State of West Virginia
Source Water Assessment and Protection Program

Source Water Assessment Report

City of Wheeling
Ohio County
PWSID: WV3303516

Prepared by:

West Virginia Department of Health and Human Resources
Bureau for Public Health
Office of Environmental Health Services
Source Water Protection Unit

Date: June 2003

Surface Water Public Water Supply Systems
Source Water Assessment and Protection Program (SWAPP)
Susceptibility Report

Prepared by the West Virginia Bureau for Public Health, Source Water Assessment and Protection Unit

Date Prepared: Friday, June 13, 2003

What is the Purpose of a Susceptibility Report?

A susceptibility report identifies the most significant potential contaminant sources that could threaten the quality of your public water supply. Your susceptibility ranking does not imply poor water quality. Regular water tests best reflect actual water quality. This report will be used by public water supply systems with a surface water source. In addition, this report will enhance West Virginia's existing watershed approach to water quality improvement and protection. Table 1 provides you information on your public water supply.

What is SWAPP?

The SWAPP, established under the Safe Drinking Water Act, requires every state to:

- Delineate the area from which a public water supply system receives its water;
- Inventory land uses within the recharge areas of all public water supplies;
- Assess the susceptibility of drinking water sources to contamination from these land uses; and
- Publicize the results to provide support for improved protection of sources.

Table 1: Public Water Supply (PWS) Information

PWS Name	City of Wheeling
PWS Address	1305 Richland Ave. Wheeling, WV 26003
PWS ID Number	WV3303516
County	Ohio
System Type	Community

The West Virginia Bureau for Public Health (WV BPH) is undertaking this task. The rankings of susceptibility of your intake (s) to potential contamination are listed in Table 2.

Table 2: Intake Information

Facility Name	Source Name	Design Meets Regulations	Susceptibility Ranking
City of Wheeling	Ohio River	Yes	High

The WV BPH Central Office assessed the source for City of Wheeling. Potesta & Associates, Inc. (POTESTA) performed the file review and field survey used to conduct the assessment.

What is my Source Water Protection Area (SWPA)?

Unlike ground water aquifers, which have a natural protective layer above them, all surface waters are susceptible to contamination because they are exposed at the surface and lack a protective barrier from contamination. Accidental spills, releases, sudden precipitation events that result in overland runoff, or storm sewer discharges can allow pollutants to readily enter the source water and potentially contaminant the drinking water at the intake. Because of this, the SWPA consists of two types of

delineations.

- **Watershed Delineation Area**

The first type of delineation is the Watershed Delineation Area (WSDA). The WSDA includes the entire watershed area upstream of the intake up to the boundary of the West Virginia state border, or a topographic boundary. The perimeter of the catchment area provides the water to the water supply intake. However, due to the very large size of the Ohio River Watershed (Figure 1), the WSDA is beyond the scope of this project. Based on the USGS stream gage near Marietta, OH (03150800), the drainage area for the Ohio River is beyond the state boundary and over 35,000 mi^2. Additional investigations and report revisions should be conducted in the future to better represent this WSDA and intake's overall susceptibility.

- **Zone of Critical Concern**

The second type of delineation is the Zone of Critical Concern (ZCC). Figure 2 shows the ZCC area, which covers approximately 97,066 acres. The ZCC is a corridor along streams within the WSDA that warrants a more detailed inventory and management due to its proximity to the surface intake and to the susceptibility to potential contaminants. Due to the size and complex nature of the Ohio River, the ZCC is based on ORSANCO guidelines for Zone 1. The ZCC length extends ¼ mile below the water intake to 25 miles upstream in the Ohio River and major tributaries. The 25-mile distance used for the ZCC is based on a 5-hour time of travel estimate using maximum Ohio River velocities near surface intakes from February 1995 to February 1998. The ZCC width is ¼ mile from each bank of the principal stream and major tributaries.

What is Susceptibility?

Susceptibility is a measure of your intake's potential for contamination from land uses and activities within the SWPA at concentrations that pose a concern. The purpose of the susceptibility analysis is to provide a pointer to what action a public water system should take to further define and reduce susceptibility. This may include recommendations for a more detailed inventory and assessment, monitoring work, or an indication of the type and intensity of source water and other protection activities needed.

The possibility of a release from potential contaminant sources is greatly reduced if best management practices (BMPs) are used. However, the susceptibility determination for your intake did not take into account whether BMPs are being used.

Susceptibility of a drinking water intake does not mean a customer will drink contaminated water. Water Suppliers protect drinking water by monitoring and treating water supplies, and using BMPs and source water protection measures to ensure that safe water is delivered to the tap.

How Was The Water Supply Susceptibility Determined?

Your intake (s) susceptibility is based on the following:

Resource Characterization

The purpose for conducting the Resource Characterization analysis of the delineated SWPA is to obtain

an understanding of its physical, biological, chemical, and hydrological characteristics. Four resource characteristics were evaluated:

- The potential for surface runoff to occur;
- The ease that surface runoff transport material can be delivered into the stream;
- The movement through the SWAP area; and
- The biological and chemical health of the surface water resource in the SWAP area.

- **Potential for Surface Runoff to Occur**

The soil types present in the watershed area and the associated soil properties have a direct influence on the potential for surface runoff to occur. As infiltration rate of soil increases, (more precipitation soaking in rather than running off) the contaminant load associated with the reduced runoff should decrease. Table 3 provides a summary of the associated soil groups within WV.

Table 3: Summary of Soil Associations in the WSDA

Soil Associations	**Soil Drainage**	**Topographic Setting**
Huntington Silt Loam	Well Drained	0-5 percent slopes
Brookside Silt Loam	Well Drained	15-25 percent slopes
Monongahela Silt Loam	Moderately Drained	8-15 percent slopes
Monongahela Silt Loam	Moderately Drained	3-8 percent slopes
Clarksburg Silt Loam	Moderately Drained	15-25 percent slopes
Westmoreland Silt Loam	Well Drained	20-30 percent slopes
Dunning Silt Loam	Poorly Drained	0-3 percent slopes
Ernest Silt Loam	Moderately Drained	8-15 percent slopes
Clarksburg Silt Loam	Moderately Drained	8-15 percent slopes
Allegheny Silt Loam	Well Drained	3-8 percent slopes
Westmoreland Silt Loam	Well Drained	40-55 percent slopes
Chavies Fine Sandy Loam	Well Drained	0-5 percent slopes
Berks Soils	Well Drained	30-65 percent slopes
Chagrin Fine Sandy Loam	Well Drained	0-3 percent slopes
Lindside Silt Loam	Moderately Drained	0-3 percent slopes
Guernsey Silt Loam	Moderately Drained	3-10 percent slopes
Clarksburg Silt Loam	Moderately Drained	3-8 percent slopes
Guernsey Silt Loam	Moderately Drained	10-20 percent slopes
Westmoreland Silt Loam	Well Drained	30-40 percent slopes
Westmoreland Silt Loam	Well Drained	10-20 percent slopes

- **Ease of movement of material into the Stream System (Rate of Overland Material Transport):**

The size, shape, and slope of the SWAP area have a direct influence on material transported by surface runoff. In general, the longer the overland travel distance and travel time that surface runoff has taken in order to reach a stream channel, the greater the chance it has to deposit and filter the contaminants that may occur. Table 4 provides an analysis of the size, shape, and slope.

Table 4: Hydrologic Setting

Size of WSDA (mi^2) *based on USGS gage (03150800) data	35,620*
Shape of WSDA	Large & Irregular
Stream Length (Main Stem) (mi)	88
Average Watershed Slope	10 to 30 %

- **Movement of Water through the Watershed Area**

A number of physical and natural factors can influence the movement of water through the SWAP area. The pattern and development of the drainage network of the SWAP area directly influence the rate of water movement. Evaluation of the hydrologic cycle will provide an indication of the amount of annual rainfall that is absorbed into the ground or becomes runoff. Table 5 summarizes the total mileage of streams contained in the ZCC, average stream gradients of the main stem, average rainfall, the nearest relevant USGS stream gauge, distance to gauge, topographic position of gauge, annual mean discharge, high flow, and low flow. Again, this data is limited and mostly not available at this time due to the large extent of the Ohio River Watershed.

Table 5: Movement of Water

Number of Stream Miles in ZCC	214
Average Stream Gradient (Main Stem)	2 ft/mi
Average Rainfall (in)	41
Nearest Relevant USGS Stream Gauge	03086000
Distance to Relevant USGS Stream Gauge (mi)	70
USGS Stream Gauge Topographic Position	Upstream
Annual Mean Discharge (cfs)	30,220
High Flow (cfs)	122,000
Low Flow (cfs)	5,800

- **Review of Water Quality Data**

In order to characterize the condition of the surface water within the watershed, the available chemical and biological water quality data was reviewed. This data was collected as part of the WV BPH and the West Virginia Department of Environmental Protection (WV DEP) implementation of the federal Safe Drinking Water Act and Clean Water Act. Water quality data was evaluated to help provide direct pointers to a source of contamination and to direct the focus for additional source evaluations. Additionally, immediate source water protection efforts will be identified by this review.

Available water quality data includes test results from treated drinking water, finished water, and untreated source water (raw water) conducted by the water supplier; ambient water chemistry; biological criteria and monitoring (bacteria, macroinvertibrates and fish); and habitat evaluation. The sampling requirements for public water systems vary depending on the type of system and the federal regulated testing requirements. Therefore, a lack of water quality impacts may indicate the lack of a certain type of sampling rather than a lack of contamination.

For water quality and stream flow data, POTESTA researched databases such as the United States Environmental Protection Agency (USEPA) Storage and Retrieval database (STORET), the United States Geological Survey (USGS) National Water Quality Assessment Program and National Water Information System databases as well as the WV DEP 303(d) listing and West Virginia and United States Safe Drinking Water Information Systems (SDWIS). The WV DEP 305(b) listing has yet to be completed for the source stream watershed. In addition to these databases, POTESTA copied portions of files from the WV BPH and requested that the City of Wheeling PWS send copies of all water testing completed for the previous five years. POTESTA received the requested documents from the City of Wheeling PWS.

Summary of Raw and Finished Water Quality Results from Public Water System

POTESTA reviewed the water quality data for the City of Wheeling PWS, and observed a secondary maximum contaminant level (MCL) exceedance for aluminum (secondary MCLs are non-enforceable federal guidelines for aesthetic quality). POTESTA obtained relevant (i.e., within the previous five years) raw water quality data for review. POTESTA observed raw water exceedances for aluminum, iron, and manganese when using secondary MCLs for finished water as comparison.

Summary of Chemical and Biological Water Quality Results from the WV DEP

The WV DEP 2002 303(d) list of water quality impaired streams lists the intake source, the Ohio River, ID No. 126, as being impaired with respect to fecal coliform, dioxin, PCBs, and mercury for the entire length of the stream. The cause listed is not known. The Ohio River appears on the 1998 WV DEP 303(d) list as being impaired with respect to PCBs, chlordane and aluminum. The cause listed is unknown. The WV DEP has yet to analyze the data from Watershed Groups D and E for the 305(b) report; however, the watershed was included in the most recent sampling endeavor and will be sampled every 5th year from that date. The USEPA STORET system reported that no stations were on the Ohio River for testing purposes. Water quality data from a USGS sampling station is unavailable. The WV DEP website reported a total maximum daily load for the source stream with respect to PCBs. Fish consumption advisories are currently issued for the source stream due to mercury, dioxin, and PCBs. The SDWIS reported one relevant violation for MCL exceedances.

POTENTIAL SIGNIFICANT CONTAMINANT SOURCES (PSCSs):

Inventory of Potential Significant Contaminant Sources

The purpose of providing an inventory of certain types of land uses, PSCSs, and activities within the SWAP area is to aid in reducing the risk posed to the public drinking water supply. The following subsections provide information regarding the methodology used to generate the inventories.

The inventory portion of the SWAP consists of two steps:

- The first step is the broad inventory based primarily on regulated and existing databases. The inventory consists of a general land use analysis, the identification of regulated activities in the delineated WSDAs, and an analysis of road and rail crossings adjacent to the streams in the WSDA.

- The second step is the detailed inventory of PSCSs in the ZCC. The detailed source inventory is conducted to identify PSCSs that were not captured in the broad regulated source inventory and to field verify the PSCSs in the ZCC. PSCSs located during the inventory are found on Figure 2.

A detailed risk-assessment of the PSCSs was beyond the scope of this survey because of minimal data and resources. Local decision makers should do the detailed risk analysis because they are better suited to make the bridge from assessment work to protective strategies. The West Virginia SWAP program can provide guidance to the decision makers and help in prioritizing the PSCSs.

- **Existing (primarily regulated) Database Review**

Table 6 is a summary of existing PSCSs based on public information obtained from various federal, state, and local agencies that maintain environmental regulatory databases. These databases provide information about the regulatory status of a property and incidents involving use, storage, spilling or transportation of oil, and hazardous materials.

Table 6: Summary of existing (primarily regulated) PSCSs in WV

	NUMBER	**PERCENT**
WSDA	510	100
ZCC	349	68

- **Summary of the Detailed Inventory**

Table 7 is a summary of the detailed inventory of PSCSs in the ZCC. The detailed source inventory was conducted to identify PSCSs that were not identified in the existing database review and to verify the location of the PSCSs within the ZCC. Additional PSCSs that were identified in detailed inventories of the ZCC consist of agricultural activities (pasture land), commercial activities (gas stations, car washes, golf courses, pharmacies, auto body shop, junkyards, boat launch, wharf, power company, slag yard, bus garage, trucking company, airport, car dealerships, and a funeral home), municipal operations (apartments, schools, pastoral center, mobile home parks, subdivisions, colleges, road maintenance facility/garage, waste water treatment plants, sewage treatment plants, drinking water treatment plants, and a public pool), and industrial operations (oil and gas operations and companies, steel mills, landfills, coal companies, glass manufacturing, paper mill, chemical manufacturing, machine shops, and a power plant). Of these PSCSs, some of the industrial sources may have large volumes of potential contaminant stored.

Table 7: Summary of PSCSs within the ZCC

Potential Contaminant Source	**TOTAL PSCSs**	**PERCENT**
AGRICULTURE	1	0.1
RESIDENTIAL	0	0
MUNICIPAL	62	7.8
COMMERCIAL	77	9.7
INDUSTRIAL	282	82.4

- **Transportation Network**

A summary of the transportation network is shown in Table 8. This information can be used to aid in planning for transportation related accidents that could result in contamination of the source water in the delineated ZCC. Table 9 is a summary of the transportation network stream crossings in the ZCC. Please note that miles of train tracks could be less due to decommissioning of tracks.

Table 8: Transportation Network Summary for ZCC

	Within 100 feet of stream	**Total**
Miles of Interstate	0	72
Miles of Primary	0	524
Miles of Secondary	0	62
Miles of Train Tracks	0.1	562

Table 9: Transportation Network Stream Crossings in the ZCC

	Train Tracks	**Interstate**	**Primary Roads**	**Secondary Roads**
Number of Stream Crossings	3	1	0	0

- **General Land Use**

The general land use analysis will provide an indication of which land uses predominate throughout the SWAP area, near the intake, or adjacent to the rivers, streams, lakes, and reservoirs. The land use data in the SWAP area is limited to the state boundary and ZCC (Table 10).

Table 10: General Land Use

LAND USE	**ZCC Area (Acres)**	**ZCC % of Total**
Agriculture	12,619	13
Barren	0	0
Power lines	0	0
Roads	0	0
Shrub land	6,795	7
Urban	33,002	34
Water	11,648	12
Wetland	0	0
Woodland	32,032	33

SWAPP Area Assessment and Protection Activities

Analysis of the Resource Characterization and potential significant contaminant sources of the SWAP area for City of Wheeling indicates that the water supply is susceptible to possible future contamination based on the following:

- ✓ The large irregular shape and the size of the WSDA present an increased potential for contamination. In addition, stream crossings provide the opportunity for an accidental release/spill of material to easily get directly into the stream drainage network. Source water protection efforts should be directed toward the establishment of an effective and efficient emergency response plan if one does not currently exist.

- ✓ Current land use practices may have an adverse impact on the ecological health of the Upper Ohio River South Watershed. In addition, the health of the Ohio River may be impacted by a number of regulated and unregulated point and non-point sources in the ZCC and WSDA.

Recommendations:

- ✓ Protection efforts should focus on the collection of additional information on the point and non-point sources present to evaluate the risk;
- ✓ Work with the Department of Health and Human Resources, other state agencies and local officials to make sure your intake is included in local regulations and inspections efforts;
- ✓ Restrict access to the intake area and post the area with Drinking Water Protection Area signs;
- ✓ Address any biological contaminant issues; and
- ✓ Protection options need to be actively considered to further evaluate and manage all potential contaminant sources and the City of Wheeling public water supply should place a high priority on protecting its supply source.

NEXT STEP – SWAP Protection Plan

The next step in source water protection planning is to prepare a SWAP protection plan. The SWAP protection plan incorporates this source water delineation assessment report and three additional sections: Contingency Planning, Alternative Sources, and Management Planning.

Contingency Planning

A contingency plan documents the system's planned response to interruption of the source water supply.

Alternative Sources

Information pertaining to alternative water sources focusing on long-term source replacement should the system be required to develop a new source of water due to contamination (or other reasons). This section outlines the most likely sources that can be used as an alternate water source.

Management Planning

Management planning is the most important element of SWAP. The management plan identifies specific activities that will be pursued by the system to protect their water resources. The system will benefit by taking a proactive approach to source water protection in their watersheds. It is

anticipated that most of the management effort will focus on coordination with government agencies and periodic surveys of the watersheds. It may be necessary to conduct a limited number of special studies to determine actual risk and consequences for selected contaminant sources. This information may be needed before decisions can be made on management activities.

Need additional information?

Additional information can be obtained by visiting the WV BPH web site at www.wvdhhr.org/bph/swap or calling 304-558-2981.

Disclaimer - The coverage's presented in this program are under constant revision as new sites or facilities are added. They may not contain all the potential or existing sites or facilities. The West Virginia Bureau for Public Health is not responsible for the use or interpretation of this information. Please report any inaccuracies on either the map or inventory by phoning 304-558-2981.

Glossary:

Best Management Practices (BMPs) are operational procedures used to prevent or reduce pollution.

Public Water System (PWS) is a system for the provision to the public of pipe water for human consumption, if such system has at least 15 service or regularly serves an average of at least 25 individuals daily at least 60 days of the year.

Water Quality Data is used to help assess both the potential pathogen contamination and other compliance monitoring (Nitrates) parameters associated with public water supplies.

Potential Significant Contaminant Source (PSCS) is a facility or activity that stores, uses, or produces chemicals or elements, and has the potential to release contaminants identified in the state program within a source water protection area in an amount, which could contribute significantly to the contaminants of the source waters of the public water supply.

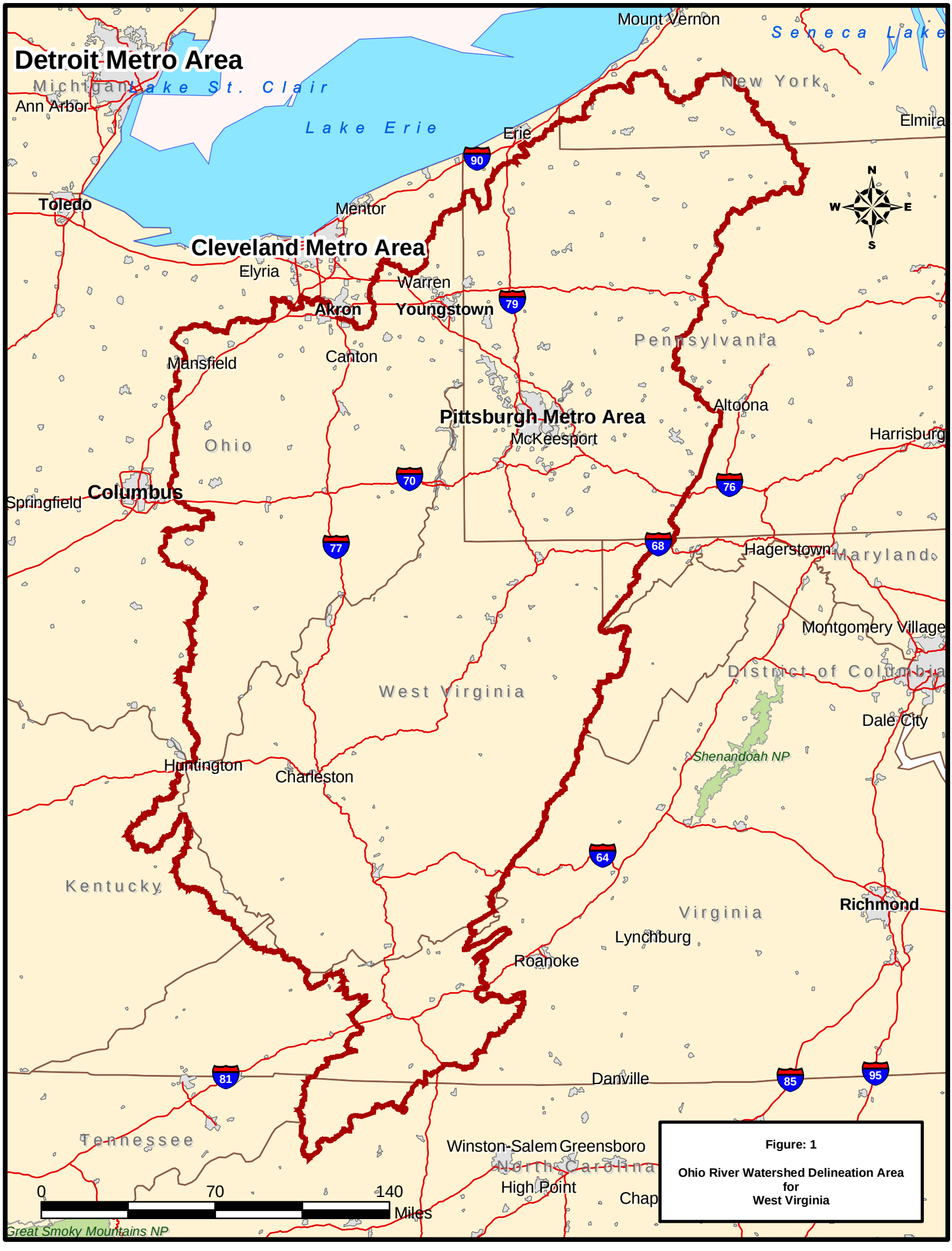
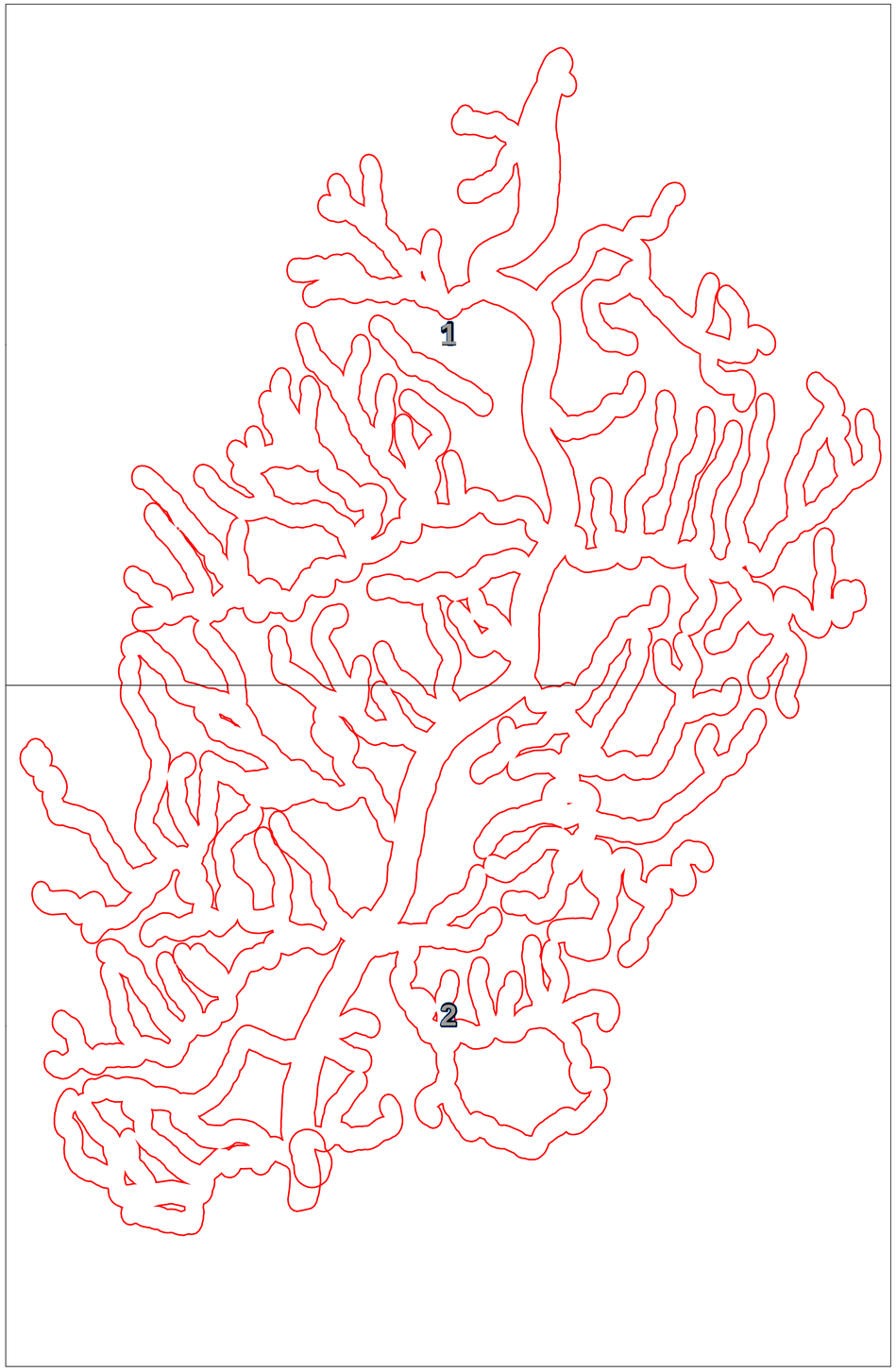


Figure: 1

Ohio River Watershed Delineation Area for West Virginia



Wheeling, City Of
WV3303516
Ohio County

Map Key

Potential Contaminant Sources

- Agriculture
- Commercial
- Industrial
- Municipal
- Residential

Zone of Critical Concern

This map is provided as a public service by the West Virginia Bureau for Public Health. The Bureau makes NO representation regarding completeness or accuracy of the data hereon. Efforts are made to verify and update the data used to generate this map. However, with data sets of this size and nature, eliminating all errors is difficult. Thus, the user assumes total responsibility for verification.

Scale: 1:40,000
Drawn By: JEM
01/12/06

Map 1

N
W E
S

Richmond
Toronto
Weirton
Wintersville
Steubenville
Bloomingdale
Follansbee
Mingo Junction
Hooverson Heights
New Alexandria
Wellsburg
Smithfield

0 0.5 1 Miles

Map 2

N
W E
S

Smithfield
Wellsburg
Beech Bottom
Dillonvale
Windsor Heights
Bethany
Rayland
Mount Pleasant
Tiltonsville
West Liberty
Yorkville
Cleanview
Martins Ferry
Wheeling
Brookside
Bridgeport
Valley Grove
West Alexander

Ohio River
Short Creek
Little Short Creek
Rush Run
Little Rush Run
Williamson Run
Salt Run
Little Salt Run
Blues Run
Rutter Run
Plum Run
Cabbage Run
Jug Run
Penny Run
Goose Run
Long Run
Parkers Run
Glen Robbins
Deep Run
Patton Run
Nixon Run
Buckeye Run
Grimms Run
Glenns Run
Wheeling Creek
McMahles Run
Flat Run
Fratzas Run
Slaughterhouse Run
Stephens Run
Dry Fork
Pinery Fork
Grog Run
Kimlin Run
Hukill Run
Pierce Run
Mingo Run
Logan Run
Girty Run
Newlons Run
Huff Run
Castleman Run
North Prong
Dogg Run
Welch Run
Narrizan Run
Indian Camp Run
Camp Run
Pierce Run
Green Run
Painters Run
Shubenacadie Run
Dunkle Run
Brush Run
Buffalo Creek
Buck Run
Crise Run
Curns Run
Lodge Run
Blayney Run
McCraw Run
Castleman Run
Dutch Fork
Bear Creek
Coulter Run
Todd Run
Middle Wheeling Creek
Little Wheeling Creek
Ohio Run
Blockhouse Run
Rankins Run
Washington
Meadow Run
Peters Run
Dixon Run
Oathall Run
McCoy Run
Browns Run
Waddles Run
Sheepskin
Talmoah
Edgewood
Rock Point
Valley View
Long Run
Pine
Elm
Chapel
Zion
Oak Grove
Ohio Valley Speedway
WHEELING OHIO 69

Brooke Hills Park

0 0.5 1 Miles