.0	25.5	31	12.19
AIRPORT Morgantown	54-061-0003	1/3/1999	2006	47.1	33.9	34	13.54
			2007	43.4	39.8	36	14.78
			2008	35.7	27.6	34	12.50
			2009	27.0	22.8	30	10.79
WARWOOD WATER PLANT Wheeling	54-069-0010	1/1/2005	2006	35.2	27.5	31	13.13
			2007	50.7	37.2	32	15.20
			2008	32.5	27.2	31	12.81
			2009	24.5	23.2	29	11.48
MAXWELL HILL ELEMENTARY Beckley	54-081-0002	1/3/1999	2006	38.4	30.7	31	11.99
			2007	44.0	28.8	30	13.20
			2008	29.0	23.4	28	10.65
			2009	19.7	18.4	24	9.24
NEALE ELEM SCHOOL Vienna	54-107-1002	1/3/1999	2006	42.1	35.1	35	14.68
			2007	41.0	38.8	37	15.25
			2008	35.6	28.2	34	13.84
			2009	32.6	26.5	31	12.04

Figure 11: PM_{2.5} Air Quality Data 24 Hour Average Trends

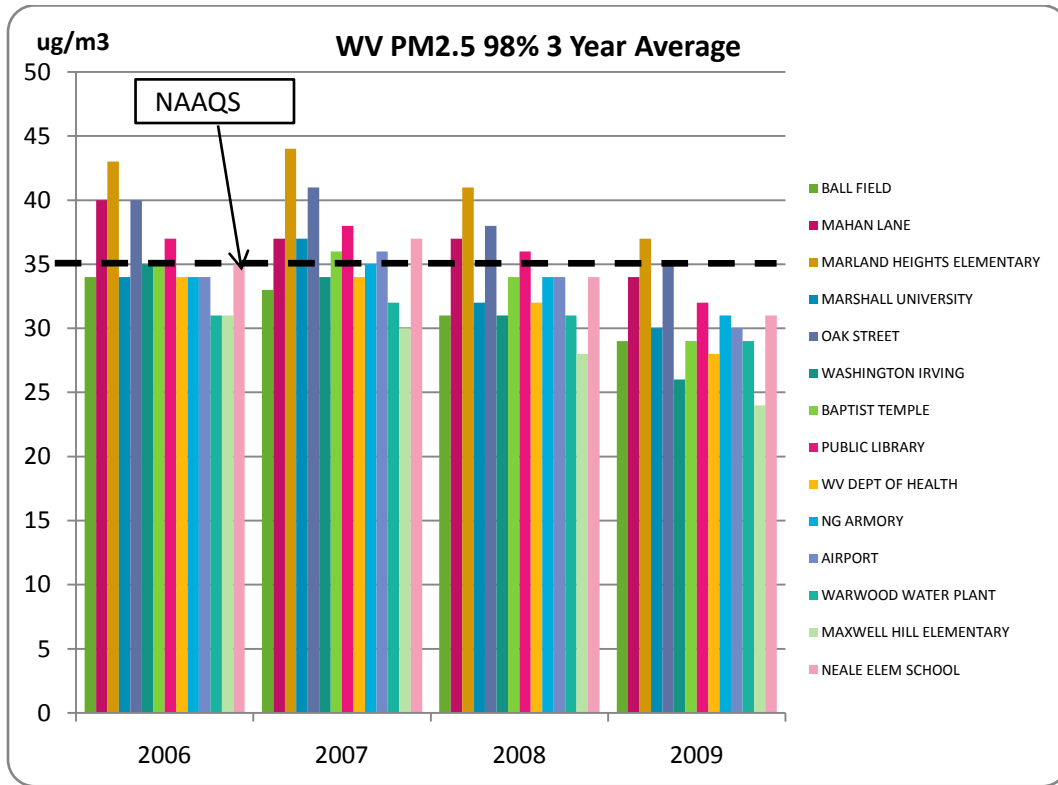
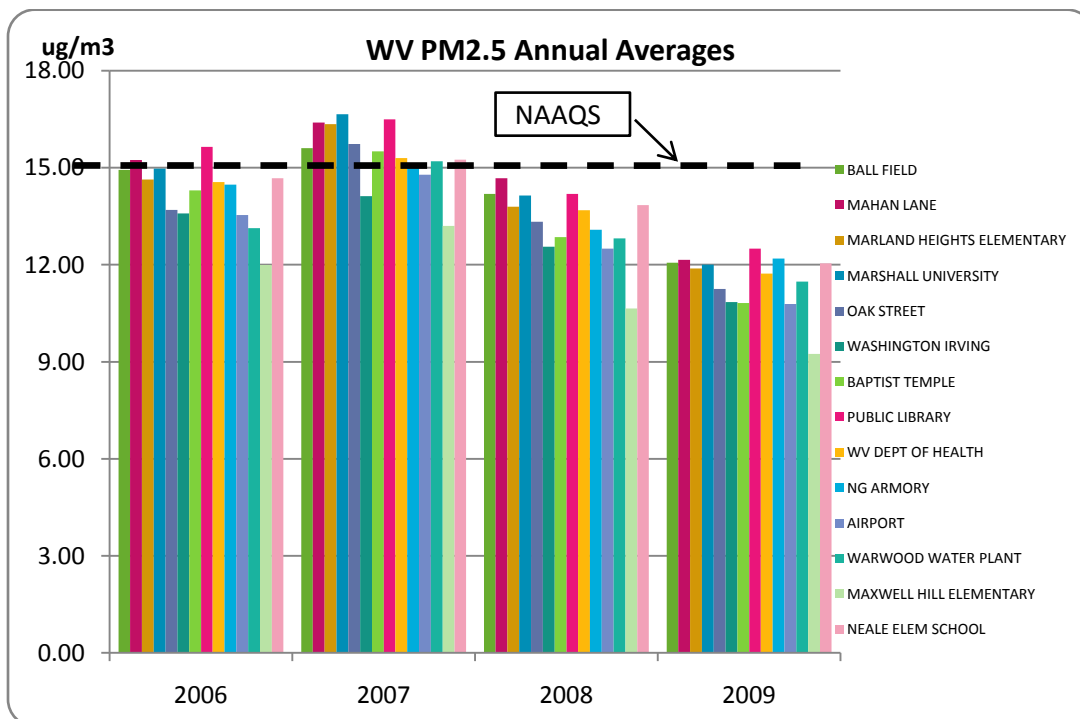


Figure 12: PM_{2.5} Air Quality Data Annual Average Trends



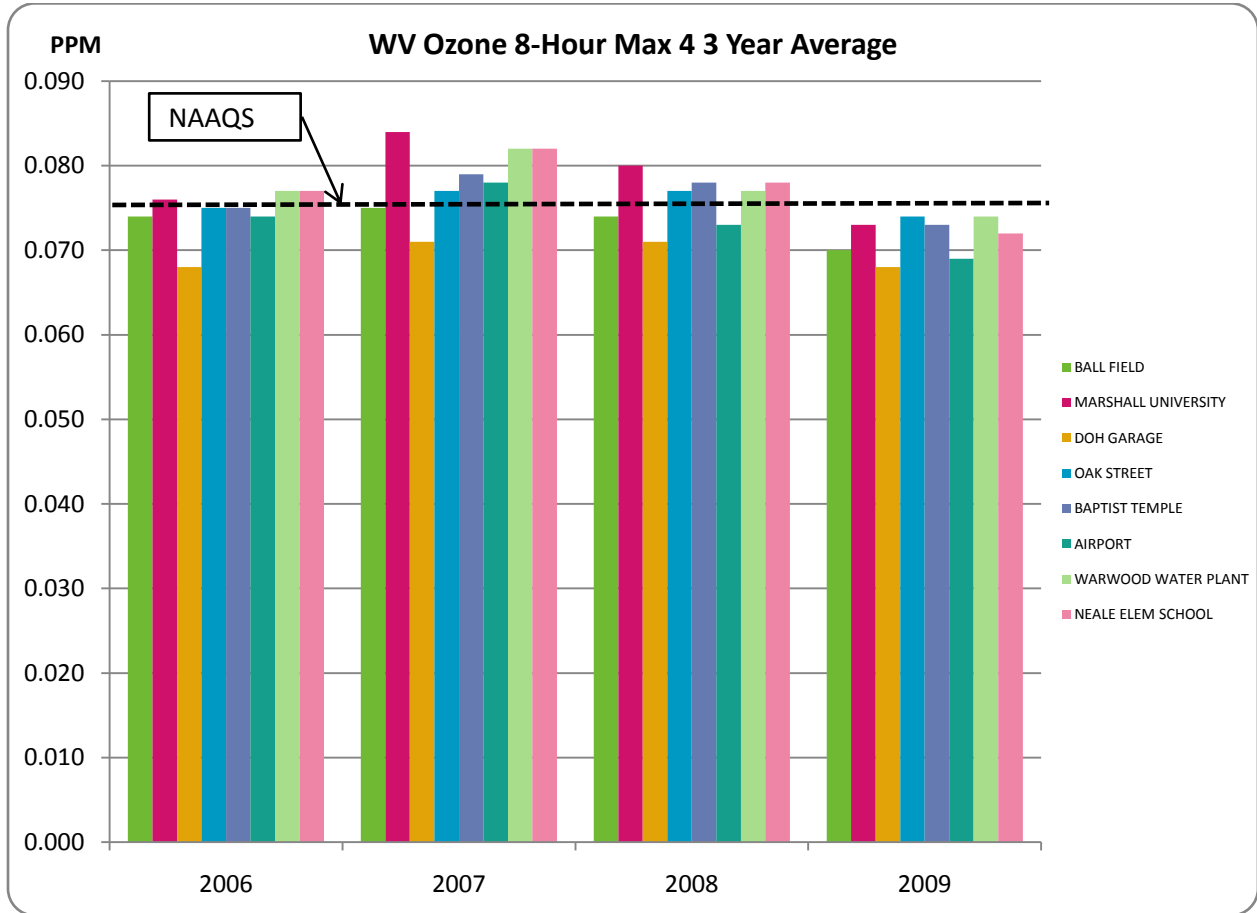
Ozone (O₃)

Ozone is monitored at eight locations throughout the state. The ozone monitoring season begins April 1 and concludes October 31 of each year. All hourly data is transmitted to Air Now. Table 11 contains O₃ and Figure 13 presents the 8 hour trends data.

Table 11: O₃ Air Quality Data

Ozone: Site Name	Site ID	Monitor Begin Date	Year	8-Hour Max4	8-Hour Max 4 3 Yr Avg. (.075 PPM)
BALL FIELD Martinsburg	54-003-0003	4/11/2001	2006	0.077	0.074
			2007	0.074	0.075
			2008	0.072	0.074
			2009	0.065	0.070
MARSHALL UNIVERSITY Huntington	54-011-0006	1/1/1982	2006	0.081	0.076
			2007	0.089	0.084
			2008	0.070	0.080
			2009	0.061	0.073
DOH GARAGE Sam Black	54-025-0003	3/31/1999	2006	0.070	0.068
			2007	0.075	0.071
			2008	0.069	0.071
			2009	0.062	0.068
OAK STREET Weirton	54-029-1004	9/1/1987	2006	0.077	0.075
			2007	0.079	0.077
			2008	0.077	0.077
			2009	0.067	0.074
BAPTIST TEMPLE Charleston	54-039-0010	4/1/2000	2006	0.077	0.075
			2007	0.082	0.079
			2008	0.076	0.078
			2009	0.062	0.073
AIRPORT Morgantown	54-061-0003	4/1/2000	2006	0.077	0.074
			2007	0.078	0.078
			2008	0.066	0.073
			2009	0.063	0.069
WARWOOD WATER PLANT Wheeling	54-069-0010	4/1/2005	2006	0.079	0.077
			2007	0.080	0.082
			2008	0.072	0.077
			2009	0.071	0.074
NEALE ELEM SCHOOL Vienna	54-107-1002	1/1/1983	2006	0.080	0.077
			2007	0.084	0.082
			2008	0.071	0.078
			2009	0.061	0.072

Figure 13: O₃ Air Quality Data 8 Hour Average Trends



MONITORING SITES

This section of the Network Assessment contains a more detailed discussion regarding the existing monitoring sites in WV. The discussions will include site background information, review and presentation of trend data and location maps. The sites in each monitored WV MSA will be discussed moving generally north to south across the state. Please refer to Table 2 for the comprehensive list of monitors. For a general perspective, Figures 14 through 19 provide map overviews of the locations of criteria pollutant monitoring sites in WV.

Figure 14: WV SO₂ Monitoring Site Locations

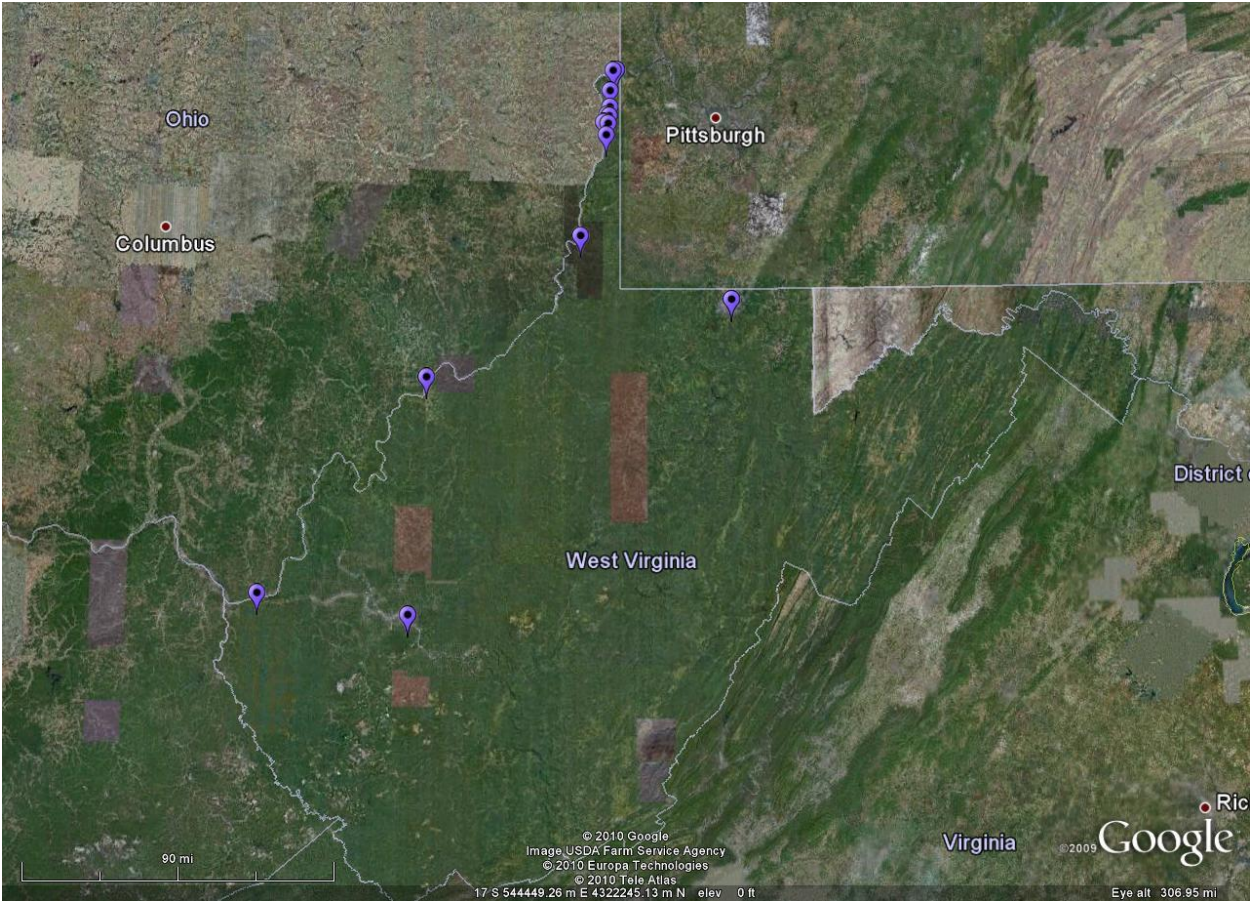


Figure 15: WV PM_{2.5} Monitoring Site Locations

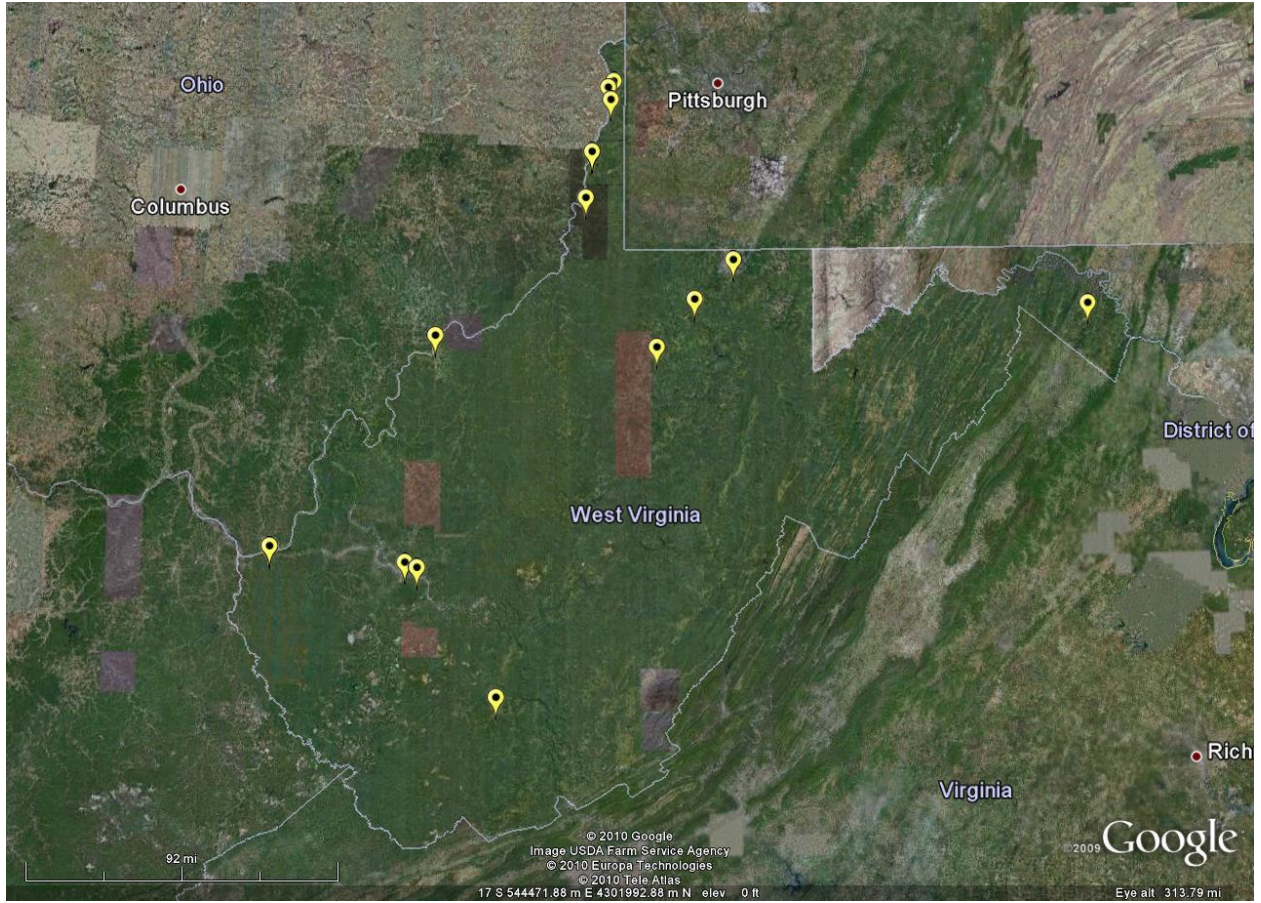


Figure 16: WV PM₁₀ Monitoring Site Locations

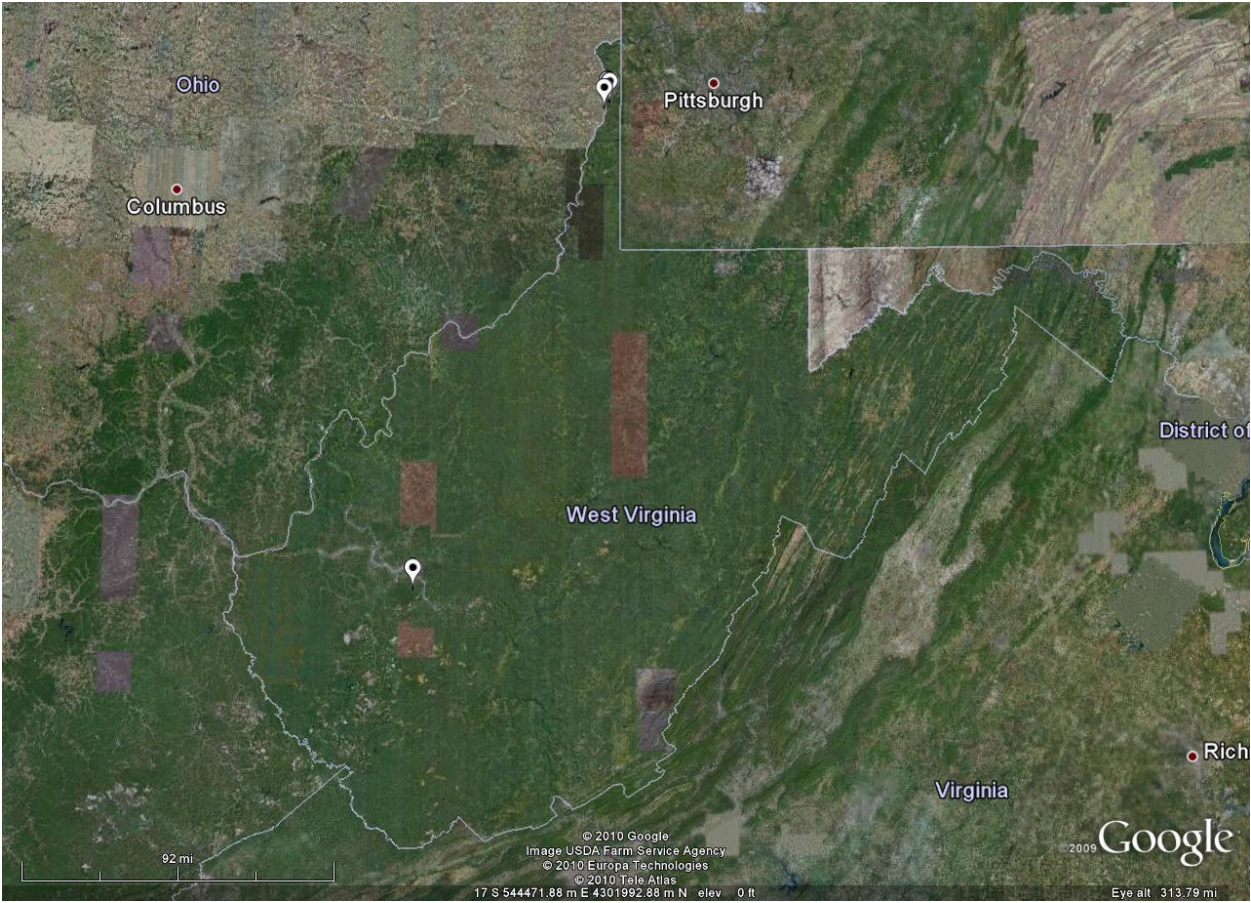


Figure 17: WV Ozone Monitoring Site Locations

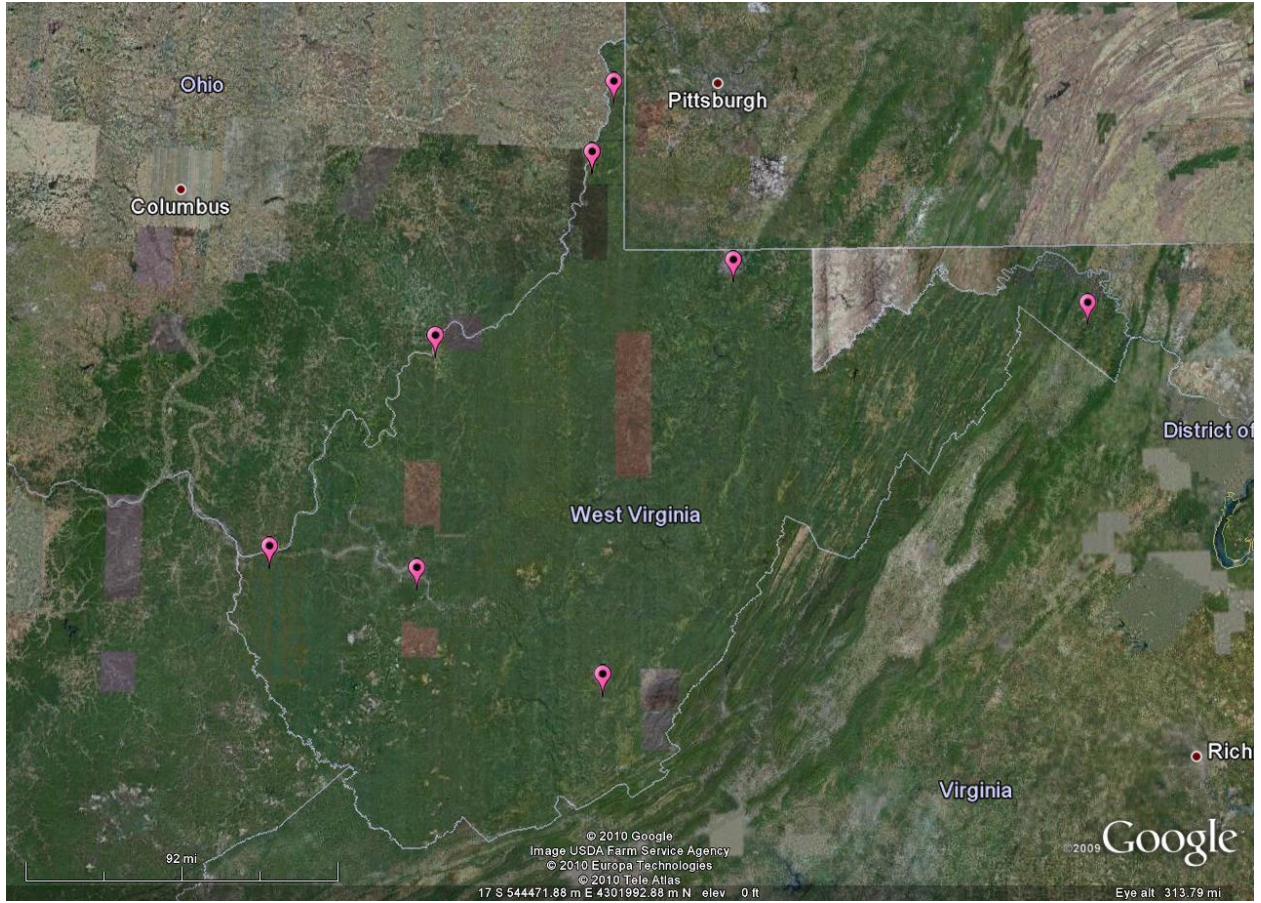


Figure 18: WV Carbon Monoxide Monitoring Site Locations

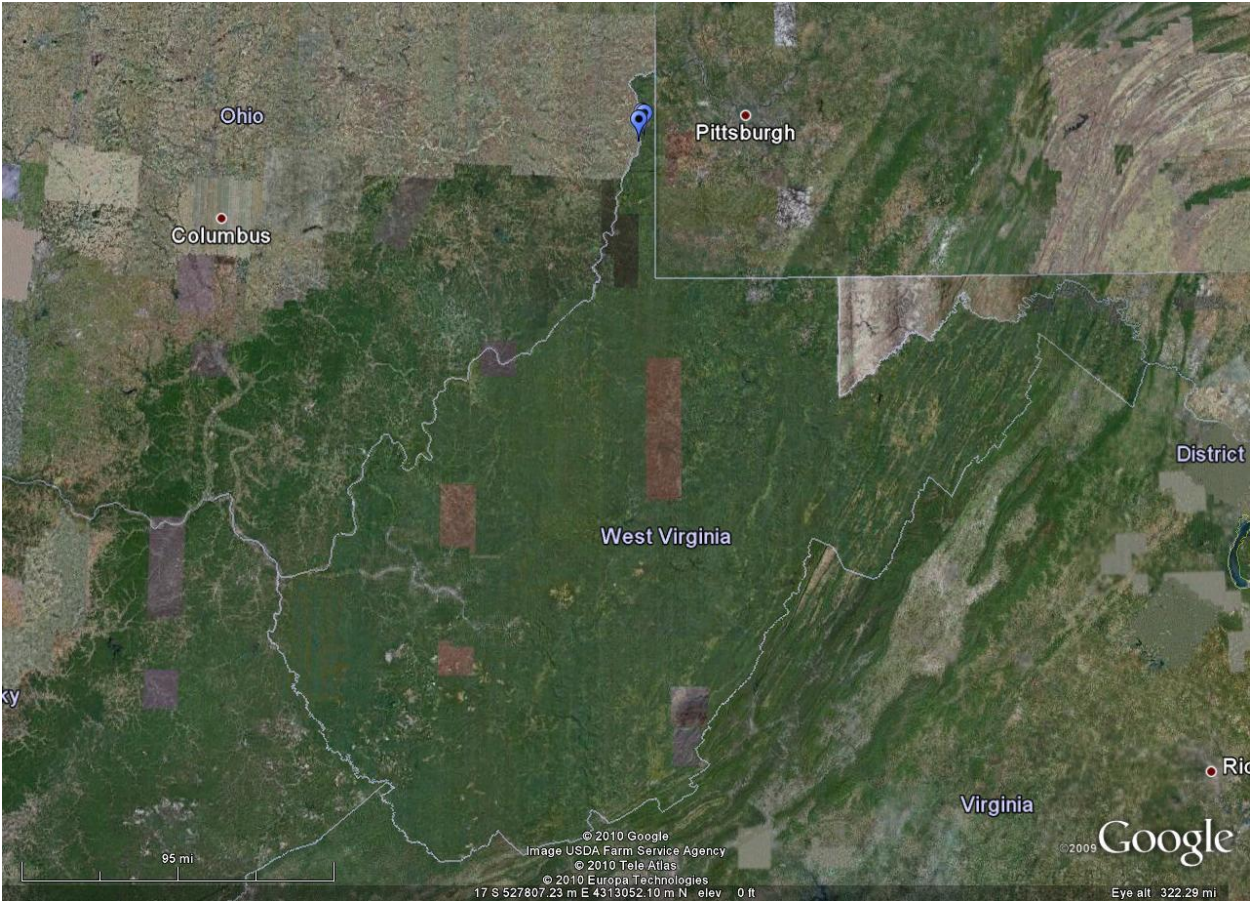
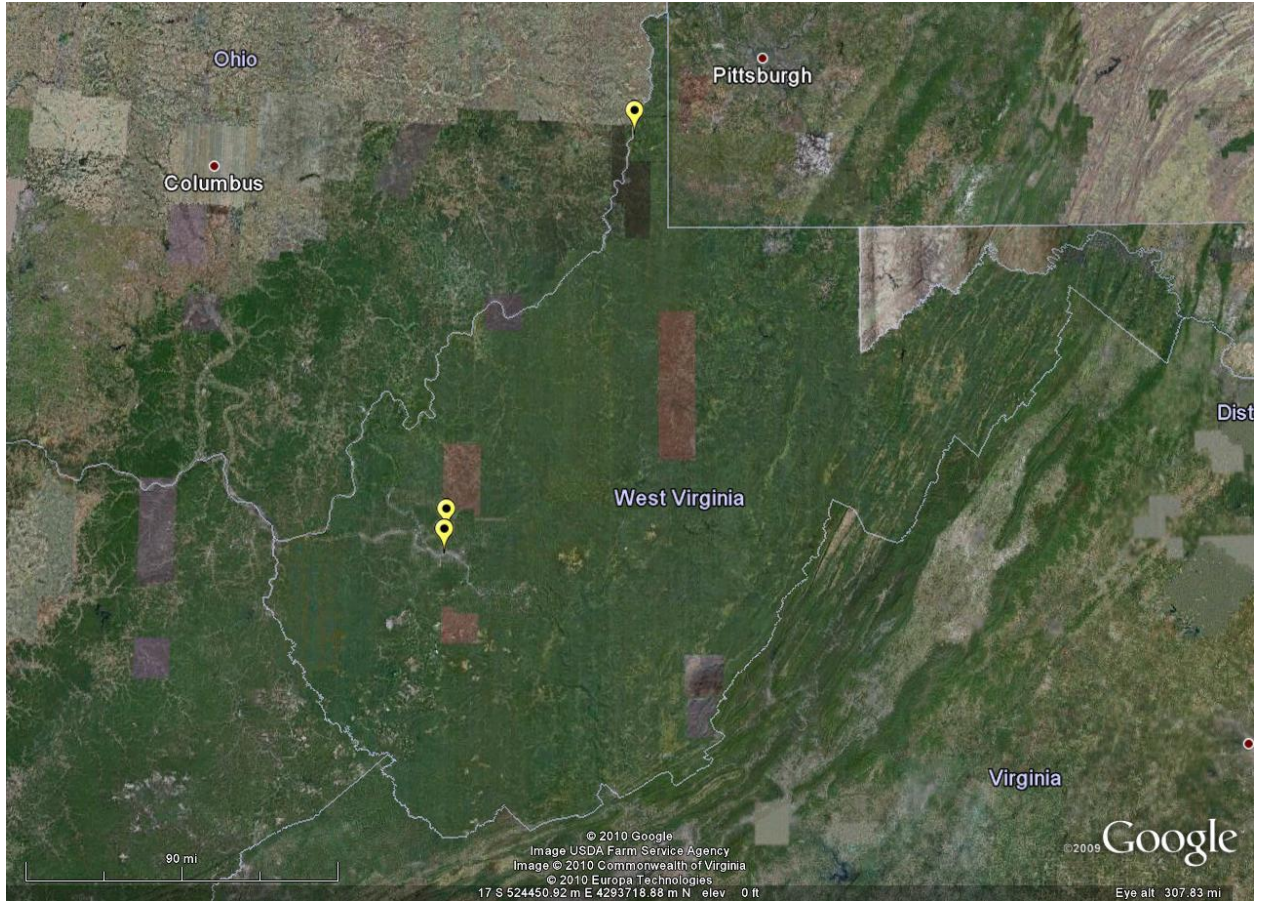


Figure 19: WV Speciation Monitoring Site Locations



Weirton-Steubenville, WV-OH MSA
Brooke, Hancock Counties, WV –Jefferson County, OH

This MSA is comprised of three counties, Brooke and Hancock Counties in WV and Jefferson County in OH. Table 12 present population data for the MSA. It is estimated that the MSA population declined by 7.5% between 2000 and 2008.

Table 12: Weirton-Steubenville, WV-OH MSA Population Estimate

Estimates of Population Change MSA's: April 1, 2000 to July 1, 2008						
Metropolitan Statistical Areas	Population estimate		Change '00 to '08		Density	Area (Mile ²)
	7/1/08	4/1/00	Number	Percent		
Weirton-Steubenville, WV-OH	122,054	132,008	-9,954	-7.5		
Brooke County, WV	23,520	25,447	-1,927	-7.6	265	89
Hancock County, WV	30,008	32,667	-2,659	-8.1	362	83
Jefferson County, OH	68,526	73,894	-5,368	-7.3	168	408

The MSA has been historically characterized by the presence of heavy industry including integrated steel making, coke ovens, a refinery, supporting material handling and storage operations and a variety of other emissions types. There are several tall stack EGUs' in the area located along the Ohio River valley. The heavy industry and EGUs are located on the valley floor. Except for the EGU's, point source emission are through stacks that emit at a level below mixing height. Sources such as the coke plant, BOP shop and blast furnaces also have fugitive emissions that are highly buoyant due to the heat content of the emission. The variety of emission (including release heights), difficult terrain and complex topography of the MSA contribute to inversions and poor mixing during calm wind conditions and temperature inversions. The topography also provides for notable differences in historically modeled source impacts within MSA. In the past, the area has experienced monitored exceedances of both the SO₂ and PM₁₀ NAAQS causing the area to be designated nonattainment for these pollutants. As a result, the DAQ has submitted State Implementation Plan (SIP) revisions to the EPA. All SIP revisions have been approved as have subsequent redesignation requests and maintenance plan submittals for both pollutants. The configuration of Hancock County itself and the variety of meteorological conditions and source mixes between the northern portion and southern portion of the county required two separate nonattainment designation and SIP submittal and maintenance plan packages for SO₂. These maintenance plans, the areas complex terrain and historical issues with SO₂ and PM₁₀ require that the state continue to monitor for these pollutants at several locations in the MSA. The pending revisions to the SO₂ NAAQS and monitoring requirements may present additional challenges to monitoring in the area.

Because of topography and the potential for impacts from several local and regional sources, the DAQ monitors for PM_{2.5} at one location in Hancock County and two sites in Brooke County. Of the two sites in Brooke County, one is located in the City of Weirton (the states' 7th largest city) and the other in the City of Follansbee (the 42nd largest city). One of those monitors, Marland Heights in Hancock County, is driving the

Design Value (DV) for the MSA. Regarding the City of Follansbee site, it may become necessary to eventually relocate that site due to leasing and other siting issues. This has been discussed in the annual Network Design submittals. That is the only WV site that is located in the same city where a recovery by-product coke oven operates. The DAQ intends to maintain a monitoring site in the Follansbee area.

A middle school, located slightly south of the current site, was selected as a School Air Toxics (SAT) monitoring site. The SAT study has concluded, however, the DAQ continues to collect met data at the site. EPA's final report on the SAT monitoring results will determine if additional monitoring may be recommended at the site.

Carbon Monoxide is monitored at two locations in Hancock County and one in Brooke County. All CO sites are located in the City of Weirton due to historical impacts of CO from source emissions from iron producing blast furnaces in both Ohio and WV. It needs to be noted that impacts from motor vehicles *are not* the reason that the CO monitors are in place. The area, whose population continues to decrease, is not characterized by high volume motor vehicle activity. There are no major interstates in the area. The most travelled road segment is the Route 22 Steubenville Bridge with approximately 29,000 average daily vehicles.

Table 13 provides the list of monitors operated in Brooke and Hancock Counties, WV. Figures 20 through 24 are maps of the site locations.

Table 13: Monitors in Brooke and Hancock Counties

Site Name	Site ID	City, County	Date Site Established	Latitude Longitude	Location Setting	MSA Code	Monitor Type	Monitor Objective Type	Measurement Scale	Monitor Begin Date	Monitor Description
ALLISON ELEMENTARY	54-029-0008	Chester, Hancock	5/15/1991	40.6157 -80.56022	SUBURBAN	8080	SLAMS	POPULATION EXPOSURE	NEIGHBORHOOD	5/15/1991	Sulfur Dioxide
COMMUNITY PARK	54-029-0015	Lawrenceville Hancock	1/20/1995	40.618333 -80.54083	URBAN	8080	SLAMS	POPULATION EXPOSURE	URBAN	1/20/1995	Sulfur Dioxide
NEW MANCHESTER ELEM SCHOOL	54-029-0005	New Manchester, Hancock	1/1/1972	40.529 -80.57628	SUBURBAN	8080	SLAMS	POPULATION EXPOSURE	URBAN	1/1/1982	Sulfur Dioxide
R D #1, CROTHERS ROAD	54-029-0007	New Cumberland, Hancock	1/5/1990	40.460117 -80.57678	RURAL	8080	SLAMS	POPULATION EXPOSURE	URBAN	4/1/1990	Sulfur Dioxide
SUMMIT CIRCLE	54-029-0009	Weirton, Hancock	1/1/1992	40.42735 -80.59253	SUBURBAN	8080	SLAMS	SOURCE ORIENTED	NEIGHBORHOOD	1/1/1992	Carbon Monoxide
								POPULATION EXPOSURE	NEIGHBORHOOD	2/1/1992	PM10 CONT
OAK STREET	54-029-1004	Weirton, Hancock	1/1/1982	40.421517 -80.58093	SUBURBAN	8080	SLAMS	POPULATION EXPOSURE	NEIGHBORHOOD	8/1/1991	Carbon Monoxide
									URBAN	9/1/1987	Ozone
								HIGHEST CONCENTRATION	NEIGHBORHOOD	3/1/1982	Sulfur Dioxide
MARLAND HEIGHTS ELEMENTARY	54-009-0011	Weirton, Brooke	1/1/1992	40.394583 -80.61202	SUBURBAN	8080	SLAMS	POPULATION EXPOSURE	NEIGHBORHOOD	1/1/1992	Carbon Monoxide
MCKIMS RIDGE	54-009-0007	Weirton, Brooke	1/1/1997	40.389633 -80.58645	RURAL	8080	SLAMS	POPULATION EXPOSURE	NEIGHBORHOOD	11/1/1992	Sulfur Dioxide
									URBAN	4/1/1992	PM10 CONTI
MAHAN LANE	54-009-0005	Follansbee, Brooke	1/1/1983	40.341 -80.59685	SUBURBAN		SLAMS	POPULATION EXPOSURE	NEIGHBORHOOD	1/1/1983	Sulfur Dioxide
										2/1/1985	PM10 HVOL
										1/3/1999	PM2.5 FRM

Figure 20: WV Sites Weirton-Steubenville, WV-OH MSA

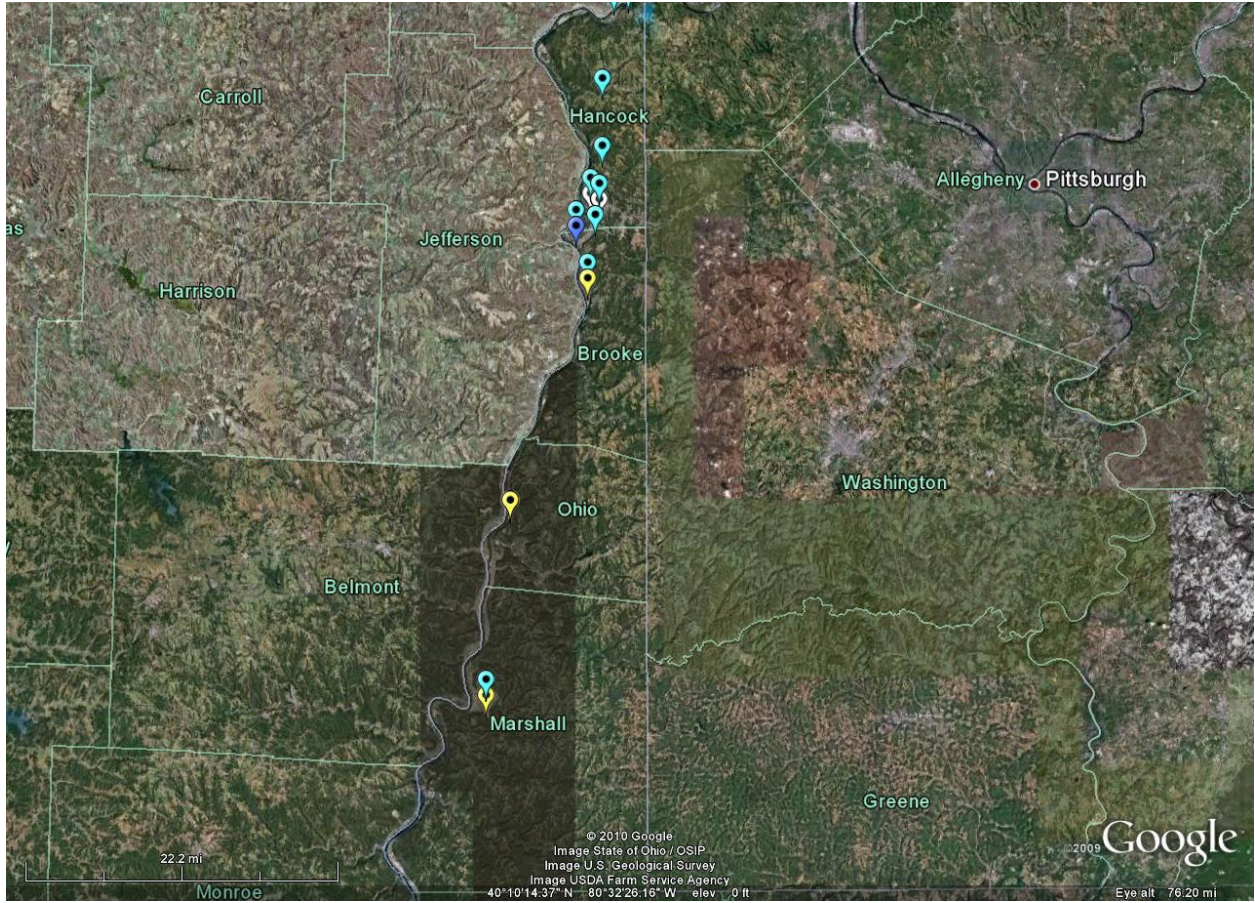


Figure 21: WV Sites Weirton-Steubenville, WV-OH MSA

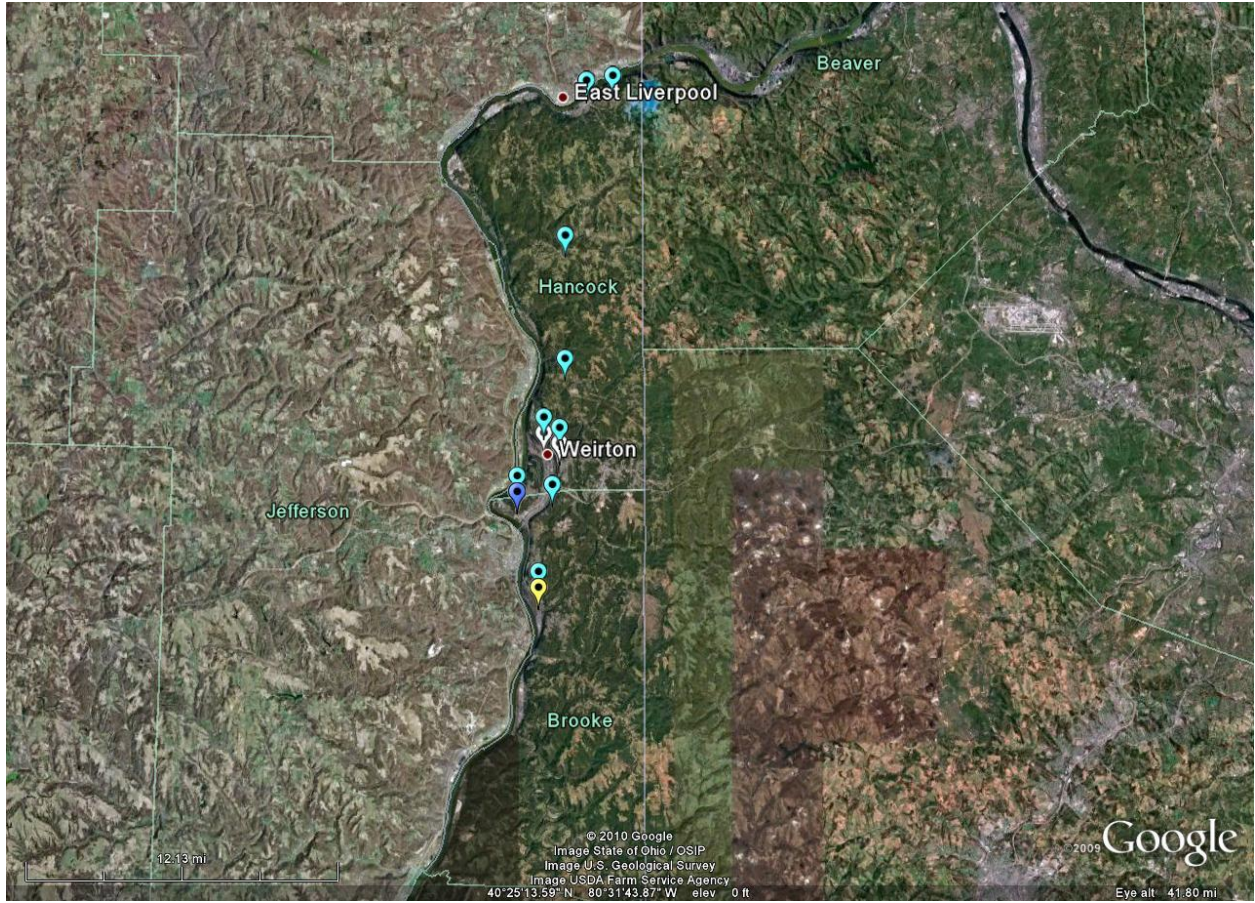


Figure 22: WV Sites Northern Hancock County: Weirton-Steubenville, WV-OH MSA

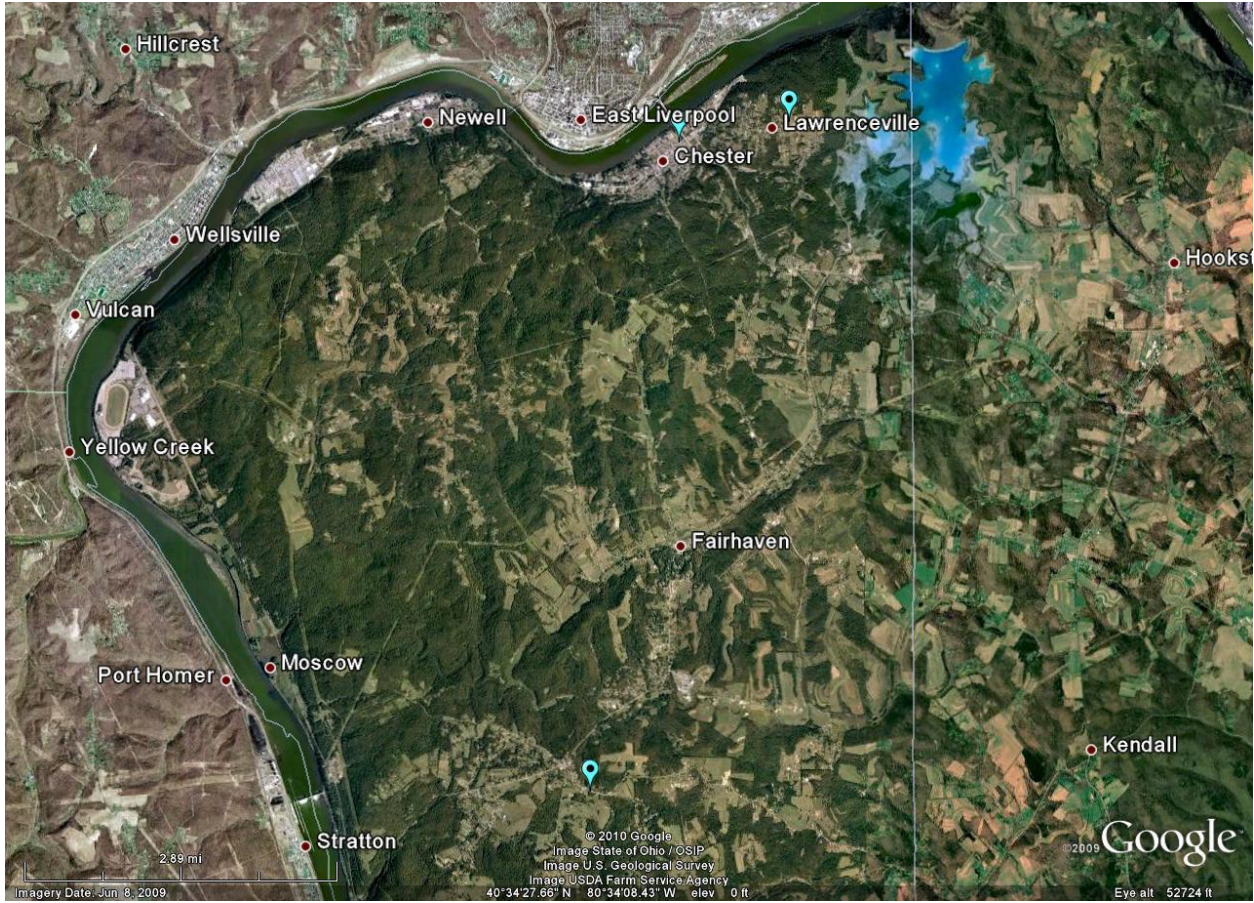


Figure 23: WV Sites Southern Hancock County: Weirton-Steubenville, WV-OH MSA

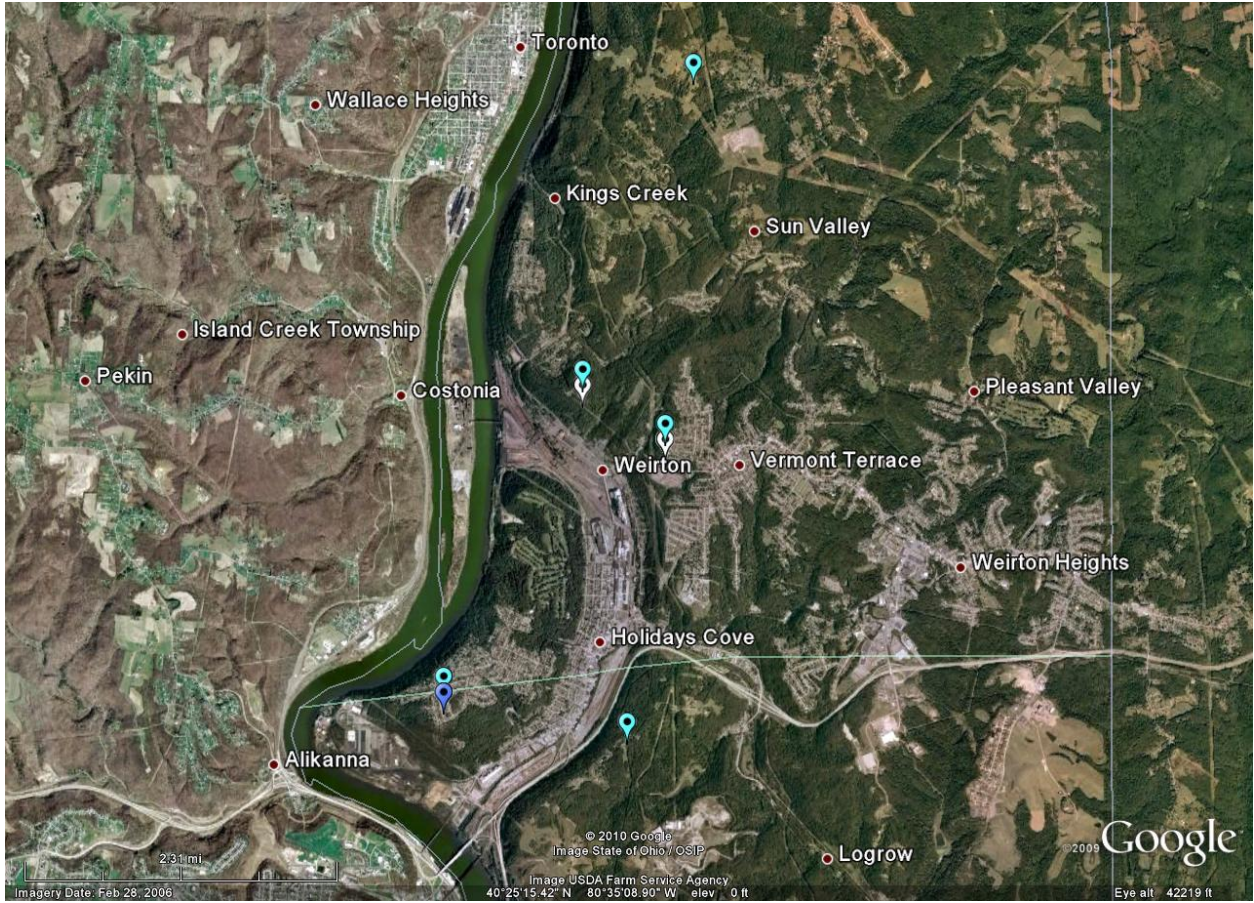
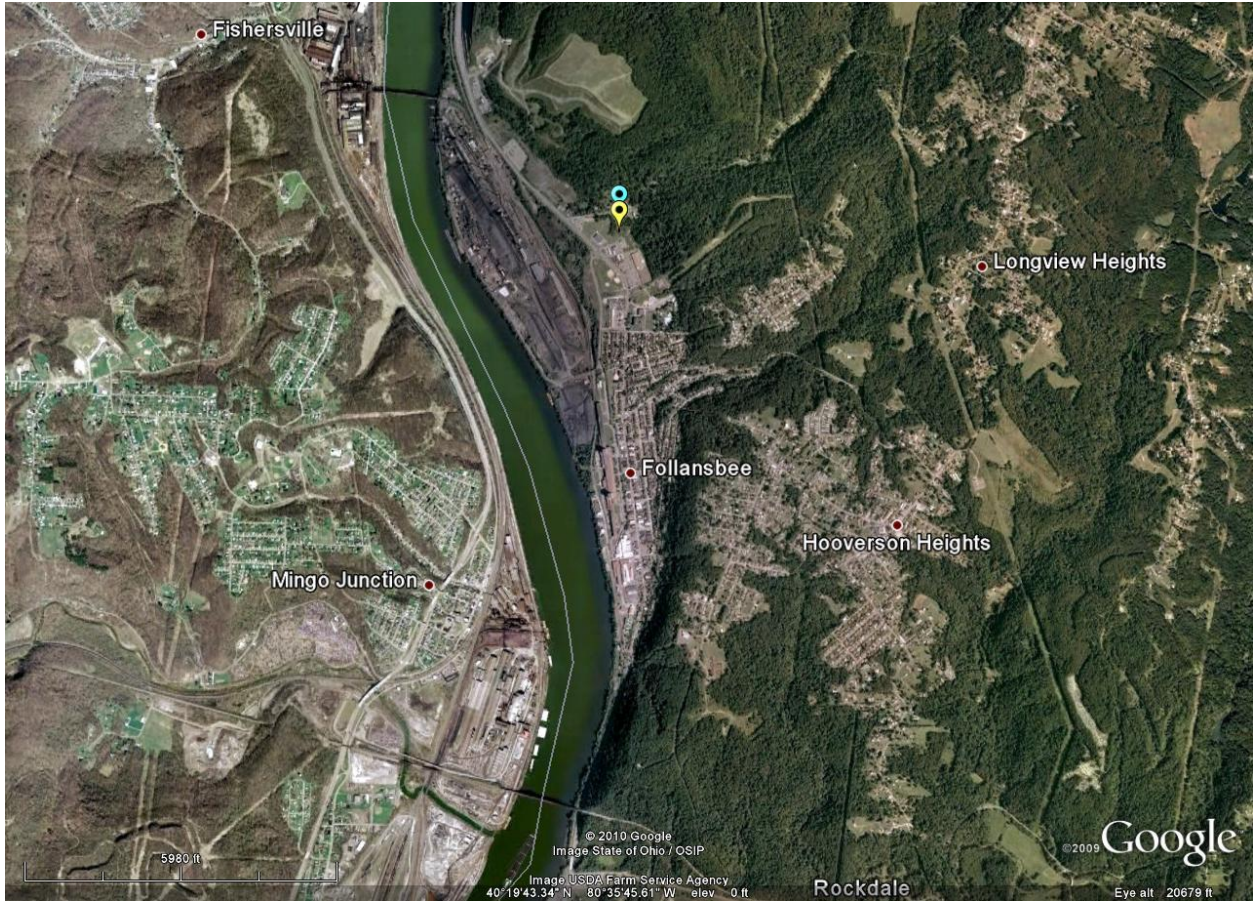


Figure 24: WV Sites Brooke County Weirton-Steubenville, WV-OH MSA



Wheeling, WV-OH MSA
Ohio, Marshall Counties, WV- Belmont County, OH

This MSA is comprised of three counties, Ohio and Marshall Counties in WV and Belmont County in OH. Table 14 presents population data for the MSA. It is estimated that the MSA population declined by 5.4% between 2000 and 2008.

Table 14: Wheeling, WV-OH MSA Population Estimate

Estimates of Population Change MSA's: April 1, 2000 to July 1, 2008						
Metropolitan Statistical Areas	Population estimate		Change '00 to '08		Density	Area (Mile ²)
	7/1/08	4/1/00	Number	Percent		
Wheeling, WV-OH	144,847	153,178	-8,331	-5.4		
Belmont County, OH	67,975	70,226	-2,251	-3.2	128	532
Marshall County, WV	32,766	35,519	-2,753	-7.8	107	305
Ohio County, WV	44,106	47,433	-3,327	-7.0	417	106

This MSA also lies within the Ohio River Valley. As with all WV monitoring sites, the area is characterized by complex topography and meteorology. Monitoring sites are located in the Cities of Wheeling (Ohio County) and Moundsville (Marshall County). Wheeling is the 5th largest city in the state with a population of 28,913 and Moundsville is the 15th largest city in WV with a population of 9,109. Both cities have experienced population loss of 8.5% and 9.8% respectively since 2000. The area contains a variety of sources included major EGU's. Marshall County is more heavily industrialized having two EGU's, chemical plants and asphalt facilities.

The Marshall County site contained a state discretionary speciation monitor that was temporarily relocated to the Ohio County site. The Ohio County site also received an URG carbon speciation in the fall of 2009. Both monitors will be moved back to Marshall County once site renovations are completed. (See Network Design submittals). The Ohio County site also contains toxic monitoring for metals, VOCs and carbonyl.

Table 15 provides the list of monitors operated in Ohio and Marshall Counties, WV. Figures 25 through 27 are maps of the site locations.

Table 15: Monitors in Ohio and Marshall Counties

Site Name	Site ID	City, County	Date Site Established	Latitude Longitude	Location Setting	MSA Code	Monitor Type	Monitor Objective Type	Measurement Scale	Monitor Begin Date	Monitor Description
WARWOOD WATER PLANT	54-069-0010	Wheeling, Ohio	1/1/2005	40.11485 -80.70118	URBAN	9000	SPM	POPULATION EXPOSURE	NEIGHBORHOOD	3/29/2005	AIR TOXICS
							SLAMS		URBAN	4/1/2005 1/1/2005	Ozone PM2.5 FRM
							CSN			9/28/2009	SPECIATION
NG ARMORY	54-051-1002	Moundsville, Marshall	1/1/1983	39.915933 -80.73407	SUBURBAN	9000	SLAMS	POPULATION EXPOSURE	URBAN	1/1/1983	Sulfur Dioxide
										1/3/1999	PM2.5 FRM
							SPM	POPULATION EXPOSURE	URBAN	1/1/2006	PM2.5 CONTINUOUS
CSN	6/2/2004	SPECIATION									

Figure 25: WV Sites Wheeling, WV-OH MSA

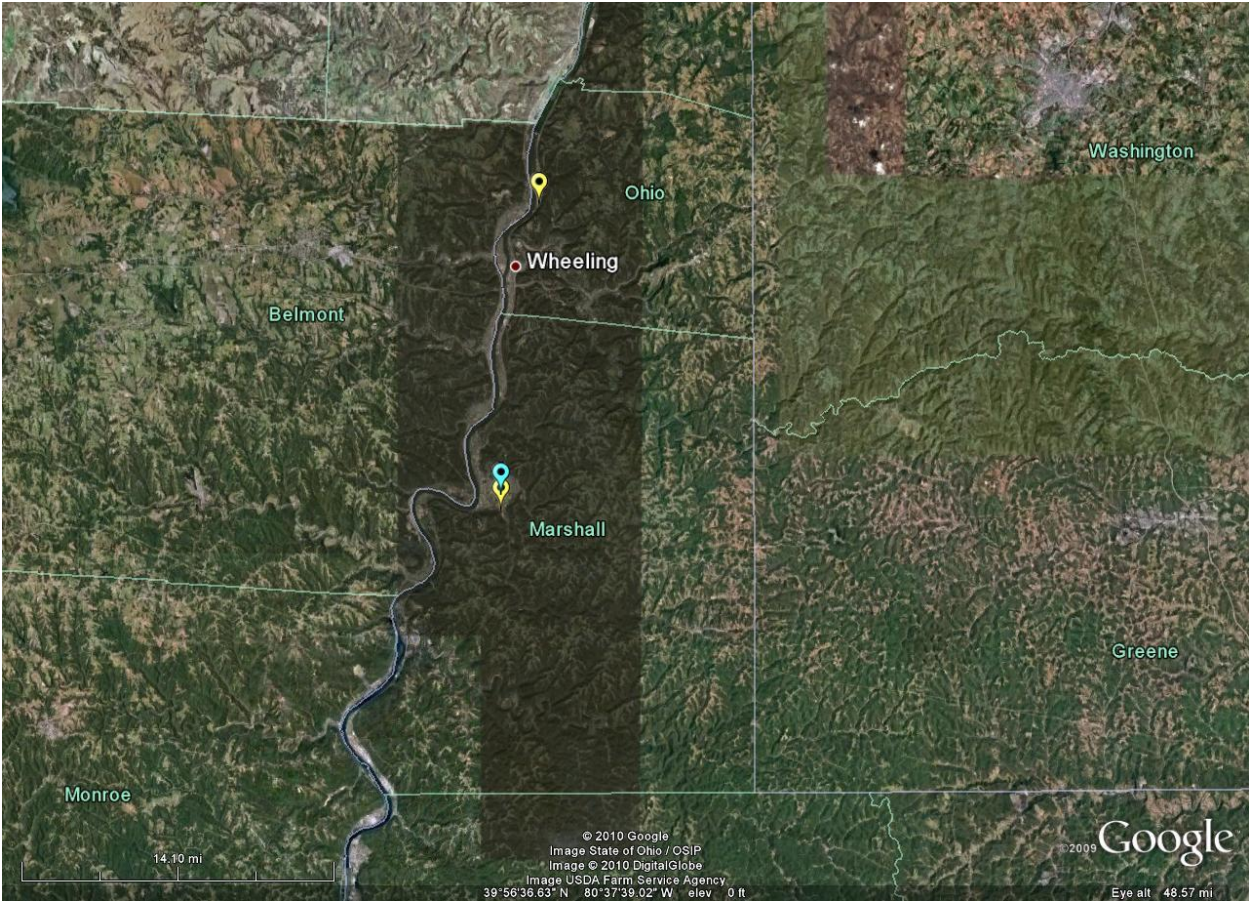


Figure 26: WV Sites Wheeling, WV-OH MSA



Figure 27: WV Sites Wheeling, WV-OH MSA



**Morgantown, WV MSA
Monongalia and Preston Counties, WV
And
Fairmont-Clarksburg CSA**

The Morgantown MSA is comprised of two counties, Monongalia and Preston in WV. Table 16 presents population data for the MSA. It is estimated that the MSA population grew by 6.6% between 2000 and 2008. A significant portion of the growth occurred in Monongalia County. The majority of the growth was in the City of Morgantown (home of West Virginia University) where population increased by over 9%, (almost 3,000 people) from 26,702 to 29,642 between 2000 and 2008.

Table 16: Morgantown, WV MSA Population Estimate

Estimates of Population Change MSA's: April 1, 2000 to July 1, 2008						
Metropolitan Statistical Areas	Population estimate		Change '00 to '08		Density	Area (Mile ²)
	7/1/08	4/1/00	Number	Percent		
Morgantown, WV	118,506	111,201	7,305	6.6		
Monongalia County, WV	88,221	81,867	6,354	7.8	245	360
Preston County, WV	30,285	29,334	951	3.2	47	649

Included in this section of the assessment due to their proximity to the Morgantown MSA and because they are along the I-79 Corridor, are Fairmont and Clarksburg, both of which are individual Micropolitan Statistical Areas (μSA) that make up a Combined Statistical Area (CSA). Table 17 presents the population information for the two areas.

Table 17: Marion and Harrison County (μSA) Population Estimate

Estimates of Population Change MSA's: April 1, 2000 to July 1, 2008						
Metropolitan Statistical Areas	Population estimate		Change '00 to '08		Density	Area (Mile ²)
	7/1/08	4/1/00	Number	Percent		
Fairmont-Clarksburg, (CSA)	148,708	148,741	-33	-0.1	237	628
Fairmont, WV - (μSA)	56,496	56,598	-102	-0.2		
Marion County, WV	56,496	56,598	-102	-0.2	183	309
Clarksburg, WV - (μSA)	92,212	92,143	69	0.1		
Doddridge County, WV	7,201	7,403	-202	-2.7	23	320
Harrison County, WV	68,853	68,651	202	0.3	166	416
Taylor County, WV	16,158	16,089	69	0.4	94	173

Morgantown is the most populous place the Morgantown MSA at 29,642 making it the fourth largest city in WV. Morgantown's population has grown by about 9% (2,941 persons) since 2000. Its population accounts for approximately 34% of the county total

and 25% of the entire MSA. The largest city in Preston County is Kingwood having a population of 2,947 which is the 41st largest city in WV.

The City of Fairmont is the largest city in the Fairmont, WV μ SA. The states 6th largest city has a population of 19,024 which is 34% of the total μ SA. The states 10th largest city, Clarksburg has a population of 16,441 the largest in the Clarksburg, WV μ SA. Harrison County is the largest county in the CSA.

Tables 18 and 19 provide the list of monitors operated in North Central WV. Figures 28 through 31 are maps of the site locations.

Table 18: Monitors in Morgantown, WV MSA

Site Name	Site ID	City, County	Date Site Established	Latitude Longitude	Location Setting	MSA Code	Monitor Type	Monitor Objective Type	Measurement Scale	Monitor Begin Date	Monitor Description
AIRPORT	54-061-0003	Morgantown, Monongalia	1/1/1983	39.649367 -79.92087	SUBURBAN		SPM	POPULATION EXPOSURE	NEIGHBORHOOD	7/4/2006	AIR TOXICS
							SLAMS		URBAN	1/1/1983	Sulfur Dioxide
							SLAMS		URBAN	4/1/2000 1/3/1999	Ozone PM2.5 FRM

Table 19: Monitors in Fairmont-Clarksburg CSA

Site Name	Site ID	City, County	Date Site Established	Latitude Longitude	Location Setting	MSA Code	Monitor Type	Monitor Objective Type	Measurement Scale	Monitor Begin Date	Monitor Description
WV DEPT OF HEALTH	54-049-0006	Fairmont, Marion	1/1/2000	39.481483 -80.13467	URBAN		SPM	POPULATION EXPOSURE	URBAN	1/1/2000	PM2.5 FRM
WASHINGTON IRVING MIDDLE SCHOOL	54-033-0003	Clarksburg, Harrison	11/19/1997	39.278117 -80.34225	URBAN		SPM	POPULATION EXPOSURE	URBAN	1/3/1999	PM2.5 FRM

Figure 28: WV Sites Morgantown, WV MSA

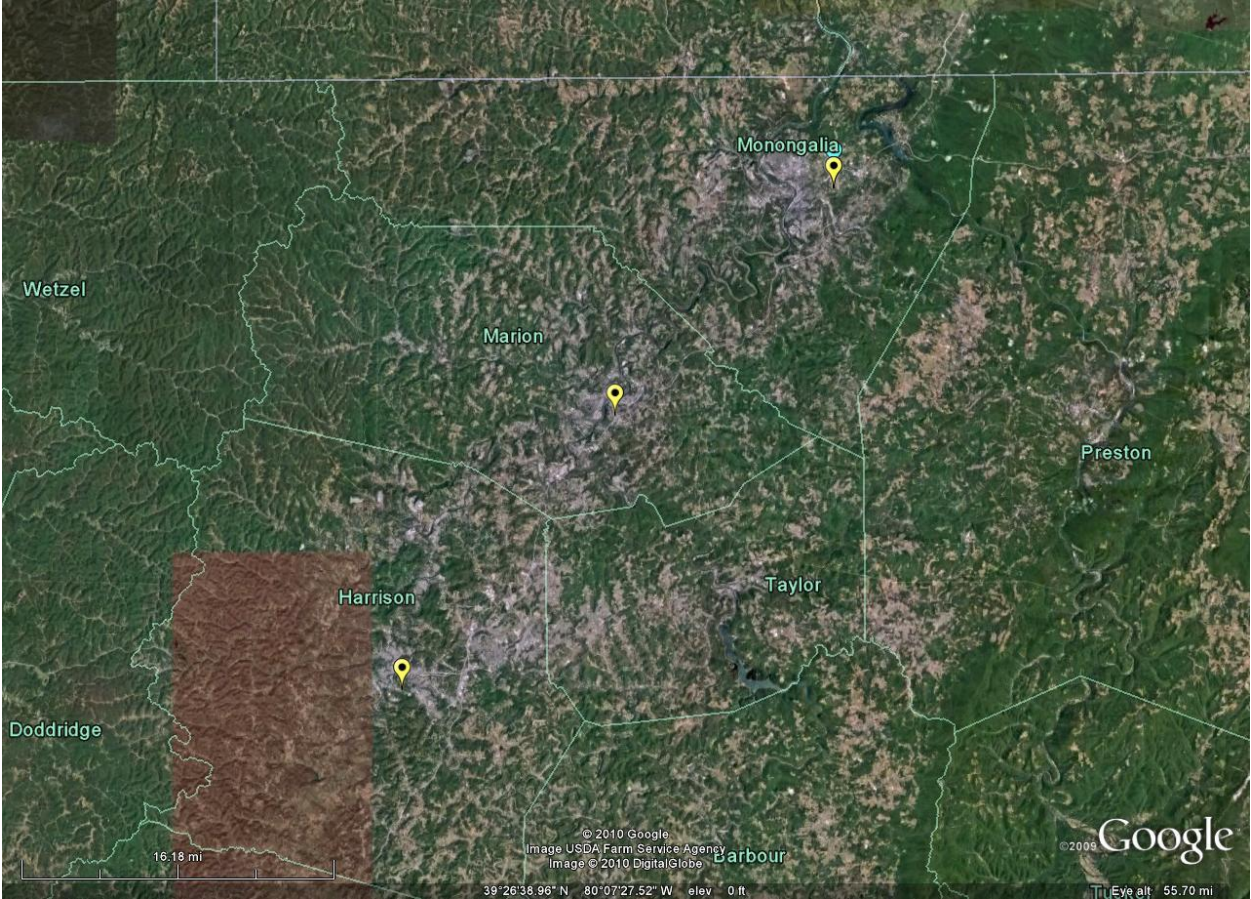


Figure 29: WV Sites Morgantown, WV MSA

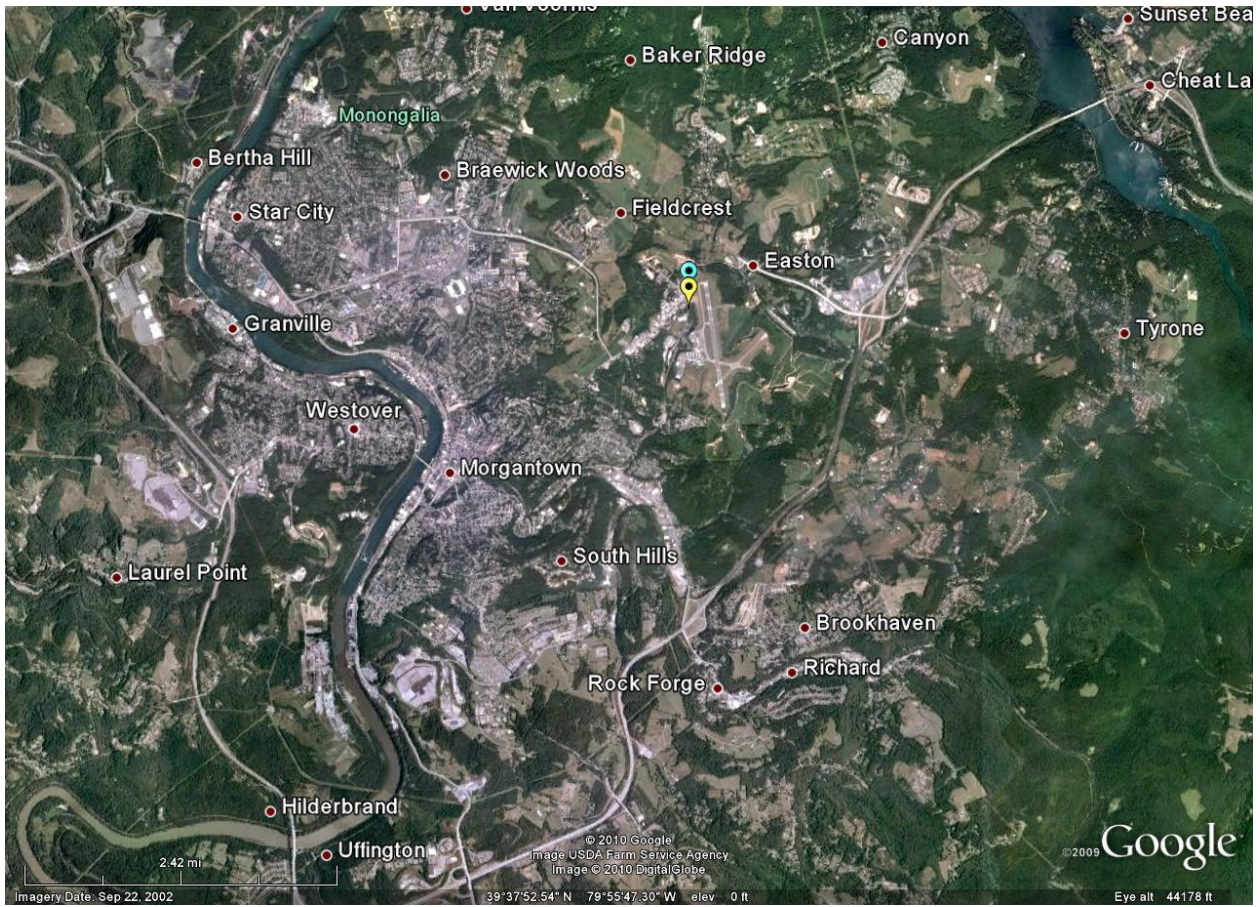


Figure 30: WV Sites Fairmont Clarksburg CSA

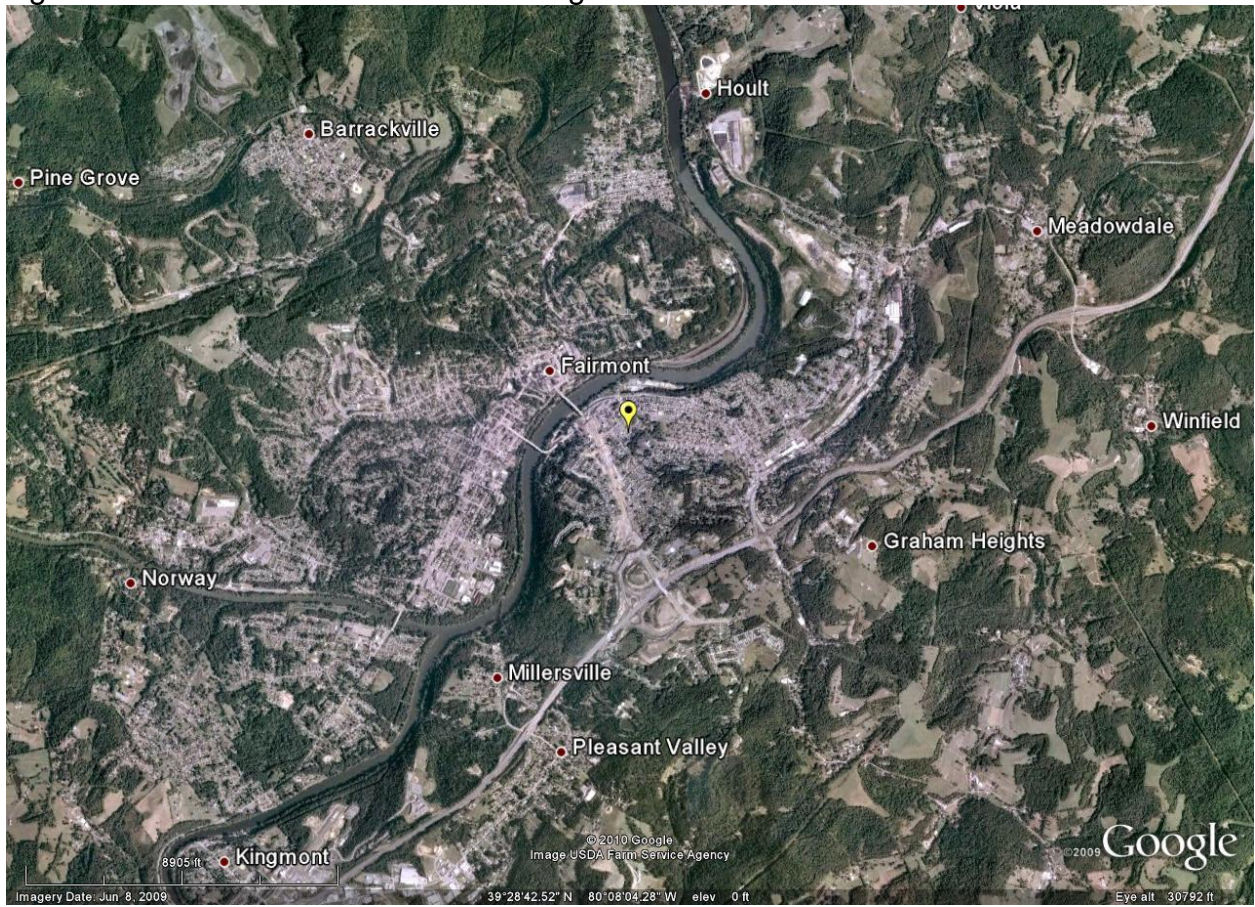
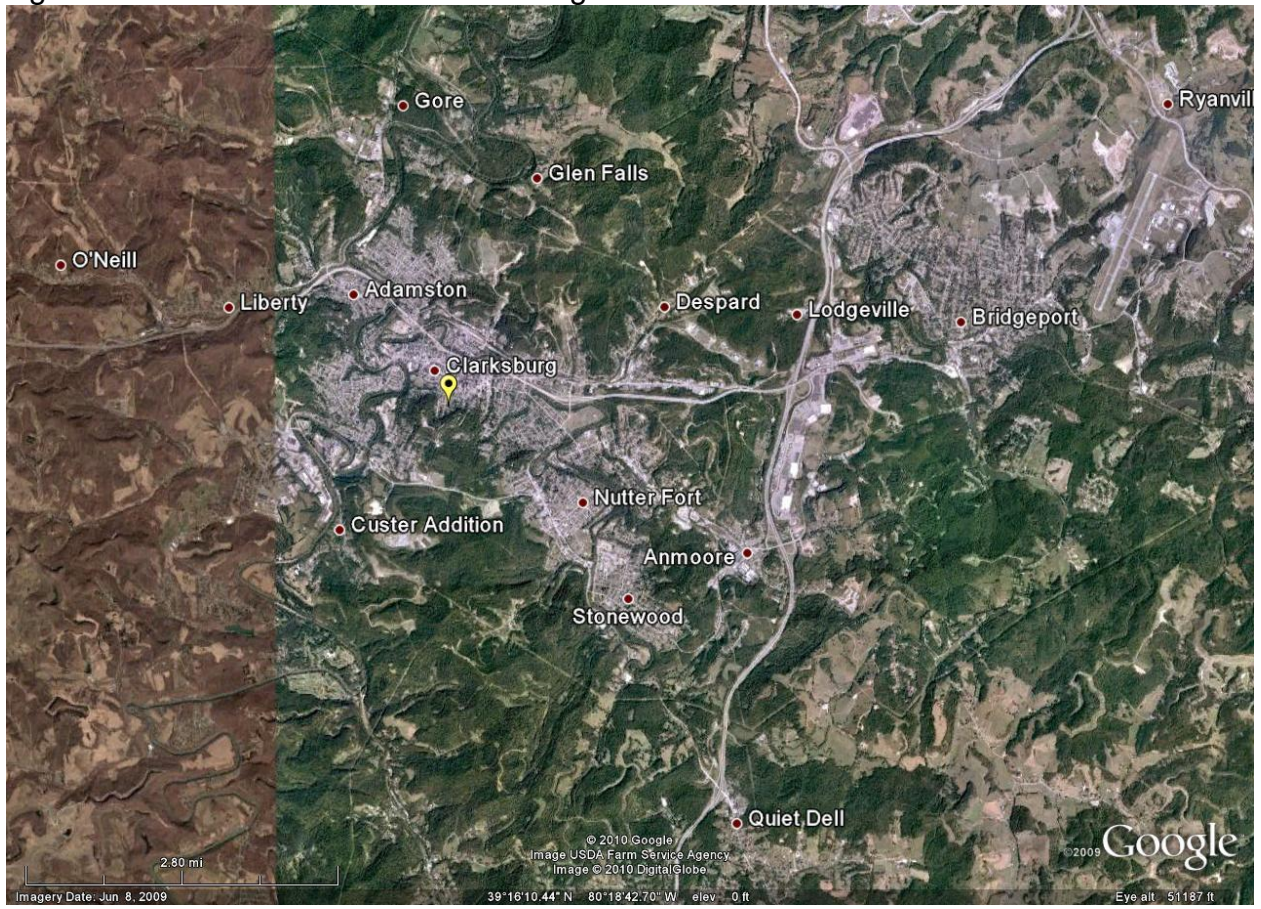


Figure 31: WV Sites Fairmont-Clarksburg CSA



Hagerstown-Martinsburg, MD-WV MSA
Berkeley, Morgan Counties, WV-Washington County, MD

The Hagerstown-Martinsburg MSA is made up of Berkeley and Morgan Counties in WV and Washington County in MD. Population data for the three counties may be found in Table 20. Overall, population in the MSA experienced a positive net gain of 40% or 40,982 people between 2000 and 2008. All three counties grew in population and while Washington County, MD remained the largest populated County, overall growth was led by Berkeley County at a rate of 34.4% between 2000 and 2008. This growth rate was the fastest in the state during the period. The growth rate of Berkeley County has been driven by its proximity to the Washington, DC metro area and Northern Virginia. The migration into the county may be attributable to affordable housing and more favorable property tax rates. People were willing to accept much longer commutes to their workplace in exchange for affordable housing in a much more rural environment. The largest city in the MSA is Hagerstown, MD at 39,728. The largest city in the WV portion of the MSA, and the Eastern Panhandle of the state is Martinsburg (the state's 8th largest city), with a population of 17,020.

Table 20: Hagerstown-Martinsburg, MD-WV MSA

Estimates of Population Change MSA's: April 1, 2000 to July 1, 2008						
Metropolitan Statistical Areas	Population estimate		Change '00 to '08		Density	Area (Mile ²)
	7/1/08	4/1/00	Number	t		
Hagerstown-Martinsburg, MD-WV	263,753	222,771	40,982	18.4		
Berkeley County, WV	102,044	75,905	26,139	34.4	318	321
Morgan County, WV	16,325	14,943	1,382	9.2	71	229
Washington County, MD	145,384	131,923	13,461	10.2		

Table 21 provides a list of the WV monitors operated within the MSA. Figures 32 and 33 are map overviews of the site locations.

Table 21: Monitors in Hagerstown-Martinsburg, MD-WV MSA

Site Name	Site ID	City, County	Date Site Established	Latitude Longitude	Location Setting	MSA Code	Monitor Type	Monitor Objective Type	Measurement Scale	Monitor Begin Date	Monitor Description
BALL FIELD	54-003-0003	Martinsburg, Berkeley	2/10/1999	39.448006 -77.96413	SUBURBAN	8840	SPM	POPULATION EXPOSURE	URBAN	4/11/2001	Ozone
							SLAMS			2/14/1999	PM2.5 FRM

Figure 32: WV Sites Hagerstown-Martinsburg, MD-WV MSA

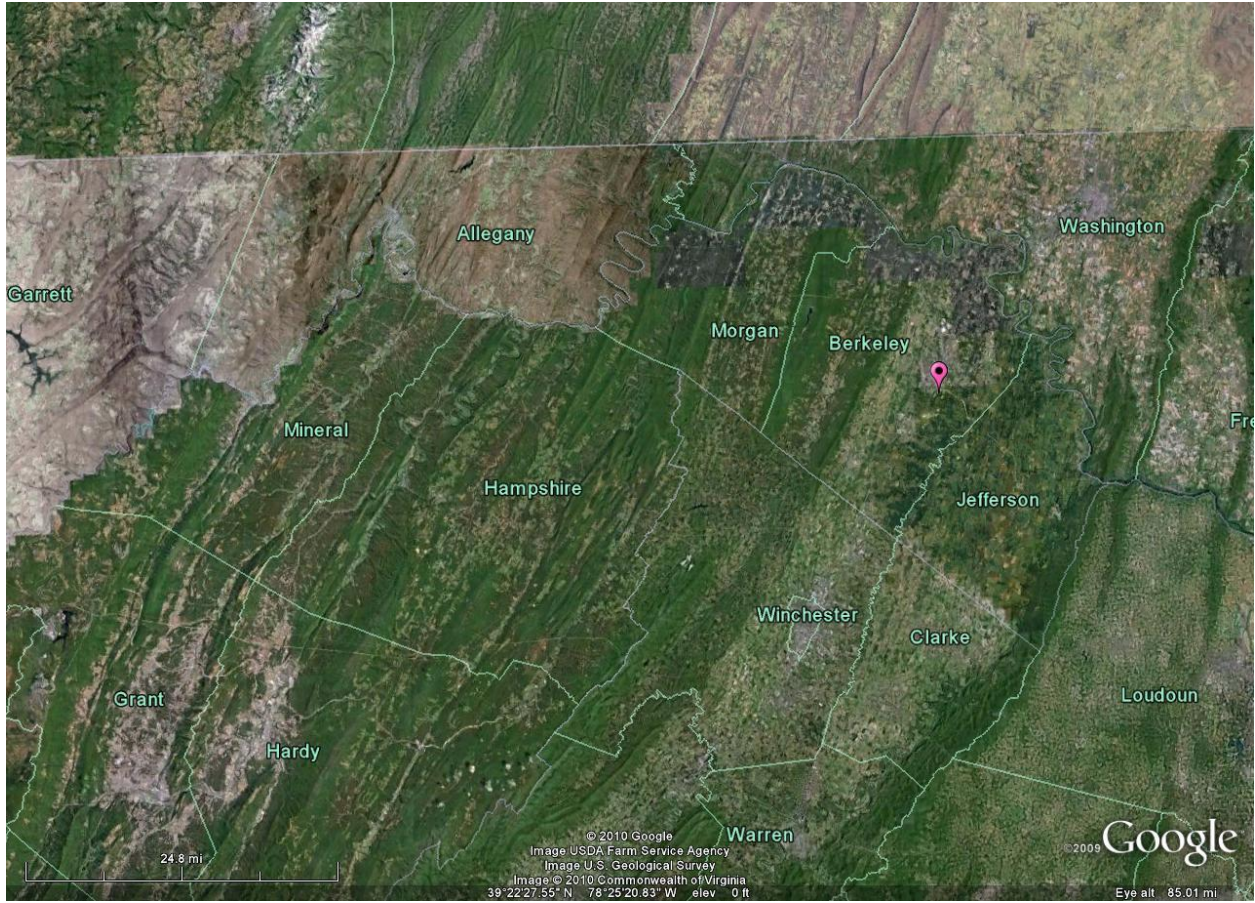
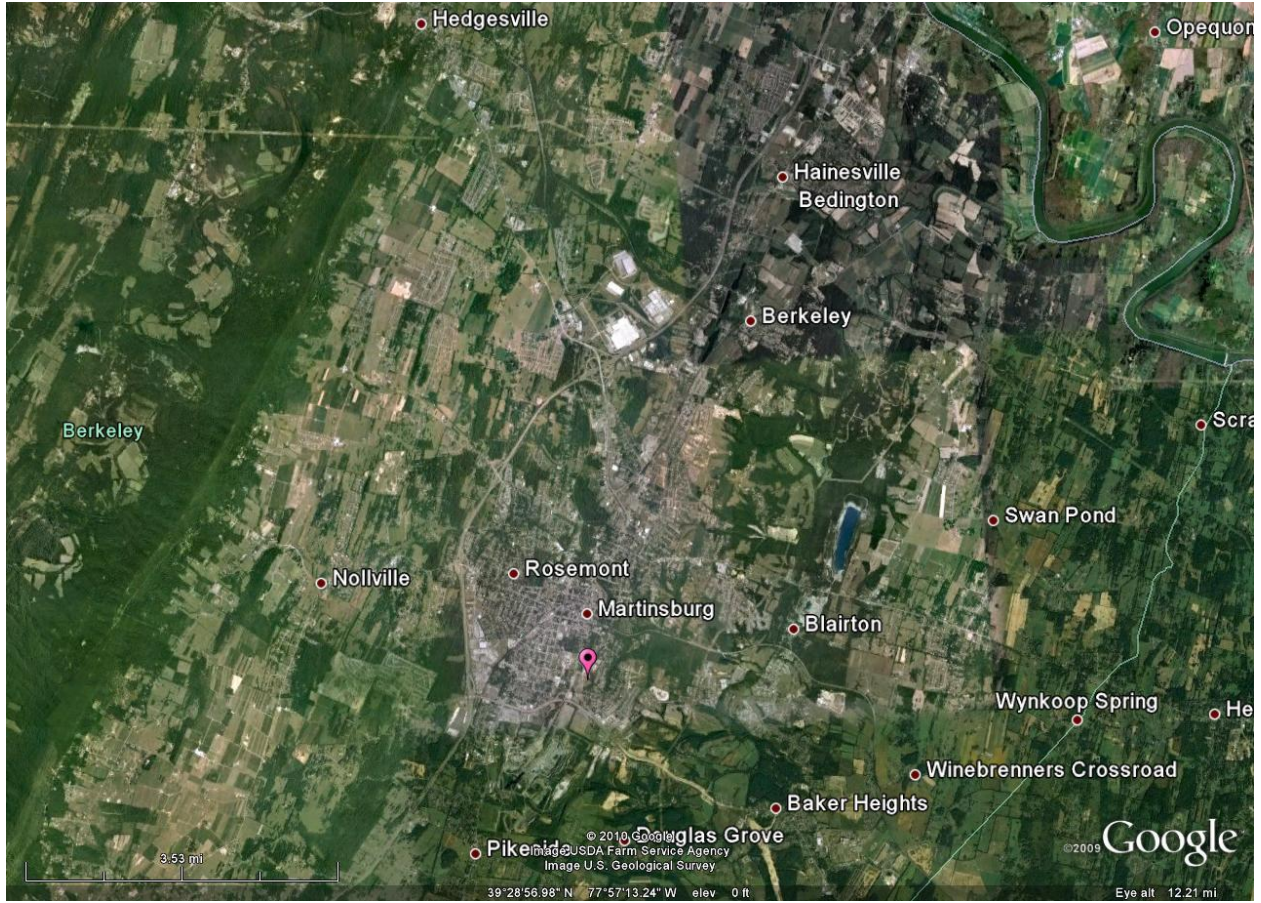


Figure 33: WV Sites Hagerstown-Martinsburg, MD-WV MSA



**Parkersburg-Marietta-Vienna, WV-OH MSA
Pleasants, Wirt, Wood Counties, WV-Washington County, OH**

The Parkersburg-Marietta-Vienna, WV-OH MSA is made up of three counties in WV; Pleasants, Wirt and Wood and one county in Ohio; Washington. Population data for the MSA is available in Table 22 below. Overall, the area has lost 2.4% of its population (3,942 people) between 2000 and 2008. While Pleasants County suffered the most population loss, the decrease was experienced in all counties. Wood County, WV is the largest county in the MSA (followed by Washington County, OH) while Wirt County (population 5,757) is the smallest. The most populated city in the MSA is Parkersburg, WV (the state's third largest city) having 31,611 people; a loss of 5.89% or 1,863 people since 2000. Marietta, OH is the second largest city in the MSA with a population of 14,307 in 2008 which is a decrease of a little over 1% since 2000.

The DAQ operated a PM₁₀ metals monitor at this location during the SAT study. The DAQ continues to collect met data under the SAT protocol. Any decision to perform additional SAT monitoring at the site will be dependent upon EPA recommendations in its final SAT report for this school.

Table 22: Parkersburg-Marietta-Vienna, WV-OH MSA

Estimates of Population Change MSA's: April 1, 2000 to July 1, 2008						
Metropolitan Statistical Areas	Population estimate		Change '00 to '08		Density	(Mile ²)
	7/1/08	4/1/00	Number	Percent		
Parkersburg-Marietta-Vienna, WV-OH	160,678	164,620	-3,942	-2.4		
Pleasants County, WV	7,150	7,514	-364	-4.8	55	130
Washington County, OH	61,567	63,251	-1,684	-2.7	97	632
Wirt County, WV	5,757	5,873	-116	-2.0	25	233
Wood County, WV	86,204	87,982	-1,778	-2.0	235	366

Table 23 provides a list of the WV monitors operated within the MSA. Figures 34 and 35 are map overviews of the site locations.

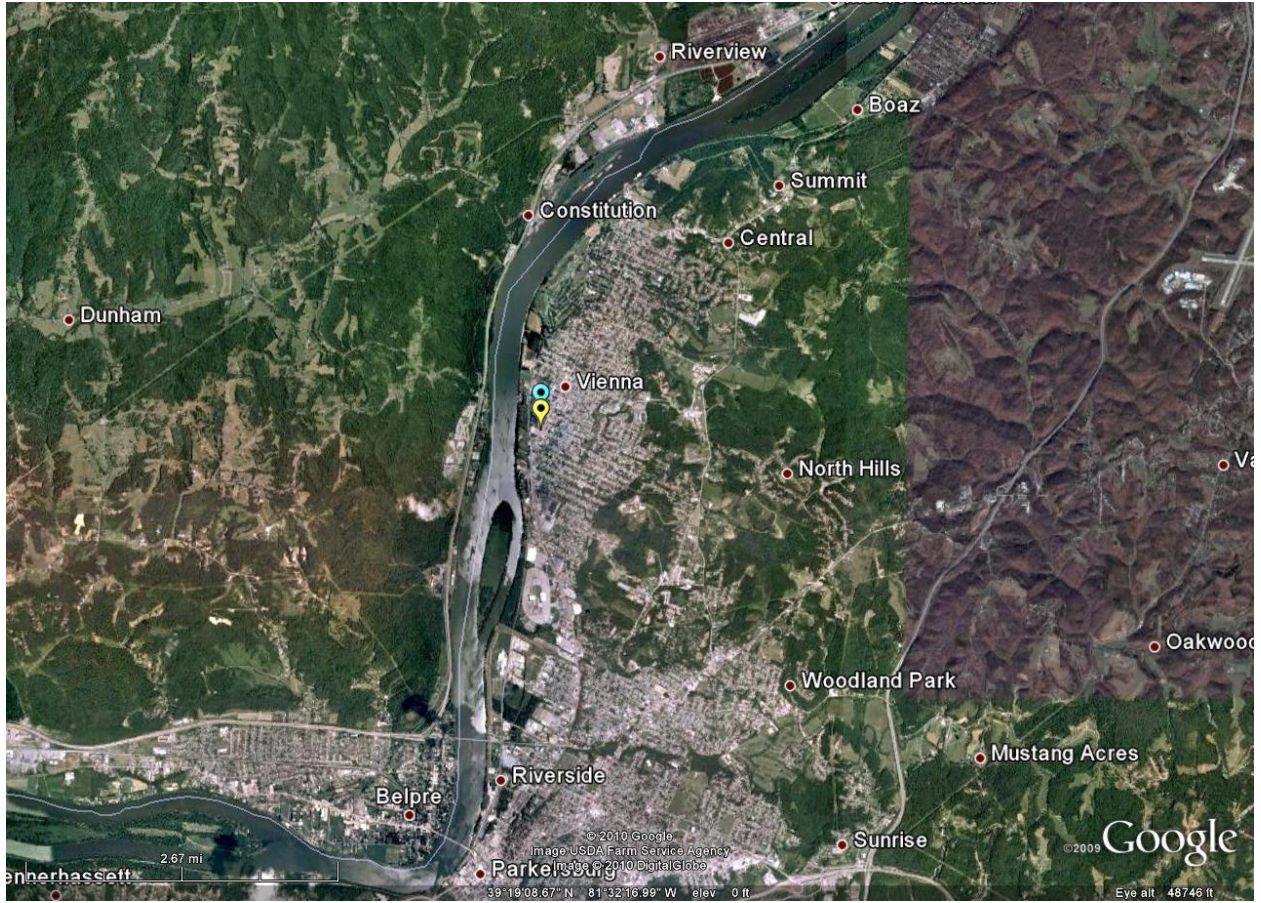
Table 23: Monitors in Parkersburg-Marietta-Vienna, WV-OH MSA

Site Name	Site ID	City, County	Date Site Established	Latitude Longitude	Location Setting	MSA Code	Monitor Type	Monitor Objective Type	Measurement Scale	Monitor Begin Date	Monitor Description
NEALE ELEM SCHOOL	54-107-1002	Vienna, Wood	1/1/1975	39.323533 -81.55237	SUBURBAN	6020	SLAMS	POPULATION EXPOSURE	URBAN	1/1/1980	Sulfur Dioxide
										1/1/1983	Ozone
										1/3/1999	PM2.5 FRM

Figure 34: WV Sites Parkersburg-Marietta-Vienna, WV-OH MSA



Figure 35: WV Sites Parkersburg-Marietta-Vienna, WV-OH MSA



Charleston, WV MSA
Boone, Clay, Kanawha, Lincoln, Putnam Counties, WV

The Charleston, WV MSA is comprised of five WV counties; Kanawha County, Putnam County, Clay County and Boone and Lincoln Counties. Besides the Morgantown site this is the only other MSA in WV whose boundaries are contained entirely within the state itself and not shared with other states. Net population in the MSA has decreased by 1.8% (5,691 people) since 2000. Kanawha County is the largest county having a population of 191,018 (a decrease of 9,058 since 2000) and Clay County has the lowest population of 10,075 people. Both Putnam and Lincoln Counties have experienced population growth since 2000 gaining by 7.6% (3,902 people) and 1.3% (278 people) respectively between 2000 and 2008. This increase may be attributable to migration other counties in the MSA; the majority from Kanawha County. The same may be said for the slight increase in population in Lincoln County. Approximately 63% of the total MSA population resides in Kanawha County while 18% reside in Putnam County. The largest city in the MSA is the state capital of Charleston, WV (also the largest city in the state of WV) with 50,302 people in 2008. Charleston lost 3,181 people between 2000 and 2008 or roughly 6.3% of its population. The largest city in Putnam County is Nitro (the 20th largest city in the state), WV having a population of 6,784 in 2008; a 2.5% decrease since 2000. The fastest growing city is Hurricane, located in Putnam County. Its population increased at a rate of 13.5% (850 people) from 5,480 to 6,335 from 2000 to 2008. Table 24 provides population information for the Charleston, WV MSA. Table 25 provides a list of the WV monitors operated within the MSA. Figures 36 and 37 are map overviews of the site locations.

Table 24: Charleston, WV MSA

Estimates of Population Change MSA's: April 1, 2000 to July 1, 2008						
Metropolitan Statistical Areas	Population estimate		Change '00 to '08		Density	(Mile ²)
	7/1/08	4/1/00	Number	Percent		
Charleston, WV	303,944	309,635	-5,691	-1.8		
Boone County, WV	24,977	25,535	-558	-2.2	50	502
Clay County, WV	10,075	10,330	-255	-2.5	29	342
Kanawha County, WV	191,018	200,076	-9,058	-4.5	212	902
Lincoln County, WV	22,386	22,108	278	1.3	51	437
Putnam County, WV	55,488	51,586	3,902	7.6	161	346

Table 25: Monitors in Charleston, WV MSA

Site Name	Site ID	City, County	Date Site Established	Latitude Longitude	Location Setting	MSA Code	Monitor Type	Monitor Objective Type	Measurement Scale	Monitor Begin Date	Monitor Description
BAPTIST TEMPLE	54-039-0010	Charleston, Kanawha	4/1/1999	38.3456 -81.62832	URBAN	1480	SPM	POPULATION EXPOSURE	NEIGHBORHOOD	10/1/2005	AIR TOXICS
									URBAN	1/1/2002	PM10 CONTINUOUS
							SLAMS	POPULATION EXPOSURE	URBAN	4/1/2000	Sulfur Dioxide
										4/1/2000	Ozone
			5/12/2000							PM2.5 FRM	
AGRICULTURAL CENTER	54-039-0011	Guthrie, Kanawha	11/1/2003	38.448833 -81.68472	RURAL		STN	POPULATION EXPOSURE	URBAN	11/23/2003	SPECIATION
PUBLIC LIBRARY	54-039-1005	South Charleston, Kanawha	1/1/1974	38.366183 -81.69372	SUBURBAN	1480	SLAMS	POPULATION EXPOSURE	URBAN	1/3/1999	PM2.5 FRM
							CSN		NEIGHBORHOOD	11/23/2003	SPECIATION

Figure 36: WV Sites: Charleston, WV MSA

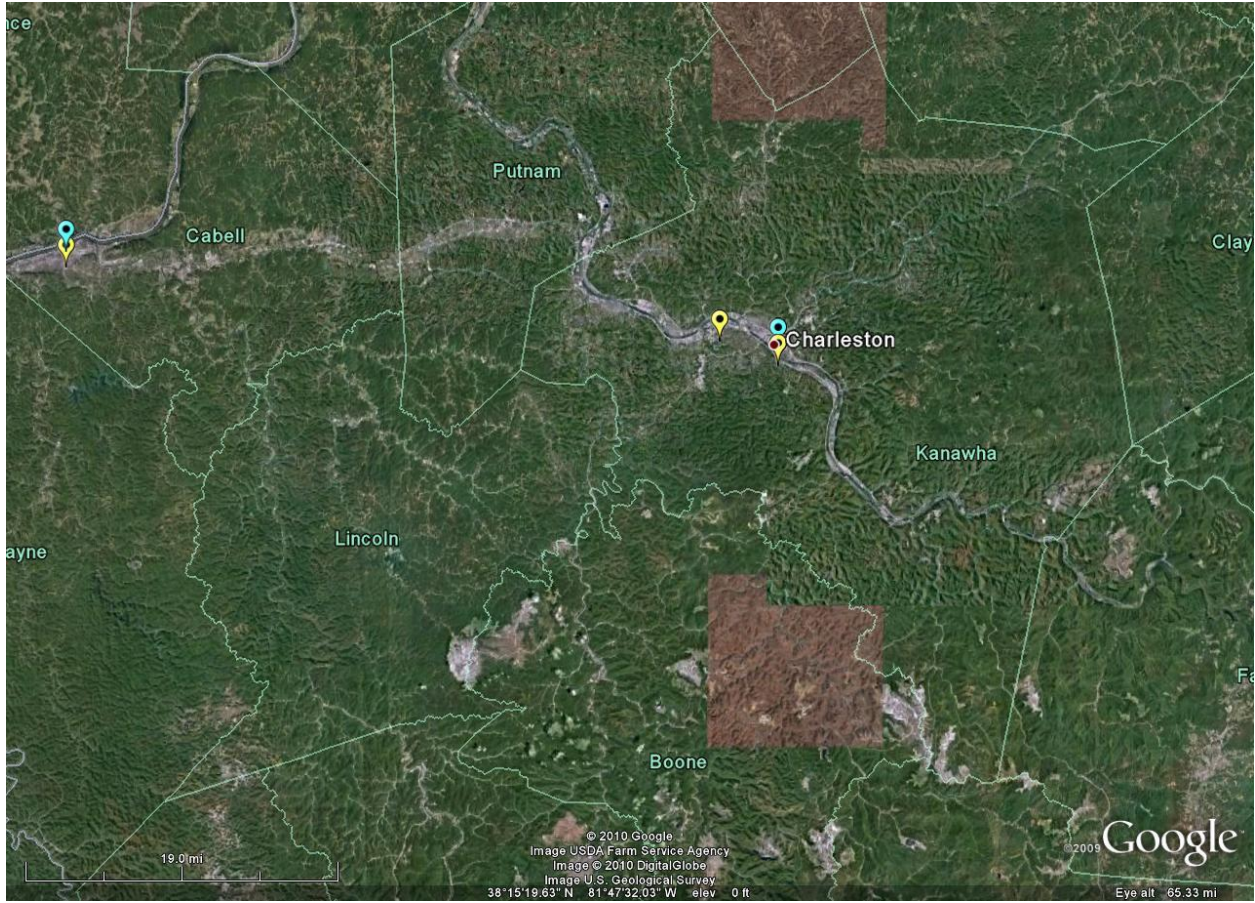
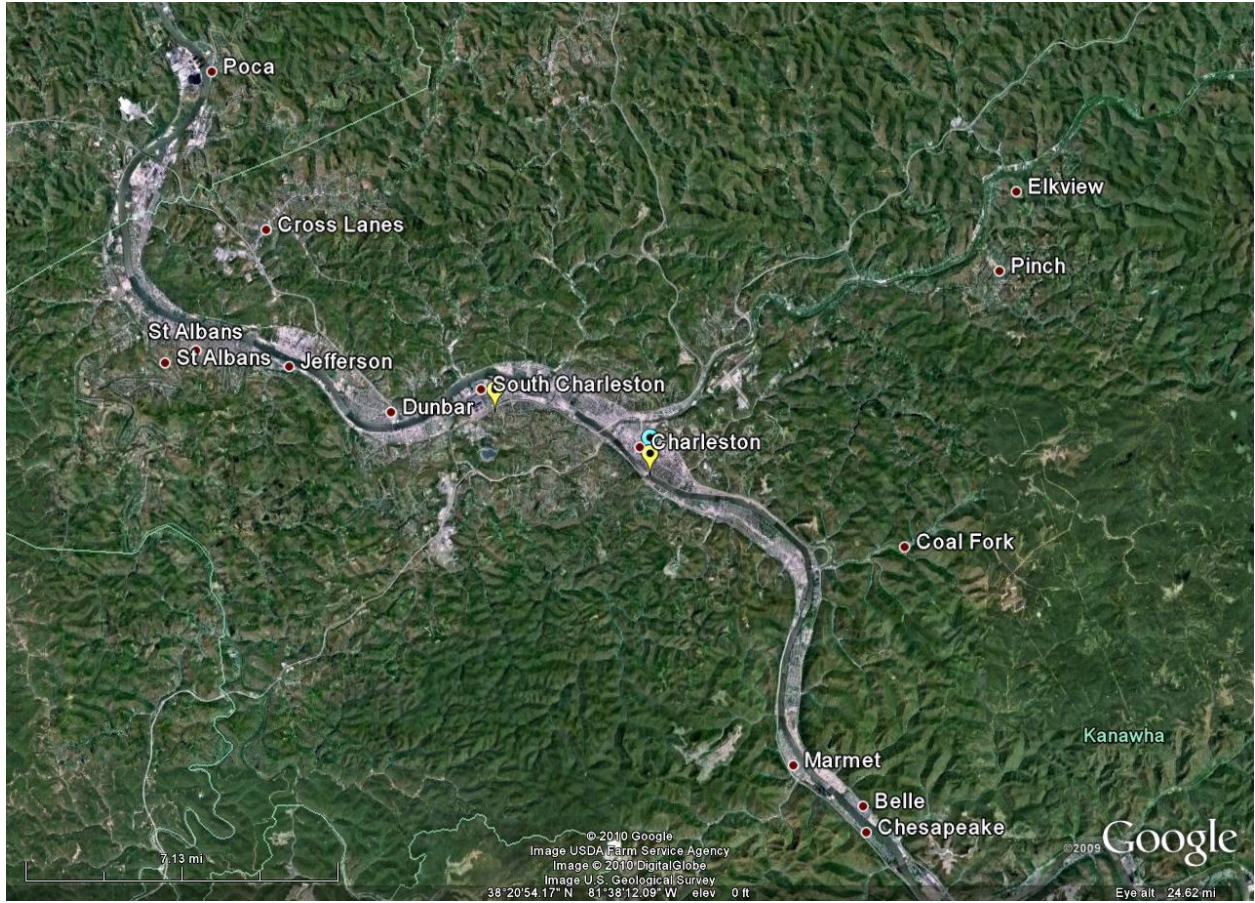


Figure 37: WV Sites Charleston, WV MSA



Huntington-Ashland, WV-KY-OH MSA

Cabell, Wayne Counties, WV-Boyd, Greenup Counties, KY-Lawrence County, OH

The Huntington-Ashland, WV-KY-OH MSA is comprised of five counties; Boyd and Greenup in KY, Lawrence County in OH and Cabell and Wayne Counties in WV. The MSA has suffered a net population loss of 1.5% from 2000 and 2008. Population dropped from 288,651 to 284,234, a loss of 4,417 people. Cabell County, WV makes up 33% of the total MSA population followed by Lawrence County, OH that contributes 22% for a combine total of over half the population. Three of the five counties experienced a decrease in population. Only Greenup County, KY and Lawrence County, OH had slight population increases of 1.4% (500 people) and 0.4% (250 people) respectively between 2000 and 2008. The three largest river cities are Huntington, WV (49,185) which is also WV second largest city, Ashland KY (21,352) and Ironton, OH (11,320).

Table 26 provides population information for the Huntington-Ashland, WV-KY-OH MSA. Table 27 provides a list of the WV monitors operated within the MSA. Figures 38 and 39 are map overviews of the site locations.

Table 26: Huntington-Ashland, WV-KY-OH MSA

Estimates of Population Change MSA's: April 1, 2000 to July 1, 2008						
Metropolitan Statistical Areas	Population estimate		Change '00 to '08		Density	(Mile ²)
	7/1/08	4/1/00	Number	Percent		
Huntington-Ashland, WV-KY-OH	284,234	288,651	-4,417	-1.5		
Boyd County, KY	48,560	49,752	-1,192	-2.4	304	160
Cabell County, WV	94,631	96,785	-2,154	-2.2	337	281
Greenup County, KY	37,388	36,888	500	1.4	109	345
Lawrence County, OH	62,573	62,323	250	0.4	138	453
Wayne County, WV	41,082	42,903	-1,821	-4.2	81	506

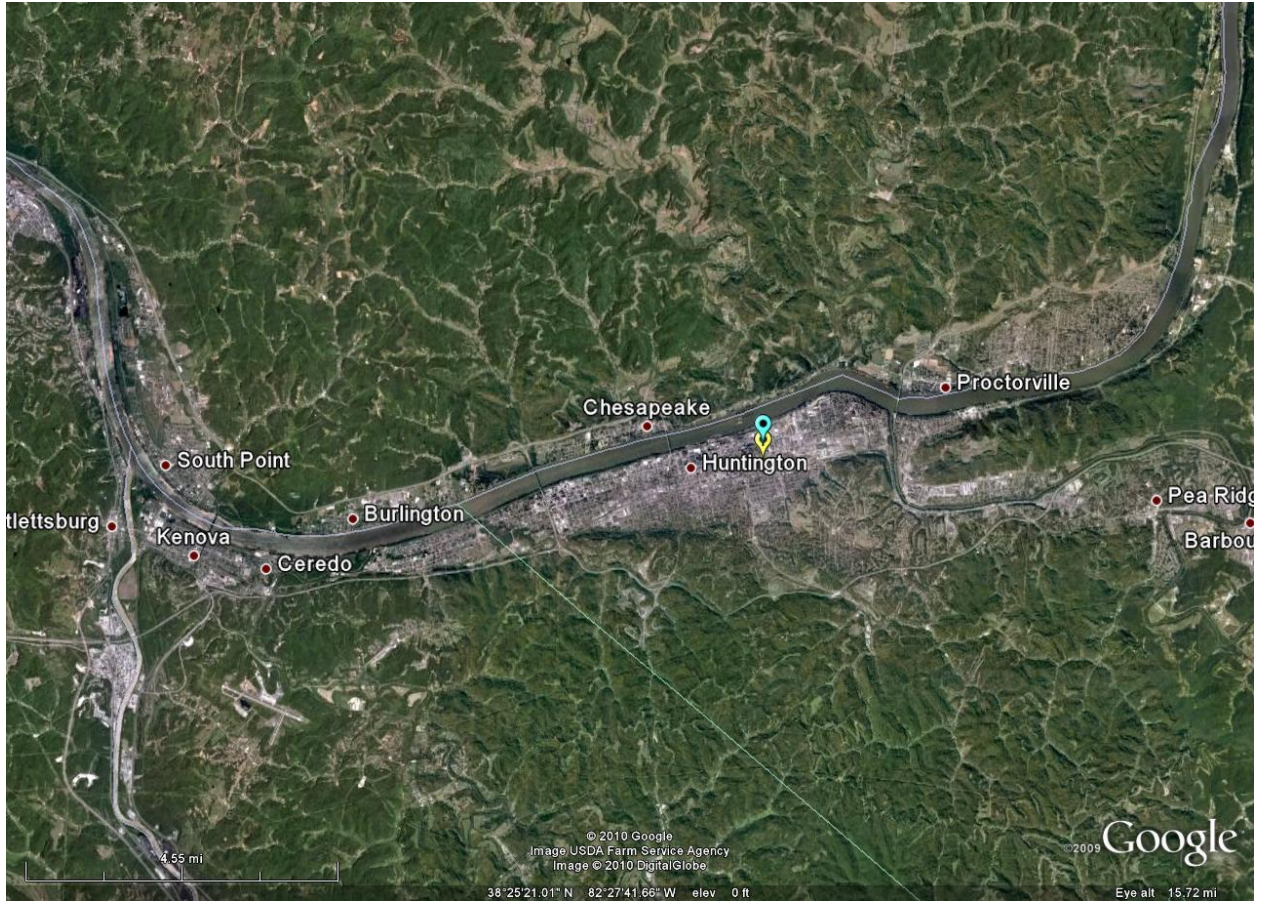
Table 27: Monitors in the Huntington-Ashland, WV-KY-OH MSA

Site Name	Site ID	City, County	Date Site Established	Latitude Longitude	Location Setting	MSA Code	Monitor Type	Monitor Objective Type	Measurement Scale	Monitor Begin Date	Monitor Description
MARSHALL UNIVERSITY	54-011-0006	Huntington, Cabell	1/1/1982	38.424133 -82.4259	SUBURBAN	3400	SLAMS	POPULATION EXPOSURE	NEIGHBORHOOD	2/8/1982	Sulfur Dioxide
									URBAN	1/1/1982 1/3/1999	Ozone PM2.5 FRM

Figure 38: WV Sites Huntington-Ashland, WV-KY-OH MSA



Figure 39: WV Sites Huntington-Ashland, WV-KY-OH MSA



Other WV Monitoring Site Locations

The WV DAQ operates two additional monitoring sites not previously discussed. One is a PM_{2.5} only site located in the municipality of Beckley, WV and the second is an ozone only site located at Sam Black Church in Greenbrier County. Information regarding these sites follows.

Beckley, WV

The city of Beckley, WV (the states' 9th largest city with 16,832 residents) is part of the Beckley-Oak Hill Combined Statistical Area (CSA) that is comprised of two Micropolitan Statistical Areas (μSA): Beckley, WV and Oak Hill, WV. The CSA is made up of Raleigh and Fayette Counties. The overall population of the CSA has decreased by 2.4% (1,101 people) from 2000 to 2008. The population of City of Beckley decreased by 3.33% (556 people) in the same period. The city of Oak Hill (the 18th largest city in the state) decreased from 7,598 people to 7,211 people; a loss of 5.37%.

Table 28 provides population information for the Beckley-Oak Hill Combined Statistical Area (CSA). Table 29 provides a list of the WV monitors operated within the CSA. Figures 40 and 41 are map overviews of the site locations.

Table 28: Beckley-Oak Hill Combined Statistical Area (CSA)

Estimates of Population Change MSA's: April 1, 2000 to July 1, 2008						
Metropolitan Statistical Areas	Population estimate		Change '00 to '08		Density	(Mile ²)
	7/1/08	4/1/00	Number	Percent		
Micropolitan statistical areas/CSA's						
Beckley-Oak Hill (CSA)	125,698	126,799	-1,101	-2.4	100	1,267
Beckley, WV - (μSA)	79,357	79,220	137	0.2		
Raleigh County, WV	79,357	79,220	137	0.2	131	605
Oak Hill, WV - (μSA)	46,341	47,579	-1,238	-2.6		
Fayette County, WV	46,341	47,579	-1,238	-2.6	70	662

Table 29: Monitors in the Beckley-Oak Hill Combined Statistical Area (CSA)

Site Name	Site ID	City, County	Date Site Established	Latitude Longitude	Location Setting	MSA Code	Monitor Type	Monitor Objective Type	Measurement Scale	Monitor Begin Date	Monitor Description
MAXWELL HILL ELEMENTARY	54-081-0002	Beckley, Raleigh	1/5/1998	37.807767 -81.19743	URBAN		SPM	POPULATION EXPOSURE	URBAN	1/3/1999	PM2.5 FRM

Figure 40: WV Sites Beckley-Oak Hill Combined Statistical Area (CSA)

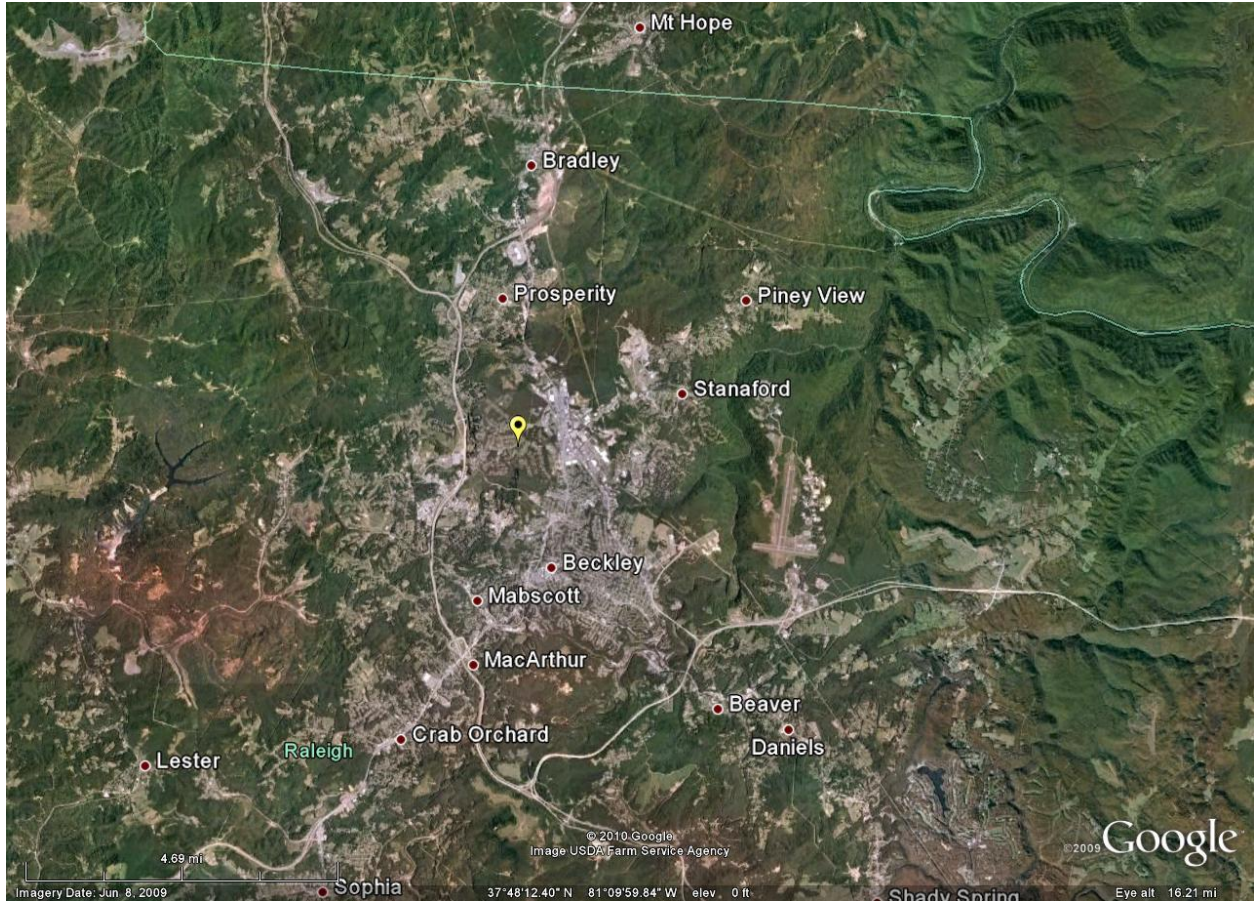
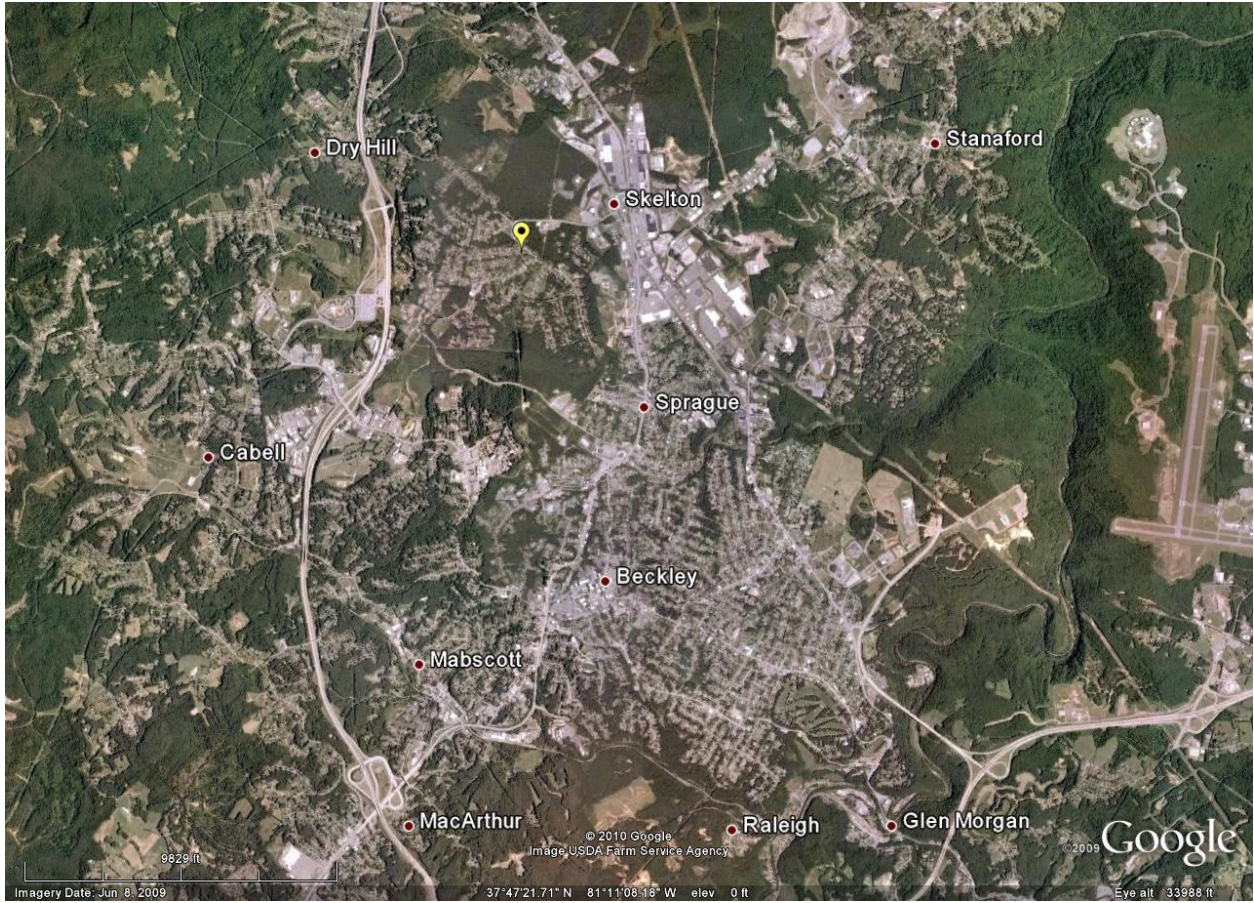


Figure 41: WV Sites Beckley-Oak Hill Combined Statistical Area (CSA)



**Sam Black Church
Greenbrier County, WV**

The Sam Black Church (SBC) site is an ozone only monitoring site that is operated during the April through October ozone season. SBC is an unincorporated community. The site is not located in a MSA, CSA or μ SA. SBC was the replacement ozone site for a prior location in Summers County at Flannigan Farm. Both sites are high elevation locations located in very rural counties to measure both regional background and nocturnal ozone values.

Table 30 provides population information for Greenbrier County and the adjacent Summers County. Table 31 provides a list of the WV monitors operated in Greenbrier County. Figures 42 and 43 are map overviews of the site location.

Table 30: Greenbrier and Summers County Populations

Estimates of Population Change MSA's: April 1, 2000 to July 1, 2008						
Metropolitan Statistical Areas	Population estimate		Change '00 to '08		Density	(Mile ²)
	7/1/08	4/1/00	Number	Percent		
Greenbrier County	34,567	34,453	114	0.3	34	1,020
Summers County	13,017	14,388	-1,371	-9.5	36	360

Table 31: Monitors in Greenbrier County Sam Black Church

Site Name	Site ID	City, County	Date Site Established	Latitude Longitude	Location Setting	MSA Code	Monitor Type	Monitor Objective Type	Measurement Scale	Monitor Begin Date	Monitor Description
DOH GARAGE	54-025-0003	Sam Black Church, Greenbrier	3/31/1999	37.908533 -80.63263	RURAL		SLAMS	POPULATION EXPOSURE	URBAN	3/31/1999	Ozone

Figure 42: WV Sites Greenbrier County Sam Black Church

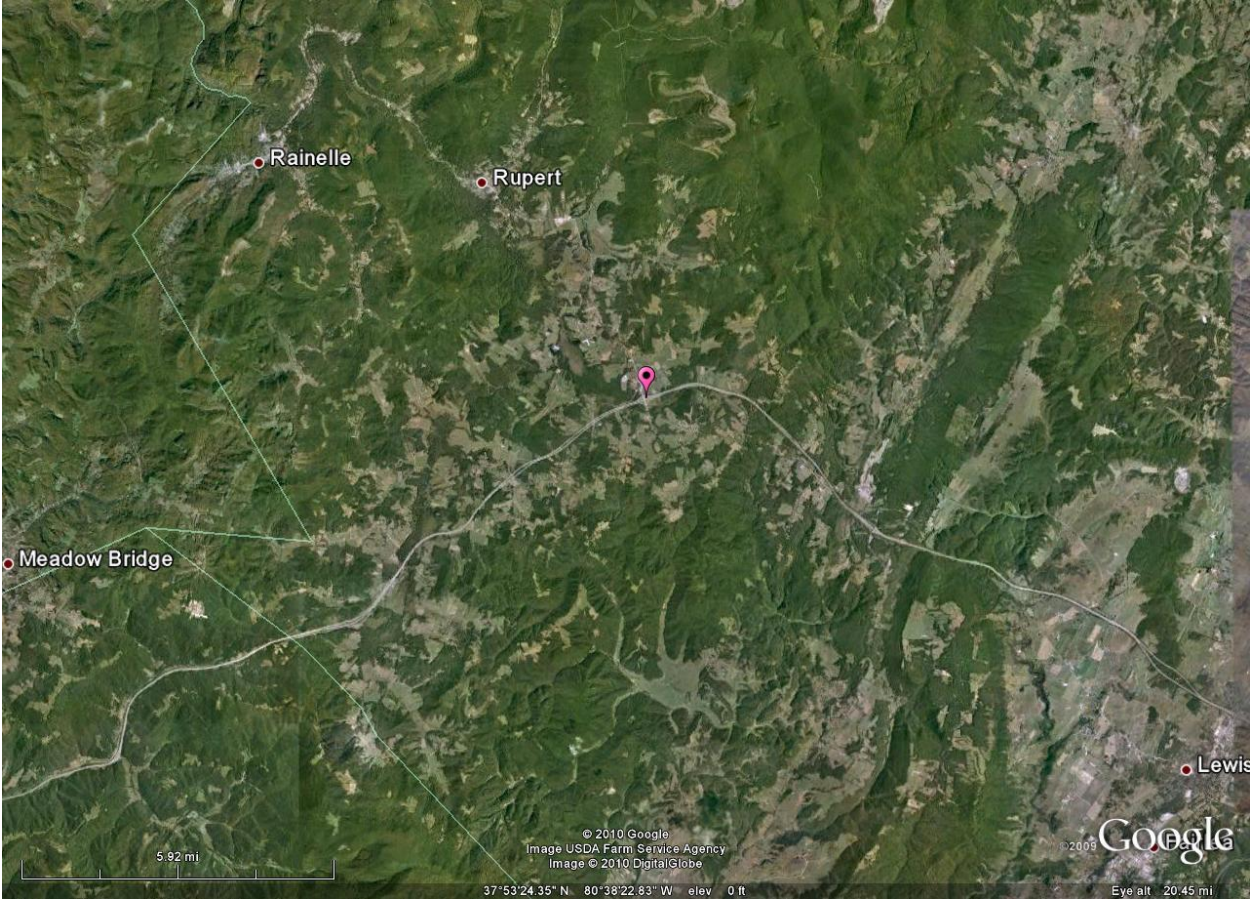
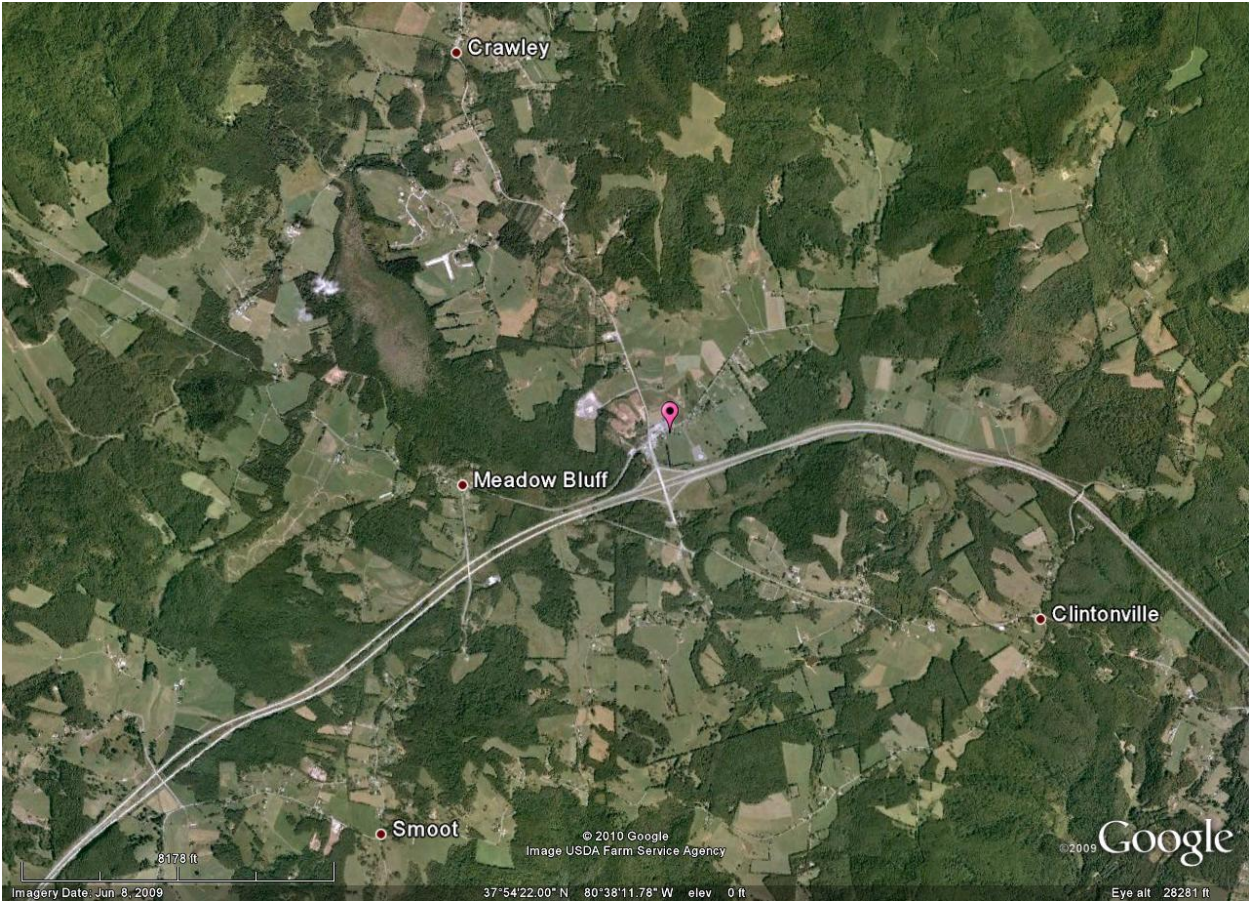


Figure 43: WV Sites Greenbrier County Sam Black Church



Population Served by the Monitoring Network

The current DAQ monitoring network (excluding the Greenbrier County ozone monitor) is located within eight MSAs and two μ SAs that represent approximately 1 million people or 55.5% of the state's total population. According to the US Department of Agriculture (USDA) estimates 1,013,428 people lived in urban settings in 2009 and 806,349 lived in rural locations. According to the table provided on the USDA website <http://www.ers.usda.gov/statefacts/wv.htm> the trends over the last three decades indicate a reduction of population in rural areas and an increase in urban areas. Based on USDA urban data, the DAQ monitoring location may represent as much as 100% of the urban population in the state.

Sensitive Populations

While the DAQ does not have epidemiological expertise regarding exposure to air pollutants by sensitive populations, by applying its limited resources to monitoring in the largest populated cities and MSAs which historically have been the areas of highest impacts from emission sources, the monitoring accounts for representative sensitive population groups that reside within those areas. The most recent (2010) American Lung Association (ALA) report "State of the Air" the ALA identifies groups at risk in the counties where the DAQ monitors. Table 32 lists those counties and groups.

According to the USDA, WV has the 5th highest rate of poverty in the nation with approximately 17.4% of its residents living below the US poverty line (<http://www.ers.usda.gov/Data/povertyrates/>). The overall US poverty rate is 13.2%. Per the US Census data (<http://www.census.gov/statab/ranks/rank29.html>) WV ranks 49th out of the 50 states in per capita income at \$29,537 per year. Average US per capita income is \$38,611 per year. Figure 44 is a USDA map indicating each counties percent of population living in poverty. Figure 45 present per capita income per county in 2007 (WV Bureau of Public Health data)

Table 32: Groups at Risk in the Counties with Monitors (ALA State of the Air Report 2010)

County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema	CV Disease	Diabetes	Poverty Estimate
Berkeley	10,2044	26,497	11,108	2,494	7,294	3,261	1,199	26,568	8,215	11,253
Brooke	23,520	4,396	4,588	414	1,825	883	406	8,018	2,459	2,674
Cabell	94,631	19,658	15,551	1,851	7,157	3,313	1,396	28,724	8,822	18,725
Greenbrier	34,567	7,223	6,201	680	2,614	1,253	562	11,234	3,449	5,952
Hancock	30,008	6,041	5,652	569	2,292	1,114	511	10,117	3,104	4,316
Harrison	68,853	15,271	11,166	1,438	5,132	2,418	1,039	21,211	6,520	12,128
Kanawha	191,107	41,029	31,892	3,862	14,381	6,848	2,991	60,630	18,639	29,656
Marion	56,496	11,260	9,663	1,060	4,320	2,023	870	17,728	5,444	10,336
Marshall	32,766	6,596	5,500	621	2,513	1,201	524	10,639	3,272	5,397
Monongalia	88,221	16,013	9,022	1,507	6,951	2,959	970	22,811	7,062	13,178
Ohio	44,106	8,819	8,479	830	3,363	1,621	743	14,690	4,503	6,570
Raleigh	79,357	16,215	13,022	1,526	6,049	2,843	1,215	24,867	7,645	14,837
Wood	86,204	18,647	14,331	1,755	6,475	3,074	1,338	27,165	8,350	13,678
Total	931,791	197,665	146,175	18,607	70,367	32,811	13,764	284,402	87,486	148,700

Figure 44: Percent of WV Counties in Poverty 2008 (USDA)

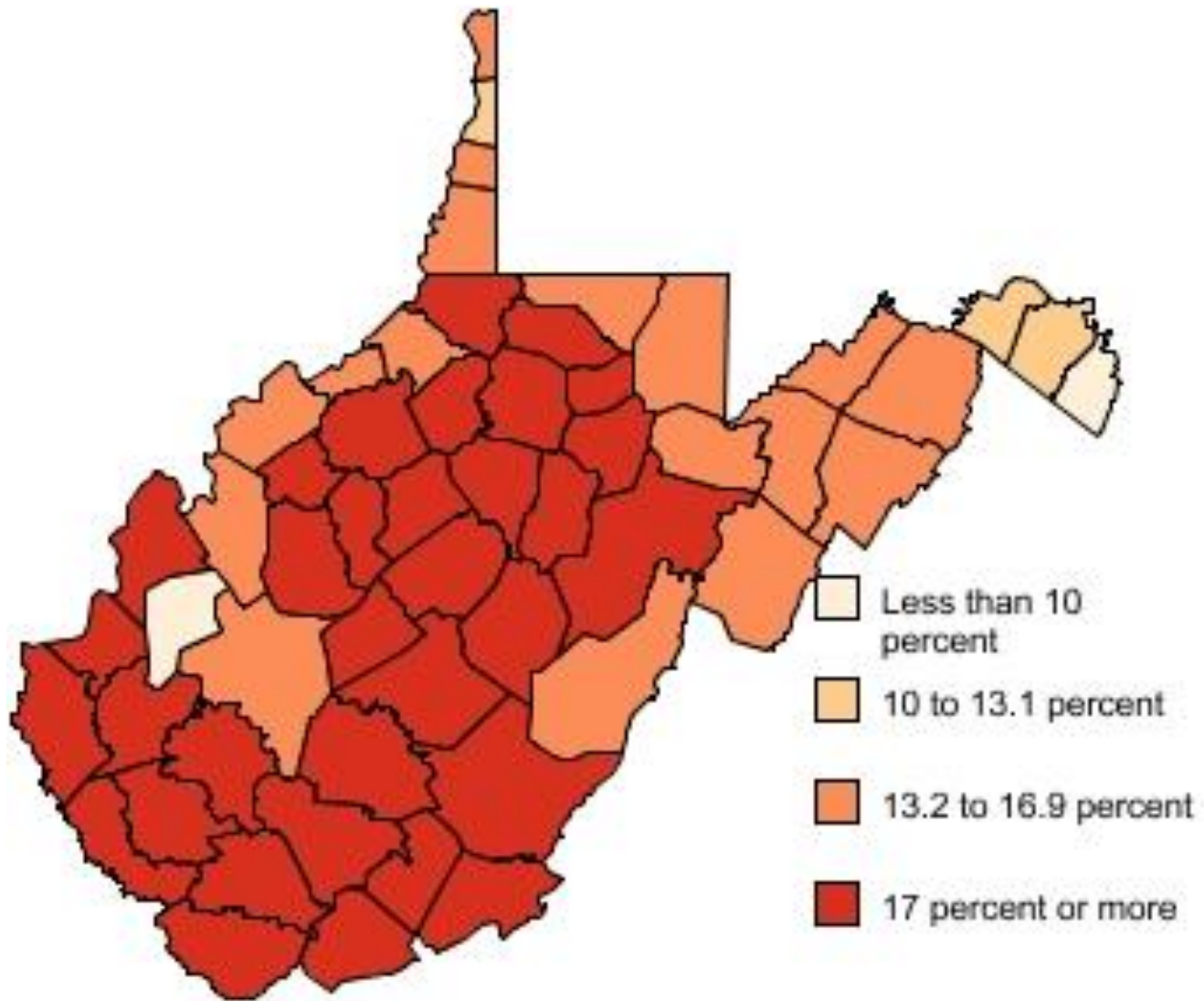
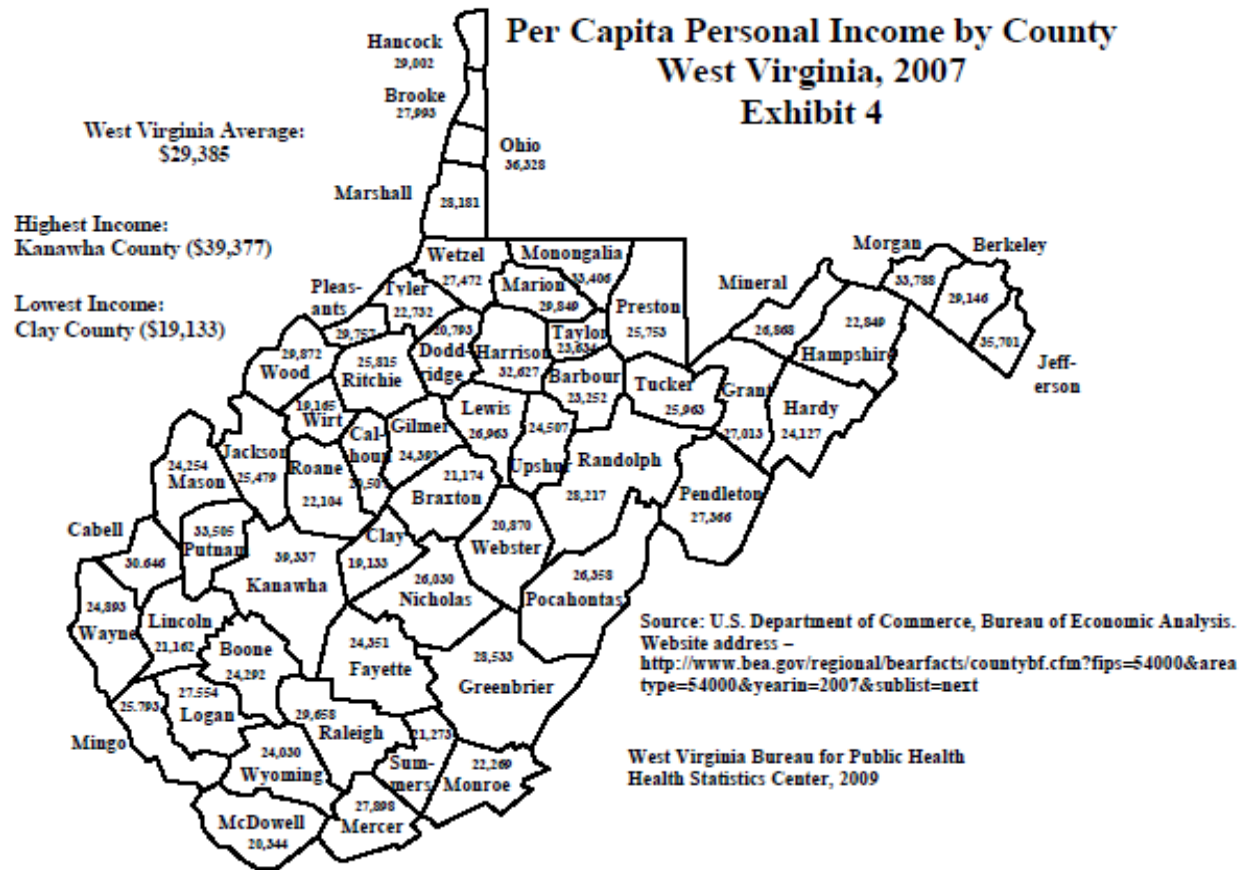


Figure 45: Per Capita Income in WV by County 2007 (WV BPH)



Statistical Correlation between Monitors

In anticipation of the Network Assessment, USEPA has provided statistical tools to assist the states in determining if certain correlated monitors have more or less value in the network. There are two tool types provided; static output where EPA has performed the analysis and made available graphical file outputs and a more interactive file set where the user can use the statistical software “R” to manipulate the file sets. The DAQ air monitoring section does not have staff resources available to download and run the R software therefore we could only review the EPA provided static files. The static correlation outputs provided by EPA are available at <http://www.epa.gov/ttn/amtic/netassess>.

While the correlations displayed both similarities and differences between certain monitor groupings, those correlations were not relied upon in this network assessment. The correlations did not take into consideration topography and/or meteorological data of the area assessed. As stated previously, WV is a predominately mountainous state that is characterized by complex topography, difficult terrain and unique meteorological conditions. River valleys such as the Ohio River and Kanawha Valley and the Tri-State area of Cabell County consist of winding valleys, steep rapidly rising elevations and river tributaries and ephemeral streams flowing through deep ravines and cuts. These geographical conditions continually alter the meteorology that affects a monitoring site.

In addition, this assessment does not consider nearby monitoring in adjacent states. Besides being beyond the scope of the expertise used in this assessment, each adjacent state may have its own particular objectives for monitoring in the area. With the several shared MSAs in WV (that incorporate three different EPA Regions), the topography and meteorology may affect the Design Value (DV) which can change over longer monitoring periods such as a three year averaging basis. Any other states' monitoring site may drive the DV for that particular MSA over the moving averaging period. Therefore, it is important that states affected by the MSA DV continue to monitor the air quality to measure impacts within its own boundaries. As State Implementation Plans (SIPs) are submitted to bring the area into attainment it is imperative that progress towards meeting the SIP goals be objectively measured across all monitors and boundaries in the nonattainment area.

Assessment of the Air Monitoring Network in WV

The five year air quality surveillance system assessment requires states to address:

- If the network meets the monitoring objectives defined in Appendix D
- Whether new monitoring sites are needed;
- Whether existing sites are no longer needed and can be terminated;
- Whether new technologies are appropriate for incorporation into the air monitoring network;
- Whether the network sufficiently supports characterization of air quality in areas with large populations of susceptible individuals;
- Whether discontinuance of a monitoring site would have an adverse impact on other data users or health studies;
- For PM_{2.5} the assessment must identify needed changes to population oriented sites.

1. If the network meets the monitoring objectives defined in Appendix D:

The current network meets the monitoring objectives of Appendix D. As discussed previously, there have not been any significant population changes in WV that would require an alteration to the network, specifically ozone and PM_{2.5}. The only MSA that is not currently monitored is the Cumberland, MD-WV MSA. This MSA is comprised of two counties, Alleghany County in MD and Mineral County in WV. Their populations are 72,238 and 26,795 respectively. The population of Alleghany County is 2.7 times that of the WV County. The largest city in the MSA is Cumberland, MD with a population of 21,591 as reported in 2000 which almost equals the population of Mineral County, WV. Mineral County population density is 82 persons per square mile compared to Alleghany County population density of 170 people per square mile. The MSA population has decreased by 2,975 people from 2000 to 2008. Alleghany County lost 2,692 people in that time frame. The Maryland Department of the Environment operates a very comprehensive monitoring site at Piney Run located in Garrett County directly west of Alleghany County and near Frostburg.

2. Whether new monitoring sites are needed

The current network has been established over the past 30+ years to accommodate changing national objectives that have affected monitoring state-wide or on a regional, county or city scale. The DAQ is monitoring in all major cities, all but one MSA and in areas that are currently nonattainment or were prior nonattainment areas and are under a SIP maintenance plan. As WV is very mountainous, the limited availability of suitable land has caused most heavy industries and population to site in the same areas in the Ohio River Valley, Kanawha River Valley and along the Monongalia River in the central part of the state. There is no geographical demarcation between industrial locations and where people live. During the industrial development, residences were built near the factories where people worked. While development has

allowed for city boundaries to expand and annex unincorporated areas (now suburbs of those cities) to maintain their populations and tax base, the geographical footprint of an area has only marginally grown due to the challenging mountainous topography. As a result of shared air basins for both industry and population monitoring sites in WV are unique in that they represent both the populated area and the highest impact areas. Due to limited population growth and very little shifting of population, this monitoring relationship will continue to be representative.

Any new sites that may need to be established in WV would be driven by changes in the federal NAAQS and EPA monitoring requirements. There are both final and pending NAAQS/monitoring rules that may affect the WV monitoring and its resources. While not all rules are final some discussion follows:

NO₂: Under the final rule, WV will not be required to conduct NO₂ monitoring near roadways. The rule requires the following:

- At least one NO₂ monitor near a major road in any urban area with a population greater than or equal to 500,000 people.
- A second monitor is required near another major road in areas with either:
 - (1) Population greater than or equal to 2.5 million people, or
 - (2) One or more road segment with an annual average daily traffic (AADT) count greater than or equal to 250,000 vehicles.

WV does not have any areas that have the population triggers or vehicular traffic activity that would require NO₂ monitoring.

Lead: Under the initial final lead rule, WV did not have any sources that emitted 1 ton per year (TPY) or greater of lead (Pb) or any aggregated sources that emitted 0.5 TPY or greater. The revised rule lowered the Pb emission threshold to 0.5 TPY for a single source. The most recent WV Pb emission inventory data to be uploaded to NEI in 2010 suggests that there is a single Pb source that reported their 2008 Pb emissions above the initial 1 TPY threshold. As a result, WV would have to establish a collocated Pb monitor at our existing site near the source. This would be addressed in the 2011 Network Design submittal and we would anticipate that the monitors would be installed and operating according to the schedule in the revised rule. This projection assumes that funding would be made available to purchase the monitors.

SO₂: SO₂ monitoring has not been addressed in detail in this because the final SO₂ NAAQS revisions may require changes to the SO₂ network. Historically, SO₂ has been one of the driving pollutants in WV due to the presence of large coal-fired EGUs. In the 1990's some areas in the Northern Panhandle failed to attain the primary standard and were required to submit an attainment demonstration. Those areas now monitor SO₂ as part of an EPA approved Maintenance Plan. Within the last decade, the DAQ has terminated two low value SO₂ only sites that

were located inside buildings and installed in response to public concerns regarding a newly permitted source in the early 1990's.

Under the final SO₂ NAAQS revision, EPA may require additional monitoring and establishing of new SO₂ only sites. The introduction of new sites into the existing network will present many resource challenges. The DAQ would have to work closely with EPA to discuss shifting of network capacity, funding and prioritize sustainable operation of sites that are of equal or greater value in the network.

O₃: EPA has proposed a revised ozone monitoring rule that may require establishment of new rural based O₃ only sites in WV. The O₃ monitoring sites may need to be sited in remote areas of WV. Using existing resources to locate a suitable site, secure a lease, building the infrastructure and accessing a remote site would be challenging. Again, DAQ and EPA would be required to work together in an effort to assess increased funding requirements and prioritize maintaining operation of equal or more valuable network site operations to accommodate the operation of any new O₃ sites.

NCore: In the 2006 ambient air monitoring rule, EPA required that each state install and operate at least one NCore site. At a minimum these sites are to monitor the following parameters:

- PM_{2.5} speciation: Organic and elemental carbon, major ions and trace metals (24 hour average; every 3rd day).
- PM_{2.5} FRM mass: typically 24 hr. average every 3rd day.
- Continuous PM_{2.5} mass: 1 hour reporting interval for all cont. species.
- Continuous PM (10-2.5) mass: in anticipation of PM (10-2.5) standard.
- Ozone (O₃): all gases through cont. monitors (except HNO₃ and NH₃).
- Carbon monoxide (CO): capable of trace levels (low ppm and below).
- Sulfur dioxide (SO₂): capable of trace levels (low ppb and below).
- Nitrogen oxide (NO): capable of trace levels (low ppb and below).
- Total reactive nitrogen (NO_y): capable of trace levels (low ppb and below).
- Ammonia (NH₃): currently under consideration.
- Nitric acid (HNO₃): currently under consideration.
- Surface meteorology: wind speed and direction, temperature, RH.
- Lead (Pb).

These sites also require extensive support equipment such as calibrators, gas cylinders, data logging and communications. A large inventory of ready to go spare equipment would also be needed to sustain the sites ongoing operation.

NCore would be the largest, most comprehensive site ever operated by WV. It may contain upward of fourteen instruments and a met system (a met system could not be installed at the location now considered for the NCore as it would not meet siting criteria). Since it would be located in the network serviced by the Charleston staff it would be equivalent to operating approximately 80% of the

current network serviced out of the Charleston office (excluding the four North Central Region sites operated out of the Fairmont regional office by one site operator). The one NCore site is also equivalent to operating about 27% of the current *state wide* monitoring network.

The WV program had traditionally been driven by determining an areas compliance with NAAQS. Air monitoring expertise has been established based on that premise. The objectives of NCore are not necessarily to determine NAAQS compliance and as a result, many different instruments will be used that are not yet FRM or equivalent. Several of the monitoring devices have never been operated by current staff and initiating and retaining their operation would be resource intensive. As with SO₂ and O₃ initiatives, the DAQ will continue to work closely with EPA to identify capital to establish NCore and ongoing stable funding to operate the site. In addition NCore may require that both agencies review and prioritize sustained operation of equal or more valuable NAAQS monitoring sites in the Charleston network in order to redirect capacity and resources to the NCore operation which will consume a significant portion of the resources dedicated to the current program.

Under this network assessment, the DAQ does not anticipate that any new monitoring sites (except for that required for Pb, NCore and SO₂) would be necessary. This assessment does not consider new sites required by pending or recently finalized regulations. New monitoring sites required by EPA that would exceed current program capacity would require additional review of the existing network in concert with EPA to assess overall prioritization of continuing operations of sites that are of equal or greater value than the proposed new sites.

3. Whether existing sites are no longer needed and can be terminated

Over the past several years the DAQ has discontinued sites and monitors and streamlined its network to accommodate new NAAQS monitoring requirements and establish other more valuable sites. Two low values SO₂ sites (located in buildings and not in shelters) were terminated and two very distant and remote low value PM_{2.5} sites were discontinued. The DAQ has sites in every MSA (except Cumberland, MD-WV as discussed previously) and every major city in the state. All maintenance plan areas are monitored. Additional sites have been retained in the maintenance plan areas due to the topography, source mix and various emission release heights (stack and fugitives) in the area.

Considering the size of the existing network, spatial coverage and multitude of MSA's relative to resources, simply discontinuing a site in one area of the state does not make those resources available to another area of the state. The DAQ has three distinct geographical monitoring offices; Charleston, Fairmont (the lone site operator reports to Charleston) and Wheeling. Each office has a fixed number of site operators that service the network in their regional geographical area. Therefore, terminating a monitoring site in the Wheeling or Fairmont region network does not make those resources transferable

to say Charleston for operating a new site. Terminating sites in a region provides no net positive gain of resource capacity to be used in another region. Resources are over maximized and a site termination would only provide some relief and not increase capacity to absorb additional monitoring.

In the past there have been situations when termination of sites that no longer serve a purpose in a region has allowed for adding monitors at a remaining site within that same region. All four sites in the North Central region of WV are serviced by one site operator. At one time there were six sites. The termination of the two low value SO₂ only sites (located in rooms in buildings) in Morgantown has enabled the DAQ to add toxics sampling to the remaining Morgantown site. The termination of the two distant PM_{2.5} sites serviced by Charleston has enabled the DAQ to add toxics monitoring to the Charleston site.

Additional air monitoring requirements will make it necessary to continue to work with EPA to assess the importance sustainability of operating sites that have equal or greater value to the newly required sites but exceed both resource availability and operating capacity of the program.

4. Whether new technologies are appropriate for incorporation into the air monitoring network

The DAQ relies upon EPA to establish tested and approved monitors for use in the network. The DAQ does not have the resources to undertake beta testing of unproven systems at the expense of its base NAAQS monitoring program. A new technology is a benefit to WV when it decreases pressure on existing resources after implementation and enhances data quality. One area where benefits may be realized from new technology application is in the communications with the sites/monitors. The DAQ currently uses modem dial up to access its sites. While this remains a more than adequate communication method for now, as technology and data requirements increase high speed communications may be beneficial in the future. Another area that may eventually benefit operations would be to have sites that are 100% digital which would require the phase out of analog monitors

5. Whether discontinuance of a monitoring site would have an adverse impact on other data users or health studies.

The DAQ is not proposing discontinuing any monitoring site as a result of this assessment. However, NCore and rule promulgations that require establishing new sites would make it necessary that the DAQ work closely with EPA to prioritize the sustained operation of equal or higher value sites in order to shift resources and capacity to establish and operate a new site.

The DAQ uploads its data to the AQS. The only health study that we have been actively involved in monitoring on behalf of the EPA has been the School Air Toxics (SAT) program which has concluded. Of the three SAT sites in WV, two were new

sites. Unless EPA recommends continuance of those sites in their final report, they will be closed once a year of met data is collected.

There is another ongoing study that DAQ has had some involvement in and that is the ATSDR Manganese study taking place in Marietta, Ohio across from Vienna, WV. ATSDR and Ohio EPA (OEPA) collected TSP metals samples for a one year period at sites in Ohio and WV. The DAQ provided access to our Vienna sites and we leased a small publically owned site in Boaz, WV for the set up of a TSP Hi-Vol. All the TSP monitors were operated by OEPA. While the project concluded some time ago and is in the health assessment phase, the DAQ (at the request of ATSDR) is maintaining access to those two sites should additional monitoring be required to be conducted by other agencies in the future.

6. For PM_{2.5} the assessment must identify needed changes to population oriented sites

As discussed earlier, overall population in WV has remained relatively constant between 2000 and 2008 with a modest growth rate of 3% or 6,123 people. Since the DAQ is already monitoring PM_{2.5} in all but one MSA and in the largest cities, those areas that have experienced growth like Berkeley County (34% or 26,139 people) in the Hagerstown-Martinsburg, MD-WV are adequately monitored. Areas that may have experienced population decline such as the Charleston WV MSA (-1.8% or 5,691 people) still remain large areas that continue to have PM_{2.5} monitors. The current PM_{2.5} population oriented network does not need to be changed since DAQ currently monitors in the most populated MSAs and largest cities.