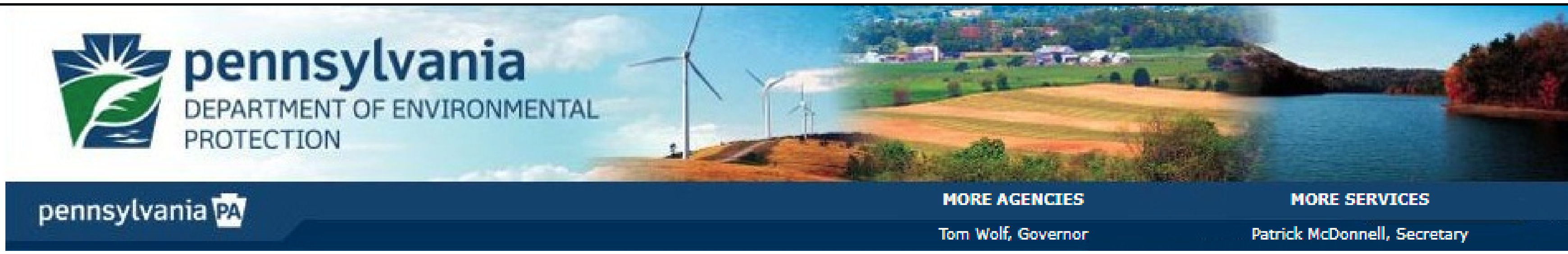
Appendix D

Environmental and Regulatory Compliance

AIR QUALITY & NOISE

PADEP Air Quality Report: (https://www.dep.pa.gov/Business/Air/BAQ/MonitoringTopics/AirQualityIndex/Pages/default.aspx)



Current Date : 5/31/2019
Current Time : 10:05 AM

Air Quality Index Report

Report period is from 30-May-2019 10:00 to 31-May-2019 11:00

	CO (8)		NO2 (1)		Ozone_01h		Ozone_08h		PM10 (24)		PM2.5 (24)		SO2_01hr (		SO2_24hr (	
	ppm		PPB		PPB		PPB		ug/m3 SC		ug/m3 LC		PPB		PPB	
Site	Avg	Inde	Avg	Inde	Avg	Inde	Avg	Inde	Avg	Inde	Avg	Inde	Avg	Inde	Avg	Inde
PECKVILLE					37	N/A	25	23								
SCRANTON	0	0	5	5	12	N/A	<				<					
SWIFTWATER					38	N/A	33	31								
WILKES-BARRE					37	N/A	27	25	<				0	0	0	N/A

Highest AQI:

Critical Area : SWIFTWATER
Critical Pollutant : Ozone_08hr (8)
Critical Subindex : 31
Descriptor : Good

< - Less than 75% of averages available

N/A - AQI is not applicable for this value

Note: Caution: Data is not validated

Current Date : 9/20/2019
Current Time : 11:05 AM

Air Quality Index Report

Report period is from 19-Sep-2019 11:00 to 20-Sep-2019 12:00

	CO (8)		NO2 (1)		Ozone_01h		Ozone_08h		PM10 (24)		PM2.5 (24)		SO2_01hr (		SO2_24hr (	
	ppm		PPB		PPB		PPB		ug/m3 SC		ug/m3 LC		PPB		PPB	
Site	Avg	Inde	Avg	Inde	Avg	Inde	Avg	Inde	Avg	Inde	Avg	Inde	Avg	Inde	Avg	Inde
PECKVILLE					45	N/A	22	20								
SCRANTON	0.4	5	33	31	50	N/A	15	14			<					
SWIFTWATER					47	N/A	28	26								
WILKES-BARRE					50	N/A	23	21	<				0	0	0	N/A

Highest AQI:

Critical Area : SCRANTON
Critical Pollutant : NO2 (1)
Critical Subindex : 31
Descriptor : Good

< - Less than 75% of averages available

N/A - AQI is not applicable for this value

Note: Caution: Data is not validated

Ambient Air Data: http://www.ahs.dep.pa.gov/aq_apps/aadata/

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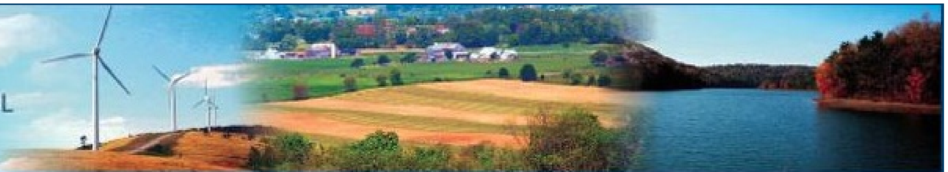

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Ambient Air Monitoring Data Reports

COPAMS Data Retrieval - Daily Site Detail

Data for site: Wilkes-Barre (WILKES-BARRE)

Date / Time	SO2 PPB	OZONE PPB	SWS MPH	VWS MPH	VWD DEG	AT DEGF	SR W/M2	PM10 UG/M3
5/31/2019	0	29	0.5	0.2	228	63	0	12
5/31/2019 1:00:00 AM			0.4	0.3	188	62	0	12
5/31/2019 2:00:00 AM	0	15	0.4	0.2	191	61	0	9
5/31/2019 3:00:00 AM	0	14	0.4	0.2	248	61	0	16
5/31/2019 4:00:00 AM	0	17	0.5	0.1	267	61	3	14
5/31/2019 5:00:00 AM	0	11	0.8	0.5	321	61	24	17
5/31/2019 6:00:00 AM	0	17	1.3	0.7	229	62	51	20
5/31/2019 7:00:00 AM	0	19	1.6	1.4	232	64	133	22
5/31/2019 8:00:00 AM	0	28	2.6	2	228	69	397	8
5/31/2019 9:00:00 AM	0	37	2.8	1.9	236	71	465	13

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Parameter Descriptions

Abbreviation	Description	Units
AT	Outdoor Temperature	Degrees Farenheit
OZONE	Ozone	Parts Per Billion
PM10	Pm10 Total 0-10um Stp	micrograms per cubic meter
VWD	Resultant Direction	Degrees
VWS	Resultant Speed	miles per hour
SR	Solar Radiation	watts per square meter
SO2	Sulfur Dioxide	Parts Per Billion
SWS	Wind Speed	miles per hour

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Back to Ambient Air Data Reports Page

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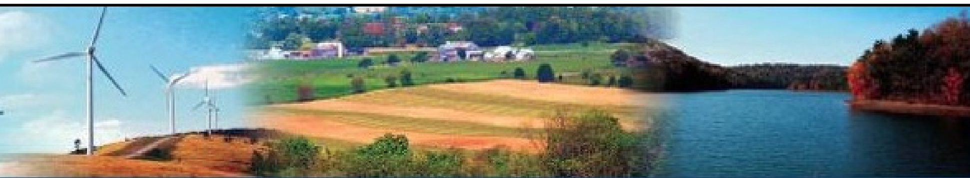

Ambient Air Monitoring Data Reports

COPAMS Data Retrieval - Daily Site Detail

Data for site: Wilkes-Barre (WILKES-BARRE)

Date / Time	SO2 PPB	OZONE PPB	SWS MPH	VWS MPH	VWD DEG	AT DEGF	SR W/M2	PM10 UG/M3
9/20/2019	0	5	0.1	0.1	35	45	0	15
9/20/2019 1:00:00 AM			0.1	0.1	140	44	0	16
9/20/2019 2:00:00 AM	0	2	0.2	0.2	44	43	0	15
9/20/2019 3:00:00 AM	0	2	0.2	0	49	42	0	16
9/20/2019 4:00:00 AM	0	2	0	0	77	41	0	18
9/20/2019 5:00:00 AM	0	2	0	0	0	40	1	17
9/20/2019 6:00:00 AM	0	3	0	0	138	43	55	28
9/20/2019 7:00:00 AM	0	6	0.7	0.5	209	52	203	39
9/20/2019 8:00:00 AM	0	10	1.5	1.1	233	56	313	28
9/20/2019 9:00:00 AM	0	20	1.7	1.4	226	63	447	24
9/20/2019 10:00:00 AM	0	39	3.3	2.6	220	69	544	20

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Parameter Descriptions

Abbreviation	Description	Units
AT	Outdoor Temperature	Degrees Farenheit
OZONE	Ozone	Parts Per Billion
PM10	Pm10 Total 0-10um Stp	micrograms per cubic meter
VWD	Resultant Direction	Degrees
VWS	Resultant Speed	miles per hour
SR	Solar Radiation	watts per square meter
SO2	Sulfur Dioxide	Parts Per Billion
SWS	Wind Speed	miles per hour

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Back to Ambient Air Data Reports Page

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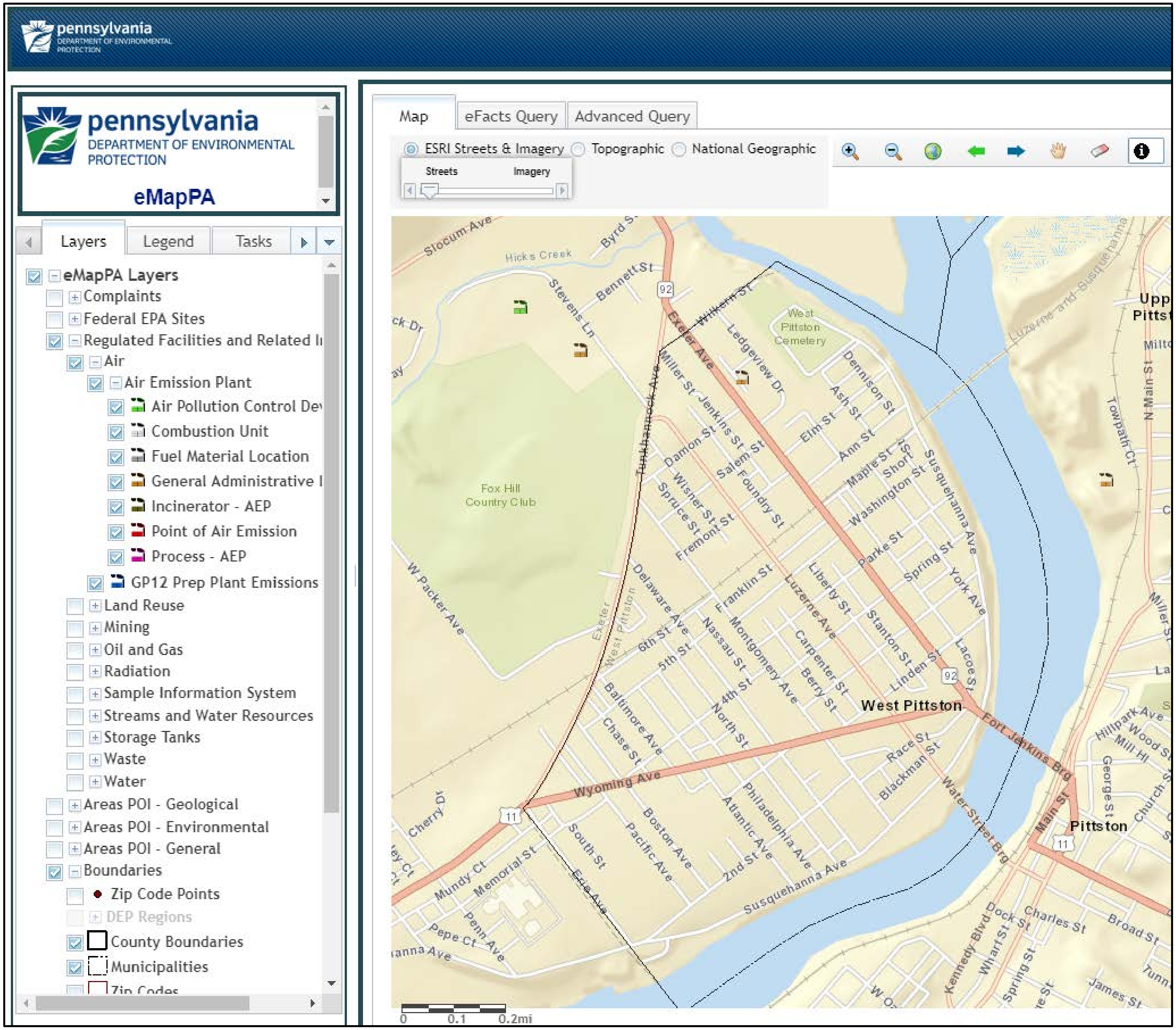
EMap



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Air Pollution Control De
Combustion Unit
Fuel Material Location
General Administrative I
Incinerator - AEP
Point of Air Emission
Process - AEP
GP12 Prep Plant Emissions
Land Reuse
Mining
Oil and Gas
Radiation
Sample Information System
Streams and Water Resources
Storage Tanks
Waste
Water
Areas POI - Geological
Areas POI - Environmental
Areas POI - General
Boundaries
Zip Code Points
DEP Regions
County Boundaries
Municipalities
Map
eFacts Query
Advanced Query
ESRI Streets & Imagery
Topographic
National Geographic
Streets
Imagery
West Pittston
Pittston
Fox Hill Country Club
West Pittston Cemetery
Wyoming Ave
Exeter Ave
Susquehanna Ave
Fort Jenkins Brg
Water Street Brg
0
0.1
0.2mi

Noise

PA Code Chapter 157. Established Sound Levels: (https://www.pacode.com/secure/data/067/chapter157/chap157toc.html)

§ 157.11. Vehicular noise limits.

(a) *Prohibition.* No person shall operate either a motor vehicle or combination of vehicles of a type subject to registration at any time or under any condition of grade, load, acceleration or deceleration in such a manner as to exceed the following noise limit for the category of motor vehicle within the speed limits specified in Table 1.

TABLE 1
Maximum Permissible Sound Level Readings (decibel (A))
Highway operations test

	soft site		*hard site*	
	35 mph or less	*Above 35 mph*	*35 mph or less*	*Above 35 mph*
(1) Any motor vehicle with a manufacturers gross vehicle weight rating of 6,000 pounds or more and any combination of vehicles towed by such motor vehicle.	86	90	88	92
(2) Any motorcycle other than a motor-driven cycle.	82	86	84	88
3) Any other motor vehicle and any combination of vehicles towed by such motor vehicles.	76	82	78	84

(b) *Measurement distance.* The noise limits established by this section shall be based on a distance of 50 feet from the center lane of travel within the speed limit specified in this section. Measurements at distances closer than 50 feet from the center of the lane of travel may be made. In such a case, the measuring device shall be so calibrated as to provide for measurements equivalent to the noise limit established by this section measured at 50 feet.

(c) *Trucks.* A truck, truck tractor, or bus that is not equipped with an identification plate or marking bearing the name and gross vehicle weight rating of the manufacturer shall be considered as having a gross vehicle weight rating of 6,000 pounds or more if the unladen weight is more than 5,000 pounds.

(d) *Exemptions.* This section does not apply to any of the following:

(1) The sound generated by a warning device, such as a horn or siren, installed in a motor vehicle, unless such device is intentionally sounded in order to preclude an otherwise valid noise emission measurement.

(2) An emergency vehicle, such as a fire department vehicle, police vehicle, ambulance, blood-delivery vehicle, armed forces emergency vehicle, one private vehicle of fire or police chief or assistant chief or ambulance corps commander or assistant commander or of a river rescue commander, or other vehicles designated by the State Police as emergency vehicles, when responding to an emergency call.

(3) A snow plow in operation.

(4) The sound generated by special mobile equipment which is normally operated only when the motor vehicle on which it is installed is stopped or is operating at a speed of 5 miles per hour or less, unless such device is intentionally operated at speeds greater than 5 miles per hour in order to preclude an otherwise valid noise measurement.

Cross References

This section cited in 67 Pa. Code § 157.1 (relating to purpose).

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

2009 AMBIENT AIR QUALITY MONITORING and EMISSION TRENDS REPORT

DIVISION OF AIR QUALITY MONITORING
400 MARKET STREET
HARRISBURG, PA 17101

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

List of Acronyms Used in this Report

AEM	Automated Equivalent Method
AES	Annual Emissions Statement
AQI	Air Quality Index
AQS	Air Quality System
ATSDR	Agency for Toxic Substances and Disease Registry
BAM	Beta-Attenuation Mass (type of continuous $PM_{2.5}$ sampler)
Be	Beryllium
CBD	Central Business District
CFR	Code of Federal Regulations
CO	Carbon Monoxide
COPAMS	Commonwealth of Pennsylvania Air Monitoring System
DCNR	Department of Conservation and Natural Resources
DEP	Department of Environmental Protection
EAC	Early Action Compact
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FR	Federal Register
FRM	Federal Reference Method
HAPs	Hazardous Air Pollutants
H_2S	Hydrogen Sulfide
HF	Hydrogen Fluoride
IRIS	Integrated Risk Information System
Max	Maximum
MM/DD-HH	Month/Day - Hour
NAAQS	National Ambient Air Quality Standard
NARSTO	North American Research Strategy for Tropospheric Ozone
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
NPAP	National Performance Audit Program
O_3	Ozone
PAMS	Photochemical Assessment Monitoring Station
PAQSS	Pennsylvania Air Quality Surveillance System
Pb	Lead
$PM_{2.5}$	Particulate Matter with aerodynamic diameter less than or equal to 2.5 micrometers
PM_{10}	Particulate Matter with aerodynamic diameter less than or equal to 10 micrometers
ppb	parts per billion
ppbC	parts per billion Carbon
ppbv	parts per billion volume
ppm	parts per million
PSI	Pollutant Standards Index
PSU	Pennsylvania State University
SO_2	Sulfur Dioxide
TSP	Total Suspended Particulate
TEOM	Tapered Element Oscillating Microbalance (type of $PM_{2.5}$ and PM_{10} samplers)
$\mu g/m^3$	micrograms per cubic meter (unit of flow)
VOCs	Volatile Organic Compounds

EXECUTIVE SUMMARY

The Department of Environmental Protection (DEP) protects the right to clean air for all Pennsylvanians as provided in Article I Section 27 of the Constitution of the Commonwealth of Pennsylvania. DEP's Bureau of Air Quality fulfills this obligation by regulating emissions from thousands of air contamination sources located at facilities such as factories, refineries, landfills, and power plants. Monitoring air quality statewide, assisting companies with compliance, requiring the installation of monitoring equipment, investigating complaints, and taking enforcement action against violators are all part of DEP's powers and duties.

As DEP continues to implement the federal Clean Air Act as Amended in 1990, the study of past and present air quality data remains a crucial component of program planning and air pollution reduction strategies. This data provides a foundation, allowing the Department to develop comprehensive strategies to prevent or control the emission of certain air contaminants.

The 2009 Ambient Air Quality Monitoring and Emission Trends Report contains summaries of air quality data collected by DEP's Bureau of Air Quality Ambient Air Monitoring Program during the 2009 calendar year. Monitoring results are presented from 155 air quality monitors at 54 sites throughout the Commonwealth of Pennsylvania. Point source emission inventories are summarized from data submitted to DEP from 2000 through 2009. Multi-year trends for both types of air quality data are presented for selected pollutants.

Data collected during 2009 demonstrate that of the six criteria pollutants regulated by the Environmental Protection Agency (EPA), sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and carbon monoxide (CO) continue to remain in concentrations well below the National Ambient Air Quality Standards (NAAQS). Statewide average concentrations for these pollutants have been consistently below one-half the level of their respective NAAQS for the past ten years.

Effective January 12, 2009, the lead (Pb) NAAQS was lowered from 1.5 micrograms per cubic meter to 0.15 micrograms per cubic meter, based on a maximum 3-month concentration average, measured over a period of three years. In addition to lowering the NAAQS, with the promulgation of this rule EPA also required monitoring near sources that emit 1 ton or more per year of lead. Preliminary data show that Beaver and Berks counties may not meet the new lead NAAQS.

Ozone (O_3) and particulate matter (PM) continue to be a challenge in Pennsylvania. Cooler than average temperatures, and greater than average cloud cover, helped to minimize the formation of ozone during the 2009 ozone season. All ozone monitoring sites operated by DEP recorded ozone concentration levels below the level of the ozone NAAQS during 2009. However, ten DEP ozone monitoring sites had calculated 3-year ozone concentration averages exceeding the level of the standard.

Particulate matter concentrations are measured using two criteria – an aggregate average of all particles less than or equal to 10 microns in diameter (PM_{10}), and an average isolating fine particles, or particles with a diameter less than or equal to 2.5 microns ($PM_{2.5}$). Although statewide average PM_{10} concentrations have remained at levels less than half of the PM_{10} annual NAAQS for the past ten years, fine particle concentrations have hovered near the level of the $PM_{2.5}$ annual and 24-hour NAAQS. The highest $PM_{2.5}$ concentrations are predominantly found in southeastern, southcentral and western Pennsylvania, although no DEP $PM_{2.5}$ monitoring sites exceeded the level of the $PM_{2.5}$ NAAQS during 2009. In addition, no DEP $PM_{2.5}$ monitoring sites yielded 3-year concentration averages exceeding the level of the standard.

Air toxics monitoring at the Arendtsville transport study site, which was temporarily suspended in 2008 for equipment upgrades, continued in 2009. Data from the Arendtsville transport study site demonstrate an overall decline in Photochemical Assessment Monitoring Station (PAMS) hydrocarbon compounds over the past ten years.

Emission inventories data also show a decreasing trend for the most common point source pollutants in Pennsylvania. From 2000 through 2009 sulfur dioxide (SO_2) emissions have decreased 17%, nitrogen oxides (NO_x) emissions have decreased 18%, carbon monoxide (CO) emissions have decreased 15% and volatile organic compounds (VOC) emissions have decreased 42%.

CHAPTER 1. INTRODUCTION

Ambient Air Monitoring

The goals of Pennsylvania's ambient air monitoring program are to evaluate compliance with federal and state ambient air quality standards, provide real-time monitoring of air pollution episodes, develop data for trend analysis, support the development and implementation of air quality regulations, and provide information to the public on daily air quality conditions.

DEP monitors air quality in areas having high population density, high levels of expected contaminants, or a combination of both factors. Over half of the monitoring takes place in the 13 air basins of the Commonwealth. Air basins are geographic areas, usually valleys, where air tends to stagnate. Pennsylvania's air basins are defined in the Pennsylvania Code (25 Pa. Code § 121.1).

DEP does not generally monitor air quality in Allegheny and Philadelphia counties (an exception exists in Allegheny County, where DEP has an ambient air monitoring site as part of an exhibit at the Carnegie Science Center in Pittsburgh). Monitoring and air quality standard compliance evaluation in these areas are performed by two independent county health agencies, the Allegheny County Health Department, and the Philadelphia Department of Health Air Management Services, respectively. Data from Philadelphia or Allegheny counties can be obtained by contacting those agencies directly. Mailing addresses and telephone numbers for all three agencies are listed in Appendix A.

Regulated Air Pollutants and Toxics

DEP devotes the bulk of its ambient air monitoring program to monitoring Pennsylvania's air for pollutants for which health-based National Ambient Air Quality Standards (NAAQS) have been established and defined in the Federal Code of Regulations (CFR). These pollutants include ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide, particulate matter ($PM_{2.5}$ and PM_{10}) and lead. Supplemental particulate matter monitoring results presented in this report include those for total suspended particulates (TSP), nitrates, and sulfates. In addition to NAAQS-related monitoring, DEP operates one Photochemical Assessment Monitoring Station (PAMS) air monitoring station in Arendtsville, Pennsylvania. This site utilizes specialized air monitoring instruments to gather air quality information relating to volatile organic compounds (VOCs) - chemical compounds that serve as precursors for ozone formation. DEP also operates a monitor for Mercury, another toxic air pollutant, at a monitoring station in Lancaster, Pennsylvania.

DEP utilizes federally-approved sampling and analytical methods for all NAAQS-regulated pollutants. Appendix E of this document provides a breakdown of monitoring methods used by DEP and their associated EPA-approved designation.

For additional information about Pennsylvania's air quality programs, visit the DEP website at http://www.depweb.state.pa.us/ (Choose "Air" from the left-hand menu.).

Air Quality Index

As a means of reporting air quality to the general public, DEP publishes a daily Air Quality Index (AQI) for all air quality monitoring sites in Pennsylvania. The AQI was developed by the U.S. Environmental Protection Agency (EPA) to standardize air pollution ratings and reports levels of six common air contaminants – ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide, and two categories of particulate matter, $PM_{2.5}$ and PM_{10}. Real time monitoring and current AQI information is available on DEP's website at http://www.dep.state.pa.us/dep/deputate/airwaste/aq/aqm/aqi.htm.

Quality Assurance Program

DEP's Bureau of Air Quality conducts regularly scheduled performance audits and precision checks on air monitoring equipment to assess the data accuracy of each monitoring system. Quality assurance checks for the ambient air monitoring program are scheduled in compliance with requirements outlined in the Federal Code of Regulations (CFR).

Acid Rain and Mercury in Rain

DEP, under cooperative agreement with the Pennsylvania State University, has maintained the Pennsylvania Atmospheric Deposition Monitoring Network (PADMN) since 1981. The purpose of this program is to determine the chemistry of rain falling in Pennsylvania for environmental assessment purposes. Parameters monitored include pH, sulfate, nitrate, ammonium, chloride, calcium, magnesium, potassium, sodium and specific conductance. Starting in 1997, measurements of the amount of mercury in rain were included as part of the National Atmospheric Deposition Program Mercury Deposition Network (NAPD/MDN).

Seventeen acid rain monitoring sites were in operation in Pennsylvania in 2009. Included in this network were eleven acid rain and nine mercury monitoring sites supported by the DEP. The remaining sites were National Atmospheric Deposition Program National Trends Network (NADP/NTN) sites and were supported by various federal agencies.

The Elemental Mercury Vapor Summary is included in Appendix D of this document. Reports on acid rain and mercury in rain can also be found on the web at the following address: http://www.dep.state.pa.us/dep/deputate/airwaste/aq/monitoring.htm.

Emission Inventories

The point source emissions inventory is one means used by the state to assess the level of pollutants released into the air from various sources. Each year, the Bureau of Air Quality (BAQ) processes approximately 1,200 Annual Emission Statement (AES) reports. The AES contains operating schedules, throughputs, and emission estimates to calculate air emissions from industrial sources. This report presents point source emission inventory trends for four types of air pollutants – carbon monoxide, nitrogen oxides, sulfur dioxide and volatile organic compounds.

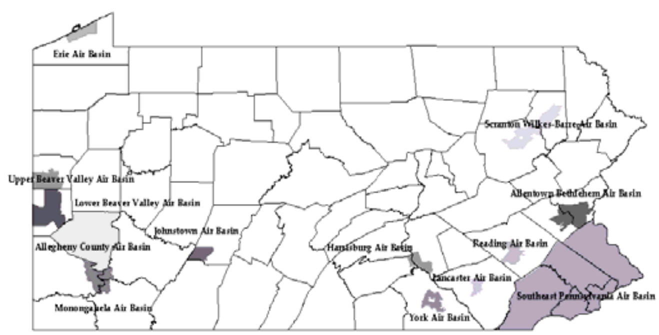
CHAPTER 2. AIR MONITORING PROGRAM

Monitoring Network Overview

The monitoring strategy of DEP places monitors in areas having high population density and/or high levels of contaminants. Over half of DEP air monitoring stations are located in the "air basins" of the Commonwealth. Air basins are defined in 25 Pa. Code § 121.1 and consist of thirteen geographical areas:

- Allegheny County Air Basin
- Allentown-Bethlehem-Easton Air Basin
- Erie Air Basin
- Harrisburg Air Basin
- Johnstown Air Basin
- Lancaster Air Basin
- Lower Beaver Valley Air Basin
- Monongahela Valley Air Basin
- Reading Air Basin
- Scranton, Wilkes-Barre Air Basin
- Southeast Pennsylvania Air Basin
- Upper Beaver Valley Air Basin
- York Air Basin

Figure 2-1. Map of Pennsylvania Air Basins



Air monitoring surveillance is conducted in the 13 air basins. The Allegheny County Health Department conducts the majority of the air quality monitoring in the Allegheny County Air Basin. DEP also performs monitoring in Allegheny County at the Carnegie Science Center in Pittsburgh as part of an air quality exhibit. The Philadelphia Department of Public Health, Air Management Services, which is located in the Southeast Pennsylvania Air Basin, conducts air monitoring only for the Philadelphia County portion of the air basin. In addition to the aforementioned 13 air basins, DEP conducts surveillance in several non-air basin regions. A listing of DEP air quality monitoring site locations is provided in Appendix C of this report.

During 2009, DEP continued a cooperative agreement began in 2000 with Pennsylvania State University's (PSU) Department of Plant Pathology to conduct ozone monitoring in four remote areas of the state - Adams County (near Biglerville), Centre County (near State College), Clearfield County (near Moshannon) and Tioga County (near Gleason). In addition to providing the department with valuable ozone data from the more sparsely populated areas of the state, the university uses ozone data collected from this cooperative monitoring effort to determine the extent of detrimental effects to Pennsylvania's forests and crops, and to assess ozone transport in rural Pennsylvania.

The ambient air monitoring network plan can be found on the Bureau of Air Quality's website at the following address: http://www.dep.state.pa.us/dep/deputate/airwaste/aq/aqm/principal.htm.

COPAMS Network

DEP operates the Commonwealth of Pennsylvania Air Monitoring System (COPAMS) as its air monitoring network. The 2009 COPAMS network consisted of 54 air monitoring sites, encompassing both continuous and discrete methods of pollutant sampling.

The continuous portion of the COPAMS network is a totally automatic, microprocessor-controlled system that consisted of 48 remote stations throughout the Commonwealth in 2009. Continuous methods employ specialized instruments designed to continuously sample and analyze ambient air *in situ*. The output of these devices is hourly pollutant concentrations. These concentrations are the raw data used to calculate the various pollutant averages needed for NAAQS comparisons. A centralized computer system operated by the Bureau of Air Quality collects the raw data on an hourly basis, enabling real-time monitoring. DEP utilizes continuous methods for the following pollutants: ozone, sulfur dioxide, nitrogen dioxide, oxides of nitrogen, carbon monoxide, hydrogen sulfide, $PM_{2.5}$ and PM_{10}.Various meteorological data from many of the COPAMS stations are measured using continuous methods as well, including wind speed, wind direction (vector averaged and sigma theta), ambient temperature, and solar radiation.

The non-continuous portion of the COPAMS network utilizes discrete sampling methods, with analysis of the sample performed off-site. A discrete method is generally a “manual” method of sampling, most commonly using an air filter to trap air pollutants from ambient air for a defined or “discrete” period of time. The filter is then removed from the collection site and analyzed in a DEP-accredited laboratory. The discrete portion of the COPAMS network consisted of 27 monitoring sites in 2009, and includes analysis methods for particulate matter 2.5 microns or less in size ($PM_{2.5}$), particulate matter 10 microns or less in size (PM_{10}), total suspended particulate (TSP), lead, sulfates and nitrates.

Pollutants and Standards

Data collected by DEP can generally be divided into two groups: gaseous pollutants and particulate matter. An overview for both types follows.

Gaseous Pollutants

Ground-Level Ozone

Ground-level ozone, or photochemical smog, is a secondary pollutant. Ozone is generally not emitted directly into the atmosphere as ozone, but rather is formed by chemical reactions between other air pollutants. The primary pollutants involved in these reactions -- volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) -- form ozone in the presence of sunlight and warm temperatures. Thus, sources that emit these ozone precursors are sources of ozone. Nitrogen oxides result from fossil fuel combustion and sources commonly include power plants, industrial boilers, and motor vehicles. VOCs are emitted from a variety of sources, including motor vehicles, chemical plants, refineries and even natural (biogenic) sources. Ozone and the precursor pollutants that cause ozone also can be transported into an area from pollution sources located hundreds of miles away. Because the formation of ozone is boosted by increasing sunlight and temperatures, changing weather patterns contribute to yearly differences in ozone concentrations, with peak concentrations occurring during the summer months.

Ground-level ozone is a strong irritant to the eyes and upper respiratory system and can hamper breathing. It also damages vegetation, including forest and agricultural crops, and man-made materials such as monuments and statues.

Sulfur Dioxide

Sulfur dioxide is a gaseous pollutant that is emitted primarily by industrial furnaces or power plants burning sulfur-containing coal or oil.

The major health effects associated with high exposures to sulfur dioxide include effects on breathing and respiratory illness symptoms. The population most sensitive to sulfur dioxide includes asthmatics and individuals with chronic lung disease or cardiovascular disease. Sulfur dioxide damages vegetation, including forests and agricultural crops, and acts as a precursor to acid rain. Finally, sulfur dioxide can accelerate the corrosion of natural and man-made materials that are used in buildings and monuments, as well as paper, iron-containing metals, zinc, and other protective coatings.

Oxides of Nitrogen

Oxides of nitrogen (NO_x), or nitrogen oxides, are a class of pollutants containing compounds of oxidized nitrogen atoms chemically bonded to oxygen atoms. Nitrogen oxides are formed when fuel is burned at a very high temperature (above 1200° F), such as in automobiles and power plants. For air pollution purposes, the nitrogen oxides of concern are primarily nitric oxide (NO) and nitrogen dioxide (NO_2). Although there is no air quality standard for NO_x in general, the level of this pollutant is of concern due to its role in the formation of ground-level ozone in the atmosphere through a complex series of reactions with volatile organic compounds (VOCs). Nitrogen oxides also contribute to deposition of nitrogen in soil and water through acid rain.

Nitrogen Dioxide

Nitrogen dioxide is a highly toxic, reddish brown gas that is created primarily from fuel combustion in industrial sources and vehicles. It creates an odorous brown haze that causes eye and sinus irritation, blocks natural sunlight and reduces visibility. It can severely irritate the respiratory system and has been associated with acute effects in individuals diagnosed with respiratory disease. Nitrogen dioxide contributes to the creation of acid rain and plays a key role in nitrogen loading, adversely impacting forests and other ecosystems.

Carbon Monoxide

Carbon monoxide is a byproduct of the incomplete burning of fuels. Industrial processes contribute to carbon monoxide pollution levels, but the largest man-made source of carbon monoxide is motor vehicle emissions. This pollutant is a health concern in areas of high traffic density or near industrial sources. Peak carbon monoxide concentrations typically occur during the colder months of the year when automotive emissions are greater and nighttime inversion (a weather-related phenomenon) conditions are more frequent.

Carbon monoxide (CO) is a colorless, odorless, poisonous gas that has an affinity for hemoglobin, 210 times that of oxygen. By combining with the hemoglobin in the blood, it inhibits the delivery of oxygen to the body's tissue, thereby causing or shortness of breath, asphyxia and eventually death. The health threat from carbon monoxide is most serious for those who suffer from cardiovascular disease. At much higher levels of exposure, healthy individuals are also affected.

Particulate Matter

Particulate matter (PM) is solid or liquid matter formed by smoke, dust, fly ash, or condensing vapors that can be suspended in the air for long periods of time. PM may be emitted directly by a source or formed in the atmosphere. Particulate emissions come from coal-burning power plants, industrial processes, mining operations, municipal waste incinerators and fuel combustion. They also are produced by natural sources such as forest fires and volcanoes. Particulates less than or equal to 10 micrometers in diameter (PM_{10}) are called "coarse" particles, while particulates less than or equal to 2.5 micrometers in diameter ($PM_{2.5}$) are called "fine" particles. The smaller of these particles are breathed into the lungs, where they can aggravate tissues, cause respiratory ailments, and carry other pollutants into the lungs. Particulate matter also can cause adverse impacts to the environment.

$PM_{2.5}$

Fine particulate emissions result primarily from industrial processes and fuel combustion - including motor vehicles, residential wood burning and forest or agricultural fires.

Fine particles can accumulate in the respiratory system and are associated with numerous adverse health effects including decreased lung function and increased respiratory symptoms and disease. Sensitive groups that appear to be at greatest risk include the elderly, individuals with cardiopulmonary disease such as asthma, and children. $PM_{2.5}$ is the major cause of reduced visibility in parts of the United States. Other environmental impacts occur when particles deposit onto soil, plants, water, or man-made materials such as monuments or statues.

PM_{10}

PM_{10} (including $PM_{2.5}$) appears to represent essentially all of the particulate emissions from transportation sources and most of the emissions in the other traditional categories (coal-burning power plants, steel mills, mining operations, etc). Although $PM_{2.5}$ is technically included in the definition of PM_{10}, the terms "PM_{10}" or "coarse" particles are commonly used to refer to particles greater than $PM_{2.5}$, but less than 10 micrometers in diameter.

Sources of coarse particles any include dust-producing process, such as crushing or grinding operations, as well as dust stirred up by vehicles traveling on roads. While they are not as much of a health concern as are fine particles, they can aggravate respiratory conditions and irritate the linings of the eyes, nose, throat and lungs. In the environment, PM_{10} contributes to reduced visibility and degradation of man-made materials.

Total Suspended Particulate

Total suspended particulates (TSP) refer to particle sizes 45 micrometers or less in diameter. Although $PM_{2.5}$ and PM_{10} are technically included in the definition of TSP, the term "TSP" is commonly used to refer to particles greater than 10 micrometers in diameter. TSP was used historically as the basis for particulate matter NAAQS, however studies have shown that these larger particles do not penetrate into the lungs and have very little effect on health. Over the past 25 years, EPA has emphasized the importance and effects of smaller particles on human health by revising particulate matter pollution standards to apply to smaller and smaller particles, first PM_{10} in 1987, then $PM_{2.5}$ in 1997. Currently, EPA does not regulate TSP levels in ambient air.

Lead

Lead is emitted to the atmosphere by vehicles burning leaded fuel and from certain industrial processes, primarily battery manufacturers and lead smelters. As a result of the reduction in lead in gasoline, metal processing is now the major source of lead emissions.

Lead is a highly toxic metal when ingested or inhaled. It is a suspected carcinogen of the lungs and kidneys and has adverse effects on the cardiovascular, nervous, and renal systems.

Sulfates

The atmosphere contains two types of sulfates: primary and secondary. Primary sulfates are emitted directly into the atmosphere from industrial processes. Secondary sulfates are formed in the atmosphere from other sulfur-containing compounds under mechanisms that involve photochemical processes. Sulfate concentrations peak during the summer due to secondary sulfate formation in the presence of sunlight.

Studies have shown significant correlation between high sulfate levels and illness. Sulfates also reduce visibility and contribute to acid rain. There are currently no federal or state air quality standards for sulfates.

Nitrates

Nitrates are secondary compounds that form in the atmosphere from the oxidation of nitrogen gases emitted from fuel combustion sources. They represent a significant portion of the finer particulates that can be inhaled into the lungs and which affect visibility. As with sulfates, nitrates are contributors to acid rain and acid deposition. There are currently no federal or state air quality standards for nitrates.

Air Quality Standards

Pennsylvania has adopted and incorporated by reference all of the National Ambient Air Quality Standards (NAAQS), as well as state ambient air quality standards. These standards, designed to protect the public health and environmental welfare, are shown in Tables 2-1 and 2-2 on the following page.

There are two types of NAAQS standards: primary and secondary. Primary standards protect against adverse health effects, while secondary standards protect against environmental welfare effects such as damage to crops, vegetation and buildings, and decreased visibility.

Table 2-1. National Ambient Air Quality Standards (NAAQS).

Pollutant	Primary (Health Related) Type of Average	Primary Standard Level Concentration	Secondary (Environmental Welfare Related) Type of Average	Secondary Standard Level Concentration
Carbon Monoxide	8-hour Running Mean (not to be exceeded more than once per year)	9 ppm	No Secondary Standard	
	1-hour (not to be exceeded more than once per year)	35 ppm	No Secondary Standard	
Lead	Maximum 3-month average (over a 3-year period)	0.15 $\mu g/m^3$	Same as Primary Standard	
Nitrogen Dioxide	Annual Arithmetic Mean	0.053 ppm	Same as Primary Standard	
Ozone	Maximum Daily 1-hour Average[1]	0.12 ppm	Same as Primary Standard	
	Fourth-Highest Daily Maximum 8-hour Running Mean (based on 3- year average)	0.075 ppm	Same as Primary Standard	
Particulate Matter PM_{10}	24-hour (not to be exceeded more than once per year, based on 3- year average)	150 $\mu g/m^3$	Same as Primary Standard	
Particulate Matter $PM_{2.5}$	Annual Arithmetic Mean (based on 3- year average)	15.0 $\mu g/m^3$	Same as Primary Standard	
	24-hour (based on 3 year average of 98th percentile)	35 $\mu g/m^3$	Same as Primary Standard	
Sulfur Dioxide	Annual Arithmetic Mean	0.030 ppm	3-hour Block Average (not to be exceeded more than once per year)	0.5 ppm
	24-hour Block Average (not to be exceeded more than once per year)	0.14 ppm		

[1] The 1-hour ozone NAAQS was generally revoked June 15, 2005, and remains in effect only in limited, Early Action Compact (EAC) areas, designated "non-attainment deferred" by EPA, none of which are located in the Commonwealth of Pennsylvania.

Table 2-2. Pennsylvania Ambient Air Quality Standards.

Pollutant	Type of Average	Standard Level Concentration
Beryllium	30-day	0.01 $\mu g/m^3$
Fluorides (total soluble, as HF)	24-hour	5 $\mu g/m^3$
Hydrogen Sulfide	24-hour	0.005 ppm
	1-hour	0.1 ppm
Settled Particulate (Total)	30-day	1.5 mg/cm^2/month
	1-year	0.8 mg/cm^2/month

CHAPTER 3. AIR QUALITY RESULTS AND TRENDS – CONTINUOUS GASEOUS SAMPLING

Ground-Level Ozone

The ozone monitoring season in Pennsylvania begins each year on April 1 and ends October 31. Although ground-level ozone levels can fluctuate depending on meteorological conditions, they are consistently higher during the summer months, when increased sunlight and warm temperatures amplify ozone formation.

Effective May 2008, EPA strengthened the 8-hour primary ozone standard to further protect children and other “at risk” populations, such as outdoor workers and individuals with asthma, lung disease or otherwise compromised respiratory systems, from the adverse health effects related to ozone exposure. The secondary standard (environmental welfare-based) was set identical to the primary (human health-based) standard. The current primary and secondary national ambient air quality standard (NAAQS) for ozone is 0.075 part per million (ppm) based on a maximum daily 8-hour running average. The 8-hour average used for comparison to the NAAQS is a three year average of the fourth highest daily 8-hour maximums per year. The former 1-hour standard was generally revoked by EPA effective June 15, 2005, remaining applicable only in specific areas designated as Early Action Compact (EAC) areas by EPA. No areas in the DEP ozone network currently fall under this special designation.

The 2009 DEP ozone (O_3) monitoring network consisted of 44 sites. Individual site locations, including county and air basin designations, and parameters monitored are listed in Appendix C of this report. In addition to the established NAAQS-related monitoring sites, DEP continued monitoring begun by the North American Research Strategy for Tropospheric Ozone (NARSTO). The Holbrook site (Greene County) is primarily designed to study ozone transport in the Northeast.

As a way of focusing on the secondary standard, DEP continued in 2009 with a cooperative agreement with Pennsylvania State University’s Department of Plant Pathology to monitor ozone four rural sites near Biglerville, State College, Moshannon and Gleason, PA. The university uses this data as part of its study of the concerns associated with ozone effects on vegetation.

Ozone data for 2009 for all DEP ozone monitoring sites are summarized in Appendix B, Tables B-1 and B-2. Table B-1 contains 8-hour data, while Table B-2 contains 1-hour data. Ten sites in the DEP ozone monitoring network registered at least one 8-hour daily maximum exceeding the level of the 8-hour standard in 2009. The total number of 8-hour exceedance days was 6. No sites in the DEP ozone monitoring network registered 1-hour averages exceeding the level of the former 1-hour standard in 2009.

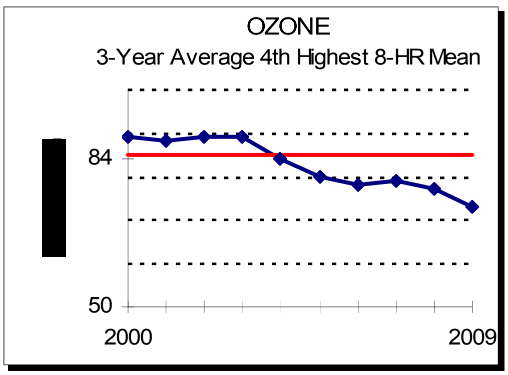
Ozone pollution control measures received a boost from weather conditions this year, which were less favorable for ozone formation during the 2009 ozone season. Cooler than average temperatures, and greater than average cloud cover across Pennsylvania helped to minimize excessive levels of ozone from being generated locally, while those same weather conditions across the Midwestern U.S. helped to prevent high levels of ozone from being transported into the state.

Figure 3-1 (on the 2nd following page) qualifies the fourth highest daily maximum running 8-hour O_3 concentrations and the second highest daily maximum 1-hour O_3 concentration, by county, for all DEP ozone monitoring sites in 2009. In spite of the strengthening of the 8-hour standard in 2008, no county within DEP’s jurisdiction had a 4th highest daily maximum that exceeded the standard in 2009, and there were no counties which contained a site that exceeded the former 1-hour NAAQS.

Appendix B, Tables B-3 and B-4 summarize 8-hour and 1-hour ozone data over the last three years. These tables include monitoring sites operated by DEP, the Allegheny County Health Department and Philadelphia Department of Public Health, Air Management Services. Ten DEP sites recorded 3-year averages of fourth highest 8-hour concentrations greater than the level of the 8-hour standard. No DEP sites recorded a 3-year average of second highest 1-hour concentrations greater than the level of the former 1-hour standard.

Figure 3-2 displays a 10-year trend of the statewide (DEP sites only) 3-year average of fourth daily maximum 8-hour ozone concentrations. Data points on or above the solid line represent an exceedance of the 8-hour NAAQS standard. As the graph indicates, there has been a continuing reduction overall during this period, about an 18% improvement. The overall improvements that have been seen in ozone concentrations can be attributed in part to controls on VOCs and gasoline volatility.

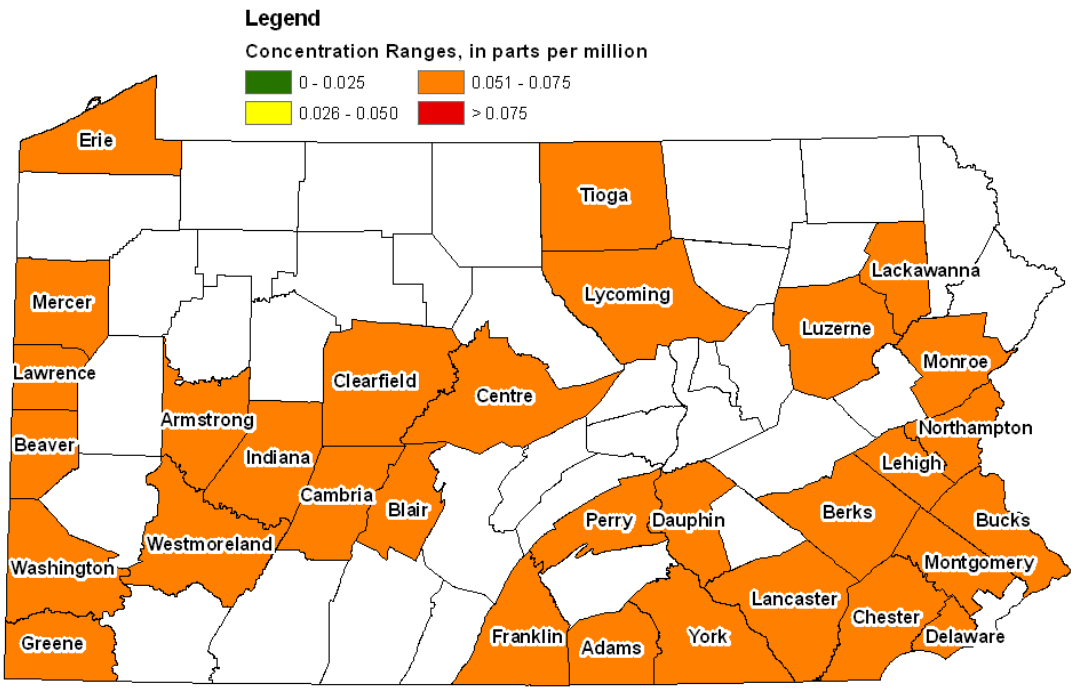
Figure 3-2. Trend in 3-Year Average of Fourth Daily Maximum 8-Hour Ozone Concentrations, DEP Monitors Statewide, 2000-2009.



Historical trends for individual air basin and non-air basin regions are shown in Figures 3-3 and 3-4. Figure 3-3 displays 10-year trends of the 3-year average of the fourth daily maximum 8-hour O_3 concentrations, while Figure 3-4 displays 10-year trends of the average second daily maximum 1-hour mean. Data points on or above the solid line represent an exceedance of the current 8-hour and former 1-hour NAAQS concentration level, respectively. All regions have followed the overall statewide trend of declining concentrations over the 10 year period for both types of averages. Four air basins - Allentown-Bethlehem-Easton, Reading, Southeast PA and York - show a current 3-year average exceeding the current 8-hour NAAQS. Two non-air basin regions – the Southwest and Northwest regions - also show a current 3-year average exceeding the current 8-hour NAAQS. Historical 1-hour and 8-hour data for ozone from 2000 to 2009 are given in Appendix B, Table B-5 for DEP sites that operated during the 10-year period.

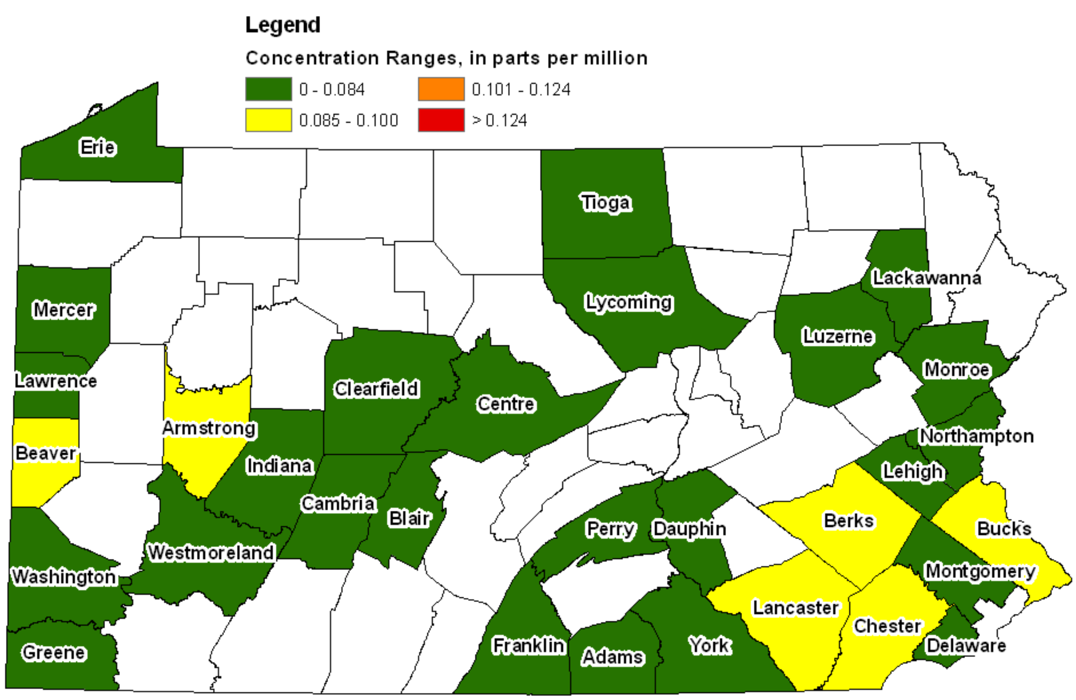
Figure 3-1. 2009 Ozone Concentration Ranges by County, for DEP-monitored Counties.

Fourth-Highest Maximum Daily 8-Hour Ozone Concentrations, by County, for 2009



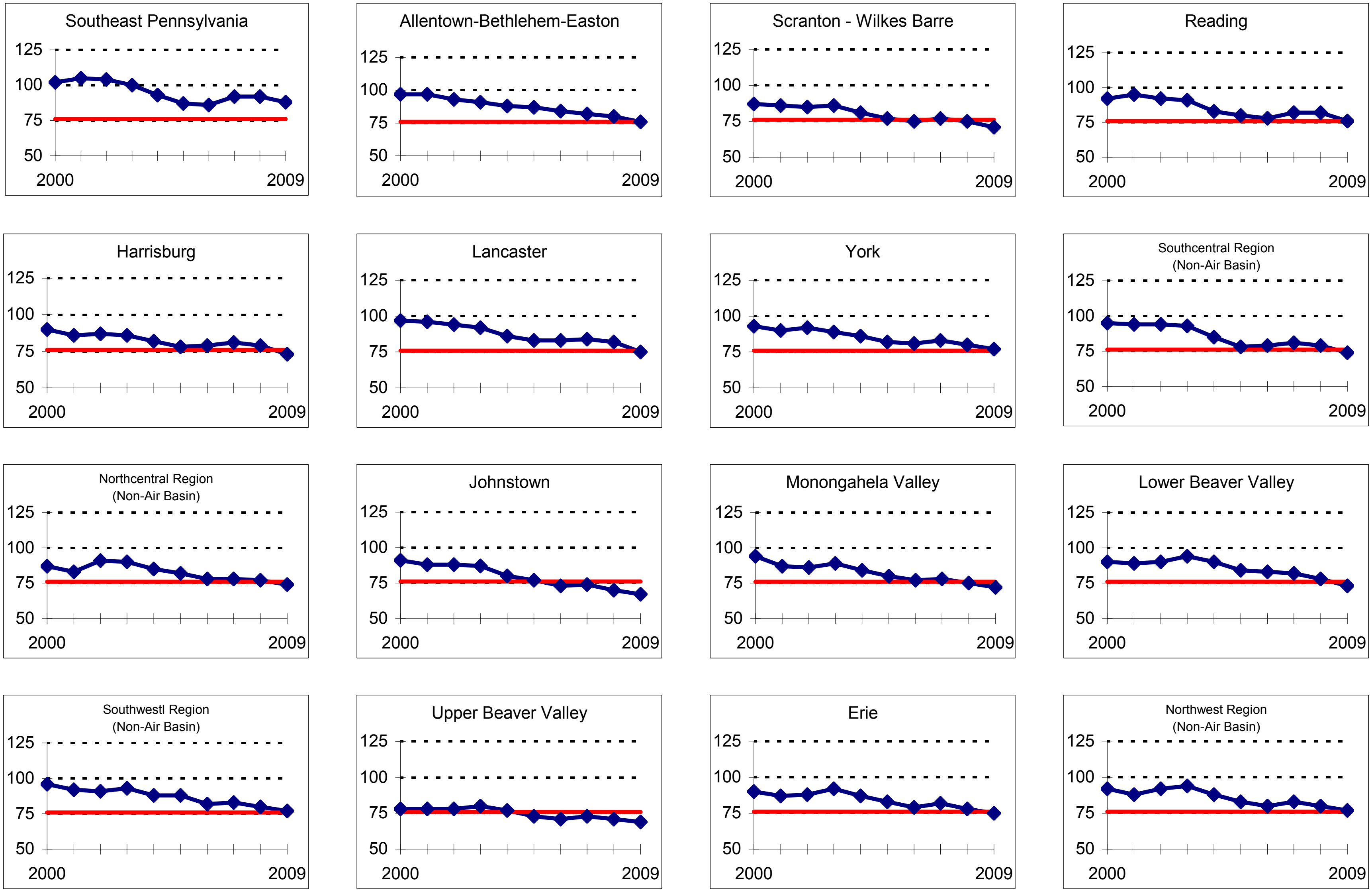
Primary and Secondary National Ambient Air Quality Standard for Ozone
Fourth-Highest Daily Maximum 8-Hour Average = 0.075 parts per million (ppm)
(Data are displayed for a single calendar year, but standard is based on a 3-year average)

Second-Highest Maximum Daily 1-Hour Ozone Concentrations, by County, for 2009



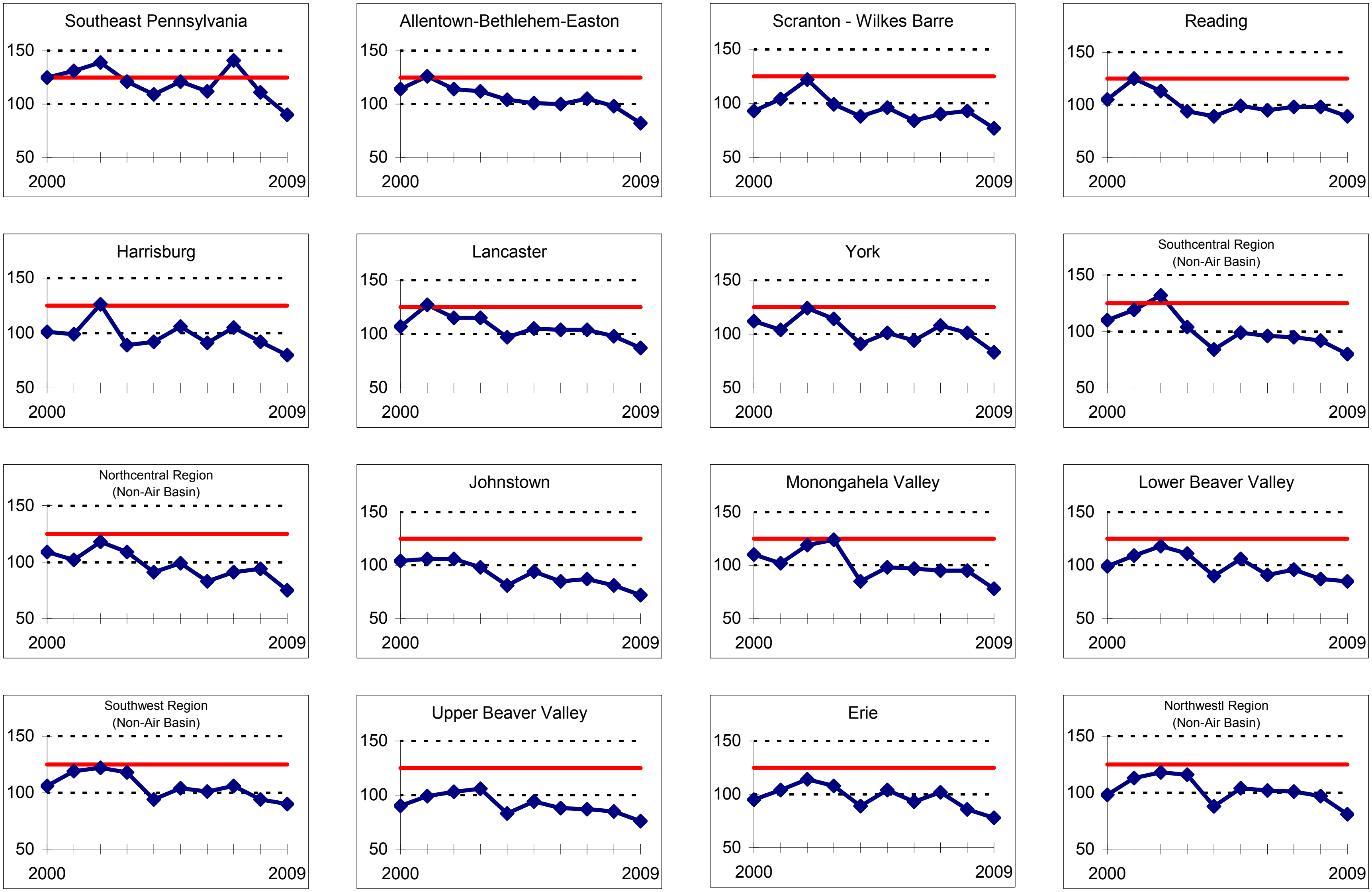
Former Primary and Secondary National Ambient Air Quality Standard for Ozone
Maximum Daily 1-Hour Average = 0.12 parts per million (ppm), not to be exceeded more than once per year

Figure 3-3. Ozone Trends in Pennsylvania, DEP-monitored Regions 2000 to 2009, 3-Year Average of Fourth Daily Maximum 8-Hour Averages, in Parts per Billion.



The 8-hour Ozone National Ambient Air Quality Standard is 0.075 parts per million (or 75 ppb), based on a 3-year average of 4th highest maximum 8-hour running averages.

Figure 3-4. Year Ozone Trends in Pennsylvania, DEP-monitored Regions 2000 to 2009, Second Daily Maximum 1-Hour Average, in Parts per Billion.



The former 1-hour Ozone National Ambient Air Quality Standard is 0.12 parts per million, maximum hourly average.

Sulfur Dioxide

EPA last reviewed the NAAQS for SO_2 in 1996. At that time EPA decided that the levels of the SO_2 standards remained sufficient to protect human health and environmental welfare, and adopted only minor technical changes to the standard. The current national ambient air quality standards (NAAQS) for sulfur dioxide (SO_2) consist of two primary standards (human health-based) and one secondary standard (environmental welfare-based). The primary standards are 0.030 part per million (ppm) for an annual mean, and 0.14 ppm based on a 24-hour block average. The secondary standard is 0.5 ppm based on a 3-hour block average. The 24-hour primary and secondary standards may not be exceeded more than once per year.

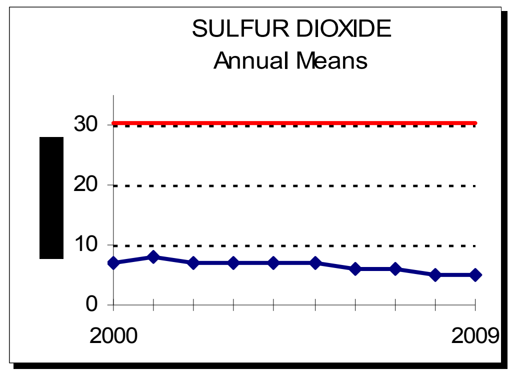
The 2009 DEP sulfur dioxide (SO_2) monitoring network consisted of 21 sites. Individual site locations, including county and air basin designations, and parameters monitored are listed in Appendix C of this report. All sites met the NAAQS for sulfur dioxide in 2009.

Sulfur dioxide data for 2009 for all SO_2 monitoring sites are summarized in Appendix B, Table B-6. No site in exceeded the level of the NAAQS in 2009, rather all sites yielded concentration averages less than one third the level of all three NAAQS for SO_2.

Figures 3-5 (on following page) qualifies the annual mean and second highest daily maximum 24-hour sulfur dioxide concentration, by county, in 2009. No monitored county contained sites exceeding the levels of the current SO_2 air quality standards.

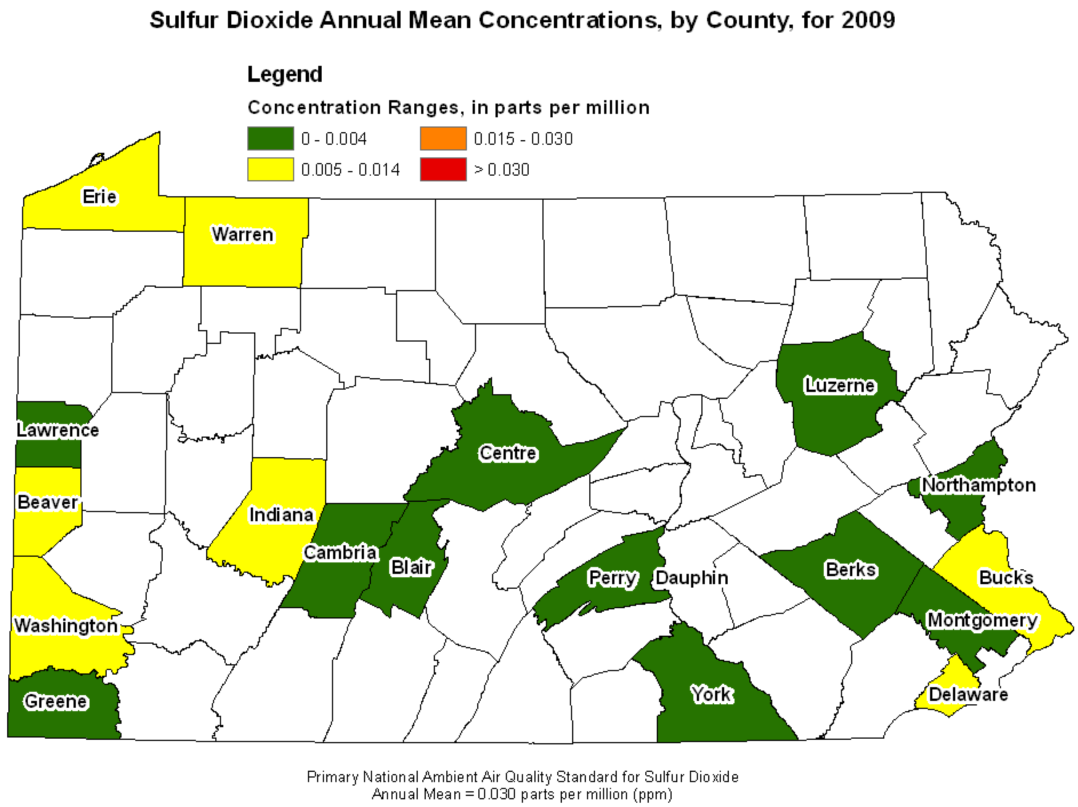
Figure 3-6 displays the statewide composite average of sulfur dioxide annual mean concentration from 2000 to 2009. Data points on or above the solid line represent an exceedance of the annual NAAQS for sulfur dioxide. In general, sulfur dioxide levels have remained relatively steady over the past 10 years, registering a slight improvement during that time

Figure 3-6. Trend in Annual Mean SO_2 Concentrations, DEP Monitors Statewide, 2000-2009.



Annual mean historical trends for individual air basin and non-air basin regions are shown in Figure 3-7. Data points on or above the solid line represent an exceedance of the annual NAAQS for sulfur dioxide. The trend graphs demonstrate that all regions have consistently remained well under the annual mean NAAQS for SO_2. Sulfur dioxide historical data from 2000 to 2009 are given in Appendix B, Table B-7 for DEP sites that operated during the 10-year period.

Figure 3-5. 2009 Sulfur Dioxide Concentration Ranges by County, for DEP-monitored Counties.



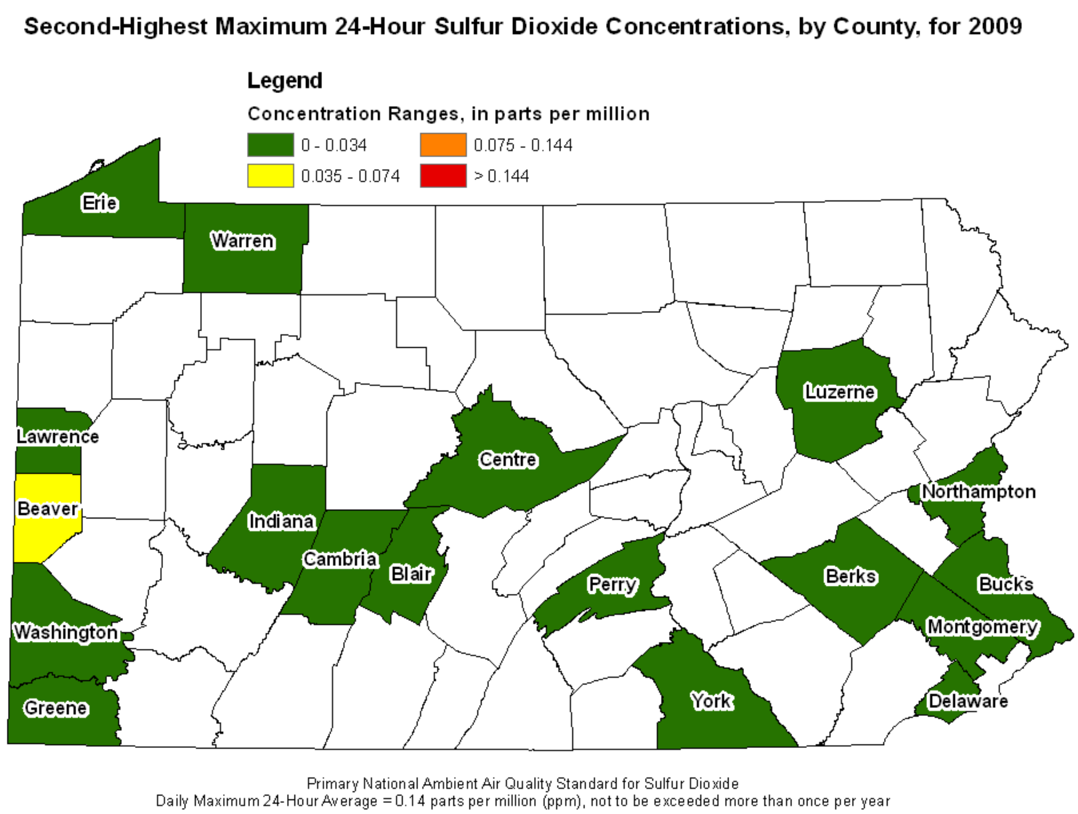
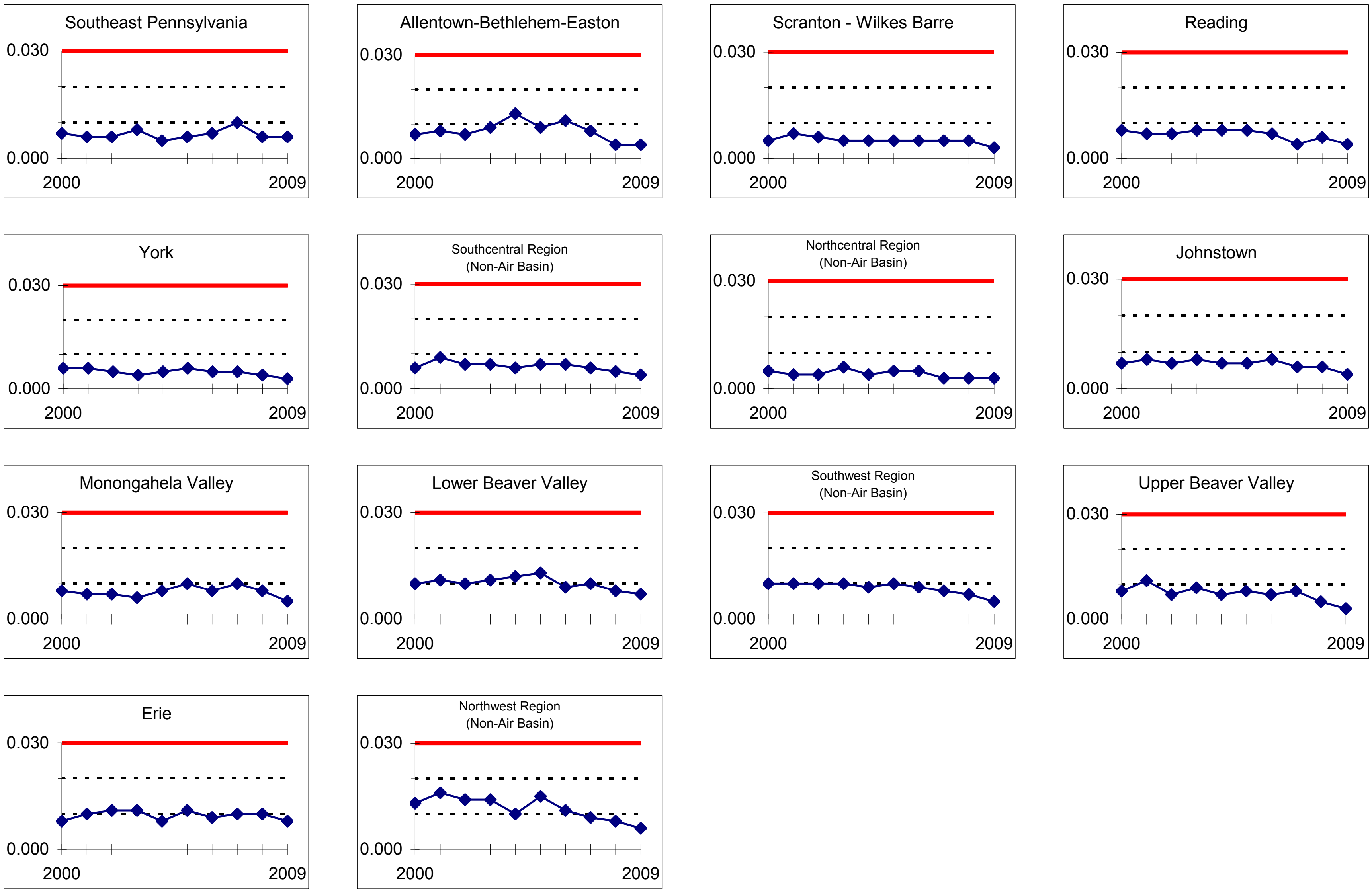


Figure 3-7. Sulfur Dioxide Trends in Pennsylvania, DEP-monitored Regions 2000 to 2009, Annual Arithmetic Means, in Parts per Million.



The SO2 Annual National Ambient Air Quality Standard is 0.030 parts per million.

Nitrogen Dioxide / Oxides of Nitrogen

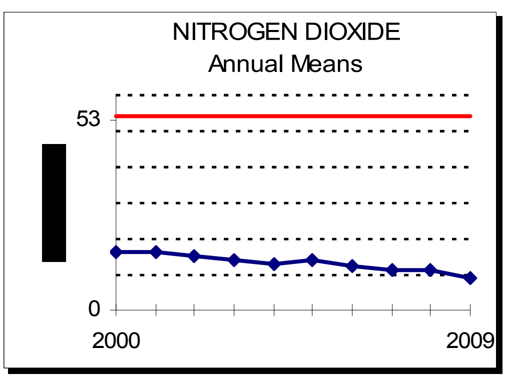
Nitrogen dioxide, a specific nitrogen oxide, is regulated by the EPA. The national ambient air quality standard for nitrogen dioxide (NO2) is set at 0.053 parts per million (ppm) as both a primary (human health-based) and secondary (environmental impact-based) standard. EPA last reviewed this standard in 1985.

The 2009 DEP nitrogen dioxide (NO_2) monitoring network consisted of 16 sites. Individual site locations, including county and air basin designations, and parameters monitored are listed in Appendix C of this report. All sites met the NAAQS for nitrogen dioxide in 2009.

Nitrogen dioxide and nitrogen oxide data for 2009 for all NO_2/NO_x monitoring sites are summarized in Appendix B, Tables B-8 and B-9, respectively. No site in exceeded the level of the NAAQS in 2009, rather all sites yielded concentration averages less than one fourth the level of the NAAQS for NO_2.

Figure 3-8 displays the statewide composite average of nitrogen dioxide annual mean concentration for 2000 to 2009. Data points on or above the solid line represent an exceedance of the annual NAAQS for nitrogen dioxide. The graph demonstrates that concentrations levels have decreased by about 36% and have remained consistently well below the annual NAAQS for nitrogen dioxide during the 10-year period.

Figure 3-8. Annual Mean NO_2 Concentrations, DEP Monitors Statewide, 2000-2009.



Annual mean historical trends for individual air basin and non-air basin regions for nitrogen dioxide are shown in Figure 3-9 (on the following page). Data points on or above the solid line represent an exceedance of the annual NAAQS for nitrogen dioxide. All regions have followed the statewide trend, remaining consistently below the NO_2 NAAQS. Historical data for nitrogen dioxide from 2000 to 2009 are given in Appendix B, Table B-10 for DEP sites that operated during the 10-year period.

Figure 3-10 represents the annual mean statewide trend of oxides of nitrogen (NO_x) over the last 10 years. Measured NO_x concentrations represent the combined total of NO_2 and nitric oxide (NO) concentrations. There is no federal or state air quality standard for NO_x. Since 1998, average NO_x concentrations have declined by about 48 percent.

Figure 3-10. Trend in Annual Mean NO_x Concentrations, DEP Monitors Statewide, 2000-2009.

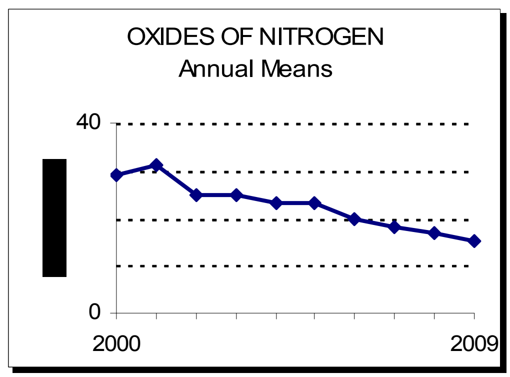
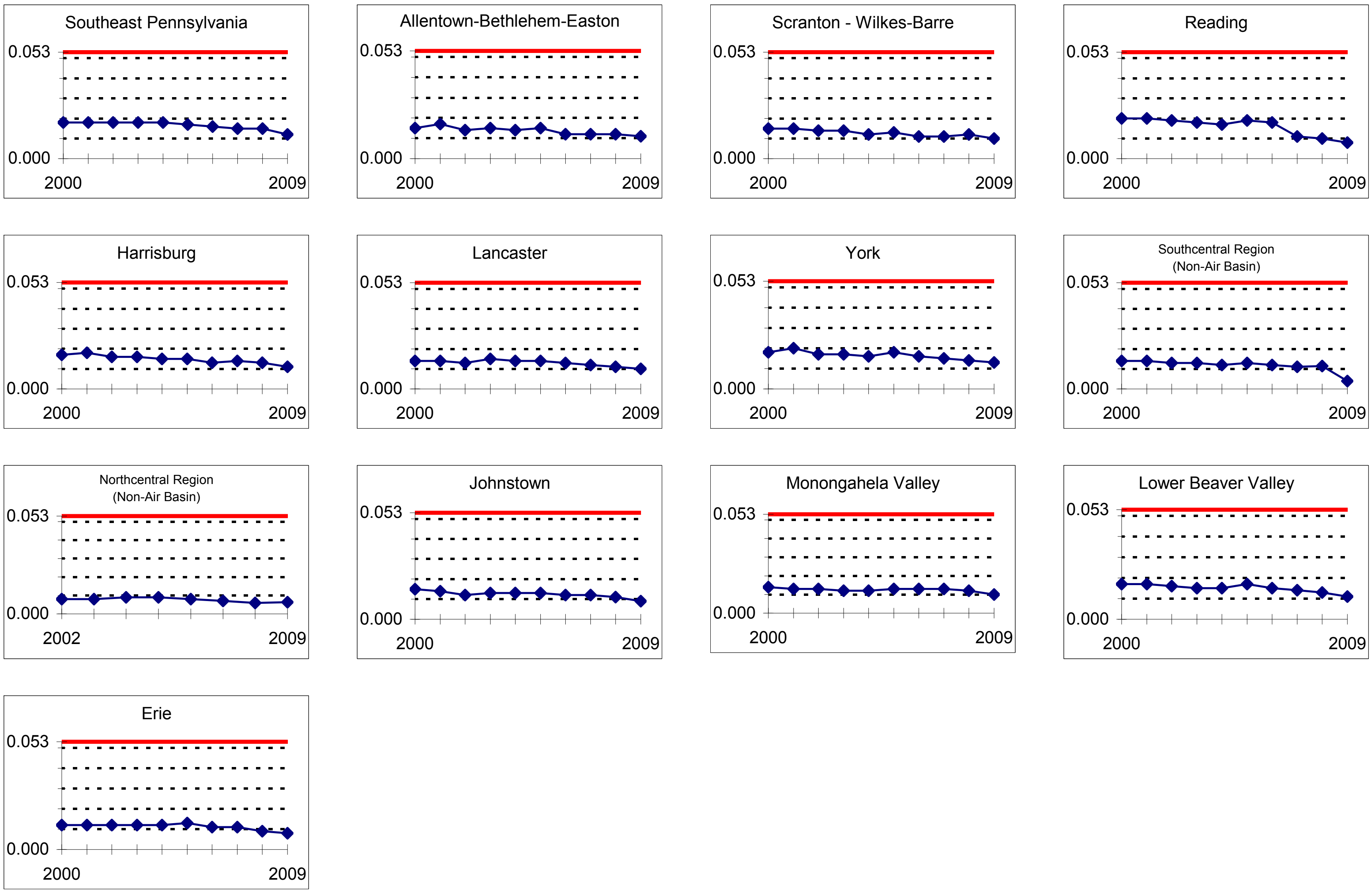


Figure 3-9. Nitrogen Dioxide Trends in Pennsylvania, DEP-monitored Regions 2000 to 2009, Annual Arithmetic Means, in Parts per Million.



The Nitrogen Dioxide Annual National Ambient Air Quality Standard is 0.053 ppm.

Carbon Monoxide

The national ambient air quality standard (NAAQS) for carbon monoxide (CO) consisted of two primary (human health-based) standards. In September 1985, EPA revoked the previous secondary (environmental welfare-based) standards, citing studies that showed no environmental welfare effects could be expected at levels found in ambient air at the time of review. EPA did not revise the primary standard at that time, and they are currently applicable at 9 parts per million (ppm) based on an 8-hour maximum, and 35 ppm based on a 1-hour maximum. To meet the standard, neither criterion may be exceeded more than once per year.

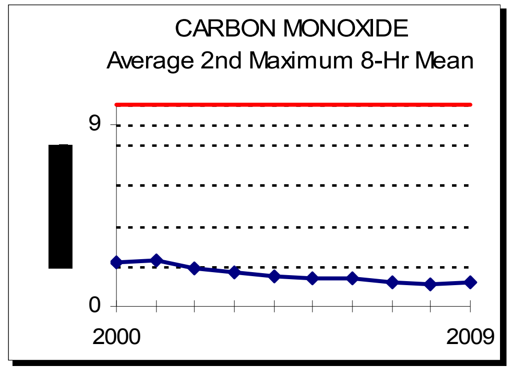
The 2009 DEP carbon monoxide (CO) monitoring network consisted of 12 sites. Individual site locations, including county and air basin designations, and parameters monitored are listed in Appendix C of this report. All sites met the NAAQS for carbon monoxide in 2009.

Carbon monoxide data for 2009 for CO monitoring sites are summarized in Appendix B, Table B-11. No site in exceeded the level of the NAAQS in 2009, rather all sites yielded concentration averages less than one third the level of the NAAQS for CO, for both 8-hour and 1-hour averages.

Figure 3-11 displays a 10-year trend of the statewide second daily maximum 8-hour CO concentration. Data points on or above the solid line represent an exceedance of the NAAQS.

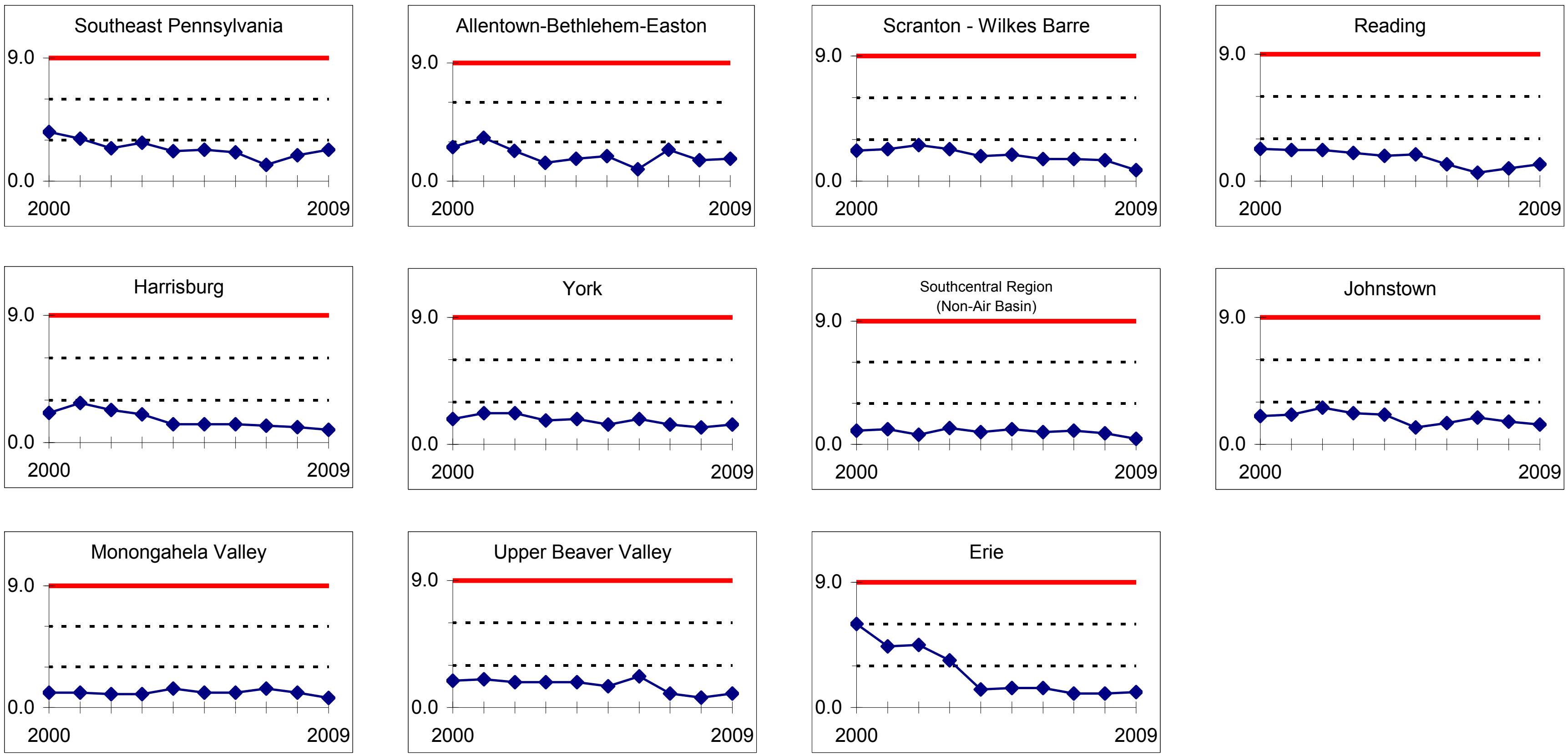
Carbon monoxide levels have seen a long-term improvement of 45% percent from levels in 2000, and have remained well below one third the CO NAAQS during the past 10 years.

Figure 3-11. Trend in Second Maximum 8-hour Average CO Concentrations, DEP Monitors Statewide, 2000-2009.



Annual mean historical trends for individual air basin and non-air basin regions for carbon monoxide are shown in Figure 3-12. Data points on or above the solid line represent an exceedance of the annual NAAQS for carbon monoxide. All regions have followed the statewide trend, remaining consistently below the CO NAAQS. Historical data for carbon monoxide from 2000 to 2009 are given in Appendix B, Table B-12 for DEP sites that operated during the 10-year period.

Figure 3-12. Ten–Year Carbon Monoxide Trend in Pennsylvania, DEP-monitored Regions 2000 to 2009, Second Maximum 8-Hour Running Mean, in Parts per Million.



CHAPTER 4. AIR QUALITY RESULTS AND TRENDS – PARTICULATE SAMPLING

$PM_{2.5}$ Particulate Matter

Citing current scientific evidence pointing strongly to significant adverse effects on human health, EPA tightened the primary (human health-based) $PM_{2.5}$ standard on December 18, 2006. The national ambient air quality standard (NAAQS) for the 24 hour level was lowered from 65 to 35 micrograms per cubic meter. The 24-hour standard is based on the 98th percentile value (the concentration below which 98 percent of 24-hour averages fall) of all 24-hour values over a calendar year. The annual mean standard of 15 micrograms per cubic meter was not adjusted. Secondary (environmental welfare-based) standard levels are identical to the primary standards.

In March 2008, EPA designated a new continuous Federal Equivalent Method (FEM) for $PM_{2.5}$ monitoring, utilizing a MetOne Beta Attenuation Mass (BAM) monitor. During 2009, DEP replaced several existing manual Federal Reference Method (FRM) monitors in the $PM_{2.5}$ monitoring network with continuous FEM monitors. These replacements are noted in Appendix B, Table B-13 of this document.

The 2009 $PM_{2.5}$ monitoring network consisted of 29 monitoring sites. Twenty-four monitoring sites utilized FRM discrete and/or FEM continuous monitoring, while the remaining five sites utilized non-FEM-compliant continuous monitoring. In addition, $PM_{2.5}$ samples were collected for constituent analysis from 13 speciation sites (detailed in next section). Individual site locations, including county and air basin designations, and parameters monitored are listed in Appendix C of this report.

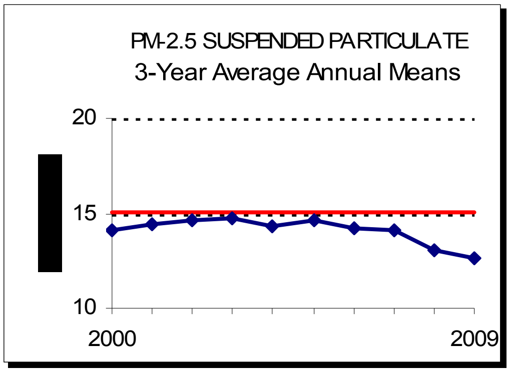
$PM_{2.5}$ data for 2009 for all $PM_{2.5}$ FRM, FEM and non-FEM continuous monitoring sites are summarized in Appendix B, Tables B-13 and B-14. No FRM/FEM sites exceeded the level of the annual mean NAAQS for $PM_{2.5}$, while the majority sites registered at least one 24-hour maximum at or exceeding the level of the 24-hour NAAQS in 2009.

Figure 4-1(on the 2nd following page) qualifies the $PM_{2.5}$ annual mean and 24-hour maximum 98th percentile, by county in 2009. Because only concentration measurements derived from FRM and FEM monitoring methods are eligible for NAAQS comparison, only FRM and FEM sites were considered in the creation of these representations. Although many counties in southeastern and western Pennsylvania contained sites yielding concentration maximums close to national standard levels, no sites yielded an annual mean or 98th percentile 24-hour concentration average exceeding the level of the $PM_{2.5}$ NAAQS in 2009.

Appendix B, Table B-15 summarizes 24-hour and annual mean $PM_{2.5}$ data over the last three years. This table includes monitoring sites operated by DEP, the Allegheny County Health Department and Philadelphia Department of Public Health, Air Management Services. No DEP sites recorded a 3-year average of 24-hour 98th percentile concentrations greater than the level of the 24-hour standard. No DEP sites recorded a 3-year average of annual mean concentrations greater than the level of the annual standard.

Figure 4-2 (on the following page) displays the statewide composite average of $PM_{2.5}$ 3-year average annual mean concentration from 2000 to 2009. Data points on or above the solid line represent an exceedance of the annual NAAQS for $PM_{2.5}$. The graph demonstrates an10-year overall improvement in average concentrations levels of about 11%.

Figure 4-2. Trend in 3-Year Average Annual Mean $PM_{2.5}$ Concentrations, DEP Monitors Statewide, 2000-2009.



Historical trends for individual air basin and non-air basin regions for $PM_{2.5}$ are shown in Figures 4-3 and 4-4. Figure 4-3 displays 10-year trends of the 3-year average annual mean $PM_{2.5}$ concentrations, while Figure 4-4 displays 10-year trends of the 24-hour maximum 98th percentile. Data points on or above the solid line represent an exceedance of the annual mean and 24-hour

.

NAAQS concentration level, respectively. These graphs show that the three-year annual mean averages have hovered around the level of the annual mean NAAQS during this time, with all regions showing a decreasing trend over the past nine years for both the annual and 24-hour averages. The 24-hour data illustrates an overall decrease of about 16 percent from the 1999-2001 average concentration levels. Historical trend data from 2000 to 2009 for $PM_{2.5}$ FRM, FEM and non-FEM continuous methods are given in Appendix B, Tables B-16 and B-17 for DEP sites that operated during the 10-year period

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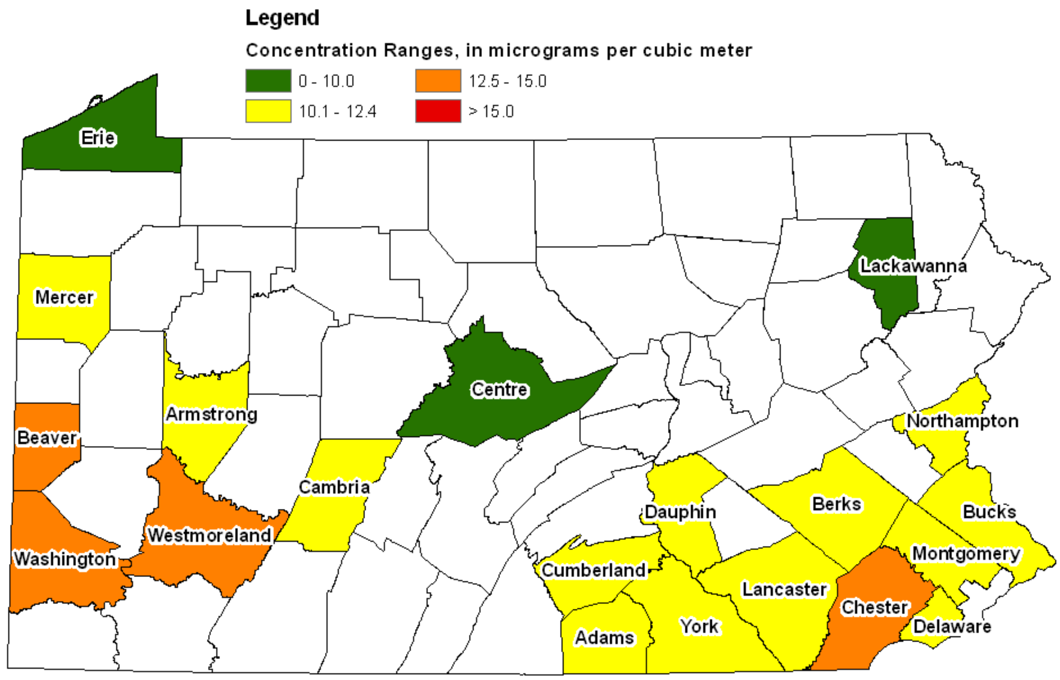
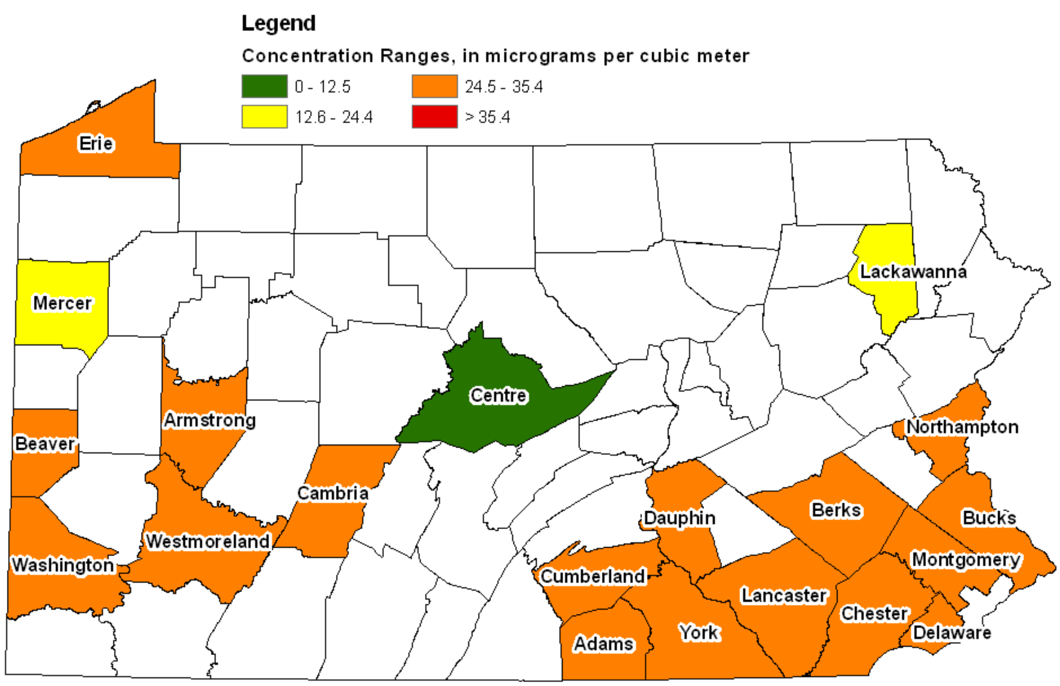
Figure 4-1. 2009 $PM_{2.5}$ Concentration Ranges by County, for DEP-monitored Counties.

$PM_{2.5}$ Annual Mean Concentrations, by County, for 2009



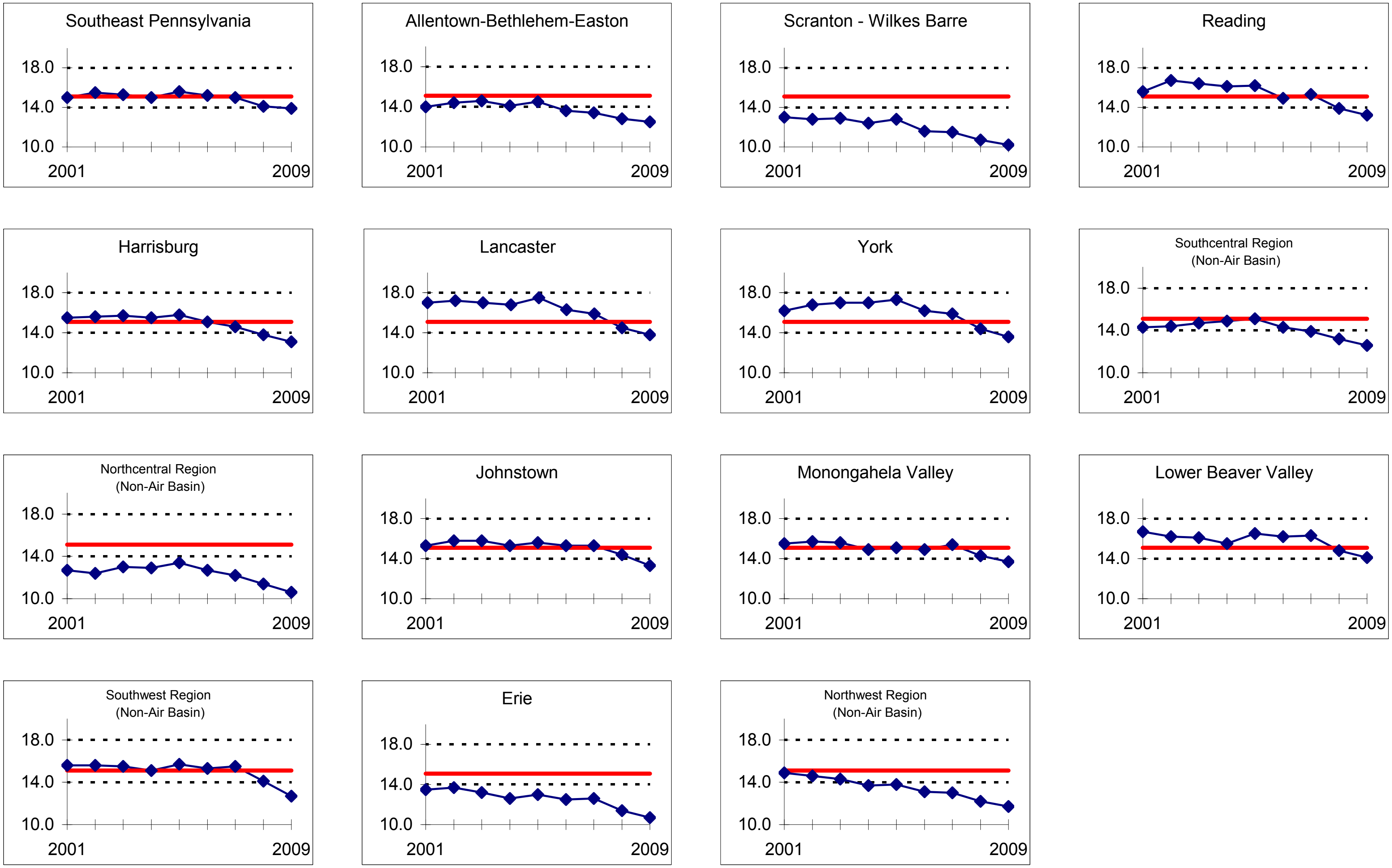
Primary and Secondary National Ambient Air Quality Standard for $PM_{2.5}$
Annual Mean = 0.15 micrograms per cubic meter (µg/m^3)
(Data are displayed for a single calendar year, but standard is based on a 3-year average)

98th Percentiles of 24-Hour $PM_{2.5}$ Concentrations, by County, for 2009



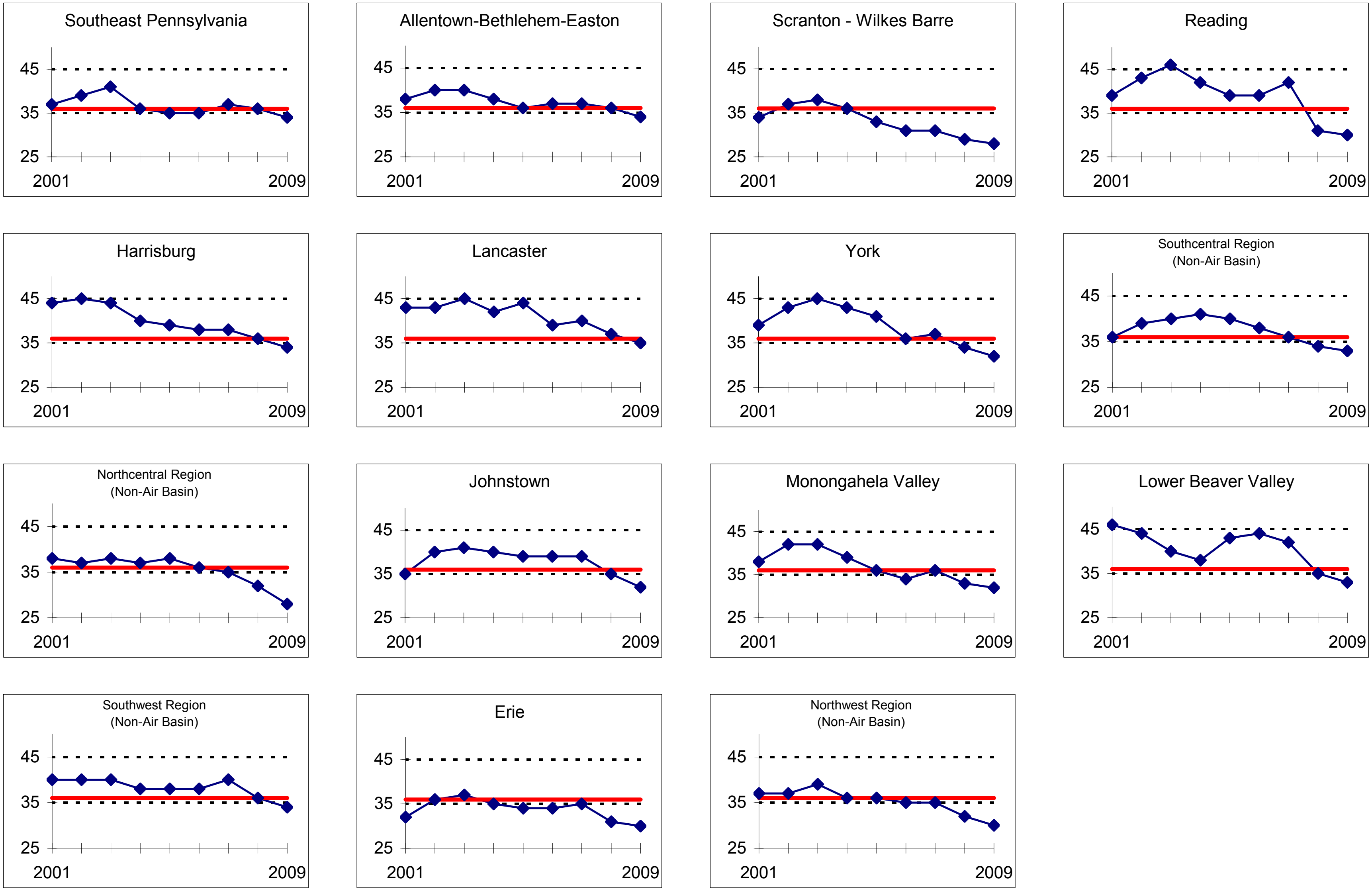
Primary and Secondary National Ambient Air Quality Standard for $PM_{2.5}$
98th Percentile of 24-Hour Average = 0.35 micrograms per cubic meter (µg/m^3)
(Data are displayed for a single calendar year, but standard is based on a 3-year average)

Figure 4-3. $PM_{-2.5}$ Trends in Pennsylvania, DEP-monitored Regions2001 to 2009, 3-Year Average of Annual Means, in Micrograms per Cubic Meter.



The Annual $PM_{2.5}$ National Ambient Air Quality Standard is 15.0 micrograms/cubic meter, based on a 3-year average.

Figure 4-4. $PM_{2.5}$ Trends in Pennsylvania, DEP-monitored Regions 2001 to 2009, 3-Year Average of 98th Percentile Concentration Micrograms per Cubic Meter.



The 24-hour $PM_{2.5}$ National Ambient Air Quality Standard is 35 micrograms/cubic meter, based on a 3-year average of 98th percentile 24-hour averages.

Chemical Speciation of $PM_{2.5}$ Particulate Matter

As part of an effort started in 2002, DEP continued in 2009 with constituent analysis (speciation) of $PM_{2.5}$ particulate matter. $PM_{2.5}$ Speciation is a physical or chemical analysis of the captured particles that provide a first order characterization of the metals, ions, and carbon constituents of $PM_{2.5}$.

Physical and chemical speciation data can be used to support several areas of study such as:

- Inputs to air quality modeling analyses used to implement the $PM_{2.5}$ standard;
- Indicators to track the progress of air pollution controls;
- Aids to interpret studies linking health effects to $PM_{2.5}$ constituents;
- Aids to understand the effects of atmospheric constituents on visibility impairment; and
- Aids in designing and siting monitoring networks.

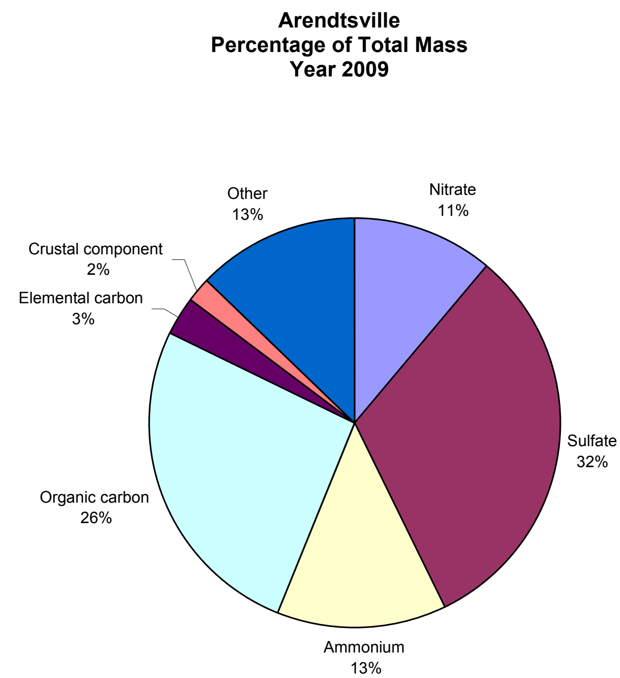
$PM_{2.5}$ is composed of a mixture of primary and secondary particles, both having long lifetimes in the atmosphere (days to weeks), traveling long distances (hundreds to thousands of kilometers) and hence, not easily traced back to their individual sources. Primary particles include soil-related particles such as road dust, construction and agriculture and combustion-related particles. Combustion-related particles come from a variety of sources such as diesel and gasoline vehicles, open burning operations, and utility and commercial boilers. The principle types of secondary aerosols are organics, sulfates and nitrates. Sulfur dioxide, nitrogen oxides and ammonia (ammonium sulfate, ammonium bisulfate, ammonium nitrate) are important precursors to secondary particles.

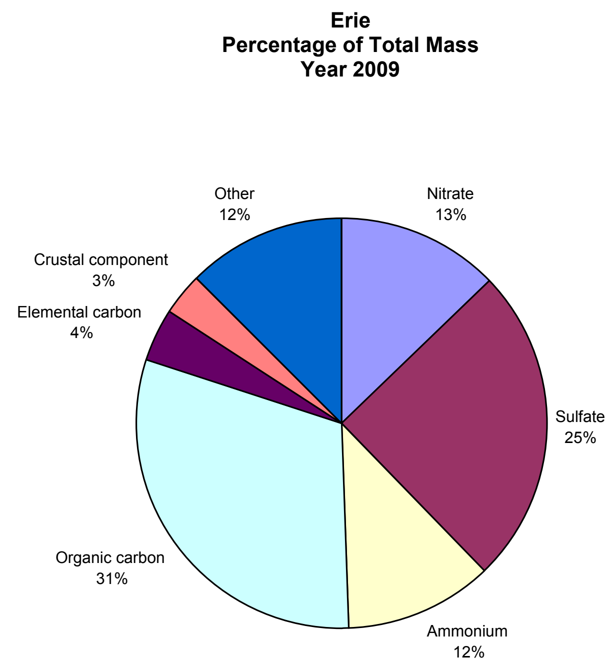
Knowing the chemical composition of the $PM_{2.5}$ mix is also important for determining sources of pollution. By developing seasonal and annual chemical characterizations of ambient particulates across the nation, this speciation data can be used to perform source attribution analyses, evaluate emission inventories and air quality models, and support health related research studies and regional haze assessments.

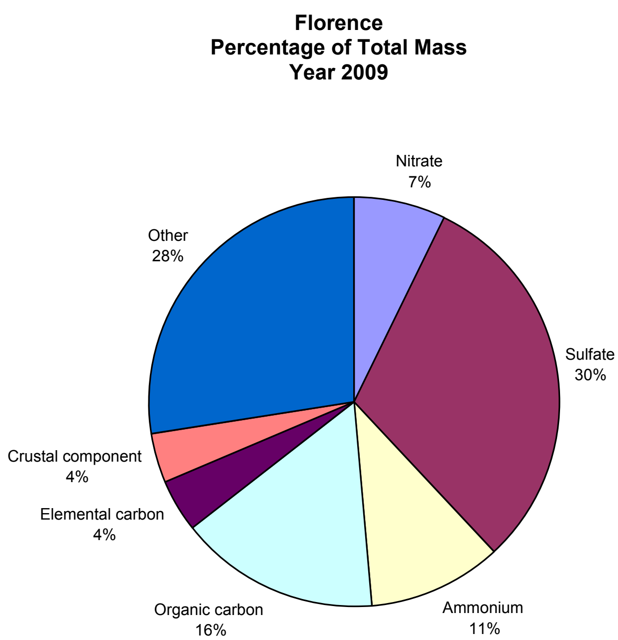
The 2009 $PM_{2.5}$ speciation network consisted of 13 sampling sites. Individual site locations, including county and air basin designations, and parameters monitored are listed in Appendix C of this report.

Figure 4-5 provides a percentage-based breakdown, by site, for the major $PM_{2.5}$ constituents -nitrates, sulfates, ammonium, organic carbon, elemental carbon and other trace elements – on average from data collected during 2009.

Figure 4-5. $PM_{2.5}$ Speciation Major Component Distribution, by Mass.







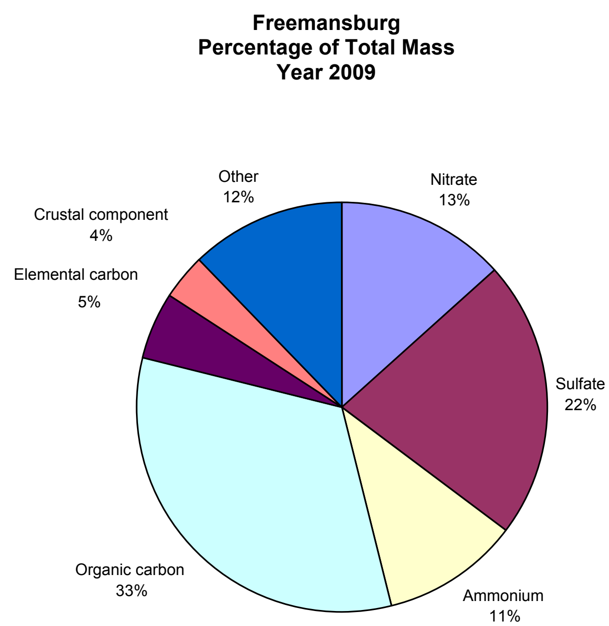
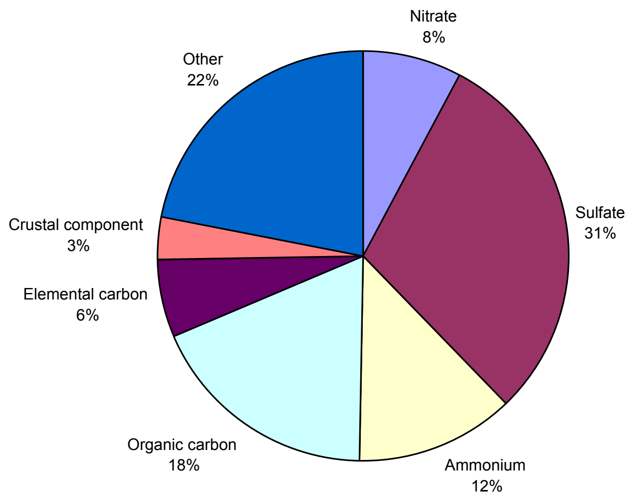
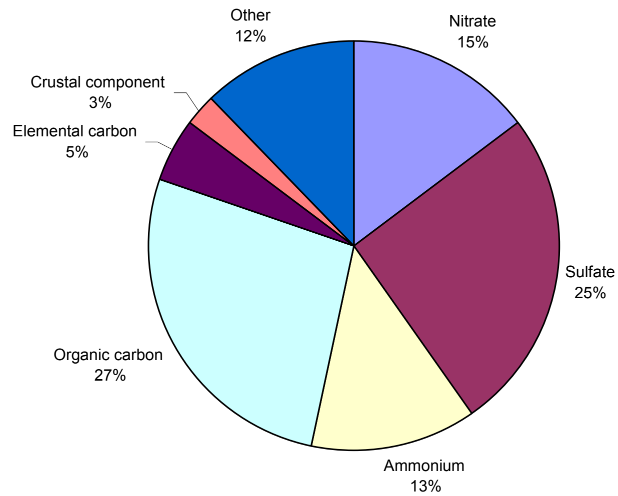


Figure 4-5. $PM_{2.5}$ Speciation Major Component Distribution, by Mass (cont.).

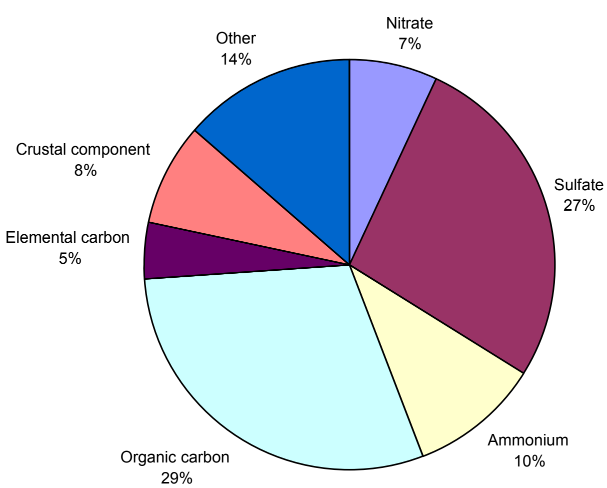
Greensburg
Percentage of Total Mass
Year 2009



Harrisburg
Percentage of Total Mass
Year 2009



Johnstown
Percentage of Total Mass
Year 2009



Lancaster
Percentage of Total Mass
Year 2009

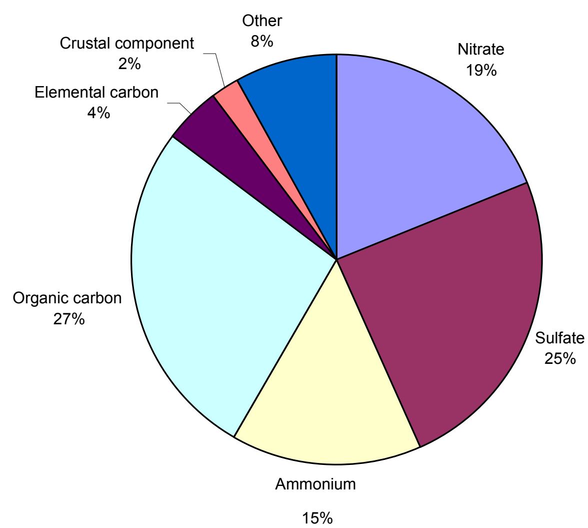
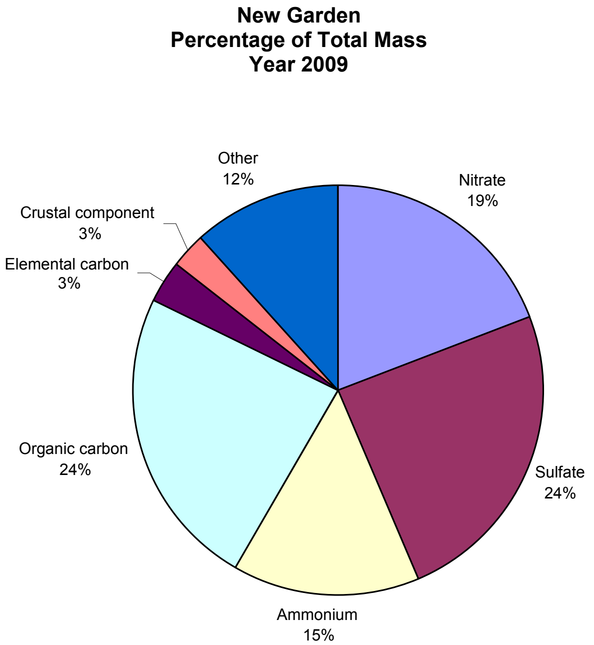
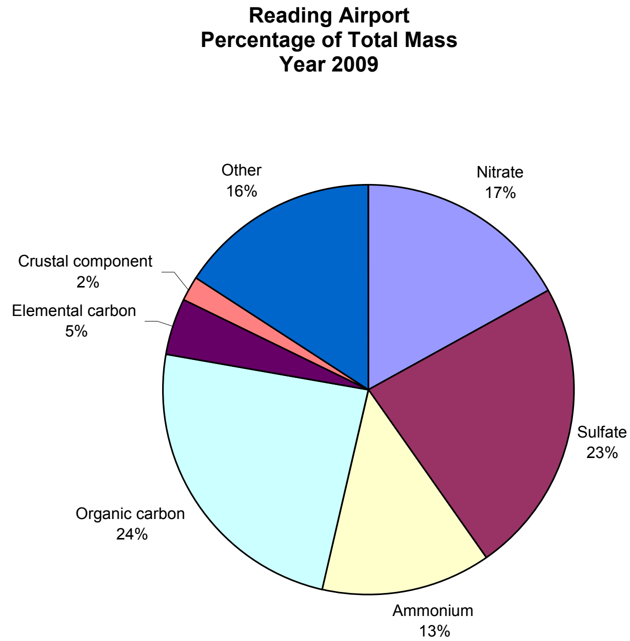
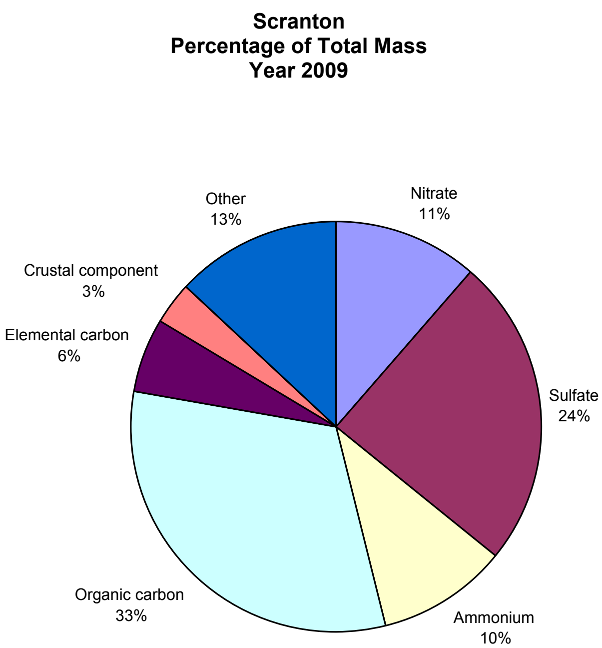


Figure 4-5. $PM_{2.5}$ Speciation Major Component Distribution, by Mass (cont.).







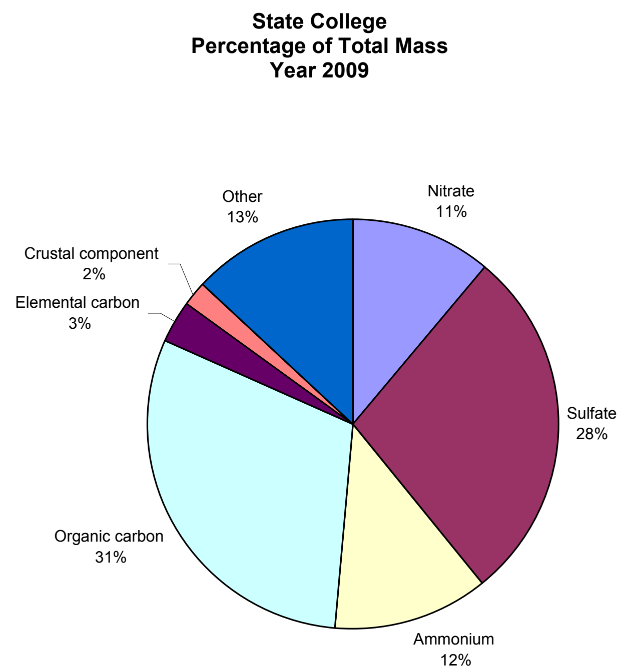
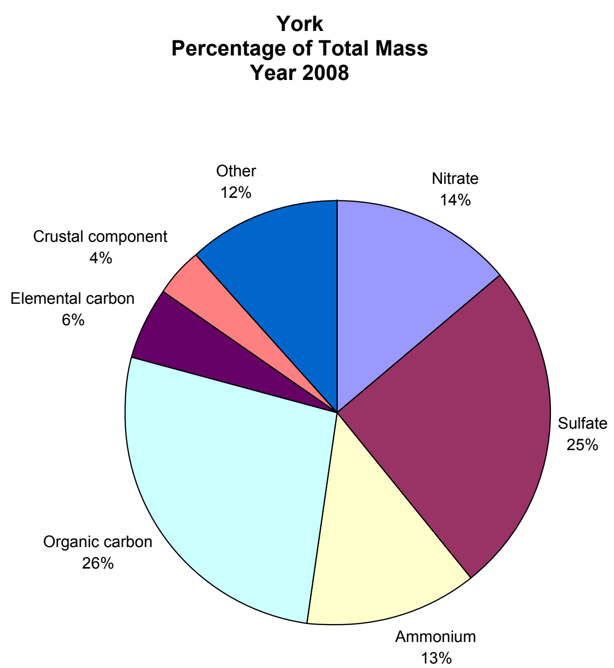


Figure 4-5. $PM_{2.5}$ Speciation Major Component Distribution, by Mass (cont.).



PM_{10} Particulate Matter

On October 17, 2006, EPA revised the national ambient air quality standard (NAAQS) for particulate matter less than or equal to 10 micrometers in diameter (PM_{10}). Citing the lack of evidence linking health problems and long-term exposure to inhalable coarse particle pollution, EPA revoked the annual PM_{10} primary (human health-based) and secondary (environmental welfare-based) standard, while implementing a tightened fine particulate ($PM_{2.5}$) standard. The 24-hour PM_{10} air quality standard was not changed and remains at 150 micrograms per cubic meter, not to be exceeded more than once per year, as both a primary and secondary standard.

The 2009 DEP PM_{10} monitoring network consisted of 15 sites. Individual site locations, including county and air basin designations, and parameters monitored are listed in Appendix C of this report. All sites met the NAAQS for PM_{10} in 2009.

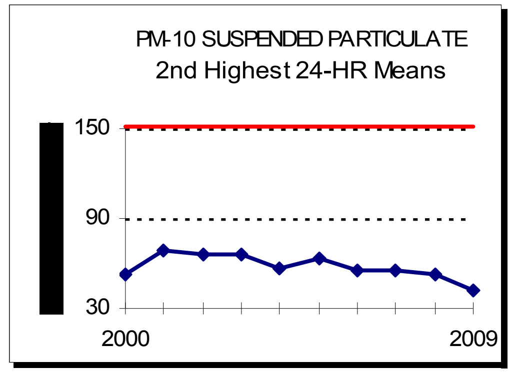
PM_{10} data for 2009 for all DEP monitoring sites are summarized in Appendix B, Table B-18. No site exceeded the level of the current 24-hour PM_{10} air quality standard during 2009, rather all sites yielded concentration averages less than one-half the level of the NAAQS for PM_{10}.

Figures 4-6 (on the following page) qualifies the second highest daily PM_{10} 24-hour maximums and annual means, by county in 2009. No monitored county contained sites exceeding the level of the current or former PM_{10} NAAQS.

Figure 4-7 displays a 10-year trend of the statewide second daily maximum 8-hour PM_{10} concentration. Data points on or above the solid line represent an exceedance of the NAAQS.

During the past 10 years, PM_{10} levels have consistently remained at or less than one-half the PM_{10} NAAQS, improving approximately 21% overall.

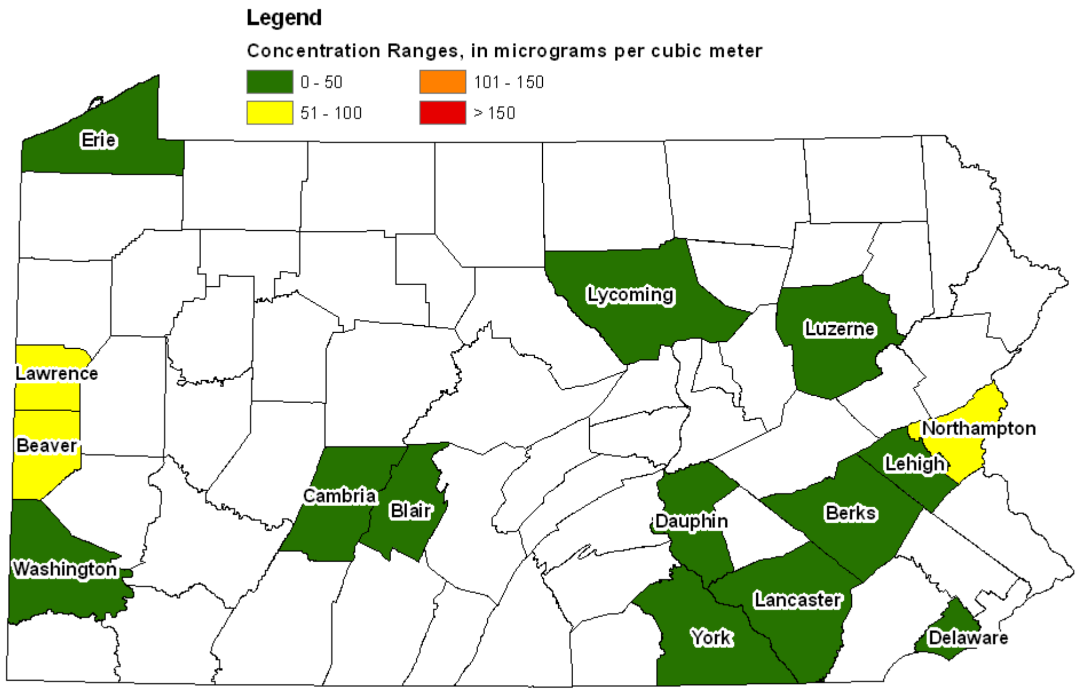
Figure 4-7. Trend in Second Maximum 24-hour Average PM_{10} Concentrations, DEP Monitors Statewide, 2000-2009.



Twenty-four hour average historical trends for individual air basin and non-air basin regions are shown in Figure 4-8. Data points on or above the solid line represent an exceedance of the annual NAAQS for sulfur dioxide. The trend graphs demonstrate that most regions followed the state-wide trend of an improvement over the previous year. All regions remained under the 24-hour NAAQS for PM_{10} in 2009. PM_{10} historical data from 2000 to 2009 are given in Appendix B, Table B-19 for DEP sites that operated during the 10-year period.

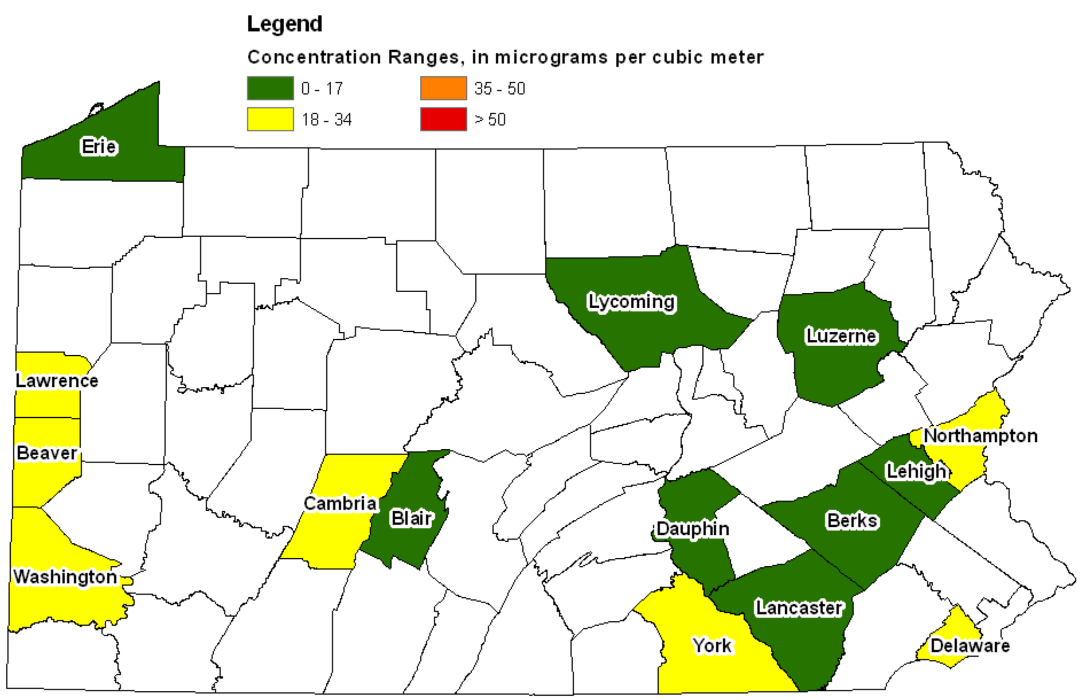
Figure 4-6. 2009 PM_{10} Concentration Ranges by County, for DEP-monitored Counties.

Second-Highest Maximum Daily 24-Hour PM_{10} Concentrations, by County, for 2009



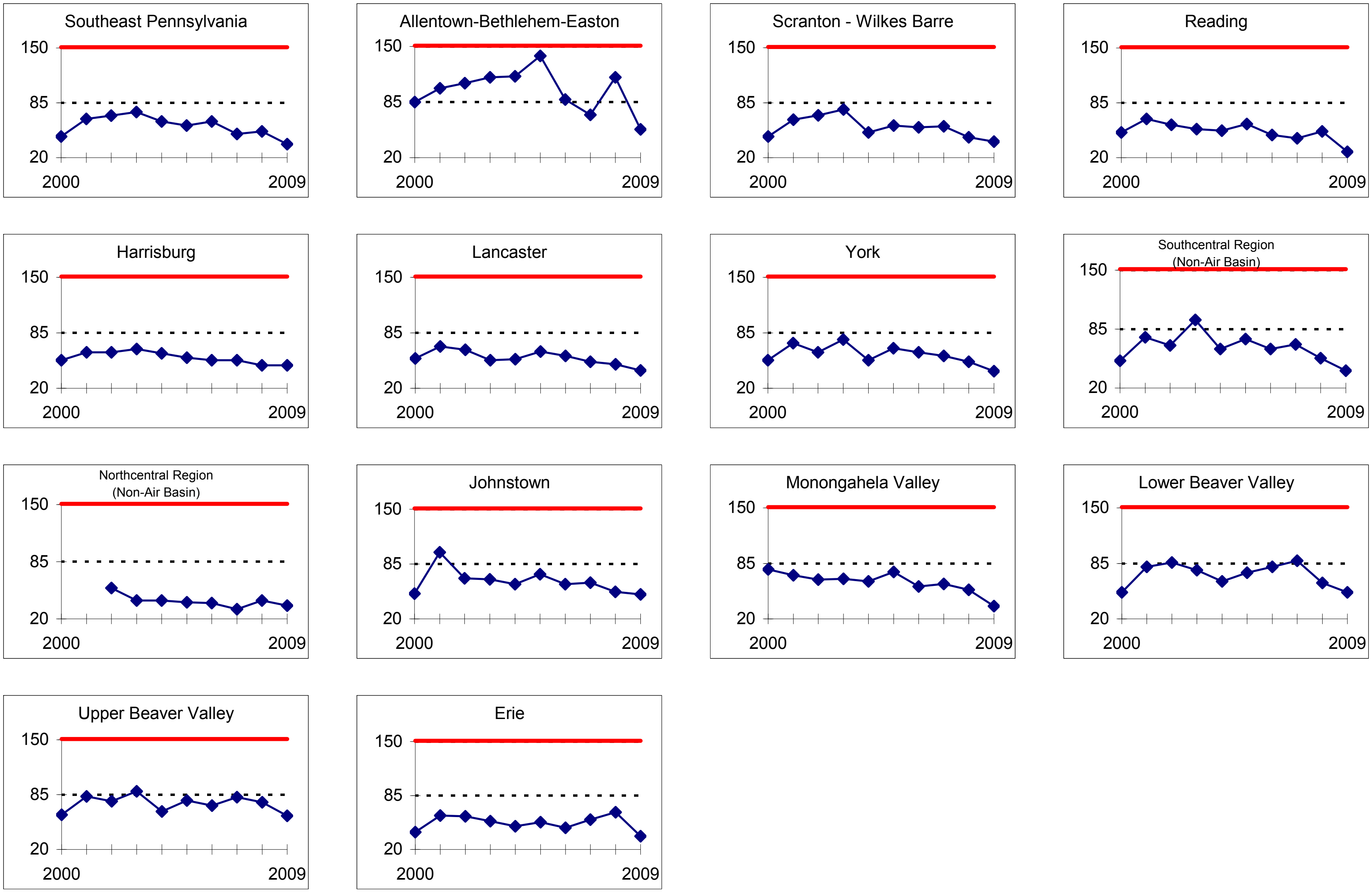
Primary and Secondary National Ambient Air Quality Standard for PM_{10}
Daily Maximum 24-Hour Average = 150 micrograms per cubic meter ($\mu g/m^3$), not to be exceeded more than once per year

PM₁₀ Annual Mean Concentrations, by County, for 2009



Former Primary and Secondary National Ambient Air Quality Standard for PM_{10}
Annual Mean = 50 micrograms per cubic meter ($\mu g/m^3$)
(Data are displayed for a single calendar year, but standard is based on a 3-year average)

Figure 4-8. PM_{10} Trends in Pennsylvania, DEP-monitored Regions 2000 to 2009, Second 24-Hour Maximums, in Micrograms per Cubic Meter.



PM_{10} 24-Hour Mean National Ambient Air Quality Standard is 150 micrograms per cubic meter (not to be exceeded more than once per year), based on a 3-year average.

Lead

Effective January 12, 2009, EPA strengthened the primary lead standard to provide increased protection for children and other at-risk populations against an array of adverse health effects related to lead exposure, most notably including neurological effects in children, including neurocognitive and neurobehavioral effects. The secondary standard (environmental welfare-based) was set identical to the primary (human health-based) standard. The current primary and secondary national ambient air quality standard (NAAQS) for lead is 0.15 micrograms per cubic meter, based on a maximum 3-month concentration average during a 3-year period. This revision represented a ten-fold strengthening of the lead NAAQS over the previous level of 1.5 micrograms per cubic meter, which had remained unchanged since 1978.

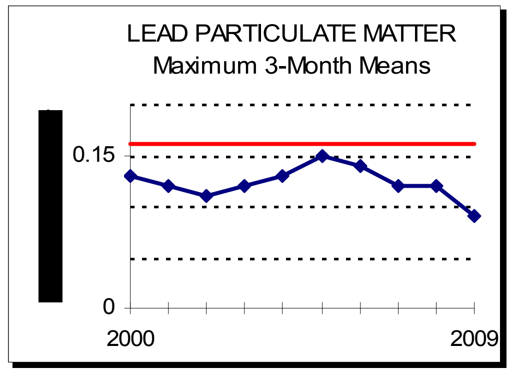
Lead levels in ambient air concentrations improved dramatically once lead was removed from gasoline in the mid-seventies. Ambient air concentrations of lead remain consistently low, although they can be affected by local influences.

The DEP 2009 lead monitoring network consisted of seven discrete monitoring sites. Individual site locations, including county and air basin designations, and parameters monitored are listed in Appendix C of this report. All sites, except the Laureldale site in Berks County, met the NAAQS for lead in 2009.

Lead data for 2009 for all DEP monitoring sites are summarized in Appendix B, Tables B-20. The Laureldale site in Berks County yielded a quarterly mean exceeding the level of the lead air quality standard during 2009. Higher lead levels recorded at sites located in Laureldale (Reading Air Basin), Lyons and Vanport (Lower Beaver Valley Air Basin) are due to the influence of lead point sources close to the monitoring sites.

Figure 4-9 displays the statewide composite average of the maximum 3-month average concentration from 2000 to 2009. Data points on or above the solid line represent an exceedance of the annual NAAQS for lead. In general, lead levels have remained relatively steady or decreased over the past 10 years.

Figure 4-9. Trend in Maximum 3-Month Average Lead Concentrations, DEP Monitors Statewide, 2000-2009.

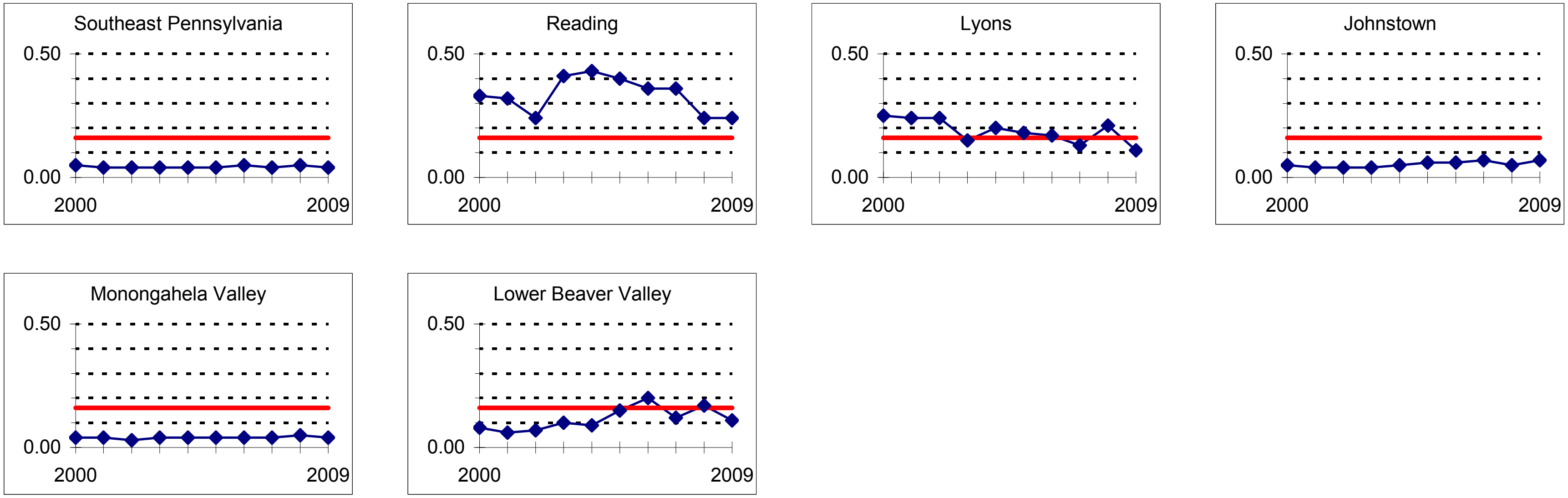


Maximum 3-month average historical trends for individual air basin and non-air basin regions are shown in Figure 4-10. Data points on or above the solid line represent an exceedance of the level of the lead NAAQS. The trend graphs demonstrate that most regions have either remained steady or followed the state-wide trend of a general improvement over the past 10 years.

Lead historical data from 2000 to 2009 are given in Appendix B, Table B-21 for DEP sites that operated during the 10-year period.

Analyses for total suspended particulates (TSP), sulfates and nitrates are also performed on the same sample collection filters that are analyzed for lead. For reference purposes, TSP, sulfate and nitrate data are given in Appendix B, Tables 22-25. Currently, there are no standards for these pollutants.

Figure 4-10. Lead Trends in Pennsylvania, DEP-monitored Regions 2000 to 2009, Highest 3-Month Average, in Micrograms per Cubic Meter.



Air Toxics

Hazardous air pollutants (HAPs), commonly referred to as air toxics, are pollutants known to cause or are suspected of causing cancer or other serious human health effects or ecosystem damage. Some air toxics are released from natural sources such as volcanic eruptions and forest fires. Most air toxics originate from mobile sources (cars, trucks, buses) and stationary sources (factories, refineries, power plants). Examples of some of the 188 toxic air pollutants include heavy metals such as mercury and chromium; benzene, found in gasoline; perchloroethylene, emitted from some dry cleaning facilities; and methylene chloride, used as a solvent and paint stripper by a number of industries.

For information on PA's Air Toxics monitoring, including site monitoring site locations and measured concentration data, visit us through the Department's website at http://www.dep.state.pa.us/dep/deputate/airwaste/aq/toxics/toxics.htm.

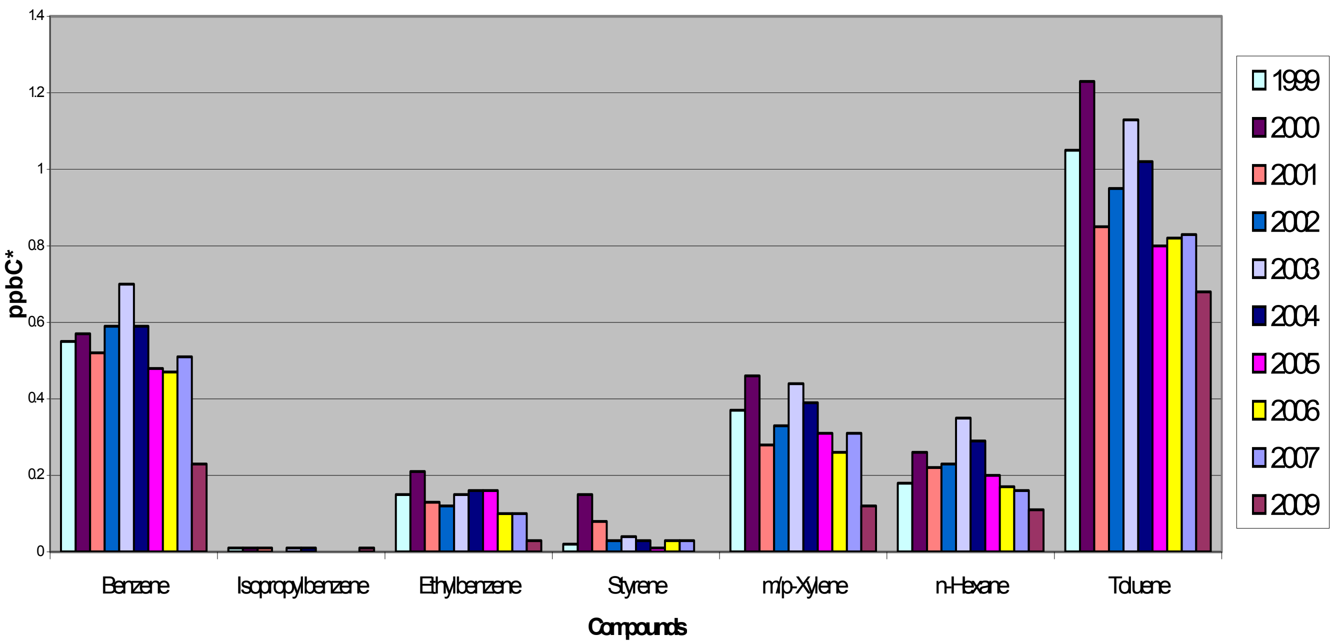
DEP performs ambient air monitoring of several air toxics at a Photochemical Assessment Monitoring Station (PAMS) site in Arendtsville, Adams County. This site studies the transport of ozone precursors from urban to rural areas. The volatile organic compounds (VOCs) routinely measured include several VOC species considered to be air toxics, such as benzene, hexane, toluene, and styrene. This station was not sited to represent the highest concentrations over a wide area, but it can be useful to study trends in ambient air toxics transported over long distances. DEP operates the Arendtsville site from May to October.

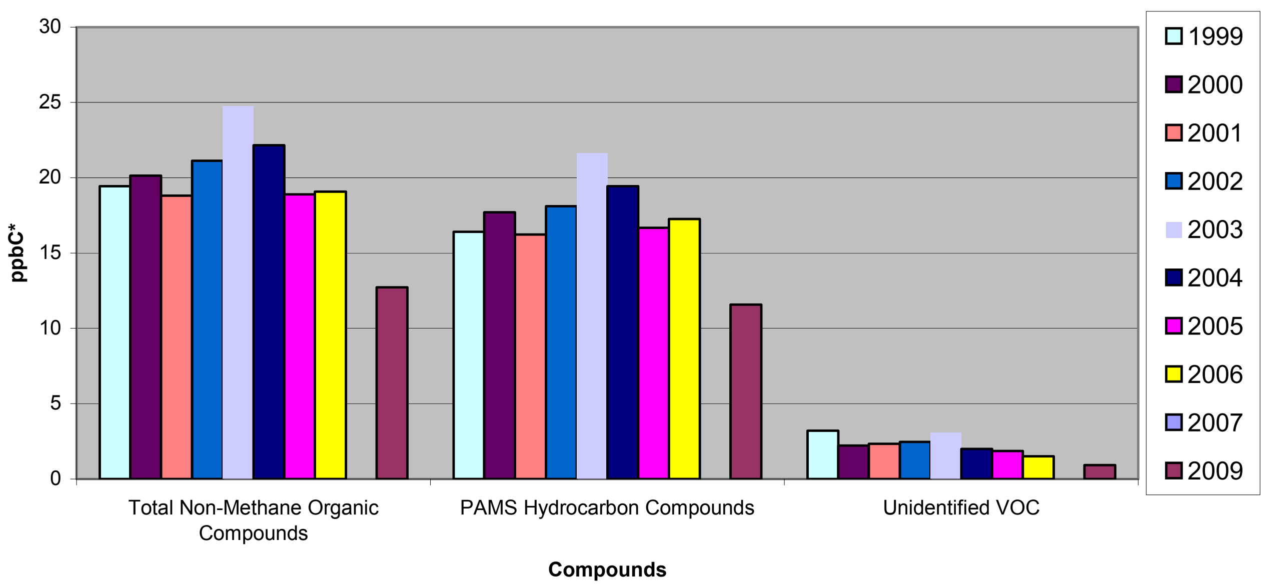
Data for PAMS compounds measured at the Arendtsville site are summarized in Appendix B, Table B-26. There are no federal or state air quality standards for the monitored compounds. Figure 4-11 on the following page displays the trend of average concentrations of selected air toxics at the Arendtsville site from 1999 until 2009.

DEP performs air toxics monitoring for mercury at a site near Lancaster. This site is designed to comply with EPA's expanded national toxic monitoring program. Data supplied from this monitoring site, and the expanded national network, assists in rulemaking and model validation. EPA uses these computer models to estimate lifetime chemical exposures and subsequent health-effect risks. The risk to human health from direct exposure by inhalation to elemental mercury vapor in ambient air is believed to be well below any level of concern. However, mercury deposited to surface waters is concentrated in the food chain and may reach levels in fish that are unsafe for consumption. There are no federal or state ambient air quality standards for mercury.

Data from the Lancaster site for 2009, as well as multi-year trend data, are summarized in the 2009 Elemental Mercury Vapor Summary, Appendix D of this document.

Figure 4-11. Air Toxics Trends at the Arendtsville Monitoring Site (1999-2009), Annual Means, in Parts per Billion Carbon (ppbC). .





CHAPTER 5. AIR QUALITY INDEX

The Air Quality Index (AQI) is the primary tool used by numerous state and local agencies, including DEP, for measuring and reporting health effects of six primary air pollutants – ozone (O_3), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), suspended particulate matter 10 microns or less in size (PM_{10}) and 2.5 microns or less ($PM_{2.5}$). The AQI is also used widely for public air quality forecasting purposes.

The AQI has been in use since October 1999, when EPA established the index to replace the former Pollutant Standards Index (PSI). The AQI reflected updated health information considered in the 1997 EPA revisions of the air quality standards for ground-level ozone (smog) and fine particulate matter. The revised index ensures consistency between current science on the health effects of all of these air pollutants and the reporting of this air quality and health information to the public.

The AQI added an additional air quality category to the former PSI categories just above the level of the standard, for each pollutant. The AQI index established a category from 101 -150 characterized as "unhealthy for sensitive groups" and a category of 151 - 200 as "unhealthy". The AQI also included modifications to the ozone sub-index (an 8-hour sub-index) and a sub-index for fine particulate matter.

In 2008, the AQI breakpoints for ozone were revised to reflect the new 8-hour National Ambient Air Quality Standard (NAAQS) for ozone.

The AQI is used extensively by DEP and is published on DEP's web site with hourly updates at http://www.dep.state.pa.us/dep/deputate/airwaste/aq/aqm/aqi.htm. The breakpoints for the AQI in terms of pollutant concentrations are shown in Table 3.

Table 5-1. Breakpoints for the Air Quality Index (AQI).

O_3 (ppm) 8 - hour	O_3 (ppm) 1 – hour([1])	$PM_{2.5}$ ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	CO (ppm)	SO_2 (ppm) 1-hour	NO_2 (ppm)	AQI	Category
0.000 – 0.059	-	0.0 – 15.4	0 – 54	0.0 – 4.4	0.000 – 0.034	([2])	0 - 50	Good
0.060 – 0.075	-	15.5 – 40.4	55 – 154	4.5 – 9.4	0.035 – 0.144	([2])	51 - 100	Moderate
0.076 – 0.095	0.125 – 0.164	40.5 – 65.4	155 - 254	9.5 – 12.4	0.145 – 0.224	([2])	101 - 150	Unhealthy for sensitive groups
0.096 – 0.115	1.65 – 0.204	65.5 – 150.4	255 – 354	12.5 – 15.4	0.225 – 0.304	([2])	151 - 200	Unhealthy
0.116 – 0.374	0.205 – 0.404	150.5 – 250.4	355 – 424	15.5 – 30.4	0.305 – 0.604	0.65 – 1.24	201 - 300	Very unhealthy
([3])	0.405 – 0.504	250.5 – 350.4	425 – 504	30.5 – 40.4	0.605 – 0.804	1.25 – 1.64	301 - 400	Hazardous
([3])	0.505 – 0.604	350.5 – 500.4	505 - 604	40.5 – 50.4	0.805 – 1.004	1.65 – 2.04	401 - 500	Hazardous

[1] Agencies are generally required to report the AQI based on 8-hour ozone values. However, there are a small number of areas where an AQI based on 1-hour ozone values would be more precautionary. In these cases, in addition to calculating the 8-hour ozone index value, the 1-hour ozone index value may be calculated and the maximum of the two values is reported.
[2] NO_2 has no short-term NAAQS and can generate an AQI only above an AQI value of 200.
[3] When 8-hour Ozone concentrations exceed 0.374 ppm, AQI values of 301 or higher must be calculated with 1-hour concentrations.

CHAPTER 6. PRECISION AND ACCURACY

DEP conducts regularly scheduled precision checks and performance audits for accuracy on all air monitoring equipment. Precision checks are performed every two weeks for continuous gaseous pollutants - carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and ozone (O_3). Precision checks are performed every sampling day (once every sixth day) for discrete method pollutants – total suspended particulates (TSP), particulate matter 10 microns or less in size (PM_{10}), particulate matter 2.5 microns or less in size ($PM_{2.5}$) and lead (Pb). Performance audits are conducted by PA DEP quality assurance personnel on all monitoring equipment annually for the purpose of assessing data accuracy.

Precision checks for continuous gaseous pollutant monitors are achieved by challenging the monitor with a low-level gas of known pollutant concentration, and assessing the instrument's response. For discrete method pollutants, precision is assessed by comparing same-day pollutant concentration data between primary monitors and monitors collocated at selected sites for quality assurance purposes.

Accuracy for continuous gaseous pollutant monitors is achieved by challenging the equipment with three known concentration levels of audit gas, and assessing the instrument's response. The specific pollutant concentration ranges for five audit levels for each pollutant are set forth in the Code of Federal Regulations (40CFR Part 58, Appendix A), and are shown in Table 6-1 below. For each pollutant network, three consecutive audit levels from these five are utilized in the annual performance audit. For discrete particulate parameters, an annual audit of the monitor's flow rate determines accuracy. For lead, there is an additional analytical accuracy check. As part of the EPA sponsored National Performance Audit Program (NPAP), air filters with known concentrations of lead are sent to PA DEP's Bureau of Laboratories to verify laboratory analysis accuracy.

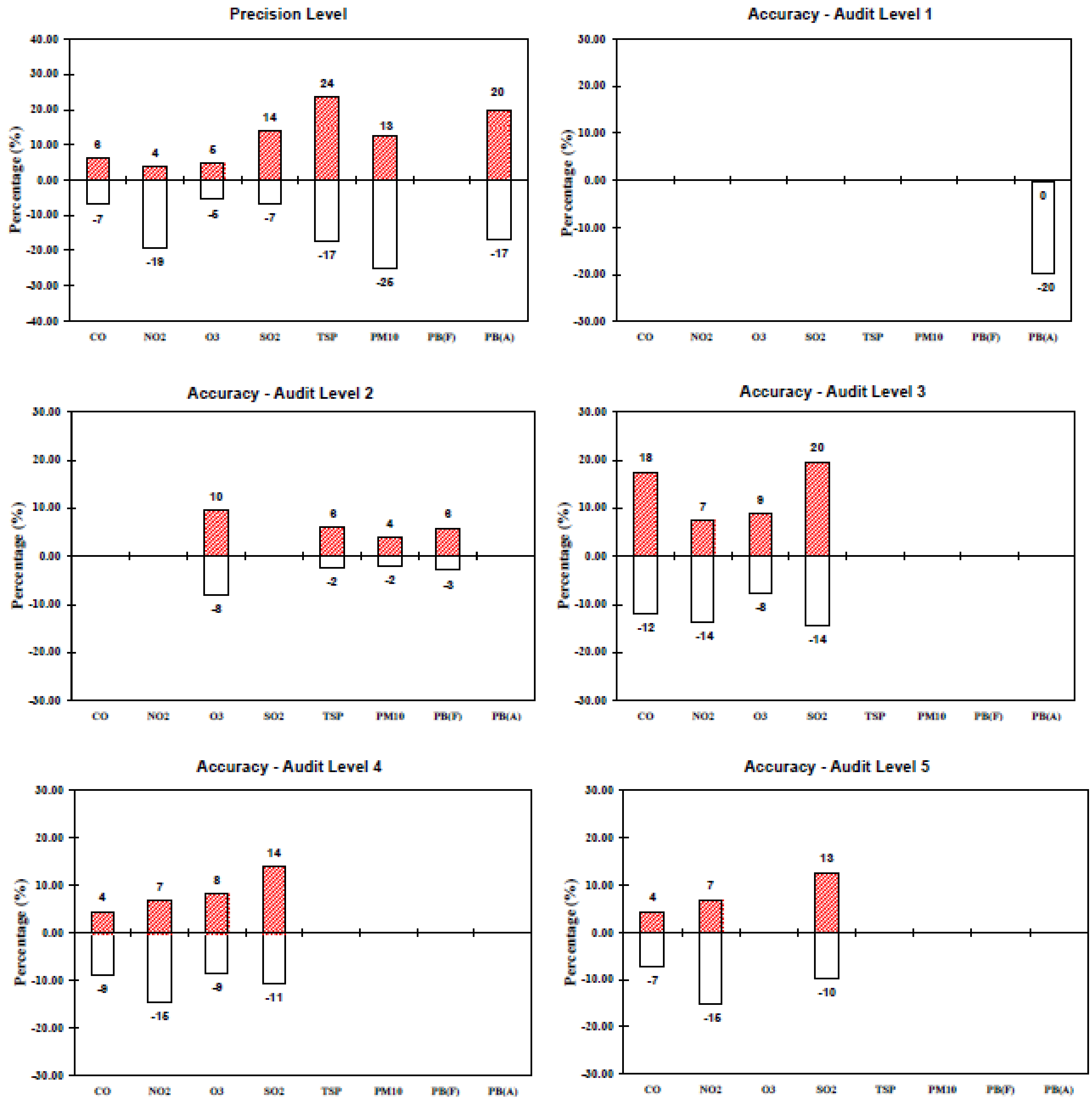
Data obtained from the precision checks, performance audits and NPAP audits are converted to 95 percent upper and lower probability limits using standard statistical methods. Figure 6-1 on the following page summarizes the 95 percent probability limits from all four quarterly reporting periods within the calendar year, for each of PA DEP's criteria pollutant networks. The values presented are calculated from weighted arithmetic averages for each quarter's probability limits. Note that there are two values for the lead network accuracy assessment; PB(F) refers to the flow rate audit performed by PA DEP quality assurance personnel, while PB(A) refers to the NPAP analytical audit.

For precision, acceptable 95 percent probability limits for precision are met when the instrument response is within 15 percent for all parameters. For accuracy, acceptable 95 percent probability limits are met when the instrument response is within 20 percent for continuous gaseous parameters, and within 15 percent for discrete particulate parameters.

Table 6-1. Audit Levels for Annual Performance Evaluations.

	Concentration Range, parts per million (ppm)			
Audit Level	**O_3**	**SO_2**	**NO_2**	**CO**
1 …….	0.02–0.05	0.0003–0.005	0.0002–0.002	0.08–0.10
2 …….	0.06–0.10	0.006–0.01	0.003–0.005	0.50–1.00
3 …….	0.11–0.20	0.02–0.10	0.006–0.10	1.50–4.00
4 …….	0.21–0.30	0.11–0.40	0.11–0.30	5–15
5 …….	0.31–0.90	0.41–0.90	0.31–0.60	20–50

Figure 6-1. 2009 Annual Precision and Accuracy Probability Limits, 95% Lower/Upper Limits.



CHAPTER 7. EMISSION INVENTORIES

Point Sources

An emission inventory is a compilation of data describing emissions from different sources of air pollution. The source may be a utility, refinery, automobile, train, etc. Each type of source can be placed into a point, area or mobile source category. A point source is a stationary source that can best be described as a manufacturing plant or a similar entity having one or more emissions units discharging air emissions into the atmosphere, and located at one specific geographic area.

Emissions from point sources are reported for 65 of the Commonwealth's 67 counties. Point source emissions from sources located in Allegheny County are reported directly to EPA by the Allegheny County Health Department. Point source emissions from sources located in Philadelphia Counties are reported directly by the Philadelphia County Health Department, Air Management Services.

There are many other purposes and uses of an emission inventory but in general it is the primary tool to identify where the State currently stands in terms of air pollution and what needs to be done in the future to reduce emissions. An inventory serves as a starting point, or a baseline, which allows the Commonwealth to develop goals and how best to meet them.

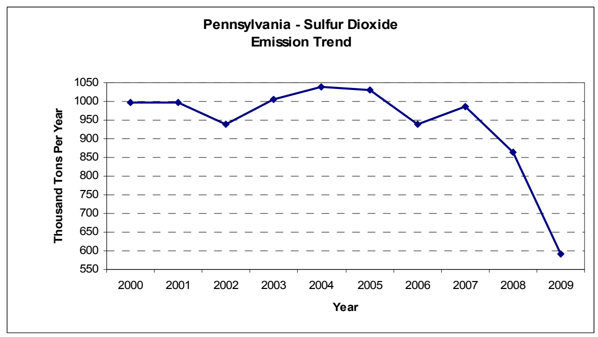
Applications for the use of emission inventory data are numerous. In addition to use as a building block in developing air quality control strategies and maintenance strategies, other specific uses of this data include:

- State oversight of point sources
- Public requests and web sites
- Use in the EPA National Annual Trends Report
- Emission trading
- Compliance demonstrations
- Emission fee programs
- To develop new methodologies and techniques to estimate emissions (emission factors)
- Document regulatory impact assessments
- Permitting
- Air Quality assessments
- Human exposure modeling

Statewide trends for the most common point source pollutants are shown below. These trends do not include data from Allegheny or Philadelphia County.

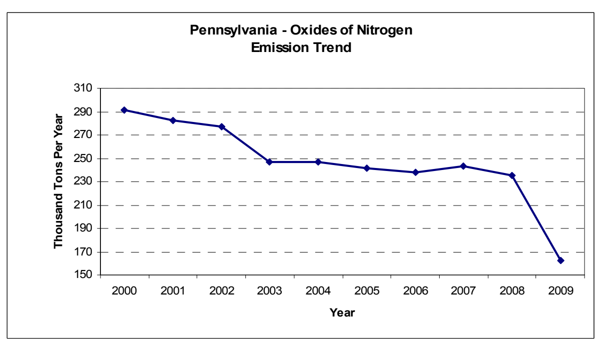
The statewide trend for point source sulfur dioxide emissions for 2000 to 2009 is shown in Figure 7-1, representing a 41% decrease over the last ten years.

Figure 7-1. Trend in Sulfur Dioxide Point Source Emissions, 2000-2009.



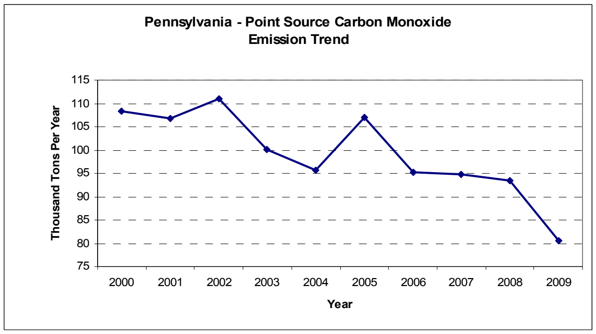
The statewide trend for point source nitrogen oxide emissions for 2000 to 2009 is shown in Figure 7-2, representing a 44% decrease over the last ten years.

Figure 7-2. Trend in Nitrogen Oxide Point Source Emissions, 2000-2009.



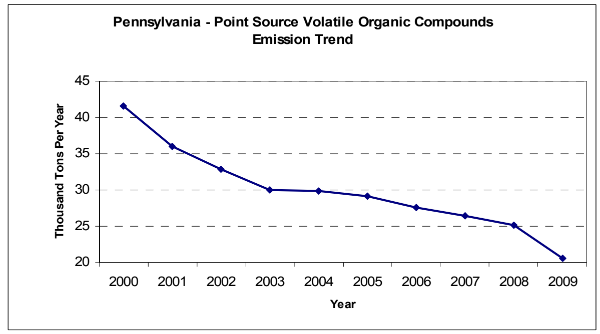
The statewide trend for point source carbon monoxide emissions for 2000 to 2009 is shown in Figure 7-3, representing a 26% decrease over the last ten years.

Figure 7-3. Trend in Carbon Monoxide Point Source Emissions, 2000-2009.



The statewide trend for point source volatile organic compounds (VOCs) emissions for 2000 to 2009 is shown in Figure 7-4, representing a 51% decrease over the last ten years.

Figure 7-4. Trend in Volatile Organic Compound Point Source Emissions, 2000-2009.



Historical data for each of these pollutants is listed by county in Appendix B, Tables B-26-29.

APPENDIX A. AIR POLLUTION CONTROL AGENCIES IN PENNSYLVANIA

Allegheny County Health Department
39th Street and Penn Avenue
Pittsburgh, PA 15201
(412) 578-8104
Website: http://www.achd.net/
(Choose "Environmental Health" under the "Divisions" tab, then "Air Quality")

City of Philadelphia
Department of Public Health
Air Management Services
321 University Avenue
Philadelphia, PA 19104
(215) 685-7584
Website: http://www.phila.gov/health/airmanagement/

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Air Quality
Division of Air Quality Monitoring
Rachel Carson State Office Building 12th Floor
400 Market Street
P.O. Box 8468
Harrisburg, PA 17105-8468
(717) 787-6548
Website: http://www.depweb.state.pa.us/
(Choose "Air" from the left-hand menu)

APPENDIX B. DATA TABLES

Table B-1. Ozone Summary (8-Hour).

Year: 2009 (April – October)

Units: parts per million

Site Name	PA Site Code	Number of Valid Days	Percent Valid Data	1st Daily Max 8-hour Mean	1st Daily Max Date MM/DD	2nd Daily Max 8-hour Mean	2nd Daily Max Date MM/DD	3rd Daily Max 8-hour Mean	3rd Daily Max Date MM/DD	4th Daily Max 8-hour Mean	4th Daily Max Date MM/DD
Southeast Pennsylvania Air Basin											
Bristol	P01	213	100	0.077	07/15	0.076	06/26	0.074	07/16	0.074	08/16
Chester	P11	210	98	0.072	06/26	0.070	07/15	0.070	08/15	0.065	08/08
Norristown	P21	214	100	0.075	07/15	0.071	06/26	0.071	08/17	0.070	04/27
New Garden Airport	P30	210	98	0.078	06/26	0.069	07/15	0.068	04/27	0.067	04/25
Allentown-Bethlehem-Easton Air Basin											
Allentown	A19	211	99	0.073	05/22	0.071	05/23	0.069	04/27	0.069	08/17
Easton	A20	213	100	0.073	05/22	0.072	05/23	0.066	04/27	0.066	08/17
Freemansburg	A25	208	97	0.073	05/23	0.072	05/22	0.069	08/17	0.068	04/27
Scranton-Wilkes-Barre Air Basin											
Scranton	S01	213	100	0.067	05/22	0.065	05/21	0.064	05/20	0.061	04/27
Nanticoke	S26	213	100	0.067	05/21	0.066	05/22	0.064	05/20	0.063	05/13
Wilkes-Barre	S28	213	100	0.064	05/22	0.060	05/21	0.058	05/20	0.055	04/27
Peckville	S29	214	100	0.074	05/22	0.072	05/21	0.070	05/20	0.068	04/27
Northeast Region Non-Air Basin											
Swiftwater	230	166	78	0.065	04/18	0.058	04/09	0.058	04/17	0.057	07/25
Reading Air Basin											
Reading Airport	R03	213	100	0.079	05/22	0.075	07/15	0.073	04/27	0.072	08/17
Harrisburg Air Basin											
Harrisburg	H11	212	99	0.070	05/21	0.070	06/08	0.066	05/22	0.063	04/18
Lancaster Air Basin											
Lancaster	L01	209	98	0.076	07/15	0.074	06/08	0.071	06/25	0.069	05/22
York Air Basin											
York	Y01	212	99	0.076	06/08	0.073	05/22	0.068	05/21	0.068	07/15
Southcentral Region Non-Air Basin											
Perry County	305	208	97	0.071	05/21	0.068	04/18	0.066	04/19	0.063	05/13
Hershey	306	213	100	0.073	05/21	0.072	05/22	0.071	06/08	0.066	04/18
Altoona	308	213	100	0.069	05/22	0.066	05/21	0.066	08/26	0.065	04/19
Kutztown	311	213	100	0.069	05/22	0.069	06/08	0.067	04/27	0.063	05/23
Methodist Hill	313	202	94	0.065	05/22	0.064	05/21	0.059	04/19	0.059	05/20
Biglerville	D14	214	100	0.075	05/21	0.069	05/22	0.065	05/20	0.064	06/08
Lancaster Downwind	L12	194	91	0.069	06/08	0.068	05/22	0.068	06/26	0.066	04/27
York Downwind	Y11	212	99	0.078	07/15	0.067	04/25	0.067	07/20	0.066	05/22

Primary and Secondary 8-hour National Ambient Air Quality Standard

0.075 parts per million for 4th daily maximum 8-hour mean, averaged over 3 years

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-1. Ozone Summary (8-Hour) (cont.).

Year: 2009 (April – October)

Units: parts per million

Site Name	PA Site Code	Number of Valid Days	Percent Valid Data	1st Daily Max 8-hour Mean	1st Daily Max Date MM/DD	2nd Daily Max 8-hour Mean	2nd Daily Max Date MM/DD	3rd Daily Max 8-hour Mean	3rd Daily Max Date MM/DD	4th Daily Max 8-hour Mean	4th Daily Max Date MM/DD
Northcentral Region Non-Air Basin											
State College	409	211	99	0.069	05/22	0.068	04/18	0.067	05/21	0.064	04/27
Montoursville	410	206	96	0.069	05/21	0.067	05/22	0.066	05/20	0.064	04/27
Moshannon	D09	204	95	0.072	04/18	0.071	05/21	0.071	05/22	0.066	04/27
Tioga County	D13	197	92	0.067	05/21	0.065	04/18	0.065	05/20	0.064	05/22
Johnstown Air Basin											
Johnstown	J01	209	98	0.068	05/23	0.065	05/22	0.064	04/18	0.064	04/19
Monongahela Valley Air Basin											
Charleroi	M01	213	100	0.069	05/23	0.068	04/18	0.068	06/15	0.068	09/05
Lower Beaver Valley Air Basin											
Beaver Falls	B11	213	100	0.070	08/14	0.068	05/15	0.068	05/22	0.068	06/15
Hookstown	B23	208	97	0.068	05/21	0.067	05/23	0.066	04/18	0.066	05/20
Brighton Township	B27	208	97	0.069	05/21	0.069	05/22	0.069	06/15	0.068	04/18
Allegheny County Air Basin											
Pittsburgh	D12	211	99	0.071	05/22	0.068	06/25	0.067	05/21	0.067	06/06
Southwest Region Non-Air Basin											
Florence	504	207	97	0.071	05/21	0.068	05/22	0.067	04/18	0.065	05/15
Washington	508	211	99	0.068	05/22	0.065	06/15	0.064	06/25	0.063	04/18
Murrysville	510	213	100	0.068	05/22	0.068	05/23	0.068	08/16	0.064	05/15
Kittanning	512	213	100	0.080	05/21	0.072	05/22	0.072	06/25	0.071	07/15
Greensburg	513	208	97	0.070	05/23	0.067	05/22	0.066	05/21	0.065	06/25
Holbrook	514	214	100	0.074	04/18	0.070	09/04	0.069	05/23	0.066	04/17
Strongstown	515	210	98	0.078	05/22	0.073	05/21	0.069	05/23	0.066	04/27
Upper Beaver Valley Air Basin											
New Castle	B21	214	100	0.071	08/16	0.064	05/15	0.064	06/06	0.063	04/18
Erie Air Basin											
Erie	E10	210	98	0.082	05/21	0.074	04/18	0.073	05/20	0.069	06/06
Northwest Region Non-Air Basin											
Farrell	606	207	97	0.076	06/06	0.071	05/20	0.071	06/25	0.070	04/18

Primary and Secondary 8-hour National Ambient Air Quality Standard

0.075 parts per million for 4th daily maximum 8-hour mean, averaged over 3 years

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-2. Ozone Summary (1-Hour).

Year: 2009 (April – October)

Units: parts per million

Site Name	PA Site Code	Number of Valid Days	Percent Valid Data	1st Daily Max 1-hour Mean	1st Daily Max Date MM/DD	2nd Daily Max 1-hour Mean	2nd Daily Max Date MM/DD	3rd Daily Max 1-hour Mean	3rd Daily Max Date MM/DD	4th Daily Max 1-hour Mean	4th Daily Max Date MM/DD
Southeast Pennsylvania Air Basin											
Bristol	P01	213	99	0.095	06/26	0.090	08/17	0.087	07/15	0.086	04/28
Chester	P11	210	98	0.093	07/15	0.081	08/08	0.078	06/26	0.078	07/10
Norristown	P21	214	100	0.090	07/15	0.082	08/17	0.081	06/08	0.080	06/26
New Garden Airport	P30	213	99	0.092	06/26	0.089	07/15	0.084	04/27	0.083	06/10
Allentown-Bethlehem-Easton Air Basin											
Allentown	A19	211	98	0.082	04/27	0.082	05/22	0.081	05/23	0.075	06/26
Easton	A20	213	99	0.086	05/23	0.079	05/22	0.077	04/27	0.075	07/20
Freemansburg	A25	208	98	0.084	05/23	0.079	05/22	0.076	04/27	0.075	06/26
Scranton-Wilkes-Barre Air Basin											
Scranton	S01	213	99	0.073	05/21	0.072	05/22	0.070	05/20	0.067	08/17
Nanticoke	S26	213	100	0.076	05/21	0.070	05/22	0.068	05/20	0.067	05/13
Wilkes-Barre	S28	213	99	0.068	05/21	0.066	05/22	0.063	05/20	0.061	08/04
Peckville	S29	214	100	0.079	05/22	0.077	05/20	0.077	05/21	0.075	08/17
Northeast Region Non-Air Basin											
Swiftwater	230	168	78	0.067	04/18	0.064	08/17	0.063	08/01	0.062	04/09
Reading Air Basin											
Reading Airport	R03	214	99	0.093	07/15	0.089	05/22	0.084	04/27	0.080	08/16
Harrisburg Air Basin											
Harrisburg	H11	214	99	0.084	06/08	0.080	05/22	0.076	05/21	0.070	05/23
Lancaster Air Basin											
Lancaster	L01	211	98	0.097	07/15	0.087	06/08	0.084	06/25	0.081	08/17
York Air Basin											
York	Y01	212	99	0.084	06/08	0.083	05/22	0.077	07/25	0.074	04/25
Southcentral Region Non-Air Basin											
Perry County	305	209	98	0.077	05/21	0.072	05/23	0.071	04/18	0.071	04/19
Hershey	306	213	99	0.085	05/22	0.080	05/21	0.077	06/08	0.072	07/25
Altoona	308	214	99	0.074	05/22	0.073	08/26	0.070	08/16	0.069	05/21
Kutztown	311	214	100	0.078	05/22	0.077	04/27	0.077	06/08	0.072	05/21
Methodist Hill	313	206	96	0.071	05/21	0.067	05/22	0.067	08/17	0.066	05/20
Biglerville	D14	214	100	0.081	05/21	0.077	05/22	0.071	05/20	0.069	09/03
Lancaster Downwind	L12	194	91	0.082	06/26	0.081	06/08	0.081	08/17	0.079	04/27
York Downwind	Y11	212	99	0.095	07/15	0.079	07/20	0.077	04/25	0.077	05/22

Former Primary and Secondary Daily 1-hour National Ambient Air Quality Standard is 0.12 parts per million (not to be exceeded more than once per year).

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-2. Ozone Summary (1-Hour) (cont.).

Year: 2009 (April – October)

Units: parts per million

Site Name	PA Site Code	Number of Valid Days	Percent Valid Data	1st Daily Max 1-hour Mean	1st Daily Max Date MM/DD	2nd Daily Max 1-hour Mean	2nd Daily Max Date MM/DD	3rd Daily Max 1-hour Mean	3rd Daily Max Date MM/DD	4th Daily Max 1-hour Mean	4th Daily Max Date MM/DD
Northcentral Region Non-Air Basin											
State College	409	213	99	0.073	05/21	0.072	05/22	0.071	04/18	0.068	04/27
Montoursville	410	209	98	0.076	05/21	0.075	05/22	0.068	04/27	0.067	05/20
Moshannon	D09	206	96	0.075	04/18	0.074	05/22	0.074	07/15	0.073	05/21
Tioga County	D13	199	97	0.071	05/21	0.070	05/20	0.069	04/18	0.066	05/22
Johnstown Air Basin											
Johnstown	J01	212	99	0.074	05/23	0.072	04/19	0.072	05/22	0.067	04/18
Monongahela Valley Air Basin											
Charleroi	M01	213	100	0.080	06/15	0.078	08/16	0.075	09/05	0.074	05/22
Lower Beaver Valley Air Basin											
Beaver Falls	B11	213	100	0.088	06/25	0.085	08/14	0.079	05/15	0.077	05/24
Hookstown	B23	210	98	0.079	06/25	0.074	06/24	0.074	07/15	0.073	05/21
Brighton Township	B27	210	98	0.079	06/25	0.078	08/14	0.077	06/16	0.076	05/15
Allegheny County Air Basin											
Pittsburgh	D12	214	99	0.081	05/22	0.075	05/23	0.075	06/25	0.073	06/15
Southwest Region Non-Air Basin											
Florence	504	209	99	0.073	05/21	0.073	05/22	0.071	04/18	0.071	09/03
Washington	508	211	99	0.070	06/15	0.069	05/22	0.069	06/25	0.069	09/03
Murrysville	510	214	100	0.083	05/22	0.080	08/16	0.079	06/25	0.077	05/23
Kittanning	512	214	100	0.098	06/25	0.090	05/21	0.085	06/07	0.084	08/25
Greensburg	513	208	98	0.074	05/22	0.073	05/23	0.073	06/25	0.071	05/21
Holbrook	514	214	100	0.080	04/18	0.076	09/04	0.073	09/03	0.072	05/23
Strongstown	515	211	98	0.082	05/22	0.079	05/21	0.075	08/16	0.073	05/23
Upper Beaver Valley Air Basin											
New Castle	B21	214	100	0.085	08/16	0.076	05/15	0.073	08/14	0.071	06/16
Erie Air Basin											
Erie	E10	212	99	0.087	05/21	0.078	04/18	0.077	05/20	0.074	06/06
Northwest Region Non-Air Basin											
Farrell	606	208	97	0.081	06/25	0.081	07/15	0.078	06/06	0.078	08/14

Former Primary and Secondary Daily 1-hour National Ambient Air Quality Standard is 0.12 parts per million (not to be exceeded more than once per year).

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-4. One-hour Ozone Days Greater than 124 ppb and Maximums Summary (2007 – 2009).

Units: parts per billion

Station	Design Value	2007 Daily Maximums Days > 75	2007 1st 8-Hr	2007 2nd 8-Hr	2007 3rd 8-Hr	2007 4th 8-Hr	2008 Daily Maximums Days > 75	2008 1st 8-Hr	2008 2nd 8-Hr	2008 3rd 8-Hr	2008 4th 8-Hr	2009 Daily Maximums Days > 75	2009 1st 8-Hr	2009 2nd 8-Hr	2009 3rd 8-Hr	2009 4th 8-Hr
Frankford (Lab)	64	3	94	82	79	73	0	74	64	63	62	0	72	63	59	59
Northwest (Rox)	81	11	87	84	81	81	***	***	***	***	***	***	***	***	***	***
Northeast (Airport)	84	21	106	104	97	95	15	99	88	87	87	1	84	75	73	72
Southwest (Elm)	82	6	110	95	89	82	***	***	***	***	***	***	***	***	***	***
Bristol	88	24	121	119	109	102	12	102	92	91	89	2	77	76	74	74
Chester	77	13	107	89	86	86	8	92	86	83	81	0	72	70	70	65
Norristown	79	15	91	88	86	84	13	96	90	84	84	0	75	71	71	70
New Garden (Airport)	77	13	116	87	85	81	7	94	88	86	84	1	78	69	68	67
Allentown	76	12	91	87	82	81	9	91	85	83	80	0	73	71	69	69
Easton	73	7	88	82	82	78	5	91	79	78	76	0	73	72	66	66
Freemansburg	75	11	93	89	84	83	3	94	82	80	75	0	73	72	69	68
Scranton	71	5	81	80	78	78	4	94	86	79	76	0	67	65	64	61
Nanticoke	66	1	79	69	66	63	2	91	84	74	74	0	67	66	64	63
Wilkes-Barre	69	5	80	79	78	77	3	91	80	78	75	0	64	60	58	55
Peckville	71	0	72	72	72	71	3	99	84	76	75	0	74	72	70	68
Swiftwater	69	2	86	78	75	75	4	93	92	76	76	0	65	58	58	57
Reading Airport	79	10	90	85	83	82	13	88	84	83	83	1	79	75	73	72
Harrisburg	74	15	86	83	82	82	4	91	83	82	79	0	70	70	66	63
Lancaster	77	17	92	85	83	83	8	83	82	81	80	1	76	74	71	69
York	77	17	91	88	86	84	7	96	81	81	81	1	76	73	68	68
Perry County	72	2	77	76	73	73	6	89	86	82	81	0	71	68	66	63
Hershey	74	11	80	80	79	79	7	95	82	79	78	0	73	72	71	66
Altoona	70	1	77	74	73	71	2	82	78	75	75	0	69	66	66	65
Kutztown	70	***	***	***	***	***	7	86	82	81	77	0	69	69	67	63
Methodist Hill	69	6	79	77	77	77	0	75	74	74	73	0	65	64	59	59
Biglerville (PSU)	73	10	83	83	81	81	4	85	78	77	76	0	75	69	65	64
Lancaster DW	71	***	***	***	***	***	5	83	82	79	77	0	69	68	68	66
York DW	72	***	***	***	***	***	6	89	85	79	78	1	78	67	67	66
State College (PSU)	70	3	82	79	77	74	2	81	77	74	74	0	69	68	67	64
Montoursville	74	4	83	78	78	77	6	89	87	84	82	0	69	67	66	64
Moshannon (PSU)	71	2	78	76	74	72	4	78	78	78	77	0	72	71	71	66
Tioga County (PSU)	70	2	78	77	75	74	2	85	81	75	73	0	67	65	65	64
Johnstown	67	2	79	77	75	72	0	72	70	69	67	0	68	65	64	64
Charleroi	72	4	84	83	83	77	2	80	78	73	71	0	69	68	68	68
Beaver Falls	73	4	79	79	79	77	2	79	76	75	74	0	70	68	68	68
Hookstown	73	8	93	87	80	80	3	79	78	77	73	0	68	67	66	66
Brighton Twp	71	3	84	79	77	72	3	79	77	76	75	0	69	69	69	68
Florence	72	3	77	76	76	75	4	81	78	77	77	0	71	68	67	65
Washington	68	3	78	77	76	73	0	72	72	71	69	0	68	65	64	63

Primary and Secondary 8-hour National Ambient Air Quality Standard

0.075 parts per million for 4th daily maximum averaged over 3 years

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-3. Eight-Hour Ozone Days Greater than 75 ppb and Maximums Summary (2007 – 2009) (cont.).

Units: parts per billion

Station	Design Value	2007 Days > 75	2007 Daily Maximums 1st 8-Hr	2007 2nd 8-Hr	2007 3rd 8-Hr	2007 4th 8-Hr	2008 Days > 75	2008 Daily Maximums 1st 8-Hr	2008 2nd 8-Hr	2008 3rd 8-Hr	2008 4th 8-Hr	2009 Days > 75	2009 Daily Maximums 1st 8-Hr	2009 2nd 8-Hr	2009 3rd 8-Hr	2009 4th 8-Hr
Murrysville	71	4	88	82	81	79	2	83	79	72	72	0	68	68	68	64
Kittanning	**77**	19	100	91	90	83	9	87	79	79	78	1	80	72	72	71
Greensburg	72	4	85	82	78	77	2	82	80	75	75	0	70	67	66	65
Holbrook	72	8	80	79	79	78	1	84	75	73	73	0	74	70	69	66
Strongstown	73	9	82	81	81	79	4	83	78	77	76	1	78	73	69	66
Pittsburgh (Carnegie SC)	74	11	86	83	82	81	1	80	75	75	74	0	71	68	67	67
Harrison Twp	**82**	13	99	89	87	86	10	91	88	86	85	6	84	80	79	77
Lawrenceville	**77**	12	92	91	85	83	7	84	79	79	79	1	77	72	71	69
South Fayette	73	9	87	78	78	77	3	79	78	78	75	0	71	71	69	69
New Castle	69	3	76	76	76	75	2	83	77	72	69	0	71	64	64	63
Erie	75	13	98	87	84	84	2	79	77	75	74	1	82	74	73	69
Farrell	**77**	14	86	85	84	83	7	85	84	81	78	1	76	71	71	70

Primary and Secondary 8-hour National Ambient Air Quality Standard

0.075 parts per million for 4th daily maximum averaged over 3 years

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-4. One-hour Ozone Days Greater than 124 ppb and Maximums Summary (2007 – 2009).

Units: parts per billion

Station	Design Value	2007 Days > 124	2007 Daily Maximums 1st 1-Hr	2007 2nd 1-Hr	2007 3rd 1-Hr	2007 4th 1-Hr	2008 Days > 124	2008 Daily Maximums 1st 1-Hr	2008 2nd 1-Hr	2008 3rd 1-Hr	2008 4th 1-Hr	2009 Days > 124	2009 Daily Maximums 1st 1-Hr	2009 2nd 1-Hr	2009 3rd 1-Hr	2009 4th 1-Hr
Frankford (Lab)	94	0	107	104	100	94	0	93	78	77	73	0	85	75	75	72
Northwest (Rox)	94	0	98	96	95	94	***	***	***	***	***	***	***	***	***	***
Northeast (Airport)	118	2	135	126	118	115	0	120	110	109	106	0	114	97	96	84
Southwest (Elm)	96	1	136	113	104	96	***	***	***	***	***	***	***	***	***	***
Bristol	123	3	142	141	140	123	0	119	109	108	105	0	95	90	87	86
Chester	102	1	128	102	101	101	0	116	111	96	93	0	93	81	78	78
Norristown	101	0	107	103	101	100	0	113	99	94	93	0	90	82	81	80
New Garden (Airport)	101	1	141	102	94	94	0	114	101	99	96	0	92	89	84	83
Allentown	98	0	104	102	90	90	0	100	98	91	88	0	82	82	81	75
Easton	94	0	105	95	94	88	0	106	93	85	84	0	86	79	77	75
Freemansburg	95	0	105	105	93	91	0	107	95	88	86	0	84	79	76	75
Scranton	90	0	92	90	89	87	0	102	93	88	84	0	73	72	70	67
Nanticoke	87	0	88	87	79	77	0	102	89	86	83	0	76	70	68	67
Wilkes-Barre	88	0	89	89	88	85	0	103	87	85	83	0	68	66	63	61
Peckville	87	0	92	85	83	83	0	108	89	87	80	0	79	77	77	75
Swiftwater	90	0	92	90	86	85	0	108	102	87	81	0	67	64	63	62
Reading Airport	98	0	102	98	94	92	0	98	98	95	95	0	93	89	84	80
Harrisburg	97	0	105	105	97	96	0	105	92	91	88	0	84	80	76	70
Lancaster	101	0	107	104	102	99	0	101	97	96	89	0	97	87	84	81
York	105	0	121	108	105	100	0	114	99	91	91	0	84	83	77	74
Perry County	89	0	89	88	83	82	0	93	92	91	89	0	77	72	71	71
Hershey	92	0	102	95	92	92	0	112	90	89	86	0	85	80	77	72
Altoona	84	0	85	81	80	80	0	90	88	84	80	0	74	73	70	69
Kutztown	91	***	***	***	***	***	0	95	92	92	91	0	78	77	77	72
Methodist Hill	86	0	90	89	89	86	0	85	81	81	80	0	71	67	67	66
Biglerville (PSU)	90	0	101	91	90	88	0	93	84	83	80	0	81	77	71	69
Lancaster DW	89	***	***	***	***	***	0	103	98	90	89	0	82	81	81	79
York DW	95	***	***	***	***	***	0	108	101	99	91	0	95	79	77	77
State College (PSU)	84	0	90	87	86	82	0	84	82	80	78	0	73	72	71	68
Montoursville	92	0	91	91	87	85	0	96	94	94	92	0	76	75	68	67
Moshannon (PSU)	85	0	88	83	81	80	0	91	85	84	83	0	75	74	74	73
Tioga County (PSU)	84	0	85	84	81	80	0	91	87	81	78	0	71	70	69	66
Johnstown	86	0	96	87	86	85	0	89	81	79	78	0	74	72	72	67
Charleroi	95	0	99	95	89	87	0	95	95	84	82	0	80	78	75	74
Beaver Falls	89	0	97	92	89	88	0	98	87	85	84	0	88	85	79	77
Hookstown	91	0	99	96	92	91	0	86	85	83	83	0	79	74	74	73
Brighton Twp	85	0	96	87	84	84	0	91	85	84	83	0	79	78	77	76
Florence	91	0	96	94	87	86	0	88	88	84	83	0	93	91	87	86
Washington	81	0	90	84	81	81	0	84	79	78	78	0	70	69	69	69

Former Primary and Secondary Daily 1-hour National Ambient Air Quality Standard is 0.12 parts per million

(not to be exceeded more than once per year)

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-4. One-hour Ozone Days Greater than 124 ppb and Maximums Summary (2007 – 2009) (cont.).

Units: parts per billion

Station	Design Value	2007 Days > 124	2007 Daily Maximums 1st 1-Hr	2007 2nd 1-Hr	2007 3rd 1-Hr	2007 4th 1-Hr	2008 Days > 124	2008 Daily Maximums 1st 1-Hr	2008 2nd 1-Hr	2008 3rd 1-Hr	2008 4th 1-Hr	2009 Days > 124	2009 Daily Maximums 1st 1-Hr	2009 2nd 1-Hr	2009 3rd 1-Hr	2009 4th 1-Hr
Murrysville	94	0	98	98	92	91	0	98	94	87	83	0	83	80	79	77
Kittanning	98	0	117	106	102	98	0	95	94	94	91	0	98	90	85	84
Greensburg	88	0	93	88	88	87	0	94	89	81	81	0	74	73	73	71
Holbrook	87	0	90	90	87	85	0	97	87	81	80	0	80	76	73	72
Strongstown	88	0	89	88	86	86	0	97	90	83	82	0	82	79	75	73
Pittsburgh (Carnegie SC)	95	0	113	104	97	92	0	95	92	89	84	0	81	75	75	73
Harrison Twp	100	0	111	106	103	99	0	100	99	98	97	0	105	90	89	88
Lawrenceville	97	0	118	114	97	94	0	99	95	94	92	0	86	83	77	77
South Fayette	87	0	97	89	87	85	0	91	86	85	82	0	76	75	74	73
New Castle	87	0	87	87	87	86	0	100	85	79	78	0	85	76	73	71
Erie	100	0	107	102	100	100	0	90	86	82	82	0	87	78	77	74
Farrell	97	0	103	101	95	94	0	98	97	95	85	0	81	81	78	78

Former Primary and Secondary Daily 1-hour National Ambient Air Quality Standard is 0.12 parts per million

(not to be exceeded more than once per year)

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-5. Ozone Historical Trend.

Units: parts per million

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Southeast Pennsylvania Air Basin											
Bristol	0.121	0.131	0.135	0.121	0.098	0.121	0.112	0.141	0.109	0.090	2nd Max Daily 1-hour Average
P01	1	2	4	0	0	1	0	3	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.099	0.104	0.111	0.087	0.082	0.089	0.087	0.102	0.089	0.074	4th Max Daily 8-hour Average
	21	28	28	16	7	15	14	24	12	2	Number Days 8-hour ≥ 0.075 ppm
Chester	0.117	0.108	0.125	0.118	0.109	0.119	0.102	0.102	0.111	0.081	2nd Max Daily 1-hour Average
P11	0	1	2	0	0	1	0	1	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.091	0.093	0.103	0.080	0.081	0.087	0.082	0.086	0.081	0.065	4th Max Daily 8-hour Average
	13	20	33	12	6	10	12	13	8	0	Number Days 8-hour ≥ 0.075 ppm
Norristown	0.125	0.120	0.122	0.111	0.094	0.107	0.096	0.103	0.099	0.082	2nd Max Daily 1-hour Average
P21	2	1	1	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.100	0.096	0.096	0.085	0.083	0.090	0.084	0.084	0.084	0.070	4th Max Daily 8-hour Average
	20	24	27	8	8	20	14	15	13	0	Number Days 8-hour ≥ 0.075 ppm
New Garden Airport	0.095	0.122	0.139	0.115	0.102	0.109	0.107	0.102	0.101	0.089	2nd Max Daily 1-hour Average
P30	0	0	2	0	0	1	0	1	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.077	0.105	0.104	0.085	0.085	0.092	0.083	0.081	0.084	0.067	4th Max Daily 8-hour Average
	5	32	46	10	16	23	12	13	7	1	Number Days 8-hour ≥ 0.075 ppm
West Chester	***	0.117	0.113	0.110	***	***	***	***	***	***	2nd Max Daily 1-hour Average
P32	***	0	1	0	***	***	***	***	***	***	Number Days 1-hour ≥ 0.125 ppm
	***	0.103	0.097	0.085	***	***	***	***	***	***	4th Max Daily 8-hour Average
	***	35	35	10	***	***	***	***	***	***	Number Days 8-hour ≥ 0.075 ppm
Allentown-Bethlehem-Easton Air Basin											
Allentown	0.112	0.126	0.114	0.109	0.101	0.101	0.100	0.102	0.098	0.082	2nd Max Daily 1-hour Average
A19	0	2	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.091	0.094	0.094	0.087	0.083	0.086	0.080	0.081	0.080	0.069	4th Max Daily 8-hour Average
	13	26	31	9	11	12	9	12	9	0	Number Days 8-hour ≥ 0.075 ppm
Easton	0.100	0.113	0.113	0.107	0.104	0.096	0.095	0.095	0.093	0.079	2nd Max Daily 1-hour Average
A20	0	0	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.083	0.092	0.092	0.083	0.083	0.080	0.078	0.078	0.076	0.066	4th Max Daily 8-hour Average
	6	20	24	7	9	10	5	7	5	0	Number Days 8-hour ≥ 0.075 ppm
Freemansburg	0.114	0.113	0.112	0.112	0.104	0.100	0.100	0.105	0.095	0.079	2nd Max Daily 1-hour Average
A25	1	0	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.092	0.094	0.090	0.087	0.088	0.086	0.078	0.083	0.075	0.068	4th Max Daily 8-hour Average
	15	28	25	10	15	11	7	11	3	0	Number Days 8-hour ≥ 0.075 ppm
Scranton-Wilkes-Barre Air Basin											
Scranton	0.082	0.097	0.122	0.099	0.088	0.096	0.082	0.090	0.093	0.072	2nd Max Daily 1-hour Average
S01	0	0	1	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.073	0.088	0.089	0.075	0.073	0.080	0.070	0.078	0.076	0.061	4th Max Daily 8-hour Average
	1	18	20	3	3	8	1	5	4	0	Number Days 8-hour ≥ 0.075 ppm

Primary and Secondary 8-hour National Ambient Air Quality Standards

8-Hour Mean = 0.075 parts per million for 4th daily maximum 8-hour mean, averaged over 3 years

Former 1-hour = 0.12 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-5. Ozone Historical Trend (cont.).

Units: parts per million

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Nanticoke	0.093	0.104	0.112	0.097	0.079	0.090	0.073	0.087	0.089	0.070	2nd Max Daily 1-hour Average
S26	0	0	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.076	0.086	0.089	0.077	0.068	0.074	0.064	0.063	0.074	0.063	4th Max Daily 8-hour Average
	6	11	21	4	0	2	0	1	2	0	Number Days 8-hour ≥ 0.075 ppm
Wilkes-Barre	0.086	0.100	0.119	0.098	0.088	0.095	0.084	0.089	0.087	0.066	2nd Max Daily 1-hour Average
S28	0	0	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.073	0.088	0.092	0.078	0.073	0.081	0.073	0.077	0.075	0.055	4th Max Daily 8-hour Average
	3	17	22	5	2	9	2	5	3	0	Number Days 8-hour ≥ 0.075 ppm
Peckville	0.090	0.099	0.122	0.097	0.085	0.093	0.081	0.085	0.089	0.077	2nd Max Daily 1-hour Average
S29	0	0	1	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.077	0.086	0.094	0.075	0.071	0.080	0.071	0.071	0.075	0.068	4th Max Daily 8-hour Average
	6	16	25	3	3	11	2	0	3	0	Number Days 8-hour ≥ 0.075 ppm
Northeast Region Non-Air Basin											
Swiftwater	***	***	***	***	***	***	0.088	0.090	0.102	0.064	2nd Max Daily 1-hour Average
230	***	***	***	***	***	***	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	***	***	***	***	***	***	0.077	0.075	0.076	0.057	4th Max Daily 8-hour Average
	***	***	***	***	***	***	5	2	4	0	Number Days 8-hour ≥ 0.075 ppm
Reading Air Basin											
Reading	0.105	0.125	0.113	0.094	0.089	0.099	***	***	***	***	2nd Max Daily 1-hour Average
R01	0	2	0	1	0	0	***	***	***	***	Number Days 1-hour ≥ 0.125 ppm
	0.084	0.099	0.095	0.080	0.076	0.085	***	***	***	***	4th Max Daily 8-hour Average
	7	20	27	5	5	15	***	***	***	***	Number Days 8-hour ≥ 0.075 ppm
Reading (Temporary)	***	***	***	***	***	***	0.095	0.077	***	***	2nd Max Daily 1-hour Average
R02	***	***	***	***	***	***	0	0	***	***	Number Days 1-hour ≥ 0.125 ppm
	***	***	***	***	***	***	0.078	0.063	***	***	4th Max Daily 8-hour Average
	***	***	***	***	***	***	6	1	***	***	Number Days 8-hour ≥ 0.075 ppm
Reading Airport	***	***	***	***	***	***	***	0.098	0.098	0.089	2nd Max Daily 1-hour Average
R03	***	***	***	***	***	***	***	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	***	***	***	***	***	***	***	0.082	0.083	0.072	4th Max Daily 8-hour Average
	***	***	***	***	***	***	***	10	13	1	Number Days 8-hour ≥ 0.075 ppm
Harrisburg Air Basin											
Harrisburg	0.101	0.099	0.126	0.089	0.092	0.106	0.091	0.105	0.092	0.080	2nd Max Daily 1-hour Average
H11	0	0	2	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.079	0.086	0.098	0.074	0.076	0.084	0.077	0.082	0.079	0.063	4th Max Daily 8-hour Average
	6	22	24	3	4	10	6	15	4	0	Number Days 8-hour ≥ 0.075 ppm
Lancaster Air Basin											
Lancaster	0.107	0.127	0.115	0.115	0.097	0.105	0.104	0.104	0.097	0.087	2nd Max Daily 1-hour Average
L01	0	2	0	1	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.090	0.097	0.096	0.083	0.081	0.085	0.085	0.083	0.080	0.069	4th Max Daily 8-hour Average
	9	30	27	6	8	18	11	17	8	1	Number Days 8-hour ≥ 0.075 ppm

Primary and Secondary 8-hour National Ambient Air Quality Standards

8-Hour Mean = 0.075 parts per million for 4th daily maximum 8-hour mean, averaged over 3 years

Former 1-hour = 0.12 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-5. Ozone Historical Trend (cont.).

Units: parts per million

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
York Air Basin											
York	0.112	0.104	0.124	0.114	0.091	0.101	0.094	0.108	0.099	0.083	2nd Max Daily 1-hour Average
Y01	0	0	1	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.090	0.087	0.101	0.081	0.077	0.089	0.077	0.084	0.081	0.068	4th Max Daily 8-hour Average
	11	24	25	6	5	16	5	17	7	0	Number Days 8-hour ≥ 0.075 ppm
Southcentral Region Non-Air Basin											
Perry County	0.099	0.102	0.110	0.095	0.081	0.099	0.094	0.088	0.092	0.072	2nd Max Daily 1-hour Average
305	0	0	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.073	0.089	0.088	0.084	0.069	0.082	0.077	0.073	0.081	0.063	4th Max Daily 8-hour Average
	3	21	23	6	0	12	4	2	6	0	Number Days 8-hour ≥ 0.075 ppm
Hershey	0.110	0.105	0.132	0.099	0.084	0.099	0.096	0.095	0.090	0.080	2nd Max Daily 1-hour Average
306	0	0	2	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.088	0.091	0.094	0.079	0.072	0.085	0.081	0.079	0.078	0.066	4th Max Daily 8-hour Average
	5	33	26	8	1	8	7	11	7	0	Number Days 8-hour ≥ 0.075 ppm
Altoona	0.104	0.107	0.102	0.104	0.083	0.090	0.082	0.081	0.088	0.073	2nd Max Daily 1-hour Average
308	0	0	0	1	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.080	0.083	0.089	0.083	0.073	0.077	0.071	0.071	0.075	0.065	4th Max Daily 8-hour Average
	8	16	24	4	0	4	2	1	2	0	Number Days 8-hour ≥ 0.075 ppm
Kutztown	0.101	0.119	0.106	0.084	***	***	***	***	***	***	2nd Max Daily 1-hour Average
(Grim Sci Bldg)	0	0	0	0	***	***	***	***	***	***	Number Days 1-hour ≥ 0.125 ppm
310	0.080	0.091	0.091	0.072	***	***	***	***	***	***	4th Max Daily 8-hour Average
	4	23	24	3	***	***	***	***	***	***	Number Days 8-hour ≥ 0.075 ppm
Kutztown	***	***	***	***	***	***	***	***	0.092	0.077	2nd Max Daily 1-hour Average
311	***	***	***	***	***	***	***	***	0	0	Number Days 1-hour ≥ 0.125 ppm
	***	***	***	***	***	***	***	***	0.077	0.063	4th Max Daily 8-hour Average
	***	***	***	***	***	***	***	***	7	0	Number Days 8-hour ≥ 0.075 ppm
Methodist Hill	0.100	0.104	0.115	0.085	0.078	0.082	0.078	0.089	0.081	0.067	2nd Max Daily 1-hour Average
313	0	0	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.085	0.095	0.104	0.080	0.071	0.074	0.066	0.077	0.073	0.059	4th Max Daily 8-hour Average
	15	42	42	5	1	1	0	6	0	0	Number Days 8-hour ≥ 0.075 ppm
Biglerville	***	0.096	0.104	0.102	0.079	0.091	0.084	0.091	0.084	0.077	2nd Max Daily 1-hour Average
D14	***	0	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	***	0.088	0.093	0.076	0.072	0.080	0.074	0.081	0.076	0.064	4th Max Daily 8-hour Average
	***	0	22	4	0	13	3	10	4	0	Number Days 8-hour ≥ 0.075 ppm
Lancaster Downwind	***	***	***	***	***	***	***	***	0.098	0.081	2nd Max Daily 1-hour Average
L12	***	***	***	***	***	***	***	***	0	0	Number Days 1-hour ≥ 0.125 ppm
	***	***	***	***	***	***	***	***	0.077	0.066	4th Max Daily 8-hour Average
	***	***	***	***	***	***	***	***	5	0	Number Days 8-hour ≥ 0.075 ppm

Primary and Secondary 8-hour National Ambient Air Quality Standards

8-Hour Mean = 0.075 parts per million for 4th daily maximum 8-hour mean, averaged over 3 years

Former 1-hour = 0.12 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-5. Ozone Historical Trend (cont.).

Units: parts per million

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
York Downwind	***	***	***	***	***	***	***	***	0.101	0.079	2nd Max Daily 1-hour Average
Y11	***	***	***	***	***	***	***	***	0	0	Number Days 1-hour ≥ 0.125 ppm
	***	***	***	***	***	***	***	***	0.078	0.066	4th Max Daily 8-hour Average
	***	***	***	***	***	***	***	***	6	1	Number Days 8-hour ≥ 0.075 ppm
Northcentral Region Non-Air Basin											
State College	0.101	0.097	0.108	0.100	0.081	0.091	0.083	0.087	0.082	0.072	2nd Max Daily 1-hour Average
409	0	0	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.079	0.086	0.090	0.082	0.074	0.083	0.078	0.074	0.074	0.064	4th Max Daily 8-hour Average
	6	17	21	8	2	8	4	3	2	0	Number Days 8-hour ≥ 0.075 ppm
Montoursville	***	***	0.112	0.102	0.091	0.099	0.083	0.091	0.094	0.075	2nd Max Daily 1-hour Average
410	***	***	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	***	***	0.091	0.083	0.074	0.082	0.073	0.077	0.082	0.064	4th Max Daily 8-hour Average
	***	***	25	7	3	9	2	4	6	0	Number Days 8-hour ≥ 0.075 ppm
Moshannon	0.105	0.102	0.106	0.103	0.082	0.096	0.079	0.083	0.085	0.074	2nd Max Daily 1-hour Average
D09	0	0	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.079	0.089	0.095	0.087	0.074	0.086	0.072	0.072	0.077	0.066	4th Max Daily 8-hour Average
	10	18	25	7	1	12	1	2	4	0	Number Days 8-hour ≥ 0.075 ppm
Tiadaghton	0.092	0.089	0.101	0.094	0.080	***	***	***	***	***	2nd Max Daily 1-hour Average
D10	0	0	0	0	0	***	***	***	***	***	Number Days 1-hour ≥ 0.125 ppm
	0.073	0.080	0.084	0.076	0.073	***	***	***	***	***	4th Max Daily 8-hour Average
	3	7	13	4	2	***	***	***	***	***	Number Days 8-hour ≥ 0.075 ppm
Penn Nursery	0.109	0.091	0.113	0.109	0.078	***	***	***	***	***	2nd Max Daily 1-hour Average
D11	0	0	0	0	0	***	***	***	***	***	Number Days 1-hour ≥ 0.125 ppm
	0.075	0.082	0.091	0.093	0.069	***	***	***	***	***	4th Max Daily 8-hour Average
	3	16	33	9	0	***	***	***	***	***	Number Days 8-hour ≥ 0.075 ppm
Tioga County	0.103	0.094	0.118	0.102	0.085	0.086	0.080	0.084	0.087	0.070	2nd Max Daily 1-hour Average
D13	0	0	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.078	0.083	0.093	0.084	0.079	0.080	0.073	0.074	0.073	0.064	4th Max Daily 8-hour Average
	5	18	23	4	5	8	0	2	2	0	Number Days 8-hour ≥ 0.075 ppm
Johnstown Air Basin											
Johnstown	0.104	0.106	0.106	0.098	0.081	0.094	0.085	0.087	0.081	0.072	2nd Max Daily 1-hour Average
J01	0	0	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.086	0.090	0.088	0.083	0.071	0.077	0.073	0.072	0.067	0.064	4th Max Daily 8-hour Average
	10	18	21	5	1	6	0	2	0	0	Number Days 8-hour ≥ 0.075 ppm
Monongahela Valley Air Basin											
Charleroi	0.110	0.102	0.119	0.124	0.085	0.098	0.097	0.095	0.095	0.078	2nd Max Daily 1-hour Average
M01	0	0	1	1	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.080	0.087	0.093	0.088	0.072	0.080	0.079	0.077	0.071	0.068	4th Max Daily 8-hour Average
	9	19	29	7	2	9	4	4	2	0	Number Days 8-hour ≥ 0.075 ppm

Primary and Secondary 8-hour National Ambient Air Quality Standards

8-Hour Mean = 0.075 parts per million for 4th daily maximum 8-hour mean, averaged over 3 years

Former 1-hour = 0.12 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-5. Ozone Historical Trend (cont.).

Units: parts per million

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Lower Beaver Valley Air Basin											
Beaver Falls	0.099	0.109	0.112	0.107	0.085	0.099	0.090	0.092	0.087	0.085	2nd Max Daily 1-hour Average
B11	0	0	0	1	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.084	0.086	0.096	0.078	0.069	0.080	0.069	0.077	0.074	0.068	4th Max Daily 8-hour Average
	8	17	23	7	0	7	2	4	2	0	Number Days 8-hour ≥ 0.075 ppm
Hookstown	0.095	0.101	0.115	0.111	0.090	0.106	0.091	0.096	0.085	0.074	2nd Max Daily 1-hour Average
B23	0	0	0	1	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.077	0.092	0.103	0.087	0.081	0.086	0.082	0.080	0.073	0.066	4th Max Daily 8-hour Average
	6	20	32	9	7	16	8	8	3	0	Number Days 8-hour ≥ 0.075 ppm
Brighton Township	0.096	0.103	0.118	0.107	0.085	0.095	0.090	0.087	0.085	0.078	2nd Max Daily 1-hour Average
B27	0	0	0	1	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.077	0.089	0.104	0.083	0.074	0.086	0.077	0.072	0.075	0.068	4th Max Daily 8-hour Average
	4	19	32	8	3	10	4	3	3	0	Number Days 8-hour ≥ 0.075 ppm
Allegheny County Air Basin											
Pittsburgh	0.111	0.112	0.119	0.110	0.094	0.105	0.092	0.104	0.092	0.075	2nd Max Daily 1-hour Average
D12	0	0	0	1	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.086	0.093	0.100	0.088	0.072	0.092	0.078	0.081	0.074	0.067	4th Max Daily 8-hour Average
	15	20	34	13	2	15	7	11	1	0	Number Days 8-hour ≥ 0.075 ppm
Southwest Region Non-Air Basin											
Florence	0.098	0.106	0.114	0.107	0.083	0.101	0.091	0.094	0.088	0.073	2nd Max Daily 1-hour Average
504	0	0	0	1	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.080	0.089	0.096	0.078	0.073	0.085	0.076	0.075	0.077	0.065	4th Max Daily 8-hour Average
	5	21	28	7	2	11	4	3	4	0	Number Days 8-hour ≥ 0.075 ppm
Washington	0.105	0.109	0.112	0.118	0.086	0.096	0.089	0.084	0.079	0.069	2nd Max Daily 1-hour Average
508	0	0	1	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.080	0.090	0.088	0.088	0.071	0.085	0.070	0.073	0.069	0.063	4th Max Daily 8-hour Average
	7	17	23	7	4	12	1	3	0	0	Number Days 8-hour ≥ 0.075 ppm
Murrysville	0.103	0.097	0.110	0.100	0.092	0.102	0.081	0.098	0.094	0.080	2nd Max Daily 1-hour Average
510	0	0	0	1	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.076	0.078	0.091	0.083	0.070	0.087	0.071	0.079	0.072	0.064	4th Max Daily 8-hour Average
	4	5	20	5	0	10	1	4	2	0	Number Days 8-hour ≥ 0.075 ppm
Kittanning	0.103	0.119	0.122	0.109	0.093	0.104	0.101	0.106	0.094	0.090	2nd Max Daily 1-hour Average
512	0	1	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.079	0.098	0.097	0.086	0.082	0.086	0.080	0.083	0.078	0.071	4th Max Daily 8-hour Average
	7	28	27	10	10	16	11	19	9	1	Number Days 8-hour ≥ 0.075 ppm
Greensburg	0.097	0.100	0.119	0.115	0.094	0.098	0.095	0.088	0.089	0.073	2nd Max Daily 1-hour Average
513	0	0	0	1	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.076	0.084	0.098	0.091	0.073	0.083	0.076	0.077	0.075	0.065	4th Max Daily 8-hour Average
	6	14	23	6	3	10	4	4	2	0	Number Days 8-hour ≥ 0.075 ppm

Primary and Secondary 8-hour National Ambient Air Quality Standards

8-Hour Mean = 0.075 parts per million for 4th daily maximum 8-hour mean, averaged over 3 years

Former 1-hour = 0.12 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-5. Ozone Historical Trend (cont.).

Units: parts per million

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Holbrook	0.106	0.099	0.113	0.106	0.082	0.103	0.092	0.090	0.087	0.076	2nd Max Daily 1-hour Average
514	0	0	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.087	0.090	0.094	0.083	0.075	0.085	0.077	0.078	0.073	0.066	4th Max Daily 8-hour Average
	18	31	21	6	2	19	5	8	1	0	Number Days 8-hour ≥ 0.075 ppm
Strongstown	***	***	***	***	***	0.097	0.093	0.088	0.090	0.079	2nd Max Daily 1-hour Average
515	***	***	***	***	***	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	***	***	***	***	***	0.088	0.073	0.079	0.076	0.066	4th Max Daily 8-hour Average
	***	***	***	***	***	17	3	9	4	1	Number Days 8-hour ≥ 0.075 ppm
Upper Beaver Valley Air Basin											
New Castle	0.090	0.099	0.103	0.106	0.083	0.094	0.088	0.087	0.085	0.076	2nd Max Daily 1-hour Average
B21	0	0	0	1	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.069	0.078	0.087	0.077	0.068	0.075	0.070	0.075	0.069	0.063	4th Max Daily 8-hour Average
	0	5	21	4	1	3	2	3	2	0	Number Days 8-hour ≥ 0.075 ppm
Erie Air Basin											
Erie	0.095	0.104	0.114	0.108	0.089	0.104	0.093	0.102	0.086	0.078	2nd Max Daily 1-hour Average
E10	0	0	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.078	0.089	0.098	0.091	0.074	0.086	0.077	0.084	0.074	0.069	4th Max Daily 8-hour Average
	7	14	25	7	3	16	4	13	2	1	Number Days 8-hour ≥ 0.075 ppm
Northwest Region Non-Air Basin											
Farrell	0.098	0.113	0.118	0.116	0.088	0.104	0.102	0.101	0.097	0.081	2nd Max Daily 1-hour Average
606	0	0	0	0	0	0	0	0	0	0	Number Days 1-hour ≥ 0.125 ppm
	0.081	0.094	0.103	0.087	0.076	0.087	0.079	0.083	0.078	0.070	4th Max Daily 8-hour Average
	7	38	30	9	4	19	8	14	7	1	Number Days 8-hour ≥ 0.075 ppm

Primary and Secondary 8-hour National Ambient Air Quality Standards

8-Hour Mean = 0.075 parts per million for 4th daily maximum 8-hour mean, averaged over 3 years

Former 1-hour = 0.12 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-6. Sulfur Dioxide Summary.

Year: 2009

Units: parts per million

				Maximum Daily (Block) Averages				3-Hour Block Averages				1-Hour Average	
				1st Maximum		2nd Maximum		1st Maximum		2nd Maximum		Maximum	
Site Name	PA Site Code	Percent Valid Data	Annual Mean	24HR Mean	Date MM/DD	24HR Mean	Date MM/DD	3HR Mean	Date MM/DD	3HR Mean	Date MM/DD	1HR Mean	Date MM/DD
Southeast Pennsylvania Air Basin													
Bristol	P01	94	0.006	0.018	01/30	0.018	02/06	0.037	01/27	0.033	01/27	0.039	01/27
Chester	P11	92	0.006	0.018	01/23	0.015	01/22	0.035	01/23	0.027	03/05	0.051	01/23
Norristown	P21	98	0.004	0.017	01/27	0.015	01/23	0.047	01/27	0.045	01/26	0.050	01/26
Allentown-Bethlehem-Easton Air Basin													
Easton	A20	97	0.004	0.016	01/22	0.015	01/23	0.031	02/03	0.026	03/07	0.054	03/07
Scranton-Wilkes-Barre Air Basin													
Wilkes-Barre	S28	98	0.003	0.018	01/22	0.015	02/07	0.032	01/22	0.026	02/06	0.035	01/22
Reading Air Basin													
Reading Airport	R03	99	0.004	0.012	01/13	0.012	02/26	0.044	01/13	0.041	07/28	0.058	06/30
York Air Basin													
York	Y01	99	0.003	0.021	01/26	0.014	03/27	0.054	03/27	0.054	07/17	0.111	06/24
Southcentral Region Non-Air Basin													
Perry County	305	96	0.002	0.014	01/26	0.011	03/15	0.045	03/15	0.030	01/26	0.054	03/15
Altoona	308	100	0.004	0.032	01/26	0.021	01/19	0.064	01/26	0.049	01/25	0.071	01/26
Northcentral Region Non-Air Basin													
State College	409	99	0.003	0.016	01/17	0.016	01/22	0.026	01/21	0.025	01/21	0.040	05/19
Johnstown Air Basin													
Johnstown	J01	98	0.004	0.026	08/24	0.018	08/23	0.081	08/23	0.080	08/24	0.093	08/24
Monongahela Valley Air Basin													
Charleroi	M01	99	0.005	0.026	02/17	0.022	11/10	0.082	01/17	0.082	02/17	0.164	02/17
Lower Beaver Valley Air Basin													
Hookstown	B23	98	0.007	0.039	01/08	0.027	07/24	0.108	02/24	0.080	07/24	0.141	02/24
Brighton Township	B27	99	0.007	0.048	05/20	0.041	04/27	0.211	04/27	0.120	05/20	0.431	04/27
Allegheny County Air Basin													
Pittsburgh	D12	94	0.004	0.020	12/24	0.018	03/15	0.057	03/15	0.053	01/01	0.087	02/17

Primary National Ambient Air Quality Standards: Annual Mean = 0.030 parts per million;

24-hour Mean (Daily Block Average) = 0.14 parts per million, not to be exceeded more than once per year

Secondary National Ambient Air Quality Standard: 3-hour Mean (Block Average) = 0.5 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-6. Sulfur Dioxide Summary (cont.).

Year: 2009

Units: parts per million

				Maximum Daily (Block) Averages				3-Hour Block Averages				1-Hour Average	
				1st Maximum		2nd Maximum		1st Maximum		2nd Maximum		Maximum	
Site Name	PA Site Code	Percent Valid Data	Annual Mean	24HR Mean	Date MM/DD	24HR Mean	Date MM/DD	3HR Mean	Date MM/DD	3HR Mean	Date MM/DD	1HR Mean	Date MM/DD
Southwest Region Non-Air Basin													
Florence	504	99	0.004	0.017	05/29	0.017	11/29	0.068	01/26	0.051	08/05	0.147	08/05
Holbrook	514	58	0.003*	0.010	04/29	0.010	07/20	0.039	04/14	0.034	07/20	0.068	04/05
Strongstown	515	96	0.005	0.024	01/26	0.021	01/22	0.073	01/26	0.069	01/25	0.088	08/25
Upper Beaver Valley Air Basin													
New Castle	B21	99	0.003	0.022	08/04	0.018	02/06	0.078	08/04	0.053	08/04	0.097	08/25
Erie Air Basin													
Erie	E10	93	0.008	0.022	02/25	0.020	02/26	0.037	02/25	0.031	01/01	0.043	01/29
Northwest Region Non-Air Basin													
Warren Overlook	612	91	0.006	0.042	02/25	0.032	11/14	0.091	05/20	0.082	03/17	0.137	07/10

Primary National Ambient Air Quality Standards: Annual Mean = 0.030 parts per million;

24-hour Mean (Daily Block Average) = 0.14 parts per million, not to be exceeded more than once per year

Secondary National Ambient Air Quality Standard: 3-hour Mean (Block Average) = 0.5 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-7. Sulfur Dioxide Historical Trend.

Units: parts per million

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Southeast Pennsylvania Air Basin											
Bristol	0.007	0.006	0.008	0.008	0.004	0.006	0.005	0.006	0.004	0.006	Annual Mean
P01	0.027	0.029	0.028	0.029	0.023	0.023	0.022	0.021	0.016	0.018	2nd Max 24-hour Mean
	0.044	0.041	0.041	0.042	0.035	0.034	0.033	0.032	0.021	0.033	2nd Max 3-hour Mean
Chester	0.008	0.007	0.006	0.006	0.005	0.006	0.005	0.010	0.006	0.006	Annual Mean
P11	0.026	0.023	0.022	0.028	0.019	0.016	0.017	0.022	0.017	0.015	2nd Max 24-hour Mean
	0.048	0.045	0.044	0.049	0.038	0.043	0.043	0.042	0.037	0.027	2nd Max 3-hour Mean
Norristown	0.004	0.004	0.005	0.005	0.004	0.006	0.007	0.005	0.004	0.004	Annual Mean
P21	0.022	0.019	0.019	0.023	0.018	0.018	0.019	0.014	0.012	0.015	2nd Max 24-hour Mean
	0.032	0.041	0.031	0.036	0.027	0.031	0.033	0.023	0.024	0.045	2nd Max 3-hour Mean
Allentown-Bethlehem-Easton Air Basin											
Allentown	0.007	0.007	0.008	0.009	0.007	0.008	0.006	0.005	0.004	***	Annual Mean
A19	0.027	0.028	0.028	0.038	0.045	0.032	0.032	0.019	0.024	***	2nd Max 24-hour Mean
	0.053	0.044	0.041	0.058	0.068	0.072	0.042	0.043	0.041	***	2nd Max 3-hour Mean
Easton	0.008	0.014	0.006	0.008	0.013	0.009	0.011	0.008	0.004	0.004	Annual Mean
A20	0.023	0.030	0.024	0.037	0.044	0.034	0.147	0.063	0.017	0.015	2nd Max 24-hour Mean
	0.069	0.055	0.046	0.054	0.096	0.080	0.256	0.140	0.034	0.026	2nd Max 3-hour Mean
Freemansburg	0.006	0.004	0.006	0.004	0.005	0.007	0.005	0.004	0.004	***	Annual Mean
A25	0.020	0.019	0.020	0.018	0.023	0.021	0.019	0.015	0.013	***	2nd Max 24-hour Mean
	0.034	0.028	0.046	0.036	0.036	0.058	0.038	0.037	0.026	***	2nd Max 3-hour Mean
Scranton-Wilkes-Barre Air Basin											
Scranton	0.004	0.005	0.004	0.005	0.005	0.005	0.004	0.005	0.003	***	Annual Mean
S01	0.021	0.026	0.023	0.020	0.016	0.025	0.016	0.018	0.015	***	2nd Max 24-hour Mean
	0.038	0.044	0.036	0.034	0.030	0.035	0.040	0.031	0.024	***	2nd Max 3-hour Mean
Wilkes-Barre	0.006	0.008	0.008	0.005	0.005	0.005	0.005	0.005	0.005	0.003	Annual Mean
S28	0.026	0.031	0.024	0.021	0.019	0.019	0.017	0.016	0.017	0.015	2nd Max 24-hour Mean
	0.052	0.048	0.044	0.035	0.035	0.034	0.039	0.032	0.044	0.026	2nd Max 3-hour Mean
Northeast Region Non-Air Basin											
Shenandoah	0.006	0.007	0.006	0.006	0.007	0.006	0.005	0.006	***	***	Annual Mean
211	0.025	0.035	0.026	0.023	0.027	0.027	0.021	0.020	***	***	2nd Max 24-hour Mean
	0.053	0.052	0.140	0.045	0.058	0.044	0.067	0.036	***	***	2nd Max 3-hour Mean
Reading Air Basin											
Reading	0.008	0.007	0.007	0.008	0.008	0.008	0.007*	***	***	***	Annual Mean
R01	0.028	0.025	0.019	0.023	0.020	0.023	0.016	***	***	***	2nd Max 24-hour Mean
	0.075	0.091	0.083	0.087	0.068	0.075	0.041	***	***	***	2nd Max 3-hour Mean
Reading Airport	***	***	***	***	***	***	***	0.004*	0.006	0.004	Annual Mean
R03	***	***	***	***	***	***	***	0.014	0.017	0.012	2nd Max 24-hour Mean
	***	***	***	***	***	***	***	0.034	0.040	0.041	2nd Max 3-hour Mean

Primary National Ambient Air Quality Standards: Annual Mean = 0.030 parts per million;

24-hour Mean (Daily Block Average) = 0.14 parts per million, not to be exceeded more than once per year

Secondary National Ambient Air Quality Standard: 3-hour Mean (Block Average) = 0.5 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-7. Sulfur Dioxide Historical Trend (cont.).

Units: parts per million

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Harrisburg Air Basin											
Harrisburg	0.005	0.005	0.005	0.005	0.004	0.005	0.005	0.005	0.003	***	Annual Mean
H11	0.015	0.013	0.017	0.017	0.018	0.020	0.014	0.015	0.016	***	2nd Max 24-hour Mean
	0.026	0.056	0.048	0.048	0.061	0.054	0.045	0.042	0.048	***	2nd Max 3-hour Mean
Lancaster Air Basin											
Lancaster	0.005	0.004	0.005	0.005	0.005	0.006	0.005	0.005	0.005	***	Annual Mean
L01	0.024	0.018	0.014	0.018	0.017	0.022	0.018	0.018	0.016	***	2nd Max 24-hour Mean
	0.048	0.036	0.034	0.032	0.049	0.050	0.044	0.051	0.049	***	2nd Max 3-hour Mean
York Air Basin											
York	0.006	0.006	0.005	0.004	0.005	0.006	0.005	0.005	0.004	0.003	Annual Mean
Y01	0.020	0.019	0.014	0.012	0.020	0.030	0.021	0.023	0.015	0.014	2nd Max 24-hour Mean
	0.059	0.043	0.036	0.039	0.070	0.099	0.075	0.122	0.065	0.054	2nd Max 3-hour Mean
Southcentral Region Non-Air Basin											
Perry County	0.003	0.002	0.003	0.005	0.003	0.003	0.002	0.003	0.003	0.002	Annual Mean
305	0.015	0.010	0.008	0.017	0.013	0.010	0.014	0.011	0.014	0.011	2nd Max 24-hour Mean
	0.034	0.036	0.026	0.033	0.030	0.028	0.030	0.022	0.034	0.030	2nd Max 3-hour Mean
Altoona	0.006	0.009	0.007	0.007	0.006	0.007	0.007	0.006	0.005	0.004	Annual Mean
308	0.045	0.042	0.032	0.030	0.030	0.036	0.024	0.022	0.019	0.021	2nd Max 24-hour Mean
	0.071	0.066	0.051	0.060	0.065	0.066	0.049	0.044	0.042	0.049	2nd Max 3-hour Mean
Northcentral Region Non-Air Basin											
State College	***	***	0.004	0.006	0.004	0.005	0.002	0.002	0.003	0.003	Annual Mean
409	***	***	0.023	0.019	0.019	0.018	0.011	0.011	0.011	0.016	2nd Max 24-hour Mean
	***	***	0.044	0.031	0.028	0.036	0.024	0.023	0.032	0.025	2nd Max 3-hour Mean
Montoursville	***	***	0.003	0.005	0.003	0.005	0.005	0.003	0.003	***	Annual Mean
410	***	***	0.015	0.017	0.015	0.018	0.027	0.015	0.016	***	2nd Max 24-hour Mean
	***	***	0.027	0.070	0.032	0.044	0.047	0.052	0.030	***	2nd Max 3-hour Mean
Johnstown Air Basin											
Johnstown	0.007	0.008	0.007	0.008	0.007	0.007	0.008	0.006	0.006	0.004	Annual Mean
J01	0.026	0.031	0.025	0.028	0.037	0.037	0.024	0.026	0.026	0.018	2nd Max 24-hour Mean
	0.065	0.078	0.074	0.074	0.115	0.097	0.072	0.049	0.056	0.080	2nd Max 3-hour Mean
Monongahela Valley Air Basin											
Charleroi	0.008	0.007	0.007	0.006	0.008	0.010	0.008	0.010	0.008	0.005	Annual Mean
M01	0.031	0.022	0.023	0.029	0.021	0.030	0.021	0.025	0.018	0.022	2nd Max 24-hour Mean
	0.059	0.107	0.070	0.079	0.051	0.064	0.063	0.099	0.073	0.082	2nd Max 3-hour Mean
Lower Beaver Valley Air Basin											
Beaver Falls	0.007	0.008	0.007	0.007	0.007	0.007	0.007	0.008	0.005	***	Annual Mean
B11	0.036	0.032	0.030	0.031	0.026	0.032	0.023	0.023	0.019	***	2nd Max 24-hour Mean
	0.070	0.076	0.064	0.082	0.064	0.065	0.053	0.053	0.041	***	2nd Max 3-hour Mean

Primary National Ambient Air Quality Standards: Annual Mean = 0.030 parts per million;

24-hour Mean (Daily Block Average) = 0.14 parts per million, not to be exceeded more than once per year

Secondary National Ambient Air Quality Standard: 3-hour Mean (Block Average) = 0.5 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-7. Sulfur Dioxide Historical Trend (cont.).

Units: parts per million

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Hookstown	0.011	0.011	0.010	0.010	0.009	0.009	0.009	0.009	0.008	0.007	Annual Mean
B23	0.039	0.037	0.038	0.045	0.048	0.034	0.036	0.036	0.038	0.027	2nd Max 24-hour Mean
	0.126	0.108	0.115	0.118	0.126	0.096	0.084	0.124	0.096	0.080	2nd Max 3-hour Mean
Brighton Township	0.012	0.014	0.014	0.011	0.012	0.013	0.009	0.010	0.008	0.007	Annual Mean
B27	0.086	0.072	0.075	0.083	0.046	0.050	0.054	0.044	0.037	0.041	2nd Max 24-hour Mean
	0.247	0.249	0.319	0.174	0.150	0.202	0.231	0.128	0.125	0.120	2nd Max 3-hour Mean
Allegheny County Air Basin											
Pittsburgh	0.010	0.009	0.010	0.010	0.007	0.008	0.007	0.006	0.005	0.004	Annual Mean
D12	0.037	0.033	0.024	0.028	0.024	0.022	0.020	0.021	0.019	0.018	2nd Max 24-hour Mean
	0.078	0.077	0.075	0.066	0.057	0.061	0.068	0.054	0.057	0.053	2nd Max 3-hour Mean
Southwest Region Non-Air Basin											
Florence	0.009	0.009	0.010	0.010	0.009	0.010	0.006	0.006	0.004	0.004	Annual Mean
504	0.031	0.039	0.037	0.033	0.034	0.047	0.029	0.025	0.016	0.017	2nd Max 24-hour Mean
	0.100	0.102	0.092	0.100	0.081	0.080	0.062	0.113	0.043	0.051	2nd Max 3-hour Mean
Washington	0.009	0.010	0.009	0.009	0.009	0.009	0.009	0.008	0.007	***	Annual Mean
508	0.027	0.038	0.032	0.028	0.026	0.027	0.024	0.020	0.019	***	2nd Max 24-hour Mean
	0.059	0.069	0.080	0.078	0.067	0.078	0.063	0.053	0.067	***	2nd Max 3-hour Mean
Greensburg	0.010	0.009	0.006	0.008	0.006	0.006	0.005	0.005	0.005	***	Annual Mean
513	0.029	0.027	0.024	0.029	0.023	0.030	0.021	0.023	0.021	***	2nd Max 24-hour Mean
	0.071	0.053	0.048	0.070	0.058	0.083	0.068	0.049	0.053	***	2nd Max 3-hour Mean
Holbrook	0.007*	0.006*	0.007*	0.006*	0.006*	0.006*	0.006*	0.006*	0.006*	0.003*	Annual Mean
514	0.022	0.023	0.022	0.029	0.028	0.021	0.017	0.018	0.017	0.010	2nd Max 24-hour Mean
	0.062	0.070	0.055	0.077	0.062	0.059	0.046	0.064	0.053	0.034	2nd Max 3-hour Mean
Strongstown	***	***	***	***	***	0.008	0.008	0.007	0.007	0.005	Annual Mean
515	***	***	***	***	***	0.032	0.028	0.029	0.024	0.021	2nd Max 24-hour Mean
	***	***	***	***	***	0.112	0.108	0.081	0.071	0.069	2nd Max 3-hour Mean
Upper Beaver Valley Air Basin											
New Castle	0.008	0.011	0.007	0.009	0.007	0.008	0.007	0.008	0.005	0.003	Annual Mean
B21	0.031	0.041	0.033	0.028	0.035	0.037	0.024	0.027	0.021	0.018	2nd Max 24-hour Mean
	0.079	0.120	0.082	0.076	0.072	0.089	0.065	0.083	0.049	0.053	2nd Max 3-hour Mean
Erie Air Basin											
Erie	0.008	0.010	0.011	0.011	0.008	0.011	0.009	0.010	0.010	0.008	Annual Mean
E10	0.041	0.043	0.037	0.038	0.029	0.041	0.023	0.021	0.019	0.020	2nd Max 24-hour Mean
	0.076	0.098	0.070	0.078	0.077	0.071	0.040	0.034	0.036	0.031	2nd Max 3-hour Mean
Northwest Region Non-Air Basin											
Farrell	0.007	0.007	0.006	0.006	0.006	0.005	0.005	0.005	0.005	***	Annual Mean
606	0.024	0.033	0.024	0.025	0.019	0.022	0.019	0.015	0.019	***	2nd Max 24-hour Mean
	0.052	0.071	0.067	0.067	0.044	0.045	0.035	0.040	0.032	***	2nd Max 3-hour Mean

Primary National Ambient Air Quality Standards: Annual Mean = 0.030 parts per million;

24-hour Mean (Daily Block Average) = 0.14 parts per million, not to be exceeded more than once per year

Secondary National Ambient Air Quality Standard: 3-hour Mean (Block Average) = 0.5 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-7. Sulfur Dioxide Historical Trend (cont.).

Units: parts per million

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Warren (High School)	0.006	0.007	0.006	0.006	0.004	0.004	0.004	0.004	0.003	***	Annual Mean
611	0.024	0.027	0.023	0.028	0.019	0.018	0.017	0.037	0.018	***	2nd Max 24-hour Mean
	0.070	0.075	0.066	0.067	0.037	0.050	0.047	0.063	0.029	***	2nd Max 3-hour Mean
Warren (Overlook)	0.013	0.016	0.014	0.014	0.010	0.015	0.011	0.009	0.008	0.006	Annual Mean
612	0.092	0.087	0.100	0.103	0.061	0.075	0.086	0.049	0.036	0.032	2nd Max 24-hour Mean
	0.214	0.209	0.273	0.249	0.212	0.235	0.200	0.129	0.125	0.082	2nd Max 3-hour Mean

Primary National Ambient Air Quality Standards: Annual Mean = 0.030 parts per million;

24-hour Mean (Daily Block Average) = 0.14 parts per million, not to be exceeded more than once per year

Secondary National Ambient Air Quality Standard: 3-hour Mean (Block Average) = 0.5 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-8. Nitrogen Dioxide Summary.

Year: 2009

Units: parts per million

Site Name	PA Site Code	Percent Valid Data	Annual Mean	1st Maximum 1-HR Mean	1st Maximum Date MM/DD	2nd Maximum 1-HR Mean	2nd Maximum Date MM/DD	3rd Maximum 1-HR Mean	3rd Maximum Date MM/DD	4th Maximum 1-HR Mean	4th Maximum Date MM/DD
Southeast Pennsylvania Air Basin											
Bristol	P01	92	0.011	0.061	03/05	0.060	02/02	0.055	02/02	0.055	03/05
Chester	P11	99	0.012	0.130	01/22	0.104	01/23	0.103	01/22	0.099	01/22
Allentown-Bethlehem-Easton Air Basin											
Freemansburg	A25	98	0.011	0.056	03/16	0.048	02/07	0.047	02/02	0.047	03/16
Scranton-Wilkes-Barre Air Basin											
Scranton	S01	98	0.010	0.049	01/22	0.048	01/12	0.048	02/01	0.048	02/01
Reading Air Basin											
Reading Airport	R03	97	0.008	0.043	04/14	0.039	01/19	0.039	03/04	0.039	04/08
Harrisburg Air Basin											
Harrisburg	H11	98	0.011	0.051	01/23	0.050	01/23	0.049	01/24	0.049	02/02
Lancaster Air Basin											
Lancaster	L01	97	0.010	0.046	10/21	0.043	11/08	0.042	02/02	0.042	11/08
York Air Basin											
York	Y01	99	0.013	0.059	02/02	0.057	02/02	0.055	01/23	0.055	04/09
Southcentral Region Non-Air Basin											
Perry County	305	92	0.004	0.031	02/26	0.029	02/06	0.028	02/06	0.028	02/26
Arendtsville	314	56	0.003*	0.021	10/28	0.020	10/28	0.020	10/28	0.019	04/14
Northcentral Region Non-Air Basin											
State College	409	98	0.006	0.041	01/23	0.040	02/01	0.040	02/06	0.039	10/21
Johnstown Air Basin											
Johnstown	J01	99	0.009	0.048	01/23	0.048	01/23	0.047	11/09	0.046	11/09
Monongahela Valley Air Basin											
Charleroi	M01	98	0.010	0.041	11/09	0.041	11/10	0.041	11/10	0.041	11/10
Lower Beaver Valley Air Basin											
Beaver Falls	B11	95	0.011	0.053	11/09	0.052	02/10	0.051	01/23	0.050	02/10
Allegheny County Air Basin											
Pittsburgh	D12	96	0.013	0.059	11/09	0.058	02/10	0.052	01/23	0.052	11/08

Primary and Secondary National Ambient Air Quality Standard

Annual Mean 0.053 parts per million

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-8. Nitrogen Dioxide Summary (cont.).

Year: 2009

Units: parts per million

Site Name	PA Site Code	Percent Valid Data	Annual Mean	1st Maximum 1-HR Mean	1st Maximum Date MM/DD	2nd Maximum 1-HR Mean	2nd Maximum Date MM/DD	3rd Maximum 1-HR Mean	3rd Maximum Date MM/DD	4th Maximum 1-HR Mean	4th Maximum Date MM/DD
Erie Air Basin											
Erie	E10	97	0.008	0.044	02/02	0.043	02/02	0.042	02/02	0.041	04/17

Primary and Secondary National Ambient Air Quality Standard

Annual Mean 0.053 parts per million

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-9. Oxides of Nitrogen Summary.

Year: 2009

Units: parts per million

Site Name	PA Site Code	Percent Valid Data	Annual Mean	1st Maximum 1-HR Mean	1st Maximum Date MM/DD	2nd Maximum 1-HR Mean	2nd Maximum Date MM/DD	3rd Maximum 1-HR Mean	3rd Maximum Date MM/DD	4th Maximum 1-HR Mean	4th Maximum Date MM/DD
Southeast Pennsylvania Air Basin											
Bristol	P01	92	0.020	0.454	02/02	0.413	02/02	0.398	01/30	0.377	02/02
Chester	P11	99	0.019	0.315	01/22	0.270	01/30	0.265	01/30	0.247	01/22
Allentown-Bethlehem-Easton Air Basin											
Freemansburg	A25	98	0.016	0.231	01/23	0.227	01/23	0.206	01/23	0.203	02/02
Scranton-Wilkes-Barre Air Basin											
Scranton	S01	98	0.015	0.200	01/22	0.186	01/12	0.178	01/22	0.166	01/12
Reading Air Basin											
Reading Airport	R03	98	0.012	0.177	01/20	0.151	01/20	0.139	03/04	0.130	01/19
Harrisburg Air Basin											
Harrisburg	H11	98	0.017	0.341	01/23	0.314	01/23	0.264	02/25	0.260	01/23
Lancaster Air Basin											
Lancaster	L01	96	0.015	0.254	02/02	0.238	01/23	0.203	01/23	0.200	02/02
York Air Basin											
York	Y01	99	0.021	0.395	01/23	0.337	02/02	0.306	02/02	0.305	01/23
Southcentral Region Non-Air Basin											
Perry County	305	92	0.005	0.039	02/06	0.039	02/07	0.036	02/06	0.034	12/02
Arendtsville	314	56	0.004*	0.028	10/28	0.027	10/28	0.026	10/28	0.026	10/28
Northcentral Region Non-Air Basin											
State College	409	98	0.007	0.154	01/23	0.129	02/10	0.118	01/23	0.118	02/10
Johnstown Air Basin											
Johnstown	J01	99	0.013	0.208	02/10	0.198	02/10	0.197	02/10	0.196	01/23
Monongahela Valley Air Basin											
Charleroi	M01	99	0.016	0.218	02/10	0.191	02/10	0.171	11/09	0.170	02/10
Lower Beaver Valley Air Basin											
Beaver Falls	B11	98	0.018	0.278	02/10	0.259	01/23	0.258	02/10	0.247	01/23
Allegheny County Air Basin											
Pittsburgh	D12	96	0.022	0.342	02/10	0.258	02/10	0.246	11/09	0.225	02/10
Erie Air Basin											
Erie	E10	97	0.012	0.253	02/23	0.163	04/16	0.160	11/13	0.151	11/12

No Primary or Secondary Air Quality Standards

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-10. Nitrogen Dioxide Historical Trend.

Annual Means

Units: parts per million

Site Name	PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Southeast Pennsylvania Air Basin											
Bristol	P01	0.017	0.018	0.016	0.016	0.016	0.017	0.015	0.013	0.013	0.011
Chester	P11	0.019	0.019	0.018	0.018	0.018	0.017	0.016	0.015	0.015	0.012
Norristown	P21	0.018	0.017	0.015	0.017	0.014	0.016	0.014	0.014	0.013	***
Allentown-Bethlehem-Easton Air Basin											
Allentown	A19	0.013	0.017	0.014	0.015	0.013	0.014	0.012	0.012	0.011	***
Freemansburg	A25	0.017	0.016	0.013	0.013	0.014	0.015	0.012	0.012	0.012	0.011
Scranton-Wilkes-Barre Air Basin											
Scranton	S01	0.015	0.015	0.014	0.014	0.012	0.013	0.011	0.011	0.012	0.010
Wilkes-Barre	S28	0.014	0.014	0.013	0.013	0.012	0.013	0.011	0.011	0.011	***
Reading Air Basin											
Reading	R01	0.020	0.020	0.019	0.018	0.017	0.019	0.018*	***	***	***
Reading Airport	R03	***	***	***	***	***	***	***	0.011*	0.010	0.008
Harrisburg Air Basin											
Harrisburg	H11	0.017	0.018	0.016	0.016	0.015	0.015	0.013	0.014	0.013	0.011
Lancaster Air Basin											
Lancaster	L01	0.014	0.014	0.013	0.015	0.014	0.014	0.013	0.012	0.011	0.010
York Air Basin											
York	Y01	0.018	0.020	0.017	0.017	0.016	0.018	0.016	0.015	0.014	0.013
Southcentral Region Non-Air Basin											
Perry County	305	0.007	0.006	0.006	0.006	0.005	0.005	0.004	0.004	0.005	0.004
Altoona	308	0.014	0.014	0.013	0.013	0.012	0.013	0.012	0.011	0.011	***
Arendtsville	314	0.004*	0.004*	0.004*	0.004*	0.004*	0.004*	0.004*	0.004*	0.003*	0.003
Northcentral Region Non-Air Basin											
State College	409	***	***	0.008	0.008	0.009	0.009	0.008	0.007	0.006	0.006
Johnstown Air Basin											
Johnstown	J01	0.015	0.014	0.012	0.013	0.013	0.013	0.012	0.012	0.011	0.009
Monongahela Valley Air Basin											
Charleroi	M01	0.014	0.013	0.013	0.012	0.012	0.013	0.013	0.013	0.012	0.010
Lower Beaver Valley Air Basin											
Beaver Falls	B11	0.017	0.017	0.016	0.015	0.015	0.017	0.015	0.014	0.013	0.011
Allegheny County Air Basin											
Pittsburgh	D12	0.022	0.021	0.020	0.021	0.021	0.022	0.018	0.019	0.018	0.013
Southwest Region Non-Air Basin											
Florence	504	0.008	0.008	0.006	0.013	0.006	0.007	0.005	0.006	0.005	***
Washington	508	0.015	0.015	0.012	0.012	0.013	0.014	0.012	0. 013	0.011	***

Primary and Secondary National Ambient Air Quality Standard

Annual Mean 0.053 parts per million

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-10. Nitrogen Dioxide Historical Trend (cont.).

Annual Means

Units: parts per million

Site Name	PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Greensburg	513	0.017	0.017	0.016	0.015	0.013	0.013	0.011	0.011	0.009	***
Strongstown	515	***	***	***	***	***	0.006	0.006	0.006	0.006	***
Upper Beaver Valley Air Basin											
New Castle	B21	0.019	0.017	0.016	0.016	0.016	0.017	0.016	0.015	0.012	***
Erie Air Basin											
Erie	E10	0.012	0.012	0.012	0.012	0.012	0.013	0.011	0.011	0.009	0.008

Primary and Secondary National Ambient Air Quality Standard

Annual Mean 0.053 parts per million

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-11. Carbon Monoxide Summary.

Year: 2009

Units: parts per million

Site Name	PA Site Code	Percent Valid Data	1st Maximum 1-HR Mean	1st Maximum Date MM/DD	2nd Maximum 1-HR Mean	2nd Maximum Date MM/DD	1st Maximum 8-HR Mean	1st Maximum Date MM/DD	2nd Maximum 8-HR Mean	2nd Maximum Date MM/DD
Southeast Pennsylvania Air Basin										
Bristol	P01	96	2.4	09/18	2.4	09/18	2.3	09/18	2.3	09/20
Allentown-Bethlehem-Easton Air Basin										
Freemansburg	A25	98	2.4	01/23	2.2	01/23	2.0	01/23	1.7	01/13
Scranton-Wilkes-Barre Air Basin										
Scranton	S01	99	1.7	01/12	1.7	01/12	0.8	01/12	0.8	01/22
Reading Air Basin										
Reading Airport	R03	98	3.7	06/06	3.2	06/06	1.2	01/30	1.2	02/07
Harrisburg Air Basin										
Harrisburg	H11	99	1.1	01/23	1.1	02/11	0.9	02/25	0.9	03/05
York Air Basin										
York	Y01	99	2.5	01/23	2.4	01/23	1.7	02/02	1.4	01/23
Southcentral Region Non-Air Basin										
Arendtsville	314	55	1.1	07/01	1.0	08/19	0.5	08/19	0.4	07/01
Johnstown Air Basin										
Johnstown	J01	100	2.3	02/10	2.3	02/10	1.9	02/10	1.4	02/11
Monongahela Valley Air Basin										
Charleroi	M01	99	1.3	03/11	1.2	01/23	0.7	02/10	0.7	03/05
Allegheny County Air Basin										
Pittsburgh	D12	88	2.0	07/04	1.8	02/10	1.2	02/07	1.2	11/10
Upper Beaver Valley Air Basin										
New Castle	B21	96	1.7	02/10	1.2	02/10	1.2	12/27	1.0	12/23
Erie Air Basin										
Erie	E10	98	2.5	11/12	1.8	11/13	1.2	12/26	1.1	02/02

Primary National Ambient Air Quality Standards

1-hour Mean = 35 parts per million

8-hour Running Mean = 9 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-12. Carbon Monoxide Historical Trend.

Units: parts per million

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Southeast Pennsylvania Air Basin											
Bristol	4.3	4.0	4.3	4.5	3.2	3.8	2.8	2.1	2.9	2.4	2nd Max 1-hour Mean
P01	3.6	3.1	2.4	2.8	2.2	2.3	2.1	1.2	1.9	2.3	2nd Max 8-hour Mean
Norristown	2.8	2.5	2.7	2.4	1.9	1.7	2.0	1.4	1.2	***	2nd Max 1-hour Mean
P21	1.7	1.7	2.3	1.8	1.4	1.2	1.4	1.1	0.9	***	2nd Max 8-hour Mean
Allentown-Bethlehem-Easton Air Basin											
Freemansburg	5.5	3.1	2.3	2.3	2.4	2.5	1.3	4.0	2.0	2.2	2nd Max 1-hour Mean
A25	2.4	2.4	1.8	1.4	1.7	1.9	0.9	2.4	1.6	1.7	2nd Max 8-hour Mean
Allentown (CBD)	4.1	4.0	4.4	***	***	***	***	***	***	***	2nd Max 1-hour Mean
A51	2.6	3.3	2.3	***	***	***	***	***	***	***	2nd Max 8-hour Mean
Scranton-Wilkes-Barre Air Basin											
Scranton	4.4	2.9	2.7	2.4	2.9	2.6	2.3	2.2	1.4	1.7	2nd Max 1-hour Mean
S01	2.1	1.8	1.6	1.5	1.8	1.5	1.4	1.5	1.0	0.8	2nd Max 8-hour Mean
Wilkes-Barre (CBD)	3.8	2.8	5.1	3.2	2.4	2.4	2.3	***	***	***	2nd Max 1-hour Mean
S27	2.2	2.3	2.6	2.3	1.8	1.9	1.6	***	***	***	2nd Max 8-hour Mean
Wilkes-Barre	***	***	***	***	***	***	2.5	2.4	2.6	***	2nd Max 1-hour Mean
S28	***	***	***	***	***	***	1.6	1.6	1.5	***	2nd Max 8-hour Mean
Northeast Region Non-Air Basin											
Shenandoah	2.6	2.0	2.3	2.8	1.5	2.6	2.1	1.9	***	***	2nd Max 1-hour Mean
211	1.3	0.9	1.2	1.4	0.8	1.4	1.3	1.4	***	***	2nd Max 8-hour Mean
Reading Air Basin											
Reading	3.8	3.8	4.1	3.2	2.5	2.4	1.8	***	***	***	2nd Max 1-hour Mean
R01	2.3	2.2	2.2	2.0	1.8	1.9	1.2	***	***	***	2nd Max 8-hour Mean
Reading Airport	***	***	***	***	***	***	***	0.8	1.3	3.2	2nd Max 1-hour Mean
R03	***	***	***	***	***	***	***	0.6	0.9	1.2	2nd Max 8-hour Mean
Harrisburg Air Basin											
Harrisburg	***	***	***	***	***	***	1.7	1.6	1.4	1.1	2nd Max 1-hour Mean
H11	***	***	***	***	***	***	1.3	1.2	1.1	0.9	2nd Max 8-hour Mean
Harrisburg (CBD)	3.5	4.4	3.6	3.0	2.3	2.0	1.8	***	***	***	2nd Max 1-hour Mean
H16	2.1	2.8	2.3	2.0	1.3	1.3	1.2	***	***	***	2nd Max 8-hour Mean
Lancaster Air Basin											
Lancaster	3.0	2.9	3.0	2.7	3.2	2.5	2.2	1.7	2.1	***	2nd Max 1-hour Mean
L01	1.9	2.2	2.2	1.7	1.6	1.5	1.3	1.3	1.5	***	2nd Max 8-hour Mean
York Air Basin											
York	3.7	3.8	4.3	2.6	2.8	2.5	3.3	2.5	2.0	2.4	2nd Max 1-hour Mean
Y01	1.8	2.2	2.2	1.7	1.8	1.4	1.8	1.4	1.2	1.4	2nd Max 8-hour Mean

Primary National Ambient Air Quality Standards

1-hour Mean = 35 parts per million

8-hour Running Mean = 9 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-12. Carbon Monoxide Historical Trend (cont.).

Units: parts per million

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Southcentral Region Non-Air Basin											
Altoona	1.7	2.4	1.5	1.6	2.3	1.9	1.9	1.6	2.0	***	2nd Max 1-hour Mean
308	1.0	1.1	0.7	1.2	0.9	1.1	0.9	1.0	0.8	***	2nd Max 8-hour Mean
Arendtsville	1.4	1.4	1.0	0.7	1.7	0.3	1.3	0.9	0.8	1.0	2nd Max 1-hour Mean
314	1.2	1.2	0.6	0.4	1.6	0.3	1.2	0.6	0.4	0.4	2nd Max 8-hour Mean
Johnstown Air Basin											
Johnstown	2.8	2.8	3.9	3.0	2.0	1.7	2.1	3.1	2.2	2.3	2nd Max 1-hour Mean
J01	2.0	2.1	2.6	2.2	2.1	1.2	1.5	1.9	1.6	1.4	2nd Max 8-hour Mean
Monongahela Valley Air Basin											
Charleroi	1.8	1.4	1.7	1.6	1.8	1.6	3.2	1.6	1.4	1.2	2nd Max 1-hour Mean
M01	1.1	1.1	1.0	1.0	1.4	1.1	1.1	1.4	1.1	0.7	2nd Max 8-hour Mean
Lower Beaver Valley Air Basin											
Beaver Falls	1.7	2.4	2.1	1.6	1.7	1.6	2.0	1.8	2.0	***	2nd Max 1-hour Mean
B11	1.2	1.5	1.6	1.1	1.2	1.4	1.5	0.9	1.3	***	2nd Max 8-hour Mean
Allegheny County Air Basin											
Pittsburgh	3.2	3.0	2.5	2.4	2.0	1.9	1.5	2.0	1.8	1.8	2nd Max 1-hour Mean
D12	2.4	2.5	2.0	2.0	1.7	1.5	1.4	1.3	1.5	1.2	2nd Max 8-hour Mean
Southwest Region Non-Air Basin											
Greensburg	2.6	3.0	2.1	3.1	2.1	1.3	1.6	1.5	1.0	***	2nd Max 1-hour Mean
513	1.8	1.8	1.2	2.1	1.4	0.9	0.9	0.9	0.5	***	2nd Max 8-hour Mean
Holbrook	0.6	1.3	0.3	0.6	0.6	0.7	1.9	1.0	0.5	***	2nd Max 1-hour Mean
514	0.3	1.1	0.3	0.3	0.3	0.7	1.3	0.6	0.3	***	2nd Max 8-hour Mean
Upper Beaver Valley Air Basin											
New Castle	3.5	3.0	4.1	3.3	2.8	2.4	2.7	1.6	1.2	1.2	2nd Max 1-hour Mean
B21	1.9	2.0	1.8	1.8	1.8	1.5	2.2	1.0	0.7	1.0	2nd Max 8-hour Mean
Erie Air Basin											
Erie	***	***	***	***	***	3.1	2.3	1.4	1.6	1.8	2nd Max 1-hour Mean
E10	***	***	***	***	***	1.4	1.4	1.0	1.0	1.1	2nd Max 8-hour Mean
Erie (CBD)	11.9	7.2	7.5	7.6	1.8	***	***	***	***	***	2nd Max 1-hour Mean
E12	6.0	4.4	4.5	3.4	1.3	***	***	***	***	***	2nd Max 8-hour Mean

Primary National Ambient Air Quality Standards

1-hour Mean = 35 parts per million

8-hour Running Mean = 9 parts per million, not to be exceeded more than once per year

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-13. $PM_{2.5}$ Particulate Matter Summary,

Federal Reference Method (FRM) and Federal Equivalent Method (FEM) Monitors

Year: 2009

Units: micrograms per cubic meter / local conditions

Site Name	PA Site Code	Arithmetic Annual Mean	Number 24HR Means	Maximum 24-hour Means: 1st Maximum 24HR Mean	1st Maximum Date MM/DD	2nd Maximum 24HR Mean	2nd Maximum Date MM/DD	3rd Maximum 24HR Mean	3rd Maximum Date MM/DD	4th Maximum 24HR Mean	4th Maximum Date MM/DD	98th PCTL 24HR Mean
Southeast Pennsylvania Air Basin												
Bristol	P01	10.84	319	35.5	01/31	35.2	01/19	31.6	11/09	27.2	04/24	25.8
Chester[2]	P11	12.38	347	37.6	03/15	37.6	11/10	35.5	11/09	35.2	01/19	27.9
Norristown	P21	10.38	330	34.9	03/15	32.0	01/19	28.6	02/07	28.5	08/26	27.2
New Garden Airport[3]	P30	14.06	332	44.7	11/09	43.5	01/19	40.1	11/10	34.3	08/04	31.1
Allentown-Bethlehem-Easton Air Basin												
Freemansburg[3]	A25	11.90	342	42.0	01/24	31.7	01/19	31.7	12/07	30.8	08/17	30.1
Scranton-Wilkes-Barre Air Basin												
Scranton[3]	S01	9.32	338	26.4	01/28	25.1	06/09	24.5	01/23	23.8	08/04	23.4
Reading Air Basin												
Reading Airport	R03	10.92	331	38.1	06/08	35.6	03/15	33.3	02/07	32.5	01/19	28.8
Harrisburg Air Basin												
Harrisburg[1]	H11	12.15	340	42.5	11/09	41.5	03/15	40.8	02/07	36.5	03/16	33.0
Lancaster Air Basin												
Lancaster	L01	12.19	336	35.3	03/15	33.6	02/07	33.3	11/09	32.8	11/10	29.4
York Air Basin												
York	Y01	11.67	346	45.1	01/19	35.6	03/16	33.0	03/15	28.9	11/09	26.6
Southcentral Region Non-Air Basin												
Arendtsville[3]	314	11.03	338	33.5	03/16	30.2	11/09	28.8	08/09	28.3	06/11	26.5
Carlisle	316	10.95	347	39.9	03/15	39.4	03/16	34.7	02/07	34.4	11/09	30.2
Carlisle (BAM)	316	13.67	349	41.8	03/16	40.1	03/15	39.8	11/09	37.8	02/07	35.2
Northcentral Region Non-Air Basin												
State College	409	9.36	333	24.9	02/10	24.0	06/08	23.9	01/18	23.8	08/09	22.6
Johnstown Air Basin												
Johnstown	J01	11.92	337	33.4	12/31	32.8	02/26	31.4	08/16	30.0	08/24	28.7
Johnstown (BAM)	J01	12.42*	263	35.6	08/24	34.4	12/31	33.6	08/16	31.7	09/05	30.0
Monongahela Valley Air Basin												
Charleroi[2]	M01	12.56	350	35.5	02/09	32.8	11/10	30.7	05/25	30.7	08/13	29.0

Primary and Secondary National Ambient Air Quality Standards

Annual Mean (3-year average) = 15 micrograms per cubic meter

24-hour Mean (3-year average of 98th Percentile) = 35 micrograms per cubic meter

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-13. $PM_{2.5}$ Particulate Matter Summary,

Federal Reference Method (FRM) and Federal Equivalent Method (FEM) Monitors (cont).

Year: 2009

Units: micrograms per cubic meter / local conditions

Lower Beaver Valley Air Basin												
Beaver Falls												
	B11	13.00	336	33.2	08/16	31.9	05/24	31.0	02/10	30.1	01/20	28.7
Southwest Region Non-Air Basin												
Florence[3]												
Washington	504	12.15	340	32.5	08/16	31.6	08/15	30.8	08/09	27.7	07/11	25.8
Kittanning	508	11.11	344	30.9	03/22	30.8	03/21	27.2	02/09	26.5	08/09	25.3
Greensburg[3]	512	11.02*	182	32.9	08/09	30.7	08/16	27.5	08/17	26.9	11/09	26.9
	513	13.51*	337	38.2	01/27	36.8	08/27	36.7	08/16	34.5	08/09	33.3
Erie Air Basin												
Erie [3]												
Bristol	E10	9.56*	310	37.5	08/16	31.1	02/26	31.1	08/17	29.1	08/15	27.5
Northwest Region Non-Air Basin												
Farrell	606	10.39	353	42.4	01/15	31.9	08/15	29.0	08/17	28.2	08/09	24.2

[1] Manual FRM monitor replaced with continuous FEM monitor January 2009 at the Harrisburg site
[2] Manual FRM monitor replaced with continuous FEM monitor April 2009 at the Chester and Charleroi sites
[3] Manual FRM monitor replaced with continuous FEM monitor July 2009 at the New Garden, Freemansburg, Scranton, Arendtsville, Florence, Greensburg and Erie sites

Primary and Secondary National Ambient Air Quality Standards

Annual Mean (3-year average) = 15 micrograms per cubic meter

24-hour Mean (3-year average of 98th Percentile) = 35 micrograms per cubic meter

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-14. $PM_{2.5}$ Particulate Matter Summary, Non-FEM Continuous Method Monitors.

Year: 2009

Units: micrograms per cubic meter / local conditions

				Maximum 24-hour Means								
				1st Maximum		2nd Maximum		3rd Maximum		4th Maximum		
Site Name	PA Site Code	Arithmetic Annual Mean	Number 24HR Means	24HR Mean	Date MM/DD	24HR Mean	Date MM/DD	24HR Mean	Date MM/DD	24HR Mean	Date MM/DD	98th PCTL 24HR Mean
Southeast Pennsylvania Air Basin												
Norristown (TEOM)	P21	11.33	239	35.0	11/09	31.2	11/10	29.1	08/26	27.3	12/07	26.7
Reading Air Basin												
Reading Airport (TEOM)	R03	12.89	300	38.9	11/09	36.2	03/15	35.6	07/29	34.8	03/16	33.9
Lancaster Air Basin												
Lancaster (TEOM)	L01	14.80	354	39.5	02/07	38.8	03/15	38.5	06/08	36.9	03/07	33.3
York Air Basin												
York (TEOM)	Y01	16.14	291	41.7	03/16	38.1	03/15	37.6	11/09	37.1	11/10	34.3
Lower Beaver Valley Air Basin												
Beaver Falls (TEOM)	B11	14.43	360	37.7	02/10	37.6	08/16	35.5	02/09	34.4	01/23	32.2

The $PM_{2.5}$ Primary and Secondary National Ambient Air Quality Standards are not applicable to these methods, but are provided below for reference purposes only

Annual Mean (3-year average) = 15 micrograms per cubic meter

24-hour Mean (3-year average of 98th Percentile) = 35 micrograms per cubic meter

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-15. $PM_{2.5}$ Particulate Matter 24- Hour Maximums Days Greater than 35 µg/m^3, 24-Hour 98^{th} Percentiles and Annual Means Summary (2007 – 2009), Federal Reference Method (FRM) and Federal Equivalent (FEM) Monitors.

Units: micrograms per cubic meter / local conditions

Station	24-Hour Design Value	Annual Design Value	2007 24-Hr 98th Percentile	2007 Wtd. Annual Mean	2008 24-Hr Days > 35	2008 24-Hr 98th Percentile	2008 Wtd. Annual Mean	2009 24-Hr Days > 35	2009 24-Hr 98th Percentile	2009 Wtd. Annual Mean
Frankford (Lab)	32	12.5	35.4	13.74	5	34.5	13.01	2	25.9	10.80
Northeast (Airport)	30	11.6*	33.5	12.85	3	30.5	11.99	0	25.5	9.91
Broad St	32	13.0*	35.2	14.37	8	32.8	13.50	6	27.2	11.07
Ritner St	32	12.4			5	34.5	13.49	3	28.6	11.29
Spring Garden St	31	12.1*	33.1	12.04	7	32.8	13.29	2	28.3	11.09
Southwest (Elmwood)	32	13.3*	31.7	13.33						
Bristol	31	12.2*	35.0	13.02	2	30.9	12.66	1	25.8	10.84
Chester	30	13.6	34.5	14.45	2	28.6	13.84	3	27.9	12.38
Norristown	27	11.7	30.1	13.09	1	23.7	11.66	0	27.2	10.38
New Garden	34	13.9*	38.1	14.07	2	32.0	13.68	3	31.1	14.06
Freemansburg	34	12.5	37.9	13.31	5	33.1	12.26	1	30.1	11.90
Scranton	28	10.2	32.0	11.28	1	27.7	10.06	0	23.4	9.32
Reading Airport	30	12.9	33.9	15.28	1	28.4	12.48	2	28.8	10.92
Harrisburg	34	13.2	35.6	14.28	4	34.3	13.18	4	33.0	12.15
Lancaster	35	13.8	39.6	15.40	2	35.0	13.93	0	29.4	12.19
York	32	13.7	37.0	15.68	1	32.3	13.64	3	26.6	11.67
Arendtsville	29	11.6	30.7	12.31	3	30.5	11.45	0	26.5	11.03
Carlisle	33	12.6	35.3	13.70	4	33.7	13.03	8	29.9	11.06
State College	28	10.7	33.1	11.93	2	29.7	10.79	0	22.6	9.36
Johnstown	32	13.4*	34.6	14.42	1	32.2	13.86	1	28.7	11.87
Charleroi	32	13.7	40.9	15.51	2	27.2	13.03	1	29.0	12.56
Beaver Falls	33	14.1*	38.2	15.72	2	31.2	13.69	0	28.7	13.00
Florence	31	12.4*	41.2	13.79	1	26.4	11.30	0	25.8	12.15
Washington	30	12.7	37.9	14.83	0	25.6	12.27	0	25.3	11.11
Kittanning	27	11.0						0	26.9	11.02
Greensburg	34	13.8*	38.2	15.26	0	29.2	12.67	3	33.3	13.51
Lawrenceville	32	13.1	39.8	14.89	3	30.3	12.87	0	24.7	11.62
Liberty	50	17.0	54.7	18.88	38	50.0	17.00	15	45.3	15.02
South Fayette	30	11.7*	42.4	13.47	0	25.5	10.77	0	22.5	10.76
North Park	28	11.3*	32.9	13.02				0	23.1	9.61
Coraopolis	26	11.5*	32.8	13.64				0	19.6	9.43
Natrona	33	13.7*	39.9	15.06	2	32.1	13.39	1	25.9	12.67
North Braddock	37	14.2	43.7	16.38	7	36.3	14.15	0	30.7	12.11
Clairton	32	13.2	35.0	15.11	1	34.6	13.32	0	25.9	11.26
Erie	30	10.8*	35.1	12.06	1	28.8	10.72	1	27.5	9.56
Farrell	30	11.7	34.9	13.16	1	30.3	11.61	1	24.2	10.39

Primary and Secondary National Ambient Air Quality Standards

Annual Mean (3-year average) = 15 micrograms per cubic meter

24-hour Mean (3-year average of 98th Percentile) = 35 micrograms per cubic meter

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-16. $PM_{2.5}$ Particulate Matter Historical Trend,

Federal Reference Method (FRM) and Federal Equivalent Method (FEM) Monitors.

Units: micrograms per cubic meter / local conditions

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Southeast Pennsylvania Air Basin											
Bristol	13.8*	14.6	14.2	14.4	13.0*	14.3	12.2*	13.02*	12.66*	10.84	Annual Mean
P01	38.4	38.5	37.2	39.6	29.9	35.4	34.2	35.0	30.9	25.8	98th Percentile 24-hour Mean
Chester	15.9	16.0	14.6	15.3	15.0	16.5	14.0*	14.45	13.84	12.38	Annual Mean
P11	36.2	39.5	31.9	37.8	30.5	37.0	36.7	34.5	28.6	27.9	98th Percentile 24-hour Mean
Norristown	13.6*	15.1*	13.7	13.9	12.0*	12.5*	12.1	13.09	11.66	10.38	Annual Mean
P21	37.5	47.6	36.8	37.5	28.8	32.8	36.4	30.1	23.7	27.2	98th Percentile 24-hour Mean
New Garden Airport	***	***	14.7	15.6	14.3*	15.9*	12.6*	14.07*	13.68*	14.06	Annual Mean
P30	***	***	33.7	38.5	32.7	33.7	38.3	38.1	32.0	31.1	98th Percentile 24-hour Mean
Allentown-Bethlehem-Easton Air Basin											
Allentown	14.3	15.3*	13.1*	15.0*	14.0	14.5	***	***	***	***	Annual Mean
A19	38.2	44.5	38.9	36.6	35.9	36.7	***	***	***	***	98th Percentile 24-hour Mean
Freemansburg	13.6*	15.5	14.1	14.3	13.7	14.2	12.8	13.31	12.26	11.90	Annual Mean
A25	37.3	42.9	40.9	37.8	35.2	39.1	38.3	37.9	33.1	30.1	98th Percentile 24-hour Mean
Scranton-Wilkes-Barre Air Basin											
Scranton	11.7	12.9	12.4	12.5	11.6	12.5	10.6	11.28	10.06	9.32	Annual Mean
S01	31.5	36.7	42.7	33.8	31.2	32.8	28.7	32	27.7	23.4	98th Percentile 24-hour Mean
Wilkes-Barre	12.7	13.8	12.0*	13.1	12.2	13.0	***	***	***	***	Annual Mean
S28	32.9	37.4	28.2	35.1	30.8	31.5	***	***	***	***	98th Percentile 24-hour Mean
Reading Air Basin											
Reading	16.9	16.5	16.7*	16.1	15.6	16.8	12.2*	***	***	***	Annual Mean
R01	37.5	43	48.5	45	33.1	39.4	36.9	***	***	***	98th Percentile 24-hour Mean
Reading (Temporary)	***	***	***	***	***	***	14.9*	13.26*	***	***	Annual Mean
R02	***	***	***	***	***	***	39.4	43.6	***	***	98th Percentile 24-hour Mean
Reading Airport	***	***	***	***	***	***	***	15.28*	12.48	10.92	Annual Mean
R03	***	***	***	***	***	***	***	33.9	28.4	28.8	98th Percentile 24-hour Mean
Harrisburg Air Basin											
Harrisburg	15.4*	16.6	14.5	16.2	15.7	15.5	14.0	14.28	13.18	12.15	Annual Mean
H11	45.6	47.7	42.7	41.5	35.5	40.1	37	35.6	34.3	33.0	98th Percentile 24-hour Mean
Lancaster Air Basin											
Lancaster	17.8	17.3	16.2	17.6	16.6	18.2	14.1	15.40	13.93	12.19	Annual Mean
L01	47	42.1	40.2	51.5	35.5	45.2	34.9	39.6	35.0	29.4	98th Percentile 24-hour Mean
York Air Basin											
York	16.7	16.9	17.1	17.4	16.5	18.1	14.0	15.68	13.64	11.67	Annual Mean
Y01	41.1	41.3	47.3	47	39	39.4	33.2	37	32.3	26.6	98th Percentile 24-hour Mean

The $PM_{2.5}$ Primary and Secondary National Ambient Air Quality Standards are not applicable to these methods, but are provided below for reference purposes only

Annual Mean (3-year average) = 15 micrograms per cubic meter

24-hour Mean (3-year average of 98th Percentile) = 35 micrograms per cubic meter

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-16. $PM_{2.5}$ Particulate Matter Historical Trend,

Federal Reference Method (FRM) and Federal Equivalent Method (FEM) Monitors (cont.).

Units: micrograms per cubic meter / local conditions

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Southcentral Region Non-Air Basin											
Perry County	12.2	12.6	13.3	13.1*	12.2	13.1	***	***	***	***	Annual Mean
305	30.2	33.7	36.9	34.5	27.9	29	***	***	***	***	98th Percentile 24-hour Mean
Arendtsville	13.1*	14.1	12.6	13.6	13.7	13.6	11.8	12.31	11.45	11.03	Annual Mean
314	36.5	36	38.9	36.5	36.3	35.8	33.6	30.7	30.5	26.5	98th Percentile 24-hour Mean
Carlisle	***	15.6	14.4	15.3	15.1	14.9	13.0	13.70	13.03	10.95	Annual Mean
316	***	45	41.5	41.6	39.1	40.1	33.3	35.3	33.7	30.2	98th Percentile 24-hour Mean
Carlisle (BAM)										13.67	Annual Mean
316										35.2	99th Percentile 24-hour Mean
Northcentral Region Non-Air Basin											
State College	***	13.9*	11.9*	13.6	13.3	13.4	11.4	11.93	10.79	9.36	Annual Mean
409	***	45	36.9	35.4	37.8	39.7	31.7	33.1	29.7	22.6	98th Percentile 24-hour Mean
Johnstown Air Basin											
Johnstown	16.1*	15.5*	16.1	15.5	14.4	16.8	14.8	14.42*	13.86	11.92	Annual Mean
J01	35.4	42.1	46.6	36.8	36.2	43.2	39	34.6	32.2	28.7	98th Percentile 24-hour Mean
Johnstown (BAM)										12.42*	Annual Mean
J01										30.0	99th Percentile 24-hour Mean
Monongahela Valley Air Basin											
Charleroi	15.5*	15.7	15.2	14.9	14.0	16.4	14.4	15.51	13.03	12.56	Annual Mean
M01	36	44.4	43.3	35.6	35.4	36.4	31.6	40.9	27.2	29.0	98th Percentile 24-hour Mean
Lower Beaver Valley Air Basin											
Beaver Falls	15.9*	16.5	15.3	15.7	15.4	18.3	14.9	15.72*	13.69	13.00	Annual Mean
B11	43.6	42.4	37.7	33.8	43	51.8	37	38.2	31.2	28.7	98th Percentile 24-hour Mean
Southwest Region Non-Air Basin											
Florence	13.3	14.3*	13.6*	13.4	13.2	14.2	11.9*	13.79	11.30*	12.15	Annual Mean
504	30.5	35.5	36.7	33.9	36	39.2	39.3	41.2	26.4	25.8	98th Percentile 24-hour Mean
Washington	15.1	15.8*	14.7	14.7	14.1	15.9	13.1*	14.83	12.27	11.11	Annual Mean
508	33.3	36.6	37.2	33.4	34	33.1	33	37.9	25.6	25.3	98th Percentile 24-hour Mean
Kittanning										11.02*	Annual Mean
512										26.9	99th Percentile 24-hour Mean
Greensburg	16.0*	15.9	14.9*	15.3	14.9	16.8	14.3	15.26	12.67	13.51*	Annual Mean
513	37.2	36	40	34.8	39	38.7	33.5	38.2	29.2	33.3	98th Percentile 24-hour Mean
Erie Air Basin											
Erie	13.8*	13.8*	13.3*	12.6*	11.9	14.4	11.3*	12.06	10.72	9.56*	Annual Mean
E10	28.2	37.5	42.9	29.7	32.5	40.7	30.2	35.1	28.8	27.5	98th Percentile 24-hour Mean

Primary and Secondary National Ambient Air Quality Standards

Annual Mean (3-year average) = 15 micrograms per cubic meter

24-hour Mean (3-year average of 98th Percentile) = 35 micrograms per cubic meter

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-16. PM$_{2.5}$ Particulate Matter Historical Trend,

Federal Reference Method (FRM) and Federal Equivalent Method (FEM) Monitors (cont.).

Units: micrograms per cubic meter / local conditions

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Northwest Region Non-Air Basin											
Farrell	***	14.9*	14.0	13.8	13.4	14.1	11.8*	13.16	11.61	10.39	Annual Mean
606	***	43	36.6	35.4	34.5	39	30.7	34.9	30.3	24.2	98th Percentile 24-hour Mean

Primary and Secondary National Ambient Air Quality Standards

Annual Mean (3-year average) = 15 micrograms per cubic meter

24-hour Mean (3-year average of 98th Percentile) = 35 micrograms per cubic meter

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-17. $PM_{2.5}$ Particulate Matter Historical Trend, Non-FEM Continuous Method Monitors.

Units: micrograms per cubic meter / local conditions

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Southeast Pennsylvania Air Basin											
Norristown (TEOM)	***	***	***	***	17.6	18.6	17.8	21.41	22.92	11.33	Annual Mean
P21	***	***	***	***	40.4	42.3	44.5	45.0	44.0	26.7	98th Percentile 24-hour Mean
Reading Air Basin											
Reading (TEOM)	***	***	***	***	15.3*	18.1*	13.6*	***	***	***	Annual Mean
R01	***	***	***	***	35.3	42.4	36.1	***	***	***	98th Percentile 24-hour Mean
Reading (Temp) (TEOM)	***	***	***	***	***	***	18.0*	15.08	***	***	Annual Mean
R02	***	***	***	***	***	***	45.4	36.9	***	***	98th Percentile 24-hour Mean
Reading Airport (TEOM)	***	***	***	***	***	***	***	16.72	16.07	12.89	Annual Mean
R03	***	***	***	***	***	***	***	41.2	43.2	33.9	98th Percentile 24-hour Mean
Harrisburg Air Basin											
Harrisburg (BAM)	***	***	***	***	21.2*	18.6	15.7	14.75	14.63	***	Annual Mean
H11	***	***	***	***	43.4	48.9	43.8	36.4	37.5	***	98th Percentile 24-hour Mean
Lancaster Air Basin											
Lancaster (TEOM)	***	***	***	***	18.7	18.0	18.7	20.45	16.25	14.80	Annual Mean
L01	***	***	***	***	46.1	44.7	46.9	46.6	45.6	33.3	98th Percentile 24-hour Mean
York Air Basin											
York (TEOM)	***	***	***	***	17.7*	16.8	16.9	16.68	14.92	16.14	Annual Mean
Y01	***	***	***	***	38.8	44.3	42.5	43.3	38.4	34.3	98th Percentile 24-hour Mean
Southcentral Region Non-Air Basin											
Arendtsville (TEOM)	***	13.8	13.4	13.3	12.3	11.4	13.6	14.23	13.57	***	Annual Mean
314	***	38.0	39.3	33.4	32.4	34.1	34.2	34.3	30.5	***	98th Percentile 24-hour Mean
Johnstown Air Basin											
Johnstown (BAM)	***	***	***	***	16.1*	16.9	15.8	16.04	15.40	***	Annual Mean
J01	***	***	***	***	40.4	45.8	40.9	42.8	36.7	***	98th Percentile 24-hour Mean
Monongahela Valley Air Basin											
Charleroi (BAM)	***	***	***	***	***	***	10.0*	14.10	16.28	***	Annual Mean
M01	***	***	***	***	***	***	18.9	40.9	36.6	***	98th Percentile 24-hour Mean
Lower Beaver Valley Air Basin											
Beaver Falls (TEOM)	***	***	***	***	17.9*	17.1	15.4	16.19	13.84	14.43	Annual Mean
B11	***	***	***	***	45.7	48.1	39.8	44.0	31.5	32.2	98th Percentile 24-hour Mean
Southwest Region Non-Air Basin											
Kittanning (TEOM)	12.2	14.9	14.3*	12.4	14.3	14.6	13.3	13.58	12.17	***	Annual Mean
512	29.0	42.0	48.3	28.8	37.8	41.2	37.3	36.0	28.2	***	98th Percentile 24-hour Mean

The $PM_{2.5}$ Primary and Secondary National Ambient Air Quality Standards are not applicable to these methods, but are provided below for reference purposes only

Annual Mean (3-year average) = 15 micrograms per cubic meter

24-hour Mean (3-year average of 98th Percentile) = 35 micrograms per cubic meter

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-18. PM_{10} Particulate Matter Summary.

Year: 2009

Units: micrograms per cubic meter / standard conditions

				Maximum 24-hour Means							
				1st Maximum		2nd Maximum		3rd Maximum		4th Maximum	
Site Name	PA Site Code	Arithmetic Annual Mean	Number 24HR Means	24HR Mean	Date MM/DD	24HR Mean	Date MM/DD	24HR Mean	Date MM/DD	24HR Mean	Date MM/DD
Southeast Pennsylvania Air Basin											
Chester (TEOM)	P11	17.6	356	37	06/29	36	09/10	36	11/09	36	11/10
Allentown-Bethlehem-Easton Air Basin											
Allentown (TEOM)	A19	15.1	345	51	02/07	40	01/23	37	11/09	34	03/07
Nazareth (TEOM)	A26	18.0	330	78	01/23	53	02/07	47	10/22	44	08/18
Scranton-Wilkes-Barre Air Basin											
Wilkes-Barre (TEOM)	S28	14.4	365	43	01/23	39	03/07	37	03/06	37	08/04
Reading Air Basin											
Reading Airport (TEOM)	R03	9.2	364	27	06/08	27	08/26	24	11/09	23	08/04
Harrisburg Air Basin											
Harrisburg (TEOM)	H11	16.4	358	48	01/23	47	11/09	41	03/07	38	02/07
Lancaster Air Basin											
Lancaster (TEOM)	L01	16.0	361	43	08/26	41	11/09	37	01/23	37	03/07
York Air Basin											
York (TEOM)	Y01	18.3	354	51	01/23	40	03/07	39	11/09	39	11/10
Southcentral Region Non-Air Basin											
Altoona (TEOM)	308	15.5	362	56	03/06	39	08/09	37	08/04	37	11/09
Northcentral Region Non-Air Basin											
Montoursville	410	14.6*	52	36	11/09	35	08/17	29	02/06	29	10/22
Johnstown Air Basin											
Johnstown (TEOM)	J01	17.4	344	59	02/26	49	02/09	45	03/06	45	08/26
Monongahela Valley Air Basin											
Charleroi	M01	18.6	57	39	11/09	35	05/25	35	09/04	34	08/05
Lower Beaver Valley Air Basin											
Beaver Falls (TEOM)	B11	18.5	353	70	12/30	51	02/26	48	11/09	43	12/18
Upper Beaver Valley Air Basin											
New Castle (TEOM)	B21	22.1	356	61	10/21	60	05/21	59	02/10	56	03/06

Primary and Secondary National Ambient Air Quality Standards

24-hour Mean = 150 micrograms per cubic meter (3-year average, not to be exceeded more than once per year)

Former Annual Mean = 50 micrograms per cubic meter (3-year average)

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-18. PM_{10} Particulate Matter Summary (cont.).

Year: 2009

Units: micrograms per cubic meter / standard conditions

				Maximum 24-hour Means							
				1st Maximum		2nd Maximum		3rd Maximum		4th Maximum	
Site Name	PA Site Code	Arithmetic Annual Mean	Number 24HR Means	24HR Mean	Date MM/DD	24HR Mean	Date MM/DD	24HR Mean	Date MM/DD	24HR Mean	Date MM/DD
Erie Air Basin											
Erie (TEOM)	E10	13.1*	332	42	08/09	36	08/16	35	03/06	35	11/08

Primary and Secondary National Ambient Air Quality Standards

24-hour Mean = 150 micrograms per cubic meter (3-year average, not to be exceeded more than once per year)

Former Annual Mean = 50 micrograms per cubic meter (3-year average)

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-19. PM_{10} Particulate Matter Historical Trend.

Units: micrograms per cubic meter

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Southeast Pennsylvania Air Basin											
Bristol (TEOM)	39	59	64	74	59	56	52	48	45	***	2nd Max 24-hour Average
P01	18	21	18	19	18	18	17	16.6	15.5	***	Annual Mean
Chester (TEOM)	45	66	111	74	63	58	63	46	51	36	2nd Max 24-hour Average
P11	22	23	20	21	23	21	20	18.8	19.4	17.6	Annual Mean
Norristown (TEOM)	41	58	72	55	52	58	55	48	44	***	2nd Max 24-hour Average
P21	19	20	16	19	17	19	17	16.4	15.2	***	Annual Mean
Allentown-Bethlehem-Easton Air Basin											
Allentown (TEOM)	78	78	90	49	45	54	52	45	45	40	2nd Max 24-hour Average
A19	29	21	18	18	15	18	17	14.5	15.5	15.1	Annual Mean
Freemansburg (TEOM)	85	64	90	68	59	55	50	54	50	***	2nd Max 24-hour Average
A25	35	20	20	19	19	19	18	18	16.5	***	Annual Mean
Nazareth (TEOM)	76	101	107	114	115	139	88	70	114	53	2nd Max 24-hour Average
A26	28	30	29	33	32	38	28	20.6	25.9	18.0	Annual Mean
Scranton-Wilkes-Barre Air Basin											
Scranton (TEOM)	40	60	74	66	43	55	52	49	42	***	2nd Max 24-hour Average
S01	16	20	18	17	16	17	17	17.4	16.3	***	Annual Mean
Wilkes-Barre (TEOM)	45	65	69	77	50	58	56	57	44	39	2nd Max 24-hour Average
S28	18	20	19	21	17	20	18	18.5	15.9	14.4	Annual Mean
Reading Air Basin											
Reading (TEOM)	44	66	82	54	52	60	34	***	***	***	2nd Max 24-hour Average
R01	20	22	20	19	20	21	13*	***	***	***	Annual Mean
Reading Airport (TEOM)	***	***	***	***	***	***	***	38	39	27	2nd Max 24-hour Average
R03	***	***	***	***	***	***	***	14.1*	12.2	9.2	Annual Mean
Reading (Central)	50	57	59	50	45	58	47	43	51	***	2nd Max 24-hour Average
R15	27	24	25	25	20	24*	21	21.5*	21.5	***	Annual Mean
Harrisburg Air Basin											
Harrisburg (TEOM)	53	62	72	66	61	56	53	53	47	47	2nd Max 24-hour Average
H11	21	22	20	21	21	21	20	19.9	18.8	16.4	Annual Mean
Lancaster Air Basin											
Lancaster (TEOM)	55	69	107	53	54	63	58	51	48	41	2nd Max 24-hour Average
L01	21	23	21	20	20	20	19	19.2	17.9	16.0	Annual Mean
York Air Basin											
York (TEOM)	53	73	85	77	53	67	62	58	51	40	2nd Max 24-hour Average
Y01	22	24	21	24	22	24	23	21.9	20.3	18.3	Annual Mean

Primary and Secondary National Ambient Air Quality Standards

24-hour Mean = 150 micrograms per cubic meter (3-year average, not to be exceeded more than once per year)

Former Annual Mean = 50 micrograms per cubic meter (3-year average)

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-19. PM_{10} Particulate Matter Historical Trend (cont.).

Units: micrograms per cubic meter

Site Name/PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Southcentral Region Non-Air Basin											
Altoona (TEOM)	50	76	67	95	63	74	63	68	53	39	2nd Max 24-hour Average
308	20	24	22	20	20	21	19	18	17.6	15.5	Annual Mean
Northcentral Region Non-Air Basin											
Montoursville	***	***	55	41	41	39	38	31	41	35	2nd Max 24-hour Average
410	***	***	20	20	18*	20	17	16.7*	16.9	14.6*	Annual Mean
Johnstown Air Basin											
Johnstown (TEOM)	50	99	68	67	61	73	61	63	52	49	2nd Max 24-hour Average
J01	21	24	24	22	22	24	23	20.9	20.2	17.4	Annual Mean
Monongahela Valley Air Basin											
Charleroi (TEOM)	78	71	62	67	64	75	58	61	50	35	2nd Max 24-hour Average
M01	21	25	21	19	20	23	21	21.4	19.0	18.6	Annual Mean
Monessen	57	58	66	56	60	53	49	55	54	***	2nd Max 24-hour Average
M16	31	31	30	29	25	30	25	27.4	25.1	***	Annual Mean
Lower Beaver Valley Air Basin											
Beaver Falls (TEOM)	51	81	86	77	64	74	81	88	62	51	2nd Max 24-hour Average
B11	22	26	25	22	23	26	26	26.4	20.4	18.5	Annual Mean
Southwest Region Non-Air Basin											
Florence	39	46	59	42	46	47	48	49	46	***	2nd Max 24-hour Average
504	22	20	21	20	16	21	17	21.0*	18.0*	***	Annual Mean
Greensburg (TEOM)	45	61	60	63	50	68	50	61	47	***	2nd Max 24-hour Average
513	19	23	22	22	20*	23	20	20.6	17.6	***	Annual Mean
Upper Beaver Valley Air Basin											
New Castle (TEOM)	61	83	77	89	65	78	72	82	76	60	2nd Max 24-hour Average
B21	28	32	29	26	26	26	27	26.6	27.4	22.1	Annual Mean
Erie Air Basin											
Erie (TEOM)	41	61	60	54	48	53	46	56	65	36	2nd Max 24-hour Average
E10	18	19	19	16	14*	16	15	16.1	16.2*	13.1*	Annual Mean

Primary and Secondary National Ambient Air Quality Standards

24-hour Mean = 150 micrograms per cubic meter (3-year average, not to be exceeded more than once per year)

Former Annual Mean = 50 micrograms per cubic meter (3-year average)

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-20. Lead Suspended Particulate Matter Summary.

Year: 2009

Units: micrograms per cubic meter

Site Name	PA Site Code	Number of Samples	3-Month Averages 1st Maximum	Month	2nd Maximum	Month	3rd Maximum	Month	4th Maximum	Month
Southeast Pennsylvania Air Basin										
Chester	P11	47	0.04	Jun	0.04	Jul	0.04	Aug	0.04	Sep
Reading Air Basin										
Laureldale	R10	56	0.24	May	0.18	Jun	0.16	Jul	0.15	Nov
Southcentral Region Non-Air Basin										
Lyons East	301	57	0.11	Jan	0.09	Jun	0.08	May	0.08	Feb
Lyons South	375	59	0.05	Apr	0.05	Feb	0.05	Mar	0.04	Sep
Johnstown Air Basin										
East Conemaugh	J08	56	0.07	Mar	0.07	Apr	0.07	May	0.04	Nov
Monongahela Valley Air Basin										
Monessen	M16	61	0.04	Jan	0.04	Feb	0.04	Mar	0.04	Apr
Lower Beaver Valley Air Basin										
Vanport	B05	50	0.11	Aug	0.11	Jul	0.11	Jan	0.10	Jun

Primary and Secondary Quarterly National Ambient Air Quality Standard is 1.5 micrograms per cubic meter

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-21. Lead Suspended Particulate Matter Historical Trend.

Maximum 3-Month Means

Units: micrograms per cubic meter

Site Name	PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Southeast Pennsylvania Air Basin											
Chester	P11	0.05	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.05	0.04
Northeast Region Non-Air Basin											
Palmerton	205	0.11	0.08	0.09	0.11	0.12	0.25	***	***	***	***
Reading Air Basin											
Laureldale	R10	0.33	0.32	0.24	0.41	0.43	0.40	0.36	0.36	0.24	0.24
Southcentral Region Non-Air Basin											
Lyons East	301	0.25	0.24	0.24	0.15	0.19	0.17	0.17	0.13	0.21	0.11
Lyons South	375	***	***	0.10	0.10	0.10	0.09	0.10	0.07	0.07	0.05
Johnstown Air Basin											
East Conemaugh	J08	0.05	0.04	0.04	0.04	0.05	0.06	0.06	0.07	0.05	0.07
Monongahela Valley Air Basin											
Monessen	M16	0.04	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.04
Lower Beaver Valley Air Basin											
Vanport	B05	0.08	0.06	0.07	0.10	0.09	0.15	0.20	0.12	0.17	0.11

Primary and Secondary Quarterly National Ambient Air Quality Standard is 1.5 micrograms per cubic meter

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-22. Total Suspended Particulate Matter Summary.

Units: micrograms per cubic meter

Year: 2009

Site Name	PA Site Code	Geometric Annual Mean	Geometric Standard Deviation	Arithmetic Annual Mean	Number 24-hour Samples	1st Maximum 24HR Mean	1st Maximum Date MM/DD	2nd Maximum 24HR Mean	2nd Maximum Date MM/DD	Minimum 24HR Mean	Minimum Date MM/DD
Southeast Pennsylvania Air Basin											
Chester	P11	25	1.85	27	37	66	09/16	55	11/09	2	03/02
Reading Air Basin											
Laureldale	R10	25	1.69	30	50	100	05/13	63	11/09	6	11/27
Southcentral Region Non-Air Basin											
Lyons East	301	20	1.92	23	49	55	11/09	48	04/25	2	12/09
Lyons South	375	15	1.81	18	51	46	11/09	41	08/17	4	11/27
Johnstown Air Basin											
East Conemaugh	J08	22	1.70	24	49	68	11/09	50	02/06	3	10/16
Monongahela Valley Air Basin											
Monessen	M16	27	1.85	34	50	79	03/14	60	03/02	5	10/16
Lower Beaver Valley Air Basin											
Vanport	B05	22	2.09	28	41	68	01/31	68	02/18	4	11/27

No Primary or Secondary Air Quality Standards

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-23. Total Suspended Particulate Matter Historical Trend.

Annual Geometric Means

Units: micrograms per cubic meter

Site Name	PA Site Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Southeast Pennsylvania Air Basin											
Chester	P11	39	36	33	35	34	37	28	32	***	25
Northeast Region Non-Air Basin											
Palmerton	205	28	27	28	30	25	29	***	***	***	***
Reading Air Basin											
Laureldale	R10	44	39	40	39	34	39	31	32	31	25
Southcentral Region Non-Air Basin											
Lyons East	301	39	30	28	42	25	27	26	26	23	20
Lyons South	375	***	***	26	23	21	22	19	21	19	15
Johnstown Air Basin											
East Conemaugh	J08	42	30	28	30	26	30	26	27	23	22
Monongahela Valley Air Basin											
Monessen	M16	42	46	39	38	37	43	40	37	34	27
Lower Beaver Valley Air Basin											
Vanport	B05	35	30	17*	9	8	14	23	29	24	22

No Primary or Secondary Air Quality Standards

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-24. Sulfate Suspended Particulate Matter Summary.

Year: 2009

Units: micrograms per cubic meter

Site Name	PA Site Code	Annual Mean	Number 24HR Samples	Number 30-Day >10	1st Maximum 30-Day Mean	1st Maximum Date MM	2nd Maximum 30-Day Mean	2nd Maximum Date MM	Number 24HR >30	1st Maximum 24HR Mean	1st Maximum Date MM/DD	2nd Maximum 24HR Mean	2nd Maximum Date MM/DD
Reading Air Basin													
Laureldale	R10	7.2	58	1	10.5	8	8.0	7	0	12.5	08/05	12.3	08/17
Johnstown Air Basin													
East Conemaugh	J08	8.2	56	1	11.7	8	9.9	7	0	16.4	08/17	13.8	06/06
Monongahela Valley Air Basin													
Monessen	M16	9.2	61	3	11.6	8	11.1	3	0	17.6	08/05	15.1	05/25

No Primary or Secondary Air Quality Standards

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-25. Nitrate Suspended Particulate Matter Summary.

Year: 2009

Units: micrograms per cubic meter

Site Name	PA Site Code	Annual Mean	Number 24HR Samples	1st Maximum 24HR Mean	1st Maximum Date MM/DD	2nd Maximum 24HR Mean	2nd Maximum Date MM/DD	3rd Maximum 24HR Mean	3rd Maximum Date MM/DD	Minimum 24HR Mean	Minimum Date MM/DD
Reading Air Basin											
Laureldale	R10	2.87	58	12.1	03/14	7.9	02/06	6.7	11/09	1.00	12/03
Johnstown Air Basin											
East Conemaugh	J08	1.95	56	6.1	11/21	6.1	01/19	5.2	01/31	0.59	10/10
Monongahela Valley Air Basin											
Monessen	M16	2.69	61	8.6	01/19	6.4	11/21	5.7	09/04	0.99	11/27

No Primary or Secondary Air Quality Standards

* does not satisfy summary criteria

*** less than 50 percent valid data for year

Table B-26. Photochemical Assessment Monitoring Station (PAMS) Compounds Summary.

Arendtsville, PA

Units: parts per billion Carbon (ppbC)

[The concentration in ppbC for a compound can be divided by the number of carbon atoms for that target compound to estimate the concentration in parts per billion Volume (ppbv).]

Year 2009 (May to October)

Compound	1 Hour Max	Date/Time of Max	Mean
Acetylene	5.08	10/22/2009 10:00	0.28
Ethylene	4.26	10/22/2009 10:00	0.44
Ethane	18.22	9/28/2009 13:00	3.24
Propylene	2.26	5/26/2009 22:00	0.5
Propane	11.58	6/4/2009 10:00	2.04
Isobutane	3.8	5/26/2009 22:00	0.4
Butene-1	0.99	5/26/2009 22:00	0.16
n-Butane	7.01	10/20/2009 8:00	0.62
t-Butene-2	0.32	6/25/2009 12:00	0.01
c-Butene-2	0.21	10/20/2009 8:00	0
Isopentane	6.3	10/22/2009 10:00	0.67
Pentene-1	0.39	7/3/2009 15:00	0.01
n-Pentane	3.08	10/22/2009 10:00	0.39
Isoprene	14.36	8/9/2009 17:00	0.81
trans-2-Pentene	0.28	8/17/2009 6:00	0
c-2-Pentene	0.44	6/29/2009 13:00	0
2,2-Dimethylbutane	0.26	10/22/2009 10:00	0
Cyclopentane	0.66	9/9/2009 21:00	0.02
2,3-Dimethylbutane	1.18	10/22/2009 9:00	0.06
2-Methylpentane	1.72	8/4/2009 8:00	0.13
3-Methylpentane	1.18	8/4/2009 8:00	0.06
n-Hexane	4.34	8/4/2009 8:00	0.11
Methylcyclopentane	1.39	8/4/2009 8:00	0.01
2,4-Dimethylpentane	0.71	6/29/2009 13:00	0
Benzene	2.22	10/22/2009 10:00	0.23
Cyclohexane	2.23	8/4/2009 8:00	0
2-Methylhexane	4.00	8/4/2009 8:00	0.01
2,3-Dimethylpentane	1.04	6/29/2009 13:00	0
3-Methylhexane	5.23	6/11/2009 13:00	0.02
2,2,4-Trimethylpentane	1.45	8/4/2009 8:00	0.06
n-Heptane	10.21	8/4/2009 8:00	0.02
Methylcyclohexane	7.59	8/4/2009 8:00	0.01
2,3,4-Trimethylpentane	0.56	6/29/2009 7:00	0.01

***Total Nonmethane Organic Compounds**

****PAMS Hydrocarbons**

VOCs refer to gaseous aliphatic and aromatic nonmethane organic compounds that have a vapor pressure greater than 0.14 mmHg at 25ºC and generally have a carbon number in the range of C-2–C-12.

Table B-26. Photochemical Assessment Monitoring Station (PAMS) Compounds Summary.

Arendtsville, PA

Units: parts per billion Carbon (ppbC)

[The concentration in ppbC for a compound can be divided by the number of carbon atoms for that target compound to estimate the concentration in parts per billion Volume (ppbv).]

Year 2009 (May to October)

Compound	1 Hour Max	Date/Time of Max	Mean
Toluene	5.77	10/22/2009 10:00	0.68
2-Methylheptane	2.36	8/4/2009 8:00	0
3-Methylheptane	2.4	6/11/2009 13:00	0
n-Octane	5.48	8/4/2009 8:00	0.01
Ethylbenzene	0.86	10/22/2009 10:00	0.03
m/p-Xylene	3.69	6/12/2009 7:00	0.12
Styrene	1.61	7/31/2009 14:00	0
o-Xylene	0.96	10/22/2009 10:00	0.03
n-Nonane	1.66	8/12/2009 8:00	0.01
Isopropylbenzene	0.41	8/20/2009 13:00	0.01
n-Propylbenzene	1.41	8/20/2009 13:00	0
1,3,5-Trimethylbenzene	1.71	8/20/2009 13:00	0
1,2,4-Trimethylbenzene	2.73	8/20/2009 13:00	0.05
o-Ethyltoluene	1.52	6/11/2009 13:00	0
m-Ethyltoluene	3.73	8/20/2009 13:00	0.06
p-Ethyltoluene	2.27	8/20/2009 13:00	0
m-Diethylbenzene	0.66	6/25/2009 11:00	0
p-Diethylbenzene	0.56	8/20/2009 13:00	0
1,2,3-Trimethylbenzene	2.55	8/20/2009 13:00	0.11
n-Decane	2.09	6/11/2009 13:00	0.12
Undecane	1.82	7/31/2009 14:00	0.02
tnmoc*	147.46	6/11/2009 13:00	12.73
pamshc**	74.55	8/4/2009 8:00	11.57
Unidentified VOC	128.13	6/11/2009 13:00	0.92

***Total Nonmethane Organic Compounds**

****PAMS Hydrocarbons**

VOCs refer to gaseous aliphatic and aromatic nonmethane organic compounds that have a vapor pressure greater than 0.14 mmHg at 25ºC and generally have a carbon number in the range of C-2–C-12.

Table B-27. Sulfur Dioxide Point Source Historical Trend.

Units: Tons Per Year

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Change Since 2000
Adams	6	19	16	21	28	19	13	20	9	7	17%
Armstrong	187915	190639	183156	197675	204299	209456	191494	202608	211810	122150	-35%
Beaver	40560	35711	40840	39763	44981	41338	32523	27807	17592	24627	-39%
Bedford	3	3	3	3	3	3	3	4	3	1	-67%
Berks	16820	11612	14828	16953	14732	16307	14213	15280	12848	10512	-38%
Blair	3347	3078	1168	1650	2940	2280	3426	3021	3954	3216	-4%
Bradford	53	162	33	132	145	173	83	52	15	23	-57%
Bucks	371	365	388	397	413	440	463	359	265	203	-45%
Butler	2607	2820	2265	2177	2162	1424	1334	1365	1068	817	-69%
Cambria	5856	5911	5842	5620	6924	7168	7363	7691	7183	6696	14%
Cameron	0	0	0	0	0	0	0	0	0	0	**
Carbon	795	762	774	806	768	747	768	752	741	771	-3%
Centre	4223	4182	4360	4316	4319	4527	4541	4279	3450	2262	-46%
Chester	4874	5203	3127	4204	6153	5532	4057	3719	3562	2493	-49%
Clarion	1177	1176	1214	1249	1080	1245	1321	1460	1493	1619	38%
Clearfield	48298	42057	38283	43411	44362	47015	47348	49117	51863	33002	-32%
Clinton	6232	4159	1355	8	12	12	5	5	3	3	-100%
Columbia	495	379	207	263	336	240	193	179	238	202	-59%
Crawford	505	259	356	383	452	434	480	370	381	302	-40%
Cumberland	806	764	708	1064	1180	1065	1171	1126	799	933	16%
Dauphin	764	789	403	808	508	711	460	488	242	112	-85%
Delaware	15398	16184	14539	17370	15964	17050	12638	12295	10316	9549	-38%
Elk	4887	5120	4792	3748	560	642	596	551	615	338	-93%
Erie	10163	8471	4125	3433	2317	2040	807	272	215	173	-98%
Fayette	263	259	261	264	263	25	25	34	27	10	-96%
Forest	0	0	0	0	0	0	0	0	0	0	**
Franklin	79	79	78	51	43	44	33	48	36	29	-63%
Fulton	1	0	0	0	0	0	0	0	0	0	-100%
Greene	166238	186131	159506	140295	149220	146147	135586	145477	160807	93326	-44%
Huntingdon	178	189	155	223	220	207	277	225	170	167	-6%
Indiana	149281	157438	122466	168248	160744	146835	122172	135657	116555	116329	-22%
Jefferson	550	287	364	395	486	543	537	583	441	434	-21%
Juniata	1	2	2	2	2	2	2	2	2	3	200%
Lackawanna	87	97	91	73	89	145	140	143	137	138	59%
Lancaster	670	847	498	721	483	385	181	107	93	69	-90%
Lawrence	28699	32378	28809	24135	26060	21237	15411	19932	14532	8410	-71%
Lebanon	815	767	764	670	252	227	247	250	247	206	-75%
Lehigh	2048	1964	1626	1360	1620	1150	1146	898	831	716	-65%
Luzerne	3552	4313	3788	3472	3875	4699	4558	3702	3868	3047	-14%
Lycoming	77	83	86	80	71	77	104	102	74	108	40%
McKean	3151	4051	3575	3361	3449	3304	3625	3083	3372	2356	-25%
Mercer	45	100	92	121	113	115	108	73	41	37	-18%
Mifflin	9	11	4	6	8	8	7	7	8	8	-11%
Monroe	194	76	58	85	38	35	30	36	31	30	-85%
Montgomery	825	835	712	726	787	821	635	548	311	337	-59%
Montour	107989	111541	111489	124819	127031	127654	129407	127858	42730	17477	-84%

*** no emissions reported

** percentage change N/A

Table B-27. Sulfur Dioxide Point Source Historical Trend (cont.).

Units: Tons Per Year

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Change Since 2000
Northampton	54854	51910	56808	61817	62833	58589	53819	53318	36692	35490	-35%
Northumberland	545	571	347	498	524	546	516	531	451	493	-10%
Perry	0	1	1	2	1	1	1	2	2	2	**
Pike	0	0	0	0	0	0	0	0	0	0	**
Potter	64	50	41	50	53	84	78	78	77	59	-8%
Schuylkill	4894	5095	5186	4920	4993	4852	5089	4738	4377	4539	-7%
Snyder	28213	28914	25335	28377	27928	27921	24033	29957	33927	15103	-46%
Somerset	219	205	183	242	253	243	247	265	223	195	-11%
Sullivan	***	***	***	***	***	***	***	***	***	***	***
Susquehanna	0	0	0	0	0	0	0	0	0	0	**
Tioga	85	79	84	67	88	52	54	51	44	39	-54%
Union	23	11	9	68	11	9	23	19	12	49	113%
Venango	1860	1260	1623	1589	1547	1465	1811	1813	1710	1820	-2%
Warren	5214	5981	4896	3204	2858	2977	2949	2628	1616	1260	-76%
Washington	6034	6572	6612	5133	5086	4935	5963	5122	3746	1478	-76%
Wayne	176	74	157	106	83	92	136	142	133	126	-28%
Westmoreland	1143	1581	621	515	674	424	471	456	568	239	-79%
Wyoming	54	611	72	110	456	653	138	84	11	4	-93%
York	71715	53600	80408	83545	102770	113352	102710	115905	108159	67232	-6%
Statewide	**996000**	**997788**	**939589**	**1004804**	**1039650**	**1029723**	**937569**	**986694**	**864726**	**591376**	**-41%**

*** no emissions reported

** percentage change N/A

Table B-28. Oxides of Nitrogen Point Source Historical Trend.

Units: Tons Per Year

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Change Since 2000
Adams	187	192	270	774	451	469	182	268	163	162	-13%
Armstrong	23354	23990	23342	16441	18430	18348	16545	16709	18861	5198	-78%
Beaver	34047	30038	35427	28508	28684	27895	30361	29848	30172	11388	-67%
Bedford	432	336	460	401	385	209	238	282	257	561	30%
Berks	5957	4941	5566	5962	5912	5811	5178	5917	5283	4201	-29%
Blair	1059	966	779	868	843	911	898	928	847	753	-29%
Bradford	458	392	464	494	468	514	453	375	324	272	-41%
Bucks	1380	1313	1502	1248	1337	1446	1357	1334	1364	1160	-16%
Butler	2422	2268	1937	1841	1672	1809	1634	1823	1738	1398	-42%
Cambria	2664	2665	2396	1836	2388	2253	2231	2591	2592	1945	-27%
Cameron	1	1	1	1	1	1	1	1	1	1	0%
Carbon	732	685	702	737	711	688	717	693	692	698	-5%
Centre	3426	3134	2172	1727	1420	1452	1469	1401	1391	1375	-60%
Chester	3442	3555	2554	2833	3123	3413	2893	3155	3069	2236	-35%
Clarion	912	761	805	645	641	801	874	922	863	762	-16%
Clearfield	7281	6797	6681	7315	6966	6940	7490	7423	7439	4745	-35%
Clinton	1954	1665	725	589	554	547	532	556	587	560	-71%
Columbia	207	151	158	182	184	197	156	181	172	161	-22%
Crawford	4031	3748	2930	2052	1876	1719	829	865	1099	400	-90%
Cumberland	3442	4531	4423	4386	3027	4213	4997	3448	2638	2870	-17%
Dauphin	1008	776	771	784	694	629	629	769	813	728	-28%
Delaware	11663	13210	11654	12115	11674	13225	11506	11321	9702	8735	-25%
Elk	1724	2026	1619	1526	1359	1363	1325	1255	1288	1280	-26%
Erie	3333	2499	1500	1239	1183	916	706	661	571	592	-82%
Fayette	440	507	540	611	579	166	128	167	144	185	-58%
Forest	378	461	451	446	349	351	369	358	396	322	-15%
Franklin	91	83	136	148	232	399	254	324	288	169	86%
Fulton	8	5	4	4	7	9	8	8	7	4	-50%
Greene	24336	28455	23809	18585	19969	18091	20792	24616	25457	22195	-9%
Huntingdon	110	88	76	78	77	78	70	75	78	80	-27%
Indiana	49041	48638	46949	44918	41115	39945	40804	39837	37921	31856	-35%
Jefferson	1573	514	589	635	672	699	573	566	586	599	-62%
Juniata	235	224	200	270	230	213	201	324	276	299	27%
Lackawanna	379	385	367	358	374	387	304	276	249	225	-41%
Lancaster	1528	1463	1368	1413	1465	1424	1188	1202	1279	1165	-24%
Lawrence	6622	6628	7027	5877	6980	5705	5976	6870	5825	2542	-62%
Lebanon	650	705	854	702	845	695	707	677	664	553	-15%
Lehigh	1484	1268	1371	1061	1167	994	1024	929	861	691	-53%
Luzerne	1898	2617	2041	1718	1374	896	887	1013	1065	1005	-47%
Lycoming	399	369	416	431	426	430	396	446	391	407	2%
McKean	1758	1612	1819	1624	1734	1652	1539	1500	1339	1215	-31%
Mercer	1469	1296	1124	1196	911	833	995	1009	1052	1073	-27%
Mifflin	117	90	88	82	79	85	79	74	77	64	-45%
Monroe	190	70	67	82	63	60	63	70	82	93	-51%
Montgomery	1957	1847	1857	1894	1878	1881	1660	1650	1481	1630	-17%
Montour	16344	12423	12391	11547	11685	12932	13704	13443	13159	5454	-67%

*** no emissions reported

** percentage change N/A

Table B-28. Oxides of Nitrogen Point Source Historical Trend (cont.).

Units: Tons Per Year

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Change Since 2000
Northampton	14844	15579	15431	15868	16339	16560	11954	12874	9819	8547	-42%
Northumberland	573	605	522	611	605	653	600	595	634	640	12%
Perry	147	74	118	164	148	105	79	167	171	150	2%
Pike	3	3	1	5	15	0	0	0	2	1	-67%
Potter	1338	1317	1209	1386	1110	1193	1105	1145	1052	901	-33%
Schuylkill	1399	1498	1513	1324	1343	1554	1392	1281	1283	1208	-14%
Snyder	6563	7588	5479	3644	2998	2995	2800	3871	4255	1851	-72%
Somerset	218	216	234	286	260	257	250	252	191	183	-16%
Sullivan	***	***	***	***	***	***	***	***	***	***	***
Susquehanna	29	22	37	22	22	26	32	37	24	21	-28%
Tioga	526	393	476	623	568	463	447	453	427	381	-28%
Union	100	105	124	134	120	101	107	102	100	98	-2%
Venango	997	906	700	644	678	609	764	860	805	634	-36%
Warren	1581	1642	1336	961	843	963	867	797	707	671	-58%
Washington	11617	11669	10941	8752	7957	7771	9645	8098	6732	2869	-75%
Wayne	41	34	36	43	31	33	31	33	31	29	-29%
Westmoreland	3030	2801	2874	2872	2833	2820	2281	2180	2035	1433	-53%
Wyoming	700	696	742	697	852	826	672	637	628	616	-12%
York	21767	17172	22912	20492	23874	20833	19617	22195	21816	18639	-14%
Statewide	**291596**	**282708**	**277067**	**246712**	**246790**	**241456**	**237565**	**243737**	**235315**	**162879**	**-44%**

*** no emissions reported

** percentage change N/A

Table B-29. Carbon Monoxide Point Source Historical Trend.

Units: Tons Per Year

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Change Since 2000
Adams	41	34	99	227	201	354	243	333	347	322	685%
Armstrong	1709	1694	1597	1783	1647	1796	1651	1595	1755	4423	159%
Beaver	31342	39938	33731	23484	22394	27297	26482	28769	30740	24261	-23%
Bedford	125	101	126	147	114	85	77	83	94	127	2%
Berks	1508	1368	1534	1729	1758	1583	1606	1648	1759	1601	6%
Blair	1048	1131	1011	1079	835	796	662	628	660	635	-39%
Bradford	266	290	305	438	498	473	482	434	340	280	5%
Bucks	344	369	342	352	521	327	415	491	477	361	5%
Butler	2137	1974	2005	1961	2146	2154	2184	2253	2079	1509	-29%
Cambria	3639	1252	1214	1196	1324	1306	1258	1294	1295	1285	-65%
Cameron	0	1	1	1	1	0	0	1	1	0	**
Carbon	9420	9301	9450	9414	9626	9450	9340	9564	9143	8559	-9%
Centre	1340	1267	1249	1311	1200	1111	1205	942	888	733	-45%
Chester	7483	6147	6226	6120	7180	7123	7906	6529	1900	1623	-78%
Clarion	173	244	440	328	318	460	508	402	356	317	83%
Clearfield	390	360	358	385	361	461	474	458	446	312	-20%
Clinton	766	647	410	426	439	445	488	478	525	517	-33%
Columbia	30	29	31	24	27	36	32	40	50	49	63%
Crawford	88	68	59	60	55	59	62	49	52	43	-51%
Cumberland	103	169	174	131	123	127	123	130	187	332	222%
Dauphin	533	383	339	419	516	504	685	656	783	448	-16%
Delaware	6590	3471	3410	3249	3470	3822	3688	3575	3196	3077	-53%
Elk	2584	1281	912	729	1615	2207	2365	2348	2519	1227	-53%
Erie	3526	2832	852	566	568	643	602	664	626	641	-82%
Fayette	156	174	87	116	101	82	61	53	45	69	-56%
Forest	216	257	248	272	239	225	227	220	241	225	4%
Franklin	53	63	88	86	132	271	154	216	263	208	292%
Fulton	2	1	4	4	6	7	6	6	6	3	50%
Greene	1986	1705	1543	1312	1163	1263	1426	1689	1779	1581	-20%
Huntingdon	73	74	73	76	72	77	69	70	75	78	7%
Indiana	2312	3224	3102	3394	4117	5191	5367	5400	4974	4690	103%
Jefferson	283	203	220	214	257	213	219	220	207	179	-37%
Juniata	43	24	22	28	17	20	23	29	24	39	-9%
Lackawanna	380	415	406	500	533	524	507	493	338	327	-14%
Lancaster	1392	1364	1370	1310	1206	1146	1162	1151	1159	1347	-3%
Lawrence	2069	1863	1796	1781	1978	1961	1902	1652	1893	1376	-33%
Lebanon	2318	2208	1811	1489	515	448	504	502	481	400	-83%
Lehigh	536	550	473	419	458	469	501	360	4205	1513	182%
Luzerne	325	299	293	320	354	367	252	260	287	259	-20%
Lycoming	830	656	654	704	722	906	828	733	782	516	-38%
McKean	360	271	254	251	252	275	292	261	258	225	-38%
Mercer	193	232	338	349	383	376	389	343	420	337	75%
Mifflin	243	193	188	217	250	273	244	236	249	265	9%
Monroe	122	94	150	147	132	117	152	180	189	148	21%
Montgomery	1021	1114	1150	1183	1250	1200	1133	1102	1107	1080	6%
Montour	832	813	843	898	863	950	966	868	821	955	15%

*** no emissions reported

** percentage change N/A

Table B-29. Carbon Monoxide Point Source Historical Trend (cont.).

Units: Tons Per Year

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Change Since 2000
Northampton	4993	4933	18771	17920	14131	18189	6650	5156	4122	3757	-25%
Northumberland	510	555	471	561	552	567	515	505	509	511	0%
Perry	18	5	12	13	8	8	2	5	3	11	-39%
Pike	1	1	0	2	4	0	1	0	1	0	-100%
Potter	1081	1143	1264	1153	767	831	1146	1084	972	927	-14%
Schuylkill	910	933	1150	1310	1305	1347	1380	1410	1364	1270	40%
Snyder	354	432	415	376	366	378	343	394	421	234	-34%
Somerset	522	478	520	760	671	666	673	715	634	501	-4%
Sullivan	***	***	***	***	***	***	***	***	***	***	***
Susquehanna	3	2	7	2	3	2	2	3	2	3	0%
Tioga	854	775	715	840	267	217	195	189	199	170	-80%
Union	156	148	126	122	127	109	103	80	75	70	-55%
Venango	342	295	292	342	336	310	300	292	319	277	-19%
Warren	535	535	540	494	500	520	440	571	643	513	-4%
Washington	1317	672	602	600	272	432	504	456	361	199	-85%
Wayne	3	2	2	3	2	2	2	0	2	2	-33%
Westmoreland	2494	2889	2254	1839	1304	1309	1176	1239	1300	825	-67%
Wyoming	395	453	398	460	461	534	553	462	437	446	13%
York	2811	2335	2582	2638	2661	2513	2313	2739	2162	2408	-14%
Statewide	**108229**	**106734**	**111109**	**100064**	**95674**	**106914**	**95220**	**94708**	**93547**	**80626**	**-26%**

*** no emissions reported

** percentage change N/A

Table B-30. Volatile Organic Compounds (VOC) Point Source Historical Trend.

Units: Tons Per Year

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Change Since 2000
Adams	210	223	179	175	208	202	197	210	191	81	-61%
Armstrong	309	161	169	167	168	183	188	174	181	192	-38%
Beaver	920	888	826	770	814	648	669	621	599	482	-48%
Bedford	455	324	336	303	259	215	229	207	179	194	-57%
Berks	1925	1757	1740	1609	1728	1595	1433	1294	1247	1113	-42%
Blair	556	532	442	402	439	439	439	395	387	346	-38%
Bradford	520	527	562	626	654	681	690	646	492	320	-38%
Bucks	1858	1320	792	783	759	728	734	664	579	469	-75%
Butler	985	828	908	885	785	782	678	691	673	488	-50%
Cambria	262	163	127	139	146	107	104	105	121	78	-70%
Cameron	28	22	14	8	10	15	9	4	4	2	-93%
Carbon	321	205	242	288	344	347	359	304	368	220	-31%
Centre	34	35	45	83	32	38	37	27	22	17	-50%
Chester	2337	1816	1424	1338	1466	1433	1304	1058	1046	766	-67%
Clarion	250	210	277	247	226	334	309	260	320	255	2%
Clearfield	114	100	109	88	89	78	83	71	54	47	-59%
Clinton	281	253	202	191	181	212	187	199	211	204	-27%
Columbia	150	126	119	142	158	153	132	100	86	66	-56%
Crawford	263	208	173	171	219	207	199	173	121	95	-64%
Cumberland	401	321	351	367	372	349	299	293	286	260	-35%
Dauphin	428	381	343	293	324	358	404	366	291	221	-48%
Delaware	2298	2017	2074	1894	1712	1766	1658	1704	1395	1187	-48%
Elk	316	234	271	189	276	276	281	332	379	262	-17%
Erie	1463	1271	512	538	619	610	611	614	525	381	-74%
Fayette	90	45	48	43	55	38	37	53	61	68	-24%
Forest	54	46	50	66	65	61	64	66	73	68	26%
Franklin	330	246	271	230	281	281	301	351	293	239	-28%
Fulton	73	40	40	36	63	91	109	88	76	32	-56%
Greene	726	781	711	642	708	629	593	622	729	772	6%
Huntingdon	142	129	95	88	95	113	119	121	123	80	-44%
Indiana	420	377	344	361	351	357	341	382	341	336	-20%
Jefferson	211	141	151	161	162	122	107	101	104	93	-56%
Juniata	201	259	251	213	235	233	238	233	196	225	12%
Lackawanna	410	347	360	334	303	296	267	282	284	263	-36%
Lancaster	3341	2907	3259	3244	3088	3159	3090	2796	2379	1995	-40%
Lawrence	348	292	399	433	347	309	290	219	196	195	-44%
Lebanon	1025	922	435	208	221	220	227	225	194	149	-85%
Lehigh	1036	1073	875	786	857	895	858	838	886	736	-29%
Luzerne	1059	1001	1015	933	736	788	771	826	859	530	-50%
Lycoming	636	498	430	356	325	352	345	342	246	187	-71%
McKean	922	842	788	677	776	772	899	833	1056	919	0%
Mercer	967	679	688	545	533	480	515	485	473	373	-61%
Mifflin	156	138	131	152	142	152	170	163	87	62	-60%
Monroe	95	45	46	80	75	72	74	65	65	67	-29%
Montgomery	1692	1469	1333	1233	1141	1002	935	883	746	642	-62%
Montour	114	37	35	38	35	42	43	34	22	35	-69%

*** no emissions reported

** percentage change N/A

Table B-30. Volatile Organic Compounds (VOC) Point Source Historical Trend (cont.).

Units: Tons Per Year

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Change Since 2000
Northampton	511	551	845	838	1108	1184	487	374	312	246	-52%
Northumberland	1096	910	847	719	716	664	741	682	574	511	-53%
Perry	33	0	0	1	2	3	5	2	7	10	-70%
Pike	0	0	0	0	1	0	0	0	0	0	**
Potter	141	146	135	136	170	202	221	240	232	206	46%
Schuylkill	551	407	438	317	407	427	324	498	296	444	-19%
Snyder	511	534	530	467	415	395	439	376	300	224	-56%
Somerset	98	86	75	77	58	89	80	75	68	58	-41%
Sullivan	***	***	***	***	***	***	***	***	***	***	***
Susquehanna	1	0	1	0	0	0	0	0	0	0	-100%
Tioga	277	230	192	215	152	146	124	143	775	124	-55%
Union	768	672	579	557	562	397	325	196	138	91	-88%
Venango	686	483	247	273	155	88	89	104	140	116	-83%
Warren	1180	693	580	602	590	542	557	584	576	495	-58%
Washington	235	175	201	184	158	172	162	152	147	110	-53%
Wayne	1	0	1	0	0	0	0	1	0	2	100%
Westmoreland	986	1313	844	795	828	888	776	736	686	536	-46%
Wyoming	299	290	354	351	318	340	351	348	321	370	24%
York	3509	3316	2994	1953	1564	1422	1321	1353	1374	1204	-66%
Statewide	**41615**	**36042**	**32855**	**30040**	**29786**	**29179**	**27628**	**26384**	**25192**	**20559**	**-51%**

*** no emissions reported

** percentage change N/A

APPENDIX C. MONITORING SITES, PARAMETERS AND ADDRESSES

Figure C-1. Commonwealth of Pennsylvania Active Air Monitoring Sites.

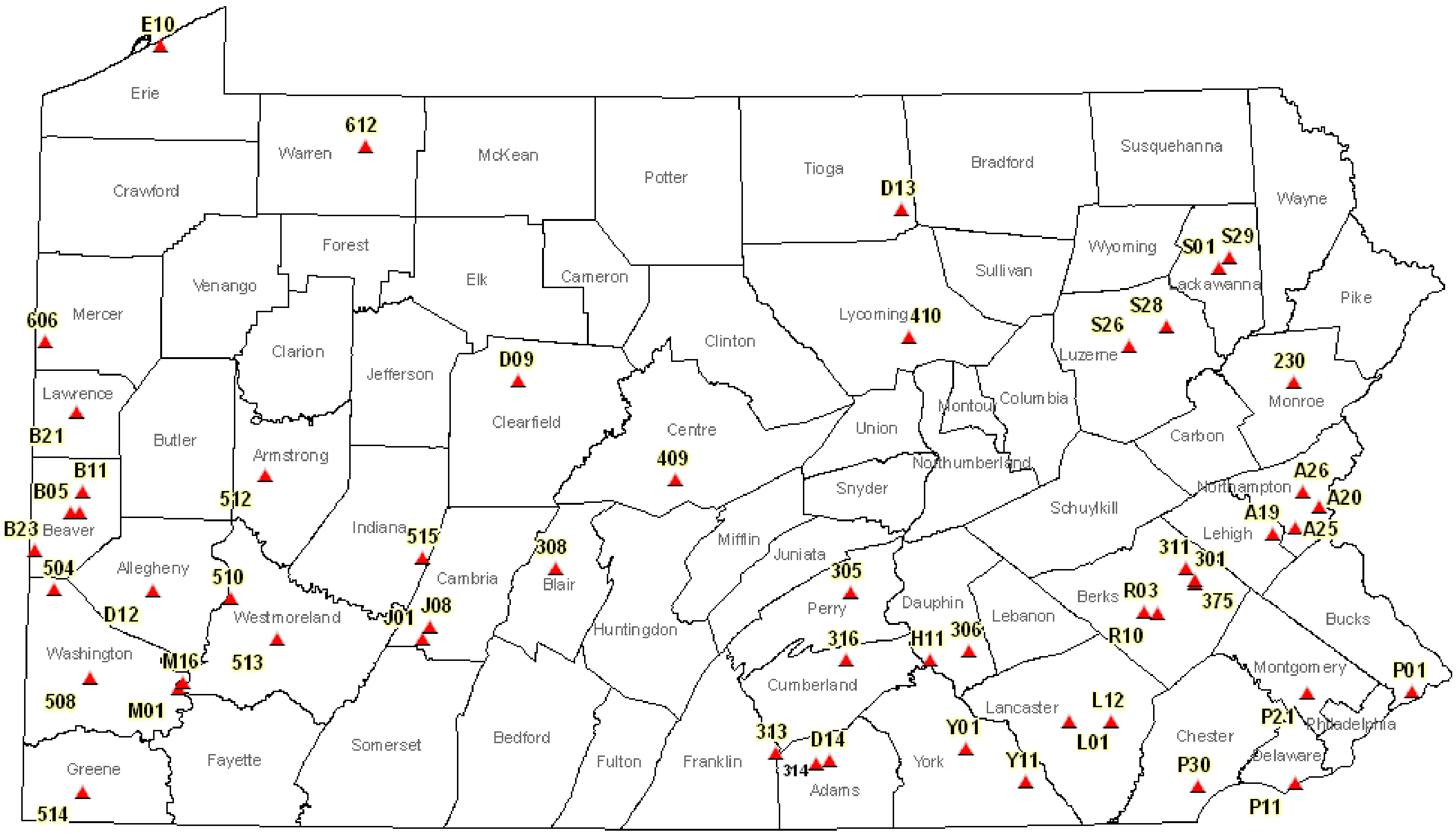


Table C-1. Air Monitoring Site Locations and Parameters Monitored.

PA SITE CODE	SITE NAME	EPA-AQS SITE CODE	COUNTY	STREET ADDRESS	LATITUDE LONGITUDE	OZONE	SULFUR DIOXIDE	NITROGEN DIOXIDE	CARBON MONOXIDE	$PM_{2.5}$	$PM_{2.5}$ SPEC	PM_{10}	TSP	LEAD	SULFATES	NITRATES
Southeast Region. Bucks, Chester, Delaware, Montgomery and Philadelphia Counties																
Southeast Pennsylvania Air Basin																
P01	BRISTOL	42-017-0012	Bucks	Roosevelt Junior High School Rockview Ln	40 06 27 N 74 52 57 W	X	X	X	X	$X_{D2.5}$						
P11	CHESTER	42-045-0002	Delaware	Front & Norris Sts	39 50 08 N 75 22 22 W	X	X	X		$X_{D2.5}$ $X_{C2.5}$		X_{C10}	X	X		
P21	NORRISTOWN	42-091-0013	Montgomery	State Armory 1046 Belvoir Rd	40 06 45 N 75 18 34 W	X	X			$X_{D2.5}$ $X_{C2.5T}$						
P30	NEW GARDEN AIRPORT	42-029-0100	Chester	1235 Newark Rd New Garden Arpt	39 50 04 N 75 46 05 W	X				$X_{D2.5}$ $X_{C2.5}$	X					
Northeast Region. Carbon, Lackawanna, Lehigh, Luzerne, Monroe, Northampton, Pike, Schuylkill, Susquehanna, Wayne and Wyoming Counties																
Allentown-Bethlehem-Easton Air Basin																
A19	ALLENTOWN	42-077-0004	Lehigh	Allentown State Hosp, Rear 1600 Hanover Ave	40 36 43 N 75 25 58 W	X						X_{C10}				
A20	EASTON	42-095-8000	Northampton	Spring Garden	40 41 32 N 75 14 14 W	X										
A25	FREEMANSBURG	42-095-0025	Northampton	Washington & Cambria Sts	40 37 41 N 75 20 28 W	X		X	X	$X_{D2.5}$ $X_{C2.5}$	X					
A26	NAZARETH	42-095-1000	Northampton	S Green & Delaware	40 44 04 N 75 18 46 W							X_{C10}				
Scranton-Wilkes-Barre Air Basin																
S01	SCRANTON	42-069-2006	Lackawanna	Behind Penn State Campus George St	41 26 34 N 75 37 23 W	X		X	X	$X_{D2.5}$ $X_{C2.5}$	X					
S26	NANTICOKE	42-079-1100	Luzerne	255 Lwr Broadway	41 12 33 N 76 00 13 W	X										
S28	WILKES-BARRE	42-079-1101	Luzerne	Chilwick & Washington Sts	41 15 58 N 75 50 47 W	X	X					X_{C10}				

X — Parameter monitored at the site
$X_{D2.5}$ — Discrete $PM2_{2.5}$ Sampler, Federal Reference Method (FRM) or Federal Equivalent Method (FEM)
$X_{C2.5}$ — Continuous $PM_{2.5}$ Sampler, Federal Equivalent Method (FEM)
$X_{C2.5T}$ — Continuous $PM_{2.5}$ Sampler (TEOM), Non-FEM
X_{D10} — Discrete PM_{10} Sampler, Federal Reference Method (FRM)
X_{C10} — Continuous PM_{10} Sampler, Federal Equivalent Method (FEM)

Table C-1. Air Monitoring Site Locations and Parameters Monitored (cont.).

PA SITE CODE	SITE NAME	EPA-AQS SITE CODE	COUNTY	STREET ADDRESS	LATITUDE LONGITUDE	OZONE	SULFUR DIOXIDE	NITROGEN DIOXIDE	CARBON MONOXIDE	$PM_{2.5}$	$PM_{2.5}$ SPEC	PM_{10}	TSP	LEAD	SULFATES	NITRATES
S29	PECKVILLE	42-069-0101	Lackawanna	Pleasant Ave & Erie St, Wilson Fire Co. No. 1	41 28 45 N 75 34 41 W	X										
Northeast Region Non-AirBasin																
230	SWIFTWATER	42-089-0002	Monroe	DEP/DCNR Pocono District Office	41 04 59 N 75 19 24 W	X										
Southcentral Region. Adams, Bedford, Berks, Blair, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Mifflin, Perry and York Counties																
Reading Air Basin																
RO3	READING AIRPORT	42-011-0011	Berks	1059 Arnold Rd	40 23 01 N 75 58 07 W	X	X	X	X	$X_{D2.5}$ $X_{C2.5T}$	X	X_{C10}				
R10	LAURELDALE	42-011-1717	Berks	Muhlenberg Twp Authority, Spring Valley Rd Substation	40 22 38 N 75 54 53 W								X	X	X	X
Harrisburg Air Basin																
H11	HARRISBURG	42-043-0401	Dauphin	1833 UPS Dr	40 14 42 N 76 50 41 W	X		X	X	$X_{C2.5}$	X	X_{C10}				
Lancaster Air Basin																
L01	LANCASTER	42-071-0007	Lancaster	Lincoln Junior High School	40 02 49 N 76 17 00 W	X		X		$X_{D2.5}$ $X_{C2.5T}$	X	X_{C10}				
York Air Basin																
Y01	YORK	42-133-0008	York	Davis Junior High School, Hill St	39 57 56 N 76 41 59 W	X	X	X	X	$X_{D2.5}$ $X_{C2.5T}$	X	X_{C10}				
Southcentral Region Non-Air Basin																
301	LYONS EAST	42-011-0717	Berks	Near State & Kemp Sts	40 28 36 N 75 45 33 W								X	X		
305	PERRY COUNTY	42-099-0301	Perry	Little Buffalo State Park	40 27 26 N 77 09 57 W	X	X	X								
306	HERSHEY	42-043-1100	Dauphin	Hershey Foods Technical Centr Sipe Ave & Mae St	40 16 21 N 76 40 53 W	X										

X — Parameter monitored at the site

$X_{D2.5}$ — Discrete $PM2_{2.5}$ Sampler, Federal Reference Method (FRM) or Federal Equivalent Method (FEM)

$X_{C2.5}$ — Continuous $PM_{2.5}$ Sampler, Federal Equivalent Method (FEM)

$X_{C2.5T}$ — Continuous $PM_{2.5}$ Sampler (TEOM), Non-FEM

X_{D10} — Discrete PM_{10} Sampler, Federal Reference Method (FRM)

X_{C10} — Continuous PM_{10} Sampler, Federal Equivalent Method (FEM)

Table C-1. Air Monitoring Site Locations and Parameters Monitored (cont.).

PA SITE CODE	SITE NAME	EPA-AQS SITE CODE	COUNTY	STREET ADDRESS	LATITUDE LONGITUDE	OZONE	SULFUR DIOXIDE	NITROGEN DIOXIDE	CARBON MONOXIDE	$PM_{2.5}$	$PM_{2.5}$ SPEC	PM_{10}	TSP	LEAD	SULFATES	NITRATES
308	ALTOONA	42-013-0801	Blair	Ward Trucking Corporation Second Ave & 7th St	40 32 07 N 78 22 15 W	X	X					X_{C10}				
311	KUTZTOWN	42-011-0006	Berks	Kutztown University Campus	40 30 51 N 75 47 23 W	X										
313	METHODIST HILL	42-055-0001	Franklin	Forest Rd (High Elevation Site)	39 57 40 N 77 28 31 W	X										
314	ARENDTSVILLE	42-001-0001	Adams	Penn State Research Orchard	39 55 25 N 77 18 29 W			X	X	$X_{D2.5}$ $X_{C2.5}$	X					
316	CARLISLE	42-041-0101	Cumberland	Imperial Court	40 14 48 N 77 11 12 W					$X_{D2.5}$ $X_{C2.5}$						
375	LYONS SOUTH	42-011-0005	Berks	Heffner & Dryville Rds	40 27 59 N 75 45 32 W								X	X		
D14	BIGLERVILLE	42-001-0002	Adams	Penn State Research Orchard, University Drive	39 56 06 N 77 15 10 W	X										
L12	LANCASTER DOWNWIND	42-071-0012	Lancaster	3545 W Newport Rd	40 02 38 N 76 06 45 W	X										
Y11	YORK DOWNWIND	42-133-0011	York	2650 Delta Rd	39 51 40 N 76 27 43 W	X										
Northcentral Region. Bradford, Cameron, Centre, Clearfield, Clinton, Columbia, Lycoming, Montour, Northumberland, Potter, Snyder, Sullivan, Tioga and Union Counties																
Northcentral Region Non-Air Basin																
409	STATE COLLEGE	42-027-0100	Centre	Pennsylvania State Univ.,West of Big Hollow Rd State College	40 48 40 N 77 52 38 W	X	X	X		$X_{D2.5}$	X					
410	MONTOURSVILLE	42-081-0100	Lycoming	PA State Police Rear Parking Lot, 899 Cherry St	41 15 01 N 76 54 51 W	X						X_{D10}				
D09	MOSHANNON	42-033-4000	Clearfield	Moshannon State Forest Elliott State Park North of Cessna	41 07 03 N 78 31 34 W	X										

X Parameter monitored at the site

$X_{D2.5}$ Discrete $PM2_{2.5}$ Sampler, Federal Reference Method (FRM) or Federal Equivalent Method (FEM)

$X_{C2.5}$ Continuous $PM_{2.5}$ Sampler, Federal Equivalent Method (FEM)

$X_{C2.5T}$ Continuous $PM_{2.5}$ Sampler (TEOM), Non-FEM

X_{D10} Discrete PM_{10} Sampler, Federal Reference Method (FRM)

X_{C10} Continuous PM_{10} Sampler, Federal Equivalent Method (FEM)

Table C-1. Air Monitoring Site Locations and Parameters Monitored (cont.).

PA SITE CODE	SITE NAME	EPA-AQS SITE CODE	COUNTY	STREET ADDRESS	LATITUDE LONGITUDE	OZONE	SULFUR DIOXIDE	NITROGEN DIOXIDE	CARBON MONOXIDE	$PM_{2.5}$	$PM_{2.5}$ SPEC	PM_{10}	TSP	LEAD	SULFATES	NITRATES
D13	TIOGA COUNTY	42-117-4000	Tioga	North of Gleason	41 38 44 N 76 56 17 W	X										
Southwest Region. Allegheny, Armstrong, Beaver, Cambria, Fayette, Greene, Indiana, Somerset, Washington and Westmoreland Counties																
Johnstown-Air Basin																
J01	JOHNSTOWN	42-021-0011	Cambria	Miller Auto Body Crafts Shop One Messenger St	40 18 35 N 78 54 54 W	X	X	X	X	$X_{D2.5}$ $X_{C2.5}$	X	X_{C10}				
J08	EAST CONEMAUGH	42-021-0808	Cambria	Recreation Field Citron Alley & First St	40 20 53 N 78 52 58 W								X	X	X	X
Monongahela Valley-Air Basin																
M01	CHARLEROI	42-125-0005	Washington	Borough Waste Treatment Plant Front St	40 08 48 N 79 54 08 W	X	X	X	X	$X_{D2.5}$ $X_{C2.5}$		X_{C10}				
M16	MONESSEN	42-129-0007	Westmoreland	Monessen Community Centr, 435 Donner Ave	40 10 00 N 79 52 30 W								X	X	X	X
Lower Beaver Valley-Air Basin																
B05	VANPORT	42-007-0505	Beaver	Vanport Water Works Tamaqui Dr	40 41 05 N 80 19 30 W								X	X		
B11	BEAVER FALLS	42-007-0014	Beaver	Eighth St & River Alley	40 44 52 N 80 19 00 W	X		X		$X_{D2.5}$ $X_{C2.5T}$		X_{C10}				
B23	HOOKSTOWN	42-007-0002	Beaver	FAA Microwave Relay Tower	40 33 47 N 80 30 16 W	X	X									
B27	BRIGHTON TOWNSHIP	42-007-0005	Beaver	1015 Sebring Rd	40 41 05 N 80 21 35 W	X	X									
Allegheny County Air Basin																
D12	PITTSBURGH	42-003-0010	Allegheny	Carnegie Science Center	40 26 44 N 80 00 59 W	X	X	X	X							
Southwest Region Non-Air Basin																
504	FLORENCE	42-125-5001	Washington	Hillman State Park	40 26 44 N 80 25 16 W	X	X			$X_{D2.5}$ $X_{C2.5}$	X					

X Parameter monitored at the site

$X_{D2.5}$ Discrete $PM2_{2.5}$ Sampler, Federal Reference Method (FRM) or Federal Equivalent Method (FEM)

$X_{C2.5}$ Continuous $PM_{2.5}$ Sampler, Federal Equivalent Method (FEM)

$X_{C2.5T}$ Continuous $PM_{2.5}$ Sampler (TEOM), Non-FEM

X_{D10} Discrete PM_{10} Sampler, Federal Reference Method (FRM)

X_{C10} Continuous PM_{10} Sampler, Federal Equivalent Method (FEM)

Table C-1. Air Monitoring Site Locations and Parameters Monitored (cont.).

PA SITE CODE	SITE NAME	EPA-AQS SITE CODE	COUNTY	STREET ADDRESS	LATITUDE LONGITUDE	OZONE	SULFUR DIOXIDE	NITROGEN DIOXIDE	CARBON MONOXIDE	$PM_{2.5}$	$PM_{2.5}$ SPEC	PM_{10}	TSP	LEAD	SULFATES	NITRATES
508	WASHINGTON	42-125-0200	Washington	McCarrell & Fayette Sts	40 10 14 N 80 15 42 W	X				$X_{D2.5}$						
510	MURRYSVILLE	42-129-0006	Westmoreland	Murrysville Volun. Fire Co. Old William Penn Hwy & Sardis Ave.	40 25 41 N 79 41 35 W	X										
512	KITTANNING	42-005-0001	Armstrong	PA State Police Barracks, Glade Dr & Nolte Rd	40 48 51 N 79 33 54 W	X				$X_{C2.5}$						
513	GREENSBURG	42-129-0008	Westmoreland	PA Dept. of Transportation Bldg, Donohue Rd	40 18 17 N 79 30 20 W	X			X	$X_{D2.5}$ $X_{C2.5}$	X					
514	HOLBROOK	42-059-0002	Greene	Field 5 km southeast of Holbrook	39 48 58 N 80 17 06 W	X	X									
515	STRONGSTOWN	42-063-0004	Indiana	PA Dept. of Transportation Bldg, Rte. 403	40 33 48 N 78 55 12 W	X	X									
Northwest Region. Butler, Clarion, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Venango and Warren Counties																
Upper Beaver Valley-Air Basin																
B21	NEW CASTLE	42-073-0015	Lawrence	Croton Ave & Jefferson St	40 59 45 N 80 20 48 W	X	X		X			X_{C10}				
Erie-Air Basin																
E10	ERIE	42-049-0003	Erie	East 10th & Marne Sts	42 08 30 N 80 02 19 W	X	X	X	X	$X_{D2.5}$ $X_{C2.5}$	X	X_{C10}				
Northwest Region Non-Air Basin																
606	FARRELL	42-085-0100	Mercer	Farrell High School Field, New Castle Rd & Mercer Ave	41 12 52 N 80 28 59 W	X				$X_{D2.5}$						
612	WARREN OVERLOOK	42-123-0004	Warren	Overlook Site near Stone Hill Rd	41 50 41 N 79 10 11 W		X									

X Parameter monitored at the site

$X_{D2.5}$ Discrete $PM2_{2.5}$ Sampler, Federal Reference Method (FRM) or Federal Equivalent Method (FEM)

$X_{C2.5}$ Continuous $PM_{2.5}$ Sampler, Federal Equivalent Method (FEM)

$X_{C2.5T}$ Continuous $PM_{2.5}$ Sampler (TEOM), Non-FEM

X_{D10} Discrete PM_{10} Sampler, Federal Reference Method (FRM)

X_{C10} Continuous PM_{10} Sampler, Federal Equivalent Method (FEM)

APPENDIX D. 2009 ELEMENTAL MERCURY VAPOR SUMMARY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Air Quality

2009 ELEMENTAL MERCURY VAPOR SUMMARY

Instrumental Method: Tekran 2537A Analyzer (Cold Vapor Atomic Fluorescence Spectrometry)

Site Location: Lancaster, Lincoln Junior High School

Monitoring for Mercury Vapor Started June 21, 1999

Valid Hours: 8116 (92.6% Data Availability)

Units: nanograms per cubic meter (ng/m^3)

Annual Average (Mean)	1.5	
1st Maximum Hour Average	9.3	11/10/2009 10:00
2nd Maximum Hour Average	4.3	11/18/2009 07:00
3rd Maximum Hour Average	3.8	01/10/2009 17:00
Maximum 5-minute Sample	12.0	11/10/09 10:10

Number of 1-Hour Average Values in Ranges

0 to 1	1 to 2	2 to 4	4 to 6	6 or more
0.41%	93.65%	5.91%	0.01%	0.01%

Mercury Vapor Historical Trend

	1999*	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Annual Mean	1.8	1.8	1.8	1.8	1.8	1.7	1.6	2.1	1.6	1.6	1.5
1st Maximum Hour Average	7.9	37.2	7.4	16.7	6.95	26.0	9.09	122.1	21.5	6.5	9.3
2nd Maximum Hour Average	7.6	32.3	7.3	14.5	5.78	12.4	7.27	84.5	18.9	6.0	4.3

* June 21, 1999 through December 31, 1999

An episode of higher than normal mercury vapor concentrations started on December 6, 2006, and continued for several weeks with concentrations gradually decreasing. The Department investigated but did not locate the source of mercury emissions. By March 2007, the ambient mercury concentrations had dropped to levels measured historically at this site.

There are no national or Pennsylvania Ambient Air Quality Standards
Other Standards or guidelines:
Agency for Toxic Substances and Disease Registry of the U. S. Dept. of Health and Human Services (ATSDR) Minimal Risk Level for Hazardous Substances, Inhalation Chronic 0.0002 mg/m3 (200 ng/m^3)
Neurol. Final 03/99 007439-97-6

EPA Integrated Risk Information System (IRIS) Reference Concentration: 0.0003 mg/m^3 (300 ng/m^3)

The risk to human health from direct exposure by inhalation to elemental mercury vapor in ambient air is believed to be well below any level of concern. Mercury deposited to surface waters is concentrated in the food chain and may reach levels in fish that are unsafe for consumption.

APPENDIX E. MONITORING METHODS

EPA mandates specific methods of sampling and analysis for all pollutants regulated by national ambient air quality standards (NAAQS). These regulations are published in the Code of Federal Regulations (CFR), and are adhered to by DEP. EPA generally approves one analysis method for each pollutant known as the Federal Reference Method (FRM). If a different method can be shown to provide adequate analysis, it may be submitted and approved by the EPA as a Federal Equivalent Method (FEM) or Automated Equivalent Method (AEM) and used in place of the FRM. DEP uses only FRM or FEM methods for all NAAQS-regulated pollutant monitoring.

EPA-approved methods include both continuous and discrete methods.

Continuous methods are automated methods that analyze continuous samples of ambient air for the specified pollutant *in situ*. The output of these specialized air monitoring instruments are hourly pollutant concentrations, which are electronically transmitted to and stored in a data logging device (datalogger). The data is transferred from the datalogger to central operations via DEP's telecommunication network, where real-time measurements can be accessed.

Discrete methods are "manual" methods that require physical removal of a sample (usually a filter through which ambient air as been passed) from its collection site. For this reason, the pollutant concentrations obtained are for a defined or "discrete" period of time; air is not sampled continuously by the instrument.

Table E-1 provides details on the methods and instrumentation utilized by the Bureau of Air Quality, Air Quality Monitoring Division.

Table E-1. Ambient Air Monitoring Equipment and Methods.

PARAMETER	MANUFACTURER/INSTRUMENT/MODEL	EPA METHOD DESIGNATION
Continuous Gaseous Sampling		
O_3	Teledyne Advanced Pollution Instrumentation Model 400 Photometric Ozone Analyzer http://www.teledyne-api.com/products/400e.asp	Automated Equivalent Method: EQOA-0992-087 57 FR 44565, 9/28/92 63 FR 31992, 6/11/98 67 FR 57811, 9/12/02
SO_2	Teledyne Advanced Pollution Instrumentation Model 100A UV Fluorescence SO2 Analyzer http://www.teledyne-api.com/products/100e.asp	Automated Equivalent Method: EQSA-0495-100 60 FR 17061, 4/4/95
$NO/NO_2/NO_x$	Teledyne Advanced Pollution Instrumentation Model 200A Chemiluminescence Nitrogen Oxides Analyzer for Ambient Concentrations http://www.teledyne-api.com/products/200e.asp	Automated Reference Method: RFNA-1194-099 59 FR 61892, 12/2/94
CO	Teledyne Advanced Pollution Instrumentation Model 300 CO Gas Filter Correlation Analyzer http://www.teledyne-api.com/products/300e.asp	Automated Reference Method: RFCA-1093-093 58 FR 58166, 10/29/93
Particulate Sampling		
$PM_{2.5}$		
Discrete	R&P Partisol-Plus Model 2025 Sequential Air Sampler w/WINS and R&P Partisol-Plus Model 2025 Sequential Air Sampler w/VSCC http://www.thermoscientific.com/wps/portal/ts/products/detail?navigationId=L10405&categoryId=89579&productId=11960559.htm	Manual Reference Method: RFPS-0498-118 63 FR 18911, 4/16/98 67 FR 15567, 4/2/02 (EQPM-0202-145 redesignated as manual reference method 12/18/06)
Continuous	Met One Instruments Beta-Attenuation Mass (BAM) Model 1020 http://www.metone.com/documents/BAM-1020_6-08.pdf	Automated Equivalent Method EQPM-0308-170 73 FR 13224, 3/12/08 73 FR 22362, 4/25/08

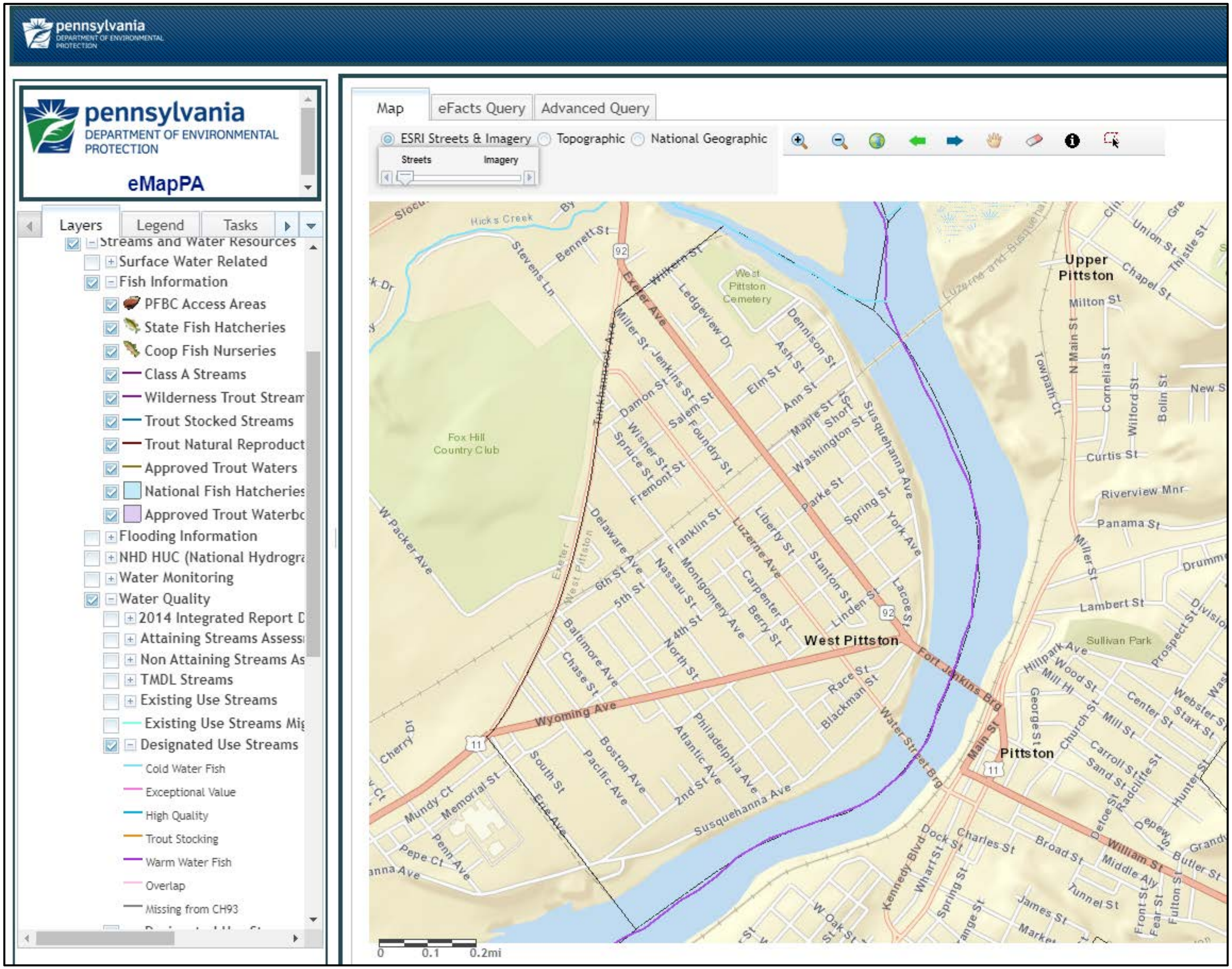
	R&P TEOM Series 8500a Filter Dynamics Measurement System (FDMS) and TEOM Series 1400ab http://www.thermoscientific.com/wps/portal/ts/products/detail?productId=11960562&groupType=PRODUCT&searchType=0	None
$PM_{2.5}$ SPECIATION	Met One Instruments SASS PM2.5 Ambient Chemical Speciation Air Sampler http://www.metone.com/documents/SASS0301Particulate.pdf	None
PM_{10}		
Discrete	Thermo GMW PM10 High-Volume Air Sampler - Volumetric http://www.thermo.com/com/cda/product/detail/1,1055,23297,00.html	Manual Reference Method: RFPS-1287-063 52 FR 45684, 12/01/87 53FR 1062, 1/15/88
Continuous	Rupprecht & Patashnick (R&P) Tapered Element Oscillating Microbalance (TEOM) Series 1400 Ambient Particulate Monitor http://www.thermoscientific.com/wps/portal/ts/products/detail?navigationId=L10405&categoryId=89579&productId=11960558	Automated Equivalent Method: EQPM-1090-079 55 FR 43406, 10/29/90
TSP	Thermo GMW TSP High Volume Air Sampler – Mass Flow http://www.thermo.com/com/cda/product/detail/1,1055,23329,00.html and Thermo GMW TSP High Volume Air Sampler – Volumetric http://www.thermo.com/com/cda/product/detail/1,1055,23328,00.html	Manual Reference Method 40 CFR Part 50, Appendix B 47 FR 54912, 12/6/82 48 FR 17355, 4/22/83
LEAD	Laboratory analysis of TSP filters by Inductively Coupled Argon Plasma-Optical Emission Spectrometry	Manual Equivalent Method EQL-0592-086 57 FR 20823, 5/15/92
SO_4, NO_3	Laboratory analysis of TSP filters by Ion Chromatography	EPA Method 300.0

This and related environmental information are available electronically via the Internet. For more information, visit us through the DEP web site at http://www.depweb.state.pa.us/
(Choose "Air" from the left-hand menu)

Comments or questions regarding this document should be directed to:
Kirit Dalal at 717-787-6548 or kdalal@state.pa.us

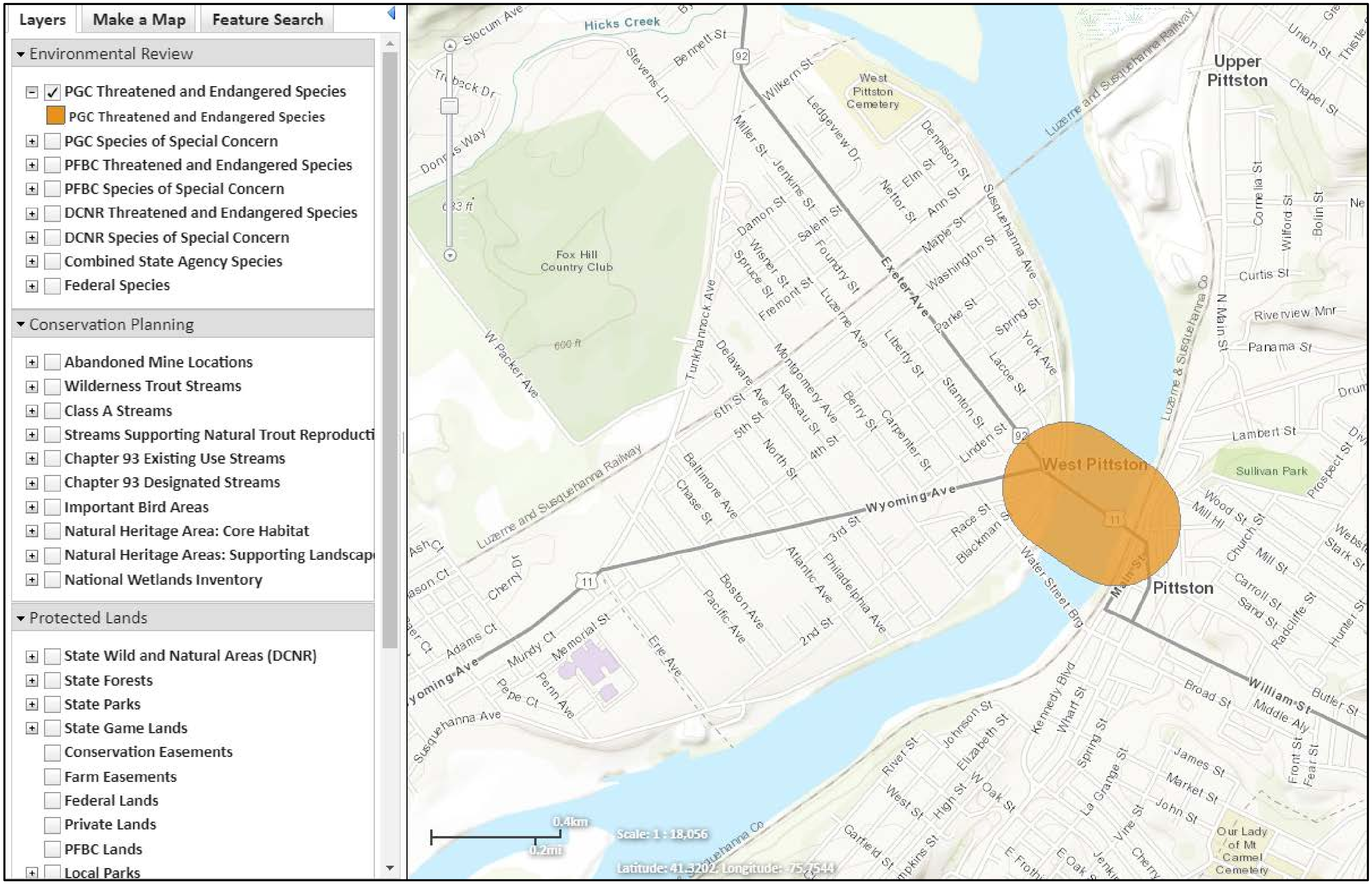
BIOLOGICAL RESOURCES

PA DEP EMapPA (http://www.depgis.state.pa.us/emappa/)

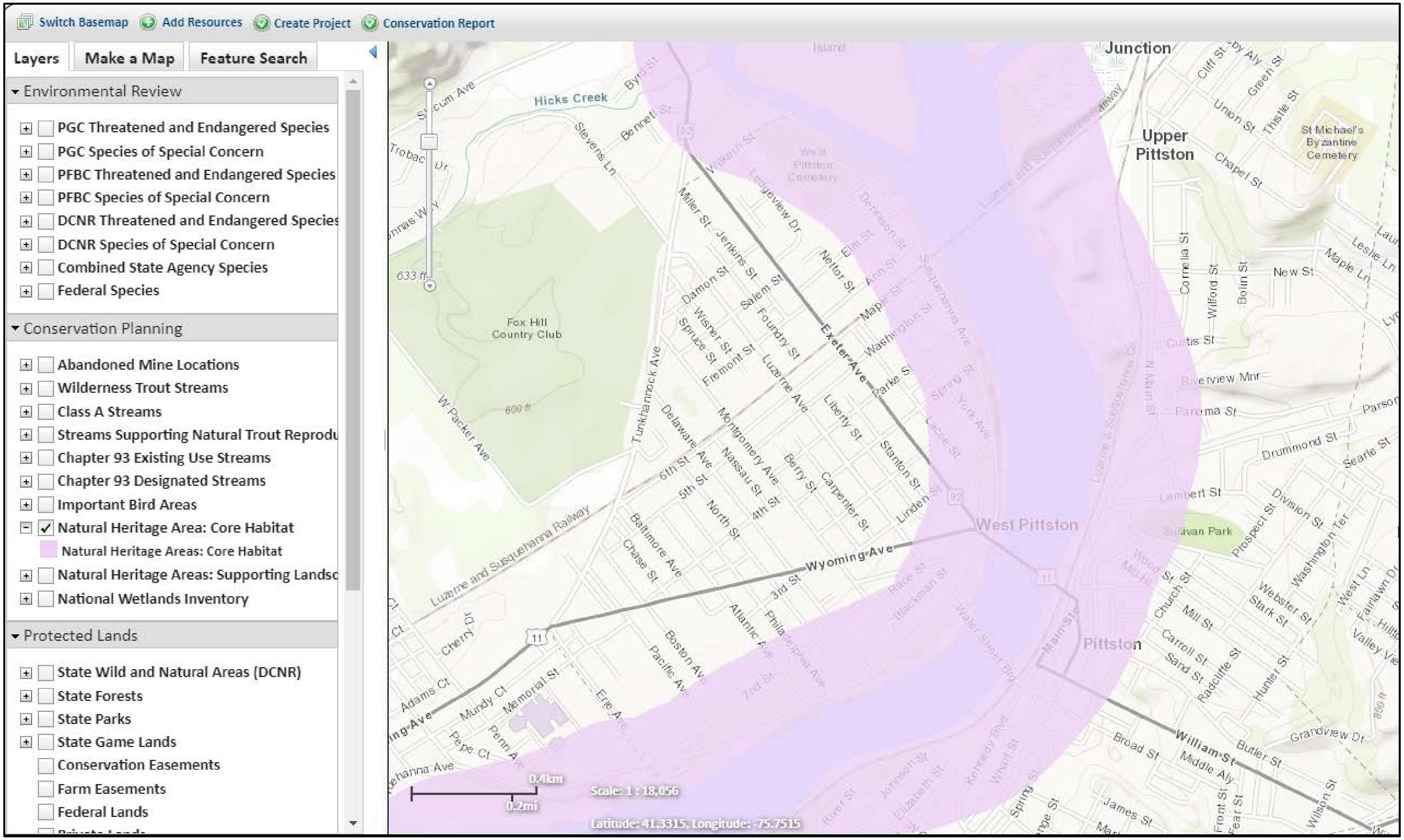


PNDI Website: https://conservationexplorer.dcnr.pa.gov/

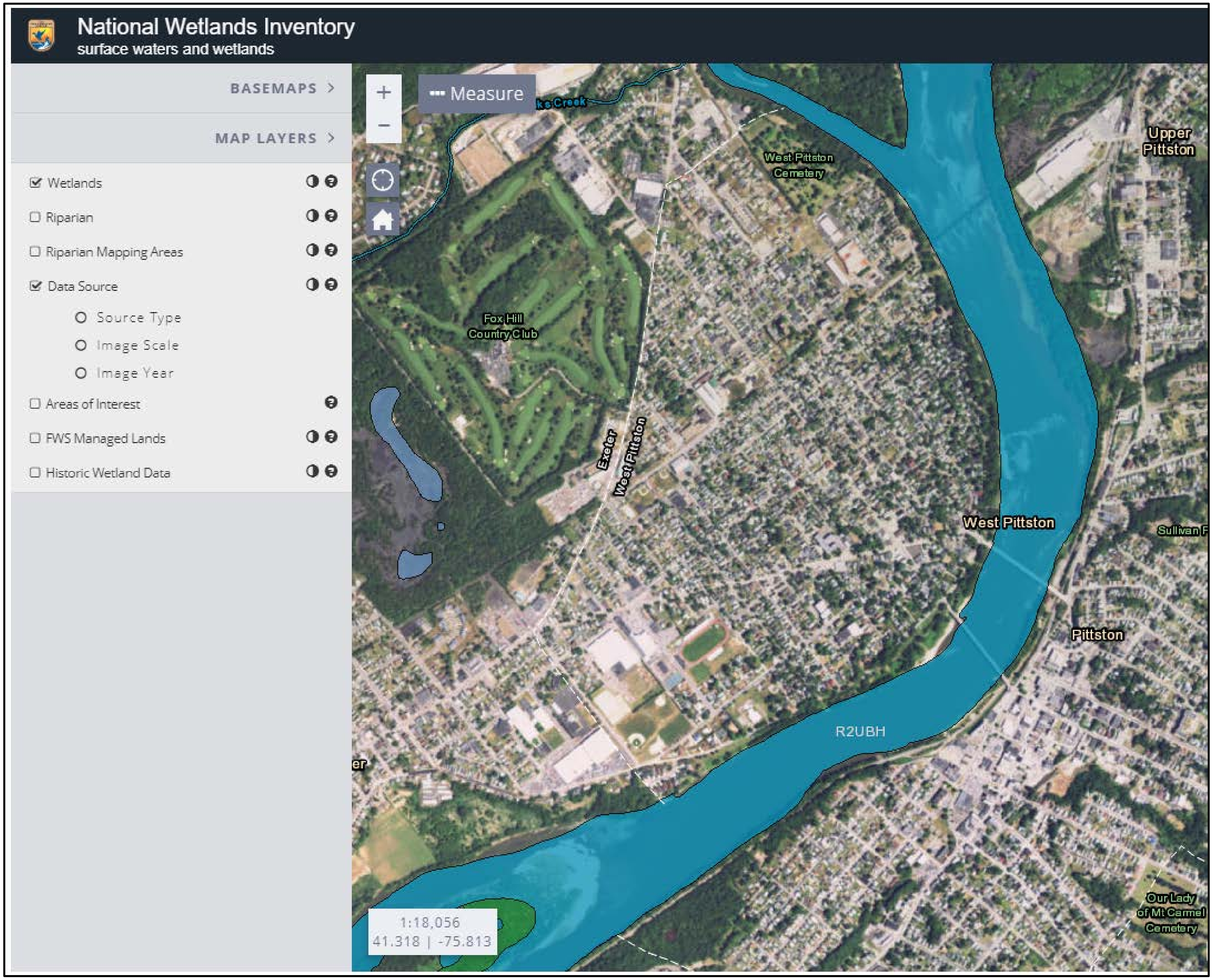
T&E Species



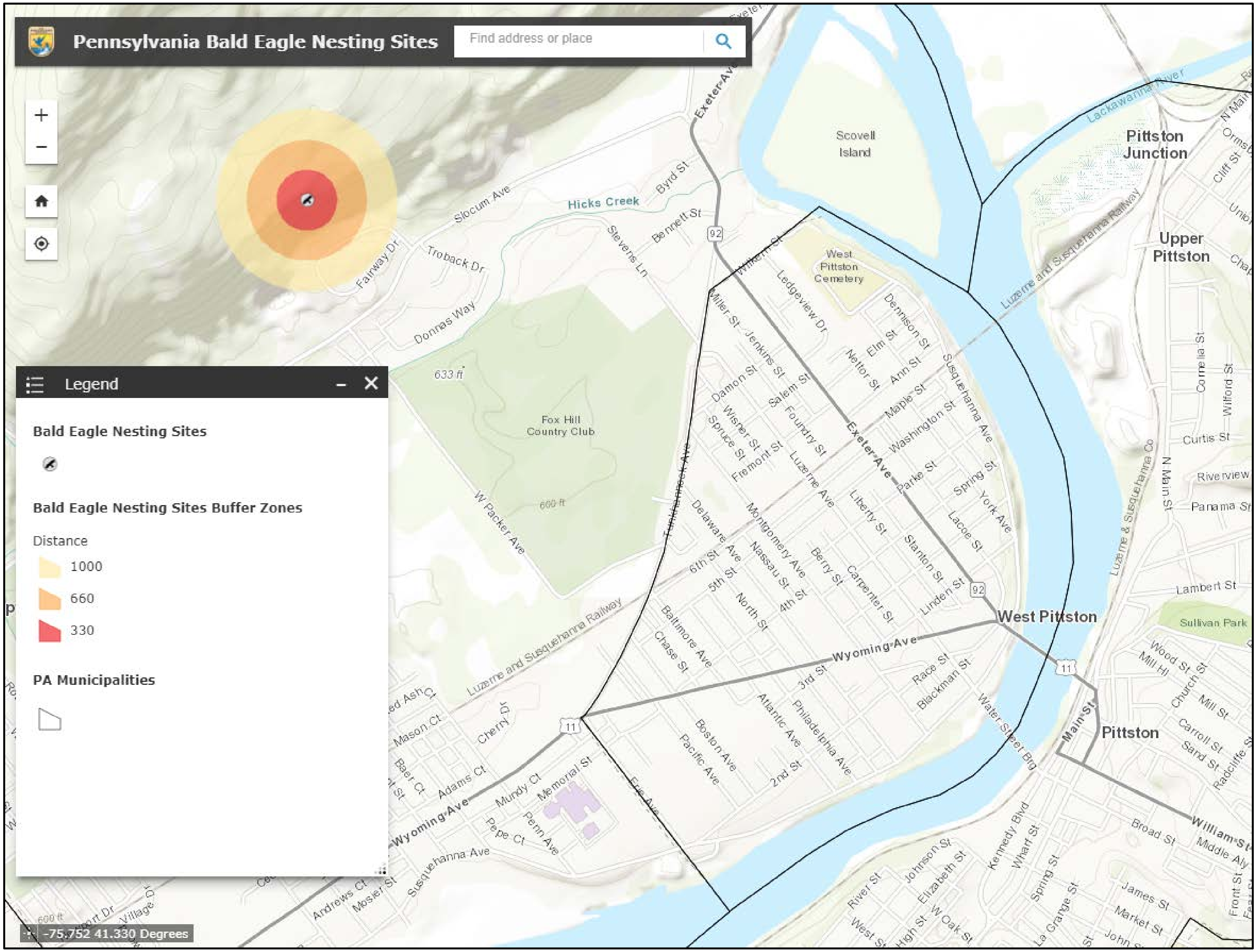
Core Habitat Area



NWI Map (https://www.fws.gov/wetlands/Data/Mapper.html)



Bald Eagle Nest Locations (https://www.fws.gov/northeast/pafo/bald_eagle_map.html)



1. PROJECT INFORMATION

Project Name: **West Pittston Levee**
Date of Review: **9/20/2019 09:20:30 AM**
Project Category: **In-stream / Riverine Activities and Projects, Levees and similar flood control structures (construction, modification, maintenance)**
Project Area: **39.98 acres**
County(s): **Luzerne**
Township/Municipality(s): **WEST PITTSTON**
ZIP Code: **18643**
Quadrangle Name(s): **PITTSTON**
Watersheds HUC 8: **Upper Susquehanna-Lackawanna**
Watersheds HUC 12: **City of Wilkes-Barre-Susquehanna River**
Decimal Degrees: **41.324259, -75.795155**
Degrees Minutes Seconds: **41° 19' 27.3313" N, 75° 47' 42.5590" W**

This is a draft receipt for information only. It has not been submitted to jurisdictional agencies for review.

DRAFT NOT FOR ACTUAL USE

2. SEARCH RESULTS

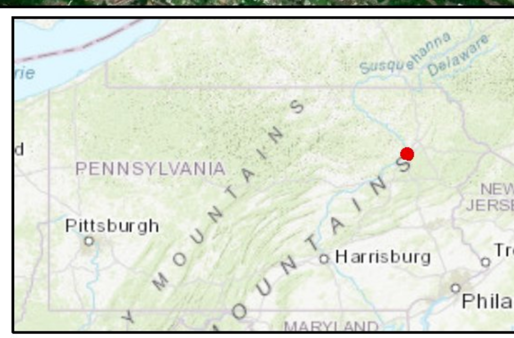
Agency	Results	Response
PA Game Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Department of Conservation and Natural Resources	No Known Impact	No Further Review Required
PA Fish and Boat Commission	No Known Impact	No Further Review Required
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

West Pittston Levee

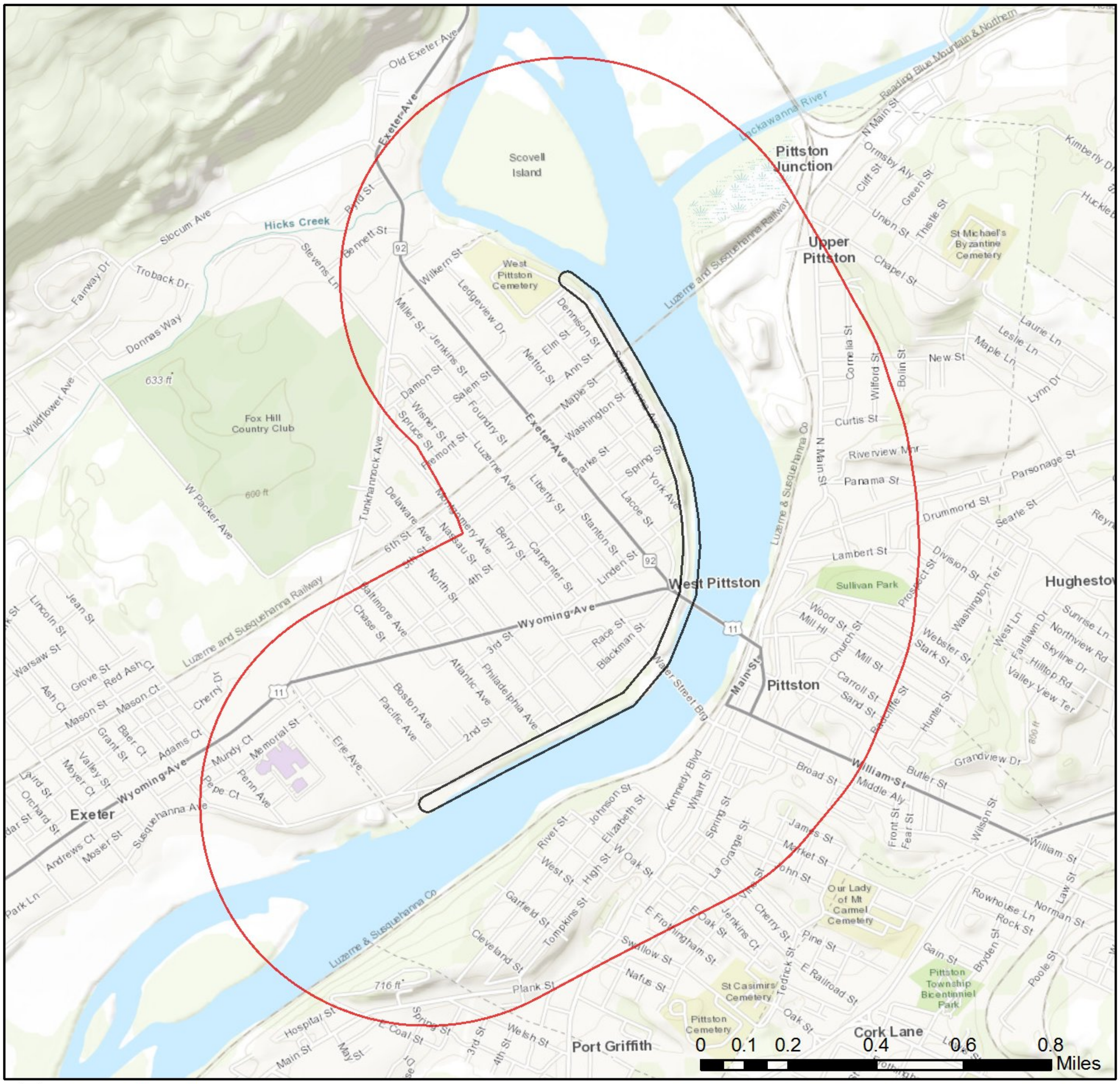
Project Boundary

Buffered Project Boundary



Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

West Pittston Levee



Project Boundary

Buffered Project Boundary

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission
RESPONSE:

Further review of this project is necessary to resolve the potential impact(s). Please send project information to this agency for review (see WHAT TO SEND).

PGC Species: (Note: The Pennsylvania Conservation Explorer tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)

Scientific Name	Common Name	Current Status
Falco peregrinus	Peregrine Falcon	Threatened

PA Department of Conservation and Natural Resources
RESPONSE:

No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Fish and Boat Commission
RESPONSE:

No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

U.S. Fish and Wildlife Service
RESPONSE:

No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq. is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictional agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

NOT FOR ACTUAL USE DRAFT

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, upload* or email* the following information to the agency(s). Instructions for uploading project materials can be found here. This option provides the applicant with the convenience of sending project materials to a single location accessible to all three state agencies. Alternatively, applicants may email or mail their project materials (see AGENCY CONTACT INFORMATION).
***Note:** U.S.Fish and Wildlife Service requires applicants to mail project materials to the USFWS PA field office (see AGENCY CONTACT INFORMATION). USFWS will not accept project materials submitted electronically (by upload or email).

Check-list of Minimum Materials to be submitted:
____Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.
____A map with the project boundary and/or a basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
In addition to the materials listed above, USFWS REQUIRES the following
____**SIGNED** copy of a Final Project Environmental Review Receipt

The inclusion of the following information may expedite the review process.
____Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
____Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams.

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. Two review options are available to permit applicants for handling PNDI coordination in conjunction with DEP's permit review process involving either T&E Species or species of special concern. Under sequential review, the permit applicant performs a PNDI screening and completes all coordination with the appropriate jurisdictional agencies prior to submitting the permit application. The applicant will include with its application, both a PNDI receipt and/or a clearance letter from the jurisdictional agency if the PNDI Receipt shows a Potential Impact to a species or the applicant chooses to obtain letters directly from the jurisdictional agencies. Under concurrent review, DEP, where feasible, will allow technical review of the permit to occur concurrently with the T&E species consultation with the jurisdictional agency. The applicant must still supply a copy of the PNDI Receipt with its permit application. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. The applicant and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at https://conservationexplorer.dcnr.pa.gov/content/resources.

NOT FOR ACTUAL USE DRAFT

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a preliminary screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

DRAFT
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Susquehanna River Islands at Pittston

This site includes the aquatic habitat in the North Branch of the Susquehanna River that provides habitat for a freshwater mussel species of concern, **yellow lampmussel** (*Lampsilis cariosa*). The site also includes a river island that provides habitat for **an additional species of concern**, which is not named at the request of the jurisdictional agency overseeing its protection. The island was not visited during the field surveys for the Natural Areas Inventory, but the area has been reported to be no longer active for this species. A field visit is needed to confirm this report.

The **eastern fox squirrel** (*Sciurus niger vulpinus*), an animal species of concern, occurs in various locations along the floodplain and slopes of the Susquehanna River riparian corridor, including this section. Further surveys need to be done to determine the extent of the population.

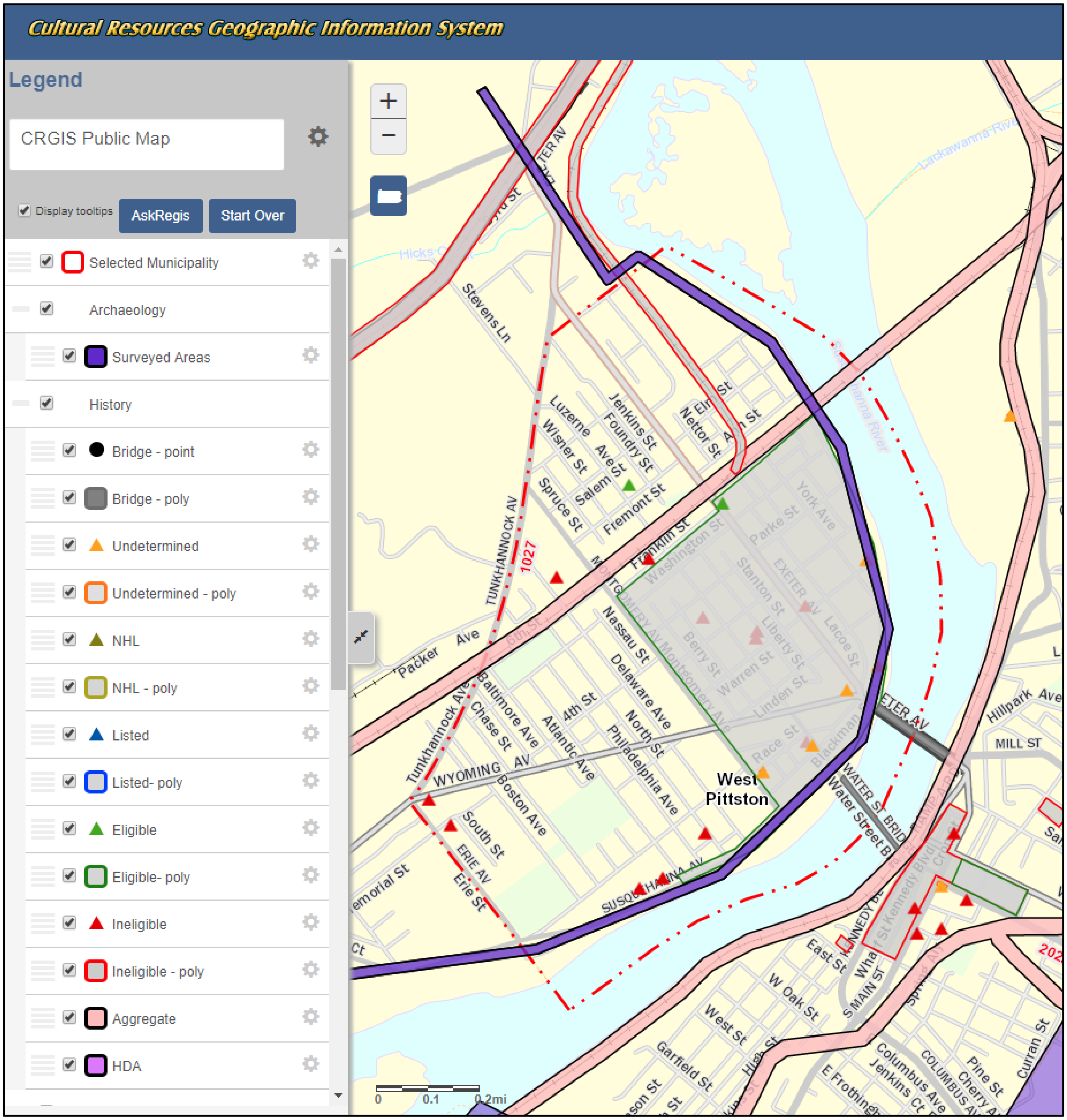
The river also provides a valuable migration corridor for many bird species, especially aquatic dependent species, but also many Neo-tropical passerine migratory species. In addition, a nesting occurrence of **Peregrine Falcon** (*Falco peregrinus*), a bird species of concern, was recently documented along this section of the river.

There are numerous examples of disturbance along the Susquehanna River. The main threat to the aquatic habitat is reduction of water quality. The aquatic habitats are affected by numerous non-point sources of pollution including sedimentation from cultivated and developed land along the river, runoff from roadways, pesticide runoff from agricultural fields, discharge of chemical pollutants and thermal pollution. The banks, floodplains and islands of the river are in areas infested with the invasive introduced plant species Japanese knotweed (*Polygonum cuspidatum*) and purple loosestrife (*Lythrum salicaria*). Control of established populations of these species is very difficult, so eradication of pioneer populations is the best way to control the spread of these species of plants.

Any of the above types of disturbances should be minimized where possible. Also, monitoring of these populations of species of concern should continue into the future. Loss of individuals and reductions in population sizes should lead to an investigation into possible causes. Water quality should be monitored and pollution sources should be identified where possible. Forested buffers should be maintained and created where absent along the length of the river with logging operations refraining from cutting within 100 feet of the river edge. River bank forests help buffer the watershed from the effects of non-point sources of pollution including runoff from agricultural, residential and roadway settings. In addition, the river floodplain and corridor is usually an area of significantly higher biodiversity than the adjoining uplands. Much of the area's important biodiversity can be preserved by maintaining an intact, forested floodplain along the river. The effectiveness of the forested riverbanks as a habitat corridor would be diminished by fragmentation of the forest continuity by the construction of houses, businesses and additional roadways along the river. Local planning should discourage construction of new structures and roadways along the river, adjacent slopes and floodplain.

CULTURAL RESOURCES

CRGIS (https://www.dot7.state.pa.us/crgis)



Historic Resource Survey Form

PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION
Bureau for Historic Preservation

Key # 156983

ER# ____

Name, Location and Ownership *(Items 1-6; see Instructions, page 4)*

HISTORIC NAME ____

CURRENT/COMMON NAME West Pittston Historic District

STREET ADDRESS Roughly bound by Maple Street, Susquehanna Avenue, Atlantic Avenue and Montgomery Avenue **ZIP** 18643

LOCATION Pittston

MUNICIPALITY West Pittston Borough **COUNTY** Luzerne

TAX PARCEL #/YEAR n/a **USGS QUAD** Pittston

OWNERSHIP ☒ Private

☒ Public/Local ☒ Public/County ☐ Public/State ☐ Public/Federal

OWNER NAME/ADDRESS n/a

CATEGORY OF PROPERTY ☐ Building ☐ Site ☐ Structure ☐ Object ☒ District

TOTAL NUMBER OF RESOURCES roughly 816 (approximately 85% of the buildings are contributing)

Function *(Items 7-8; see Instructions, pages 4-6)*

Historic Function	Subcategory	Particular Type
Domestic	Single Dwelling	____
Domestic	Multiple Dwelling	____
Commerce	Business	____
Social	Civic	____
Religious	Church	____

Current Function	Subcategory	Particular Type
Domestic	Single Dwelling	____
Domestic	Multiple Dwelling	____
Commerce	Business	____
Social	Civic	____

Architectural/Property Information *(Items 9-14; see Instructions, pages 6-7)*

ARCHITECTURAL CLASSIFICATION

Greek Revival	Late 19th & 20th Century American Movements
Queen Anne	Other
Late 19th & 20th Century Revivals	Mixed

EXTERIOR MATERIALS and STRUCTURAL SYSTEM

Foundation	various	____
Walls	various	____
Roof	various	____
Other	____	____
Structural System	various	____

WIDTH various **DEPTH** various **STORIES/HEIGHT** various

Key #________________
ER#________________________________

Property Features *(Items 15-17; see Instructions, pages 7-8)*

Setting city/town neighborhood

Ancillary Features

Acreage approximately 151 Acres

Historical Information *(Items 18-21; see Instructions, page 8)*

Year Construction Began 1850 ☒Circa **Year Completed** 1930 ☒ Circa

Date of Major Additions, Alterations various ☒ Circa ____ ☐ Circa ____ ☐ Circa

Basis for Dating ☒Documentary ☒ Physical

Explain Sanborn Maps, records, etc.

Cultural/Ethnic Affiliation(s) None

Associated Individual(s) None

Associated Event(s) None

Architect(s) Unknown

Builder(s) Unknown

Submission Information *(Items 22-23; see Instructions, page 8)*

Previous Survey/Determinations

Threats ☐ None ☐ Neglect ☒ Public Development ☐ Private Development ☐ Other

Explain HMGP-4030-DR-PA-027, HMGP-4030-DR-PA-073 and HMGP-4030-DR-PA-089.

This submission is related to a ☐ non-profit grant application ☐ business tax incentive ☒NHPA/PA History Code Project Review ☐ other

Preparer Information *(Items 24-30; see Instructions, page 9)*

Name & Title Julie Weisgerber

Date Prepared May 2013 **Project Name** PA Flood Hazard Mitigation Grant Program

Organization/Company Federal Emergency Management Agency

Mailing Address EHP, One Independence Mall, 6th Floor, 615 Chestnut Street, Philadelphia, PA 19106

Phone 215.931.5651 **Email** amanda.ciampolillo@fema.dhs.gov

Key #______________

ER#________________________________

National Register Evaluation *(Item 31; see Instructions, page 9)*

(To be completed by Survey Director, Agency Consultant, or for Project Reviews ONLY.)

☐ Not Eligible (due to ☐ lack of significance and/or ☐ lack of integrity)

☒ Eligible Area(s) of Significance Architecture

Criteria Considerations _____ Period of Significance 1850-1930

☒Contributes to Potential or Eligible District District Name West Pittston Historic District

Bibliography *(Item 32; cite major references consulted. Attach additional page if needed. See Instructions, page 9.)*

Cultural Resources Geographic Information System. Pennsylvania Historical and Museum Commission and Pennsylvania Department of Transportation. 1 March 2012. <http://crgis.state.pa.us>.

McAlester, Virginia and Lee. A Field Guide to American Houses, Knopf (New York), 1984.

Pittston, Pennsylvania [map]. Scale not given. "Sanborn Fire Insurance Maps. 1891, 1896, 1903, 1950- Pittston". Assessed online May 1, 2012. <http://sanborn1.proquest.com/>.

Portelli, Mary L. "History of West Pittston". West Pittston Historical Society. 2007. Accessed May 1, 2012 http://www.westpittstonhistory.org/history.php

Portelli, Mary L. Emailed Oral History. June 5, 2013.

Pittston, Pennsylvania [map]. Scale not given. "1892 MrSID Map of Pittston". Assessed online May 1, 2012. <http://frontiers.loc.gov/cgi-bin/map_item.pl>

US Geological Survey. Accessed online May 1, 2012.

Additional Information

The following must be submitted with form. Check the appropriate box as each piece is completed and attach to form with paperclip.

☒ Narrative Sheets—Description/Integrity and History/Significance (See Instructions, pages 13-14)

☒ Current Photos (See Instructions, page 10)

☒ Photo List (See Instructions, page 11)

☒ Site Map (sketch site map on 8.5x11 page; include North arrow, approximate scale; label all resources, street names, and geographic features; show exterior photo locations; See Instructions, page 11)

☐ Floor Plan (sketch main building plans on 8.5x11 page; include North arrow, scale bar or length/width dimensions; label rooms; show interior photo locations; See Instructions, page 11)

☒USGS Map (submit original, photocopy, or download from TopoZone.com; See Instructions, page 12)

Send Completed Form and Additional Information to:

National Register Program
Bureau for Historic Preservation/PHMC
Keystone Bldg., 2nd Floor
400 North St.
Harrisburg, PA 17120-0093

	Key #__________
ER#____________________	

Photo List (Item 33)

See pages 10-11 of the Instructions for more information regarding photos and the photo list. In addition to this photo list, create a photo key for the site plan and floor plans by placing the photo number in the location the photographer was standing on the appropriate plan. Place a small arrow next to the photo number indicating the direction the camera was pointed. Label individual photos on the reverse side or provide a caption underneath digital photos.

Photographer name J. Falone, J. Redmond, and J. Weisgerber

Date April 2013

Location Negatives/Electronic Images Stored FEMA / Region III

Photo #	Photo Subject/Description	Camera Facing
1	211 York Avenue, looking southwest	SW
2	11 York Avenue, looking south	S
3	21 Exeter Avenue, looking south	S
4	21 Exeter Avenue, looking southwest	SW
5	21 Exeter Avenue, looking southwest	SW
6	21 Exeter Avenue, looking west	W
7	Wyoming Avenue and Blackman Street, looking north	N
8	804 Susquehanna Avenue, looking southwest	NW
9	804 Susquehanna Avenue, looking northwest	N W
10	216 Wyoming Avenue, looking north	N
11	216 Wyoming Avenue, looking northeast	NE
12	216 Wyoming Avenue, looking northwest	NW
13	216 Wyoming Avenue, looking east	E
14	225 Race Street, looking southeast	SE
15	320-322 Race Street, looking southwest	SW
16	320-322 Race Street, looking northeast	NE
17	320-322 Race Street, looking west	W
18	334 Race Street, looking northwest	NW
19	Susquehanna Avenue and Montgomery Avenue, looking northwest	N W
20	Susquehanna Avenue and North Street, looking northeast	NE
21	Susquehanna Avenue and Atlantic Avenue, facing northeast	NE
22	205 Montgomery Avenue, looking southwest	SW
23	128 Luzerne Ave (at right), looking north	N
24	Corner of Luzerne and Warren, looking north	N
25	230 Parke Street, looking north	N
		N

Key #______________

ER#______________

Physical Description and Integrity (Item 38)

Provide a current description of the overall setting, landscape, and resources of the property. See page 13 of the Instructions for detailed directions. Continue on additional sheets as needed. Suggested outline for organizing this section:

- Introduction [summarize the property, stating type(s) of resource(s) and function(s)]
- Setting [describe geographic location, streetscapes, natural/man-made landscape features, signage, etc.]
- Exterior materials, style, and features [describe the exterior of main buildings/resources]
- Interior materials, style, and features [describe the interior of main buildings/resources]
- Outbuildings/Landscape [describe briefly additional outbuildings/landscape features found on property, substitute Building Complex Form if preferred; See Instructions, page 18]
- Boundaries [explain how/why boundaries chosen, such as historic legal parcel, visual natural features such as tree lines, alley separating modern construction, etc.]
- Integrity [summarize changes to the property and assess how the changes impact its ability to convey significance

After a site visit with FEMA and PHMC staff in January 2012, initial boundaries for the potential West Pittston Historic District are proposed as Maple Street to the north, Susquehanna Avenue to the east and south, and Montgomery Avenue to the west, with just Susquehanna Avenue being extended down to Atlantic Avenue. This boundary was justified given the similar setbacks, architecture massing, and association with the development with West Pittston. The period of significance for this potential large district would be 1850-1930. The setting of the historic district is mostly flat, with tree-lined streets, with the nicest houses located along the Susquehanna River

Early development of the district began with the incorporation of the West Pittston Land Association in 1850. The boundaries for this were Parke Street to the north, Exeter Avenue to the east, the Susquehanna River to the south, and Nassau Street to the west. The original architecture of this section consists of mostly Italianate and Second Empire.

11 York Avenue (photo #2) is a classic example of Italianate architecture. This two-and-a-half story, five bay by two bay structure has all the classic signs of the style: a low-pitched hip roof with deep eaves that are supported with paired brackets, a cupola on top of the roof finished with arch-topped windows, and classical ornamentation in the porch details including the columns and temple front pavilion on the second floor. This building would be contributing to the historic district.

21 Exeter Avenue (photos #3-6) is another example of a contributing Italianate structure, although its architectural detailing is a little more vernacular. The building almost appears Colonial Revival, but that is due to some changes that were made to the façade and porch ca. 1905. The house is a two-story, three bay by two bay side gable structure. The front (east) façade's central bay has a tripartite entrance door with sidelites and a paneled door. The second floor of the central bay has a six-over-six window flanked with decorative shutters. Crowning the central bay above the second floor is small gable front jetting out from the roof. This feature is purely decorative, as it does not extend the wall space by any real area; it solely highlights the entry. The entire roofline has a deep overhang with decorative brackets. The flanking bays on the front façade have six-over-six windows on both floors, with the first floor windows being slightly larger with decorative shutters. The one-story front porch has paired Tuscan columns on top of stone piers. The Sanborn Fire Insurance Maps show that this porch appeared on the house sometime after 1903 and before 1910. The side (north) elevation has four windows broken up over the two bays on two floors with a brick chimney attached in the center of the elevation. This building also has another feature common to the historic district- a detached garage at the back of the lot. The original carriage house was demolished by 1910, and a three bay garage had been constructed.

Key #______________

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There are a few Second Empire buildings in the historic district. 211 York Avenue (photo #1) is a good contributing example. This three bay by four bay home's most prominent feature is its S-curve mansard roof. Within the mansard are arch-topped windows with pedimented window surrounds. The roof is visually supported with a cornice. The three bays of the main block are asymmetrical in design, with the arch topped double door located in the last bay. The first two bays have very tall triple hung windows. The second floor has three evenly spaced two-over-two double hung arch topped windows. All of the fenestrations on the house have plain window hoods.

As development continued, smaller working-class houses were constructed to the north, extending past the railroad tracks. To the east, from Exeter Avenue to the Susquehanna River, newer homes began cropping up in the 1920s. In addition to these new areas, within the original incorporated area, existing house lots were subdivided and infill homes were constructed.

230 Parke Street and 205 Montgomery Avenue are great examples of intact Queen Annes that are typical for the style, and would be contributing to the historic district. 230 Parke Street (photo #25) is a two-and-a-half story residence with asymmetrical massing dominated by a wrap-around porch and a two-story bay window capped with a pedimented gable roof. Classic Queen Anne features are still intact on the building including turned columns, balustrades and a spindle work frieze on both the wrap-around first-story porch and the second floor porch, and original paired paneled doors at the entrance to the house. 205 Montgomery Avenue (photo #22) also features a wrap-around porch and a pedimented bay window. In addition the house also boasts a mixture of siding including fishscale shingles and narrow clapboards. The house also has decorative Queen Anne style windows up in the tympanum of the gable end.

216 Wyoming Avenue (photos #10-13) is another contributing example of a Queen Anne structure. The two-and-a-half story structure is comprised of a gable-front main block and a side "L". The three bay main block of the front (south) façade has an off-center entrance in the third bay comprised of two paneled doors covered by wooden screen doors. To the left of the entry are two six-over-six replacement windows. On the second floor are three windows evenly spaced that match the ones on the first floor. In the gable end, there is a decorative window treatment. Two small six-over-six replacement windows flank a wooden carved panel of a grid with x's in the center of each square. The whole first floor of the façade is covered by a porch supported by bracketed turned columns. The porch has a shed roof with a gable front roof centered over the front door. The front façade of the side "L" is also three bays wide with both the first and second floor matching in fenestration. The first two bays have the same windows as on the main block, and on the third bay there is Chicago-style window. To the west of the main block is a one-story addition with a narrow pitch shed roof. This addition lacks fenestration and detail.

804 Susquehanna Avenue (photos #8-9) is an example of a Queen Anne that has undergone some changes, but would still be contributing to the historic district. This structure dates to the 1880s and it is clearly a Queen Anne in form with wall bays that project and recede and a complex roof plan made up of cross hips with tall, narrow gable fronted dormers accenting the structure. However, the typical wall and porch details that augment the style are not present. The walls have been resided in vinyl, with an attempt to reference the architecture with a narrow band or vinyl fish scales placed at the cornice line. The porch has been replaced

Key #______________

ER#______________

with thin, plain posts and railings. The entry door is original, with a wide, paneled door with sidelites and transom, all finished out with flat pilasters and wooden cornice.

With any large historic district, there are examples of structures that would be non-contributing to the significance of the area. These structures include modern infill, such as 225 Race Street (photo #14), which was constructed in 1973, and 334 Race Street (photo #18) that was constructed in 1966.

Lastly, there are several examples of buildings constructed within the period of significance that would be considered non-contributing due to severe alterations. 320-322 Race Street (photos #15-17) is a prime example of a house that has been through several changes. Situated on a tight residential lot approximately 1,000 feet from the Susquehanna River, the two-and-a-half-story structure was built c. 1900. The former single family Queen Anne style residence has undergone many changes over the years, most notably that the dwelling has been converted into a duplex unit. The asymmetrical structure sits on a concrete masonry unit foundation, and the street front façade now features two separate walk up entrances. Originally, this house would have had a partial one-story porch, adorning the left two-thirds of the front façade, and then wrapping around the left side for another eight feet towards the rear, where the porch stopped when it met the left elevation abutment. The former open porch is evident from the existing roof lines, and it has since been enclosed. The right third of the house was formerly a two-story bay window column. However, a distinctly boxy one-story addition has been tacked onto the lower portion of the bay window tower, which also appears to be a separate enclosed porch space. The left walk-up entrance is served by a brick stair leading to a stuccoed landing, outlined by a cast iron railing, with the door entrance on the far left side of the building. The right walk-up entrance, meanwhile, is served by a simple wooden staircase and side rail that leads directly to the door entrance at the right-center of the house. Both entrances are covered by aluminum awnings. In addition to the above mentioned changes, the original siding has been re-clad in aluminum siding. None of the original doors or windows remain, and the hipped roof with its intersecting cross-gables appears as if it was recently replaced with modern asphalt shingles as well. This building would be non-contributing to the historic district.

This historic district is heavily residential in type. As this area was developed as a garden district for wealthy and upper middle class capitalists and merchants from Pittston, most of the businesses remained in Pittston. Only a few shops and stores popped up in West Pittston, and these were centered along Exeter Avenue. Only a few of the structures from the period of significance remain. These are mainly one and two story early twentieth century commercial structures. A few of the best examples are located at 128 Luzerne Avenue (photo #23) and 202 Luzerne Avenue (photo #24).

Overall, the West Pittston historic district is a good mixture of architectural styles that helps explain the development of the town. The largest character-defining feature of the district is the town plan itself. Laid out in a grid plan, the only non-gridded street is Wyoming Avenue. The forethought in planning gave the town a uniform feel, with similar setback in the buildings, porches on the front of the houses and carriage houses placed at the back of the lots. Despite the fact that many architectural styles appear in the town, the uniformity in layout gives the town a harmonious feeling. In addition, the majority of the structures are wood (or replacement siding), with only a few structures rendered in brick or stone.

Key #______________

ER#__________________________________

Note: 21 Exeter Avenue, 225 Race Street, 320-322 Race Street, 334 Race Street, 804 Susquehanna Avenue and 216 Wyoming Avenue are proposed to be acquired and demolished in a FEMA project, HMGP-4030-DR-PA-027, HMGP-4030-DR-PA-073 and HMGP-4030-DR-PA-089.

	Key #__________
ER#__________	

History and Significance (Item 39)

Provide an overview of the history of the property and its various resources. Do not substitute deeds, chapters from local history books, or newspaper articles. See page 14 of the Instructions for detailed directions. Continue on additional sheets as needed.
Suggested outline for organizing this section:

- History [Summarize the evolution of the property from origin to present]
- Significance [Explain why the property is important]
- Context and Comparisons [Describe briefly similar properties in the area, and explain how this property compares]

West Pittston Borough sits on the eastern side of Luzerne County, at a bend in the Susquehanna River, just north of the older mining community of Pittston, and four miles south of the lumbering community of Exeter Township. Once the first permanent bridge in Pittston was built across the Susquehanna River, Pittston businessmen, shop owners, grocers, lawyers, doctors and others began to look to West Pittston, which bore the nickname of "Garden Village" at the time.

The formal start to this garden village was in 1851 when the West Pittston Land Association was formed. The early boundary was roughly Parke Street to the north, Exeter Avenue to the east, the river to the south, and Montgomery to the west. The company disbanded after twenty years when most of the lots were sold; the remaining lots were divided among the many partners. Two separate, new groups developed the rest of the town's core. To the north, the partnership of Lacoe and Lowenstein developed from Parke Street to the railroad located at Maple Street. To the east, York Smith and the W.C. Gildersleeve Estate developed everything east of Exeter Avenue, including over half of the large homes along Susquehanna Avenue.

Population quickly rose in the area, and a borough charter was submitted and approved in 1857. Improvements such as a free library, public schools, sidewalks and street lighting continued though the late nineteenth century as population continued to rise.

The economy of West Pittston remained vibrant from a number companies and light industries including Exeter Machine Works, Hitchner Biscuit Company, Luzerne Cut Glass Factory, Luzerne Knitting Mill, Vulcan Iron Works, and the Wisner and Strong Foundry (later the West Pittston Iron Works). Some of these businesses were regionally sustaining; the machine and iron works businesses were mainly providing machinery for the mining industry and railroads in the area.

The mining industry remained the primary employer well into the twentieth century; however, in 1959 there was a major mining disaster at the Knox Mine in Pittston, which effectively ended the anthracite industry in the area. According to Mary Portelli, President of the West Pittston Historical Society, the Knox Mine accident was a major factor in the decline of West Pittston. The unskilled male residents could not find other jobs in the area that paid as much as mining did, and thus the middle class in the garden village ended.

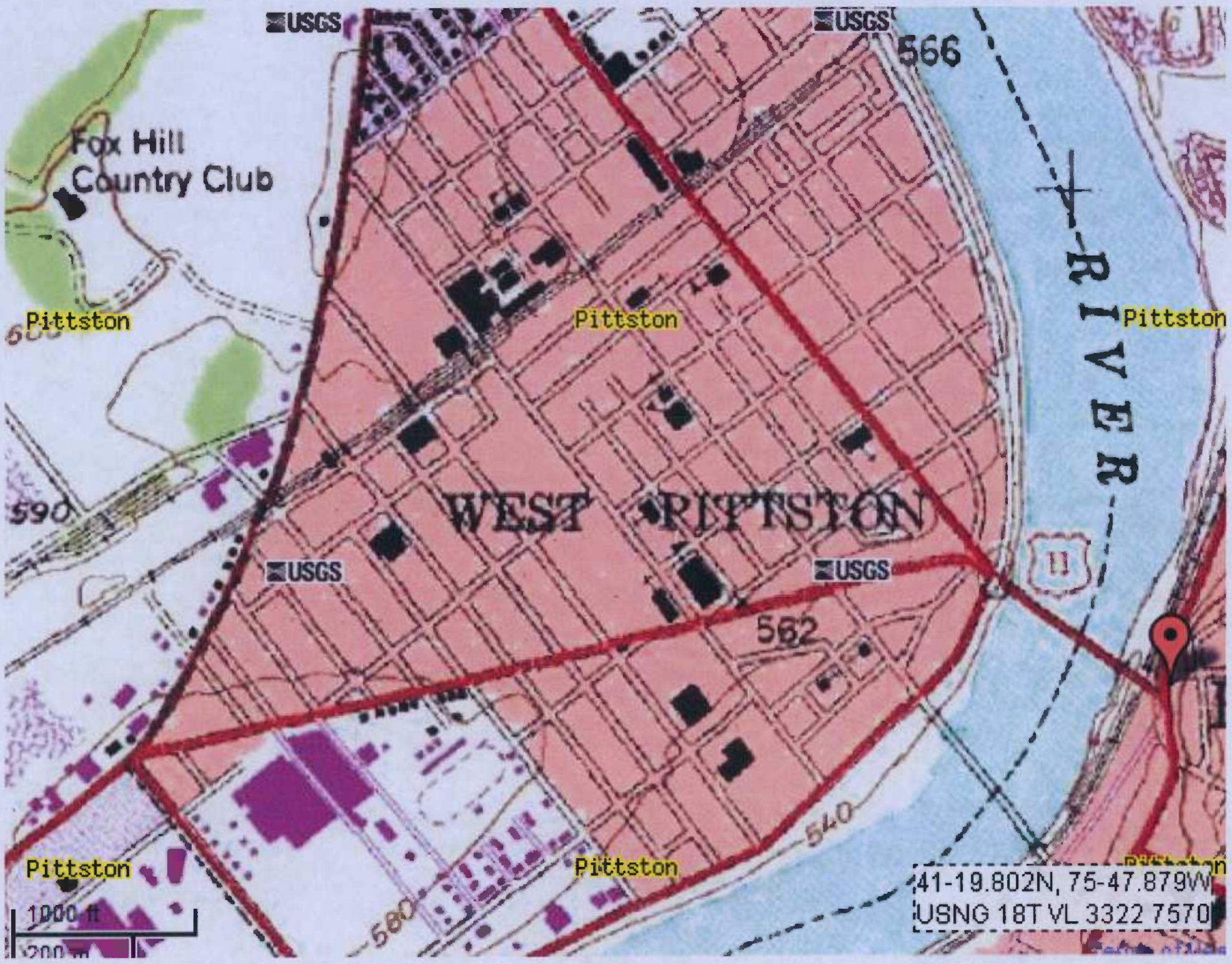
After the site visit with FEMA and PHMC staff in January 2012, PHMC staff returned to West Pittston in June of 2012 to confirm and define the boundaries of the eligible historic district. The staff confirmed the above proposed large boundary of Maple Street to the north, Susquehanna Avenue to the east and south, and Montgomery Avenue to the west, with just Susquehanna Avenue being extended down to Atlantic Avenue. The West Pittston Historic District would be **eligible for the National Register of Historic Places** under Criterion C for architecture.

Key #______________

ER#______________________________

Note: 21 Exeter Avenue, 225 Race Street, 320-322 Race Street, 334 Race Street, 804 Susquehanna Avenue and 216 Wyoming Avenue are proposed to be acquired and demolished in a FEMA project, HMGP-4030-DR-PA-027, HMGP-4030-DR-PA-073 and HMGP-4030-DR-PA-089.

West Pittston Borough Historic District, Luzerne County
Photographs



USGS Map

West Pittston Potential Historic District Exploration

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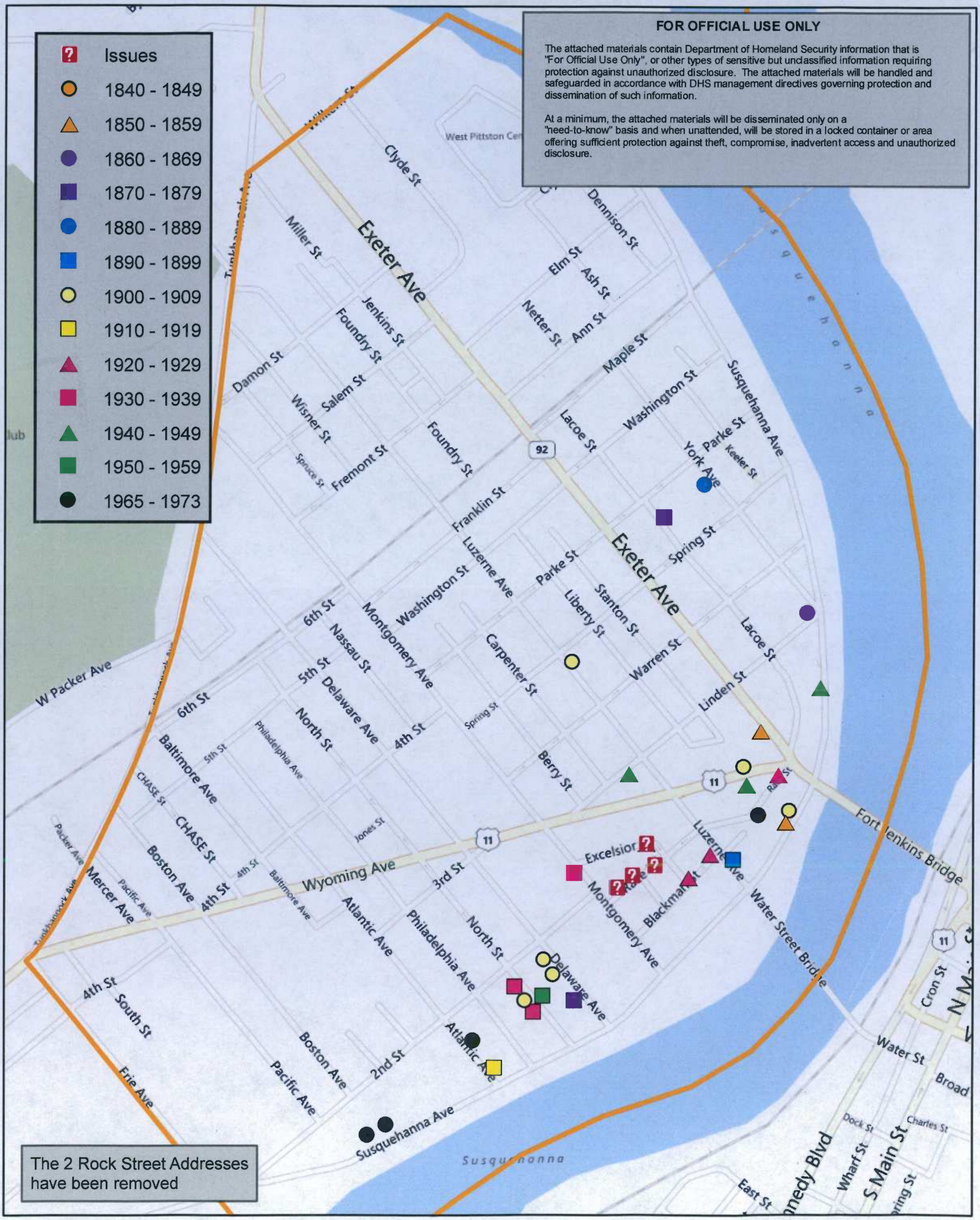
At a minimum, the attached materials will be disseminated only on a "need-to-know" basis and when unattended, will be stored in a locked container or area offering sufficient protection against theft, compromise, inadvertent access and unauthorized disclosure.



The 2 Rock Street Addresses have been removed

West Pittston Potential Historic District Exploration

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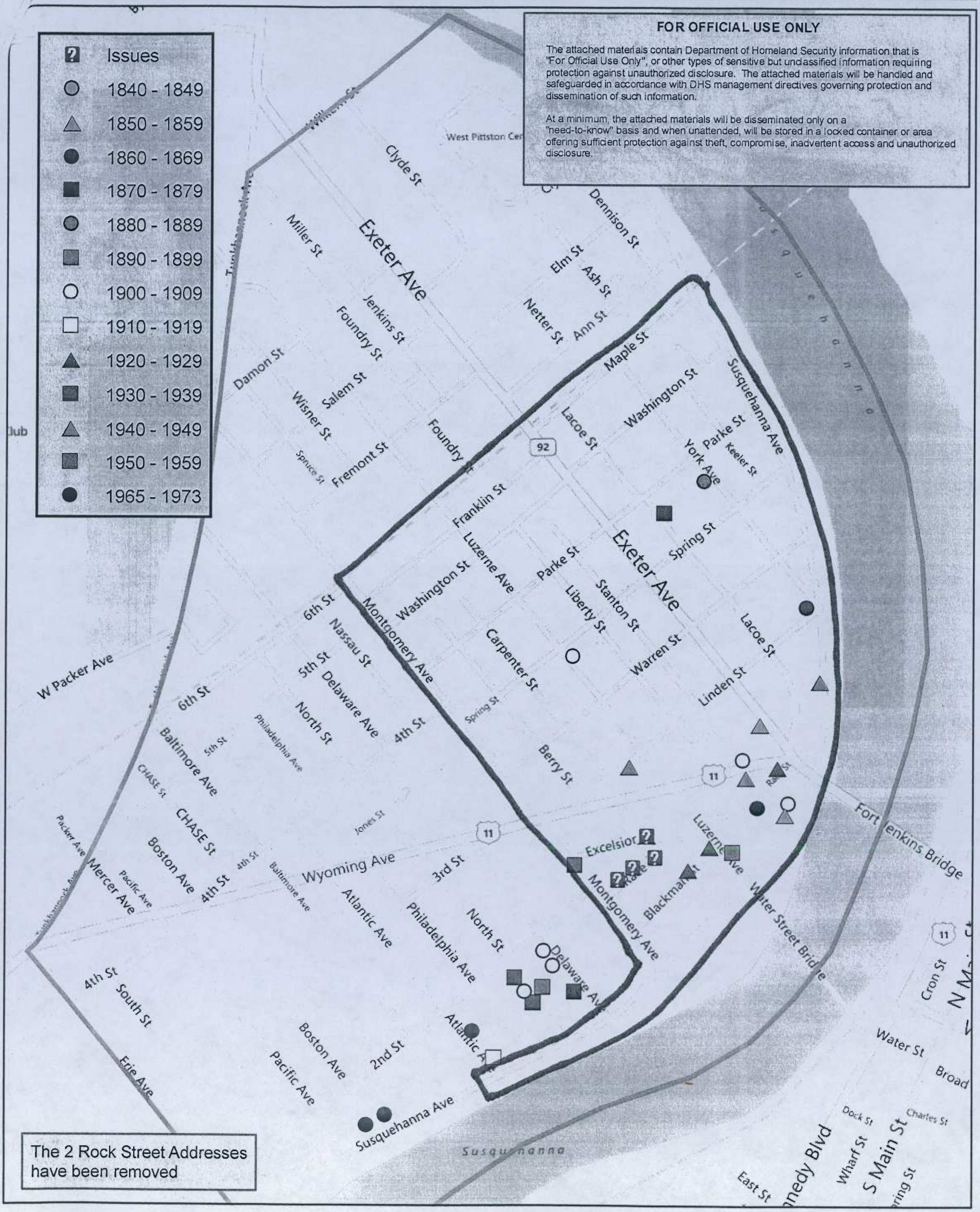
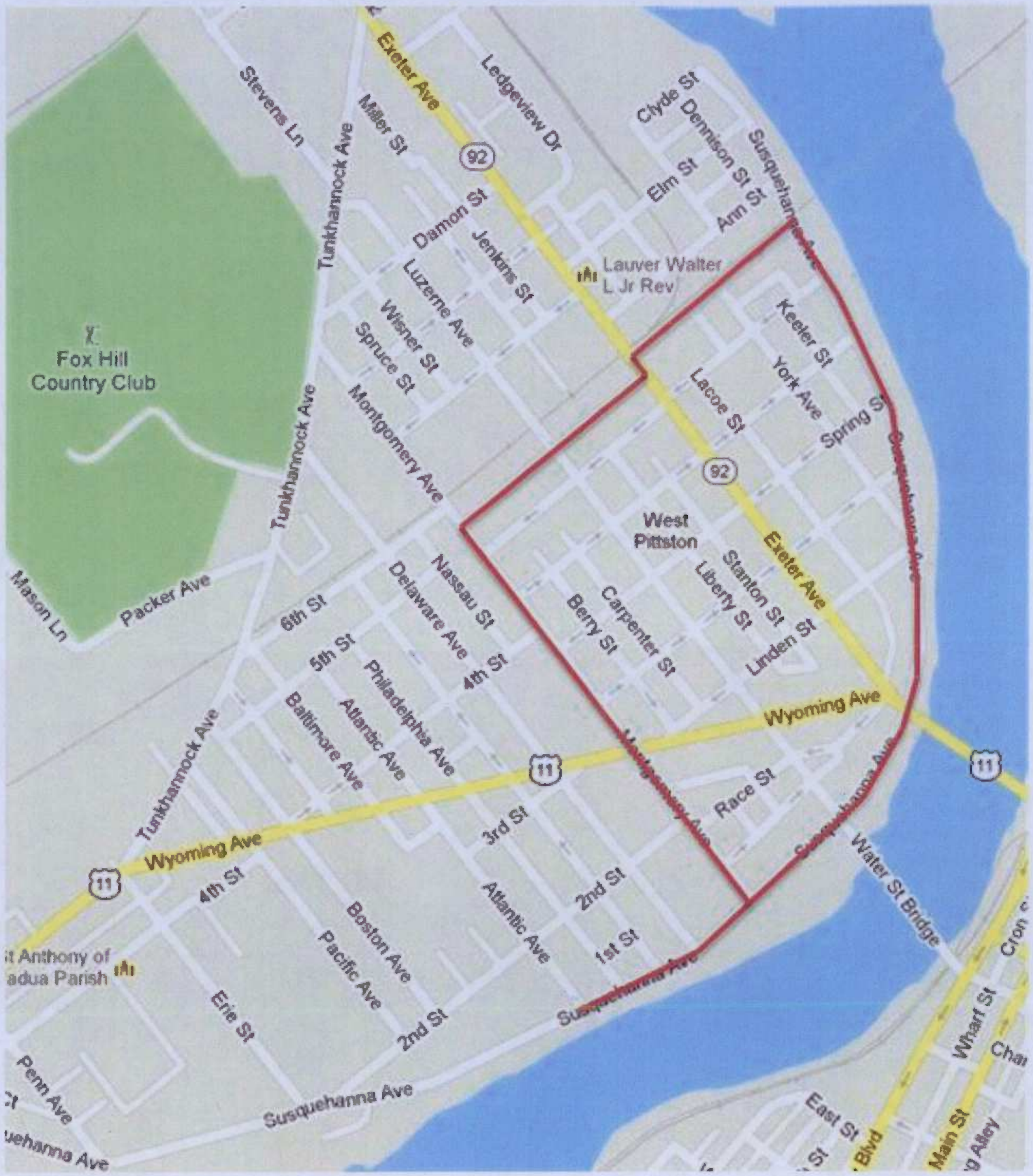


West Pittston Borough Historic District, Luzerne County
Photographs



Historic District Proposed Boundaries

West Pittston Borough Historic District, Luzerne County
Photographs

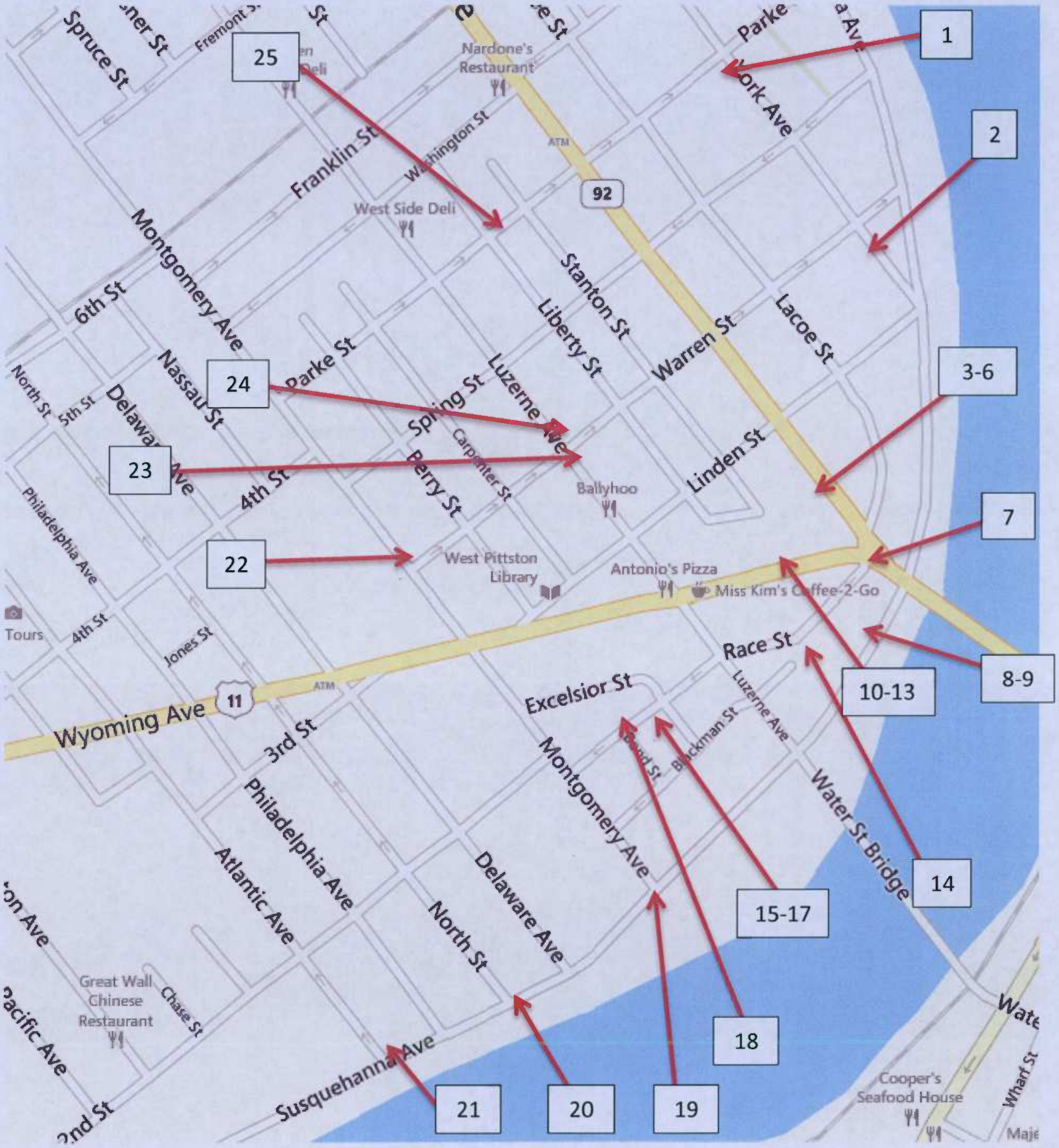


Photo Key

West Pittston Borough Historic District, Luzerne County
Photographs

Photo 1- 211 York Avenue, looking southwest

Photo 2- 11 York Avenue, looking south

Photo 3- 21 Exeter Avenue, looking south

Photo 4- 21 Exeter Avenue, looking southwest

Photo 5- 21 Exeter Avenue, looking southwest

Photo 6- 21 Exeter Avenue, looking west

Photo 7- Wyoming Avenue and Blackman Street, looking north

Photo 8- 804 Susquehanna Avenue, looking southwest

Photo 9- 804 Susquehanna Avenue, looking northwest

Photo 10- 216 Wyoming Avenue, looking north

West Pittston Borough Historic District, Luzerne County
Photographs

Photo 11- 216 Wyoming Avenue, looking northeast

Photo 12- 216 Wyoming Avenue, looking northwest

Photo 13- 216 Wyoming Avenue, looking east

Photo 14- 225 Race Street, looking southeast

Photo 15- 320-322 Race Street, looking southwest

Photo 16- 320-322 Race Street, looking northeast

Photo 17- 320-322 Race Street, looking west

Photo 18- 334 Race Street, looking northwest

West Pittston Borough Historic District, Luzerne County
Photographs

Photo 19- Susquehanna Avenue and Montgomery Avenue, looking northwest

Photo 20- Susquehanna Avenue and North Street, looking northeast

West Pittston Borough Historic District, Luzerne County
Photographs

Photo 21- Susquehanna Avenue and Atlantic Avenue, facing northeast

Photo 22- 205 Montgomery Avenue, looking southwest

West Pittston Borough Historic District, Luzerne County
Photographs

Photo 23- 128 Luzerne Ave (at right), looking north

Photo 24- Corner of Luzerne and Warren, looking north

Photo 25- 230 Parke Street, looking north

Key # 156983
ER# 2012-6070-079

Historic Resource Survey Form

PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION
Bureau for Historic Preservation

Name, Location and Ownership *(Items 1-6; see Instructions, page 4)*

HISTORIC NAME ____

CURRENT/COMMON NAME West Pittston Historic District

STREET ADDRESS Roughly bounded by Maple Street, Susquehanna Avenue, Atlantic and Montgomery **ZIP** 18643

LOCATION Pittston

MUNICIPALITY West Pittston Borough **COUNTY** Luzerne

TAX PARCEL #/YEAR n/a **USGS QUAD** Pittston

OWNERSHIP ☒ Private
☒ Public/Local ☒ Public/County ☐ Public/State ☐ Public/Federal

OWNER NAME/ADDRESS n/a

CATEGORY OF PROPERTY ☐ Building ☐ Site ☐ Structure ☐ Object ☒ District

TOTAL NUMBER OF RESOURCES 100+

Function *(Items 7-8; see Instructions, pages 4-6)*

Historic Function	Subcategory	Particular Type
Domestic	Single Dwelling	____
Domestic	Multiple Dwelling	____
Commerce	Business	____
Social	Civic	____
Education	School	____

Current Function	Subcategory	Particular Type
Domestic	Single Dwelling	____
Domestic	Multiple Dwelling	____
Commerce	Business	____
Social	Civic	____
Education	School	____

Architectural/Property Information *(Items 9-14; see Instructions, pages 6-7)*

ARCHITECTURAL CLASSIFICATION

Greek Revival	Late 19th & 20th Century American Movements
Late Victorian	Other
Late 19th & 20th Century Revivals	Mixed

EXTERIOR MATERIALS and STRUCTURAL SYSTEM

Foundation	various	____
Walls	various	____
Roof	various	____
Other	____	____
Structural System	various	____

WIDTH various **DEPTH** various **STORIES/HEIGHT** various

Key #________

ER#________

Property Features *(Items 15-17; see Instructions, pages 7-8)*

Setting city/town neighborhood

Ancillary Features

____ ____ ____

____ ____ ____

____ ____ ____

Acreage approximately 151 Acres

Historical Information *(Items 18-21; see Instructions, page 8)*

Year Construction Began 1850 ☒Circa **Year Completed** 1930 ☒ Circa

Date of Major Additions, Alterations various ☒ Circa ____☐ Circa ____ ☐ Circa

Basis for Dating ☒Documentary ☒ Physical

Explain Sanborn Maps

Cultural/Ethnic Affiliation(s) None

Associated Individual(s) None

Associated Event(s) None

Architect(s) Unknown

Builder(s) Unknown

Submission Information *(Items 22-23; see Instructions, page 8)*

Previous Survey/Determinations

Threats ☐ None ☐ Neglect ☒ Public Development ☐ Private Development ☐ Other

Explain FEMA- Luzerne County SHPO # 142

This submission is related to a ☐ non-profit grant application ☐ business tax incentive

☒NHPA/PA History Code Project Review ☐ other

Preparer Information *(Items 24-30; see Instructions, page 9)*

Name & Title Julie Weisgerber

Date Prepared May 2012 **Project Name** PA Flood Hazard Mitigation Grant Program

Organization/Company Federal Emergency Management Agency

Mailing Address EHP, One Independence Mall, 6th Floor, 615 Chestnut Street, Philadelphia, PA 19106

Phone 215.936.5510 **Email** kate.mcmanus@dhs.gov

Key #____________

ER#____________

National Register Evaluation *(Item 31; see Instructions, page 9)*

(To be completed by Survey Director, Agency Consultant, or for Project Reviews ONLY.)

☐ Not Eligible (due to ☐ lack of significance and/or ☐ lack of integrity)

☒ Eligible Area(s) of Significance Architecture, Town Planning

Criteria Considerations _____ Period of Significance 1850-1930

☒ Contributes to Potential or Eligible District District Name West Pittston Historic District

Bibliography *(Item 32; cite major references consulted. Attach additional page if needed. See Instructions, page 9.)*

McAlester, Virginia and Lee. A Field Guide to American Houses, Knopf (New York), 1984.

US Geological Survey. Accessed online May 1, 2012.

Cultural Resources Geographic Information System. Pennsylvania Historical and Museum Commission and Pennsylvania Department of Transportation. 1 March 2012. <http://crgis.state.pa.us>.

Pittston, Pennsylvania [map]. Scale not given. "Sanborn Fire Insurance Maps. 1891, 1896, 1903, 1950- Pittston". Assessed online May 1, 2012. <http://sanborn1.proquest.com/>.

Portelli, Mary L. "History of West Pittston". West Pittston Historical Society. 2007. Accessed May 1, 2012 <http://www.westpittstonhistory.org/history.php>

Pittston, Pennsylvania [map]. Scale not given. "1892 MrSID Map of Pittston". Assessed online May 1, 2012. <http://frontiers.loc.gov/cgi-bin/map_item.pl>

Additional Information

The following must be submitted with form. Check the appropriate box as each piece is completed and attach to form with paperclip.

- ☒ Narrative Sheets—Description/Integrity and History/Significance (See Instructions, pages 13-14)
- ☒ Current Photos (See Instructions, page 10)
- ☒ Photo List (See Instructions, page 11)
- ☒ Site Map (sketch site map on 8.5x11 page; include North arrow, approximate scale; label all resources, street names, and geographic features; show exterior photo locations; See Instructions, page 11)
- ☐ Floor Plan (sketch main building plans on 8.5x11 page; include North arrow, scale bar or length/width dimensions; label rooms; show interior photo locations; See Instructions, page 11)
- ☒ USGS Map (submit original, photocopy, or download from TopoZone.com; See Instructions, page 12)

Send Completed Form and Additional Information to:

National Register Program
Bureau for Historic Preservation/PHMC
Keystone Bldg., 2nd Floor
400 North St.
Harrisburg, PA 17120-0093

	Key #__________
ER#____________________	

Photo List (Item 33)

See pages 10-11 of the Instructions for more information regarding photos and the photo list. In addition to this photo list, create a photo key for the site plan and floor plans by placing the photo number in the location the photographer was standing on the appropriate plan. Place a small arrow next to the photo number indicating the direction the camera was pointed. Label individual photos on the reverse side or provide a caption underneath digital photos.

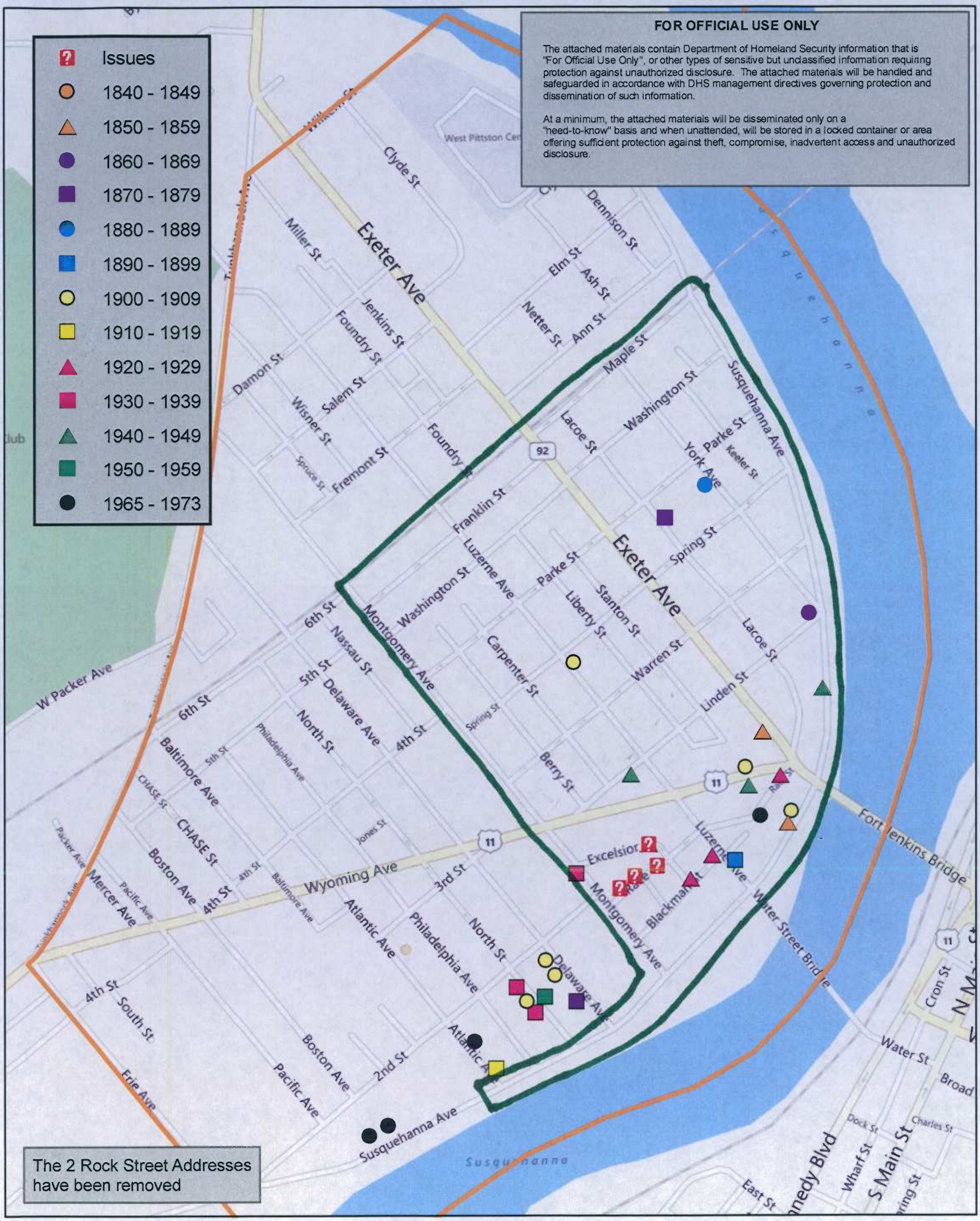
Photographer name J. Weisgerber

Date April 2012

Location Negatives/Electronic Images Stored FEMA / Region III

Photo #	Photo Subject/Description	Camera Facing
1	Wyoming Avenue, looking west.	W
2	Wyoming Avenue, looking west	W
3	Susquehanna Avenue, looking west	W
4	Race Street, looking north	N
5		
6		

West Pittston Potential Historic District Exploration



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The 2 Rock Street Addresses have been removed

West Pittston Borough, Luzerne County
Photographs

Photo 1 – Wyoming Avenue, looking west.

West Pittston Borough, Luzerne County
Photographs

Photo 2 – Wyoming Avenue, looking west.

West Pittston Borough, Luzerne County
Photographs

Photo 3 – Susquehanna Avenue, looking west.

West Pittston Borough, Luzerne County
Photographs

Photo 4 - Race Street, looking north.

Key #______________

ER#_____________________________

Physical Description and Integrity (Item 38)

Provide a current description of the overall setting, landscape, and resources of the property. See page 13 of the Instructions for detailed directions. Continue on additional sheets as needed. Suggested outline for organizing this section:

- Introduction [summarize the property, stating type(s) of resource(s) and function(s)]
- Setting [describe geographic location, streetscapes, natural/man-made landscape features, signage, etc.]
- Exterior materials, style, and features [describe the exterior of main buildings/resources]
- Interior materials, style, and features [describe the interior of main buildings/resources]
- Outbuildings/Landscape [describe briefly additional outbuildings/landscape features found on property, substitute Building Complex Form if preferred; See Instructions, page 18]
- Boundaries [explain how/why boundaries chosen, such as historic legal parcel, visual natural features such as tree lines, alley separating modern construction, etc.]
- Integrity [summarize changes to the property and assess how the changes impact its ability to convey significance

---

After a site visit with FEMA and PHMC staff, initial boundaries for the potential West Pittston Historic District would be Maple Street to the north, Susquehanna Avenue to the east and south, and Montgomery Avenue to the east. This boundary was justified given the similar setbacks, architecture massing, and association with the development with West Pittston.

This district would cover approximately 151 acres. Its architecture is varied, showing that lots were purchased, built upon, and later on many lots were subdivided and newer houses were infilled between the older buildings. The architecture of the late nineteenth and early twentieth century is well represented in the district with following types of architecture:

- Italianate
- Second Empire
- Stick
- Queen Anne
- Late Victorian
- Colonial Revival
- Classical Revival
- Craftsman
- Commercial Style

Most of stately, high-style examples are concentrated on Susquehanna Avenue, bounded on the edge of town with views of the river. The upper middle-class homes are directly behind, on Linden Street, Warren Street, and Exeter Avenue. The main street of commerce is Wyoming Avenue and civic buildings are somewhat focused on Montgomery Avenue. Religious buildings are large in scale, and mixed throughout the district. The northern section of the proposed district is intermixed with smaller middle-class single-family homes and duplexes, showing the development of working class in the area.

Key #______________

ER#___________________________________

History and Significance (Item 39)

Provide an overview of the history of the property and its various resources. Do not substitute deeds, chapters from local history books, or newspaper articles. See page 14 of the Instructions for detailed directions. Continue on additional sheets as needed. Suggested outline for organizing this section:

- History [Summarize the evolution of the property from origin to present]
- Significance [Explain why the property is important]
- Context and Comparisons [Describe briefly similar properties in the area, and explain how this property compares]

West Pittston Borough sits on the eastern side of Luzerne County, at a bend in the Susquehanna River. Early residents of this region chose to settle near lumbering operations in Exeter Township, roughly four miles to the north of present West Pittston. It was not until anthracite mining began in the 1850s that area residents began to look for a better setting.

The West Pittston Land Association was formed in 1851. The early boundary was roughly Parke Street to the north, Exeter Avenue to the east, the river to the south, and Montgomery to the west. The company disbanded after most of the lots were sold and any remaining lots were divided among the many partners. Two separate, new groups developed the rest of the district. To the north, the partnership of Lacoe and Lowenstein developed from Parke Street to the railroad located at Maple Street. To the east, York Smith and the W.C. Gildersleeve Estate developed everything east of Exeter Avenue, including over half of the large homes along Susquehanna Avenue.

Population quickly rose in the area, and in 1857 a borough charter was submitted and approved. Improvements such as a free library, public schools, sidewalks and street lighting continued though the late nineteenth century as population continued to rise.

An 1892 birds-eye map of Pittston and West Pittston show how developed the borough had become. According to the West Pittston Historical Society, only a few open house lots remained when the borough celebrated its fiftieth anniversary in 1907.

West Pittston Borough exemplifies not only fine architecture but also still reflects the pattern of community planning and development with local significance to Luzerne County.

West Pittston Borough, Luzerne County
USGS Map

PENNSYLVANIA HISTORICAL RESOURCE SURVEY FORM
BUREAU FOR HISTORICAL PRESERVATION Box 1026
PA HISTORICAL & MUSEUM COMMISSION Harrisburg, PA 17120

1. County: Luzerne

2. Municipality: West Pittston

3. Street Address or Specific Location: Susquehanna Avenue between Atlantic and Washington Streets, York Avenue between Susquehanna Avenue and Parke Street

4. Survey Code: 28-0

5. Present Name: Susquehanna Avenue Historic District

6. Other Name (historic name if any):

7. Local Survey Organization: Kise, Franks, and Straw, 219 N. Broad St., Philadelphia, PA 19107

8. Property Owner's Name and Address: Multiple

9. Tax Parcel Number/Other Number:

10. U.T.M. zone 18, easting 433000, northing 4574630; Usgs Sheet: Pittston(see over)

11. Status (Other Surveys, Lists, Etc.):

12. Resource Count: buildings (____) district (X) sites (____) structures (____) objects (____) intrusions (____)

13. Date(s) (how determined): Circa 1850-1925

14. Period: 1850-1874 (cont.)

15. Style, Design or Folk Type: Various

16. Architect or Engineer:

17. Contractor or Builder:

18. Primary Building Mat./Construction: Frame, brick and masonry

19. Original Use: Residential

20. Present Use: Residential

21. Condition: Excellent

22. Integrity: Excellent

23. Site Plan with North Arrow

see attached page

24. Photo Notation: 28-0

25. File/Location:

26. Brief Description (note unusual features, integrity, environment, threats and associated buildings)

The Susquehanna Avenue Historic District extends along the Susquehanna Avenue between Atlantic Avenue and Washington Street and along York Avenue from Susquehanna Avenue to Parke Street. The district is primarily residential and includes an impressive collection of fashionable homes set closely together on well-landscaped lots. The district's southern boundary is at the intersection of Atlantic and Susquehanna Avenues, the dwellings beyond this point are typically of modern construction. From Atlantic Avenue, the district extends along the rear property lines of the buildings fronting Susquehanna Avenue and along the river parallel to Susquehanna Avenue. The district's northern boundary is at Washington Street, beyond which the residences are typically vernacular gabled frame dwellings, displaying little of the stylistic

(continue on back if necessary)

27. History, Significance and/or Background

The Susquehanna Avenue Historic District is significant as part of the development history of West Pittston and as a cohesive group of architecturally outstanding residences. Built primarily between 1850 and 1920, the houses mark the prosperity and extended development of West Pittston after its incorporation as a borough in 1857. The district displays high-style interpretations of the Italianate, Second Empire, Queen Anne, Shingle, Craftsman and Georgian, Dutch Colonial and Colonial Revival styles, some likely the works of local or regional architects. This concentration of rich architectural fabric is rare in the Wyoming Valley. (Continued)

(continue on back if necessary)

28. Sources of Information

Directory of Pittston and West Pittston. Pittston, PA: T.P. Robinson, 1892-1894.

Interview with Ms. Ruth Evans, owner of John Muirhead House, West Pittston, PA. January 8, 1990.

(continue on back if necessary)

29. Prepared By: Benenson/Claypoole

30. Date: 1/90

Revision(s):

ADDITIONAL DATA/PHOTOS
number all continuations from front

4. Survey Code
28-0

10. (continued)

-E:	432980	433380	433500
-N:	4574720	4575820	4576040

Computer Coding (BHP Survey Grantees Must Complete)

31. County 079
32. Total Structures 0049
33. Style 08; 11; 12; 13; 15; 21
34. Construction 04; 03; ; ;
35. Roof 01; 03; 04
36. Survey Date (Year) 1989
37. Area of Significance 04; 13; ; ; ; ; ; ; ;
38. Primary Use 010000 P; P; P; P
39. Secondary Use S; S; S
40. Associated With A; A; A
41. Event 1

Event 2

42. Individual 1

Individual 2

43. Status: 101 Potential NR; 102 Part of Potential district; 102; ; ;
44. Design Type: 01 High Style; 02 Style Elements; 03 Popular Vernacular; 04 Traditional (Folk); 05 Utilitarian; 01
45. Ext. Walls 04; 03
46. Roof Material
47. Plan
48. Stories
49. Facade Width
50. Construction Feature ; ;
51. Ext. Design Feature 100; 600; 800 RIVERFRONT
52. Int. Design Feature ; ;
53. Comment

EVALUATION

The resources in the Susquehanna Avenue Historic District merit significance as landmarks of West Pittston's development as a "suburb" of the industrially and economically prosperous City of Pittston. The historic district stands as an impressive and well-preserved grouping of stylistically significant architecture which retains an unusually high degree of integrity.

EVALUATOR(S)

C. Benenson

ADDITIONAL DATA/PHOTOS number all continuations from front	4. Survey Code 28-0	CARD NO. 4 OF 7

26. Brief Description (Continued).

interpretation significant in the district. A few blocks of York Street between Susquehanna Avenue and Parke Street are included as they are of the same scale and stylistically compatible with the properties on Susquehanna Avenue. Two bridges, the Water Street and Fort Jenkins, are incorporated into the district. The bridges are contributing resources to the district as they represent the ongoing relationship between the City of Pittston and West Pittston. The district also contains the Fort Jenkins marker, which commemorates the eighteenth-century history of West Pittston as a fort location during the Revolutionary War.

The district contains a cohesive group of well-preserved, architecturally distinctive residences reflective of industrial and commercial prosperity in the City of Pittston. The diversity of styles in the district signifies individual preferences and the progression of fashionable architecture through the second half of the nineteenth and early twentieth centuries. The houses retain a high level of integrity, including clear views to the river, and have well-landscaped grounds. All of the houses in the district are constructed on the west side of Susquehanna Avenue. Land to the east has either remained as open space or been improved into a park, planted with cherry trees, which were donated by Roy Stauffer in 1974. Land on the opposite river bank has also remained undeveloped. The large residences in the district are typically 2-1/2 stories in height and constructed of brick, frame or stone. The outstanding collection of architecture includes the nineteenth-century Italianate, Second Empire, Queen Anne and Shingle styles and the twentieth-century Craftsman, American Four Square, Colonial and Dutch Colonial Revival styles. Of particular interest are: the Second Empire houses at 608 and 1200 Susquehanna Avenue, which feature mansarded roofs and bracketed cornices; the Theodore Strong Mansion at 708 Susquehanna Avenue which displays an Italianate cupola, floor to ceiling windows, and a bracketed porch; the characteristic Queen Anne residence at 712 Susquehanna Avenue with a multi-pitched roof, shingled upper-story and decorative porch features; John Muirhead's house in the Craftsman style at 606 Susquehanna Avenue; and the Allen House at 902 Susquehanna Avenue, in the Dutch Colonial Revival style with an embellished portico, dentiled cornice, side porches and gambrel roof. The houses on York Avenue are stylistically contiguous with those on Susquehanna Avenue, displaying features of a number of styles, including the Charles Foster House at 11 York Avenue, built in the Italianate style. Two handsome bridges link West Pittston with Pittston: the Fort Jenkins Bridge (Exeter Avenue), a concrete deck bridge built in 1924, and the Water Street Bridge (Luzerne Avenue), a Parker truss bridge erected in 1914 and rebuilt in 1918.

The district contains 46 contributing residences, some with period outbuildings, two contributing bridges, and one contributing object, the Fort Jenkins Market. All of the resources retain the integrity to communicate the era of industrial and economic prosperity that gives West Pittston a rich and diverse architectural fabric.

27. History, Signficance (Continued).

West Pittston originally comprised the lower section of Exeter Township. Settlement in Exeter began before the Revolutionary War. During the war, the Jenkins Fort was built as protection against the British. The Fort Jenkins Marker, included in the district, marks the fort's location. Settlement of Exeter Township continued at a modest pace until the mid-nineteenth century. At this time, the expansion of the anthracite mining industry brought prosperity and increased development to the entire Wyoming Valley, including Pittston (across the Susquehanna River) where local industry and commerce flourished. Successful coal industrialists, professionals, and merchants from Pittston sought new areas for their residences, and were attracted to the natural beauty of the landscape across the Susquehanna River. To that end, land speculators pursued the opportunity to establish a "residence town" or suburb. In 1851, the first of these developers, the West Pittston Land Association purchased the Peter Polen farm, now the heart of West Pittston. The Polen Farm included land in the historic district along the Susquehanna River between Exeter and Montgomery Avenue. The Association subdivided the land into lots which sold rapidly. Following the West Pittston Land Association, came E. C. Knight, a famous Philadelphia merchant, railroad executive, and real estate developer. Knight was also president of the West Pittston Coal Company, which was organized in 1856. The company obtained 708 acres of land, part within the borough of West Pittston. On the land in West Pittston, the company created the town of 'Luzerne' along the Susquehanna River, approximately between Montgomery Avenue and Schooley Lane. However, the present town of West Pittston established itself further to the north. The land of the northern part of the district was originally part of Ferry Farm, owned by John Jenkins. Jenkins sold the land to Amos York Smith, who divided the land into lots.

An 1858 West Pittston map shows the entire stretch of land along River Road (now Susquehanna Avenue) laid out with parcels and, by 1880, a Pittston directory lists a photographer, insurance agent, dry goods merchant and

27. History, Significance (Continued).

leather merchant, among others, living along the Susquehanna. By 1885, a West Pittston map shows sketches of the area's prominent houses, many of which still survive.

Transportation to West Pittston from Pittston was originally by ferry. The first bridge across the river was the Ferry Bridge, built under the supervision of developer Amos York Smith. Two bridges, the Water Street Bridge and Fort Jenkins Bridge (dedicated in 1926), connect West Pittston with Pittston today. These bridges are included in the district as they represent the vital connection and ongoing relationship between the city of Pittston and its suburb. Many of West Pittston's residents work in Pittston, and commonly refer to the city as "over town" .

In the late nineteenth and early twentieth centuries, the property owners along Susquehanna Avenue were involved in commerce, finance, industry, and the professions. Grocers, bankers, lawyers, brewers, coal industrialists, doctors, and a dentist were just some of the former residents along the river. These owners included Theodore Strong, a leading citizen of West Pittston and president of the First National Bank of Pittston who constructed the Italianate mansion at 708 Susquehanna Avenue. Another fine Italianate building was constructed by Charles Foster, a banker, at 11 York Avenue. John Muirhead and Newt Thomas, both coal industrialists, owned homes respectively at 606 and 506 Susquehanna Avenue in the Craftsman and Dutch Colonial Revival styles. Many merchants, including Cory Sutherland, A. B. Brown, and the Mangans also purchased land along the river. They preferred a wide range of styles, including the Georgian Revival house at 704 Susquehanna Avenue and the Victorian home at 502 Susquehanna Avenue. Homes in the fashionable Second Empire style were also constructed by Reverend Nathan Parke, the minister of the First Presbyterian Church, at York and Susquehanna Avenues, and the Scrimmagers, a family of plumbers, at 200 Susquehanna Avenue. Many of these residents worked in Pittston but took an active role in the leadership and development of the community of West Pittston. Religious, social, and educational institutions, reflective of the middle and upper middle class residents, were established including the West Pittston Seminary (Pittston Academy) dedicated in 1868, and the First Methodist Church dedicated in 1873.

The riverfront real estate that composes a majority of the district was a prime location for the prosperous industrialists and merchants of Pittston to build their homes. From their properties along the west side of Susquehanna Avenue they had a panoramic view of the Susquehanna River and the industries and businesses which they owned and worked for in Pittston. The land on the opposite side of the street was not built upon, thus protecting the vistas West Pittston's elite residents enjoyed. This land remains undeveloped, presenting the historical setting of the streetscape lined with homes of distinctive architectural merit.

28. Sources of Information (Continued).

"Many Nationalities Make Up Population", The Evening Times, 1857.
100 Years: 1857-1957. Published for the West Pittston, PA, Centennial Celebration.
Pittston Directory 1918-1919. Scranton, PA: R.L. Polk & Company, 1918.
Recorder of Deeds, Luzerne County Courthouse, Wilkes-Barre, PA.
Rowley, H.H. Map of West Pittston, PA, Wyoming Valley. Utica, New York: H.H. Rowley, 1885.
Schooley, David. Map of Pittston, Luzerne County, PA. Philadelphia: McKinney and Banvill, 1858.

14. Period (Continued)

1875-1899
1900-1924

ADDITIONAL DATA/PHOTOS number all continuations from front	4. Survey Code 28–0	CARD NO. 6 OF 7

ADDITIONAL DATA/PHOTOS
number all continuations from front

4. Survey Code 28–0

CARD NO. 5 OF 7

ADDITIONAL DATA/PHOTOS number all continuations from front	4. Survey Code 28-0	CARD NO. 7 OF 7

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

December 19, 2013

Amanda Ciampolillo, Acting Reg. Env., Manager
FEMA, Dept. of Homeland Security
One Independence Mall, Sixth Floor
615 Chestnut Street
Philadelphia, PA 19104-4404

Re: ER 2013-6033-079-D
Acquisition and Demolition of Four Properties in West Pittston, Luzerne County
(21 Exeter Avenue, 320-422 Race Street-duplex, 804 Susquehanna Avenue,
216 Wyoming Avenue), HMGP-4030-DR-PA-027, 073, 089, SHPO-169
Recordation Documentation

Dear Ms. Ciampolillo:

Thank you for submitting information concerning the above referenced project. The Bureau for Historic Preservation (the State Historic Preservation Office) reviews projects in accordance with state and federal laws. Section 106 of the National Historic Preservation Act of 1966, and the implementing regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, is the primary federal legislation. The Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988) is the primary state legislation. These laws include consideration of the project's potential effects on both historic and archaeological resources.

We are in receipt of the recordation documentation for the four properties listed above. This documentation meets our standards and will be forwarded to the State Archives for retention. With this documentation and the public education meeting held in West Pittston on November 14, 2013 we concur with the agency that the mitigation for this project is complete.

If you need further information in this matter please consult Susan Zacher at (717) 783-9920.

Sincerely,

Susan Zacher for
Douglas C. McLearen, Chief
Division of Archaeology &
Protection

DCM/smz

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

August 9, 2013

Amanada Ciampolillo, Acting Reg. Env. Manager
FEMA, Dept. of Homeland Security
One Independence Mall, Sixth Floor
615 Chestnut Street
Philadelphia, PA 19106-4404

TO EXPEDITE REVIEW USE
BHP REFERENCE NUMBER

Re: ER 2013-6033-079-B
Acquisition and Demolition of Four Properties in West Pittston, Luzerne County
21 Exeter Avenue; 320-322 Race Street; 804 Susquehanna Avenue; 216 Wyoming Avenue
FEMA Projects: HMPG-4030-DR-PA-027; HMPG-4030-DR-PA-073; HMPG-4030-DR-PA-089

Dear Ms. Ciampolillo:

Thank you for submitting information concerning the above referenced project. The Bureau for Historic Preservation (the State Historic Preservation Office) reviews projects in accordance with state and federal laws. Section 106 of the National Historic Preservation Act of 1966, and the implementing regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, is the primary federal legislation. The Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988) is the primary state legislation. These laws include consideration of the project's potential effects on both historic and archaeological resources.

We concur that these projects will have an effect on properties eligible for the National Register of Historic Places as part of the West Pittston Historic District. Furthermore, these projects will adversely affect the historic and architectural qualities that make the properties eligible. To comply with the regulations of the Advisory Council on Historic Preservation, you must follow the procedures outlined in 36 CFR 800.6, and the Programmatic Agreement for FEMA projects, when the effect is adverse. You will need to continue to consult with the Bureau for Historic Preservation to seek ways to avoid, minimize, or mitigate the effects on historic properties.

If you need further information in this matter please consult Susan Zacher at (717) 783-9920.

Sincerely,

Douglas C. McLearen, Chief
Division of Archaeology &
Protection

DCM/smz

Zacher, Susan

From: Lee, Carol
Sent: Tuesday, August 07, 2012 12:12 PM
To: 'Julie.Weisgerber@fema.dhs.gov'
Cc: Zacher, Susan
Subject: West Pittston
Attachments: West Pittston.docx

Hello Julie
I don't have the template for the official response letter, but attached are the field view notes and outline of items for preparing an HRF for the potential West Pittston HD. Susan and I spent a good bit of time investigating the area and have focused on the high-end architecture as the basis for a potential district. You can use the language from the notes to help frame the boundary justification and statement of significance.
Call me if you have any questions.

Carol Lee | National Register & Survey Coordinator
Bureau for Historic Preservation
Pennsylvania Historical and Museum Commission
400 North Street, 2nd Floor | Harrisburg, PA 17120-0093
Phone: 717.783.9918 | Fax: 717.772.0920

West Pittston, Luzerne County
Field view
June 8, 2012

Carol Lee
Susan Zacher

A field view was conducted on June 8 by Susan Zacher and Carol lee to investigate the area of West Pittston targeted by FEMA for selective demolitions. The FEMA consultant provided a map that outlines a multi-block area fronting on the river. It includes many blocks of turnoff the century residential properties with substantial pockets of modern commercial infill. The residential properties reflect a range of quality, style, and size.

The field view team recommends a boundary focusing on the area along the river front and about two blocks in from the river are a number of substantial high quality residential properties, with outstanding stylistic details, quality materials, and craftsmanship. The landscaping matches the quality of the residence, lot sizes are larger than elsewhere in the borough and consistent, sizeable setbacks are important character-defining features of the neighborhood.

The field view team delineated a boundary that encompasses the high-end residential architecture. In the blocks beyond this are the housing is also of the same vintage but the quality of style, design, material, craftsmanship and condition is much more pedestrian. The neighborhoods are more dense, the houses are smaller, with assorted alterations due to window changes and siding, smaller lot sizes, smaller setbacks, and little or no landscaping.

The FEMA consultant should be advised to prepare an HRF documenting the residential area identified by the field view team. Focus on Criterion C for Architecture. There may be other areas of significance, but the neighborhood is clearly significant for its architecture.

Information to document eligibility of West Pittston Residential HD:

1. Use the boundary map provided by BHP
2. Photographs of the district, streetscapes, individual shots of exceptional buildings, general landscaping features
3. Physical description of the district as a cohesive concentration of distinguished residential architecture: include a discussion of the styles represented by the buildings, overall quality of the design, craftsmanship, materials,
4. Physical description of the district as a residential neighborhood; include street patterns, lots size, set backs, outbuildings, ancillary features such as visible utilities
5. Brief description of the setting of the district—ie, the surrounding neighborhoods and the relative architectural character of the neighborhoods outside the district
6. Briefly evaluate the integrity of the proposed district based on the seven aspects of integrity

7. Statement of significance summarizing the local significance of the proposed district as a distinctive concentration of high quality residential architecture. The absolute quality of the architecture and residential setting distinguishes the neighborhood, and in comparison with the residential architecture outside the district, as well as the general quality of residential architecture in the anthracite region, the West Pittston Residential HD easily meets the NR standards for Criterion C.
8. Brief history of the development of the neighborhood as part of the history of Pittston. Who bought and lived in these houses (as compared to these who bought and lived in the nearby factory neighborhood or the 'second tier" residences abutting the district)? How did the development of the neighborhood proceed? For instance, was there a single developer who platted the lots and provided construction services? The quality of the buildings suggests architect design; what is known about the architects of the buildings?

Luzerne County
West Pittston

Key file 156983

Hanover / Ply.

11042

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION
BUREAU FOR HISTORIC PRESERVATION
BOX 1026
HARRISBURG, PENNSYLVANIA 17108-1026

December 23, 1990

James F. Johnson
Chief, Planning Division
Department of the Army
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Re: ER 81-0555-079-N-Q-R
Wyoming Valley Flood Control Project
Phase II Architectural Report

Dear Mr. Johnson:

The above named project has been reviewed by the Bureau for Historic Preservation (the State Historic Preservation Office) in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation. These requirements include consideration of the project's potential effect upon both historic and archaeological resources.

We agree with the report's findings with the exception of the Following:

1) United Gas Improvement Company, Plymouth: It is the opinion of the State Historic Preservation Officer that the property is eligible for listing in the National Register of Historic Places under Criterion A. We cannot determine the effect until we are provided with the degree of impact caused by the project. 110420 Elig.

2) Wilkes-Barre Connecting Bridge, Wilkes-Barre: It is the opinion of the State Historic Preservation Officer that the property is eligible for listing in the National Register of Historic Places under Criteria A and C. We cannot determine the effect until we are provided with the degree of impact caused by the project. 097143 Elig

3) William Culver House, Forty-Fort: It is the opinion of the State Historic Preservation Officer that the property is eligible for listing in the National Register of Historic Places under Criteria B and C. We cannot determine the effect until we are provided with the degree of impact caused by the project. 097142 elig

Page Two
December 23, 1990
Mr. Johnson

In our opinion this project will have an effect on properties listed in or eligible for the National Register of Historic Places (listed below). Furthermore, it is our opinion that this project will adversely effect the historic and architectural qualities that make the property eligible. To comply with the regulations of the Advisory Council on Historic Preservation, you must follow the procedures outlined in 36 CFR 800.5 (e), when the effect is adverse. You will need to notify the Advisory Council of the effect finding and continue to consult with the Bureau for Historic Preservation to seek ways to avoid or reduce the effects on historic properties.

1) River Street Historic District Extension: including the Lyman Howe House. Since the property is a contributing building within the eligible district, it will not be listed individually. The district was determined eligible on December 17, 1990 under Criteria A and C. 097140

2) McCullough Farm, Plains Township: The property was determined eligible December 17, 1990 under Criterion C. 097138

3) Woodward Pumping Station, Edwardsville: The property was determined eligible December 17, 1990 under Criteria A and C. elig 097165

4) Susquehanna Avenue Historic District, West Pittston: including the John Muirhead House, the Theodore Strong Mansion, the Fort Jenkins Bridge and the Water Street Bridge. Since the properties are contributing structures within the eligible district, they will not be listed individually. The district was determined eligible December 19, 1990 under Criteria A and C. 156983

5) Market Street Bridge, Wilkes-Barre: listed in the National Register.

The regulations of the Advisory Council on Historic Preservation (36 CFR Part 800) require that you submit Documentation for Determination of No Adverse Effect, including the comment of the State Historic Preservation Office (Bureau for Historic Preservation) to the Advisory Council on Historic Preservation, 1100 Pennsylvania Avenue, N.W., Washington, D.C. 20004. These procedures must be followed for all findings of No Adverse Effect listed below:

Kingston\Edwardsville

Loveland Avenue Pumping Station
Church Street Pumping Station

Swoyersville\Forty Fort

Robert Pettebone Building

Wilkes-Barre\Hanover

Luzerne County Courthouse
Lyman H. Howe House
Delaney Street Pumping Station
D&H RR Pumping Station
Horton Street Pumping Station
Old River Road Pumping Station
Ross Street Pumping Station
Market Street Pumping Station
Union Street Pumping Station

Sunbury

Tenth Street Bridge

If you need further information in this matter please consult Joanne Keim at (717) 783-6099.

Sincerely,

Brenda Barrett
Director

BB/JK
cc: Advisory Council on Historic Preservation
Enclosures

CHAPTER I

EXECUTIVE SUMMARY

This report presents the results of Phase II archeological investigations for the Wyoming Valley Levee Raising Project in northeastern Pennsylvania, reviews previous studies, and presents the Baltimore District's cultural resource management (Section 106) decisions for all sections of the proposed project. The archeological investigations are one component of planning studies being conducted by the Baltimore District, U.S. Army Corps of Engineers for the Wyoming Valley Levee Raising Phase II General Design Memorandum. R. Christopher Goodwin & Associates, Inc., undertook this study at the request of the Baltimore District. The field studies took place between October 11, 1989, and January 26, 1990.

Corps Project Actions

The Wyoming Valley Flood Protection project area is located in Luzerne, Columbia, Montour, and Northumberland counties. The proposed Corps of Engineers project includes 10 non-contiguous sections along the banks of the North Branch of the Susquehanna River, two non-contiguous sections on Mill Creek, and one section on the Lackawanna River (Figure 1). The largest component of the project consists of raising the height of the existing Wyoming Valley Flood Protection System in Luzerne County. New levee and floodwall construction is proposed in Exeter-West Pittston on the West bank of the Susquehanna (Figure 2). Levee and floodwall raising is proposed for four sections: Swoyersville-Forty Fort (Figure 2), Kingston-Edwardsville (Figure 3), and Plymouth (Figure 4) on the west bank, and Wilkes-Barre-Hanover (Figure 5) on the east bank of the Susquehanna River.

Actions upstream from the main Wyoming Valley system include levee/floodwall raising with some new floodwall segments at Duryea on the Lackawanna River (Figure 6); nonstructural measures at Port Blanchard and Plainsville on the east bank of the Susquehanna River (Figure 7); and raising existing levees and floodwalls at Miners Mills (Figure 8) and Brookside (Figure 9) on Mill Creek. The downstream project actions include bridge removal at Bloomsburg (Figure 10). Actions previously proposed at Danville are no longer part of the Corps project. Also proposed is the raising of existing levees at Sunbury (Figure 11).

Previous Archeological Investigations

The current Phase II investigations are a continuation of several other archeological investigations conducted for the Wyoming Valley Levee Raising Project. A Phase I cultural resources reconnaissance of portions of the main Wyoming Valley system was conducted by Rasson and Evans in 1980 on behalf of the Baltimore District. That study compiled information on documented sites in the valley, and conducted shovel testing to explore the potential for new archeological sites. In 1988, the District undertook an archeological and historical overview and preliminary assessment of cultural resources in the entire project area, including sections not examined by Rasson and Evans (Fehr et al. 1988). No subsurface investigations were performed as part of that study. Following the work by Fehr et al. (1988) the District sponsored a Phase I field investigation by R. Christopher Goodwin & Associates, Inc. (Shaffer et al. 1989). Geomorphological and archeological data were collected to permit the ranking of sections of the project area with regard to archeological sensitivity. Exploratory excavations included 51 backhoe trenches; hand-excavated units were placed in the walls of 28 trenches. The Phase I study resulted in the discovery of five new archeological sites and in the identification of two previously documented sites. Phase

II investigations of four sites (Luzerne Products, Susquehanna Avenue, Swetland Estate, and Beade Street) were recommended. Additionally, more intensive survey was recommended for several project segments.

Phase II Archeological Investigations

The objectives of the current Phase II investigations were to delineate the boundaries of archeological sites within 11 study locations and to gather sufficient information from identified sites in order to assess their cultural association, function, and significance in terms of the National Register of Historic Places criteria (36 CFR 60.4 [a-d]). Furthermore, these investigations were to provide management recommendations concerning treatment of identified sites, if any. Areas that did not receive Phase II investigation also are discussed in the report; previous investigations and recommendations are reviewed. Field investigations included the excavation of 50 x 50 cm shovel test pits, 1 x 2 m test units, and 2 x 2 m squares at various sampling intervals. Resources to be addressed in this report were assigned "Location Numbers" that reference locations on the maps in Figures 2-10. The 11 locations examined during the present study were: Location 7A (West Pittston: Clyde Street to vicinity of Fort Jenkins Bridge); Location 7B (West Pittston: Area of Susquehanna & Exeter Avenues); Location 7C (West Pittston: Fort Jenkins Bridge to Delaware Avenue); Location 7D (West Pittston: Delaware Avenue to Erie Street); Location 8 (West Pittston: Site 36Lu26); Location 9 (Exeter: Orchard to Lincoln Avenues); Locations 10A and 10C (Wyoming Borough: Eighth to Fourth Streets); Location 11 (Wyoming Borough: Swetland Store & Crawford House); Location 15 (Forty Fort: Cross Valley Expressway to Turner Street); Location 17 (Plymouth: Beade Street to Carey Avenue); and Location 25 (Wilkes-Barre: Courthouse).

Summary of Recommendations

Susquehanna Avenue: Clyde Street to Fort Jenkins Bridge (Location 7A)

Location 7A was the portion of the Susquehanna Avenue Historic Midden Site (37Lu122) located between Clyde Street and the Fort Jenkins Bridge in Exeter-West Pittston. Phase II testing in this location yielded historic artifacts from Site 36Lu122; these proved insufficient in number and type to answer important research questions about the area. No additional archeological investigation is recommended in this location.

Susquehanna Avenue at Exeter Avenue (Location 7B)

Location 7B in Exeter-West Pittston near Susquehanna and Exeter Avenues, is the postulated location of Fort Jenkins, built in 1776. Excavation in this area did not find evidence of Fort Jenkins within the project area. Phase I and Phase II survey sampling and the very steeply sloping soil strata along this narrow bank indicate a low probability for discovering intact remains of the fort in the rest of the project corridor. Historic artifacts from the Susquehanna Avenue Historic Midden Site (36Lu122) were recovered, but they represent major dumping episodes by municipal workers to provide a base for Susquehanna Avenue. This activity would have diffused local trash deposits with imported fill; the deposits would be unable to clearly answer questions about socioeconomic development. No further archeological studies are recommended.

Susquehanna Avenue: Fort Jenkins Bridge to Delaware Avenue (Location 7C)

Location 7C was identified as an area with potential for prehistoric resources located in the Exeter-West Pittston section between Fort Jenkins Bridge and Delaware Avenue. The few potential prehistoric archeological resources and the small number of historic artifacts from the Susquehanna Avenue Historic Midden Site (36Lu122) located in this study area offer little information about history under National Register criterion d. No additional archeological studies are warranted here.

Susquehanna Avenue: Delaware Avenue to Erie Street (Location 7D)

Location 7D was the section of the Susquehanna Avenue Historic Midden Site (36Lu122) located from Delaware Avenue to Erie Street. Excavations in the upstream half of this study area evidenced the same mass dumping of historic fill as seen in Location 7B. This situation compromised the integrity of local neighborhood refuse deposits so that they do not possess the quality of significance. No further archeological studies are needed in the upstream section of this study area. The limited numbers of prehistoric and historic artifacts in the downstream half of this location, and the documentation of the modern dump over much of the area, point to little historic information potential for this section of the study area. No additional archeological investigations are recommended.

Scrimgeour Site (36Lu26) (Location 8)

Location 8 was identified as location of prehistoric site 36Lu26 (Scrimgeour Site), in Exeter-West Pittston. The field investigation and archival research indicated that the Scrimgeour Site was not located within the project corridor. No additional archeological investigations are recommended.

Lincoln Avenue to Orchard Avenue (Location 9)

Location 9 was identified as the general vicinity of Fort Wintermoot, built in 1776. The Phase II shovel testing and unit excavation on the floodplain in this location produced only a small quantity of modern and historic artifacts in disturbed plow zones. One possible flake was found in a buried plowzone mixed with historic artifacts. Phase I backhoe trenching to 4.2 m riverward of the project corridor discerned no cultural horizons below 1.4 m. No further archeological studies are recommended in the floodplain portion of Location 9.

Investigation on the terrace in this location did identify the probable remains of a nineteenth century domestic occupation; however, this site (36Lu129) lacked integrity and no further work is recommended. Because of the intense development and landscaping observed here, additional resources are not predicted to have survived in this reach and no further investigation is recommended for the reach as a whole.

Fifth Street to Seventh Street (Locations 10A and 10C)

Locations 10A and 10C refer to the Sixth Street Garden Site (36Lu125) on the bluff near Sixth Street (10A), and to potential prehistoric resources in the floodplain at the base of the slope between Fifth Street and Seventh Street (10C) in the Exeter-West Pittston section. Phase II testing at the Sixth Street Garden Site (36Lu125) recovered evidence of Late Archaic, Late Woodland, and historic (Sharpe Homestead) occupations. However, the excavation units revealed considerable mixing of prehistoric and historic to modern artifacts. Historic construction and gardening activities appear to have created this situation. The lack of integrity and the small quantity of prehistoric items indicate low information potential; no additional investigations are recommended.

Elsewhere, on the high ground of the study area's outwash terrace, observation of shallow soil development and the fact that almost the entire bluff edge consists of recent fill indicate a very low probability for significant sites. At the base of the bluff, small numbers of historic to modern artifacts were collected from disturbed plow zone and fill deposits. Deeper excavation units on the floodplain at the base of the bluff similarly produced only historic to modern artifacts with limited information potential. No additional archeological investigation is recommended in this location.

Swetland Estate Site (36Lu127) (Location 11)

Location 11, in the Swoyersville - Forty Fort section, was the location of components of the Swetland Estate Site. Phase II excavations at the Swetland Estate Site (36Lu127) found only a few historic artifacts amid and beneath the architectural rubble from the 1948 demolition of the Swetland General Store. Additionally, excavations in front of the Metcalfe & Shaver Casket Company Building and the Crawford House yielded minimal artifactual material. Because Location 11 contains only a small number of historic non-architectural artifacts, and some of those without contextual integrity, it cannot provide important historical information; no additional investigation is recommended.

Cross Valley Expressway to Rutter Street (Location 15)

Location 15 was thought to have potential for containing buried prehistoric resources. Phase II archival research and archeological testing in Location 15 determined that a twentieth century quarrying operation had removed all natural sediments down to below the level of the Susquehanna River. Therefore, neither potential prehistoric sites nor a documented site at the Sgarlat sand pit would be preserved. Filling and flooding events deposited the modern and historic artifacts recorded during the present archeological testing. No additional investigations are recommended.

Beade Street Site (36Lu54) (Location 17)

Phase II investigations at the Beade Street Site (36Lu54), located in Plymouth at Beade Street, recovered prehistoric materials from the Late Archaic, Transitional, Early Woodland, Late Woodland, and Contact periods; at least portions of the site have integrity. The multicomponent deposits of the Beade Street site can provide important controlled information on the valley's prehistoric settlement, technology, and diet for different time periods. This site possesses the quality of significance as defined by National Register of Historic Places criterion D. Because new levee or flood wall construction will impact the Beade Street site directly, it is recommended that either the Baltimore District alter its engineering design to avoid the site, or that Phase III mitigative data recovery be undertaken.

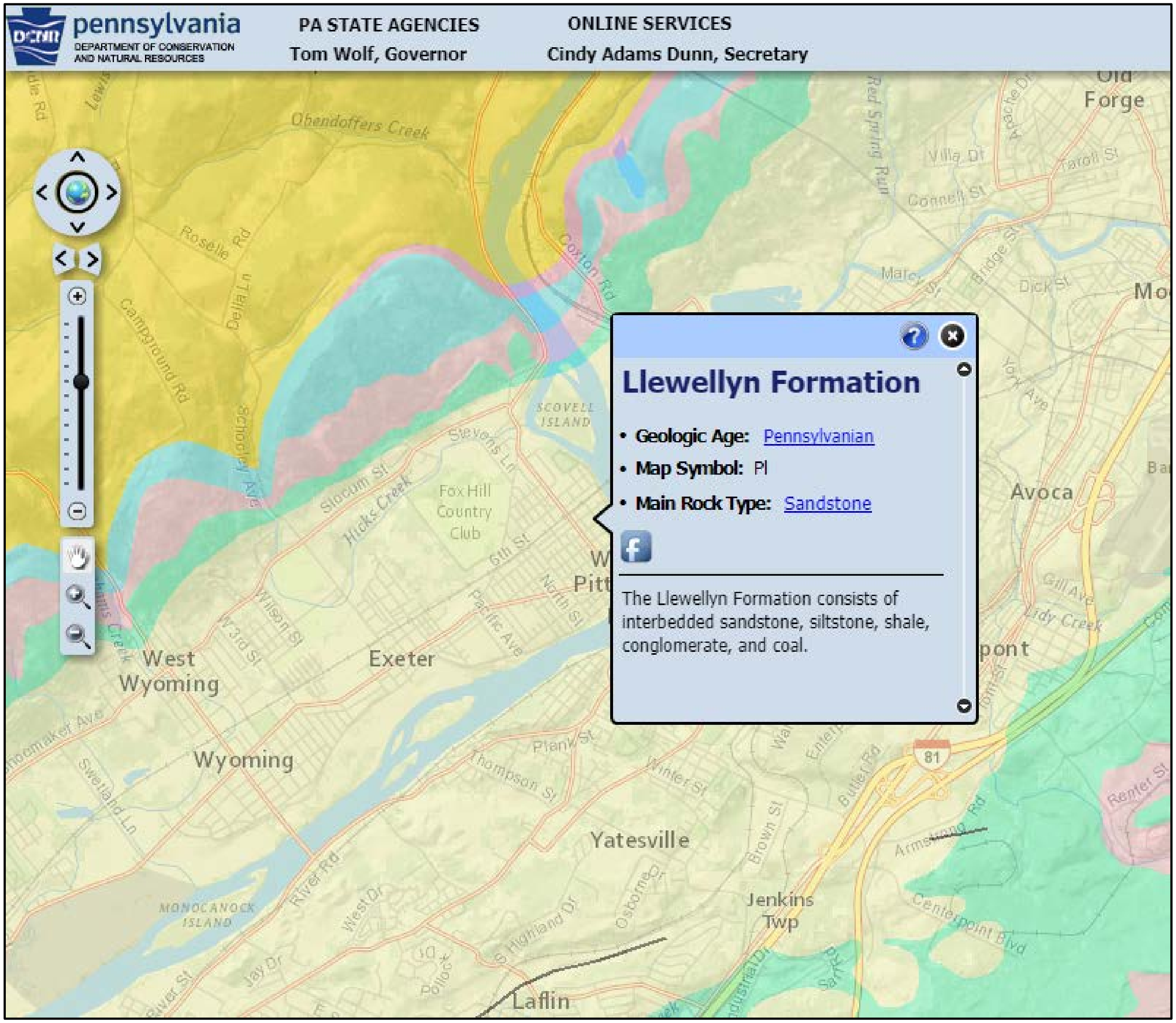
Luzerne Courthouse (Location 25)

Excavations on the southwestern lawn of the Luzerne County Courthouse revealed historic and modern fill; no additional work is needed in this location. The Baltimore District has decided to build a new levee and T-wall tie-out through the Courthouse parking lot and the Pierce Street lawn. The revised plan will avoid the southwestern lawn. No additional archeological investigations are required there due to similar fill/landscaping on the second lawn and because it is unlikely that archeological excavations under the parking lot, in the location of the North Branch Canal basin, would reveal information about the canal not already available through archival research, or from examination of extant sections of the canal.

GEOLOGY & MINERAL RESOURCES

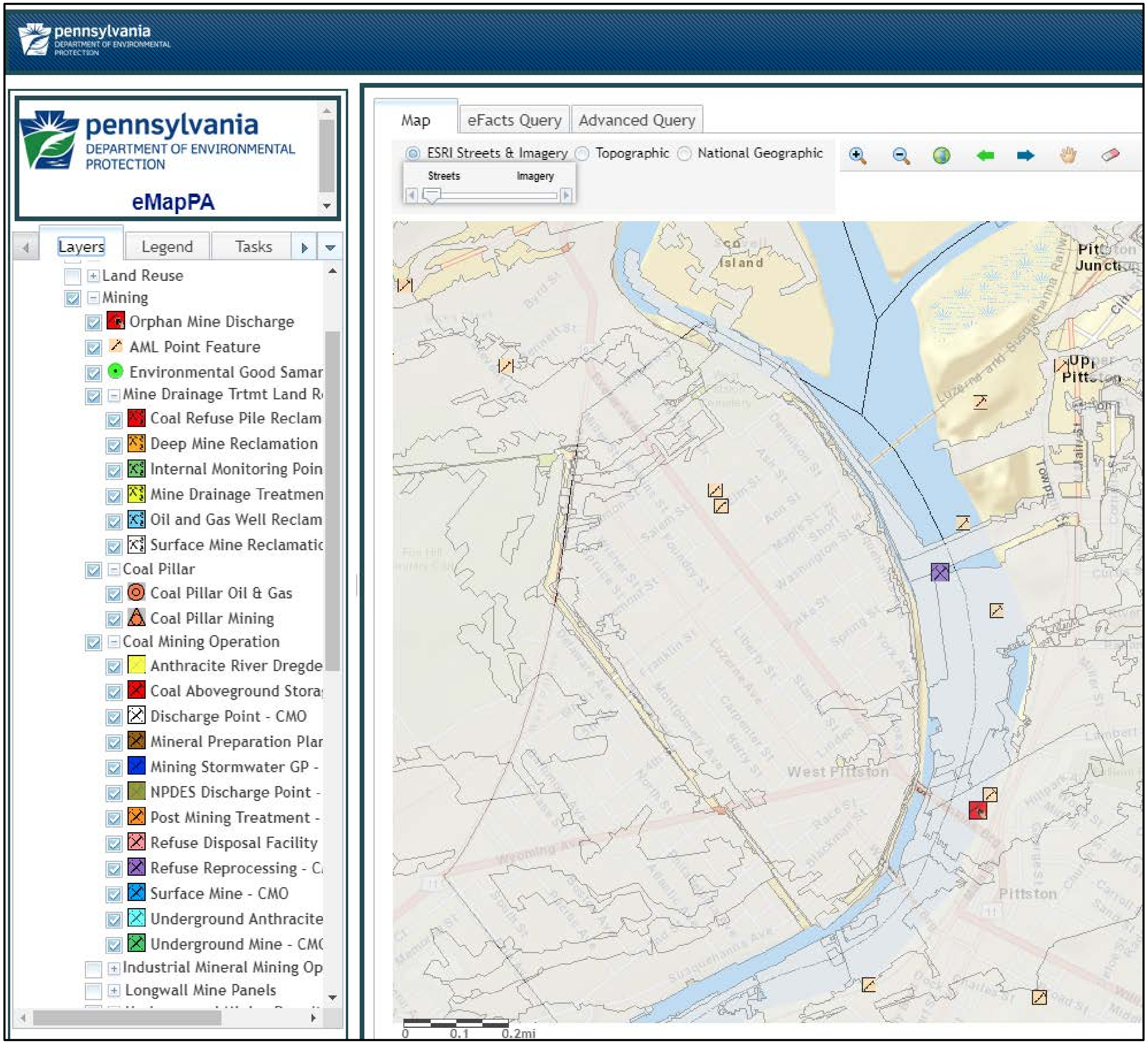
PA DCNR (http://www.gis.dcnr.state.pa.us/maps/index.html?geology=true)

Bedrock Geology

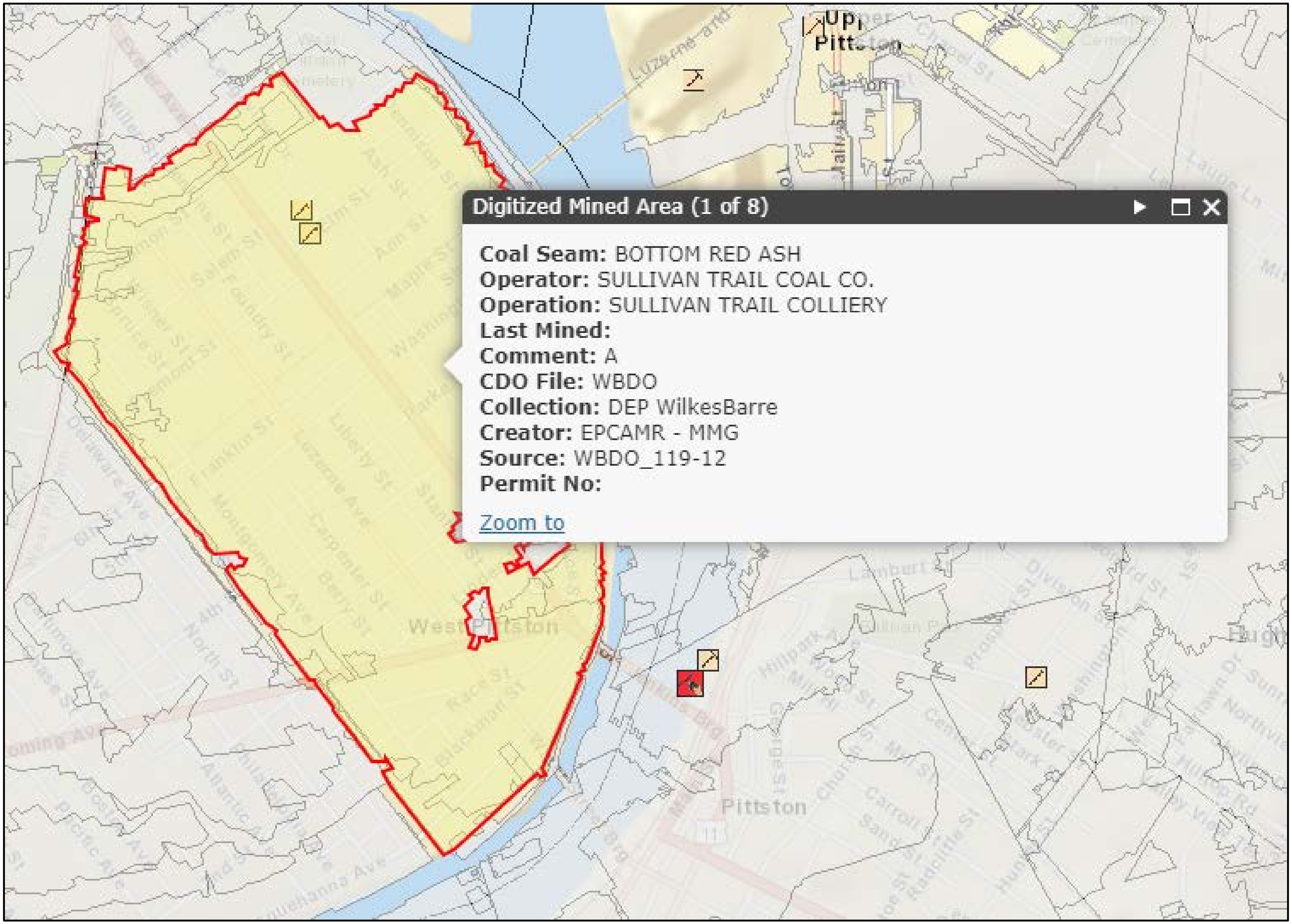


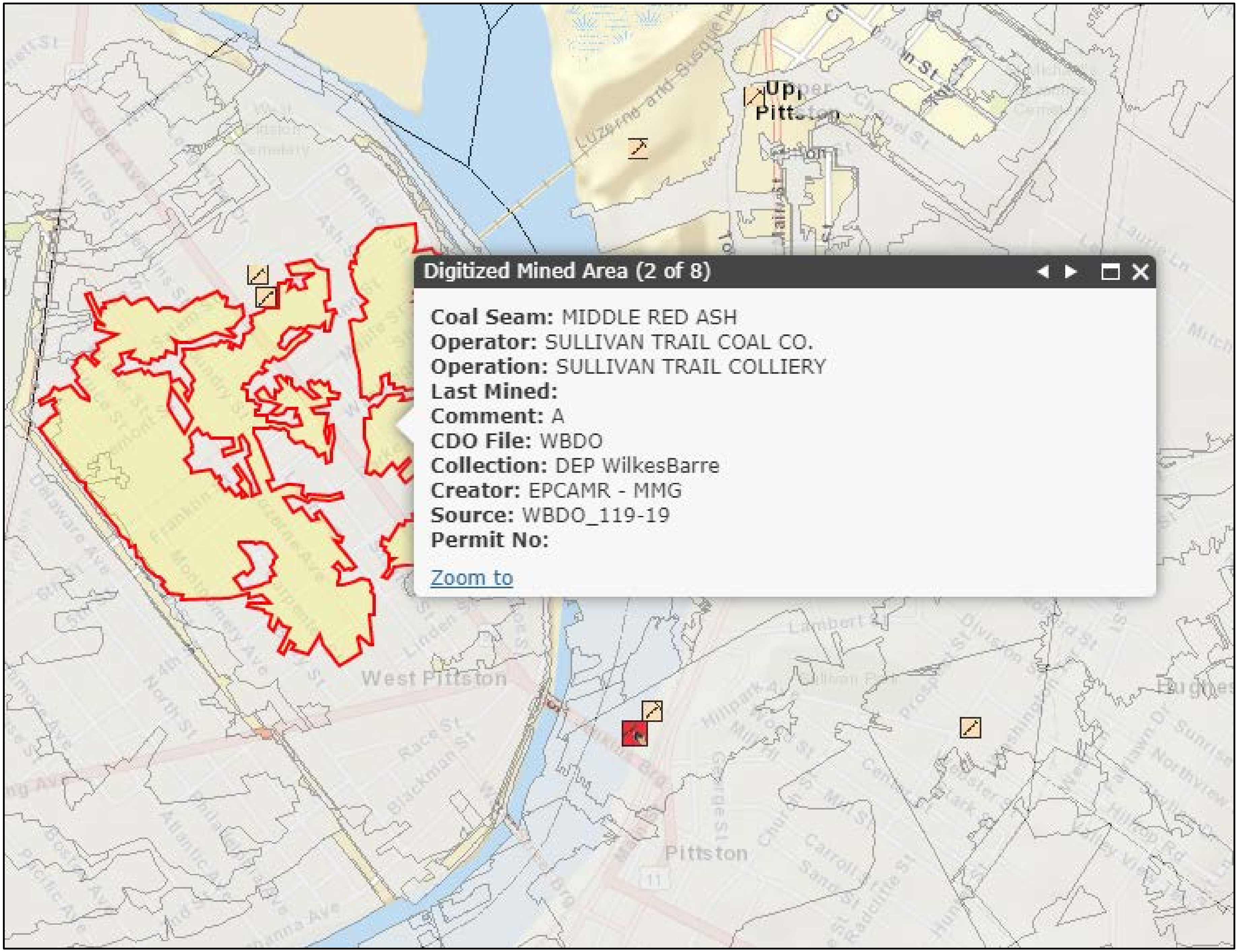
See page 35 of Geology of PA Coal Regions and description of Llewellyn Formation in Engineering Characteristics of rocks of PA.

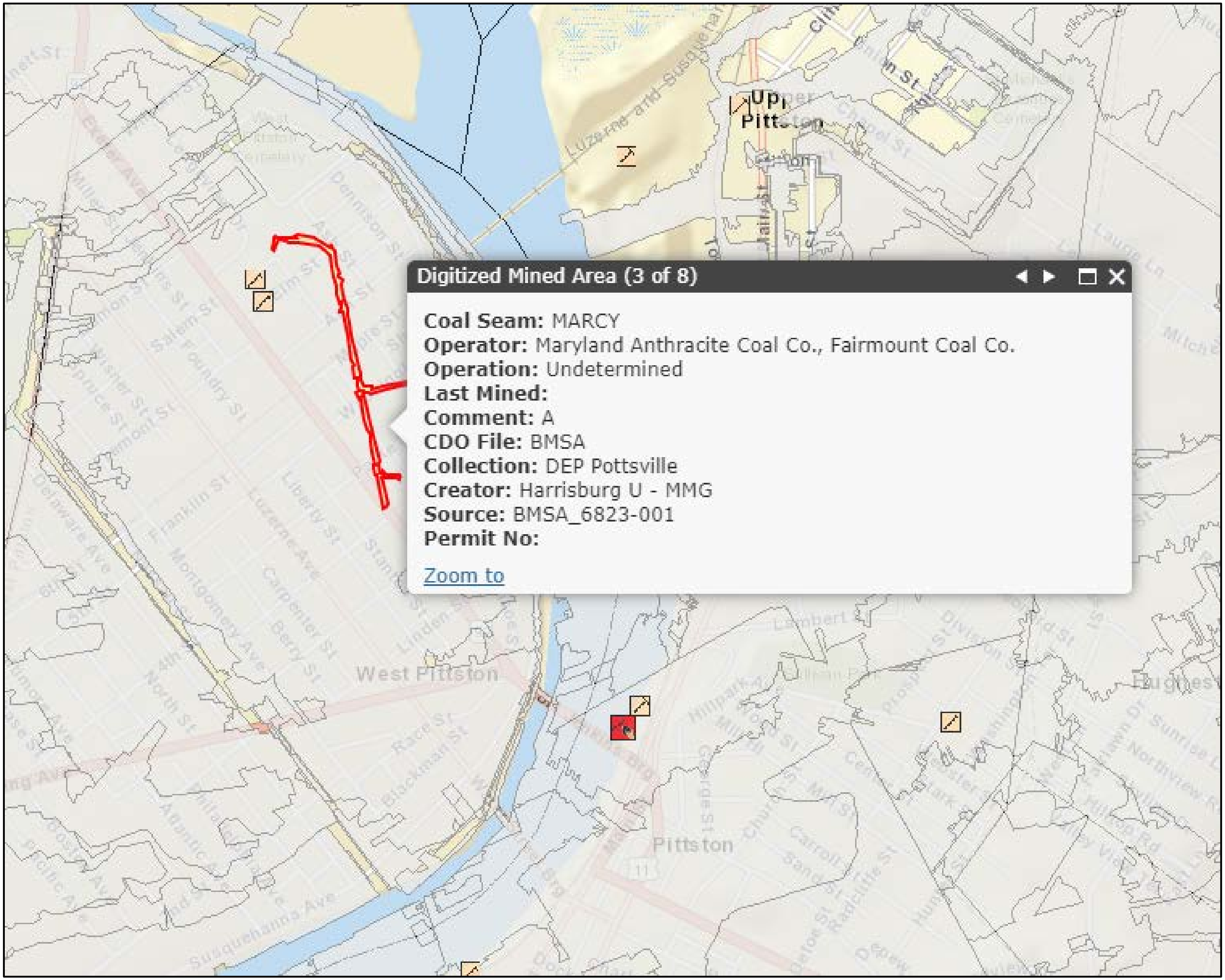
EMap

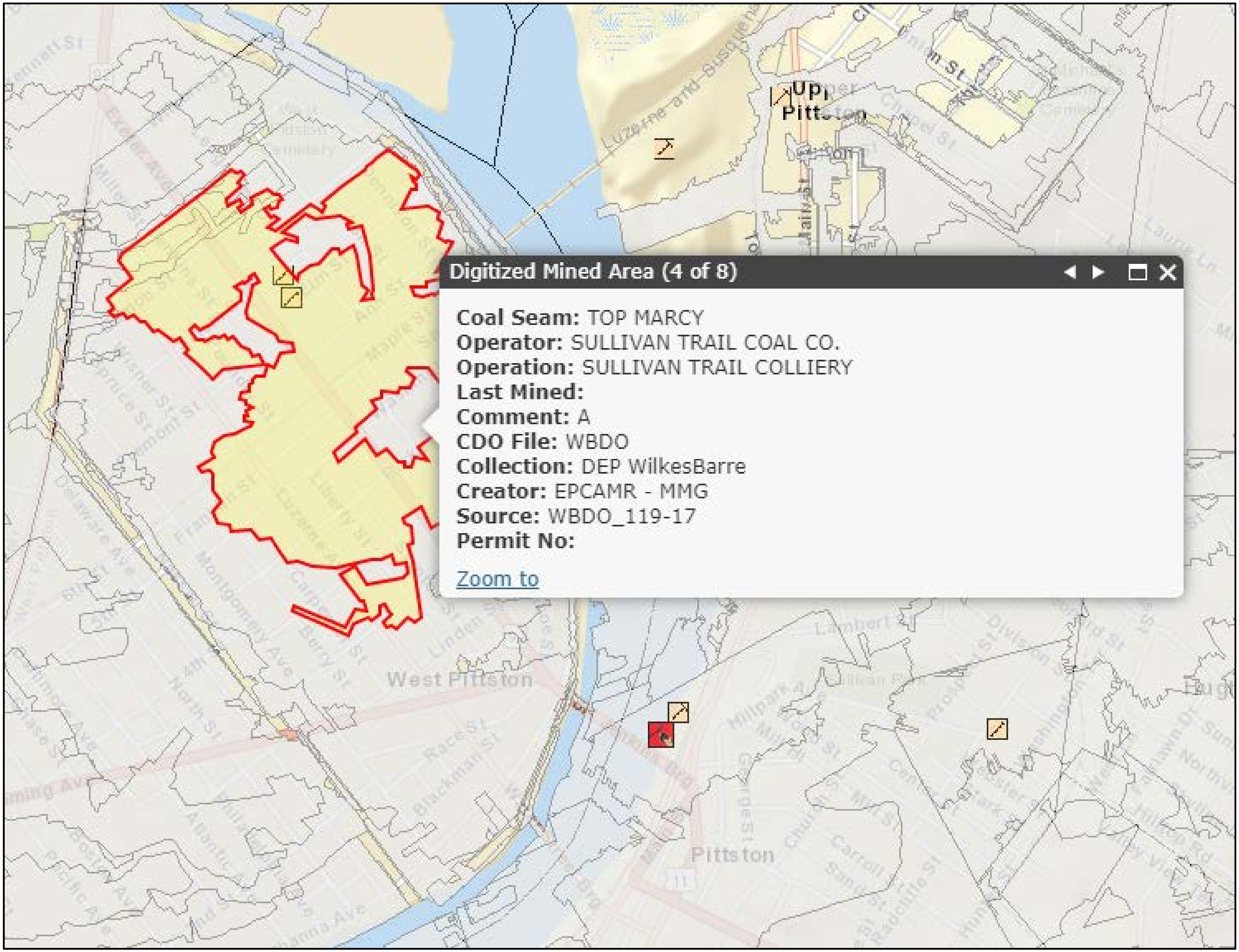


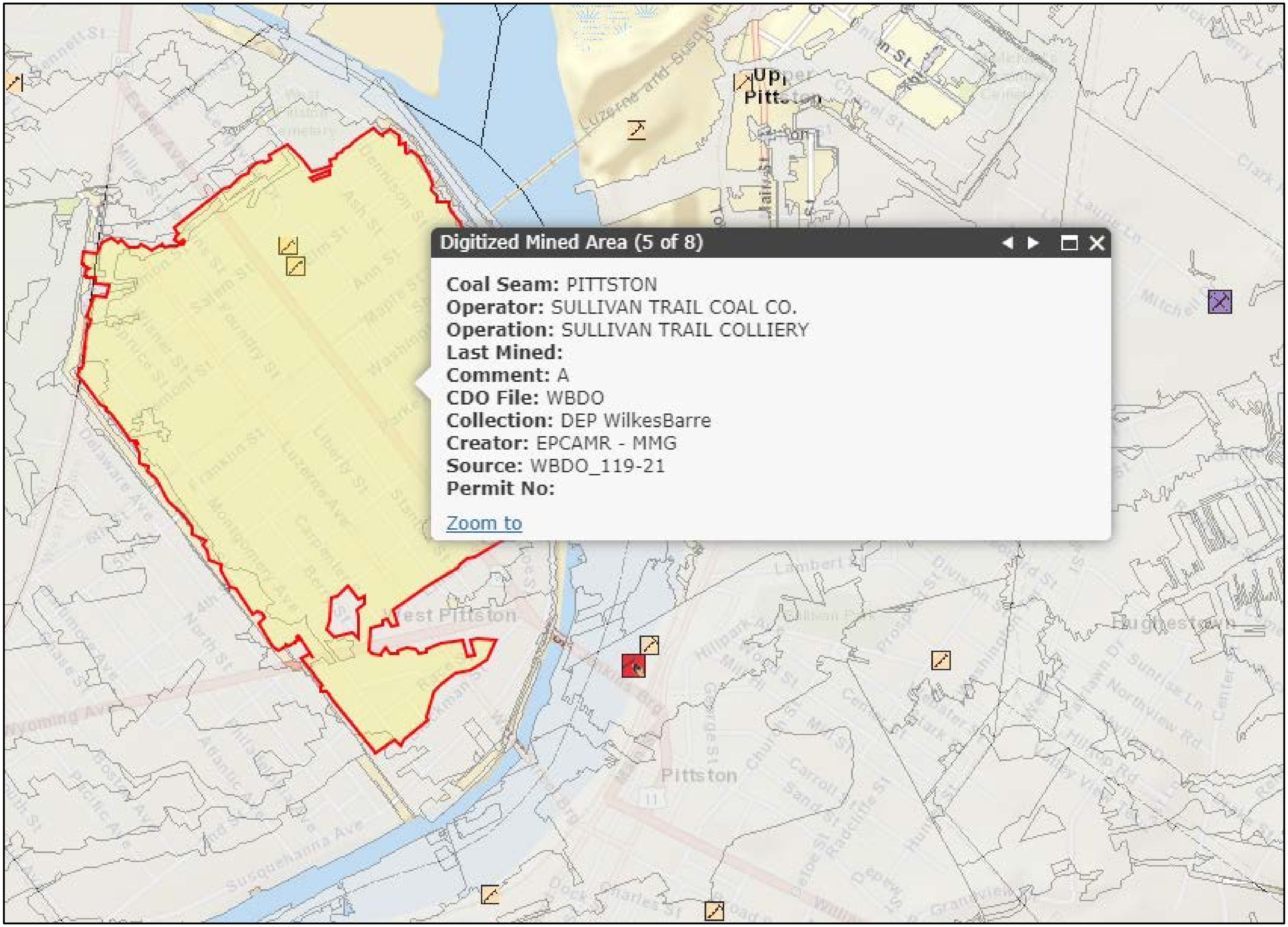
Gray hatch is digitized mine areas.

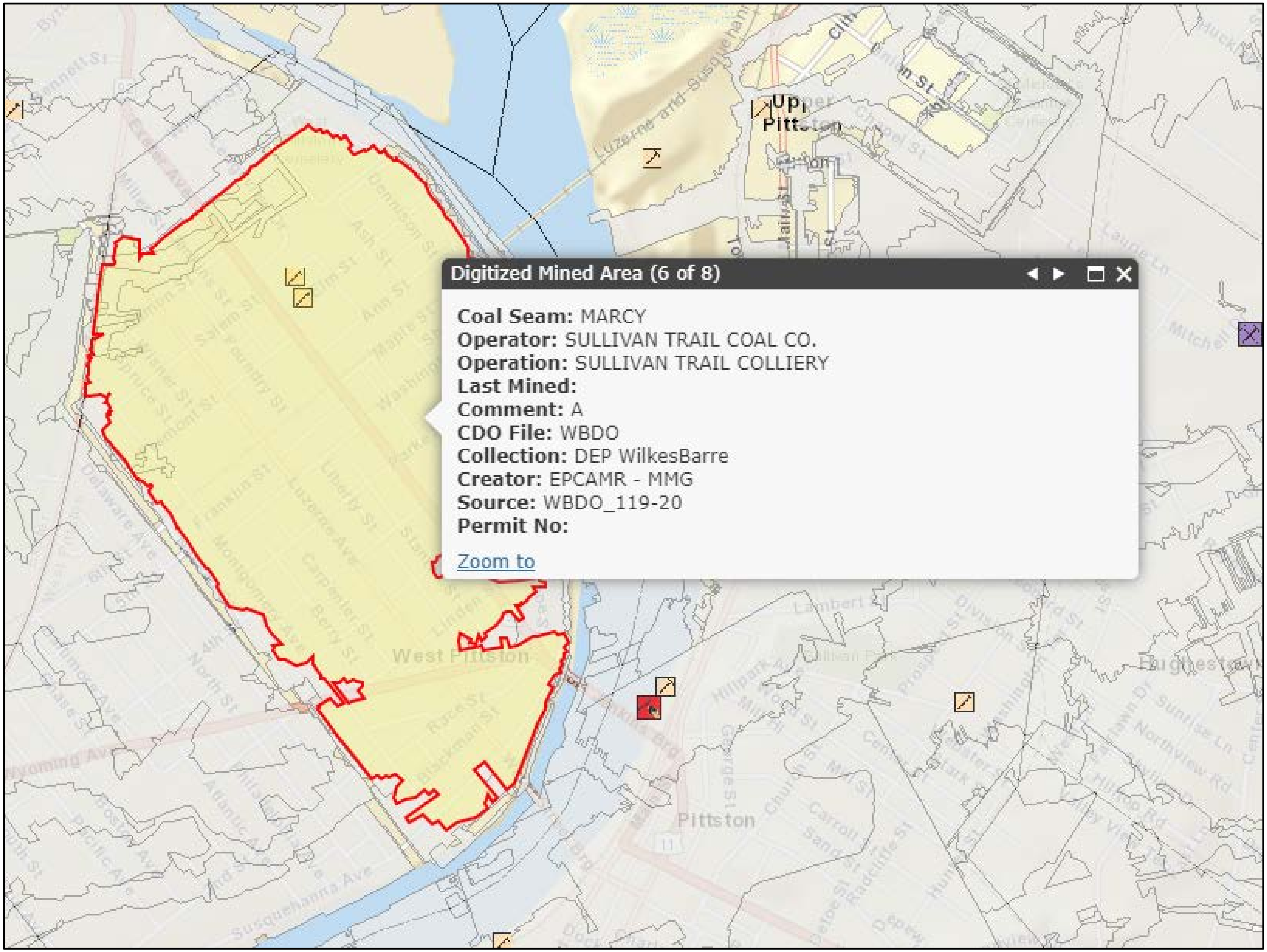

Digitized Mined Area (1 of 8)
Coal Seam: BOTTOM RED ASH
Operator: SULLIVAN TRAIL COAL CO.
Operation: SULLIVAN TRAIL COLLIERY
Last Mined:
Comment: A
CDO File: WBDO
Collection: DEP WilkesBarre
Creator: EPCAMR - MMG
Source: WBDO_119-12
Permit No:
Zoom to
West Pittston
Pittston


Digitized Mined Area (2 of 8)
Coal Seam: MIDDLE RED ASH
Operator: SULLIVAN TRAIL COAL CO.
Operation: SULLIVAN TRAIL COLLIERY
Last Mined:
Comment: A
CDO File: WBDO
Collection: DEP WilkesBarre
Creator: EPCAMR - MMG
Source: WBDO_119-19
Permit No:
Zoom to
West Pittston
Pittston


Digitized Mined Area (3 of 8)
Coal Seam: MARCY
Operator: Maryland Anthracite Coal Co., Fairmount Coal Co.
Operation: Undetermined
Last Mined:
Comment: A
CDO File: BMSA
Collection: DEP Pottsville
Creator: Harrisburg U - MMG
Source: BMSA_6823-001
Permit No:
Zoom to
West Pittston
Pittston
Upper Pittston

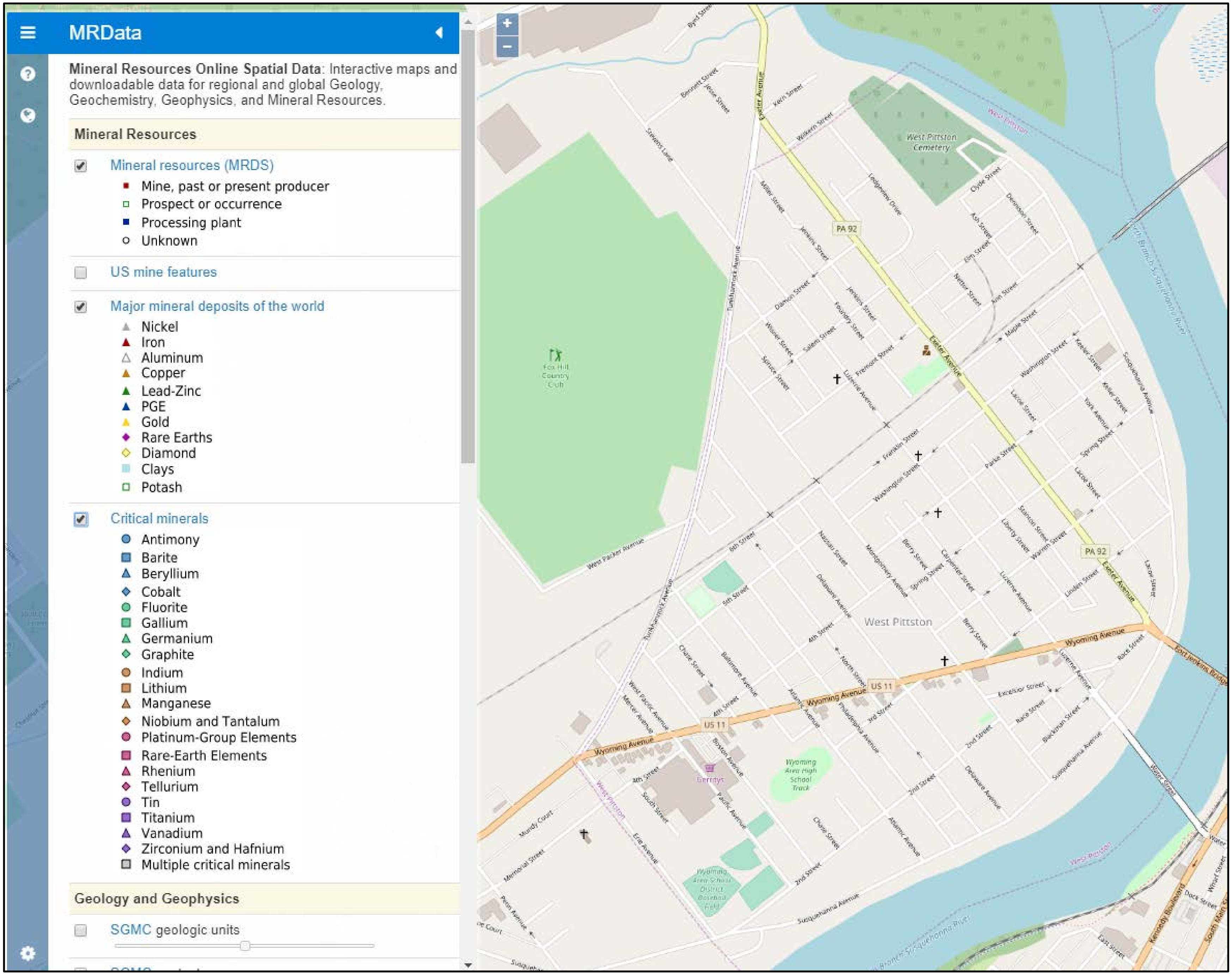

Digitized Mined Area (4 of 8)
Coal Seam: TOP MARCY
Operator: SULLIVAN TRAIL COAL CO.
Operation: SULLIVAN TRAIL COLLIERY
Last Mined:
Comment: A
CDO File: WBDO
Collection: DEP WilkesBarre
Creator: EPCAMR - MMG
Source: WBDO_119-17
Permit No:
Zoom to
West Pittston
Pittston


Digitized Mined Area (5 of 8)
Coal Seam: PITTSTON
Operator: SULLIVAN TRAIL COAL CO.
Operation: SULLIVAN TRAIL COLLIERY
Last Mined:
Comment: A
CDO File: WBDO
Collection: DEP WilkesBarre
Creator: EPCAMR - MMG
Source: WBDO_119-21
Permit No:
Zoom to
West Pittston
Pittston
Hughestown
Upper Pittston



The PA Mine Map Atlas (http://www.paminemaps.psu.edu/) has an extensive library of georeferenced digitized maps of coal mines in PA.

USGS Mineral Resources Map (https://mrdata.usgs.gov/)



United States Department of Agriculture

NRCS

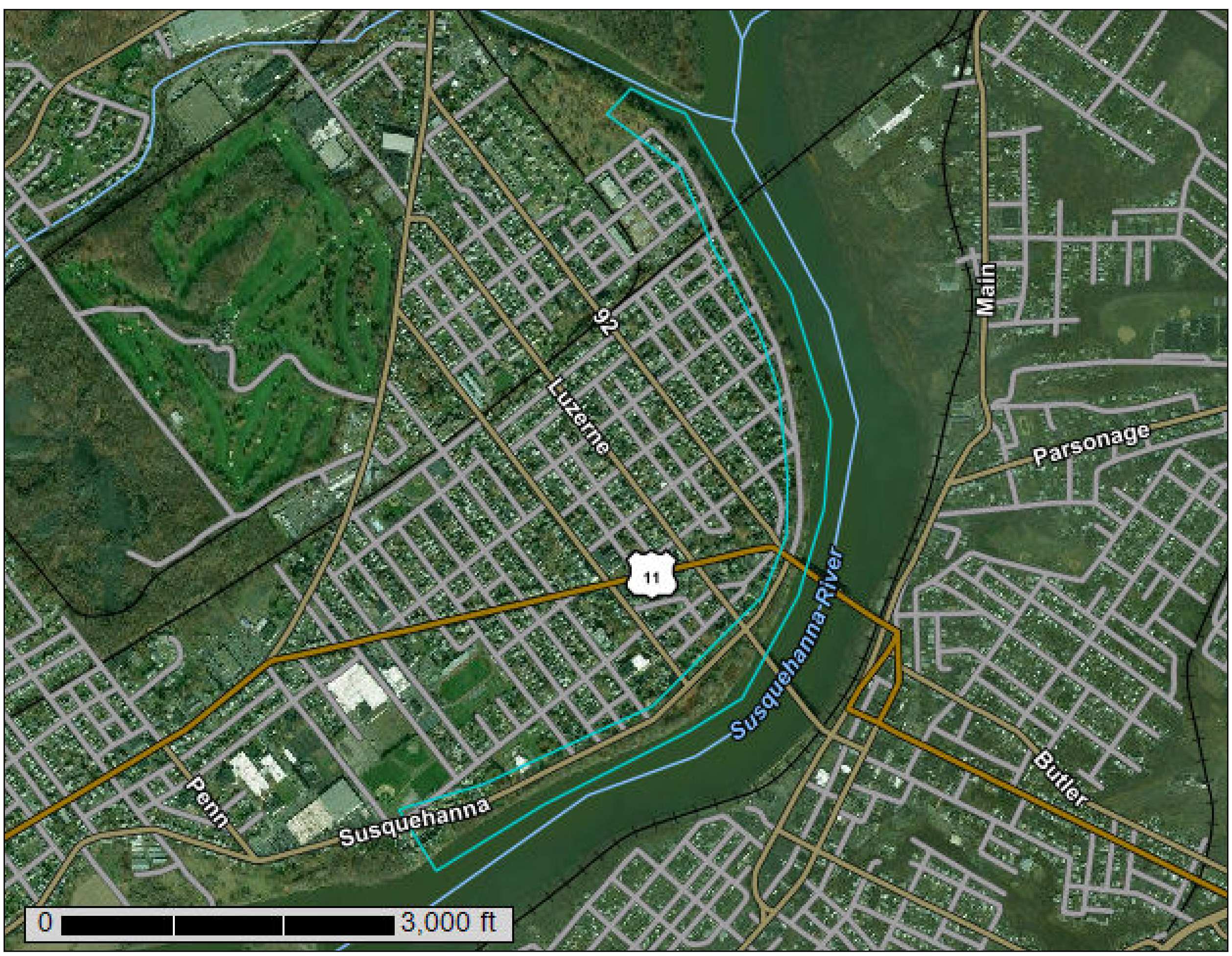
Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Luzerne County, Pennsylvania

West Pittston Feasibility



August 2, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map


75° 48' 36" W
75° 47' 13" W
41° 20' 27" N
41° 19' 4" N
432300
432600
432900
433200
433500
433800
434100
4576800
4576500
4576200
4575900
4575600
4575300
4575000
4574700
4574400
Hicks Creek
Stevens Ln
92
ChA
Luzerne
Montgomery
North St
W
11
Boston Ave
Ps
Water
Main
ChC
CF
Susquehanna River
Kennedy
Market
Map Scale: 1:12,500 if printed on A portrait (8.5" x 11") sheet.
Meters
0 150 300 600 900
Feet
0 500 1000 2000 3000
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Luzerne County, Pennsylvania
Survey Area Data: Version 13, Sep 19, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 20, 2010—Jul 7, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CF	Cut and fill land	6.6	8.2%
ChA	Chenango gravelly loam, 0 to 3 percent slopes	22.2	27.4%
ChC	Chenango gravelly loam, 8 to 15 percent slopes	1.0	1.3%
Ps	Pope soils	24.2	30.0%
W	Water	26.7	33.1%
Totals for Area of Interest		**80.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Luzerne County, Pennsylvania

CF—Cut and fill land

Map Unit Setting

National map unit symbol: 9yg0
Mean annual precipitation: 36 to 46 inches
Mean annual air temperature: 46 to 56 degrees F
Frost-free period: 135 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, cut and fill, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Cut And Fill

Setting

Down-slope shape: Linear
Across-slope shape: Linear

Properties and qualities

Slope: 0 to 70 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

ChA—Chenango gravelly loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9yg1
Elevation: 600 to 1,800 feet
Mean annual precipitation: 30 to 56 inches
Mean annual air temperature: 40 to 54 degrees F
Frost-free period: 100 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Chenango and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chenango

Setting

Landform: Outwash terraces
Landform position (three-dimensional): Riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear

Parent material: Gravelly outwash

Typical profile

H1 - 0 to 8 inches: gravelly loam
H2 - 8 to 32 inches: gravelly fine sandy loam
H3 - 32 to 72 inches: very gravelly loamy coarse sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Braceville

Percent of map unit: 5 percent
Landform: Outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, concave
Hydric soil rating: No

Rexford, somewhat poorly drained

Percent of map unit: 5 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

ChC—Chenango gravelly loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9yg3
Elevation: 600 to 1,800 feet
Mean annual precipitation: 30 to 56 inches
Mean annual air temperature: 40 to 54 degrees F
Frost-free period: 100 to 180 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Chenango and similar soils: 93 percent
Minor components: 7 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chenango

Setting

Landform: Outwash terraces
Landform position (three-dimensional): Riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Gravelly outwash

Typical profile

H1 - 0 to 8 inches: gravelly loam
H2 - 8 to 32 inches: gravelly fine sandy loam
H3 - 32 to 72 inches: very gravelly loamy coarse sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Braceville

Percent of map unit: 5 percent
Landform: Outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, concave
Hydric soil rating: No

Rexford, somewhat poorly drained

Percent of map unit: 2 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Ps—Pope soils

Map Unit Setting

National map unit symbol: 9yht
Elevation: 800 to 840 feet
Mean annual precipitation: 30 to 51 inches
Mean annual air temperature: 40 to 54 degrees F
Frost-free period: 100 to 187 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Pope and similar soils: 90 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pope

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy alluvium derived from sandstone and siltstone

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 42 inches: fine sandy loam
H3 - 42 to 62 inches: sandy loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Holly

Percent of map unit: 5 percent

Landform: Backswamps, depressions on flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

W—Water

Map Unit Setting

National map unit symbol: 9yj6
Mean annual precipitation: 34 to 51 inches
Mean annual air temperature: 40 to 50 degrees F
Frost-free period: 100 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Bodies of water 2 to: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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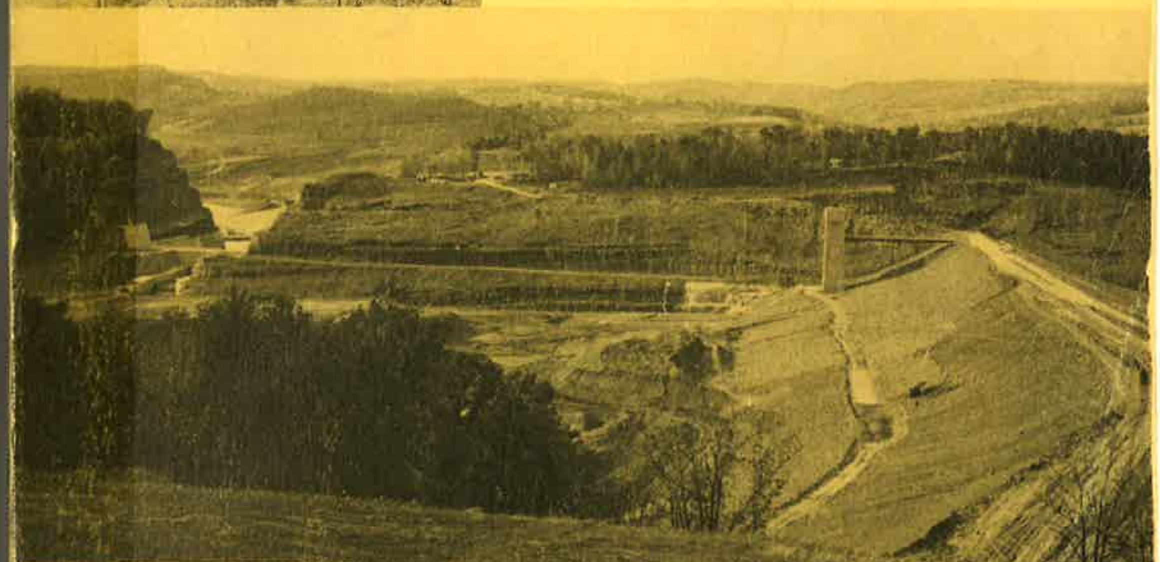
Environmental Geology Report 1

1982

ENGINEERING CHARACTERISTICS OF THE ROCKS OF PENNSYLVANIA



Alan R. Geyer
J. Peter Wilshusen

DEPARTMENT OF
ENVIRONMENTAL RESOURCES
OFFICE OF RESOURCES MANAGEMENT
BUREAU OF
TOPOGRAPHIC AND GEOLOGIC SURVEY

EASE OF EXCAVATION: Difficult; fast drilling rate.

CUT-SLOPE STABILITY: Good.

FOUNDATION STABILITY: Good; sinkholes have been observed, and detailed investigation should be undertaken.

CONSTRUCTION MATERIALS: Good source of decorative stone and fill.

LINDEN HALL FORMATION (SEE BENNER FORMATION)

LLEWELLYN FORMATION (IPl)

DESCRIPTION: Interbedded sandstone, siltstone, and conglomerate; medium to coarse grained; light gray to brown; contains coal and dark-gray to black shales; a maximum thickness of 830 feet has been reported; reference section is along Interstate Route 81 at mile 107, Schuylkill County.

BEDDING: Moderately well developed; coal and shale are thin; sandstone, siltstone, and conglomerate may be thick to massive.

FRACTURING: Joints are moderately developed; moderately abundant; blocky pattern; moderately spaced; regular sequence; open and steeply dipping.

WEATHERING: Slightly to moderately weathered; shallow to moderate depth; depending on lithology, rubble consists of small to medium, flat, elongate fragments to large blocky fragments; overlying mantle is thin to moderate.

TOPOGRAPHY: Low ridges and valleys in rolling terrain; natural slopes are stable at moderate angles.

DRAINAGE: Good surface drainage.

POROSITY AND PERMEABILITY: Total effective porosity is moderate; moderate to low permeability.

GROUNDWATER: Average yield is 38 gal/min; high iron and acidity are common quality problems.

EASE OF EXCAVATION: Difficult; fast to slow drilling rate, depending on lithology.

CUT-SLOPE STABILITY: Fair to good; undercutting of shale and siltstone under more resistant sandstone and conglomerate units can be a

severe problem; support-drainage maintenance may be required to reduce weathering from excessive moisture.

FOUNDATION STABILITY: Good; should be excavated to sound material; extreme caution should be exercised where coals have been removed underground.

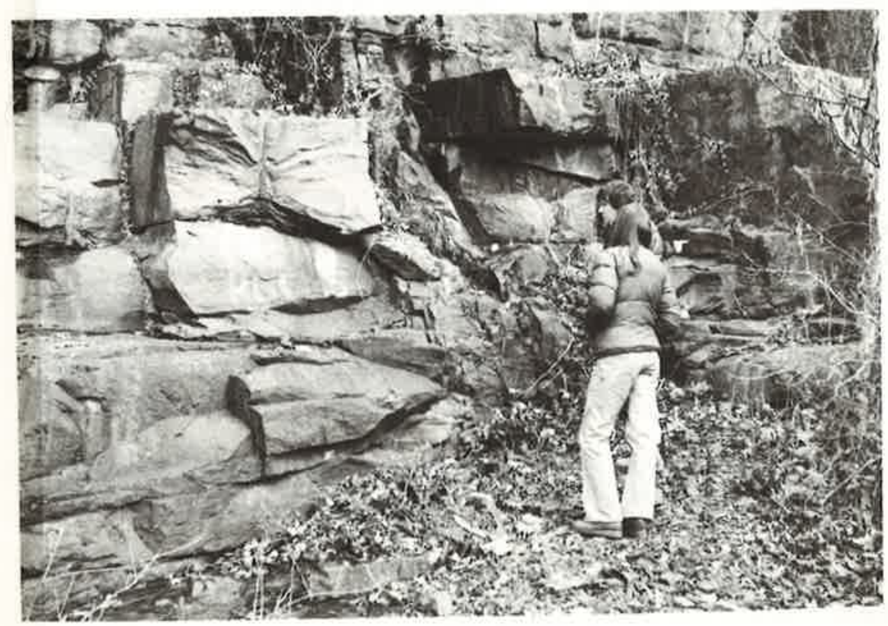
CONSTRUCTION MATERIALS: Good source of road material and fill; conglomerate is suitable for building stone, flagstone, embankment facing, and riprap.

LOCKATONG FORMATION (Trl)

DESCRIPTION: Dark-gray to black argillite having some zones of black shale; locally, thin layers of impure calcareous shale; maximum thickness is approximately 3,800 feet; reference section is along Delaware River between Point Pleasant and Lumberville, Bucks County.

BEDDING: Moderately well developed; flaggy to thick.

FRACTURING: Joints have a blocky pattern; moderately developed; closely spaced; steeply dipping and open.



CHAPTER 2. GEOLOGY OF THE PENNSYLVANIA COAL REGIONS

Roger J. Hornberger, Caroline M. Loop, Keith B. C. Brady, Nathan A. Houtz

The geology of the Anthracite and Bituminous Coal Regions of Pennsylvania is fundamental to most of the contents of this book. Since most of the coal ash placement sites described in this book are in the anthracite coal fields, the geology of the Anthracite Region is emphasized. However, the significant differences and similarities between the anthracite and bituminous regions, in their regional-scale physiography and local-scale topography, geologic structure, stratigraphy and hydrogeology will be briefly discussed in this chapter.

2.1 PHYSIOGRAPHY AND TOPOGRAPHY

Pennsylvania's Anthracite Region is located in the Valley and Ridge Province of the Appalachian Mountains as shown on Figure 2.1. The Valley and Ridge Province and other provinces and sections of the Appalachian Highlands were described in Fenneman (1938) and delineated on a U.S. Geological Survey Map by Fenneman and Johnson (1946). The province extends for a distance of 1200 miles from the St. Lawrence Lowland to Alabama, according to Thornbury (1965) who calls it the Ridge and Valley Province. This province is generally divided into three sections: a northern section also known as the Hudson-Champlain section; a middle section reaching from the Delaware River to the New River in southern Virginia; and a southern section from southern Virginia to the end of the highlands in Alabama. The width of the Valley and Ridge Province ranges from about 20 miles in New York near the Hudson River to about 80 miles wide in central Pennsylvania between Williamsport and Harrisburg, according to Hunt (1974) and Thornbury (1965).

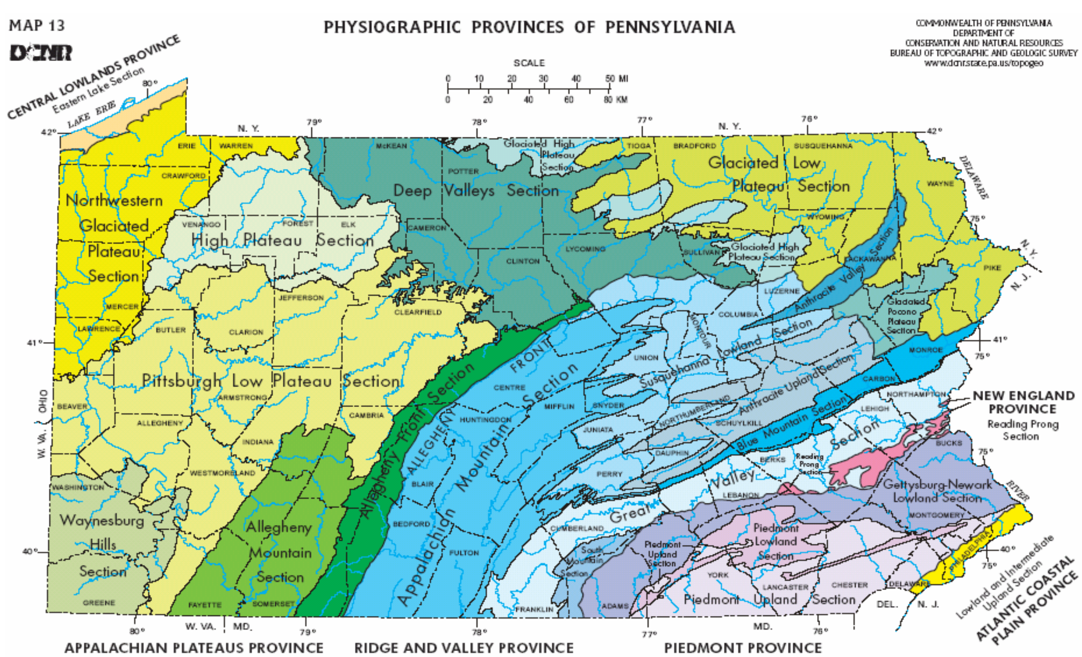


Figure 2.1. Map of Physiographic Provinces of PA.

In a classic work on the evolution of North America, King (1977) divides the Appalachian Mountains into two parts, referred to as the "sedimentary Appalachians" including the Valley and Ridge Province and the "crystalline Appalachians" in the New England Upland and Piedurant Plateau. King (1977, p. 45) states: "In the humid climate of the eastern states, the limestones and dolomites are more susceptible to erosion than are the sandstones and shales; wherever deformation has raised them to view they are worn down to low ground, whereas the adjacent sandstones and shales project in ridges. Characteristic topography of the sedimentary Appalachians is thus a succession of parallel valleys and ridges which form the Valley and Ridge province". This pattern of alternating ridges and valleys, with many cross-cutting water gaps and wind gaps in the ridges is very distinctive on the USGS digital shaded relief map of land forms of the conterminous United States by Thelin and Pike (1991). Additional description of the Appalachian Mountain Section of the Ridge and Valley Province, including the topographic features of the Anthracite Regions is included in Way (1999).

The Anthracite Region consists of 4 major coal fields: the Northern, Eastern Middle, Western Middle, and Southern Anthracite Fields as shown on Figure 1.1. The anthracite coal fields contain approximately 95% of the remaining identified anthracite and semianthracite resources in the United States (Averitt, 1975). The anthracite fields are of Pennsylvanian age and are time equivalent to the bituminous fields of western Pennsylvania. The time equivalence and other stratigraphic relationships between the Anthracite and Bituminous Coal Regions of Pennsylvania will be discussed in the stratigraphy section of this chapter. The principal difference between the anthracite and bituminous regions is the geologic structure, with the anthracite coals located within the extensively folded and faulted terrain of the Valley and Ridge Province and the bituminous coals located on the adjacent Allegheny Plateau Province shown on Figure 2.1 which was considerably less affected tectonically.

The four anthracite fields are preserved in synclinal basins that are essentially surrounded and "defended" by sandstone ridges. These ridges are more resistant to erosion than the shales and coals of the Pottsville and Llewellyn Formations. The slope forms of the ridges are typically mature (i.e., convexo-concave), but some free faces occur, such as the Harveys Creek water gap in the Northern Field. Descriptions of Appalachian slope form development are contained in Hack (1960, 1979). Additional information on weathering in the Ridge and Valley is found in Thornbury (1965, 1969), Clark and Ciolkosz (1988), and Sevon (1989, 2000a).

The bituminous coal fields of Western Pennsylvania lay within the Appalachian Plateau Physiographic Province, which in Pennsylvania extends from the western state border to the Allegheny Front, the prominent southeast-facing escarpment of approximately 1000 feet of topographic relief that clearly defines the boundary of plateau with the adjacent Valley and Ridge Province.

The major and most typical section of the plateau in Western Pennsylvania is termed the Unglaciated Allegheny Plateau by Fenneman (1938). It has a smooth, undulating surface with narrow, relatively shallow valleys. Highest hilltops are typically about 1600 feet throughout the section. Relief is usually several hundred feet and as much as 400 to 500 feet along the larger streams. This area is designated as the Waynesburg Hills Section and Pittsburgh Low Plateau Section by Sevon (2000b) on Figure 2.1. Between this section and the Valley and Ridge

Province of the Appalachian Mountains to the east lies a strip of the plateau known as the Allegheny Mountains Section, which is much higher in elevation, attaining 3,213 feet of elevation atop Mount Davis, the highest point in Pennsylvania and whose topography, though distinctly plateau-like, is much affected by open folds (Fenneman, 1938 p. 283). Northward, starting at approximately 41º latitude, the land surface of Fenneman's Unglaciated Allegheny Plateau exhibits a steady increase in altitude all the way up to the New York border where the elevation is greater than 2100 feet (640 meters). This area comprises the High Plateau Section and part of the Deep Valleys Section on Figure 2.1 (Sevon, 2000b). It has broad, rounded to flat uplands separated by distinctively deep, angular valleys.

According to Thornbury (1965 p. 130): "The Appalachian Plateaus have not been subjected to the intense deformation that affected the other Appalachian provinces. A few mild folds exist, particularly adjacent to the Ridge and Valley Province, but they are broad open folds and not strongly compressed or faulted like those in the Ridge and Valley Province." Briggs (1999) provides additional description of the sections of the Appalachian Plateaus Province in Pennsylvania, including maps of generalized topography and topographic relief classes.

2.2 GEOLOGIC STRUCTURE

The structural geology of the four anthracite coal fields within the folded and faulted Valley and Ridge Province is much more complex than the relatively flat-laying strata of most of the bituminous coal fields within the Allegheny Plateau of western Pennsylvania, shown on Figures. 1.1 and 2.1.

Intense orogenic activity in the Ridge and Valley Province occurring during the Permian Period resulted in: (a) substantial increase in rank of the anthracite coals due to metamorphism as compared to time-equivalent coal beds in the Appalachian Plateau Province of the bituminous region, and (b) the preservation of the anthracite coal fields within synclinal basins which are essentially surrounded by sandstone/conglomerate ridges that are more resistant to erosion than the coal and associated finer-grained sedimentary rocks. Though there were three major orogenies responsible for the formation of the Appalachian Mountains, only the final one, the Alleghenian Orogeny, had any effect on the rocks of the Ridge and Valley Province in Pennsylvania. According to Rodgers (1970, Chapter 11) who summarized the tectonics of the Appalachian Mountains, there were three major orogenic movements which resulted in the development of the Valley and Ridge Province of the Appalachian Mountains in Pennsylvania, including the Anthracite Region; the Taconic Orogeny occurring from approximately 450 through 500 million years ago, the Acadian Orogeny occurring during the Devonian Period from approximately 360 through 400 million years ago, and the Allegheny Orogeny occurring from approximately 230 through 260 million years ago.

The Allegheny Orogeny was the most significant mountain-building development in the present geologic structure of the Valley and Ridge Province of central and eastern Pennsylvania (including the anthracite coal region). The anthracite coal beds were deposited during the Pennsylvanian Period approximately 275 million years ago. At the type section of the Pottsville Group strata located on Sharp Mountain at Pottsville, Pennsylvania, the Mammoth coal seam and associated strata have been uplifted from a horizontal, to a nearly vertical structural orientation.

Orogenic deformation preceding Pennsylvanian sedimentation did not structurally affect Pennsylvanian rocks. As the Allegheny Orogeny postdated the deposition of these coal seams, it is responsible for most of the structural deformation.

A comprehensive description of the geologic history of the north-central Appalachians, is contained in Faill (1997a, 1997b, 1998a 1998b). The most recent orogenic episode, the Alleghenian, commenced in the Early Permian (Faill, 1997b). Faill (1997a, p. 552) states that "(l)ate in the Allegheny orogeny, rock thrust northward over the Carboniferous rocks in the Anthracite Region of northeastern Pennsylvania and caused anthracitization of the underlying coals."

Following these significant orogenic episodes during Paleozoic times, the Appalachian Mountains continue to mature. Concerning the post-Paleozoic history, Rodgers (1970, p. 218) states: "Our next glimpse of the Appalachians is in the Late Triassic; they were now a chain of mountains, though not necessarily lofty ones, and the core areas were already deeply eroded.… Only in the Cretaceous or the Late Jurassic did the sea once more enter the region, and then only to wash the southeastern and southern margins of the Appalachian chain, which repeated arch-like uplifts kept high and subject to erosion .… During this period the mountains approached the forms we see today.".

For the past approximately 65 through 100 million years Sharp Mountain in Schuylkill County, Pennsylvania and other Appalachian ridges have been undergoing further weathering and erosion to produce the mature slope forms seen today. During these millions of years of weathering the rough edges of the tops of these mountains were worn down and colluvium developed as a veneer over the bedrock on the middle to lower slopes of the ridges.

A concise description of the structural geology of the Ridge and Valley Province in Pennsylvania is provided by Faill and Nickelsen (1999), including a tectonic map of the province, a cross-section of the Minersville Synclinorium, and other relevant information about the Anthracite Region. Much of the Southern and Western Middle Fields has been geologically mapped by Wood and associates (e.g., the Minersville Quadrangle, Wood, et al., 1968). The maps depict the synclinoria and other complex geologic structures. The geologic structure and stratigraphy of the Southern Anthracite Field are described in Wood et al. (1969) and the depositional and structural history of the entire Anthracite Region are presented in Wood et al. (1986). The complexity of the geologic structure, particularly the nearly vertical beds of rocks in many areas of the anthracite fields, has impeded the acquisition of stratigraphic data from routine exploration drilling.

According to Wood et al. (1986): "Each coal field of the Anthracite Region is a complexly folded and faulted synclinorium, with structural trends between N55°E and N85°E.… The Southern field is the most highly deformed, with several highly faulted, closely spaced synclinal basins. Deformation is most complex toward the southeast, where it is characterized by hundreds of thrust, reverse, tear and bedding plane faults and tightly compressed, commonly overturned folds." (p. 45).

The principal structural features of these four anthracite coal fields are shown on Figure 2.2, from Wood et al. (1986, p. 44) and Wood and Bergin (1970, p. 150). The tremendous structural complexity of the Southern Field is described in greater detail in Wood et al. (1969), including descriptions of the largest structural features, the Minersville Synclinorium, the New Bloomfield Anticlinorium and the Broad Mountain Anticlinorium, plus detailed descriptions of individual anticlines, synclines and fault complexes within these three major structural features. Of the many hundreds of anticlines, associated synclines and significant faults present in the area, (Wood et al., 1969, p. 87) examples include: the Donaldson Syncline, with an amplitude of 4,000 to 7,800 feet in the Tower City, Donaldson and Tremont area (p. 91), and the Mine Hill fault complex (in the area of the Lytle, Oak Hill and Wadesville Collieries) which has, in places, a klippe composed of beds of the Schuylkill Member overlying the Upper Mine Hill fault and upright beds of the Llewellyn Formation (p. 102).

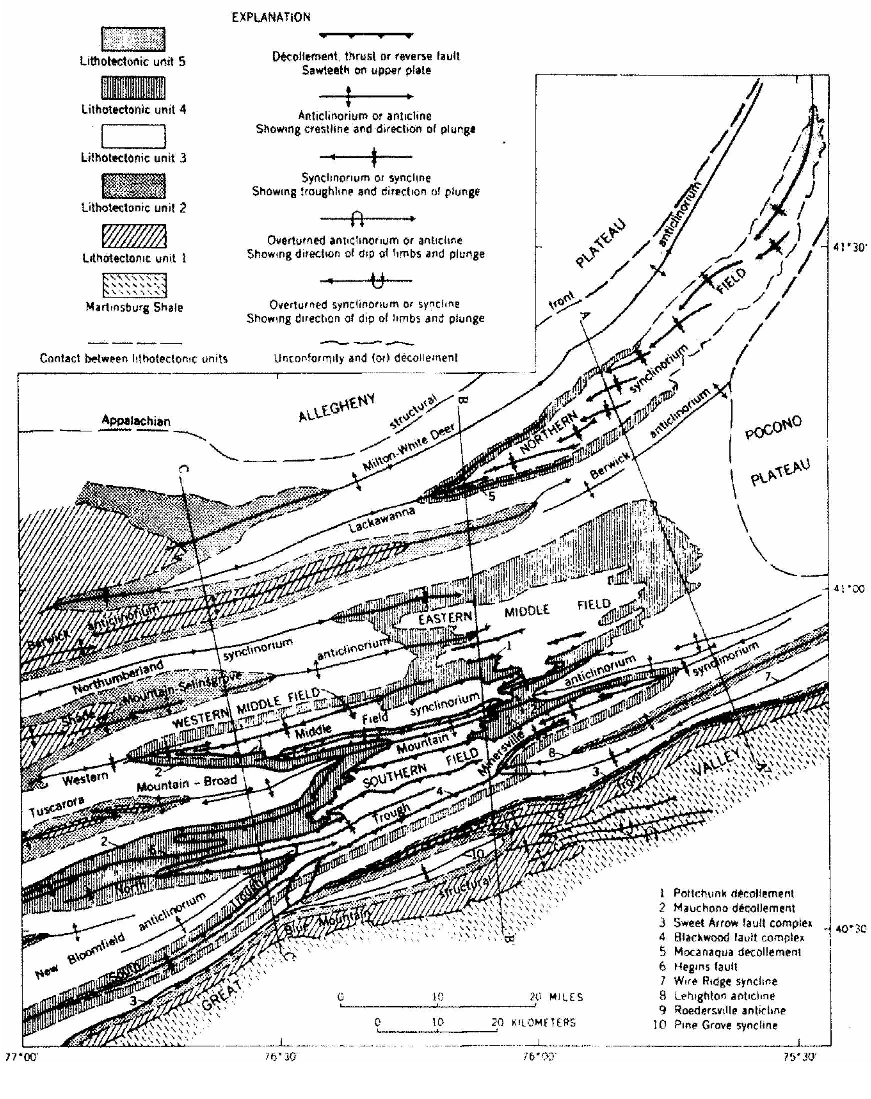


Figure 2.2. Principal structural features of the Anthracite Coal Fields (from Wood et al**.,** 1986).

The distinct contrast between the geologic structure of the Allegheny Plateau and the Valley and Ridge Plateau is depicted in the series of Appalachian cross-sections constructed by King (1977) as shown in Figures. 2.3a, and 2.3b. The entire area east of the Findley Arch in Ohio on Figure 2.3a, labeled the Allegheny Synclinorium, is termed a foreland basin by King (1977, p. 44), who describes this basin extending southward from Pennsylvania into Kentucky, and states: "Surface rocks of the plateau and synclinorium are largely Pennsylvanian continental and coal-bearing strata…. The Pennsylvanian and associated rocks have been warped into a series of anticlines and synclines by the Appalachian movements, but most of the deformation is so light that over wide areas the strata appear to lie nearly flat." (p. 45).

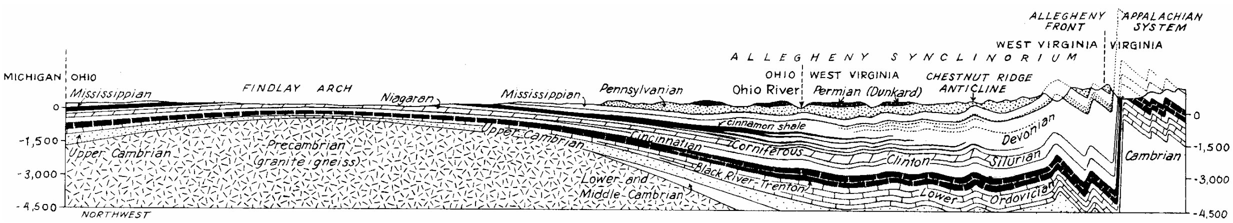


Figure 2.3(a). Cross-section of the geologic structure of the Allegheny Plateau (from King 1977).

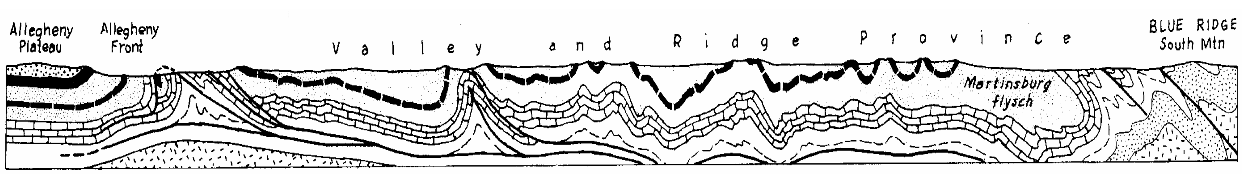


Figure 2.3(b). Cross-section of the geologic structure of the Ridge and Valley Province.

The entire Allegheny Plateau in western Pennsylvania is part of a major structural basin referred to as the Appalachian Coal Basin (Rodgers, 1970) or Allegheny Synclinorium (Kay, 1942) or as the Pittsburgh-Huntingdon Basin (Richardson, 1928). According to Gwinn (1964, p. 866): "Viewed on a regional basis the surface structure of the Plateau is a broad asymmetrical synclinorium, steeper on the southeast …. the surface axis of the synclinorium plunges southwestward in a smooth arc from Binghamton, New York, through Pittsburgh, Pennsylvania, and south-southwestward toward Parkersburg and Huntington, West Virginia."

Although the axis of the structural basin is known to curve in plan view and plunge toward the southwestern corner of the state, the basin may be three-dimensionally visualized as a broad spoon-shaped structure, in which the youngest strata are at the center of the spoon and successively older strata become exposed toward the outer edge of the spoon (Richardson, 1928; Ashley, 1928; Piper, 1933). Consequently a bed such as the Upper Freeport Coal of the Allegheny Group, which is present at the land surface at elevations of approximately 2,000 feet above sea level at the northern and eastern margins of the bituminous coal field in western Pennsylvania, is present in the southwestern corner of Pennsylvania at an elevation several hundred feet below sea level and beneath hundreds of feet of younger rocks, including the Pittsburgh Coal, which may be mined at the land surface.

The asymmetry of the basin is evident in the contrast between the northwestern and southeastern sides in terms of the intensity and manner of production of folds and other geologic structures. The folds and smaller scale irregularities manifested in the surficial configuration of the basin have been described by Gwinn (1964), Rodgers (1970), Fettke (1954) and others. Rodgers (1970) divides the basin into a northwest flank and a southeast flank which are both about 60 to 80 miles (37 to 50 kilometers) wide. The north-west flank generally has a gentle and persistent regional dip toward the basin center. At a more detailed scale, irregular minor structural features become evident on the northwest flank which have been described by Rodgers (1970, p. 15) as "scattered and apparently planless irregularities – folds of erratic trend, domes, noses, etc. – whose structural relief is rarely more than a few tens of meters (a hundred feet)." A belt of transition (i.e. the bottom of the basin) separates the northwestern flank from the markedly different structure of the southeastern flank which Rodgers (1970, p. 16) describes as "a succession of roughly parallel anticlines and synclines, mostly many times longer than broad…. As these folds are superposed on the southward regional dip they show a consistent asymmetry, the southeast flanks of the anticlines being the steeper."

According to Gwinn (1964) structural relief decreases north-westward in a step-like fashion from the well-defined folds of the southeastern side of the plateau where anticlines rise 800 to 2500 feet (244 to 1067 meters) above adjacent synclines. Gwinn (1964) provided the decollement interpretation of the mechanics of formation of the high folds and other structural features of the Appalachian Plateau in western Pennsylvania, which involved movement associated with major thrust faults along bedding planes in the sedimentary rock sequence. Rodgers (1970) provides additional description of the manner of production of structures of the plateau, confirming Gwinn's interpretation as applicable to the southeastern flank of the plateau in Pennsylvania, while relating the irregular structures of the northwestern flank to a contrasting interpretation involving tectonics of the basement rocks.

The axes of anticlines and classes of structural relief associated with the anticlines and synclines of the Appalachian Plateau in western Pennsylvania have been described by Gwinn (1964), Berg et al. (1980) and Beardsley et al. (1999). Figure 2.4 from Beardsley et al. (1999) shows the major Chestnut Ridge, Laurel Hill anticlines and the Smethport-Sharon anticline labeled CR, LH and SS respectively. The importance of linear structural features of various scales in western Pennsylvania has been discussed by Nickelsen and Williams (1955), Hough (1959), Poth (1963), Nickelsen and Hough (1967), Gold et al. (1974), Kowalik (1975) and others. Nickelsen and Hough (1967) illustrate regional joint patterns in Pennsylvanian aged coals and shales of western Pennsylvania. The systematic joint pattern defined by Nickelsen and Hough (1967) was found to be generally east-west trending, perpendicular to major fold axes, and somewhat arcuate in north-central Pennsylvania, presumably in response to a Paleozoic doming episode in that area.

The structural and topographic transition between the Allegheny Plateau and the Valley and Ridge Province to the east is the Allegheny Front, which is shown on the eastern side of Figure 2.3a and the western side of Figure 2.3b, and is described by King (1977) as follows: "On the southeast the Allegheny Plateau breaks off along the Allegheny Front (Fig. 2.3b), an imposing escarpment that overlooks the more varied, linear ridges and valleys of the true Appalachians. The front marks an abrupt change in style of deformation; the strata now turn up abruptly, and beyond they are heavily folded and faulted; we pass here from the foreland into the main deformed belt." (p. 45).

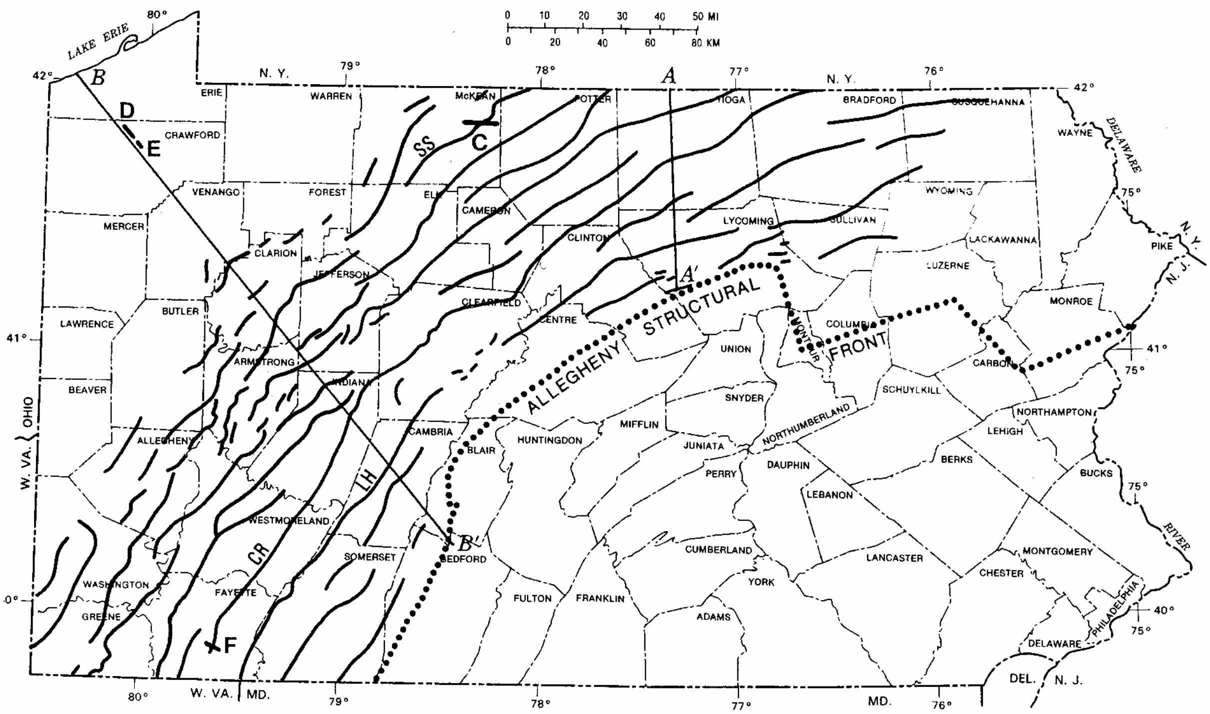


Figure 2.4. Generalized location of surface anticlines in the Appalacian Plateau's Province. (from Beardsley et al., 1999).

2.3 STRATIGRAPHY

Far more is known about the stratigraphy of the Bituminous Coal Region of western Pennsylvania than the Anthracite Coal Region for several reasons, including the abundance of drill hole data, the availability of paleontological information, and the fact that it is less difficult to correlate strata between drill holes and other exposures in the relatively flat-lying strata of the Allegheny Plateau than in the structurally complex anthracite coal region. The stratigraphy of the Anthracite Region of eastern Pennsylvania has not been studied as extensively as that of Pennsylvania's bituminous coal region. Geologic and mining engineering work done in the Anthracite Region over the past 150 years documents some significant stratigraphic differences between the Anthracite and Bituminous Coal Regions. The complexity of the geologic structure, resulting in nearly vertical beds of coal and other rocks in some areas of the anthracite fields, has impeded the acquisition of stratigraphic data from routine exploration drilling. Detailed mine maps of the abandoned underground mines and cross-sections through vertical shafts and nearly horizontal tunnels have added to the understanding of the structure and stratigraphy of the anthracite coal fields, however most stratigraphic efforts have been directed toward coal seam delineation.

The coal-bearing rocks in Pennsylvania are from the Pennsylvanian and Permian Periods of geologic time. The rocks of the Bituminous Coal Field of western Pennsylvania are divided, from oldest to youngest, into the Pottsville, Allegheny, Conemaugh, Monongahela, and Dunkard

Groups. The majority of mineable coal occurs in the Allegheny and Monongahela Groups. The strata in the Anthracite Region are divided, from oldest to youngest, into the Pottsville and Llewellyn Formations.

Generalized stratigraphic sections of the Allegheny Formation and the Conemaugh Group of western Pennsylvania are depicted on Figure 2.5 from Edmunds et al. (1999). The graphic drill logs and overburden analysis data for the entire Pennsylvania coal bearing sequence are included in a series of figures in Brady et al. (1998), examples of which are shown in Figures 2.6a and 2.6b. These figures were constructed from overburden analysis drill holes with percent sulfur and neutralization potential (NP) that were obtained from the permit files of the Department of Environmental Protection's District Mining Offices.

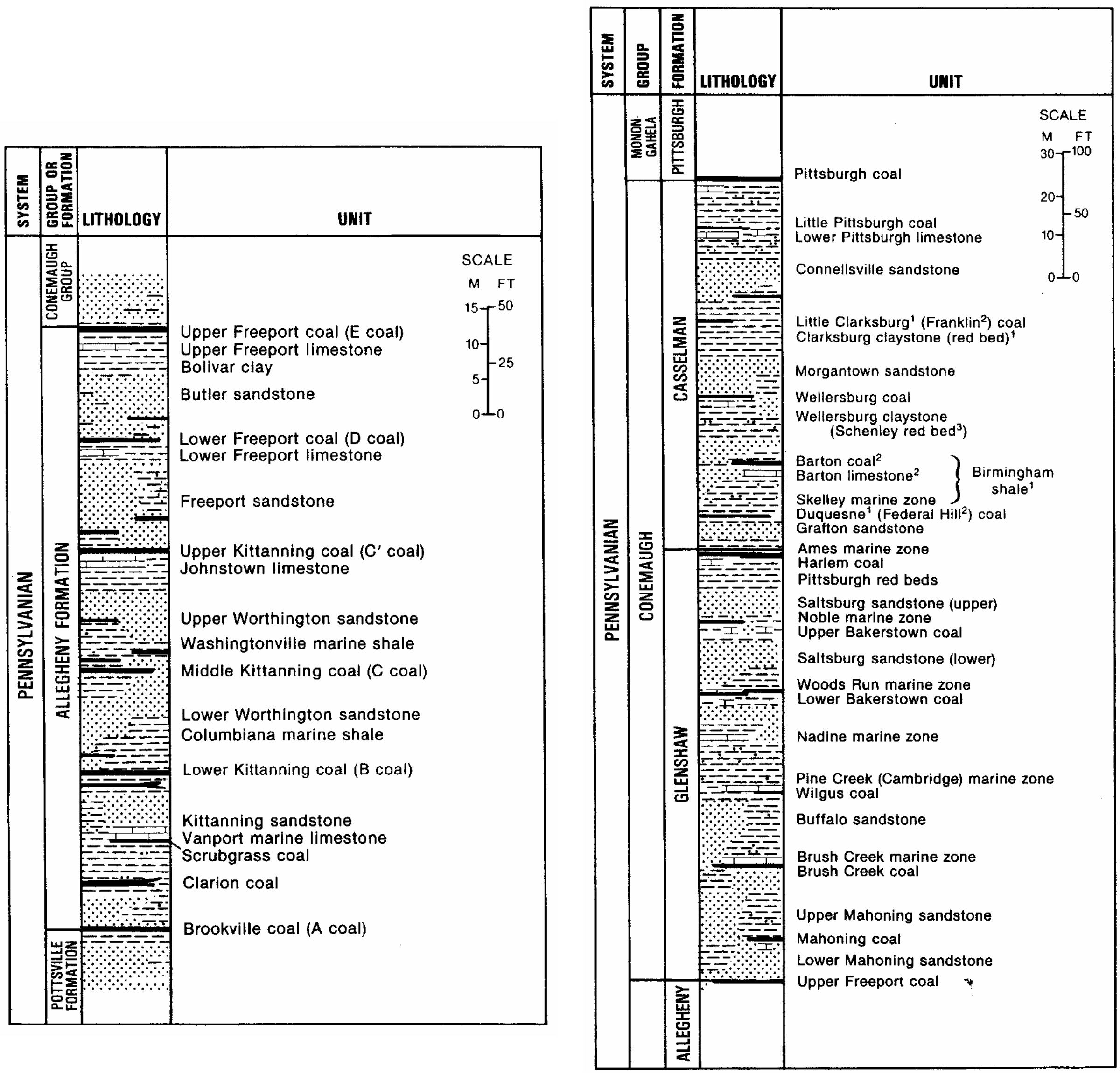


Figure 2.5. Generalized stratigraphic sections of the Allegheny and Conemaugh Group (from Edmunds et al., 1999).

2.3.1 Pottsville Group – Bituminous

The Pottsville Group is variable in thickness. For the most part, it is dominated by sandstone, and the coals are discontinuous. Because of the discontinuous nature of these coals, and the fact that they are often thin and split with numerous partings, mining is not common in the Pottsville Group. The principal coal that is mined is the Mercer. Edmunds et al. (1999) discuss the Pottsville of western Pennsylvania in terms of strata below the Mercer Coal and above the Mercer Coal: "In practice, the western Pottsville is usually divided into an upper sequence consisting of the Mercer coals and associated and overlying rocks, and a lower sequence dominated by sandstone." They also report that "The Pottsville Formation in western Pennsylvania ranges from 20 ft (6 m) to at least 250 ft. (75 m) in thickness. Its basal contact is apparently everywhere disconformable and from south to north overlies increasingly older Mississippian and possibly uppermost Devonian rocks…." (p. 150-151).

2.3.2 Allegheny Group – Bituminous

The Allegheny Group is one of two groups within the Pennsylvanian that contains the majority of economically mineable coals. For the purpose of discussion, the Allegheny has been divided into the upper and the lower Allegheny. The lower Allegheny extends from the base of the Brookville coal to the base of the JohnstownLlimestone (or Upper Kittanning Coal where the limestone is absent). The upper Allegheny extends from the base of the JohnstownLlimestone to the top of the Upper Freeport Coal. This division is made because "marine units occur only below the upper Kittanning underclay…. and, with minor exceptions, nonmarine limestones occur only at or above that unit" (Edmunds, et al., 1999, p. 154). This distinction of "marine" and "nonmarine" is to a large extent based on the work of Williams (1960). Williams defined four faunal groups, inferred as "fresh-water", "restricted marine or near-shore marine", and two marine groups, one having a more diverse fauna than the other. Williams also relied on the geochemical investigations of Degens et al. (1957, 1958) in defining his depositional environments.

According to Edmunds et al. (1999) the Allegheny Group: "was specifically defined to include all of the economically significant coals present in that part of the Pennsylvanian sequence. The thickness of the formation is between 270 (82 m) and 330 feet (100 m) in Pennsylvania, and there is no obvious regional trend. The Allegheny Formation is a complex, repeating succession of coal, limestone, and clastics, ranging from claystone or underclay to coarse sandstone.... No individual bed or lithosome is universally persistent, but some coals, marine shales, and limestones seem to be fairly continuous over thousands of square miles (thousands of square kilometers). The group is fairly uniform in its lithologic diversity.… The Allegheny Formation contains six major coal zones. The coal in each zone may exist as a single, more-or-less continuous sheet, as a group of closely related individual lenses, or as a multiple-bed complex in which the various beds can be separated by tens of feet or merge into a single thick coal" (pp. 153-154).

The major coal zones in the Allegheny Group, from oldest to youngest are the Clarion, Lower Kittanning, Middle Kittanning, Upper Kittanning, Lower Freeport and Upper Freeport. Geochemical data for overburden strata of Allegheny Group coals are shown in Figures 2.6a and

2.6b. The numbers on the left side of each drill hole represent the total sulfur (%) content of the stratigraphic unit, and numbers on the right side of the drill holes represent the Neutralization Potential (parts per thousand). A comparison of the overburden strata in Figures 2.6a and 2.6b shows that the brackish strata of the lower Allegheny are characterized by high total sulfur contents and relatively low NP values, while the nonmarine (freshwater or continental) overburden strata of the upper Allegheny are characterized by relatively low total sulfur content and relatively high NP (calcareous) overburden strata.

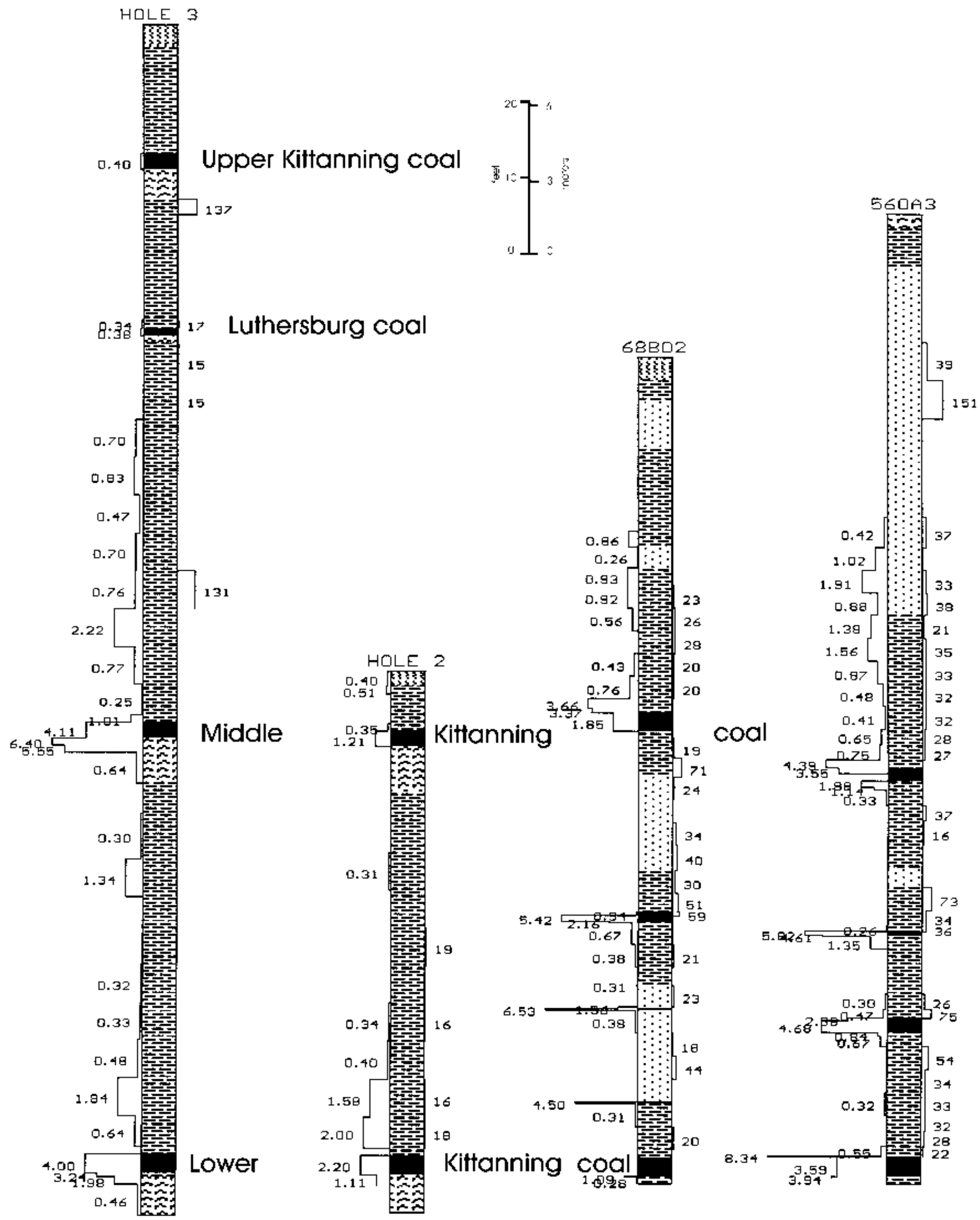


Figure 2.6(a). Lower Kittanning and Middle Kittanning Coals and brackish overburden strata from Clearfield County, PA. (from Brady et al., 1998).

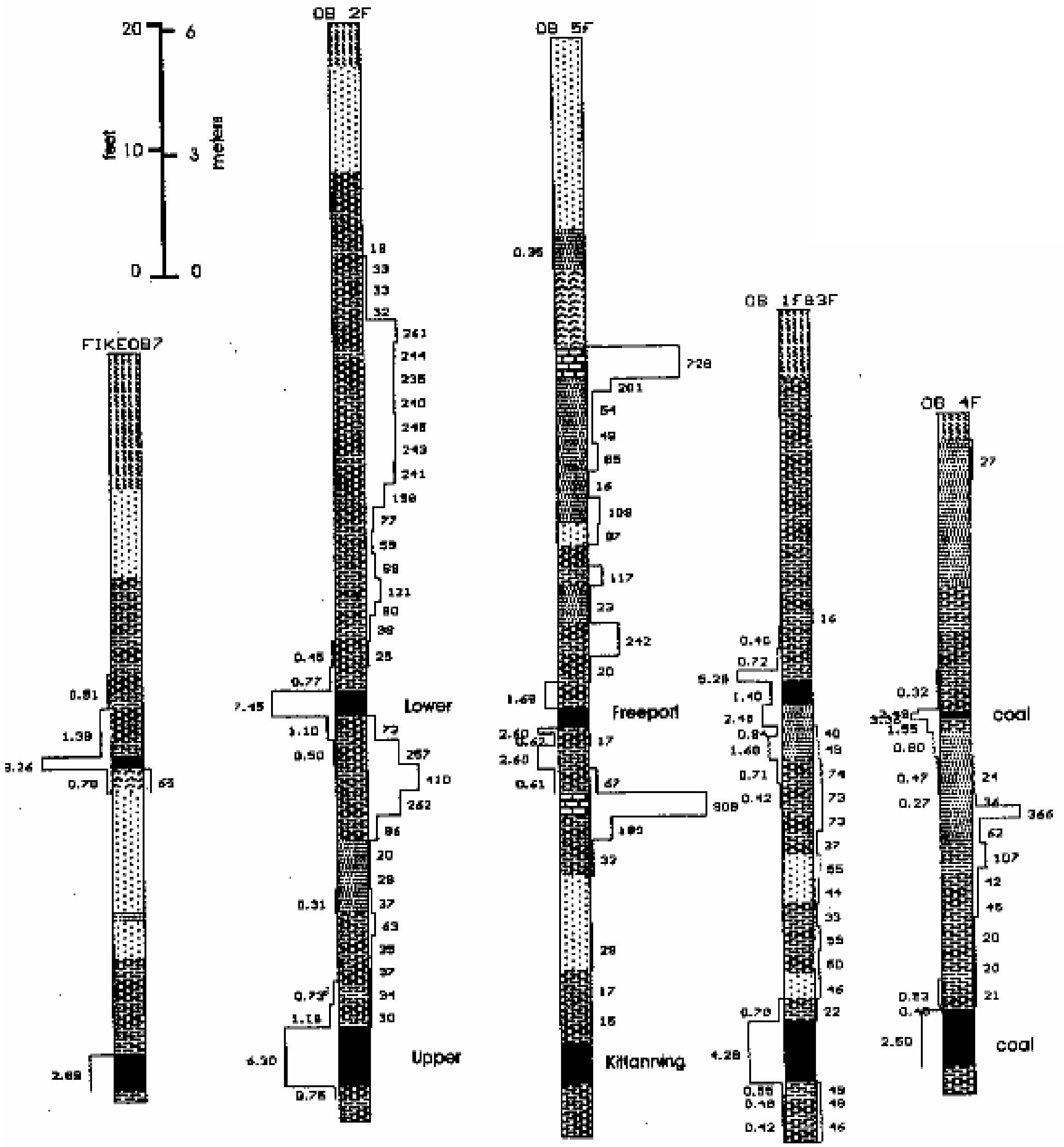


Figure 2.6(b). Upper Kittanning and Lower Freeport Coals and nonmarine overburden strata from Fayette County, PA.

2.3.3 Conemaugh Group – Bituminous

The Conemaugh Group contains two formations, the older Glenshaw Formation and the overlying Casselman Formation.

2.3.3.1 Glenshaw formation

The Glenshaw contains several widespread marine zones, the most prominent of which include the Brush Creek, Pine Creek, Woods Run, and Ames. There are also several less prominent and obscure marine zones , bringing the total of possible marine zones within the Glenshaw to as many as seven (Edmunds et al., 1999). The Glenshaw is thickest in Somerset and southern Cambria Counties, where it reaches 400 to 420 ft (122 to 128 m). It is thinnest near the Ohio border where it is about 280 ft (85 m) thick (Edmunds et al., 1999). The mineable coals of the Glenshaw Formation, from oldest to youngest, typically are the Mahoning, Brush Creek, Lower and Upper Bakerstown.

2.3.3.2 Casselman formation

According to Edmunds et al., (1999) "The thickness of the Casselman Formation ranges from 230 feet (70 m) in the extreme western part of the Appalachian Plateaus province to 485 feet (148 m) in southern Somerset County" (p. 156). With the exception of the marine shales above the Ames limestone, and the Skelly horizon, which occurs about 30 to 60 ft (9 to 18 m) above the Ames marine zone, the Casselman is made up of exclusively fresh water rocks. Redbeds, which are regionally discontinuous, are scattered throughout the Casselman in the western portion of Pennsylvania. "Eastward they become thinner and fewer in number. This trend continues into eastern Somerset and Cambria Counties, where large areas are completely devoid of red beds in the Casselman Formation . Conversely, coals are nearly absent or very thin in the west but increase in quantity eastward. In Somerset County, a few coals are thick enough to mine" (Edmunds, et al., 1999, p. 156). The coals of the Casselman Formation, typically include from oldest to youngest, the Duquesne (or Federal Hill), the Barton (or Elk Lick), Wellersburg, Little Clarksburg (or Franklin), and the Little Pittsburgh. Except for the Federal Hill, the Barton, the Wellersburg, and the Little Pittsburgh Coals in portions of Somerset County (Shaulis, personal communication, 2004), these coals are generally not mineable.

2.3.4 Monongahela Group – Bituminous

The Monongahela Group extends from the base of the Pittsburgh Coal to the base of the Waynesburg Coal. It is divided into the Pittsburgh and Uniontown Formations at the base of the Uniontown Coal. According to Edmunds et al. (1999): "The group is about 270 to 400 feet (82 to 122 m) thick in Pennsylvania, increasing in thickness irregularly from the western edge of the state to western Fayette County.... It is entirely nonmarine and dominated by limestones and dolomitic limestones, calcareous mudstones, shales, and thin-bedded siltstones and laminites.... The only sandstone of significant thickness within the formation lies directly above the Pittsburgh coal complex. A major fluvial channel system flowing north to northwest through what is now Greene and Washington Counties, deposited an elongate sandstone body up to 80 feet (24 m) thick and several miles (kms) wide" (Edmunds et al., 1999, pp. 156-157).

The Pittsburgh Coal is unusually continuous, covering thousands of square miles (km^2) and is unusually thick (4 to 10 ft.; 1.5 to 3 m, Edmunds et al., 1999) for a coal of western Pennsylvania. The other major coals are the Redstone and Sewickley. In Somerset County an additional coal, the Blue Lick, occurs between the Pittsburgh and Redstone Coals. Shaulis (1993) believes the Blue Lick Coal is a split of the Pittsburgh Coal.

2.3.5 Dunkard Group – Bituminous

The Dunkard Group is found only in the most southwestern corner of Pennsylvania in Greene and Washington Counties. It is made up of Waynesburg, Washington and Greene Formations (Berryhill et al., 1971). The Dunkard reaches a maximum thickness of about 1120 ft (340 m) in Greene County and the upper surface is the modern day erosional surface. The lower boundary of the Dunkard Group is defined as the base of the Waynesburg coal, which is the only coal routinely mined in the Dunkard.

The Dunkard is generally composed of fine-grained clastics which are frequently calcareous. Thick lacustrine limestones are especially prevalent in the Washington Formation. The only significant interval with sandstone is above the Waynesburg coal. This sandstone is often, but not always, calcareous.

2.3.6 Pottsville Group – Anthracite

Pennsylvanian age rocks contain all the coal seams of the Anthracite Region of Pennsylvania, and have been divided into two major formations, the Pottsville and the Llewellyn. Generalized columnar sections of the Pottsville and Llewellyn Formations are shown on Figure 2.7.

The Pottsville Formation ranges in thickness from a maximum of approximately 1600 ft (490 m) in the Southern Field to less than 100 ft (30 m) in the Northern Field. The Pottsville Formation is subdivided into three members, from oldest to youngest, they are the Tumbling Run Member, the Schuylkill Member and the Sharp Mountain Member. The Tumbling Run and Schuylkill Members of the Formation are not present in the Northern Anthracite Field (Wood et al., 1969, 1986; Meckel, 1967, 1970; and Edmunds et al. 1979, 1999).

The Pottsville Formation contains up to 14 coal beds in some areas, but most are relatively discontinuous and only a few persist outside of the Southern Field (Edmunds et al. 1999). Figure 2.7 shows the mineable coals of the Pottsville Formation. The Lykens Valley Coal Numbers 4 through 7 are within the Tumbling Run Member; the Lykens Valley Coal Numbers 1 through 3 are within the Schuylkill Member; and the Scotty Steel and Little Buck Mountain Coals are within the Sharp Mountain Member of the Pottsville Formation (Fig. 2.7). The base of the Buck Mountain Coal is considered the top of the Pottsville Formation in the anthracite fields of eastern Pennsylvania. The Buck Mountain Coal is tentatively correlated with the lower Kittanning Coal within the lower Allegheny Group in western Pennsylvania, and since the upper boundary of the Pottsville Formation in western Pennsylvania is defined as the base of the Brookville Coal, positioned below the Lower Kittanning Coal, the Pottsville of eastern Pennsylvania and the Pottsville of the western Pennsylvania main bituminous field are not precisely equivalent (see Edmunds et al., 1999). The type section of the Pottsville Formation (located near Pottsville) is described by C.D. White (1900) and more recently by Wood et al. (1956) and Levine and Slingerland (1987).

The Pottsville Formation in eastern Pennsylvania is entirely of a nonmarine depositional environment (Edmunds et al., 1999). As in western Pennsylvania, the dominant lithology of the Pottsville Group is sandstone and conglomerate; but the Pottsville Formation of the Anthracite

Region contains significantly more pebble conglomerates derived from an orogenic source area relatively close to the southeast (Meckel, 1967, 1970; Edmunds et al. 1999; and Faill, 1997a,b). The Tumbling Run Member is composed of approximately 55% conglomerate and conglomeratic sandstone, about 30% fine- to coarse-grained sandstone, and about 15% shale and siltstone. Conglomerate and conglomeratic sandstone comprise about 50% of the Schuylkill Member, and the sandstone in the member ranges from very fine to very coarse, constituting approximately 30% of the member. The Sharp Mountain Member in most of the Southern Anthracite Field is composed of about 45% conglomerate, 25% conglomeratic sandstone, 15% sandstone, 5% siltstone, 9.5% shale, and 0.5% anthracite (Wood et al. 1969, 1986). The carbonate content of the rocks has not been determined, except for a few localities.

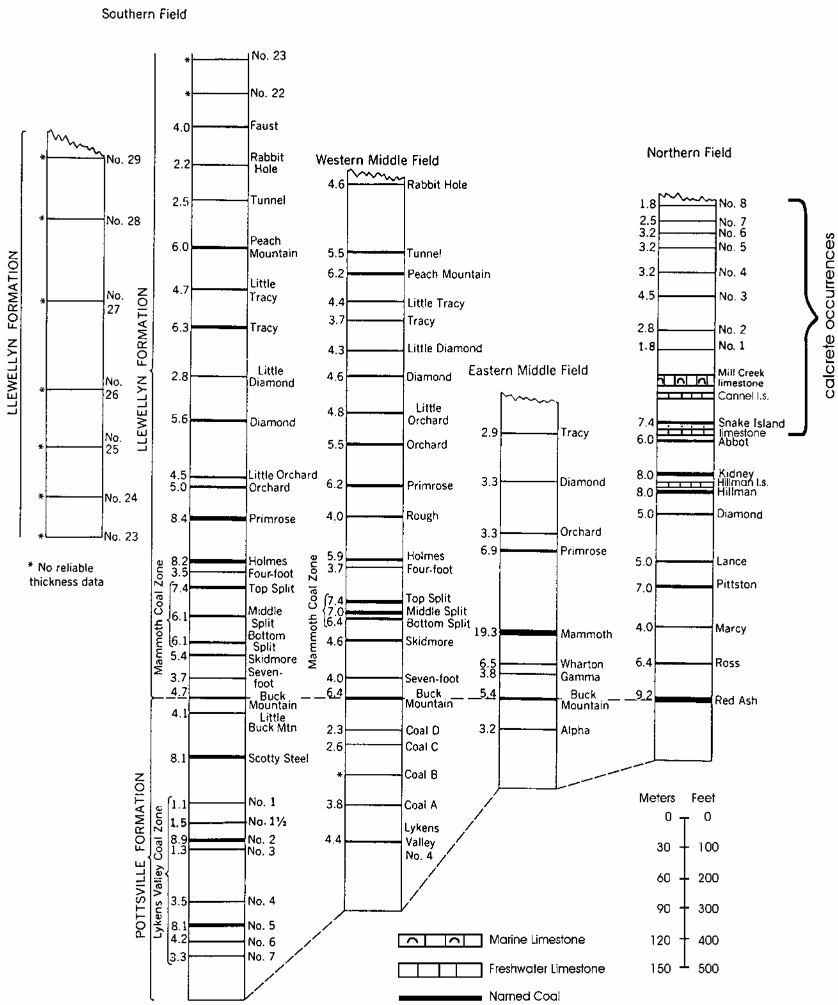


Figure 2.7. Generalized columnar sections showing names, average thickness of coals (in ft), and intervals between coal beds in the Pennsylvania Anthracite fields. Figure is primarily from Wood et al. (1986). Information on calcareous zones in the Northern Field has been supplemented by data from Edmunds et al. (1999) and Inners and Fabiny (1997).

2.3.7 Llewellyn Formation- Anthracite

The Llewellyn Formation is as much as 3500 feet thick. The maximum known thickness of the Pennsylvanian in Pennsylvania is approximately 4400 ft near the town of Llewellyn in Schuylkill County (Edmunds et al., 1999). The Llewellyn Formation contains up to 40 mineable coals (Edmunds et al., 1999), most of which are shown on Figure 2.7. The thickest and most persistent coals occur in the lower part of the Llewellyn Formation, particularly the Mammoth Coal zone. The Mammoth Coal zone typically contains 20 ft of coal, and thicknesses of 40 ft to 60 ft. are not unusual. A local thickness of greater than 125 ft has been reported in the Western Middle Field. This was attributed to structural thickening in the trough of the syncline. The nomenclature and stratigraphy of the coal bearing rocks of the Llewellyn Formation in the Northern Anthracite Field are different than in the Southern and Middle Fields (Fig. 2.7).

The dominant lithology of the Llewellyn Formation is sandstone, including conglomerate units, as in the Pottsville Formation. According to Edmunds et al. (1999, p. 159): "Lithologically, the Llewellyn is a complex, heterogeneous sequence of subgraywacke clastics, ranging from conglomerate to clay shale and containing numerous coal beds. Conglomerates and sandstones dominate". The Llewellyn Formation in the Southern and Middle Fields is believed to be entirely terrestrial in depositional environment (i.e., lacking any marine beds). The Llewellyn Formation in the Northern Field, however, contains one known marine bed, the Mill Creek Limestone (Fig. 2.7). I.C. White (1903) suggested that the Mill Creek was correlative with the Ames Limestone in the Conemaugh Group of western Pennsylvania. This belief is generally held to the present. The Mill Creek Limestone is a one- to three-ft, richly fossiliferous marine limestone (Chow, 1951). The Llewellyn Formation contains several nonmarine limestones in the Northern Field in a 330 ft thick zone directly below the Mill Creek Limestone, including the Cannal and Hillman Limestones (Chow, 1951, and Edmunds et al., 1999). Additionally, Inners and Fabiny (1997) have identified calcareous paleosols ("calcrete") in the uppermost Llewellyn Formation in the Northern Field. They have tentatively correlated this portion of the stratigraphy with the Conemaugh of western Pennsylvania. These two zones combined potentially provide an appreciable amount of calcareous material in the top approximately 850 feet of the Llewellyn Formation of the Northern Anthracite Field.

Deep drill holes of the stratigraphic sequence of the Pottsville and Llewellyn Formations in the AnthraciteRegion are rarely included in the permit files for anthracite coal mine permits. However, DEP cooperated with the Pennsylvania Geologic Survey, Reading Anthracite Company and Mr. Louis DeNaples (a landowner in the Northern Anthracite Coal Field) to obtain two significant cores and several deep air-rotary drillholes in the Southern Field (at Reading's Wadesville mine) and in the Northern Field (on Mr. DeNaples' land). A graphic drill log for 500 feet of the Llewellyn Formation above the Mammoth Coal is shown in Figure 2.8, for one of the air-rotary drill holes at Wadesville.

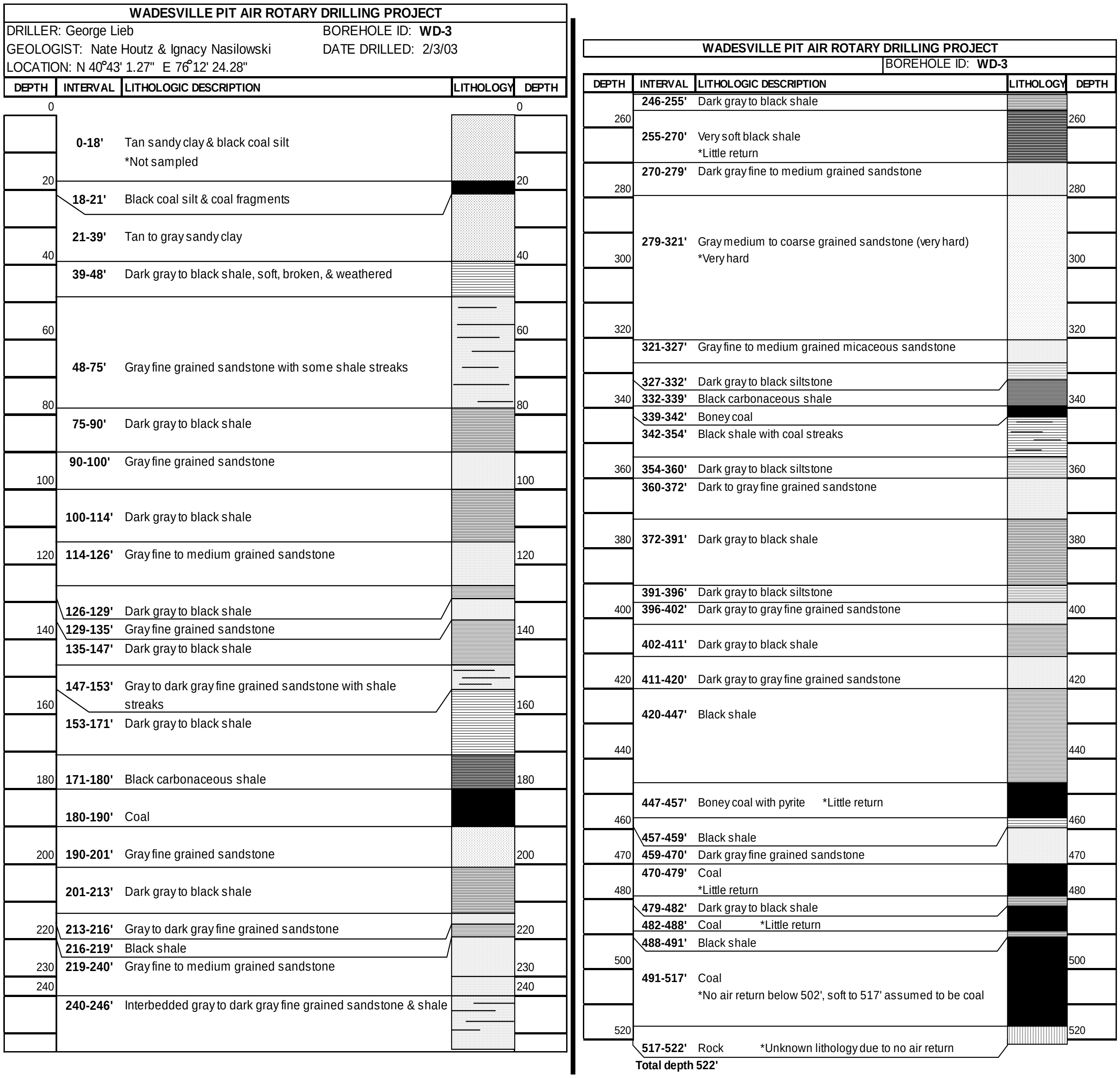


Figure 2.8. Stratigraphic interval from the Mammoth Coal zone up to the Primrose Coal bed at the Wadesville site.

2.3.8 Stratigraphic Observations and Inferences in the Anthracite Coal Fields

Bedrock formations exposed near the Eastern Middle Field are the products of weathering to the southeast. A poorly understood tectonic event in the early Carboniferous produced uplift to the southeast that was the primary source of clastic material to the basin. It is speculated that the cause of this possible orogeny may have resulted from strike slip movement generated by the approaching African plate (Faill, 1997a,b). While these highlands were eroding, the Mauch Chunk Formation and the overlying Pottsville Formation were deposited. The Mauch Chunk consists of predominantly fining upward alluvial cycles of interbedded sandstones, siltstones, mudstones, and conglomerates (Inners, 1988), and can be recognized in the field by its characteristic red color. The contact between the Mauch Chunk Formation and the Pottsville represents a transition from the warm, seasonally dry climate present at the time of Mauch Chunk red bed deposition to the much wetter climate in which the Pottsville coal forming peat swamps flourished (Edmunds et al., 1999). Sedimentary structures, thickness patterns, and a southeastward increase in grain size indicate that the Pottsville Formation was also derived from a southeastern source (Wood et al., 1986).

Figure 2.9 shows a schematic of the Spring Mountain cut along I-81, approximately 4 miles south of Hazleton. The outcrop exposes the contact between the Mauch Chunk and the Pottsville Formation as part of a large syncline (Bolles and Geyer, 1976). Superimposed on the syncline in Figure 2.9 is a large fault, which occurred during the rock's burial during the Permian. The resistant Pottsville Formation forms many of the high ridges around each field, and the overlying less resistant Llewellyn Formation occupies the valley floors within each field (Eggleston et al., 1999).

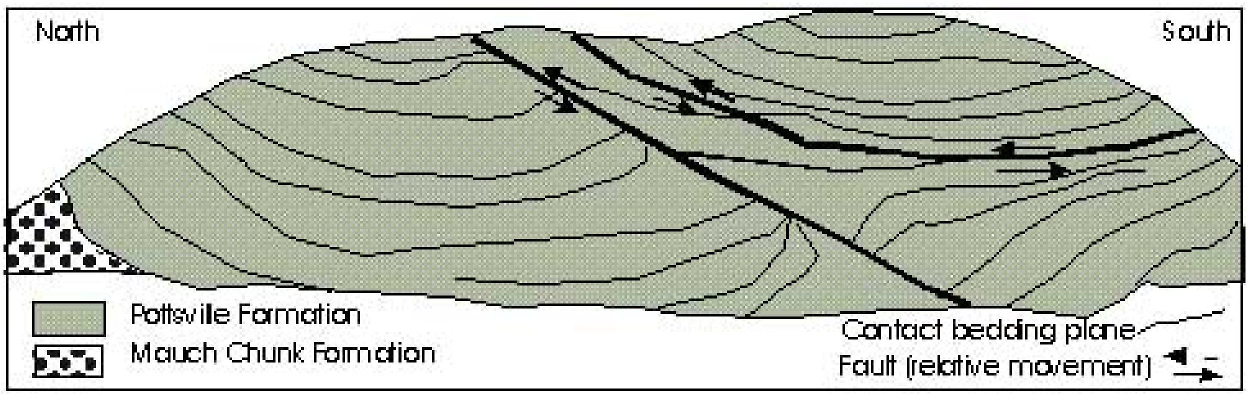


Figure 2.9. A schematic of the outcrop at mile marker 138 along Interstate 81, near McAdoo, PA, showing the contact between the Mauch Chunk and Pottsville Formations (modified from Bolles and Geyer, 1976).

The identification and mapping of limestone and other calcareous rocks in the Southern and Middle Fields have not been reported in the literature; however, some large mine pool discharges such as the Wadesville Colliery (Table 2.1), have alkalinity of several hundred milligrams per liter, which must be attributed to some carbonate minerals in the overburden. Discharges in the Eastern Middle Field have little if any alkalinity (Table 2.1). This strongly suggests a lack of calcareous rock in this coal field. Kochanov (1997) has found calcareous sandstones in the lower part of the Llewellyn in the Northern Field. Further study of carbonate minerals and identification of calcareous lithologic units in the Southern and Middle Fields is needed.

2.4 HYDROGEOLOGY

The hydrogeology of the Anthracite and Bituminous Coal Regions of Pennsylvania is the product of the topography, geologic structure and stratigraphy of these regions. Whereas the Bituminous Region has a more conventional integration of these geologic factors, the hydrogeology of the Anthracite Region is largely controlled by the hydrology of the mine pools related to large abandoned underground mine complexes, or collieries as they are called in the region.

2.4.1 Regional Hydrogeology of the Bituminous Coal Region

Regional and local patterns of groundwater flow on the Allegheny Plateau of western Pennsylvania are established in response to topographic, structural and stratigraphic controls, some of which were discussed separately in preceding sections on the regional geology, but which are briefly integrated below at various scales to comprise the hydrogeologic setting. In addition to the stratigraphic controls on the general configuration of the flow system, lithologic variations within the Pottsville and Allegheny Groups can be related to factors that influence the quantity and quality of ground and surface water supplies available on the Allegheny Plateau in western Pennsylvania.

Groundwater flow of the Appalachian Plateau of Pennsylvania is described in detail in Callaghan et al. (1998), including several mining case studies. A similar comprehensive chapter on the hydrogeology of the Appalachian Bituminous Coal Basin is in Callaghan et al. (2000). Hawkins (1998) provides additional valuable information on the hydrogeologic characteristics of mine spoil within the Appalachian Coal Basin.

In the regional geomorphic setting of the Allegheny Plateau, variations in relief and the configuration of the topographic surface are closely related to the drainage pattern. The regional topographic highs are the major groundwater recharge areas while the elevation and configuration of regional groundwater discharge areas are controlled by the depth of incision of the major streams and rivers such as the Allegheny and Monongahela Rivers. Within this regional flow system, local and intermediate scale flow systems exist, wherein local and intermediate scale topographic lows are usually groundwater discharge areas, while corresponding topographic highs are usually groundwater recharge sites, (Fig. 2.10).

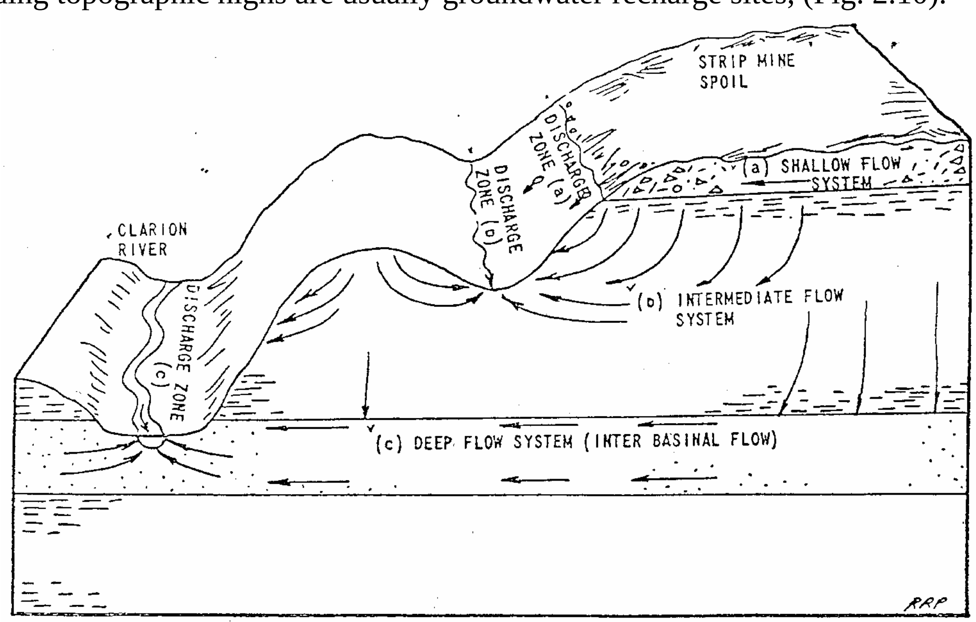


Figure 2.10. Block diagram showing shallow, intermediate, and regional (deep) groundwater flow systems in the Bituminous Coal Region of western PA, (from Parizek 1979).

Groundwater flow systems of various scales and configurations for various geologic settings have been discussed by Hubbert (1940), Toth (1962), Meyboom (1966), Brown and Parizek (1971), Freeze and Cherry (1979) and others. Parizek (1979) provides a review of the flow systems cited above and discusses a high-relief, coal-field, flow-system model as shown on Figure 2.10. That model of groundwater flow is most appropriate for most of the Allegheny Plateau and the bituminous case study sites described in Chapter 5.

As the bedrock structure is often closely related to the present topography, the structural configuration may be related to the groundwater flow system as with topography above. For example, the crests of anticlines or other structural highs may be groundwater recharge areas, with the discharge areas located in the synclinal lows coincident with the topographic lows. However, numerous interacting geologic and hydrologic factors produce flow-system behavior which deviates considerably from the ideal case where the groundwater is flowing through isotropic, homogeneous media. In a typical geologic setting for Pottsville and Allegheny Groups strata in western Pennsylvania where a cyclical sequence of varying rock types outcrops in a gently dipping or folded configuration, a three-dimensional representation of the groundwater flow system may reveal structurally-induced flow pattern controls. The uplands may still be the principal recharge areas with the lowlands as the principal discharge areas, but groundwater flow may follow preferred avenues, such as along bedding planes and selected lithologic units of contrasting permeability, to down-dip discharge sites.

Strong control on the patterns of groundwater flow also may be exerted by the orientations and the frequency of joints, zones of fracture concentration (revealed by fracture traces), and other linear structural features which introduce a secondary porosity and permeability to the bedrock. The dramatic influence of these linear features on groundwater flow has been shown by Lattman and Parizek (1964), Parizek (1971, 1976), Brown and Parizek (1971), Parizek, et al. (1971), Lovell and Gunnett (1974), Cline (1968) and others. The relationship of fracture-trace intersections and/or lineament intersections to high productivity of water supply wells has been documented by Siddiqui and Parizek (1971a, 1971b) and others.

The general stratigraphy of the Pottsville and Allegheny Groups in western Pennsylvania and the lithologic characteristics of specific stratigraphic intervals therein are interrelated with the topographic and structural controls on regional and local groundwater flow systems. The most resistant lithologic units generally form the topographic highs while the most easily weathered units form the topographic lows. The fundamental or primary properties of the sedimentary rocks, such as the mineralogical composition of the rock and the size, shape, orientation and packing of the mineral grains, (Griffiths, 1967), not only determine the relative resistance to weathering, but also greatly influence other derived or secondary lithologic properties such as the intergranular porosity and permeability. Hence, the variations in lithology of the Pottsville and Allegheny Groups (as discussed in the preceding section on stratigraphy), are highly related to variations in the potential to store and transmit groundwater. For example, the large sandstone units may be the best aquifers regionally, while the shales and underclays tend to be confining beds. The coal seams, which often occur in a highly-jointed condition between the underclays and thick sequences of overlying shale, may readily transmit groundwater accumulated by vertical leakage from the overlying beds. The prevalence of springs and seeps at the outcrop line of coal seams in some topographic settings reflects the role of these beds in the transmission and discharge of infiltrating groundwater as part of shallow and intermediate flow systems.

The relationship between the stratigraphy and permeability of rocks of the Pottsville and Allegheny Groups has been discussed by Caruccio and Parizek (1967), Brown and Parizek (1971) and Schubert (1978) who found horizontal permeability greatly exceeds vertical permeability and thus causes a predominantly lateral groundwater movement. A multiaquifer hydrogeologic setting on the Allegheny Plateau, in which the shallow flow system is significant, has been investigated by Poth (1963), and Brown and Parizek (1971) Emrich and Merritt (1969).

In a detailed study of the geology and hydrology of the Pottsville and Allegheny Groups in a portion of Mercer, Lawrence, and Butler counties, Pennsylvania, Poth (1963, p. 88) describes the relationship between patterns of groundwater flow and the major stratigraphic units as follows: "The mature dissection of the bedrock divided the Mercer quadrangle into a number of "hydrologic islands", each with its own pattern of groundwater circulation. Precipitation enters the upper part of the "islands" and is discharged through the outcrop areas of the aquifers along the perimeter of the "islands."

According to Poth, the "hydrologic islands" are a few square miles in area, and are composed of rocks younger than the lower member of the Connoquenessing Formation which is generally the highest hydrologically-continuous stratigraphic unit throughout the area. As shown on Figure 2.11 (from Poth, 1963, p. 58), infiltrating groundwater is discharged into glacial deposits in valleys around the margin of the "islands", or is carried downward into the deep circulation system of Connoquenessing Sandstone and lower aquifers through the aid of fracture zones.

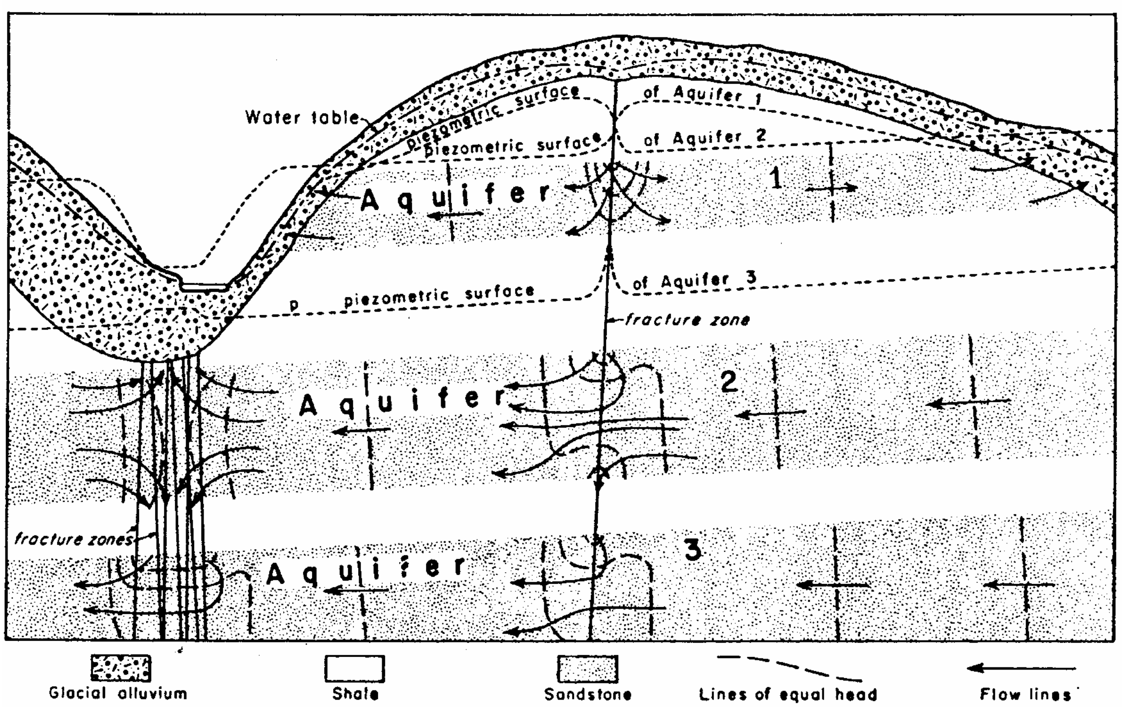


Figure 2.11. Idealized pattern of groundwater flow in the Mercer Quadrangle, PA**.**

Several studies have been completed within the Allegheny Plateau of western Pennsylvania, which relate the above hydrogeologic principles and associated topographic, structural and stratigraphic factors to the mining of coals from the Pottsville and Allegheny Groups as well as to coal mining in other areas. Parizek and Tarr (1972) provide a survey of existing and proposed techniques of mine drainage pollution prevention and abatement, employing naturally occurring hydrogeological and geochemical systems which are prevalent in western Pennsylvania and elsewhere.

The relationship between stratigraphy and mine drainage quality in the bituminous and anthracite mining regions of Pennsylvania are described in Brady et al. (1988). A bimodal frequency distribution of the pH of coal mine drainage was first reported by Brady et al. (1997). Figures 2.12a and 2.12b from Brady et al. (1998) shows the bimodal distribution of pH for bituminous and anthracite mine discharges. Table 2.1 shows the relationships between mine drainage quality and stratigraphic intervals for water samples representing the coal-bearing Pennsylvania and Permian stratigraphic sequence in western and eastern Pennsylvania. Table 2.1 in this chapter is an abridged version of mine drainage quality data compiled in Table 8.2 and 8.14 in Brady et al. (1998).

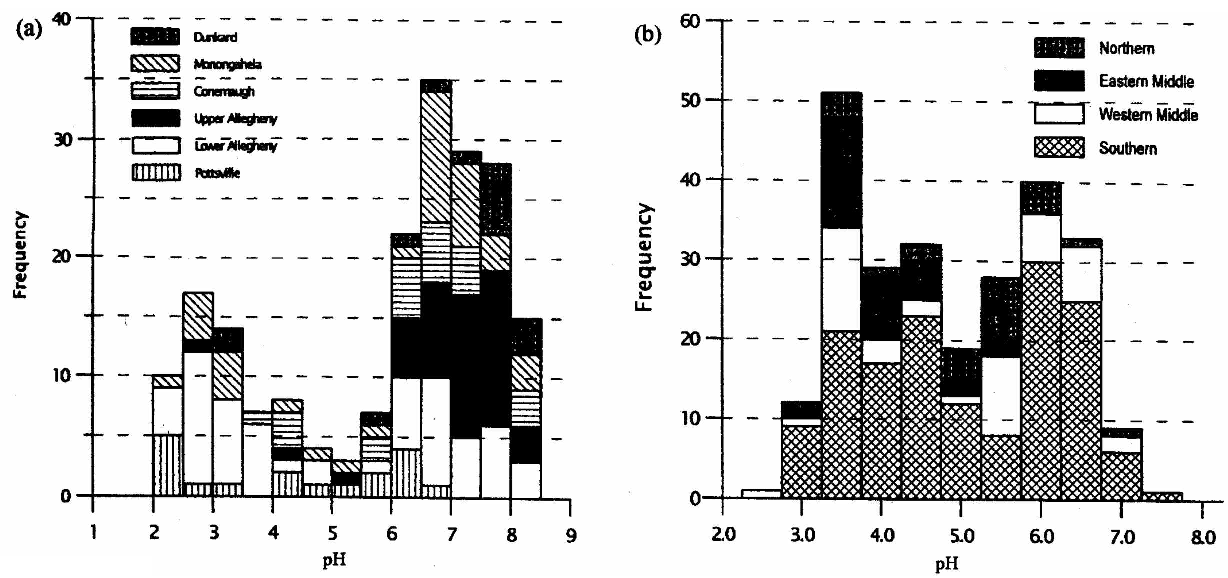


Figure 2.12. Bimodal distribution of pH for (a) bituminous mines and (b) anthracite mine discharges in PA. (Bituminous data are from Table 8.2 in Brady et al. (1998) and anthracite data are from Growitz et al., (1985). Bituminous data are displayed by stratigraphic group and anthracite data by coal field.)

2.4.2 Regional Hydrogeology of the Anthracite Coal Region

The hydrogeology of the Anthracite Coal Region of eastern Pennsylvania is similarly the product of the topography, geologic structure and stratigraphy of the region, as described for the bituminous region. However, in considering the integration of these geologic factors, the hydrogeology of the Anthracite Region is much simpler in some respects, while being more complex than the bituminous regions hydrogeology in other respects. Part of the simplicity is that a large portion of the groundwater in the four anthracite coal fields is accounted for by about 100 large mine pool discharges, in comparison to the many thousands of mine drainage discharges and AMD seeps in the bituminous coal fields of Pennsylvania. Also, much is known about the areal extent, depth and other aspects of the geometry and hydrology of the anthracite mine pools along with their interconnections from the detailed mine maps that are available for most of the abandoned deep underground mines.

The complexity of the Anthracite Region hydrogeology is largely a result of the complexity of the geologic structure and how that complex structure is translated into an elaborate system of mine development patterns, including numerous overlapping gangways, chutes or breasts, and slopes, that are interconnected by nearly horizontal rock tunnels and vertical shafts. The configuration of anticlinal and synclinal folds and the presence of significant faults can often be interpreted from the mine development patterns on the colliery maps. The gangways are frequently significant components of groundwater flow patterns, analogous to the conduit and sinkhole systems in karst hydrology, because the gangways are long voids developed parallel to the strike of the beds, that are often connected vertically to the land surface by cropfalls (mine subsidence features), which resemble sinkholes and promote infiltration of surface water into the groundwater flow system.

Adding to the complexity of the Anthracite Region hydrogeology in some areas is the presence of local-scale shallow groundwater flow systems, that may be somewhat independent of, or interconnected with, the more regional-scale underlying mine pool flow systems (similar to Figure 2.10). Examples of these shallow groundwater flow systems are found along ridges in the Southern Anthracite Field near Tamaqua, where abandoned, relatively small pits on the flanks of the ridges, and the sandstone ridge tops themselves, serve as groundwater recharge areas, and the discharge areas are through the collovium or underlying bedrock into the underlying mine pool system in the valley bottom.

The configuration of the mine pools and associated barrier pillars for most of the Anthracite Region were documented in a series of reports by S.H. Ash and associates at the U.S. Bureau of Mines (Ash and Eaton., 1947; Ash et al., 1949; Ash et al., 1950a,b; and Ash, 1954). These reports contain delineations of the shorelines of the mine pools, locations of documented breeches in the barrier pillars, and estimations of the volume of water impounded in specific mine pools. Two USGS reports contain data for most of the large anthracite mine pool discharges from 1975 (Growitz et al., 1985) and (Wood, 1996) that allow comparison of water quality changes through time.

The work of J.R. Hollowell of the Susquehanna River Basin Commission (SRBC) and associates provided significant hydrogeological information on the Northern and Eastern Middle Coal Fields. Hollowell (1971) described the mine-water hydrology for the Wyoming Basin of the Northern Field, and Hollowell and Koester (1975) contains a similar description of the mine-water hydrology of the Lackawanna Basin of the Northern Field. Figure 2.13 from Hollowell (1971) is a map of the collieries of the Wyoming Basin, and Figure 2.14 from the same publication is a companion schematic plumbing diagram of mine water flow through these abandoned underground mines of the Wyoming Basin. Hollowell and Koester (1975) contains a large water-table contour map (Plate 2 of that publication) showing the collieries of the Lackawanna Basin and the associated mine pool shoreline, plus the mine pool elevations in key shafts and the associated potentiometric surface contours.

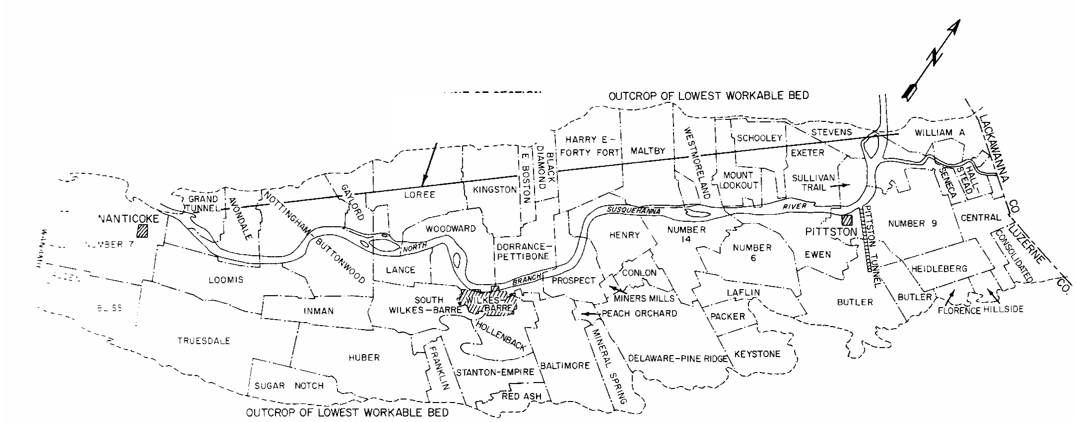


Figure 2.13. Map of collieries in Wyoming Basin of the Northern Field (from Hollowell,1971).

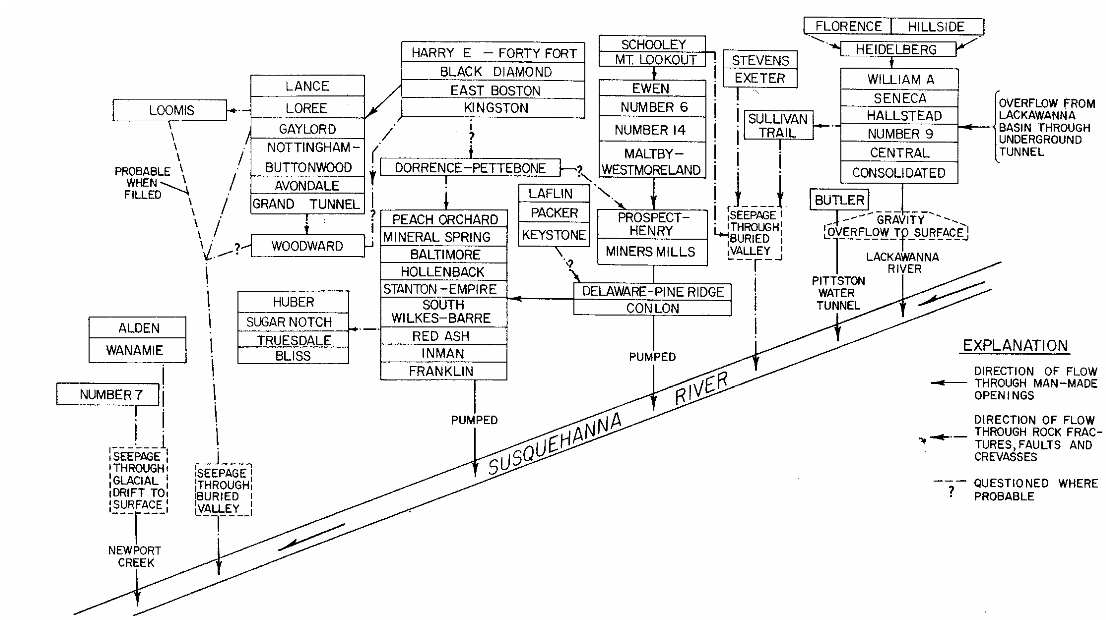


Figure 2.14. Schematic diagram of water flow through the mines (eg. Barrier pillar breaches) in the Wyoming Basin, (from Hollowell 1971).

Hollowell (1999) describes the mine drainage outfalls of the Eastern Middle Field, and delineates the individual coal basins, the locations of the outfalls and the extent of the Jeddo drainage tunnel system, as shown on Figure 2.15. According to Hollowell (1999, p. 1), there are 13 functional mine drainage tunnels in the Eastern Middle Field that were specifically driven to dewater the mine workings. This drainage system was most successful in the Eastern Middle Field because of the comparable elevation of the drainage tunnel discharge to the receiving streams. The Jeddo Tunnel is by far the most extensive of these. The other discharges each yield a comparatively minor amount of water.

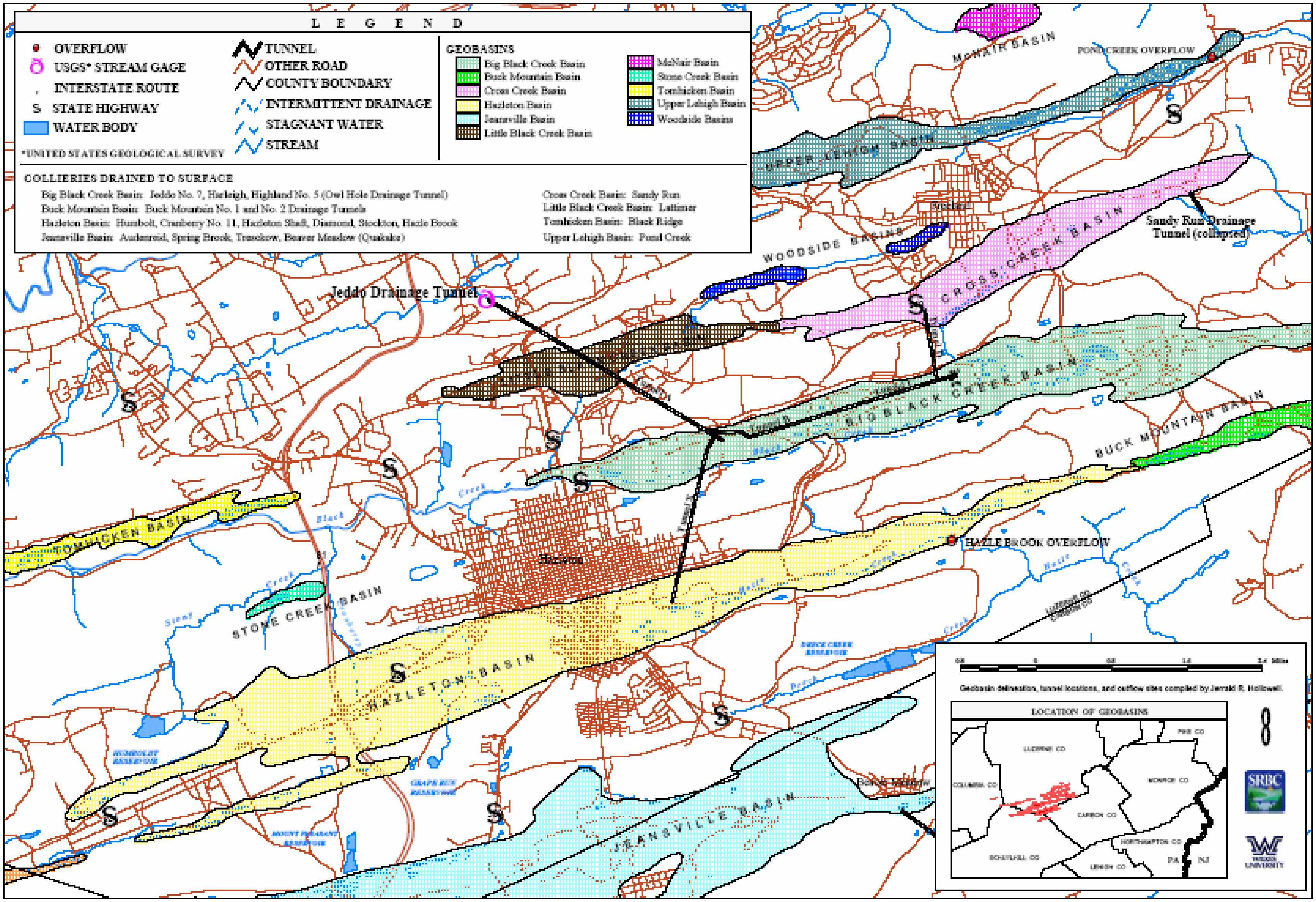


Figure 2.15. Jeddo Tunnel drainage system (from Hollowell 1999).

The report by Hollowell (1999) includes plots of the flow and pollution load (i.e. acidity, sulfate, iron, manganese, aluminum, magnesium, zinc) of the 16 major mine drainages of the Eastern Middle Field for 3 water years. In a companion report by the SRBC, Ballaron (1999) describes a hydrologic budget for the Jeddo Tunnel Basin that was done in cooperation with USGS, DEP and the Little Nescopeck Watershed Association.

Few detailed hydrogeologic studies have been completed for the Southern Field and the Western Middle Field, except for some unpublished hydrogeologic reports in DEP files, and some thesis publications including the groundwater modeling study by Bair (1980) of an area near Tamaqua in the Southern Field. However, a number of significant geochemical and hydrologic studies have been completed by C.A. Cravotta and associates at USGS for the Swatara Creek Watershed and other selected watersheds in the Southern Field and Western Middle Fields including Cravotta (2000), Cravotta and Watzlaf (2002), Cravotta (2003) and Cravotta et al. (2004).

2.4.3 Jeddo Tunnel Discharge

Much has been written about the Jeddo Tunnel, in terms of an extraordinary engineering feat, the eventual success of dewatering the coal basins (Ash et al., 1950b) and more recently, its environmental impact. The Jeddo Tunnel mine discharge near Hazleton, Pennsylvania is the largest abandoned underground mine discharge in the Eastern Middle Field of the Anthracite Region, and is among the largest mine drainage discharges in Pennsylvania. The Jeddo Tunnel has a total drainage areas of 32.24 square miles, and its underground drainage system collects and discharges more than half of the precipitation received in the drainage area (Ballaron et al., 1999).

The flow of this discharge was monitored with a continuous recorder from December 1973 through September 1979 by the USGS in cooperation with Pennsylvania Department of Environmental Resources. The results of that monitoring for the water year from October 1, 1974 through September 30, 1975 are shown in Figure 2.16 (Growitz et al., 1985). During that year, the discharge ranged from 36 to 230 cfs (16,157 to 103,224 gpm).

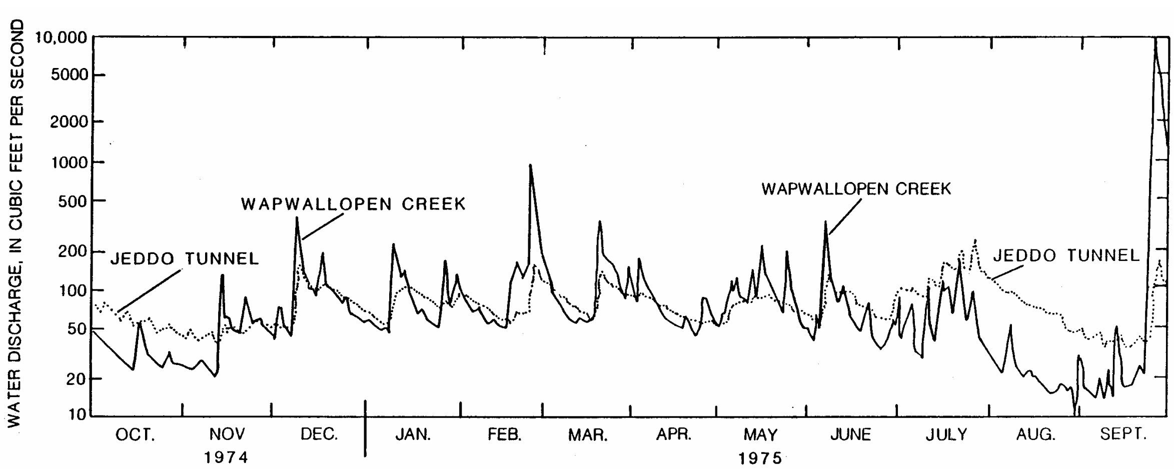


Figure 2.16. Water discharge from the Jeddo Tunnel in Hazleton, and Wapwallopen Creek near Wapwallopen, PA, October 1, 1974 to September 30, 1975 (from Growitz et al. 1985).

The Wapwallopen Creek, ten miles north of the Jeddo Tunnel drains an area of 43.8 square miles and has a measured mean discharge of 78 cfs (35,008 gpm) (Growitz et al., 1985). The Jeddo Tunnel discharge flows are compared to the stream-flow of Wapwallopen Creek (approximately 10 miles north of the Jeddo Tunnel) on Figure 2.16. Growitz et al. found that the response of the Jeddo Tunnel discharge to precipitation events is considerably less than that of the Wapwallopen Creek, and that during large storm events, the Jeddo Tunnel data peaked later than the stream discharge.

The continuous flow recording station at the mouth of the Jeddo Tunnel was reconstructed and operated by USGS from October 1995 through September 1998 in cooperation with PA DEP, the Susquehanna River Basin Commission, US EPA and other project cooperators. Figure 2.17a (from Ballaron et al., 1999) shows variations in the flow of this discharge during this period. The average annual discharge flow was 79.4 cfs (35,635 gpm) and the range of recorded flow measurements was between 20 cfs (8,976 gpm) in October 1995 and 482 cfs (216,322 gpm) in November 1996, following 3.89 inches of rainfall (Ballaron, 1999). In comparison, Figure 2.17b shows a graph of precipitation data from Hazelton Pennsylvania for the period from October 1995 through September 1998. This graph was plotted from data contained in Ballaron (1999). Additional information on the Jeddo Tunnel discharge is contained in Fox et al. (2001).

2.4.4 Anthracite Region Water Quality

Regional variations in mine drainage quality of the Anthracite Region are shown in Table 2.1. The relationships between the post-mining water quality and specific stratigraphic intervals of the Anthracite Region are much less well known than those of the Bituminous Region for at least two reasons: 1) the complexity of the geologic structure has impeded the acquisition of stratigraphic data from routine exploration drilling and made correlations of units and associated mine drainage difficult; and 2) a large portion of the mining hydrology of the four anthracite fields is controlled by large-volume, mine pool discharges. The mine drainage from gangways developed in multiple coal beds is commingled in rock tunnels (that crosscut the geologic structure and strata), which interconnect the mine workings. Thus discharges are often a composite representing water from multiple coal seams throughout a large mine complex. Despite this, some significant regional variations in mine drainage quality are evident for the anthracite fields (Figure 2.18). These are probably related to mineralogic differences between the fields.

Some Northern Anthracite Field mine waters have significant alkalinity (e.g., Plains Borehole, Table 2.1). This may be attributable to the presence of marine and freshwater limestones and other calcareous rocks in the Northern Field. A few post-mining discharges of the Northern Field have low pH and high acidity (Loomis Bank discharge), although high acidity discharges are relatively rare in the anthracite fields. Many large volume discharges of the Northern Field have circumneutral pH with nearly equal concentrations of acidity and alkalinity. However, some of these discharges have relatively high concentrations of iron, manganese or aluminum, and because of large flows they have high pollution loads.

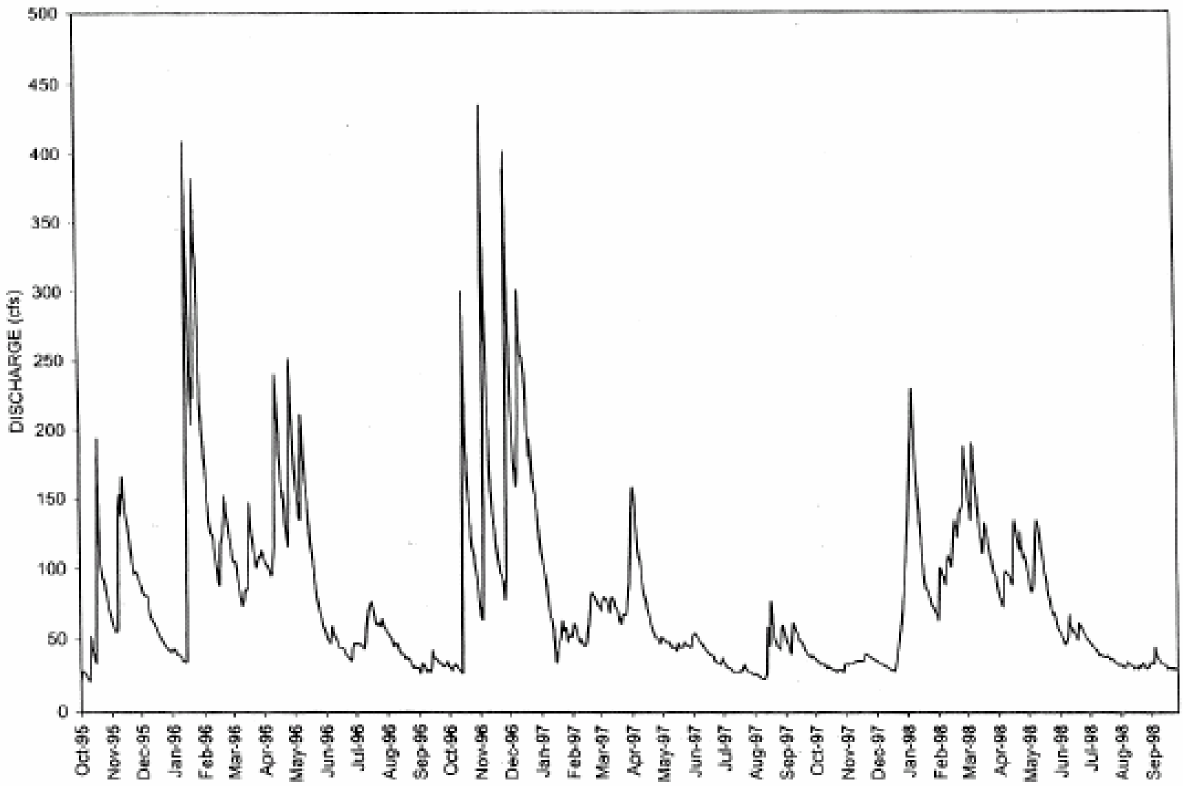


Figure 2.17(a). Discharge from the Jeddo Tunnel - water years 1996-1998 (from Ballaron 1999).

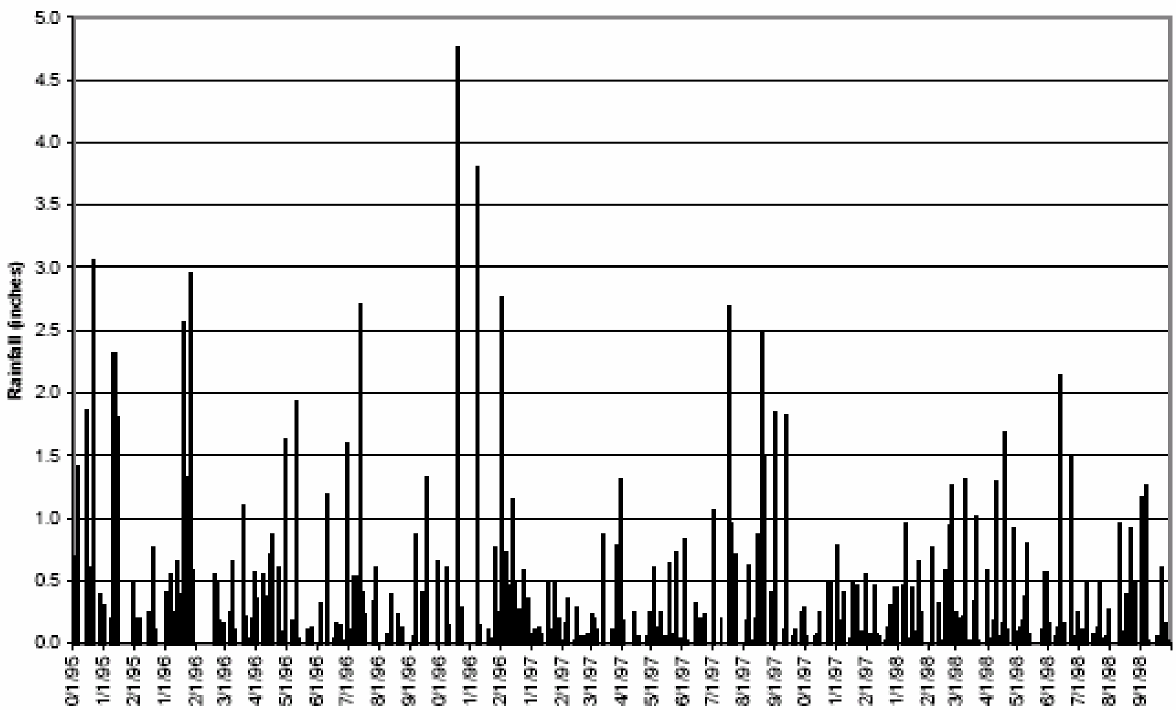


Figure 2.17(b). Precipitation data from Hazleton, PA 1996-1998 (from Fox et al., 2001).

Table 2.1. Mine drainage quality of the Bituminous and Anthracite Coal Regions of PA

(Bituminous mine sites are identified by major coal seams mined: WY= Waynesburg, RS = Redstone, PT = Pittsburgh, UB= Upper Bakerstown, BC = Brush Creek, UF = Upper Freeport, LF = Lower Freeport, UK = Upper Kittanning, LK = Lower Kittanning, CL = Clarion, MR = Mercer. Anthracite mines are identified by coal field: N = Northern Field, EM = Eastern Middle Field, WM = Western Middle Field, S = Southern Field.

Site Name	County	Coal ID	Sample Date	pH	Alkalinity mg/L	Acidity mg/L	Iron mg/L	Mn mg/L	Al mg/L	SO_4 mg/L	TSS mg/L	Flow (gpm)
Susan Ann	Greene	WY	10/24/91	7.9	286	0	2.61	17.60	<0.50	1392	15	<1
Smith	Westmoreland	RS	7/16/92	7.7	246	0	1.47	0.27	1.22	122	57	0
Brown	Fayette	RS	8/17/93	7.4	626	0	1.65	1.05	<0.50	1440	12	
Trees Mills	Westmoreland	PT	10/6/88	2.4	0	2,086	371.00	20.04	159.90	2409	26	8
State Line	Somerset	UB	4/29/96	8.1	210	0	<0.30	1.37	<0.5	416	<3	
Hager	Fayette	BC	7/12/95	6.9	189		0.21	0.40	0.07	68	1	4
Laurel Hill #1	Cambria	UF	1/6/97	8.1	484	0	0.97	1.98	1.04	590	34	0
Chanin	Fayette	LF	1/4/89	4.3	7	186	0.30	28.40	24.60	1152	8	
Morrison	Fayette	UK	6/22/89	7.0	308	0	0.63	3.49	<0.50	327	5	<1
Swisscambria	Cambria	LK	10/25/90	4.2	5	88	0.09	24.20	10.00	1070	36	
Albert #1	Clearfield	LK	1/30/89	3.1	0	1,335	186.00	111.00		3288	0	55
Snyder #1	Armstrong	LK	7/24/90	6.9	114	0	1.10	3.14		264	127	0
Lawrence	Fayette	LK	1/18/82	2.2	0	5,938	2,060	73.00	146.00	3600		0
Phillipsburg	Centre	CL	2/5/96	3.0	0	1,063	153.70	20.92		1796		900
Old 40	Clarion	CL	11/12/85	2.2	0	10,000	3,200	260.00	550.00	1400		well
Horseshoe	Cambria	MR	4/3/84	2.3	0	1,835	194.00	27.00	88.00	2510	0.2	700
Duryea Ditch	Lackawanna	N	11/1/85	5.9	90	2	35.20			464		11,670
Alden Strip #2	Luzerne	N	7/28/92	7.1	168	7	0.90	0.30	<0.50	628	22	
Jeddo Tunnel	Luzerne	EM	10/24/96	4.3	6	104	7.20	4.50	11.10	346	22	50,150
Oneida #3	Schuylkill	EM	12/30/96	4.7	9	26	0.10	0.30	1.10	22	<2	7,415
Packer V	Schuylkill	WM	7/29/97	6.4	160	0	20.90	7.80	0.10	597	30	1,200
Richards	Northumberland	WM	8/19/97	3.7	0	70	7.50	2.50	4.80	82	2	1,672
Scott Overflow	Columbia	WM	8/19/97	5.9	54	68	28.30	4.10	0.30	254	2	4,386
Goodspring #1	Schuylkill	S	9/27/95	6.2	66	0	15.20	2.50	<0.50	112	6	127
Goodspring #3	Schuylkill	S	9/27/95	6.0	54	32	22.20	3.40	<0.50	323	26	516
Markson	Schuylkill	S	9/27/95	3.4	0	82	18.30	5.60	1.60	491	4	844
Wadesville	Schuylkill	S	5/19/86	7.1	330	0	1.90	2.60	<0.50	1164	14	

There are 16 major discharges in the Eastern Middle Field. Mine drainage from two of these are shown in Table 2.1. There is no significant alkalinity in any of the discharges. As far as is known, there are no limestones or other calcareous strata in this region. No severe AMD (pH < 3.0, acidity > 1000 mg/L) is known in the Eastern Middle Field. The Eastern Middle Field appears to lack both calcareous rocks and high-sulfur rocks. The Jeddo Tunnel discharge, in the Eastern Middle Field, (Table 2.1), generally has an acidity concentration > 100 mg/L and a flow > 40,000 gpm. Though the acidity concentration is not "high", the acid load is large because of the high flow.

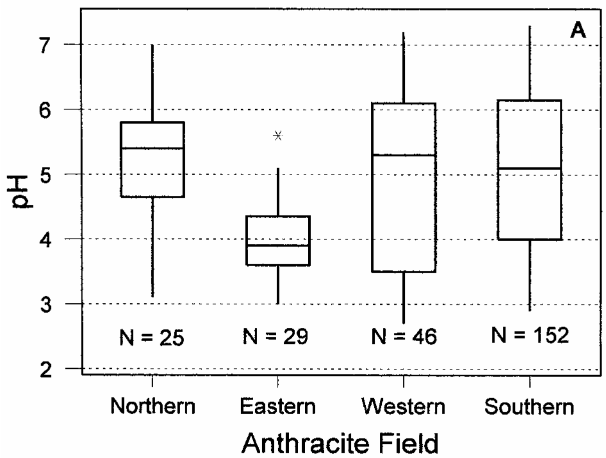
The water quality of the post-mining discharges of the Western Middle and Southern Anthracite Fields is somewhat more mysterious than that of the Northern and Eastern Middle Fields. Some discharges have significant alkalinity, but no carbonate stratigraphic units have been reported in these fields. The Packer V discharge in the Western Middle Field has alkalinity of 160 mg/L and iron of 20.9 mg/L (Table 2.1). The Richards discharge near Mt. Carmel has a pH of 3.7 and an acidity of 70 mg/L. Because some of these discharges drain large interconnected underground mines spanning square miles, various anthropogenic sources may also contribute to water quality. However the North Franklin and the Doutyville Tunnel discharges are located in a mostly rural area, and questions remain.

Several mine discharges of the Southern Anthracite Field have significant alkalinity concentrations, including the Wadesville, Eagle Hill, and Kaska discharges. For example, the water pumped from the Wadesville shaft has an alkalinity of 330 mg/L, in Table 2.1. This is one of the most alkaline mine waters found in Pennsylvania. It is almost certain that a detailed study of stratigraphy in this area would reveal calcareous strata or calcareous secondary mineralization. Several Southern Field discharges have significant acidity concentrations (Bell, Newkirk, Porter Tunnel and Markson discharge). Promisingly, a study by C.R. Wood (1996) shows that many abandoned underground mine discharges in the anthracite fields have improved in water quality between 1975 and 1991.

A final factor that may affect the relationships between post-mining water quality and stratigraphy in the Anthracite Region is the stratification of mine pool water. The mine pools consist of water accumulated in void spaces within abandoned underground mines, and deep pools or lakes in abandoned surface mines that are hydrologically connected to abandoned underground mines. These mine pools typically become chemically stratified into "top water" and "bottom water". The stratification of anthracite mine pools is discussed in Barnes et al. (1964), Erickson et al. (1982) and Ladwig et al. (1984). Additional discussions on the areal extent and volume of impounded water in the mine pools are contained in a series of studies by Ash et al. (1949) and Ash (1954).

The top water discharges are typically of circumneutral pH, although some samples in Table 2.1 may have elevated iron, manganese or aluminum. Top water is believed to reflect shallow groundwater systems, with relatively short residence times, where most of the flow is confined to the upper part of the mine pool. The bottom water typically has higher concentrations of acidity, metals, and sulfate than the top water of the same mine pool. Bottom waters are indicative of longer residence times, less circulation (and less oxygen). For example, the Markson and Good Spring No. 1 mine pool discharge samples shown in Table 2.1 are from adjacent collieries within the Donaldson Syncline in the Southern Anthracite Field. The mine maps of these two collieries indicate that the coal seams mined, mining engineering factors, and geologic conditions of the collieries are essentially the same; yet the Good Spring No. 1 discharge has a pH of 6.2 (and sulfates of 112 mg/L) and the Markson discharge has a pH of 3.4 (and sulfates of 491 mg/L) (Table 2.1). The Good Spring No. 1 and Good Spring No. 3 discharges are top water and the Markson discharge is bottom water with a distinct hydrogen sulfide aroma. The samples of the Markson, and Good Spring No. 1 and Good Spring No. 3 mine pool discharges were collected on the same date in relatively low flow conditions and are within a few mg/L of the average sulfate values from five years of monthly samples.

Figure 2.18a depicts variations in the pH of mine discharges for the four anthracite fields. The Eastern Middle Field has the lowest median pH and the least variability in pH, consistent with an absence of carbonate strata. Figure 2.18b shows that the Eastern Middle Field discharges also have the lowest sulfate concentrations and the least variability in concentration. The other fields show a wider range in pH and sulfate, although the Southern Field typically has lower sulfate than the Northern and Western Middle Fields.



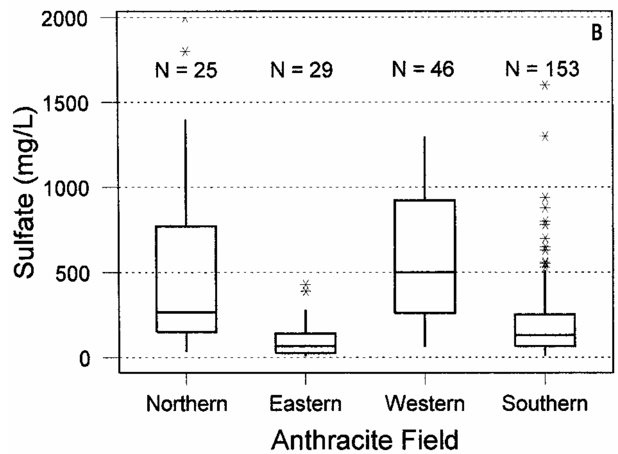


Figure 2.18 (a) and (b). Boxplots showing differences in pH and sulfates from the four anthracite fields in eastern PA (from Brady et al., 1998).

2.5 ANTHRACITE MINING

The Anthracite Region has been mined commercially from the late 1700s until the present. Anthracite mining peaked in 1917 (Fig. 2.19), and has declined significantly since then due to: 1) competition from cheaper and cleaner fuels; 2) labor disputes that disrupted supplies at critical times; 3) labor intensive mining methods; 4) depletion of more accessible coal beds; and 5) liability for water treatment and environmental concerns.

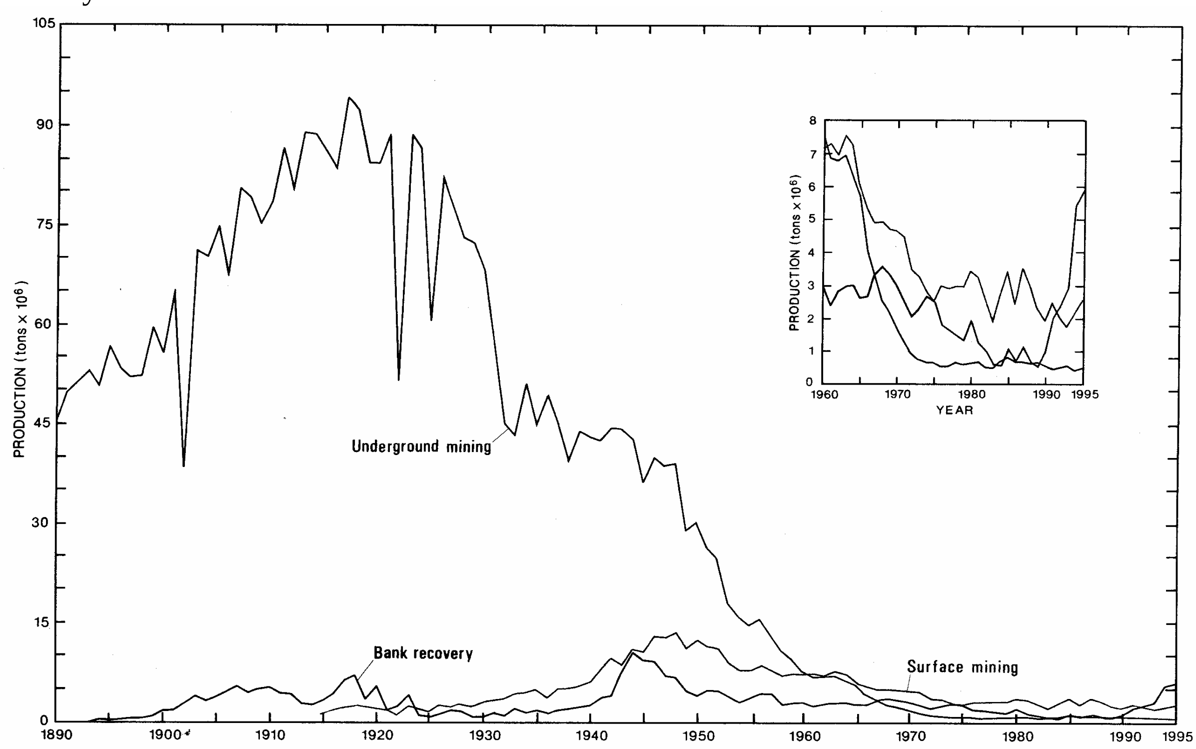


Figure 2.19. Anthracite production, 1890-1995 (from Eggleston, et al., 1999).

Anthracite production in 2001 was reported as 2,979,287 tons. Of this total amount, underground mining, once the dominant method for extraction, accounted for 154,111 tons, only 5 percent of Pennsylvania's total anthracite production, and surface mines produced 725,452 tons (Dodge and Edmunds, 2003). Eggleston et al. (1999) describe the process of underground mining anthracite coal in the following steps: 1) miners enter by a tunnel, slope, or shaft, 2) two horizontal headings are driven parallel to the strike of the coal bed from the shaft, 3) the upper heading, called the monkey, provides access to drill and blast upwards in the coal bed dip for distances of 200 to 300 feet (breast development), 4) coal then falls by gravity into coal cars in the lower heading, called the gangway, and 5) coal is hauled out through the gangway (Figure 2.20). The breast-and-pillar method just described is very labor intensive.

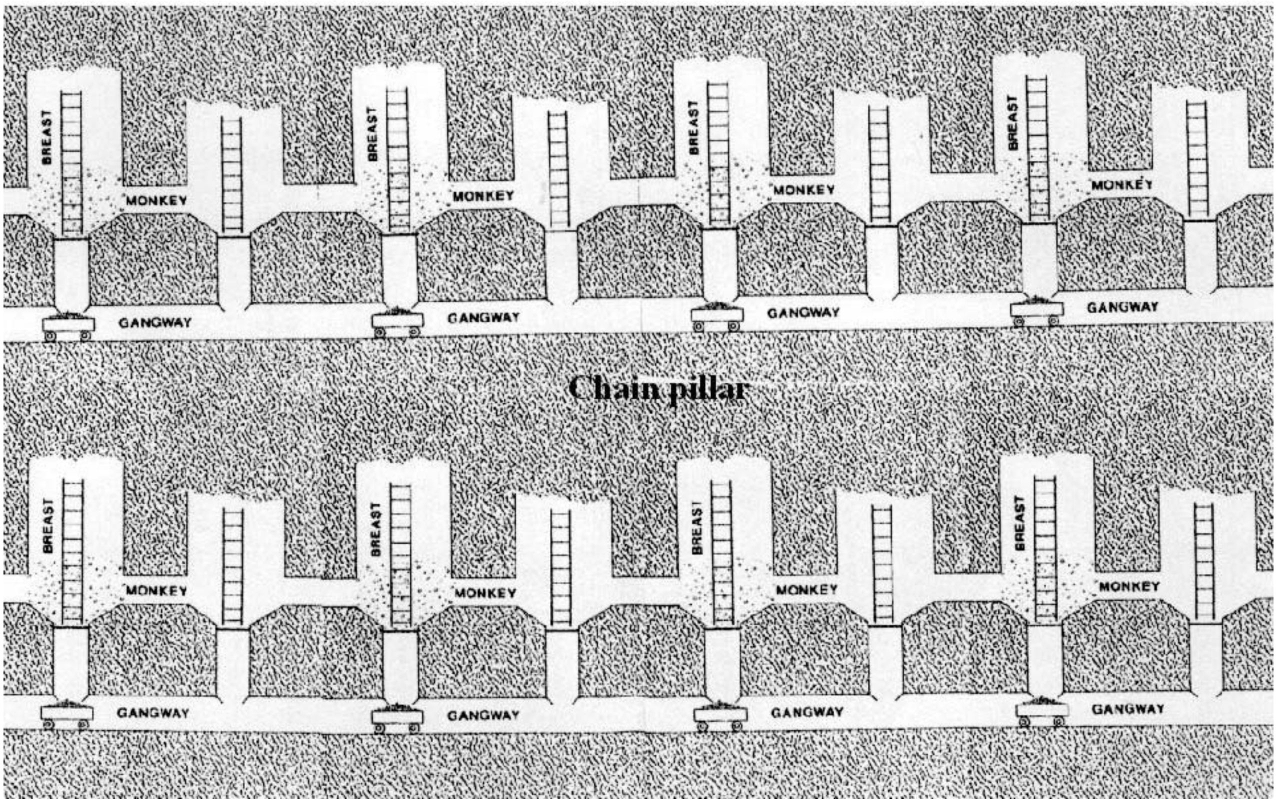


Figure 2.20. Typical anthracite underground mining practices (modified from Eggleston et al., 1999).

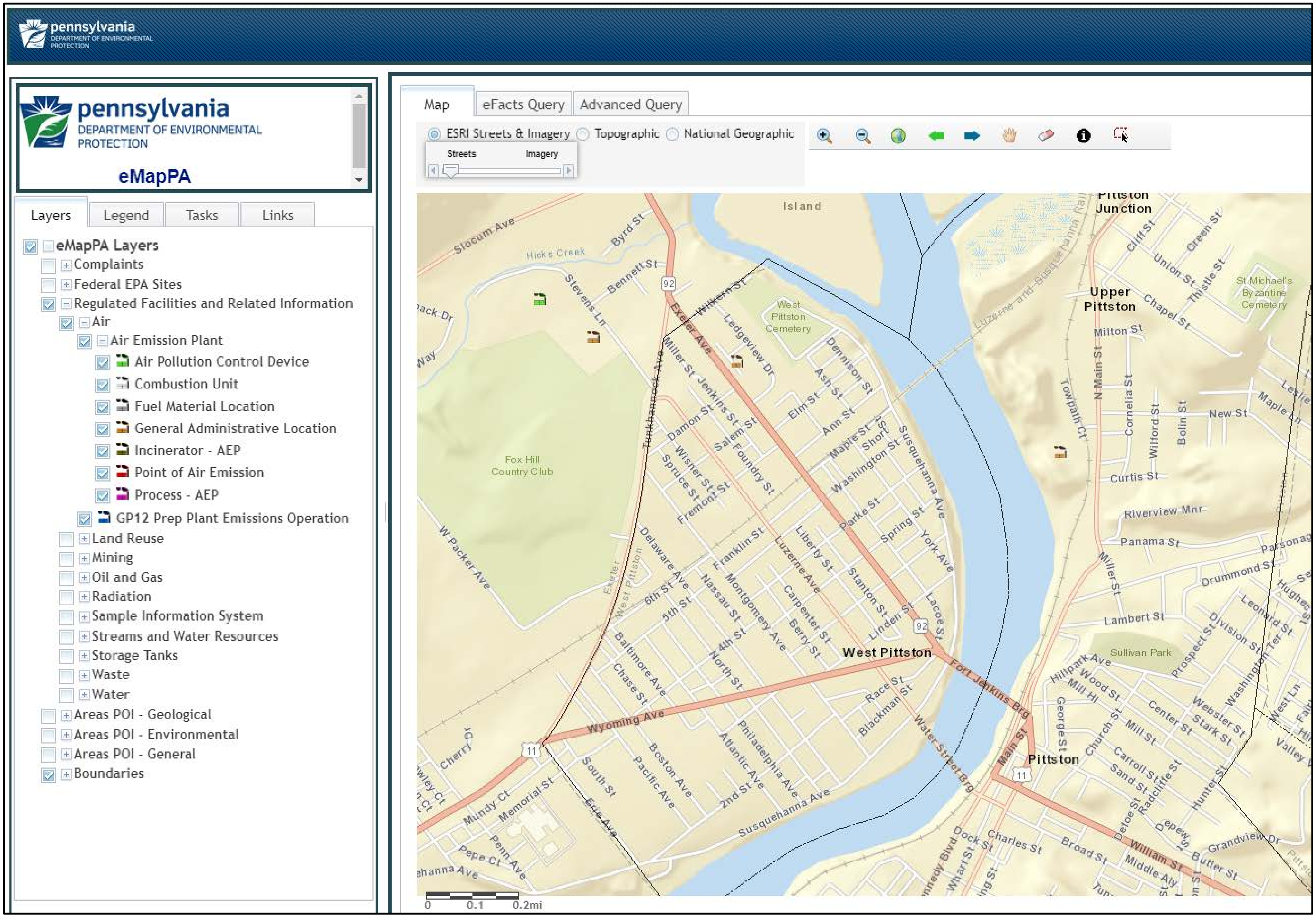
Neither surface mining nor bank recovery has surpassed the quantity of coal historically extracted by underground mining in the Anthracite Region of Pennsylvania. Surface mining dominated anthracite production in Pennsylvania between 1961 and 1991 (Eggleston et al., 1999). Bank recovery of coal silt and waste anthracite (culm) currently accounts for the largest percentage of anthracite production, 10,661,043 tons of coal extracted in 2001 (Dodge and Edmunds, 2003). Small (18 to 108 MW) co-generation plants have been constructed throughout the Anthracite Region in order to make use of this formerly discarded material (Inners et al., 1996). The culm-burning plants have provided a number of benefits to the region, including: 1) a reduction in AMD production from the culm, 2) reclamation of land, 3) a regional increase in jobs, and 4) an increase in the attractiveness of the landscape. Because many of these waste piles were created prior to SMCRA (1977), little money has been available to remove them.

2.6 SUMMARY

The geologic setting of the Anthracite and Bituminous Coal Fields of Pennsylvania provides a foundation for much of the subject matter in this book. Pennsylvania was blessed with abundant coal reserves. Along with this blessing, Pennsylvania was also bestowed with a curse of abundant abandoned mine land problems----including greater than 189,000 acres of abandoned, unreclaimed surface mines, more than 3,100 miles of stream polluted by acid mine drainage, and thousands of mine subsidence features, mine fires and other mine hazards. The physiography, geologic structure, stratigraphy and hydrogeology of the Anthracite and Bituminous Coal Regions are significantly different, but there are substantial similarities in the beneficial use of coal ash in these regions to reclaim abandoned mine lands and remediate acid mine drainage problems. The Anthracite Coal Fields have the most significant abandoned mine land reclamation problems due to the complexity of the geologic structure, the thickness of these coals, and the hydrology of the minepool systems. The Bituminous Coal Fields have the greatest number of acid mine drainage discharge problems and the most severe concentrations of acidity, iron and other parameters of the acidic drainage, due to the stratigraphy and depositional environments (i.e. greater sulfur contents) of these coals and overburden strata.

An attempt was made in the preceeding sections of this chapter to include sufficient information from the current scientific literature and older relevant references in order to provide an understanding of the geologic setting of the coal ash sites described in Chapters 4 through 9. The section on anthracite mining was included because most of the sites featured in these chapters are from the Anthracite Region, and an understanding of the underground mining methods is useful in relating the geology to the abandoned mine land reclamation problems. Additional information on the geology of the Anthracite and Bituminous Coal Regions of Pennsylvania is contained in two recent comprehensive publications: *The Geology of Pennsylvania* published by the Pennsylvania Geological Survey and the Pittsburgh Geological Society in 1999, and *Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania* published in 1998 by Pennsylvania Department of Environmental Protection.

HAZARDS & HAZARDOUS MATERIALS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Process - AEP
GP12 Prep Plant Emissions Operation
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Upper Pittston
West Pittston Cemetery
Fox Hill Country Club
West Pittston
Pittston
Sullivan Park
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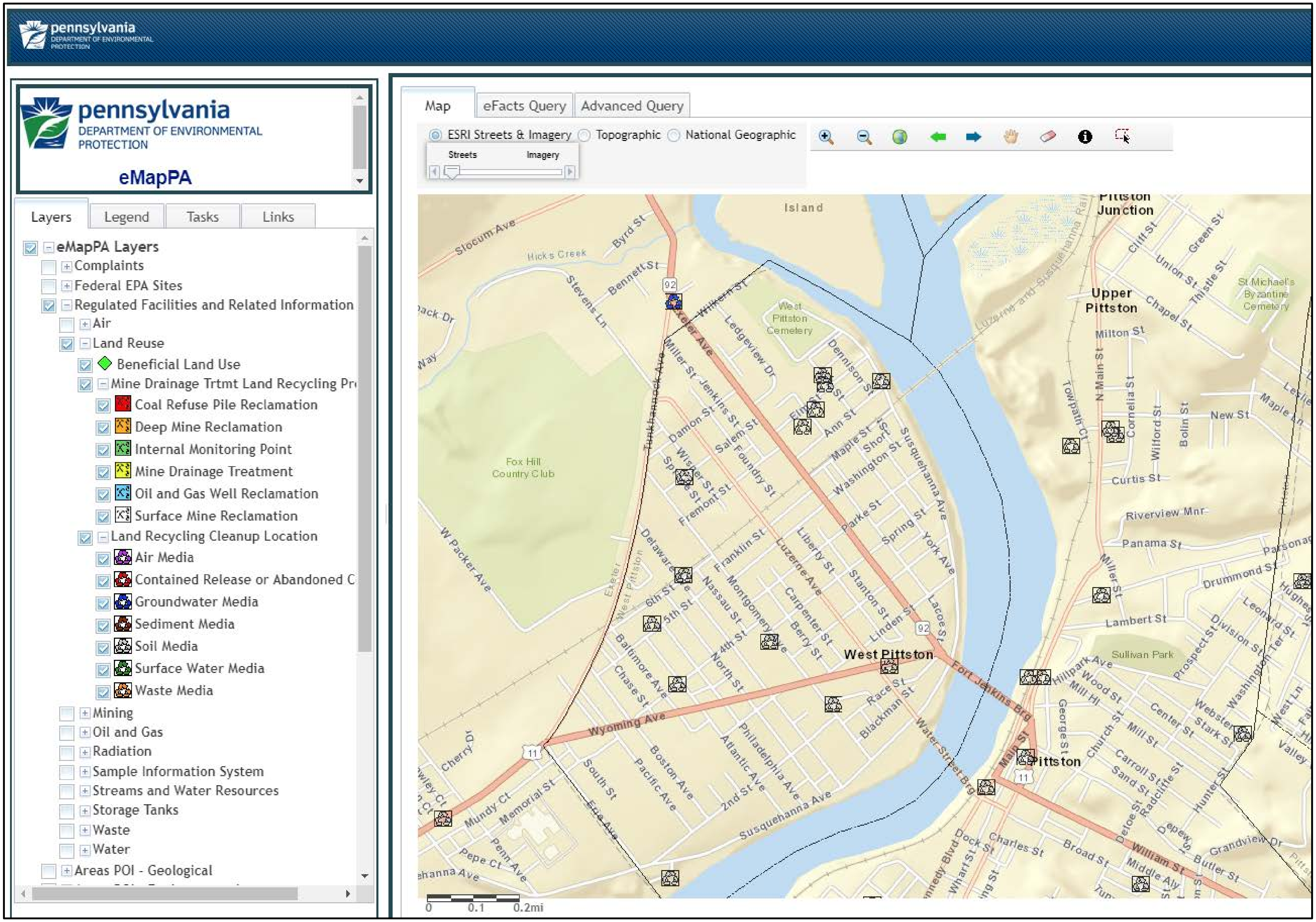
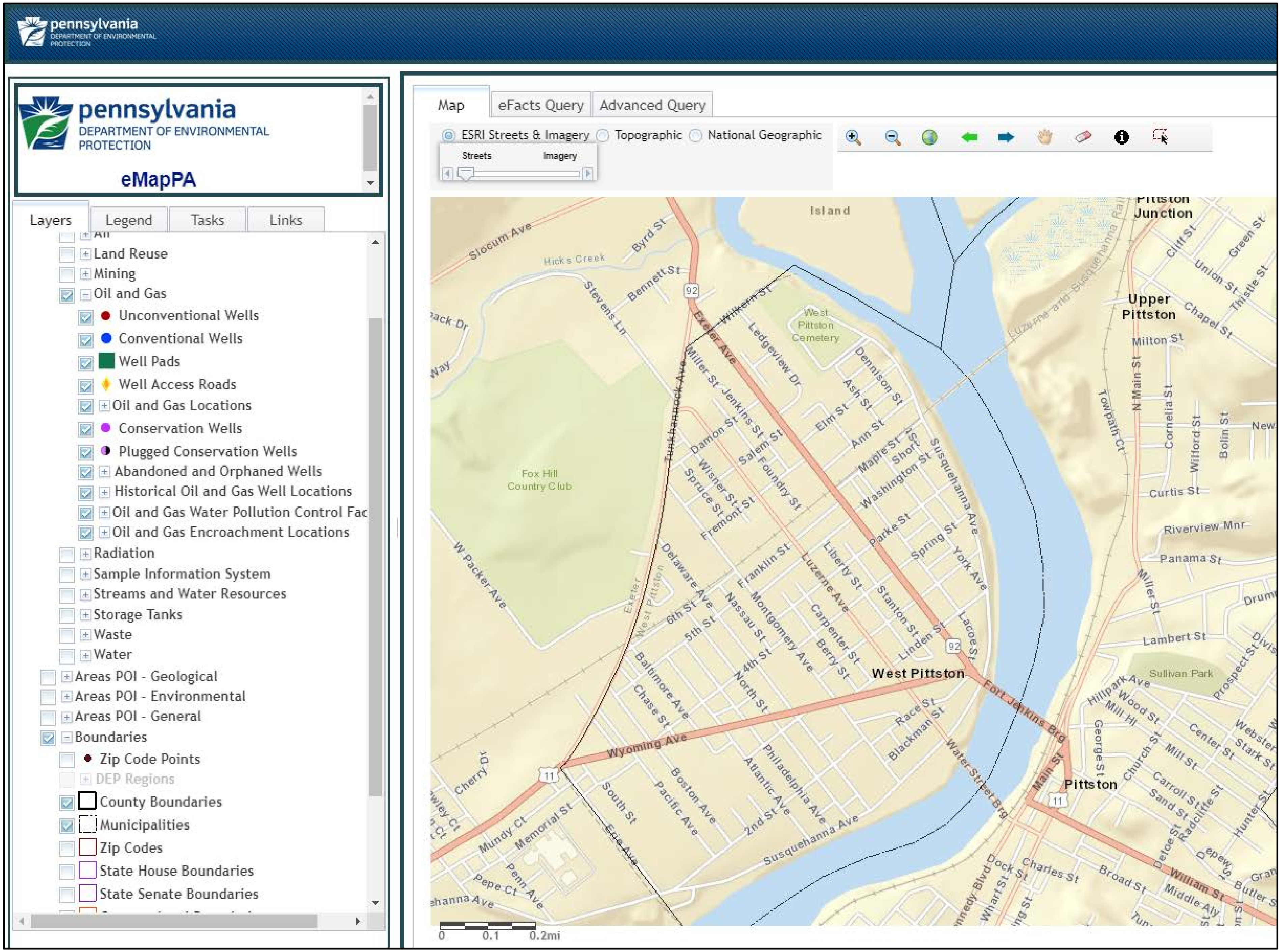


Land Recycling Cleanup Location on Susquehanna Ave: PPL Electric Utilities pole# 53576N43170 – soil media, active, in compliance.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Well Pads
Well Access Roads
Oil and Gas Locations
Conservation Wells
Plugged Conservation Wells
Abandoned and Orphaned Wells
Historical Oil and Gas Well Locations
Oil and Gas Water Pollution Control Fac
Oil and Gas Encroachment Locations
Radiation
Sample Information System
Streams and Water Resources
Storage Tanks
Waste
Water
Areas POI - Geological
Areas POI - Environmental
Areas POI - General
Boundaries
Zip Code Points
DEP Regions
County Boundaries
Municipalities
Zip Codes
State House Boundaries
State Senate Boundaries
Map
eFacts Query
Advanced Query
ESRI Streets & Imagery
Topographic
National Geographic
Streets
Imagery
Island
Pittston Junction
Upper Pittston
West Pittston Cemetery
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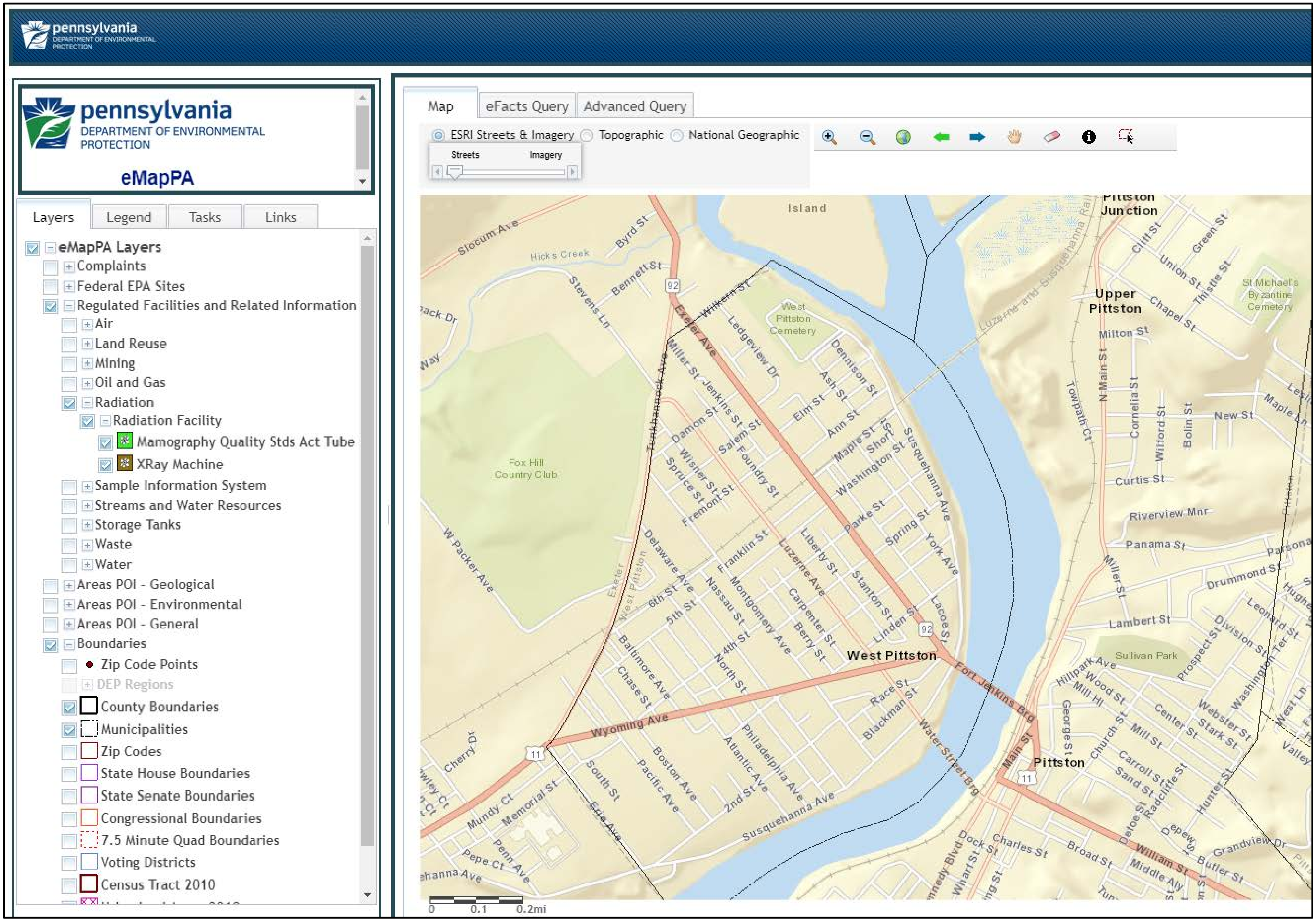
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eMapPA
Layers
Legend
Tasks
Links
eMapPA Layers
Complaints
Federal EPA Sites
Regulated Facilities and Related Information
Air
Land Reuse
Mining
Oil and Gas
Radiation
Radiation Facility
Mamography Quality Stds Act Tube
XRay Machine
Sample Information System
Streams and Water Resources
Storage Tanks
Waste
Water
Areas POI - Geological
Areas POI - Environmental
Areas POI - General
Boundaries
Zip Code Points
DEP Regions
County Boundaries
Municipalities
Zip Codes
State House Boundaries
State Senate Boundaries
Congressional Boundaries
7.5 Minute Quad Boundaries
Voting Districts
Census Tract 2010
Map
eFacts Query
Advanced Query
ESRI Streets & Imagery
Topographic
National Geographic
Streets
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Island
Pittston Junction
Upper Pittston
West Pittston
Pittston
West Pittston Cemetery
Fox Hill Country Club
St Michael's Byzantine Cemetery
Sullivan Park
Wyoming Ave
Susquehanna Ave
Luzerne Ave
Exeter Ave
Fort Jenkins Brg
Water Street Brg
Main St
William St
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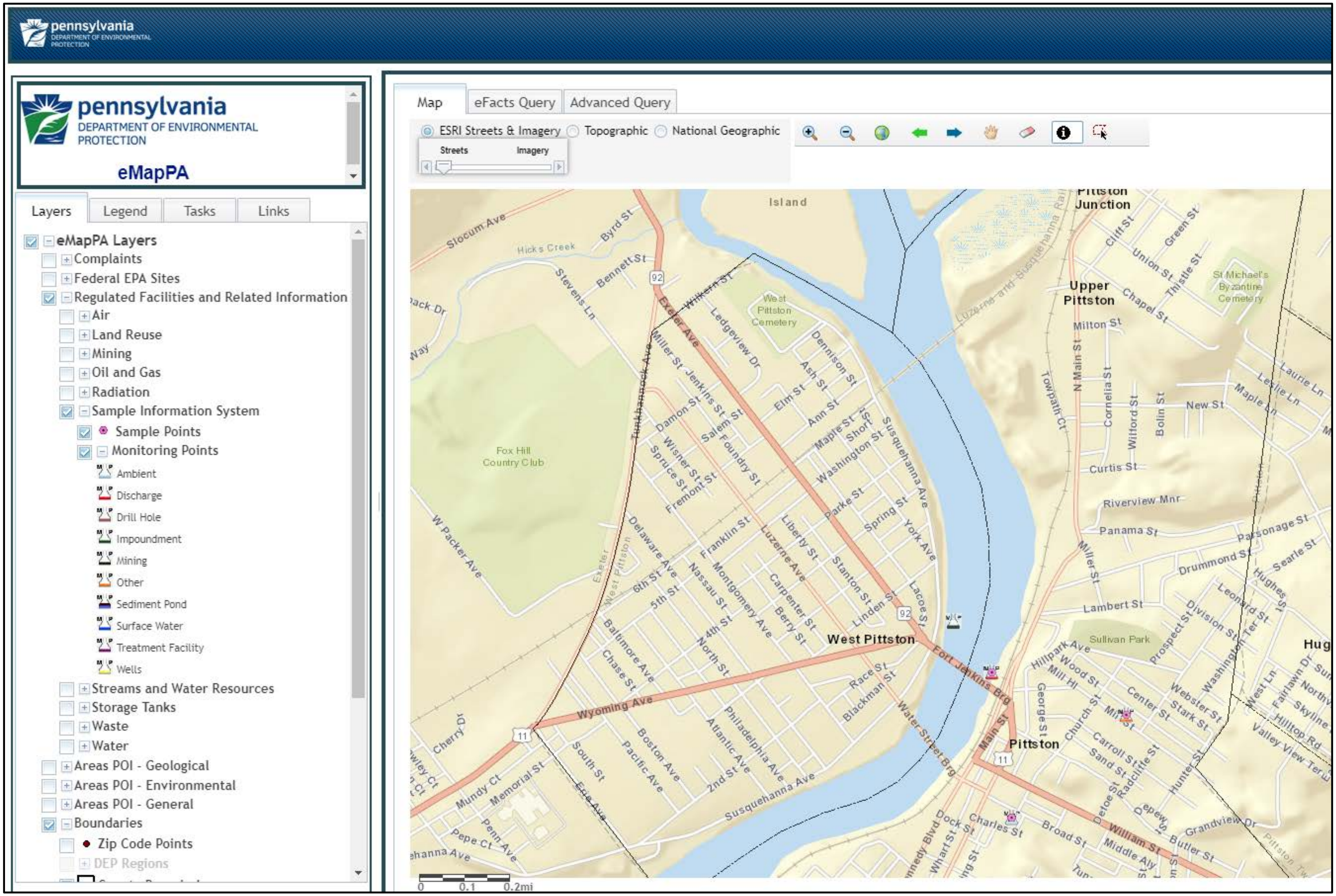
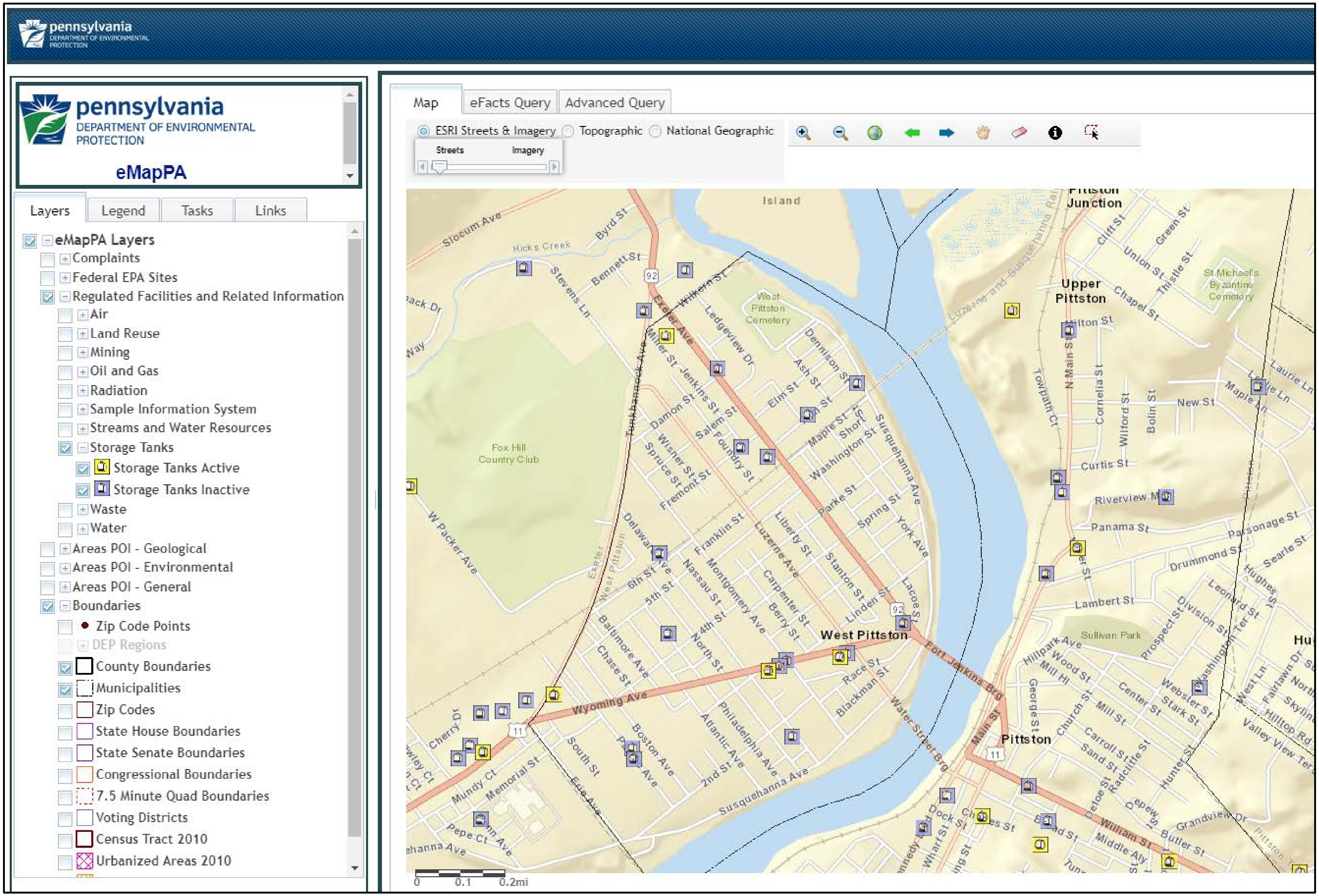
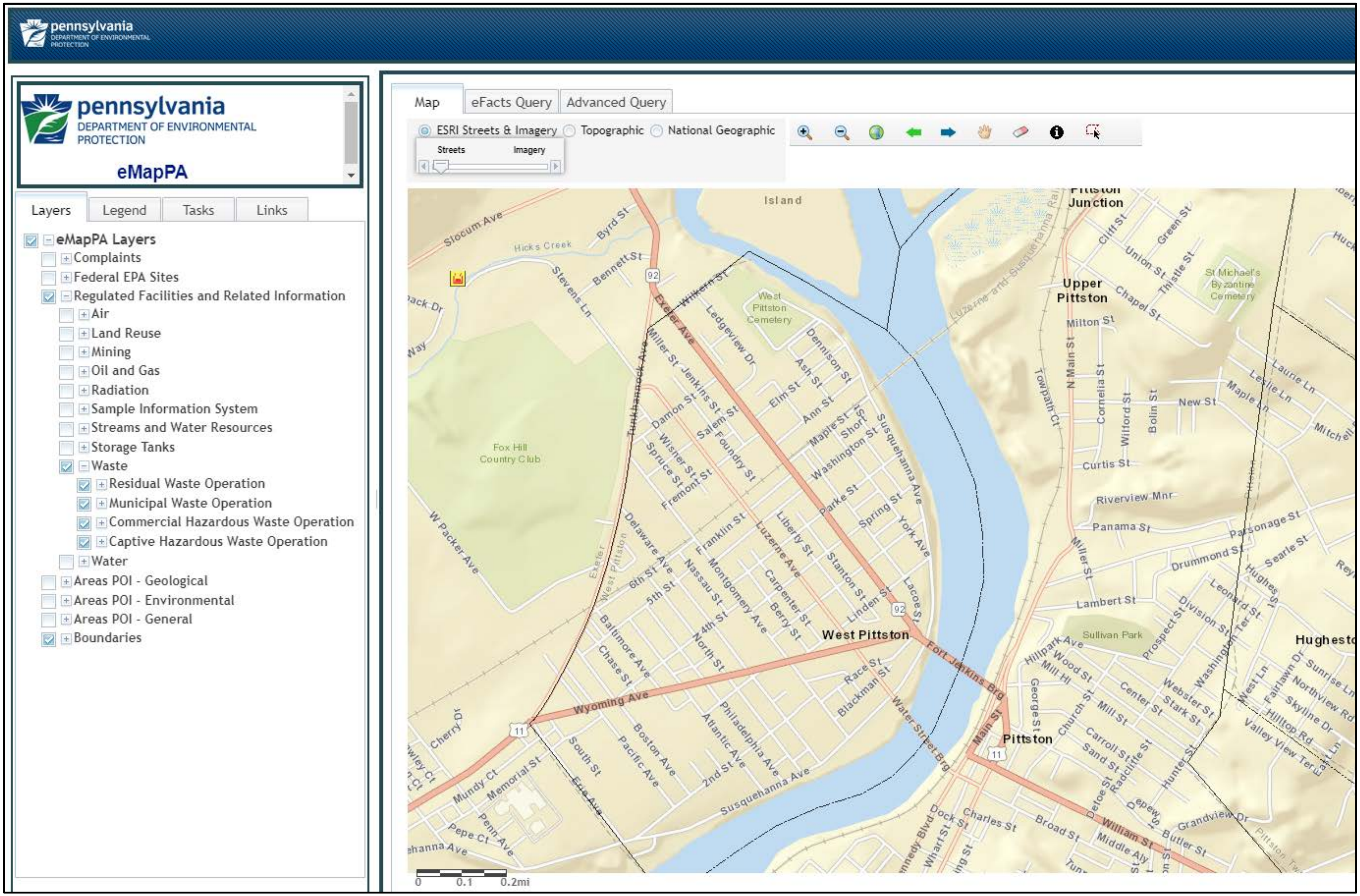


Impoundment: Deep mining opening discharge (un-permitted)
East riverbank Sample Point: ID: 162946, water, routine sampling.
East Riverbank Discharge: Pittston (Butler) water tunnel, ID 162946



Inactive tanks: Susquehanna Ave: PG Energy Inc.; Exeter Ave: George Budnovitch Service Station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Layers
Legend
Tasks
Links
eMapPA Layers
Complaints
Federal EPA Sites
Regulated Facilities and Related Information
Air
Land Reuse
Mining
Oil and Gas
Radiation
Sample Information System
Streams and Water Resources
Storage Tanks
Waste
Residual Waste Operation
Municipal Waste Operation
Commercial Hazardous Waste Operation
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Water
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Boundaries
Map
eFacts Query
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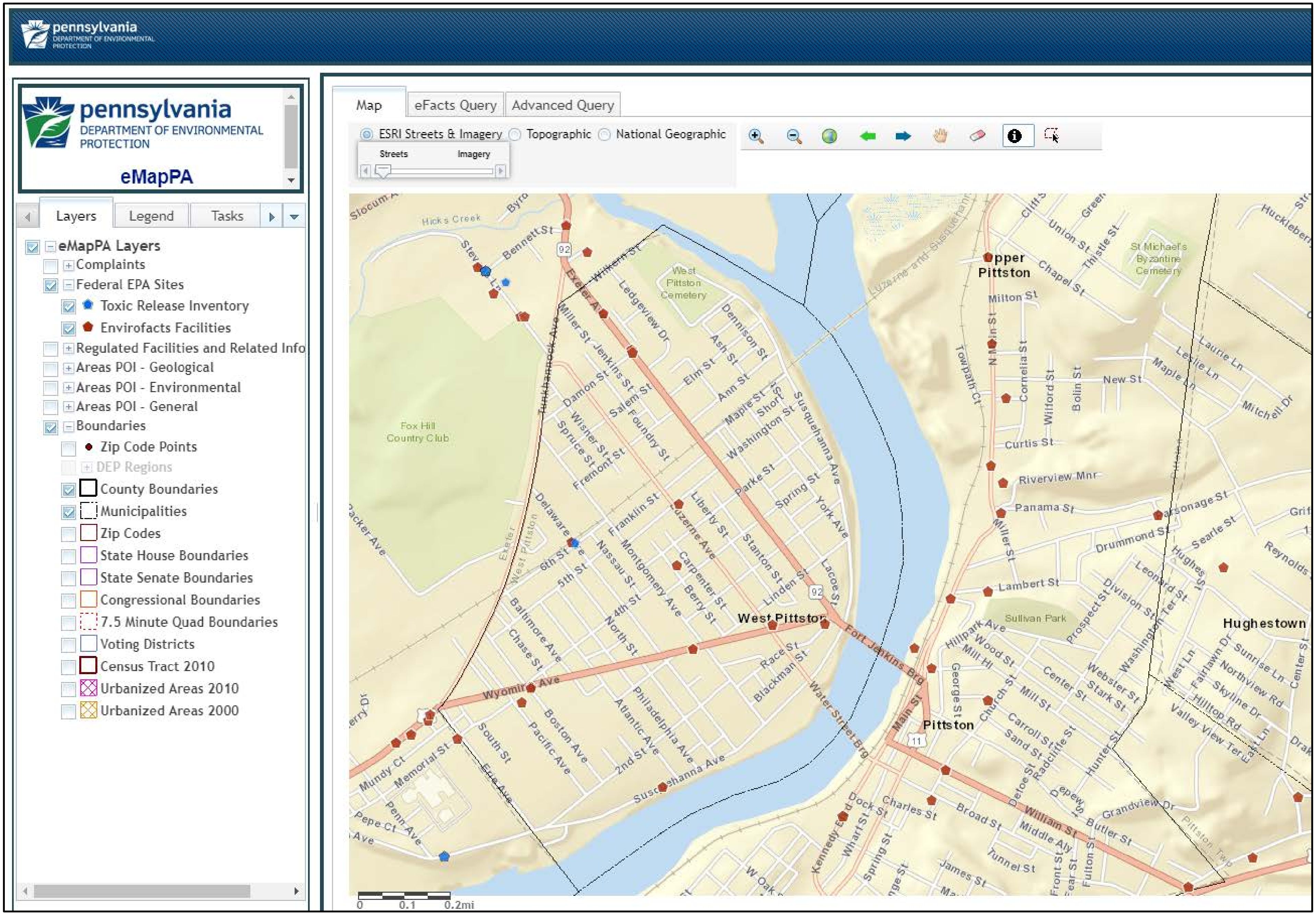
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Layers
Legend
Tasks
eMapPA Layers
Complaints
Federal EPA Sites
Toxic Release Inventory
Envirofacts Facilities
Regulated Facilities and Related Info
Areas POI - Geological
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Boundaries
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DEP Regions
County Boundaries
Municipalities
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State House Boundaries
State Senate Boundaries
Congressional Boundaries
7.5 Minute Quad Boundaries
Voting Districts
Census Tract 2010
Urbanized Areas 2010
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Map
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Fort Jenkins Brg
Water Street Brg
Susquehanna Ave
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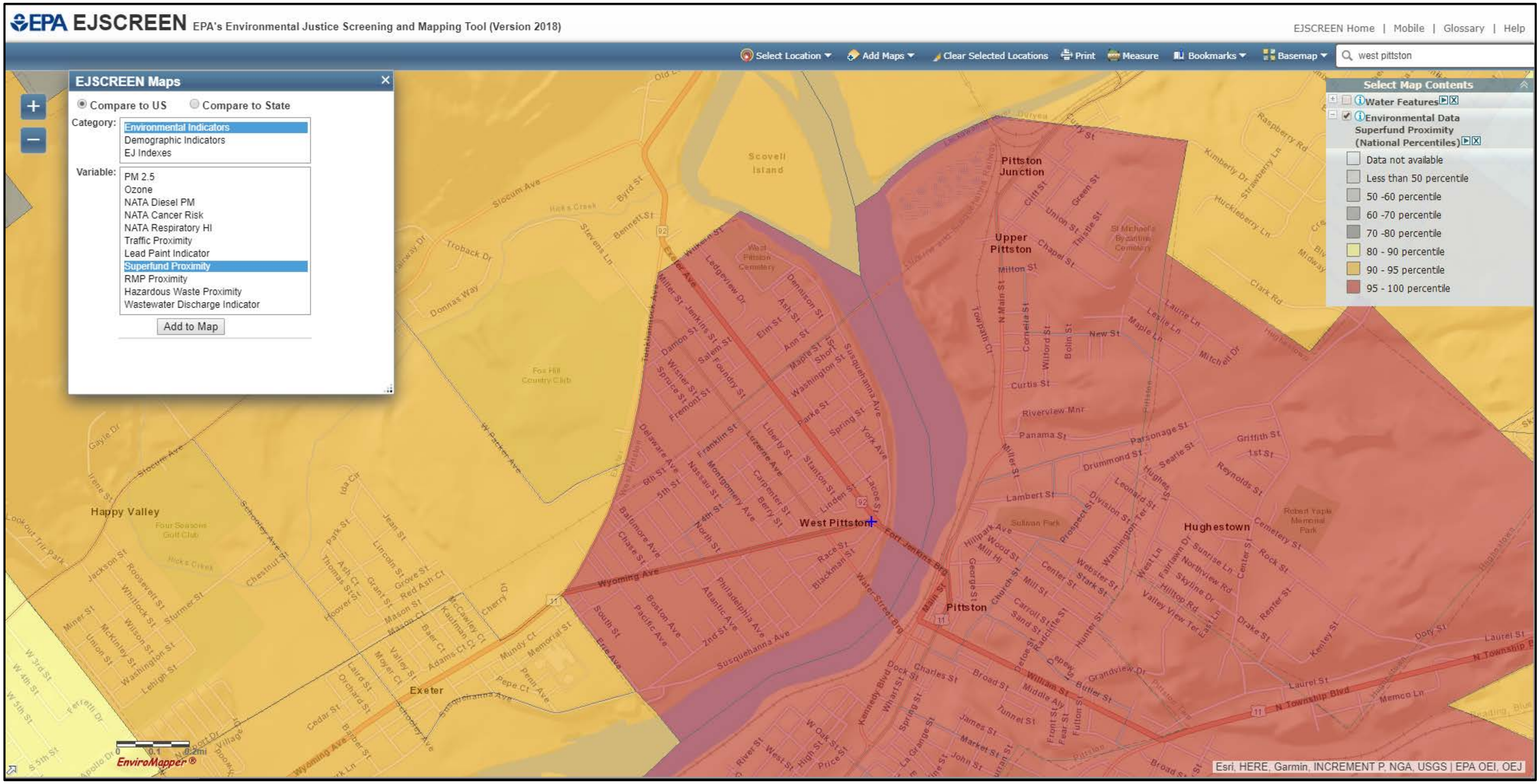
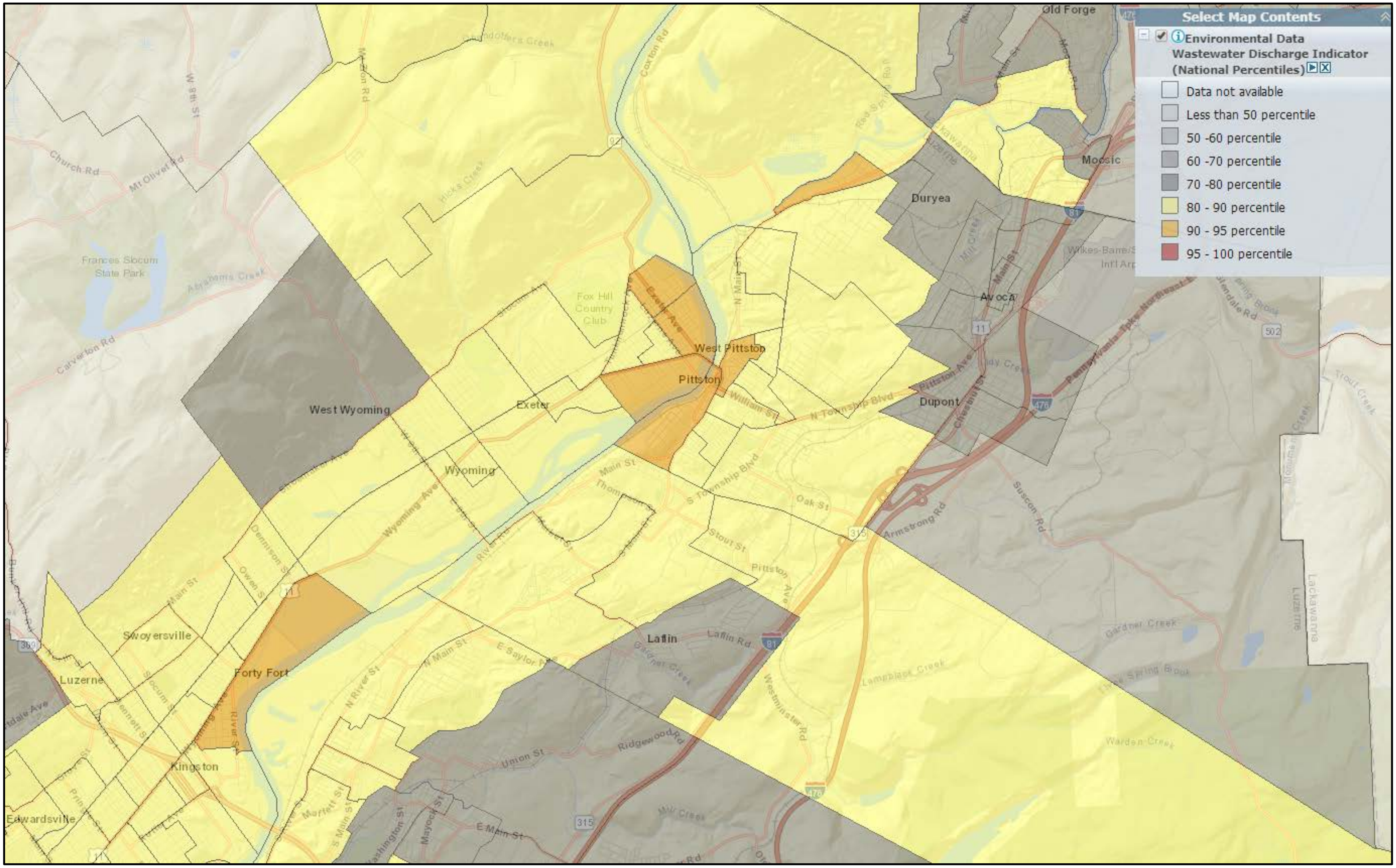
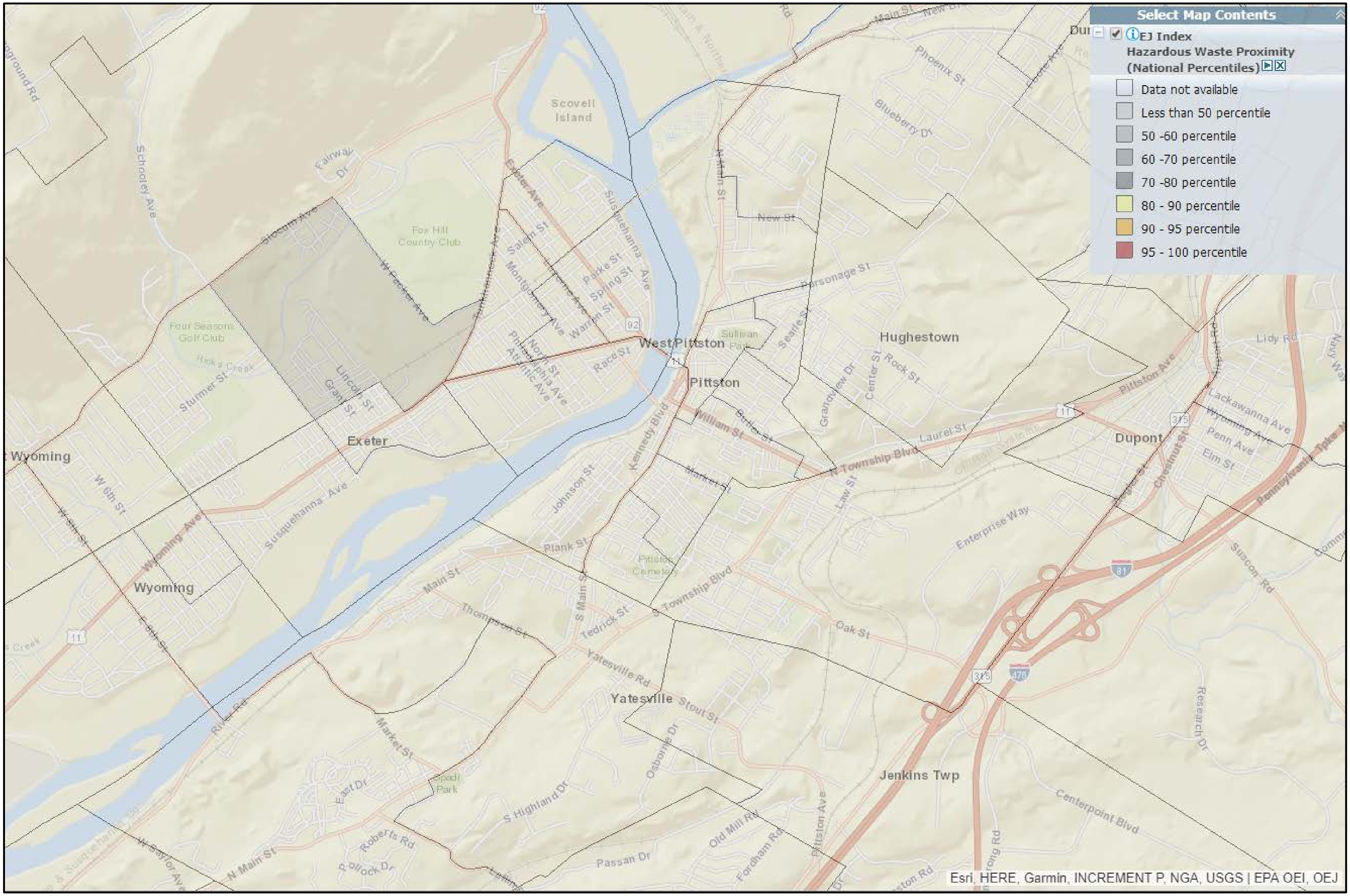
Superfund proximity



Wastewater Discharge Indicator:



Hazardous Waste Proximity



Maps from EPA EJSCREEN https://www.epa.gov/ejscreen

EPA United States Environmental Protection Agency

Related Topics: Envirofacts

FRS

FRS Facility Detail Report

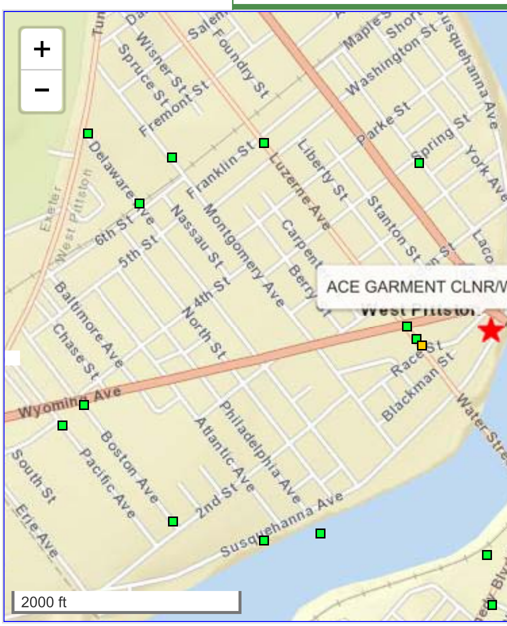
ACE GARMENT CLNR/WEST PITTSTON

EPA Registry Id:
110001077307
201 WYOMING AVE
WEST PITTSTON, PA
18643-2821

Facility Registry Service Links:

- Facility Registry Service (FRS) Overview
- FRS Facility Query
- FRS Organization Query
- EZ Query
- FRS Physical Data Model
- FRS Geospatial Model

Report an Error



Legend

- Selected Facility
- EPA Facility of Interest
- State/Tribe Facility of Interest

The facility locations displayed come from the FRS Spatial Coordinates tables. They are the best representative locations for the displayed facilities based on the accuracy of the collection method and quality assurance checks performed against each location. The North American Datum of 1983 is used to display all coordinates.

Environmental Interests

Information System	System Facility Name	Information System Id/Report Link	Environmental Interest Type	Data Source	Last Date
RESOURCE CONSERVATION AND RECOVERY ACT INFORMATION SYSTEM	ACE GARMENT CLEANERS	PAD981738586	SQG (Y)	RCRAINFO	12/14
AIR FACILITY SYSTEM	ACE GARMENT CLNR/WEST PITTSTON	4207995005	AIR MINOR (OPERATING)	AIRS/AFS	09/11
ICIS-AIR (AIR)	ACE GARMENT CLNR/WEST PITTSTON	PA000650559	AIR MINOR	ICIS	02/15
PENNSYLVANIA - ENVIRONMENTAL FACILITY APPLICATION COMPLIANCE TRACKING SYSTEM	ACE GARMENT CLEANERS	PAD981738586	STATE MASTER	PA-EFACTS	
PENNSYLVANIA - ENVIRONMENTAL FACILITY APPLICATION COMPLIANCE TRACKING SYSTEM	ACE GARMENT CLNR/WEST PITTSTON	00-2300038-1	STATE MASTER	PA-EFACTS	

Additional EPA Reports: MyEnvironment Enforcement and Compliance Site Demographics Facility Coordinates Viewer Environmental Justice Map Viewer Watershed Report

Standard Industrial Classification Codes (SIC)

Data Source	SIC Code	Description	Primary
AIRS/AFS	7216	DRYCLEANING PLANTS, EXCEPT RUG CLEANING	
PA-EFACTS	7216	DRYCLEANING PLANTS, EXCEPT RUG CLEANING	
AIR	7216	DRYCLEANING PLANTS, EXCEPT RUG CLEANING	

Facility Codes and Flags

EPA Region:	03
Duns Number:	
Congressional District Number:	17
Legislative District Number:	2
HUC Code/Watershed:	02050107 / UPPER SUSQUEHANNA-LACKAWANNA
US Mexico Border Indicator:	
Federal Facility:	
Tribal Land:	

Alternative Names

Alternative Name	Source of Data
ACE GARMENT CLNR SVC	PA eFACTS
ACE GARMENT CLEANERS	PA-EFACTS

Organizations

Affiliation Type	Name	DUNS Number	Information System	Mailing Address
OWNER/OPERATOR	ACE GARMENT CLNR		PA-EFACTS	View
MAILING ADDRESS	ACE GARMENT CLNR		AIR	View
OWNER/OPERATOR	ACE GARMENT CLNR		PA-EFACTS	View

National Industry Classification System Cod

Data Source	NAICS Code	Description
AIR	812320	DRYCLEANING AND LAUNDRY SERVICES OPERATED).
AIRS/AFS	812320	DRYCLEANING AND LAUNDRY SERVICES OPERATED).
PA-EFACTS	339990	

Facility Mailing Addresses

Affiliation Type	Delivery Point	City Name
FACILITY MAILING ADDRESS	201 WYOMING AVE	WEST PITTSTON
OWNER/OPERATOR	201 WYOMING AVE	WEST PITTSTON
MAILING ADDRESS	201 WYOMING AVE	WEST PITTSTON
FACILITY MAILING ADDRESS	201 WYOMING AVENUE	WEST PITTSTON

Contacts

No Contacts returned.

Query executed on: AUG-02-2019

Last updated on September 24, 2015

SDMS DocID 2194197

ORIGINAL

ORIGINAL

FIVE-YEAR REVIEW REPORT

Butler Mine Tunnel Superfund Site

Luzerne County, PA

EPA ID#: PAD980508451

Prepared by:

U.S. Environmental Protection Agency

Region III

Philadelphia, Pennsylvania

Cecil Rodrigues, Director
Hazardous Site Cleanup Division
EPA Region III

7/24/2014
Date

Table of Contents

Acronyms

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CD	Consent Decree
EPA	Environmental Protection Agency
FS	Feasibility Study
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operations and Maintenance
OU	Operable Unit
PADEP	Pennsylvania Department of Environmental Protection
PADER	Pennsylvania Department of Environmental Resources
PPB	Part per billion
PPM	Part per million
PRP	Potentially Responsible Party
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SDWA	Safe Drinking Water Act

EXECUTIVE SUMMARY

The Butler Mine Tunnel (BMT) Site ("Site") is located in Luzerne County, in northeastern Pennsylvania. The tunnel discharge point (BMT outfall) is located on the east bank of the Susquehanna River, approximately 350 feet north of the Fort Jenkins Bridge in the City of Pittston, Pennsylvania. Between 1977 and 1979 liquid industrial waste was disposed of into abandoned underground mine workings via a borehole located at the Highway Auto Service Station (HWAS) in Pittston Township. Such disposal was responsible for discharges of oily waste from the Butler Mine Tunnel in 1979 and 1985. The 1985 discharge following the high precipitation event of Hurricane Gloria.

The Site was placed on the National Priorities List in 1987, and a Record of Decision for the Site was issued by EPA in 1996.

The remedy implemented for the Butler Mine Tunnel Superfund Site in the Luzerne County, Pennsylvania included:

- Establishing an Administrative Center.
- Improving and using a warehouse in Pittston to store response equipment.
- Constructing a boat launch ramp and access roads.
- Installing the Tunnel flow monitoring equipment and monitoring system.
- Constructing five in-river permanent moorings.
- Constructing 11 anchor points (eight pad-eyes and three fair-leads) and four winch pads.
- Preparing the response preparedness plan.
- Implementing the Community Information Program.
- Closing seven boreholes used during the RI at the Site, including the HWAS borehole.

The Site achieved construction completion with the signing of the Preliminary Close-Out Report on September 8, 2005. The trigger for this five-year review was the signature date for the first Five Year Review report, July 30, 2009. This 2014 five-year review found that the remedy was constructed in accordance with the requirements of the Record of Decision (ROD).

Based on a review of decision documents, O&M documents, monitoring results, interviews with O&M staff, and residents who live in the Site vicinity, and the Site inspection, the remedy is functioning as intended by the ROD, and the remedy is protective of human health.

Five Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Butler Mine Tunnel		
EPA ID: PAD980508451		
Region: 3	**State:** PA	**City/County:** Pittston/Luzerne

SITE STATUS	
NPL Status: Final	
Multiple OUs? No	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: EPA
Author name (Federal or State Project Manager): Mitch Cron
Author affiliation: EPA Region 3
Review period: 2013-2014
Date of site inspection: December 11, 2013
Type of review: Statutory
Review number: 2
Triggering action date: July 30, 2009 – previous Five Year Review issue date
Due date *(five years after triggering action date)*: July 30, 2014

Five-Year Review Summary Form (continued)

Issues/Recommendations

Issues and Recommendations were not identified in the Five Year Review report

Protectiveness Statement(s)

Protectiveness Statement.

The remedy at the Site is protective of human health and the environment because the Selected Remedy has been constructed and is operational, weather conditions and BMT flow are monitored in real time to determine when an oil flush out may occur, in the event of an oil flush out a response plan will be implemented using facilities and equipment which have been constructed on-Site or are staged near the Site

Government Performance and Results Act (GPRA) Measure Review

Human Health: HHPA (Long-Term Human Health Protection Achieved)
Groundwater Migration GMNA (Not a Groundwater Site)

Site wide RAU· Site wide Ready for Anticipated Use (SWRAU) was achieved on May 21, 2010

U.S. Environmental Protection Agency
Region III
Hazardous Site Cleanup Division
2nd Five-Year Review Report
Butler Mine Tunnel Superfund Site
City of Pittston, Luzerne County, Pennsylvania

I. Introduction

The purpose of the Five-Year Review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of these Five-Year Reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The Environmental Protection Agency (EPA or "the Agency") is preparing this Five-Year Review report pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f) (4) (ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

EPA Region III conducted this Five-Year Review of the remedy implemented at the Butler Mine Tunnel Superfund Site (Site) in the City of Pittston, Luzerne County, Pennsylvania. This review was conducted by the Remedial Project Manager (RPM) for the Site during 2013 and 2014. This report documents the results of the Five-Year Review. This is the second Five-Year Review for the Site. The triggering action for this statutory review is the signature date of the first Five Year Review for the Site: July 30, 2009. The Five-Year Review is required because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology

Table 1 lists the chronology of events for the Site.

Table 1: Chronology of Site Events

Date	Event
1977-1979	Disposal of waste liquids, including oil waste, occurs at the Highway Auto Service Station (HWAS) borehole.
July 1979	First discharge of oil from the Butler Mine Tunnel (BMT) outfall.
September 1985	Second discharge of oil from the BMT outfall.
March 30, 1987	Seventeen potentially responsible parties (PRPs) entered into a Consent Agreement and Order to perform the RI/FS
July 1, 1987	Site was placed on the National Priorities List (NPL) by EPA.
July 15, 1996	EPA issued the Record of Decision (ROD) for the Site.
February 15, 2001	EPA and the Commonwealth of Pennsylvania entered into a Consent Decree (CD) with a group of PRPs to perform the Remedial Design/Remedial Action and Operations and Maintenance at the Site. February 15, 2001 is the date the CD was entered in court.
December 30, 2003	EPA approved the Remedial Design.
August 4, 2004	Construction of the Remedy outlined in the ROD began.
September 8, 2005	Preliminary Close-Out Report signed.
October 2, 2008	Remedial Action Completion Report approved by EPA
July 30, 2009	First Five Year Review completed at the Site.
2009-2013	Training and operations and maintenance of Selected Remedy features (see Appendix 5)

III. Background

Physical Characteristics

The Butler Mine Tunnel (BMT) Site ("Site") is located in Luzerne County, in northeastern Pennsylvania. The tunnel discharge point (BMT outfall) is located on the east bank of the Susquehanna River, approximately 350 feet north of the Fort Jenkins Bridge in the City of

Pittston, Pennsylvania. The City of Pittston, and nearby areas are densely populated urban areas.

A Site location map is provided in Appendix 1.

The BMT was constructed prior to the 1930s as a drainage tunnel for underground coal mines via a series of interconnecting drainage ditches. The BMT drains an approximate five-square mile area of underground mine caverns and waterways. The BMT still continues to drain the mine workings. It routinely discharges water containing contaminants of acid mine drainage composed of sulfate, iron, and magnesium into the Susquehanna River.

During mining operations, boreholes were drilled into the mines to serve as air vents for the mines. Many individuals and companies used the bore holes to dispose of various wastes, including, residential and commercial wastes containing hazardous substances and waste oil. One such borehole was in Pittston, PA at a gas station and auto repair shop called the Hi-Way Auto Service Station ("HWAS"), located over two miles from the Tunnel discharge point. This borehole is known as the HWAS borehole. Water in the mine workings is not used as a drinking water source for the area.

Broadly, the Site consists of three distinct but related areas. First, the Site includes a contaminated source area in the mine workings beneath HWAS. Second, the Site also includes the subsurface migration pathway where the contamination in the source area has the potential to migrate to the BMT outfall. As noted above, the BMT outfall discharges into the Susquehanna River in the City of Pittston. Finally, the Site includes the areas along the Susquehanna River bank, in the City of Pittston, which are necessary to implement responses during future oil flushouts from the BMT.

Land and Resource Use

Ground water in the mine workings is not used as a drinking water source for the area; rather the drinking water supply is surface water reservoirs. The Susquehanna River itself is used a drinking water source in the City of Danville, which is located 60 miles downstream of the BMT outfall.

HWAS continues to operate as a truck fueling and repair business. The coal mines and related underground features which act as a migration pathway between the HWAS contamination source area and the BMT outfall are no longer active mines. Several areas in the vicinity of the BMT outfall are used in conjunction with the Site remedy to monitor rainfall in the vicinity of the BMT outfall, measure tunnel flow from the BMT outfall, and facilitate training and future response actions to address potential future discharges of oil from the BMT. Certain portions of the Site remedy (concrete pads for hydraulic winches, "pad eyes" for trot-line/boom management, etc.) lie in City Park, on the banks of the Susquehanna River in the City of Pittston.

History of Contamination and Initial Response

In late 1977, an oil recycling and reclamation company contracted with the owner of the HWAS for the disposal of oil waste into the HWAS borehole on the service station property. It is estimated that several million gallons of liquid industrial waste were disposed of into this borehole. In July 1979, this disposal was discontinued because of a Pennsylvania State Police investigation.

At the end of July 1979, Pennsylvania authorities were notified of a strong odor emanating from the BMT outfall on the banks of the Susquehanna. Upon arriving at the scene, authorities discovered a 35-mile long oil slick on the Susquehanna River originating at the Butler Tunnel outfall. Both the EPA and the Pennsylvania Department of Environmental Resources (now known as the Pennsylvania Department of Environmental Protection or "PADEP"), responded and performed an emergency removal under the authority of §311 of the Clean Water Act ("CWA"). Section 311 of the CWA authorizes the cleanup of any oil discharge into navigable water.

After further investigation by EPA, PADEP and other authorities, the source of the hazardous substances was traced to the HWAS borehole. Testing of the wastes found in the borehole matched the waste in the outfall. To provide conclusive proof, a dye was placed in the HWAS borehole. The same dye was subsequently observed in the outfall discharge.

After this spill was cleaned up, EPA installed an emergency monitoring device at the outfall of the Butler Tunnel. The Butler Emergency Response Program ("BERP") was designed to monitor the continuing discharge of water from the BMT outfall and trigger an alarm if hazardous substances were discharged. PADEP was charged with the operation and maintenance of the BERP system. After several years without a toxic discharge, the system was abandoned.

Following the 1979 spill, EPA evaluated the Butler Mine Tunnel Site and proposed for inclusion on the NPL. However, EPA made the determination that no remedial activities were needed and the Site was removed from the proposed list.

In September 1985, another sudden oil discharge from the BMT occurred following heavy rains and flooding associated with Hurricane Gloria. Upon arriving at the scene, PADEP found a 50-mile oil slick in the Susquehanna River emanating from the BMT outfall. EPA was notified and, with the assistance of PADEP, began cleanup activities under §311 of the Clean Water Act.

This response became an emergency removal under §104 of CERCLA when chemical analysis confirmed the presence of bis(2-ethylhexyl) phthalate and dichlorobenzene, which are federally regulated hazardous substances. EPA removed and disposed of 161,000 pounds of oil/chemical-soaked debris and soil from the Site. After further testing and investigation, EPA determined that the 1985 discharge was linked to the illegal dumping that caused the 1979 discharge. EPA spent over $735,000 on the 1985 removal action.

On May 20, 1986, the BMT site was once again proposed for inclusion on the NPL and was listed on the NPL on July 1, 1987.

After both the 1979 and 1985 discharges, hydrogeologic studies were performed by EPA. These studies concluded that a low probability of a future discharge exists under normal day to day conditions but another discharge may occur anytime a large storm impacts the area.

Basis for Taking Action

The Remedial Investigation ("RI") attempted to re-construct the operations of the oil recycling contractor and the dispatching tanker trailers carrying waste materials to the HWAS borehole. Based on reports from different refinery facilities and records, it is estimated that between 1,500,000 to 2,700,000 gallons of liquid wastes were disposed into the mine workings. The RI report further estimates the oil content of the liquid to be between 330,000 to 490,000 gallons. In reviewing the two oil discharge events from 1979 and 1985, PADEP and EPA have estimated that between 276,000 and 400,000 gallons were discharged during these events. Therefore, the RI concluded that there still could be 50,000 to 90,000 gallons of oil contained in the mine workings.

Hazardous Substances

In 1985 the analysis of the oily hydrocarbon discharge from the BMT revealed hazardous substances which triggered CERCLA jurisdiction and funding to address the discharge.

The oily waste containing these hazardous substances moved through the mine workings into the BMT and discharged into the Susquehanna River at the BMT outfall. The RI also shows that some hazardous substances and oily waste still remain in the mine workings and present a potential risk if another flushout should occur. Therefore, EPA evaluated two discharge conditions, a flushout condition and a day to day condition, to describe the nature and extent of releases that could occur at the outfall of the Tunnel.

The following table from the 1996 ROD shows the two conditions and the concentrations of the contaminants of concern that were reported during: 1) the 1985 flushout of the oily liquid wastes, and 2) the day to day concentrations as reported in the RI:

Contaminant Concentration in Flushout Events		
Compound	1985 Flushout – Maximum Concentration (parts per billion)	Day to Day – Maximum concentration (parts per billion)
Benzene	26.8	Non detect (ND)
Carbon Tetrachloride	13.6	ND

Chloroform	7	ND
Ethylbenzene	ND	9
Methylene Chloride	795	ND
Toluene	11	4
Trichloroethene	ND	ND
Total Xylenes	ND	59
bis (2ethylhexyl) phthalate	36	8
4-Bromophenyl phenyl ether	166	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	26.5	ND
1,4-Dichlorobenzene	ND	ND
Diethyl phthalate	5	ND
Dimethyl phthalate	5	ND
Di-n-octyl phthalate	5	ND
Naphthalene	ND	ND
Phenol	ND	ND
Cyanide	1	ND
Oil	NA	100
ND – Non detect NA – Not analyzed		

Hydrogeologic Investigation

EPA hydrogeologic studies conducted in 1981 and 1987 demonstrated that contaminants injected into the HWAS borehole migrated downward through the Red Ash mine workings and into the Bottom Red Ash workings. The contaminants followed the structure contours of the Bottom Red Ash mine workings, entered an underground east-west drainage ditch and then reached the tunnel discharge location on the eastern side of the Susquehanna River. During the investigation additional boreholes were drilled, some existing boreholes were reopened, and the monitoring, sampling and analytic program was conducted. One of the goals was to determine if any accumulation of contaminants was present underground. Using 14 different boreholes, the RI detected some of the hazardous substances detected in the 1985 release in 10 of the boreholes. The highest concentrations were found in the HWAS borehole. The frequency of detection and the concentrations decreased as the borehole locations followed the main contaminant migration pathway along the Bottom Red Ash workings toward the east-west drainage ditch. The second part of the hydrogeologic investigation attempted to correlate rainfall events with an increase in water flow into the east-west drainage ditch and ultimately to the tunnel discharge location. In general each storm produced a different rainfall amount and occurred over a different time duration. The size of storms is assessed by comparing return periods. A storm's return period is the average number of years within which the storm's rainfall amount will be equaled or exceeded. As an example, the September 1985 storm caused by Hurricane Gloria had a return period of 55 years and can be described as a "55 year storm". It is estimated that flow from the BMT exceeded

42 million gallons per day during that rainfall event. During the RI three storms did exceed the 1 year storm level, and these storms did increase the volume of water exiting the tunnel. Therefore, the RI concluded that measurement of storm rainfall can be used to predict the actual flow from the BMT.

Surface Water and Sediment Investigation

Surface water samples were collected during the RI at three different locations on the eastern side of the Susquehanna River. The first location was north of the tunnel discharge location. The second was located at the Bridge just south of the discharge location (Fort Jenkins Bridge) and the third was located at the next bridge further south (Water Street Bridge). The surface water analytical results did not show detectable concentrations of the hazardous substances at any of the three locations. Sediment samples were also collected and analyzed from the same three locations. Three of the hazardous substances were detected, but they did not exceed sediment quality criteria based on PADEP Water Quality Criteria for the protection of fresh water aquatic life. Generally volatile, semi-volatile and petroleum compounds were detected in sediments at higher levels at the bridge just south of the tunnel discharge. These detections could be attributed to the previous discharge incidents.

Biota Investigation

A macro invertebrate investigation was conducted as part of the RI and samples were collected near the three locations where surface water and sediment samples were taken. Generally, the macro invertebrate community improves as the distance from the Lackawanna River and the Susquehanna River confluence increases; this confluence is a short distance upriver from the BMT discharge. The total number of specimens was smallest at a location north of the BMT and greatest at the second bridge south of the tunnel. There were no changes directly attributable to the Butler Tunnel discharges on a day to day basis. The Lackawanna River quality is the factor that probably explains the results of the river biota study.

Risk Conclusions

The discharge of oil and hazardous substances from the BMT outfall did not reveal significant risks to human health or ecological receptors under non-flushout conditions. However, the ROD indicated that if another flushout should occur, "there would be damaging effect on both river bank vegetation and aquatic life in the river." In addition, potential risks to human health were concluded to exist during a potential future flushout condition from human exposure to oil and hazardous substances, as well as a potential risk for public water intakes located along the Susquehanna River. Broadly, with regard to risk from the Site, the ROD concluded that, "actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response actions selected in the ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment."

IV. Remedial Actions

Remedy Selection

Based primarily on the information collected during the RI/FS, EPA issued a ROD for the Site on July 15, 1996. The ROD selected remedy consisted of the following components:

- The establishment of an Administrative Center. The Administrative Center is to be maintained for 10 years following its establishment. The Administrative Center is established and maintained to perform the following functions: (1) monitor rainfall in the Site area; (2) monitor flow from the BMT; (3) measure water levels in boreholes; (4) collect water samples for chemical analysis; and (5) monitor precipitation forecasts for the Site area. These functions are performed to predict when a future flushout from the BMT may occur.
- The following activities are to be performed to prepare for future flushouts: construction of an access road to the Susquehanna River and a boat ramp; construction of anchor points along the river to allow for the deployment of oil control/recovery booms; purchasing and staging oil control/recovery booms and associated response equipment (including a boat) near the Site, to allow for accelerated flushout response and cleanup.
- Preparation of a response plan detailing appropriate response procedures should a flushout occur. The response plan also includes guidelines for the storage and upkeep of response equipment (booms, boat, etc.), deployment exercises, etc.
- Development of a community information program for local municipal officials and residents. The program is designed to discourage the use of mine ventilation boreholes for waste disposal activities.
- Closure of six boreholes used during the RI.
- Establishment of deed restrictions to prohibit excavation or disturbance of the Site.
- Funding to conduct two cleanup efforts comparable to the 1985 flushout event.
- An Operations and Maintenance (O&M) plan for the selected remedy is required. The performance of the Administrative Center's functions shall be carefully monitored and the system may be modified, as warranted by the performance data collected during operation.

Remedy Implementation

Under a remedial design and remedial action consent decree entered by the United States District Court for the Middle District of Pennsylvania on February 15, 2001, the settling defendants established the BMT Site Trust Fund (the "Trust Fund") to carry out obligations under the consent decree. The Trustees are authorized to administer the Trust Fund to carry out the settling defendants' consent decree obligations and to obtain from them the funds necessary to do so. The consent decree also requires the Trustees to develop a remedial design (RD) and implement the remedial action (RA) at the Site. The performance standards and other requirements of the ROD are incorporated into various provisions of the consent decree. The RD for the Site was completed on December 30, 2003, when the final RD report was approved by EPA.

Remedial Action construction activities, as prescribed in the RD included:

- Improving and using a warehouse in Pittston to store response equipment, including: trot line deployment equipment and a recovery barge; two 26' work boats; two oil skimmers; shore-based trot line tension system, motor and trailer; booms; debris barrier; barricade fencing; absorbent pads; portable pressure washer; crew shelter tents; equipment trailers; decontamination pools; and diesel-powered light stands.
- Constructing a boat launch ramp and access roads.
- Installing the Tunnel flow monitoring equipment and monitoring system.
- Constructing five in-river permanent moorings, to allow for deployment and control of oil control/recovery booms.
- Constructing 11 anchor points (eight pad-eyes and three fair-leads) and four winch pads. Fair-leads/pad-eyes are concrete pilings installed on the banks of the Susquehanna River, and topped with steel rings, to allow for deployment and control of oil control/recovery booms. The fair-leads/pad-eyes were installed along the river to accommodate boom control at different river heights. The winch pads are fitted with hydraulic motors that drive multi-reduction planetary gear to achieve needed line pull to fit current river conditions.
- Preparing the response preparedness plan, which covers storage and upkeep of the booms and equipment; response and deployment procedures; access to utilities; practiced deployment exercises; and handling, transportation and disposal of hydrocarbon material from within the boom system and from along the shoreline.
- Implementing the Community Information Program, designed to discourage continued use of boreholes for waste disposal.
- Closing seven boreholes used during the RI at the Site, including the HWAS borehole. The ROD specified that six RI-related boreholes were to be closed as part of the RA. However, EPA and PADEP later determined that a seventh borehole, the HWAS borehole, should also be properly abandoned during the RA. The seven specific boreholes that were closed in accordance with the Remedial Design were: HWAS, BH-2A1, BH-2A2, BH-2A3, BH-2C, BH-8A1, and BH-S1.

The Trustees perform operations and maintenance of the Selected Remedy components and provide financial assurance for a limited number of oil flush out events. The time-frame for the operations and maintenance activities and financial assurance is 10 years after EPA provided certification to the Trustees that the remedial action construction activities are complete.

On August 29, 2005, EPA and PADEP performed a pre-final inspection at the Site. The pre-final inspection was attended by representatives of EPA and its oversight contractors, PADEP, and the

Trustees and their contractors. During the pre-final inspection, a representative number of boats and containment and absorbent booms were found to be ready for use. Additionally, newly installed access roads, anchors, and boat launch areas were found to be ready for use. Based on the pre-final inspection, the remedy prescribed in the 1996 ROD for the BMT was constructed at the Site as outlined in the final RD report.

EPA documents indicate that the Site achieved construction completion status when the Preliminary Close-Out Report was signed on September 8, 2005.

The remedial action completion report was approved by EPA on October 2, 2008.

System Operation/Operation and Maintenance

Site-related Operations and Maintenance (O&M) activities are overseen by de maximis, inc. (PRP Project Coordinator), on behalf of the Trustees, and performed by a team of contractors and subcontractors. O&M activities for the Site are described in the Site Operations and Maintenance Manual.

O&M activities performed at the Site include:

1. Sampling of the borehole 11 (BH-11) located near the HWAS station, and the BMT outfall.
2. Maintaining the response equipment which is stored in a warehouse in the City of Pittston, PA.
3. Performing monitoring of Site weather, rainfall, flow from the BMT, and Susquehanna River conditions, to continuously evaluate flushout potential, and factors related to implementing a potential oil recovery response on the river.
4. Inspection and maintenance of the permanent features of the remedy which exist on the banks of the Susquehanna River, including pad-eyes, winch pads, access roads, staging areas, a boat ramp, etc.
5. Updating the Flushout Preparedness/Response Plan.
6. Performing off-river and on-river exercises to prepare for a flushout of oil from the BMT.

<u>Training and Response activities</u>

Training with the on-river oil recovery response system has occurred annually by the PRP group with oversight by EPA and PADEP. Training activities included on-river deployment of oil recovery booms, and on-river deployment of oil skimming equipment. A summary of training activities is included as Appendix 5 to this Five Year Review report.

Weather Monitoring

Since September 2005 (construction completion PCOR) the Administrative Center has monitored 12 storms of considered significance (capable of producing greater than 2 inches of rain in a 24 hour period with additional precipitation forecast). Four of the twelve storms produced in excess of 4 inches of rain and were monitored following approved procedures. In addition, Hurricane Ivan passed through the area during remedial action activities in September 2004 producing over 5 inches of rain in less than 24 hours. This storm was monitored by the remedial action contractor.

During each of the referenced storms, response personnel visited the Site to observe tunnel discharge. An oil discharge from the Butler Mine Tunnel did not occur.

In 2011, storms Irene and Lee passed through the project area over a very short period of time. On August 27, 2011 Hurricane Irene passed through area dropping 3.7 inches of rain at the Site in less than 24 hours. A week later, Tropical Storm Lee impacted the project area dropping 6+ inches of rain over several days. The combination of the two storms created widespread flooding and due to the storm's severity EPA requested that water quality samples be collected from the tunnel discharge for laboratory analysis and visual inspection. The laboratory results did not indicate the presence of COCs in the tunnel discharge.

Borehole and Tunnel Outfall Monitoring

The Remedial Action Sampling and Analysis Plan (SAP) describes borehole and BMT outfall sampling activities to be performed as part of the remedial action. Sampling of boreholes and the BMT outfall is performed to evaluate the environmental condition of the HWAS source area, and the water quality at the BMT outfall. The SAP indicates that the following locations are to be sampled semi-annually for the first four years of the remedial action, with an evaluation of the need for continued sampling to be performed during Five-Year Reviews of the Site:

- Borehole-7 (BH-7)
- BH-11
- BH-12
- BMT outfall to Susquehanna River

The following are borehole analytes:

- Benzene
- Carbon Tetra Chloride
- Chloroform
- Ethylbenzene
- Methylene Chloride
- Toluene

- Trichloroethene
- Total Xylenes
- Bis(2-ethylhexyl)phthalate
- 4-Bromophenyl phenyl ether
- 1,2-dichlorobenzene
- 1,3-dichlorobenzene
- 1,4-dichlorobenzene
- Diethyl phthalate
- Dimethyl phthalate
- Di-n-octyl phthalate
- Napthalene
- Phenol
- Cyanide
- Oil

EPA allowed the closure of BH-7 on July 14, 2005, and allowed the closure of BH-12 on October 29, 2007. BH-7 and BH-12 were closed in response to land development issues where the boreholes were located. EPA allowed the closure of BH-7 and BH-12 because another borehole (BH-11, discussed below), located proximate to the HWAS source area, was considered to represent an adequate sampling point for long-term monitoring of the environmental condition of the HWAS source area.

BH-11, located along Route 315, is considered to be down gradient along the main subsurface contaminant pathway between the HWAS station borehole and the BMT outfall. Of the three boreholes contemplated for sampling and analysis in the SAP, BH-11 is the borehole nearest to the HWAS source area.

Operation and Maintenance Period

The Trustees perform operations and maintenance of the Selected Remedy components and provide financial assurance for a limited number of oil flush out events, in accordance with the consent decree. The time-frame for the operations and maintenance activities and financial assurance is 10 years after EPA provided certification to the Trustees that the remedial action construction activities are complete. Therefore, during the next Five Year Review period the PRPs will no longer be obligated to continue with operation and maintenance activities.

V. Progress Since the Last Five-Year Review

Two recommendations were included in the 2009 Five Year Review report, as follows:

- Long-term access and assurance of integrity of BH-11 must be obtained

- RI boreholes should be properly abandoned or confirmed to have been properly abandoned

On August 29, 2011 EPA determined that access to BH-11 was satisfactory. From 2009-2011, the PRP group documented closure of the RI boreholes indentified in the 2009 Five Year Review report. EPA concluded on August 29, 2011 that the identified boreholes are closed and do not represent a threat to human health or the environment.

VI. Five-Year Review Process

Administrative Components

Members of the local government in the City of Pittston, de maximis, inc. (the Project Coordinator for the Site), and PADEP were notified of the initiation of the Five-Year Review in approximately January 2014.

The Five-Year Review team was led by Mr. Mitch Cron, EPA-Remedial Project Manager (RPM) for the Site.

The review team established the review schedule which included: community involvement; document review; data compilation and review; site inspection; local interviews; and Five-Year Review report development and review.

Community Involvement

The general public in the vicinity of the Site was notified of the performance of the Five-Year Review by publishing an advertisement in the Times Leader newspaper on February 14, 2014. The Times Leader is based out of Wilkes-Barre, Pennsylvania and serves the community in the vicinity of the Site.

Activities to involve the community in the Five-Year Review included interviewing the following individuals:

1. Local government officials
2. Project Coordinator
3. PADEP officials

During the interview, representatives of EPA summarized the findings of the Five-Year Inspection at the Site and asked for any input or concerns about the protectiveness of the remedy.

Document Review

This Five-Year Review consisted of a review of relevant documents including:

- ROD – Signed July 15, 1996
- PCOR – Signed September 8, 2005
- Hydrogeology of the Butler Water Tunnel Hazardous and Toxic Materials Discharge, Pittston, Pa., prepared by R.E. Wright Associates, Inc, dated December 1979.
- Hydrogeology of the Butler Water Tunnel Hazardous and Toxic Materials Discharge, Pittston, Pa. – Phase II Exploration and Monitoring Program, prepared by R.E. Wright Associates, Inc, dated January 1981.
- Phase II Remedial Investigation Report – Butler Mine Tunnel Site, prepared by Gannett Fleming, Inc., dated May 29, 1992.

Data Review

The following reports were reviewed during the performance of this Five-Year Review:

- Borehole monitoring data for the following sampling events: December 2008, July 2009, December 2009, June 2010, December 2010, June 2011, December 2011 June 2012, December 2012, June 2013.

<u>SUMMARY OF BOREHOLE AND TUNNEL OUTFALL SAMPLING</u>

Several boreholes (BH-7, 11, 12) were identified in the remedial design for semi-annual sampling during the remedial action. The boreholes were located along what is expected to be the main contaminant pathway between the HWAS borehole (where contamination was disposed) and the BMT outfall at the Susquehanna River (where contamination discharged to the river in 1979 and 1985). The main contaminant pathway is described in the RI, as follows: "Migration from the HWAS borehole to the Bottom Red Ash vein and thence via the No. 29 Tunnel to the east-west drainage ditch and (Butler Mine) Tunnel in the Red Ash mine workings (main contaminant pathway)." The manner by which BH-7, BH-11, and BH-12 lie along the main contaminant pathway is depicted on Figure 4-14 of the Phase II RI, which is included as Appendix 3 to this Five-Year Review report.

A summary of the sampling and analysis that has been performed at Borehole 11 and BMT outfall during the time period addressed by this Five Year Review is included as Appendix 7.
Review of the BH-11 and BMT Outfall sample results indicates that Site related contamination is still present near the HWAS borehole. Oil and grease can still be identified at the BH-11 sampling location; and the contaminant bis(2-ethylhexyl)phthalate is identified at BH-11 at concentrations above federal drinking water standards. However, water from the mine pool is not used for drinking water. In addition, Bis(2-ethylhexyl)phthalate is not a vapor forming

compound. Volatile compounds identified at BH-11 (e.g. benzene, trichloroethylene) are present at levels below federal drinking water standards. With regard to water coming through the Butler Mine Tunnel and discharging to the Susquehanna River, compounds were not identified above drinking water standards between 2008 and 2013, although oil and grease are sometimes detected.

Site Inspection

A Site inspection was performed on December 11, 2013. The Site inspection was attended by Mitch Cron of EPA, Mark Leipert of EPA, Craig Coslett of de maximis, inc. (PRP Project Coordinator), and members of a PRP subcontractor. The Site Inspection was performed during a borehole and Butler Mine Tunnel outfall sampling event. The purpose of the inspection was to assess the protectiveness of the remedy.

During the inspection, EPA visited certain land-side features associated with the Butler Mine Tunnel response system (winch pads, pad-eyes), as well as the warehouse where response equipment is stored and maintained. EPA did not observe concerns with the remedy during the Site inspection. Photographs taken during the inspection are included in Appendix 2. A Site inspection checklist is included in Appendix 4.

Interviews

The following individuals were interviewed during the performance of the Five-Year Review:

1. Local community officials

Interviews were performed by the EPA Community Involvement Coordinator (CIC) with local community officials. The interviews were performed with elected officials, emergency service providers, and local government officials.

The following paragraph is the "Summary Narrative" from the CIC's notes for interviews conducted as part of this Five Year Review report:

"In general, interviewees are satisfied with the project and think EPA has done everything technologically possible to protect human health and the environment with regards to the mine tunnel response system "

See Appendix 6 for the EPA CIC notes regarding interviews with local government officials.

2. Project Coordinator (de maximis, inc.)

The Project Coordinator did not raise concerns with regard to the protectiveness of the remedy at the Site. However, the Project Coordinator did suggest that EPA, PADEP, and PRP group meet in near future to discuss disposition of the remedy components (boats, monitoring equipment etc) after PRP involvement in the Site ends.

3. PADEP officials

EPA communicated with three PADEP officials during the preparation of this Five Year Review report. The PADEP officials did not identify concerns with regard to the protectiveness of the Superfund remedy at the Site. The PADEP officials did suggest that a final closure report be prepared as part of completion of PRP involvement at the Site. This recommendation is under consideration by EPA, and will be among the issues discussed with the PRPs in preparation for completion of PRP activities at the Site.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The remedy has been constructed and is functioning as intended by the ROD. The following work has been completed as described in the Selected Remedy:

- The establishment of an Administrative Center.
- Landside and in-river improvements have been constructed to facilitate response to future oil flush outs, including access roads, boat ramps, anchor points. Materials to be used during future oil flush outs have been purchased and staged near the BMT oufall, including oil booms, oil skimmers, and boats.
- A response plan has been prepared and is being implemented with regard to response training and preparation activities.
- A community information program regarding the problems associated with disposal of waste into boreholes was prepared and delivered to the public.
- Boreholes associated with the Site have been closed.
- Institutional controls have been established at the Site (see below)
- An operations and maintenance plan for the Site monitoring and response equipment has been prepared and is being implemented.

Institutional Controls

The ROD required the establishment of institutional controls at the Site, as follows: establishment of deed restrictions to prohibit excavation or disturbance of the Site.

Institutional controls, focused on securing long-term access to Site areas along the Susquehanna River which are owned primarily by the City of Pittston and the Redevelopment Authority of the City of Pittston, are necessary to ensure that monitoring and response activities can occur.

Monitoring activities at the Site include real-time monitoring of weather and BMT flow. Access to rainfall and tunnel flow monitoring equipment has been secured as part of the remedial action. Rainfall and tunnel flow monitoring equipment is located proximate to the BMT outfall and its disposition and secured access is described in the Remedial Action Completion Report. Monitoring of the HWAS source area is performed at Borehole-11 (BH-11). Long-term access to BH-11 for purposes of monitoring the HWAS source area is described further below. Access to numerous improvements along the Susquehanna River in the City of Pittston, including pad-eyes, fair-leads, winch-pads, access roads, crane pads, and staging areas, which were constructed as part of the remedial action, is necessary to implement an effective response to a potential future oil flushout from the BMT.

The institutional controls, including easement agreements, which were established as part of the remedial action and establish long-term access to the constructed improvements are described in the Remedial Action Completion Report. The institutional controls include provisions disallowing the disturbance of certain constructed improvements, and limiting access to areas where Site-related improvements are located.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Yes.

Environment health concerns raised by the community in 2011

It should be noted that during the period of time since the last Five Year Review in 2009, community members in the City of Pittston expressed concern that environmental contamination present in the underground abandoned mine features beneath Pittston and possibly related to the Butler Mine Tunnel Superfund Site was resulting in a higher than normal incidence of sickness in their community. EPA requested that the Agency for Toxic Substances and Disease Registry (ATSDR) and the Pennsylvania Department of Health (PADOH) evaluate the citizen concerns regarding higher than normal incidence of disease in their community. As part of this Five Year Review, EPA contacted ATSDR/PADOH for a summary of their conclusions regarding the citizen's concerns. The following summary of environmental health evaluation activities conducted at the Site was received from PADOH:

On May 24, 2011, the PADOH attended a meeting hosted by the EPA in Pittston. PADOH presented a review of the state's cancer registry data and self-reported health surveys.

In February 2012, PADOH published a health consultation on the cancer incidence data review for the City of Pittston. Based on the review, PADOH concluded the Pittston ZIP code had an 11 percent higher cancer incidence rate when compared to the overall state rate, and this difference is statistically significant. Among the specific cancer types, statistically significant elevated rates were found for colon and rectum, lung, and thyroid. However, these cancer types are not closely linked to environmental chemical hazards. The excess of cancers (colon and rectum and thyroid) is not unique to Pittston and was also observed at the county level. In addition, no statistically significant differences in the distribution of cancer were found in the area of concern around Mill and Carroll streets when compared to the remainder of the Pittston ZIP code.

In October 2013 PADOH updated the previous cancer registry data review with 2009 and 2010 cancer registry data in response to a request from a community member who lives near the Butler Mine Tunnel site. The resident requested an updated cancer review. The findings of the updated review are consistent with the 2012 cancer data review for the Pittston Zip code area.

On January 9, 2014, PADOH conducted a conference call with the concerned resident. In the course of the conference call, the resident requested an analysis of the occurrence of polycythemia vera which was not included in the October 2013 update of the cancer registry data. PADOH agreed to conduct such a review. The results of this review were summarized to EPA on May 20, 2014 as follows:

At the request of a resident, PADOH Bureau of Epidemiology (BOE) reviewed the incidence of polycythemia vera and chronic myeloproliferative diseases in the Pittston (18640) Zip code that were reported to the Pennsylvania Cancer Registry for the years 2001 – 2011.

- For polycythemia vera: The number of expected cases for the 18640 Zip code for the period is 3.85 when compared to the Commonwealth as a whole. The number of observed cases for the zip code for the same time frame was 5. The Standard Incidence Ratio (SIR) = 1.30. Due to the small number of cases PADOH does not believe there is an unusual rate of polycythemia occurring in the 18640 Zip code area. In other words, the difference between the observed number of cases of polycythemia in the 18640 zip code does not appear to be the result of a particular factor and most likely can be attributed to random variation.

- The PADOH BOE also compared the rate of chronic myeloproliferative disease in the 18640 Zip code area with the Commonwealth as a whole for the 2001 – 2011 period. The number of expected cases = 1.17. The number of cases observed = 0. The Standard Incidence Ratio for chronic myeloproliferative disease in the 18640 Zip code area for the years 2001 – 2011 is 0. Therefore, there is not an unusual rate or occurrence of chronic myeloproliferative disease in the 18640 Zip code area.

Based on a review of PADOH's activities and conclusions EPA is not aware of environmental health issues associated with the Site.

Vapor Intrusion evaluation

During the Five Year Review EPA evaluated the mine water data to determine the potential for vapor intrusion at the Site. Vapor intrusion can occur when volatile organic compounds present in the subsurface can migrate into building structures above a contaminated area. To complete this evaluation EPA reviewed the mine water data collected at BH-11 (immediately down gradient from the HWAS borehole where the alleged disposal occurred), and mine water data collected from the Butler Mine Tunnel, where the Butler Mine Tunnel discharges into the Susquehanna River.

As discussed above, review of mine water data indicates that Site related contamination is still present near the HWAS borehole. The only Site related contaminant that was identified above federal drinking water standards was bis(2-ethylhexyl)phthalate at BH-11. Bis(2-ethylhexyl)phthalate is not a vapor forming compound. Site-related volatile (vapor forming) compounds identified at BH-11 (e.g. benzene, trichloroethylene) were either not detected or were present at levels below federal drinking water standards. With regard to water coming through the Butler Mine Tunnel and discharging to the Susquehanna River, Site-related compounds were not identified above drinking water standards between 2008 and 2013.

Oil and grease are still detected at BH-11 near the contamination source area, and are sometimes detected at the Butler Mine Tunnel discharge location.

The area in the vicinity of the HWAS source area where oil was identified consists of commercial development (gas stations, hotels, retail development), and major roadways (Route 314, Interstate 81, and Interstate 476).

Vapor forming compounds were not identified in mine water data collected at the Site and therefore vapor intrusion is not expected to be a pathway of concern for the Site.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No. Additional information has not been revealed during the performance of this Five-Year Review that calls into question the protectiveness of the remedy as specified in the ROD.

Technical Assessment Summary

Based on a review of decision documents, O&M documents, monitoring results, interviews with O&M staff, and residents who live in the Site vicinity, and the Site inspection, the remedy appears to be functioning as intended by the ROD. There are no evident changes in the physical conditions of the Site that would affect the protectiveness of the remedy.

VIII. Issues

Table 2- Issues

Issue	**Currently Affects Protectiveness (Y/N)**	**Affects Future Protectiveness (Y/N)**
N/A		

IX. Recommendations and Follow Up Actions

Table 3- Recommendations

Issue	**Recommendations and Follow-Up Actions**	**Party Responsible**	**Oversight Agency**	**Milestone Date**	**Affects Protectiveness**
N/A					

X. Statement on Protectiveness

The remedy at the Site is protective of human health and the environment because the Selected Remedy has been constructed and is operational; weather conditions and BMT flow are monitored in real time to determine when an oil flush out may occur; in the event of an oil flush out a response plan will be implemented using facilities and equipment which have been constructed on-Site or are staged near the Site.

XI. Next Five-Year Review

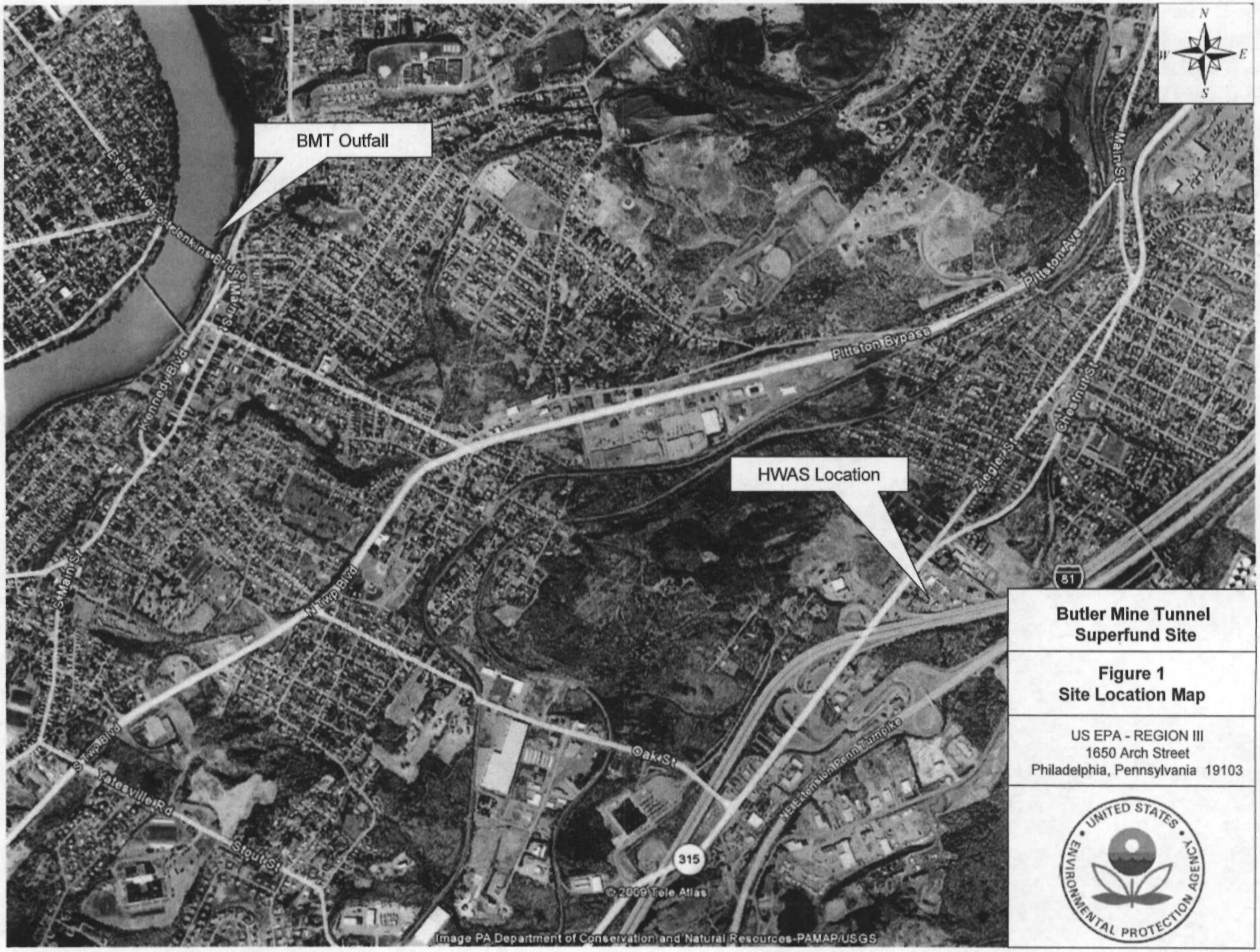
The next Five Year Review will be prepared five years after the issue date of this Five Year Review, in approximately July 2019.

Butler Mine Tunnel Superfund Site

Five Year Review Report

Appendix 1

Site Location Map



Butler Mine Tunnel Superfund Site

Figure 1
Site Location Map

US EPA - REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

Butler Mine Tunnel Superfund Site

Five Year Review Report

Appendix 2

Photographs during Site Inspection (12/11/13)

Borehole 11, near HWAS Service Station. Located along Route 315.

Sampling activities at Borehole 11.

View of oil response boat associated with Site equipment.

View of Butler Mine Tunnel outfall to Susquehanna River. Photograph taken in Pittston, PA.

View of Susquehanna River where Butler Mine Tunnel outfall discharges to river.

View of boat ramp to Susquehanna River; one of a number of features constructed on the river bank to facilitate potential future oil responses.

View of monitoring building, located approximately above the Butler Mine Tunnel near where the Tunnel discharges into the Susquehanna River. In foreground is a concrete pad mounted winch pad, used to control lines during training activities and potential on-river oil responses.

Butler Mine Tunnel Superfund Site

Five Year Review Report

Appendix 3

Phase II RI – Figure 4-14

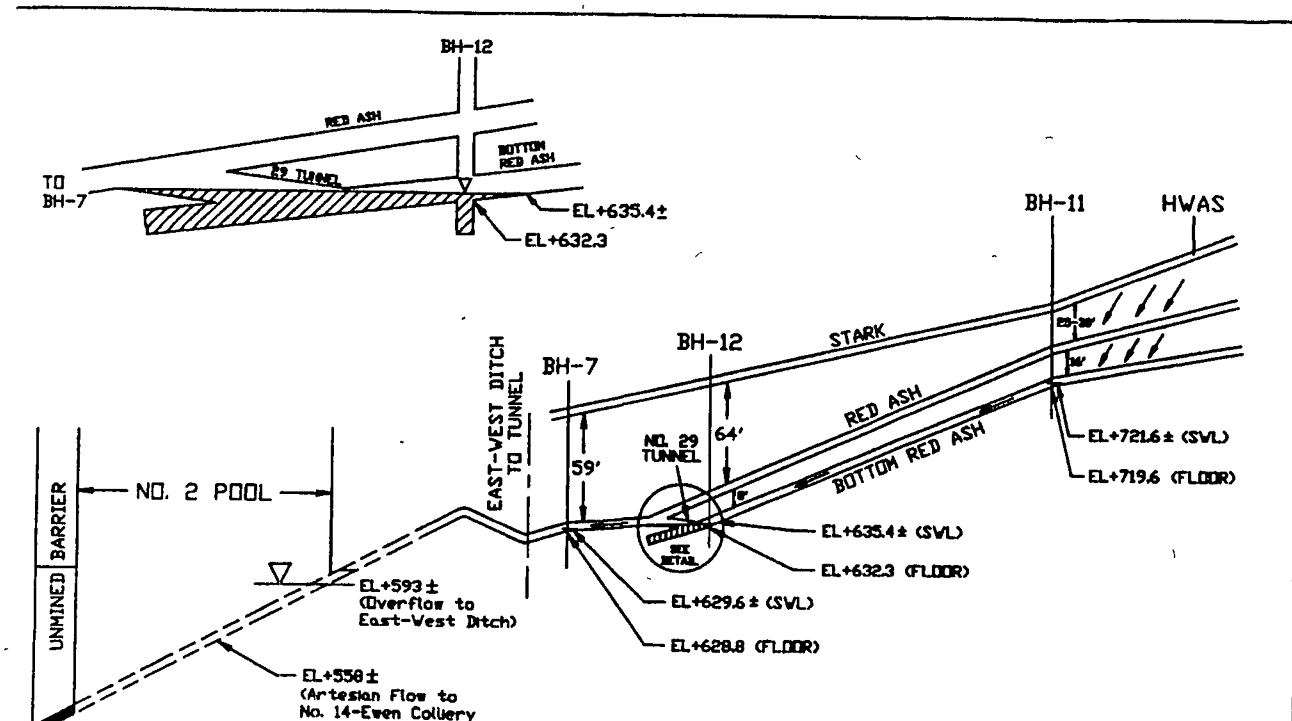


FIGURE 4-14

SCHEMATIC CROSS-SECTION CONTAMINANT MIGRATION PATHWAY

Butler Mine Tunnel Superfund Site

Five Year Review Report

Appendix 4

Five-Year Review Inspection Checklist

Site Inspection Checklist

5/14/14

I. SITE INFORMATION	
Site name: BUTLER MINE TUNNEL SUPERFUND SITE	**Date of inspection: DECEMBER 11, 2013**
Location and Region: PITTSTON, LUZERNE COUNTY, PA. EPA REGION III	**EPA ID:**
Agency, office, or company leading the five-year review: EPA REGION III, HSCD	**Weather/temperature: COLD, WINDY, OVERCAST**

Remedy Includes (Check all that apply)

- ■ Landfill cover/containment
- ■ Access controlsX
- ■ Institutional controlsX
- ■ Groundwater pump and treatment
- ■ Surface water collection and treatment
- ■ OtherX
- ■ Monitored natural attenuation
- ■ Groundwater containment
- ■ Vertical barrier walls

REMEDY CONSISTS OF WEATHER/RAINFALL MONITORING EQUIPMENT, AS WELL AS STAGED EQUIPMENT AND CONSTRUCTED FEATURES TO FACILITATE ON-RIVER OIL RECOVERY IN THE EVENT OF AN OIL FLUSHOUT FROM THE BUTLER MINE TUNNEL FOR CONTEXT, THE LAST OIL FLUSHOUT WAS 1985

Attachments: ■ Inspection team roster attached - LISTED IN FYR ■ Site map attached – FYR APPENDIX 1

II. INTERVIEWS (Check all that apply)

1 **O&M site manager** N/A________________ ________________ ________

Name Title Date

Interviewed ■ at site ■ at office ■ by phone Phone no ____________

Problems, suggestions; ■ Report attached (NOTE THERE IS NO ON-SITE MANAGER)

2. **O&M staff** CRAIG COSLETT, PRP PROJECT COORDINATOR, DECEMBER 11, 2013

Name Title Date

Interviewed ■ at siteX ■ at office ■ by phone Phone no (610) 435-1151

Problems, suggestions, ■ Report attached OVERALL CRAIG INDICATED THAT THE SUPERFUND REMEDY WAS FUNCTIONING AS DESIGNED CRAIG SUGGESTED THAT THE PRPS, EPA, AND PADEP MEET SOON TO DISCUSS COMPLETION OF PRP INVOLVEMENT IN REMEDY

3 **Local regulatory authorities and response agencies** (i.e , State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc) Fill in all that apply

LARRY JOHNSON, EPA CIC, INTERVIEWED LOCAL OFFICIALS HIS RECORDS OF SUCH INTERVIEWS WILL BE INCLUDED IN FYR REPORT AS AN APPENDIX

Agency ______________________
Contact ______________________ ______________ ________ ________
Name Title Date Phone no
Problems; suggestions, ■ Report attached ______________________

Agency ______________________
Contact ______________________ ______________ ________ ________
Name Title Date Phone no.
Problems, suggestions, ■ Report attached ______________________

Agency ______________________
Contact ______________________ ______________ ________ ________
Name Title Date Phone no
Problems, suggestions; ■ Report attached ______________________

Agency ______________________
Contact ______________________ ______________ ________ ________
Name Title Date Phone no
Problems, suggestions, ■ Report attached ______________________

4 **Other interviews** (optional) ■ Report attached

EPA COMMUNICATED WITH THREE PADEP OFFICIALS ON JANUARY 29, 2014 (JOE IANUZZO, PAUL PANEK, BOB LEWIS) DURING THE PREPARATION OF THE FIVE YEAR REVIEW REPORT. THE PADEP OFFICIALS DID NOT IDENTIFY CONCERNS WITH REGARD TO THE PROTECTIVENESS OF THE SUPERFUND REMEDY AT THE SITE. THE PADEP OFFICIALS DID SUGGEST THAT A FINAL CLOSURE REPORT BE PREPARED AS PART OF COMPLETION OF PRP INVOLVEMENT AT THE SITE.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)
1. **O&M Documents** ■ O&M manual ■ Readily availableX ■ Up to date ■ N/A ■ As-built drawings ■ Readily availableX ■ Up to date ■ N/A ■ Maintenance logs ■ Readily availableX ■ Up to date ■ N/A Remarks
2 **Site-Specific Health and Safety Plan** ■ Readily availableX ■ Up to date ■ N/A ■ Contingency plan/emergency response plan ■ Readily availableX ■ Up to date ■ N/A Remarks
3 **O&M and OSHA Training Records** ■ Readily availableX ■ Up to date ■ N/A Remarks OVERALL TRAINING RECORDS FOR SITE RELATED TRAINING ARE AVAILABLE
4. **Permits and Service Agreements ---- THIS IS NOT APPLICABLE** ■ Air discharge permit ■ Readily available ■ Up to date ■ N/A ■ Effluent discharge ■ Readily available ■ Up to date ■ N/A ■ Waste disposal, POTW ■ Readily available ■ Up to date ■ N/A ■ Other permits ■ Readily available ■ Up to date ■ N/A Remarks
5 **Gas Generation Records** ■ Readily available ■ Up to date ■ N/AX Remarks
6 **Settlement Monument Records** ■ Readily available ■ Up to date ■ N/AX Remarks
7 **Groundwater Monitoring Records** ■ Readily available ■ Up to date ■ N/AX Remarks
8 **Leachate Extraction Records** ■ Readily available ■ Up to date ■ N/AX Remarks
9 **Discharge Compliance Records** ■ Air ■ Readily available ■ Up to date ■ N/AX ■ Water (effluent) ■ Readily available ■ Up to date ■ N/AX Remarks THE BUTLER MINE TUNNEL DOES NOT HAVE A DISCHARGE PERMIT; HOWEVER, BI-ANNUAL SAMPLES OF THE WATER FROM THE BUTLER MINE TUNNEL ARE COLLECTED BY PRPS A DISCUSSION OF SAMPLING RESULTS IS INCLUDED IN FYR REPORT
10 **Daily Access/Security Logs** ■ Readily available ■ Up to date ■ N/AX Remarks THERE ARE NOT DAILY ACTIVITIES AT THE SITE

IV. O&M COSTS

1 **O&M Organization**
■ State in-house ■ Contractor for State
■ PRP in-houseX ■ Contractor for PRPX
■ Federal Facility in-house ■ Contractor for Federal Facility
■ Other____

2 **O&M Cost Records**
■ Readily available ■ Up to date
■ Funding mechanism/agreement in placeX – CONSENT DECREE IN PLACE FOR O&M
Original O&M cost estimate__________________ ■ Breakdown attached

Total annual cost by year for review period if available

From__________ Date	To__________ Date	__________ Total cost	■ Breakdown attached
From__________ Date	To__________ Date	__________ Total cost	■ Breakdown attached
From__________ Date	To__________ Date	__________ Total cost	■ Breakdown attached
From__________ Date	To__________ Date	__________ Total cost	■ Breakdown attached
From__________ Date	To__________ Date	__________ Total cost	■ Breakdown attached

3 **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons ____

V. ACCESS AND INSTITUTIONAL CONTROLS ■ ApplicableX ■ N/A

A. Fencing

1 **Fencing damaged** ■ Location shown on site map ■ Gates securedX ■ N/A
Remarks OVERALL SECURITY AT SITE LOOKED OK

B. Other Access Restrictions

1 **Signs and other security measures** ■ Location shown on site map ■ N/AX
Remarks____

C. Institutional Controls (ICs)
1 **Implementation and enforcement** Site conditions imply ICs not properly implemented ■Yes ■NoX ■N/A Site conditions imply ICs not being fully enforced ■Yes ■NoX ■N/A Type of monitoring (*e g* , self-reporting, drive by) ____ Frequency ____ Responsible party/agency ____ Contact ____ Name ____ Title ____ Date ____ Phone no. Reporting is up-to-date ■Yes ■No ■N/A Reports are verified by the lead agency ■Yes ■No ■N/A Specific requirements in deed or decision documents have been met ■YesX ■No ■N/A Violations have been reported ■Yes ■No ■N/A Other problems or suggestions ■Report attached IMPLEMENATION OF ICS IS SATISFACTORY – THIS ISSUE WAS EVALUATED DURING PERIOD BETWEEN 2009 AND 2014 FIVE YEAR REVIEWS
2 **Adequacy** ■ICs are adequateX ■ICs are inadequate ■N/A Remarks ICs SEEM ADEQUATE, AT PRESENT ICs MAINTAIN ACCESS TO RESPONSE AREAS ALONG SUSQUEHANNA RIVER
D. General
1. **Vandalism/trespassing** ■Location shown on site map ■No vandalism evidentX Remarks PRP CONTRACTOR INDICATED THAT SOME GRAFITTI HAS BEEN REMOVED FROM MONITORING BUILDING OVER BUTLER MINE TUNNEL OUTFALL DURING FYR PERIOD (2009-2014)
2. **Land use changes on site** ■N/A Remarks NO
3 **Land use changes off site**■N/A Remarks RETAIL DEVELOPMENT HAS OCCURRED ALONG ROUTE 315 WEST OF THE HI WAY AUTO SERVICE STATION
VI. GENERAL SITE CONDITIONS
A. Roads ■ApplicableX ■N/A
1 **Roads damaged** ■Location shown on site map ■Roads adequateX ■N/A Remarks ACCESS ROADS TO RESPONSE AREAS ALONG SUSQUEHANNA RIVER SHOWED SOME SIGNS OF RUTTING/WEAR DURING THE SITE INSPECTION, HOWEVER THEY APPEARED TO BE OK FOR USE DURING TRAINING/RESPONSE ACTIVITIES

B. Other Site Conditions
Remarks OVERALL THE ELEMENTS OF THE SITE APPEAR TO BE IN GOOD CONDITION, THE BH-11 HAS BEEN IMPROVED, THE RESPONSE WAREHOUSE APPEARED TO BE IN GOOD ORDER/CONDITION, AND RIVER SIDE SITE IMPROVEMENTS APPEARED TO BE IN SATISFACTORY CONDITION

VII. LANDFILL COVERS ■ Applicable ■ N/AX

NO LANDFILL COVER IS-PRESENT AT THE BUTLER MINE TUNNEL SUPERFUND SITE

A. Landfill Surface

1. **Settlement** (Low spots) ■ Location shown on site map ■ Settlement not evident
   Areal extent______________ Depth____________
   Remarks____

2. **Cracks** ■ Location shown on site map ■ Cracking not evident
   Lengths____________ Widths____________ Depths____________
   Remarks____

3. **Erosion** ■ Location shown on site map ■ Erosion not evident
   Areal extent______________ Depth____________
   Remarks____

4 **Holes** ■ Location shown on site map ■ Holes not evident
   Areal extent______________ Depth____________
   Remarks____

5. **Vegetative Cover** ■ Grass ■ Cover properly established ■ No signs of stress
   ■ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks____

6. **Alternative Cover (armored rock, concrete, etc.)** ■ N/A
   Remarks____

7. **Bulges** ■ Location shown on site map ■ Bulges not evident
   Areal extent______________ Height____________
   Remarks____

8 **Wet Areas/Water Damage** ■ Wet areas/water damage not evident
   ■ Wet areas ■ Location shown on site map Areal extent____________
   ■ Ponding ■ Location shown on site map Areal extent____________
   ■ Seeps ■ Location shown on site map Areal extent____________
   ■ Soft subgrade ■ Location shown on site map Areal extent____________
   Remarks____

9	**Slope Instability** ■ Slides ■ Location shown on site map ■ No evidence of slope instability Areal extent______________ Remarks____ ____
B. Benches	■ Applicable ■ N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel)
1.	**Flows Bypass Bench** ■ Location shown on site map ■ N/A or okay Remarks____ ____
2.	**Bench Breached** ■ Location shown on site map ■ N/A or okay Remarks____ ____
3	**Bench Overtopped** ■ Location shown on site map ■ N/A or okay Remarks____ ____
C. Letdown Channels	■ Applicable ■ N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)
1	**Settlement** ■ Location shown on site map ■ No evidence of settlement Areal extent______________ Depth____________ Remarks____ ____
2	**Material Degradation** ■ Location shown on site map ■ No evidence of degradation Material type______________ Areal extent____________ Remarks____ ____
3	**Erosion** ■ Location shown on site map ■ No evidence of erosion Areal extent______________ Depth____________ Remarks____ ____

4	**Undercutting** ■ Location shown on site map ■ No evidence of undercutting Areal extent______________ Depth____________ Remarks________________________________	
5	**Obstructions** Type__________________ ■ No obstructions ■ Location shown on site map Areal extent______________ Size___________ Remarks________________________________	
6	**Excessive Vegetative Growth** Type__________________ ■ No evidence of excessive growth ■ Vegetation in channels does not obstruct flow ■ Location shown on site map Areal extent______________ Remarks________________________________	
D. Cover Penetrations ■ Applicable ■ N/A		
1	**Gas Vents** ■ Active ■ Passive ■ Properly secured/locked ■ Functioning ■ Routinely sampled ■ Good condition ■ Evidence of leakage at penetration ■ Needs Maintenance ■ N/A Remarks________________________________	
2.	**Gas Monitoring Probes** ■ Properly secured/locked ■ Functioning ■ Routinely sampled ■ Good condition ■ Evidence of leakage at penetration ■ Needs Maintenance ■ N/A Remarks________________________________	
3	**Monitoring Wells** (within surface area of landfill) ■ Properly secured/locked ■ Functioning ■ Routinely sampled ■ Good condition ■ Evidence of leakage at penetration ■ Needs Maintenance ■ N/A Remarks________________________________	
4.	**Leachate Extraction Wells** ■ Properly secured/locked ■ Functioning ■ Routinely sampled ■ Good condition ■ Evidence of leakage at penetration ■ Needs Maintenance ■ N/A Remarks________________________________	
5	**Settlement Monuments** ■ Located ■ Routinely surveyed ■ N/A Remarks________________________________	

E. Gas Collection and Treatment ■ Applicable ■ N/A
1 **Gas Treatment Facilities** ■ Flaring ■ Thermal destruction ■ Collection for reuse ■ Good condition ■ Needs Maintenance Remarks________________________
2 **Gas Collection Wells, Manifolds and Piping** ■ Good condition ■ Needs Maintenance Remarks________________________
3 **Gas Monitoring Facilities** (*e g* , gas monitoring of adjacent homes or buildings) ■ Good condition ■ Needs Maintenance ■ N/A Remarks________________________
F. Cover Drainage Layer ■ Applicable ■ N/A
1. **Outlet Pipes Inspected** ■ Functioning ■ N/A Remarks________________________
2 **Outlet Rock Inspected** ■ Functioning ■ N/A Remarks________________________
G. Detention/Sedimentation Ponds ■ Applicable ■ N/A
1 **Siltation** Areal extent__________ Depth__________ ■ N/A ■ Siltation not evident Remarks________________________
2 **Erosion** Areal extent__________ Depth__________ ■ Erosion not evident Remarks________________________
3 **Outlet Works** ■ Functioning ■ N/A Remarks________________________
4. **Dam** ■ Functioning ■ N/A Remarks________________________

H. Retaining Walls	■ Applicable	■ N/A	
1	**Deformations** ■ Location shown on site map ■ Deformation not evident Horizontal displacement________ Vertical displacement________ Rotational displacement________ Remarks________		
2	**Degradation** ■ Location shown on site map ■ Degradation not evident Remarks________		
I. Perimeter Ditches/Off-Site Discharge	■ Applicable	■ N/A	
1	**Siltation** ■ Location shown on site map ■ Siltation not evident Areal extent________ Depth________ Remarks________		
2	**Vegetative Growth** ■ Location shown on site map ■ N/A ■ Vegetation does not impede flow Areal extent________ Type________ Remarks________		
3	**Erosion** ■ Location shown on site map ■ Erosion not evident Areal extent________ Depth________ Remarks________		
4	**Discharge Structure** ■ Functioning ■ N/A Remarks________		
VIII. VERTICAL BARRIER WALLS	■ Applicable	■ N/AX	
THERE ARE NO VERTICAL BARRIER WALLS AT THE BUTLER MINE TUNNEL SUPERFUND SITE			
1	**Settlement** ■ Location shown on site map ■ Settlement not evident Areal extent________ Depth________ Remarks________		
2	**Performance Monitoring** Type of monitoring________ ■ Performance not monitored Frequency________ ■ Evidence of breaching Head differential________ Remarks________		

IX. GROUNDWATER/SURFACE WATER REMEDIES ■ Applicable ■ N/AX THERE IS NO GROUND WATER OR SURFACE WATER REMEDY ASSOCIATED WITH THE SITE – THE SITE IS WEATHER AND TUNNEL MONITORING TO PREDICT OIL FLUSHOUT FROM BUTLER MINE TUNNEL + PREPARATION/EXECUTION OF NECESSARY RESPONSES
A. Groundwater Extraction Wells, Pumps, and Pipelines ■ Applicable ■ N/A
1 **Pumps, Wellhead Plumbing, and Electrical** ■ Good condition ■ All required wells properly operating ■ Needs Maintenance ■ N/A Remarks________________________________
2 **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ■ Good condition ■ Needs Maintenance Remarks________________________________
3 **Spare Parts and Equipment** ■ Readily available ■ Good condition ■ Requires upgrade ■ Needs to be provided Remarks________________________________
B. Surface Water Collection Structures, Pumps, and Pipelines ■ Applicable ■ N/A
1. **Collection Structures, Pumps, and Electrical** ■ Good condition ■ Needs Maintenance Remarks________________________________
2 **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ■ Good condition ■ Needs Maintenance Remarks________________________________
3 **Spare Parts and Equipment** ■ Readily available ■ Good condition ■ Requires upgrade ■ Needs to be provided Remarks________________________________

C. Treatment System	■ Applicable ■ N/A
1	**Treatment Train** (Check components that apply) ■ Metals removal ■ Oil/water separation ■ Bioremediation ■ Air stripping ■ Carbon adsorbers ■ Filters ______ ■ Additive (*e g*, chelation agent, flocculent) ______ ■ Others ______ ■ Good condition ■ Needs Maintenance ■ Sampling ports properly marked and functional ■ Sampling/maintenance log displayed and up to date ■ Equipment properly identified ■ Quantity of groundwater treated annually ______ ■ Quantity of surface water treated annually ______ Remarks ______
2	**Electrical Enclosures and Panels** (properly rated and functional) ■ N/A ■ Good condition ■ Needs Maintenance Remarks ______
3.	**Tanks, Vaults, Storage Vessels** ■ N/A ■ Good condition ■ Proper secondary containment ■ Needs Maintenance Remarks ______
4	**Discharge Structure and Appurtenances** ■ N/A ■ Good condition ■ Needs Maintenance Remarks ______
5.	**Treatment Building(s)** ■ N/A ■ Good condition (esp roof and doorways) ■ Needs repair ■ Chemicals and equipment properly stored Remarks ______
6.	**Monitoring Wells** (pump and treatment remedy) ■ Properly secured/locked ■ Functioning ■ Routinely sampled ■ Good condition ■ All required wells located ■ Needs Maintenance ■ N/A Remarks ______

D. Monitoring Data – MONITORING DATA DOES EXIST FOR BOREHOLE 11 – NEAR SOURCE AREA AND FROM BUTLER MINE TUNNEL OUTFALL TO SUSQUEHANNA RIVER	
1	Monitoring Data ■ Is routinely submitted on timeX ■ Is of acceptable qualityX

2.	Monitoring data suggests ■ Groundwater plume is effectively contained ■ Contaminant concentrations are declining MONITORING DATA SUGGESTS SOME SITE RELATED CONTAMINANTS ARE STILL PRESENT IN MINE WATER NEAR HI WAY AUTO SERVICE STATION SITE RELATED CONTAMINANTS ARE VERY RARELY DETECTED IN WATER DISCHARGING THROUGH THE BUTLER MINE TUNNEL TO THE SUSQUEHANNA RIVER

D. Monitored Natural Attenuation – NOT PART OF REMEDY	
1	**Monitoring Wells** (natural attenuation remedy) ■ Properly secured/locked ■ Functioning ■ Routinely sampled ■ Good condition ■ All required wells located ■ Needs Maintenance ■ N/AX Remarks

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy An example would be soil vapor extraction

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed Begin with a brief statement of what the remedy is to accomplish (i e , to contain contaminant plume, minimize infiltration and gas emission, etc.)

OVERALL THE PURPOSE OF THE REMEDY IS TO 1) MONITOR WEATHER AND RAINFALL NEAR THE BUTLER MINE TUNNEL, 2) PREDICT FLOW THAT WILL COME FROM BUTLER MINE TUNNEL IN RESPONSE TO RAINFALL AND MEASURE ACTUAL TUNNEL FLOW, 3) IF MODELED OR ACTUAL TUNNEL FLOWS EXCEED LEVELS NOT KNOWN TO BE ASSOCIATED WITH A FLUSHOUT, PREPARE FOR A FLUSHOUT RESPONSE, 4) RESPOND TO OIL FLUSHOUTS WITH A LAND-BASED AND IN-RIVER OIL RECOVERY SYSTEM

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures In particular, discuss their relationship to the current and long-term protectiveness of the remedy

O&M OF SITE FEATURES APPEARED TO BE ADEQUATE.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. NO
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. PRP PROJECT COORDINATOR REQUESTED A MEETING WITH PADEP AND EPA TO DISCUSS FUTURE END OF PRP INVOLVEMENT IN SITE ACTIVITIES.

Butler Mine Tunnel Superfund Site

Five Year Review Report

Appendix 5

Butler Mine Tunnel Site – Drill and Training Summary (prepared by PRPs)

Butler Mine Tunnel Site - Drill and Training Summary
Updated - 2/6/2014
Major Equipment

Year	Date	Work Boats	Jon Boat	Barge Training	Barge Deployment	Trotline Training	Trotline Deployment	Winch Deployment	"A" boom deployment	"B" Boom Deployment	"C" Boom Deployment	"D" Boom Deployment	Skimmer Operation	Auxillary Equipment	Notes
2007	April	X	X		X	X	X	X	X	X	X	X	X	X	System prove out / in water testing Full system deployment with full extents of boom installed on the river The prove out was conducted with the river stage above 16 feet The PCOR was submitted to agency in August 2007
2008	10-Nov-08			X		X		X						X	The Barge was taken for a dry run to the deployment area where a trotline deployment was mimicked on dry land including the connections of boom buoys A single winch was also taken to the blockhouse winch pad and used for training
	11-Nov-08		X						X					X	"A" Boom configuration was installed using Jon Boat Auxillary equipment included the use of the pressure washer trailer and misc hand tools
2009	2nd Quarter Maintence	X													Work Boats were tested at Lake Wallenpaupak
2010	26-Apr-10	X	X		X		X	X		X	X	X	X	X	Full Sytem Deployment and training The debris trotline and boom was installed multiple times at various angles for training purposes The training exercise was conducted over a one week period
2011	2nd Quarter Maintenance	X													Work Boats were tested at Harvey's Lake
	15-Nov-11			X		X		X						X	Winches were tested at shoreside locations, Barge and trotline training was conducted in the warehouse Auxillary equipment was utilized during winch installation and during warehouse barge training
2012	2nd Quarter Maintenance	X													Work Boats were tested at Harvey's Lake
	4-Dec-12		X			X		X	X						Barge and trotline training was conducted at the warehouse including boom buoy attachments "A" boom was deployed in the river using the Jon boat and winches were installed and tested at the southern winch pad location
2013	6-May-13	X	X		X		X	X		X	X		X		Full system deployment "B" boom configuration was installed serval times as practice "D" trotline and booms were not installed due to low water conditions and rock outcrops along the "D" trotline orientation
														X	Night operations were conducted by installing a light plant on the barge This was done to observe river hazards during potential night operations

Butler Mine Tunnel Superfund Site

Five Year Review Report

Appendix 6

Summary of Community Involvement Coordinator's interview with local officials (3/13/14)

Butler Mine Tunnel 5 year review Interview (Synopsis) (March 13, 2014)

Interviewees were selected for Site knowledge and connection to Community
Total number of interviewees: 3.

Mix of elected officials (Mayor), appointed Officials (City Manager) and emergency services managers (Fire and Police Chiefs)

Question 1: Aside from the Butler Mine Tunnel site, In general what issues receive the most attention locally?

Stormwater Control
Sinkholes
Antiquated sewage system

Question 2: What are the main environmental issues that continue to be resurface?

Flooding
Stormwater Management

Question 3: What is your impression of the remedy EPA has decided upon for the Butler Mine Tunnel?

Interviewees have personally observed the deployment of the response system for the Butler Mine Tunnel in at least 2 instances. They expressed admiration for the scope of the response and the attention to detail that has been evident in each of the training exercises to date. Of particular note was the coordination of response activities with local law enforcement and fire department personnel.

1. Numerous sinkholes and mine subsidence issues continue to plague the town with no effective resolution in sight. Structural failures in the sewer system and personal property continue to plague the city in recent years.
2. The City Manager is particularly concerned about the end of the active response system being maintained after 2017. The City of Pittston would like to be considered as recipients of the equipment associated with the response.
3. Citizens concerns related to the BMT have successfully transitioned from focus on EPA activities to a better working relationship with the Pennsylvania Department of Health. No inquiries from the Menichini Family in several months
4. Serious concerns about mine subsidence and stormwater management

Question 4: Do you think there is community interest or concern about the operation or administration of the Butler Mine Tunnel Site?

Interviewees had some concerns during Hurricane Irene and Hurricane Lee. Having observed EPA/ Trustee drills and exercises has given them confidence that the existing remedy will be successful in containing any outflow from the Mine Tunnel. However, without observing an actual release and containment they reserve comment on this issue. Generally, the project has the publics approval but with reservations as well.

Question 5: Do you feel well informed about the site's activities and progress?

The Mayor of Pittston expressed considerable praise for our outreach and information activities with regards to the flurry of concern from the Menichini family. He was particularly pleased with the extent and quality of our presentations at the Public meeting which was held

Question 6: What is your overall impression of the site?

In speaking with interviewees there has been a significant shift in the understanding of both City leadership and the general population that BMT is an unusual type of EPA response which will not lead to a general cleanup but a coordinated containment.

Summary narrative:

In general, interviewees are satisfied with the project and thinks EPA has done everything technologically possible to protect human health and the environment with regards to the mine tunnel response system. They have come to understand that EPA's role is not as a 'public health' agency per se but as a bulwark of engineering and technology that works for the situation at hand.

Larry C. Johnson
Community Involvement Coordinator
EPA Region 3 HSCD
Brownfields and Community Outreach Branch
Philadelphia, PA

Butler Mine Tunnel Superfund Site
Five Year Review Report
Appendix 7
Summary of Sampling Data

Borehole 11

Borehole-11 analytical results	Sampling Dates Results in parts per billion(ppb)				
Compound	12/2008	7/2009	12/2009	6/2010	12/2010
Benzene	<0.5	0.12 (estimated)	<0.5	<0.5	<0.5
Carbon Tetra Chloride	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5
Methylene Chloride	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	1.1	1.1	1.2	0.71	0.72
Total Xylenes	1.0	<0.5	<0.5	<0.5	<1.5
Bis(2-ethylhexyl)phthalate	41	<20	240	130 (sample was noted as diluted prior to analysis)	340 (sample was noted as diluted prior to analysis)
4-Bromophenyl phenyl ether	Not provided	<5.1	<5	<5.1	<50
1,2-dichlorobenzene		2.5	3.1	3.9	3.6
1,3-dichlorobenzene		<0.5	<0.5	<0.5	<0.5
1,4-dichlorobenzene		<0.5	<0.5	<0.5	<0.5
Diethyl phthalate	1.5	<5.1	<5	<5.1	<50
Dimethyl phthalate	1.5	<5.1	<0.5	<5.1	<50
Di-n-octyl phthalate		<5.1	<0.5	<5.1	<50
Napthalene		0.16 (estimated)	<0.5	0.2 (estimated)	0.98
Phenol		<5.1	18	<5.1	<50
Cyanide	69	33	9.6 (estimated)	26	160
Oil	75,500	2,900 (estimated)	26,400	72,600	105,000
Borehole-11 analytical results	Sampling Dates Results in parts per billion(ppb)				
Compound	6/2011	12/2011	6/2012	12/2012	6/2013
Benzene	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon Tetra Chloride	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5
Methylene Chloride	<0.5	<0.5	<0.5	<0.5	<0.5

Toluene	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	0.56	0.8	0.69	0.51	0.69
Total Xylenes	<1.5	<1.5	<1.5	<1.5	<0.5
Bis(2-ethylhexyl)phthalate	110	33,000	5.6	670 (sample was noted as diluted prior to analysis)	68
4-Bromophenyl phenyl ether	<10	<5,000	<5.1	<10	<5
1,2-dichlorobenzene	2.5	4.2	3.5	3.1	5.7
1,3-dichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-dichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5
Diethyl phthalate	<10	<5,000	<5.1	<10	<5
Dimethyl phthalate	<10	<5,000	<5.1	<10	<5
Di-n-octyl phthalate	<10	<5,000	<5.1	<10	<5
Napthalene	<0.5	0.78	1.2	1.2 (estimated)	<0.5
Phenol	<10	<5,000	<5.1	<10	<5
Cyanide	44	33	79	77	86
Oil	3,900 (estimated)	2,300 (estimated)	2,500 (estimated)	9,100	3,600 (estimated)

Borehole-11 analytical results	Sampling Dates Results in parts per billion(ppb)
Compound	12/2013
Benzene	<0.5
Carbon Tetra Chloride	<0.5
Chloroform	<0.5
Ethylbenzene	<0.5
Methylene Chloride	<0.5
Toluene	<0.5
Trichloroethene	0.56
Total Xylenes	<0.5
Bis(2-ethylhexyl)phthalate	37
4-Bromophenyl phenyl ether	<5.1
1,2-dichlorobenzene	3.2
1,3-dichlorobenzene	<0.5
1,4-dichlorobenzene	<0.5
Diethyl phthalate	<5.1
Dimethyl phthalate	<5.1
Di-n-octyl phthalate	<5.1
Napthalene	<0.5

Phenol	<5.1	
Cyanide	74	
Oil	6,900 (estimated)	

BMT Outfall

BMT Outfall analytical results	Sampling Dates Results in micrograms per liter				
Compound	12/2008	07/2009	12/2009	6/2010	12/2010
Benzene	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon Tetra Chloride	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5
Methylene Chloride	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	<0.5	<0.5	<0.5	<1.5	<1.5
Bis(2-ethylhexyl)phthalate	<1.9	<5.1	<5	<5	<5
4-Bromophenyl phenyl ether	Not provided	<5.1	<5.2	<5.1	<5
1,2-dichlorobenzene		<0.5	<0.5	<0.5	<0.5
1,3-dichlorobenzene		<0.5	<0.5	<0.5	<0.5
1,4-dichlorobenzene		<0.5	<0.5	<0.5	<0.5
Diethyl phthalate	1.5	<5.1	<5.2	<5.1	<5
Dimethyl phthalate	1.5	<5.1	<5.2	<5.1	<5
Di-n-octyl phthalate		<5.1	<5.2	<5.1	<5
Napthalene		<0.5	<0.5	<0.5	<0.5
Phenol		<5.1	<5.2	<5.1	<50
Cyanide	<10	10	<10	10	<100
Oil	<5000	2600 (estimated)	3,600 (estimated)	3500 (estimated)	2200 (estimated)
BMT Outfall analytical results	Sampling Dates Results in micrograms per liter				
Compound	6/2011	12/2011	6/2012	12/2012	6/2013
Benzene	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon Tetra Chloride	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5

Methylene Chloride	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	<1.5	<1.5	<1.5	<1.5	<0.5
Bis(2-ethylhexyl)phthalate	<5	<5,000	5.1	<5.1	<5
4-Bromophenyl phenyl ether	<5	<5,000	<5.1	<5.1	<5
1,2-dichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-dichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-dichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5
Diethyl phthalate	<5	<5,000	<5.1	<5.1	<5
Dimethyl phthalate	<5	<5,000	<5.1	<5.1	<5
Di-n-octyl phthalate	<5	<5,000	<5.1	<5.1	<5
Napthalene	<0.5	<0.5	<0.5	<0.5	<0.5
Phenol	<5	<5,000	<5.1	<5.1	<5
Cyanide	<100	<10	<10	4.7 (estimated)	<10
Oil	1,600 (estimated)	<5,000	1,400	<710	3,100 (estimated)

BMT Outfall analytical results	Sampling Dates Results in micrograms per liter
Compound	12/2013
Benzene	<0.5
Carbon Tetra Chloride	<0.5
Chloroform	<0.5
Ethylbenzene	<0.5
Methylene Chloride	<0.5
Toluene	<0.5
Trichloroethene	<0.5
Total Xylenes	<0.5
Bis(2-ethylhexyl)phthalate	<5.1
4-Bromophenyl phenyl ether	<5.1
1,2-dichlorobenzene	<0.5
1,3-dichlorobenzene	<0.5
1,4-dichlorobenzene	<0.5
Diethyl phthalate	<5.1
Dimethyl phthalate	<5.1
Di-n-octyl phthalate	<5.1
Napthalene	<0.5

Phenol	<5.1	
Cyanide	<10	
Oil	3,800 (estimated)	

Related Topics: Envirofacts

FRS

FRS Facility Detail Report

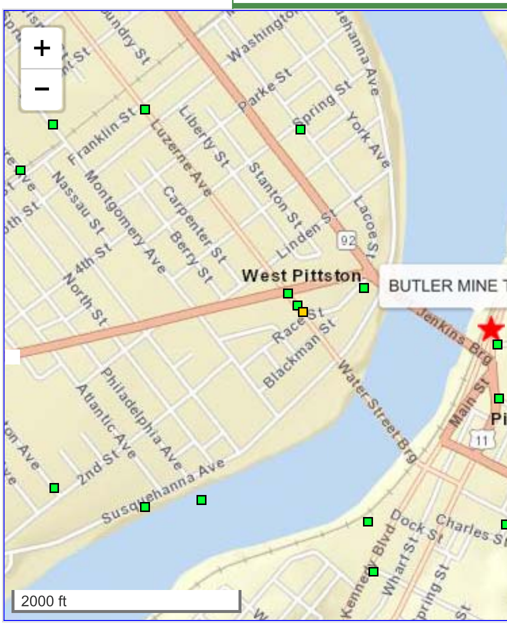
BUTLER MINE TUNNEL

EPA Registry Id: 110009322580
SUSQUEHANNA RIVER
PITTSTON, PA 18640

Facility Registry Service Links:

- Facility Registry Service (FRS) Overview
- FRS Facility Query
- FRS Organization Query
- EZ Query
- FRS Physical Data Model
- FRS Geospatial Model

Report an Error



Legend
- Selected Facility
- EPA Facility of Interest
- State/Tribe Facility of Interest

The facility locations displayed come from the FRS Spatial Coordinates tables. They are the best representative locations for the displayed facilities based on the accuracy of the collection method and quality assurance checks performed against each location. The North American Datum of 1983 is used to display all coordinates.

Environmental Interests

Information System	System Facility Name	Information System Id/Report Link	Environmental Interest Type	Data Source	Last Updated Date
SUPERFUND ENTERPRISE MANAGEMENT SYSTEM	BUTLER MINE TUNNEL	PAD980508451	SUPERFUND NPL	SEMS	
INTEGRATED COMPLIANCE INFORMATION SYSTEM	BUTLER MINE TUNNEL	44735	FORMAL ENFORCEMENT ACTION	ICIS	08/17/2010

Additional EPA Reports: MyEnvironment Site Demographics Facility Coordinates Viewer Environmental Justice Map Viewer Watershed Report

Standard Industrial Classification Codes (SIC)

Data Source	SIC Code	Description	Primary
ICIS	9999	NONCLASSIFIABLE ESTABLISHMENTS	

Facility Codes and Flags

EPA Region:	03
Duns Number:	
Congressional District Number:	17
Legislative District Number:	
HUC Code/Watershed:	02050107 / UPPER SUSQUEHANNA-LACKAWANNA
US Mexico Border Indicator:	
Federal Facility:	NO
Tribal Land:	NO

Alternative Names

Alternative Name	Source of Data
ALCAN ALUMINUM *	CERCLIS

Organizations

No Organizations returned.

National Industry Classification System Cod

No NAICS Codes returned.

Facility Mailing Addresses

No Facility Mailing Addresses returned.

Contacts

Affiliation Type	Full Name	Office Phone
UNKNOWN CONTACT	CHRISTOPHER CORBETT	215814322
UNKNOWN CONTACT	LINDA R. DIETZ	215814319
ON-SCENE COORDINATOR (OSC)	TERRY STILMAN	904783876

Query executed on: AUG-02-2019

Last updated on September 24, 2015

NPL Site Narrative for Butler Mine Tunnel

BUTLER MINE TUNNEL
Pittston, Pennsylvania

Conditions at proposal (June 10, 1986): The Butler Mine Tunnel in Pittston, Luzerne County, Pennsylvania, was originally constructed about 50 years ago as a collection and discharge point for mine drainage from an estimated 5-square-mile area of underground coal mines. In addition, hazardous materials were disposed in the tunnel, which discharges directly to the Susquehanna River.

On July 30, 1979, an oily discharge coming from the tunnel created an oil slick from bank to bank on the Susquehanna River. EPA tracked the contaminants from this initial discharge 60 miles downstream to a municipal water intake that is the sole source of drinking water for approximately 11,700 residents of Danville, Pennsylvania. The primary source of the contaminants entering the river was traced, via State enforcement actions, to the illegal dumping of hazardous chemicals into a 4-inch borehole 3.5 miles inland from the river. The borehole discharges into the labyrinth of underground mines which the tunnel drains. The State identified as responsible parties the owner of the Hi-Way Auto Service Station where the borehole was located, the president of the waste transporting company, and the dispatcher of the company. All three received jail sentences.

In 1979, EPA emergency personnel responded to the Butler discharge under the Clean Water Act. Booms were installed to collect the oily substances on the surface. They continued to operate until December 5, 1980, collecting 160,000 gallons of oil, which contained approximately 13,000 pounds of dichlorobenzene. After the booms were removed, an automated detection system was installed. The cost of the emergency action was $2.2 million. The State operated the system until 1984, during which time there was no evidence of any discharge from the tunnel.

On October 23, 1981, EPA announced the Interim Priorities List (IPL), which included the Butler Mine Tunnel. The IPL was a preliminary list developed prior to formal proposal of the first NPL. In February 1982, the State indicated that no further response actions were warranted based on monitoring of existing conditions. On December 30, 1982, the first NPL was proposed. Butler Mine Tunnel was not included because EPA had determined that all appropriate Fund-financed cleanup had been completed. Therefore, the Butler Mine Tunnel satisfied one of the criteria for deleting a site from the NPL.

In September 1985, approximately 100,000 gallons of waste oil containing 1 to 3 percent of bis(2-ethylhexyl)phthalate were released at the Butler Mine Tunnel following heavy rains associated with Hurricane Gloria. Once again EPA responded, this time using CERCLA emergency funds. EPA installed booms, is disposing of the collected waste and contaminated soil, and is reinstalling the automatic detection system.

Status (July 22, 1987): EPA has removed contaminated materials to an approved disposal facility and reinstalled the detection system, which the State is monitoring.

On March 30, 1987, EPA and 17 individuals and companies potentially responsible for wastes associated with the site entered into a Consent Order to conduct a remedial investigation/feasibility study to determine the type and extent of contamination at the site and identify alternatives for remedial action.

For more information about the hazardous substances identified in this narrative summary, including general information regarding the effects of exposure to these substances on human health, please see the Agency for Toxic Substances and Disease Registry (ATSDR) ToxFAQs. ATSDR ToxFAQs can be found on the Internet at ATSDR - ToxFAQs (http://www.atsdr.cdc.gov/toxfaqs/index.asp) or by telephone at 1-888-42-ATSDR or 1-888-422-8737.

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Lawsuit targets developer in woman's death during flooding

BY PETER CAMERON AND BILL WELLOCK (STAFF WRITERS) / PUBLISHED: JULY 25, 2012

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A sister of a woman who asphyxiated in the basement of a West Pittston house last year has filed a lawsuit against the home's developer.

Carol Mikols, formerly of Exeter, died Sept. 9 in the house of another sister, Ann Mikols. She was 62.

The civil lawsuit, filed by Mary Howells in the Court of Common Pleas of Luzerne County, alleges the developer, Susquehanna River Shores, LLC, was negligent in checking the ground for toxic gases from a landfill buried below and in preventing them from seeping into the basement.

Howells is seeking damages in excess of $300,000.

Frank Delaney, the developer and builder for Susquehanna River Shores, said the land was tested "extensively" by engineers, scientists and the Department of Environmental Protection before construction began, and 2 feet of topsoil were added to the ground. He owns a home and lives there as well, he said.

"I wouldn't have bought the property or built the home if I thought there was any danger whatsoever," he said Tuesday.

During the massive floods last year, heavy rains saturated the ground, forcing gases out of the ground, said Bruce Zero, the attorney representing Howells.

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The oxygen in Mikols's basement was displaced by the rising landfill gases, and when Carol Mikols went downstairs on Sept. 9, the lack of oxygen killed her, Zero said.

Neighbors found Carol Mikols and two cats dead in the basement of the home.

Delaney said all the homes built on the landfill by his company had air evacuation systems - pipes under the foundation designed to prevent gases from entering.

But residents needed to connect a motorized fan for the system to be effective.

"It's up to the homeowner to connect those systems," Delaney said. "Eventually everyone connected to those systems except for Ann Mikols."

Zero said that should have been the developer's responsibility.

"You don't make a safety feature optional," he said.

bwellock@citizensvoice.com, 570-821-2051

pcameron@citizensvoice.com, 570-821-2110

This Week's Circulars

Hover for Circular

Hover for Circular

Hover for Circular

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LeafFilter Partner

by Taboola

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- ‘Munsters’ star brings smiles to meet and greet in Kingston
- Police: Man held woman captive for three hours
- W-B Area high school plan catches auditor’s eye
- Officials cracking down on code violations in Glen Lyon
- State grant goes to W-B hotel project
- Man allegedly sent nude photos of ex
- Local man prepares to brew up new business in Plymouth
- NEW Ex-boyfriend charged in revenge porn case
- LCTA reveals name change

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  45 comments · 44 minutes ago
- State grant goes to W-B hotel project

EPA United States Environmental Protection Agency

Related Topics: Envirofacts

FRS

FRS Facility Detail Report

WEST PITTSTON ARMORY

EPA Registry Id:
110000996931
1308
SUSQUEHANNA
AVE
WEST PITTSTON, PA
186430091

Facility Registry Service Links:

- Facility Registry Service (FRS) Overview
- FRS Facility Query
- FRS Organization Query
- EZ Query
- FRS Physical Data Model
- FRS Geospatial Model

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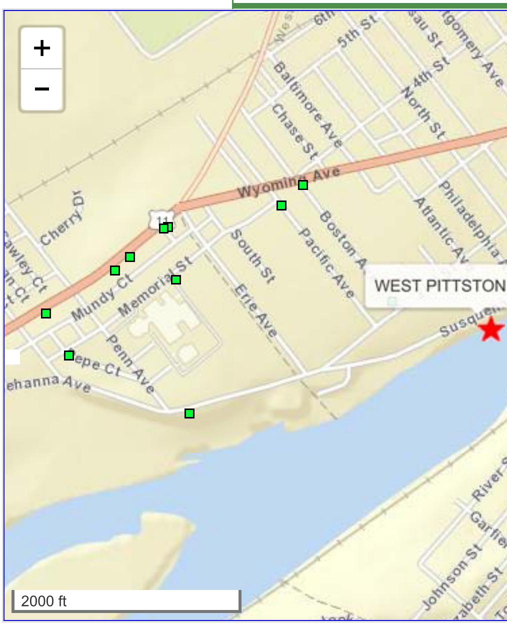


Legend

- Selected Facility
- EPA Facility of Interest
- State/Tribe Facility of Interest

The facility locations displayed come from the FRS Spatial Coordinates tables. They are the best representative locations for the displayed facilities based on the accuracy of the collection method and quality assurance checks performed against each location. The North American Datum of 1983 is used to display all coordinates.

Environmental Interests

Information System	System Facility Name	Information System Id/Report Link	Environmental Interest Type	Data Source	La: Up Da
RESOURCE CONSERVATION AND RECOVERY ACT INFORMATION SYSTEM	PA DMVA WEST PITTSTON READINESS CENTER	PA0000952648	CESQG (Y)	RCRAINFO	11/
PENNSYLVANIA - ENVIRONMENTAL FACILITY APPLICATION COMPLIANCE TRACKING SYSTEM	WEST PITTSTON ARMORY	PA0000952648	STATE MASTER	PA-EFACTS	

Additional EPA Reports:	MyEnvironment Enforcement and Compliance Site Demographics Facility Coordinates Viewer Environmental Justice Map Viewer Watershed Report

Standard Industrial Classification Codes (SIC)

No SIC Codes returned.

Facility Codes and Flags

EPA Region:	03
Duns Number:	
Congressional District Number:	17
Legislative District Number:	2
HUC Code/Watershed:	02050107 / UPPER SUSQUEHANNA-LACKAWANNA
US Mexico Border Indicator:	
Federal Facility:	NO
Tribal Land:	NO

Alternative Names

No Alternative Names returned.

Organizations

Affiliation Type	Name	DUNS Number	Information System	Mailing Address
OPERATOR	PA DEPT OF MILITARY & VETERAN AFFAIRS		RCRAINFO	
OWNER	PA DEPT OF MILITARY AFFAIRS		RCRAINFO	View
OTHER CONTACT	PA DEPT OF MILITARY & VETERANS AFFAIRS		PA-EFACTS	View

National Industry Classification System Cod

Data Source	NAICS Code	Description
RCRAINFO	92811	NATIONAL SECURITY

Facility Mailing Addresses

Affiliation Type	Delivery Point	City Nam
FACILITY MAILING ADDRESS	1308 SUSQUEHANNA AVE	WEST PITTSTO
OWNER	FT INDIANTOWN GAP	ANNVIL
FACILITY MAILING ADDRESS	FORT INDIANTOWN GAP	ANNVIL
FACILITY MAILING ADDRESS	1306 SUSQUEHANNA AVE	WEST PITTSTO
OTHER CONTACT	1 FORT INDIANTOWN GAP BLDG 0-11	ANNVIL
REGULATORY CONTACT	FORT INDIANTOWN GAP	ANNVIL

Contacts

Affiliation Type	Full Name	Office Phone	Info
REGULATORY CONTACT	DREAMA ONEAL	717-861-2339	RCI

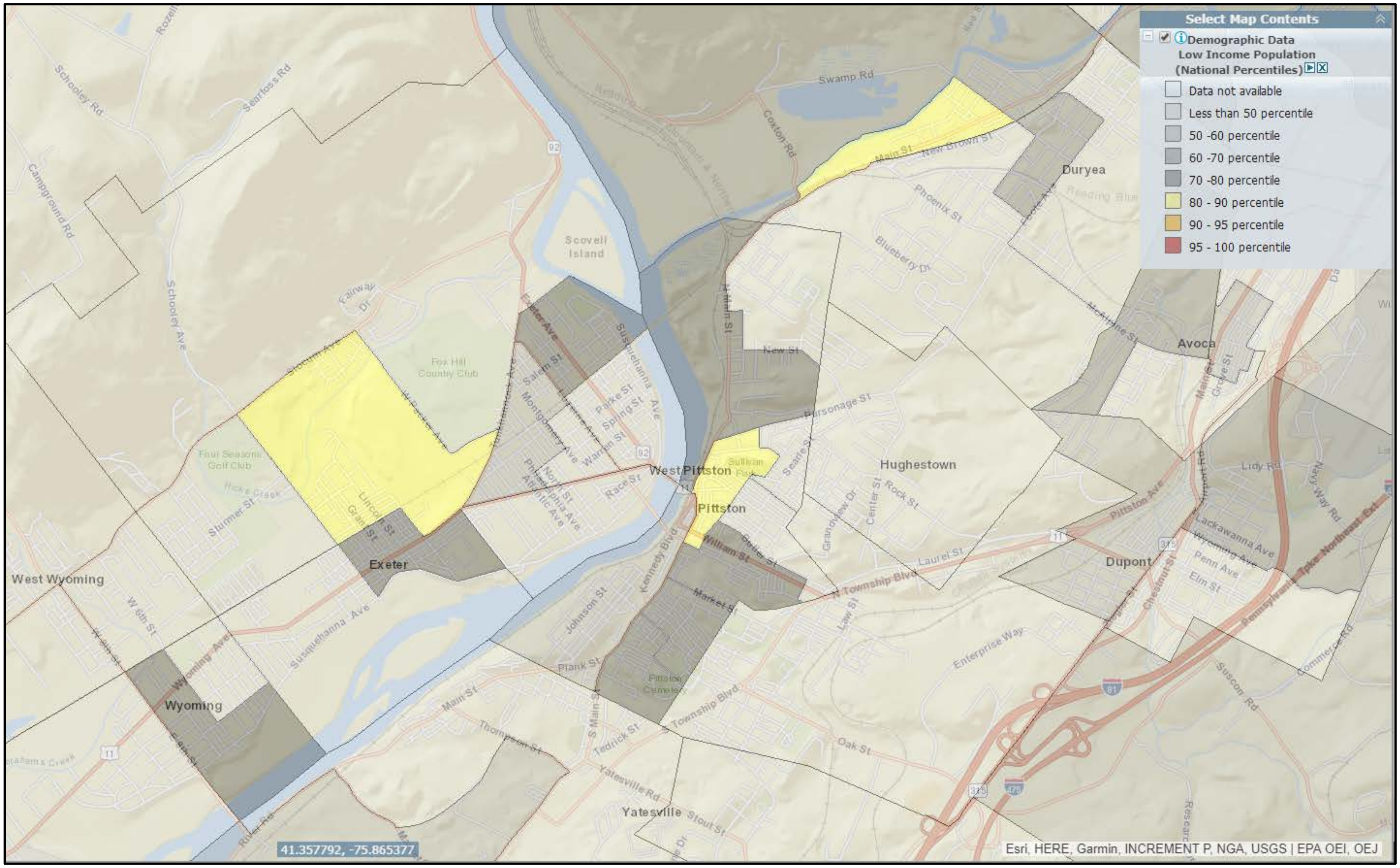
Query executed on: AUG-02-2019

Last updated on September 24, 2015

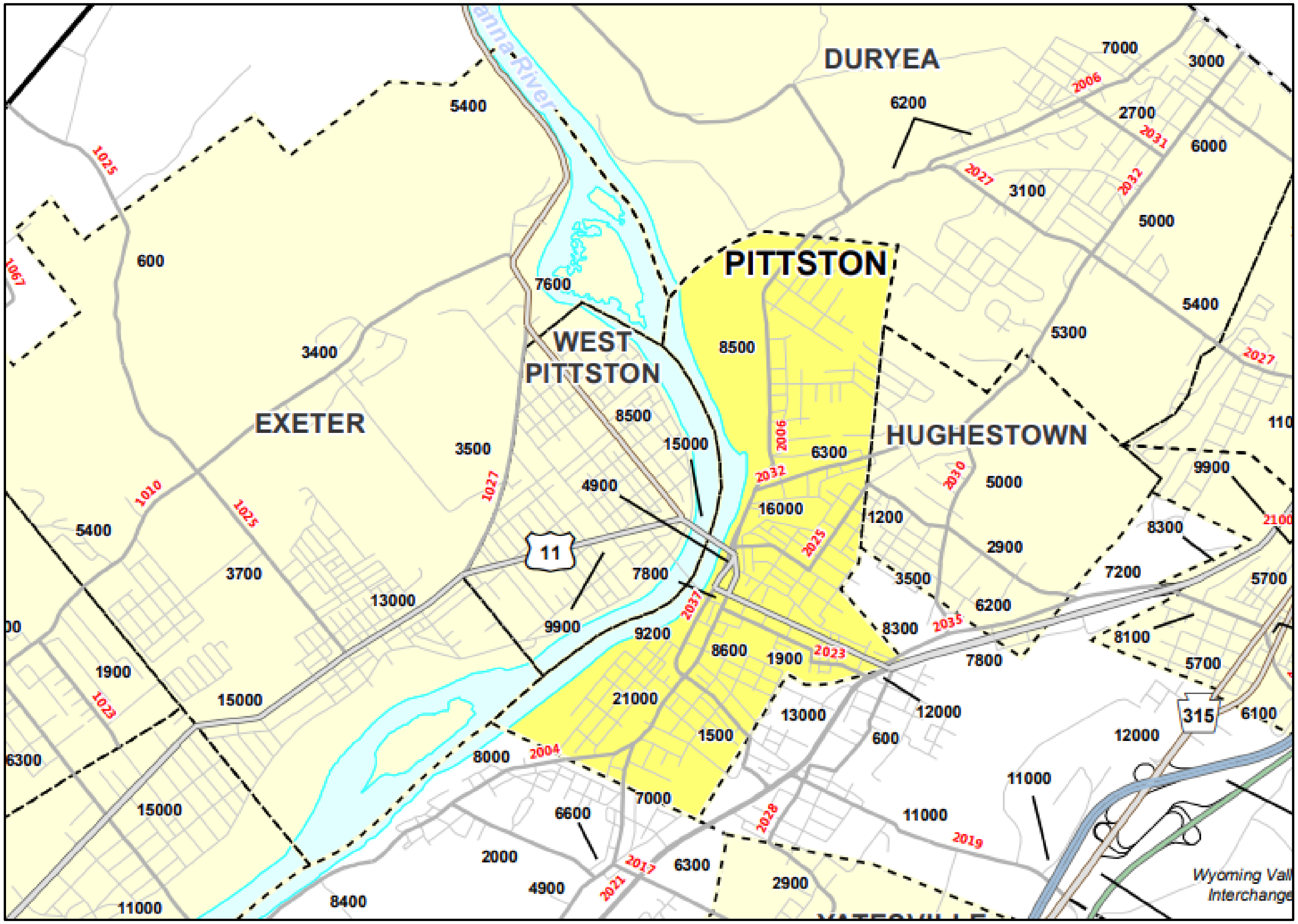
POPULATION & HOUSING, TRANSPORTATION & TRAFFIC

Population in 2017: 4,783 (100% urban, 0% rural)
Median age: 40
Median household income: $47,192
Poverty rate: 17.2%
Number of employees: 2,498
Median property value: $138,900
Number of households: 2,060
Homeownership (Own vs. Rent): 58.7%
Source: https://datausa.io/profile/geo/west-pittston-pa/#housing

Low income population:

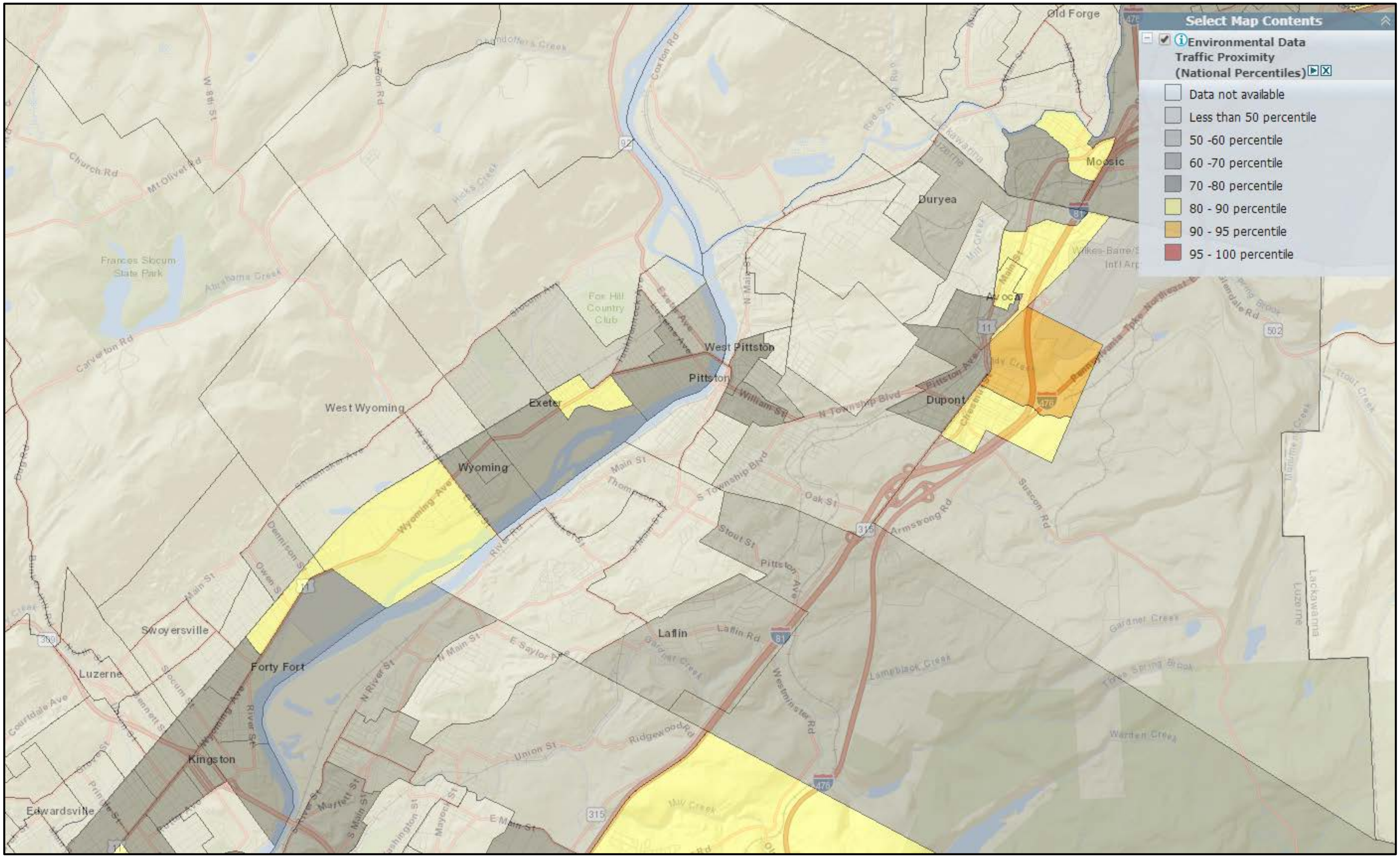


Transportation and Traffic
Car Ownership: 2 cars
Commute Time: avg. 20 minutes
Commuter Transportation: 82.8% drive alone
10.6% carpool
2.99% bicycle
Traffic Volume:

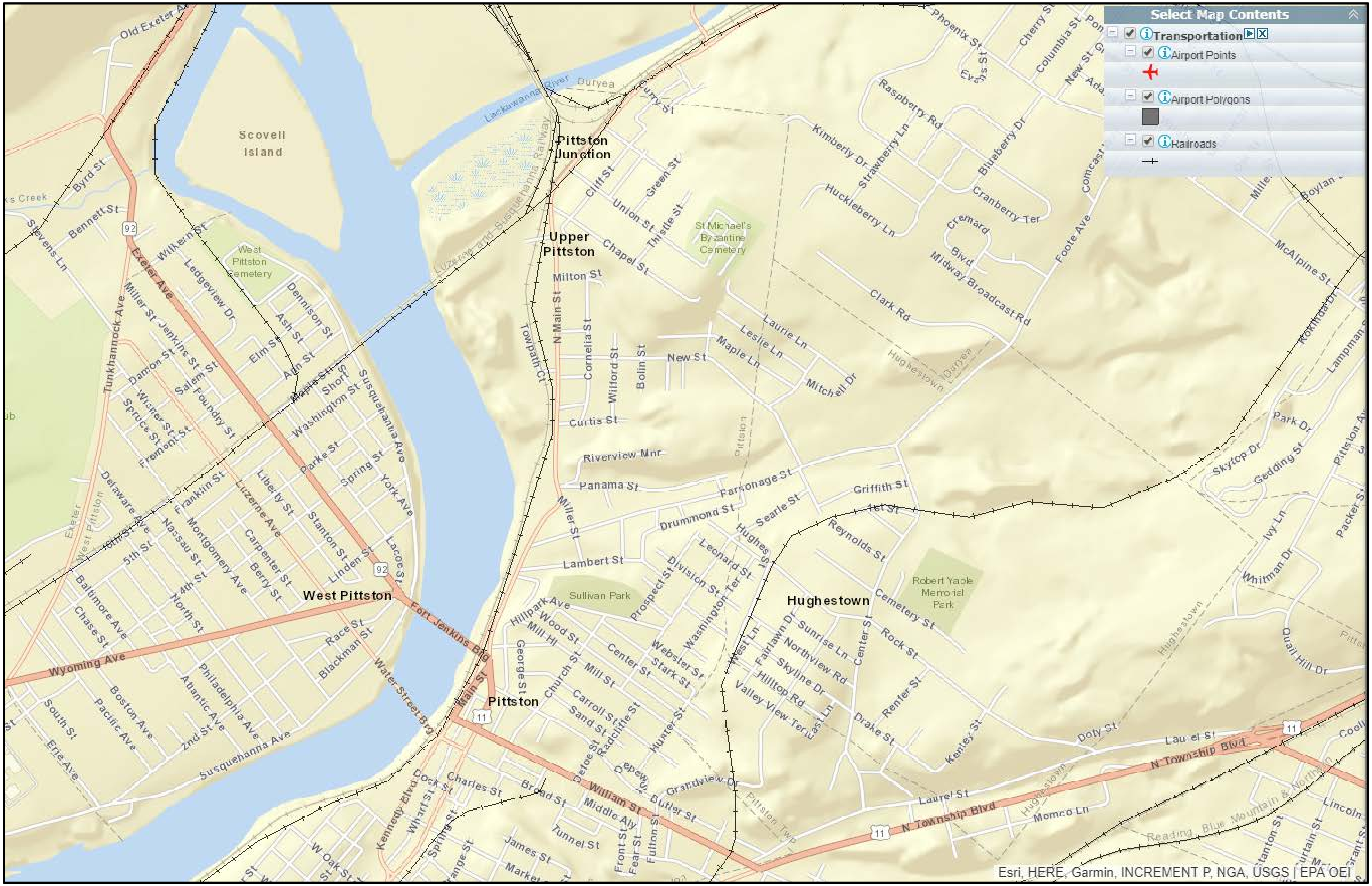


Traffic Volume in West Pittston (see full Luzerne County Traffic Volume map)
Red numbers are state route numbers
Black numbers represent annual average daily traffic
Source: https://www.penndot.gov/ProjectAndPrograms/Planning/Maps/Pages/Traffic-Volume.aspx

Traffic Proximity:



Transportation: (Railroad)



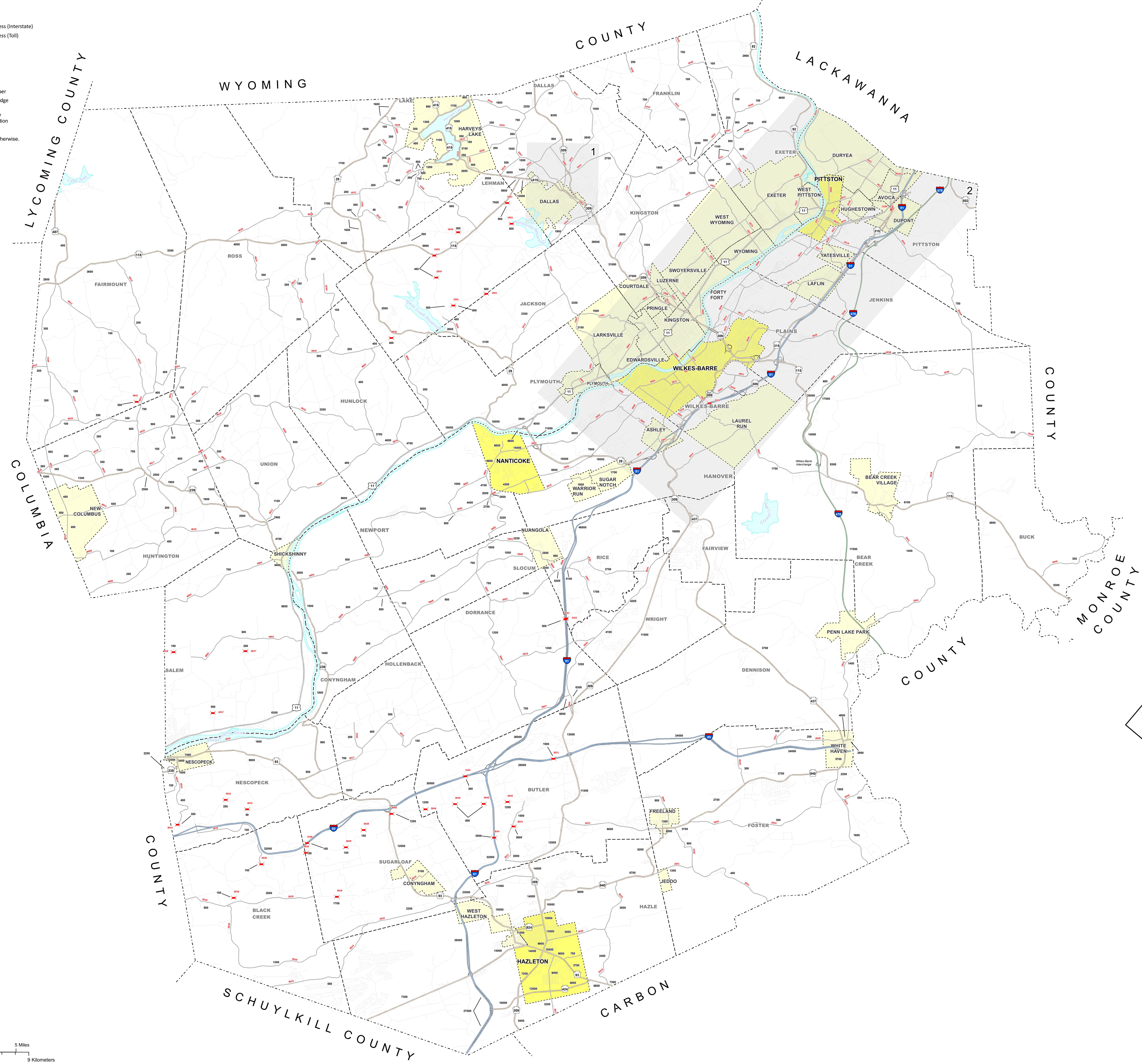
Source: EJSCREEN https://www.epa.gov/ejscreen

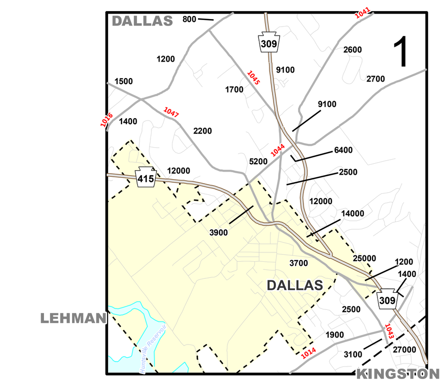
LEGEND

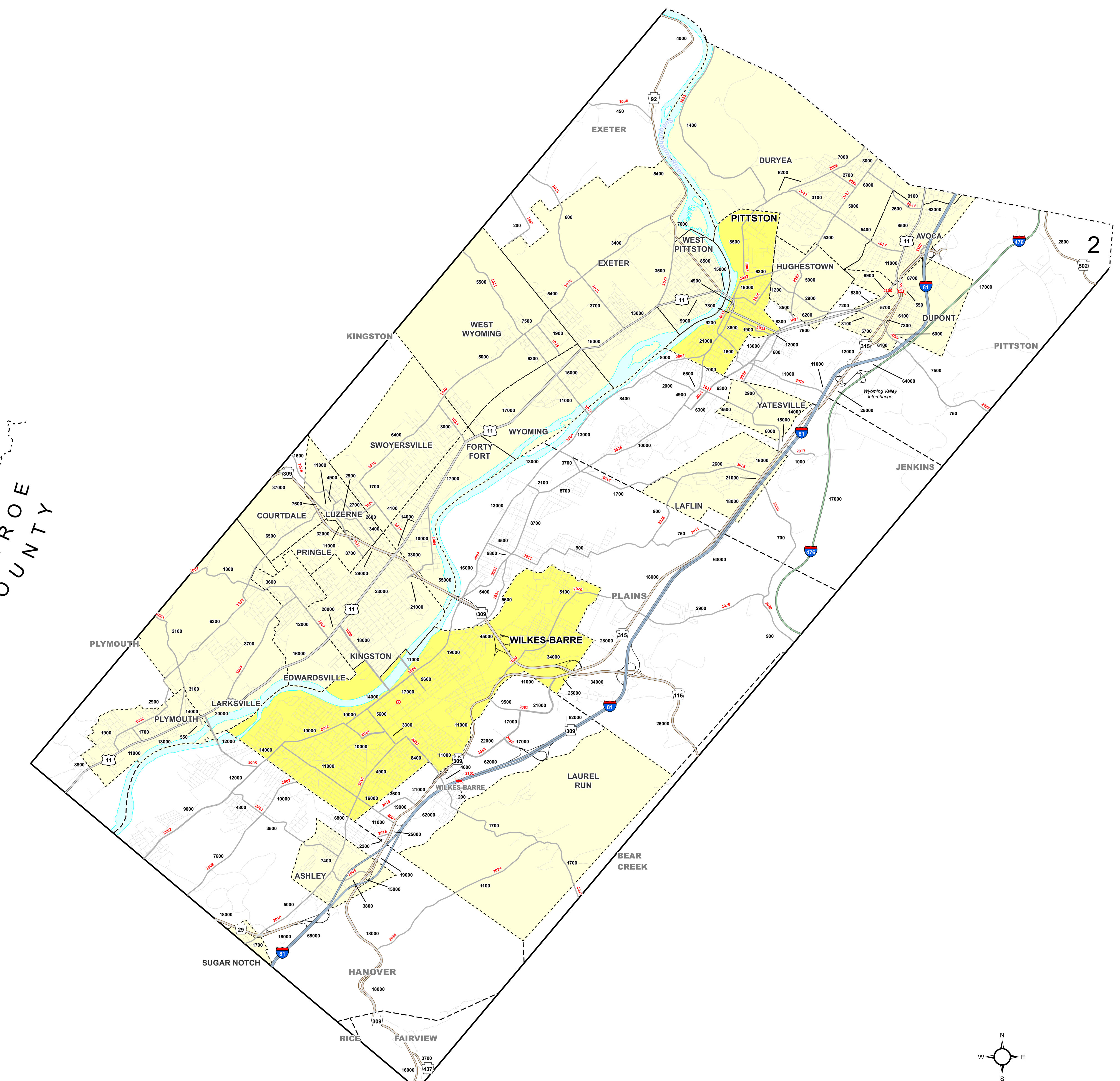
- State Boundary
- County Boundary
- Borough Boundary
- City Boundary
- Fully Controlled Access (Interstate)
- Fully Controlled Access (Toll)
- US Route
- PA Route
- State Route
- Local Road
- County Seats
- 12500 Traffic Volume Number
- State Maintained Bridge

Volumes shown are annual average daily traffic based on the most current information available.

Enlargement scale is 2:1 unless noted otherwise.







Copies of this map are available at nominal cost
Contact:
Pennsylvania Department of Transportation
Sales Store
P.O. Box 2028
Harrisburg, Pennsylvania 17105-2028
Telephone: (717) 787 - 6746

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The data is provided "as is" and the user assumes the entire risk as to its quality and performance

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2017
Traffic Volume Map
Published December, 2018
Luzerne County
Pennsylvania

Prepared by the
Pennsylvania Department of Transportation
Bureau of Planning and Research
Transportation Planning Division
In cooperation with the
U.S. Department of Transportation
Federal Highway Administration

Type 4