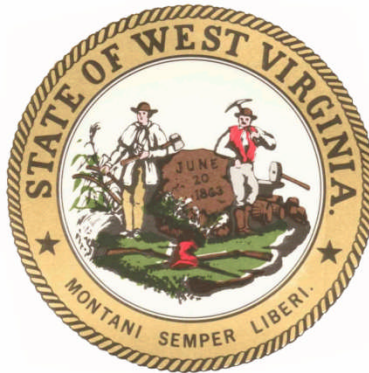


**State of West Virginia
Source Water Assessment and
Protection Program
Source Water Assessment Report**

**Deep Water PSD
Fayette County
PWSID: WV3301009**



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 2004

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

*November 2002 Report – R.D. Zande and Associates, Inc.
June 2004 Report Revised – WV Bureau for Public Health*

What Is The Purpose of a Susceptibility Report?

A susceptibility report identifies the most significant potential significant contaminant sources that could threaten the quality of the general public's water supply. A public water supply's susceptibility ranking does not indicate poor water quality. Regular testing of both the raw water and finished water best reflects actual water quality conditions. This susceptibility report will be used by the West Virginia Bureau for Public Health, hereinafter referred to as the WVBPH, and the public water supply systems to identify the quality of the source water and what techniques may be required to improve the water quality in the future. 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.

Table 1: Public Water Supply (PWS) Information

PWS Name	Deep Water PSD
PWS Address	P.O. Box 386 Deep Water, West Virginia 25057
PWS ID Number	WV3301009
County	Fayette
System Type	Community

What Is The Source Water Assessment and Protection Program?

The Source Water Assessment and Protection Program, also known as SWAPP, was established under the Safe Drinking Water Act, requires every state in the United States 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.

R.D. Zande & Associates, Inc., hereinafter referred to as RDZ, in conjunction with WVBPH, is undertaking the second and third requirements of the SWAPP. The final task will be undertaken by the WVBPH upon completion of the first three (3) tasks. The rankings of susceptibility of the Deep Water PSD's intake(s) to potential contamination are listed in **Table 2**.

Table 2: Intake Information

Facility Name	Source Name	Design Meets Regulations	Susceptibility Ranking
Deep Water PSD	Upper Kanawha River	Yes	High

RDZ assessed the source water treated by the Deep Water Public Service Water District based upon three (3) sources of information. The three (3) sources that RDZ utilized were field reconnaissance, personnel interviews, and the analysis of water quality data. The data review, the personnel interviews, and the field reconnaissance were conducted within the Zone of Critical Concern, hereinafter referred to as ZCC. Upon completion of the necessary fieldwork and data review, the results were analyzed, and the findings were used to produce the assessment report. A brief summary of each of the information sources used is listed below.

- **Field Reconnaissance**

On the site visit that began on November 8, 2002, RDZ began conducting the field reconnaissance survey for the Deep Water ZCC. This field reconnaissance survey consisted of the verification of existing potential significant contaminant sources, hereinafter referred to as PCSs, using Global Positioning System, also known as GPS, equipment and the identification of new PCSs using GPS equipment. The GPS equipment utilized for the PCSs was the Trimble Geo Explorer III-C, which generated latitude and longitude in decimal degrees. The unit also had the ability to be differentially corrected to +/- 5 meters of accuracy. The field survey at each PCS also consisted of a minimum of 30 counts at five-second (5 sec) intervals with a position dilution of precision (PDOP) of six (6) to ensure accuracy. Six (6) existing PCSs were identified and surveyed and 23 new PCSs were identified and surveyed. Upon completion of the GPS locating of the existing and new PCSs, a field information sheet, and the accompanying digital photograph(s), was completed for each PCS. This information was then transferred to a Microsoft Access database that will be provided to the WVBPH for further source water analysis.

A majority of the PCSs located within the ZCC was considered to have a high threat to the source water because they could be classified as either industrial or commercial sites. Fourteen industrial sites were located, which made up 48.3 percent (48.3%) of the total PCSs located. The commercial sites identified accounted for 37.9 percent (37.9%). Car washes, gas stations, and auto repair shops made up the majority of the commercial sites. Only one (1) agricultural site was identified. An illegal dumpsite was also located in the community of Jodie, West Virginia, that was located within approximately 200 yards of the source river. The above information is a result of a combination of information verification methods, including business directory research, agency database research, and a windshield survey, being conducted for the Deep Water ZCC. Figure 2 shows the locations of the identified and surveyed PCSs.

- **Personnel Interviews**

Personnel interviews were conducted by RDZ on November 8, 2002 at sites where PCSs were located and at the water treatment plant in the Deep Water ZCC. Interviews with personnel from the water treatment plant indicated that both the raw water that was being used to provide the potable drinking water and the potable drinking water meet the requirements of the federal and state governments' guidelines.

- **PCS Photographs**

Per the requirements of the contract between the WVBPH and RDZ, digital photographs were taken at both the existing and newly identified PCSs. The photographs and the Photograph Index Sheet, which will be utilized by the WVBPH in identifying the location of the PCS while in the field, will be provided to the WVBPH in a digital format upon the submittal of this report.

- **Inaccessible Areas**

A few inaccessible areas within the Deep Water ZCC were a result of the lack of accessible roads. There were also areas, which were inaccessible due to their location on private property. Some PCSs were inaccessible due to locked gates that prevented vehicular access.

- **Miscellaneous Notes**

Not Available

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 contaminate the drinking water at

the intake. Because of this, the Source Water Protection Area, hereinafter referred to as the SWPA, consists of two (2) types of delineations, which include the Watershed Delineation Area and the Zone of Critical Concern.

- **Watershed Delineation Area**

The first type of delineation is the Watershed Delineation Area, hereinafter referred to as WSDA, which covers approximately 5,328,686 acres in the Kanawha River Watershed. The WSDA includes the entire watershed area upstream of the intake, and includes waters from the State of West Virginia and the State of Kentucky. The perimeter of the catchment area provides the water to the water treatment plant's supply intake. The WSDA for the Deep Water area consisted mainly of agricultural land uses, pasture fields, and crop fields, mainly corn. Limited areas of industrial or commercial land uses were also found.

- **Zone of Critical Concern**

The second type of delineation is the Zone of Critical Concern. Figure 2 shows the Deep Water ZCC area, which covers approximately 1,772.45 acres. The ZCC is a corridor along streams within the WSDA area that warrants a more detailed inventory and management due to its proximity to the surface source water intake and to the susceptibility to PCSs. The ZCC is calculated using a mathematical model that accounts for stream flows, gradient, and area topography. The length of the ZCC is based on a five-hour (5 hour) time of travel. The ZCC width is approximately 1,000' from each bank of the principal receiving stream (for a total width of 2,000') and 500' from each bank of each tributary (for a total width of 1,000') draining into the principal receiving stream. The development around the ZCC consisted mainly of agricultural areas, pasture fields and crops, and small areas of residential communities. A few inaccessible areas within the Deep Water ZCC were a result of the lack of accessible roads. There were also areas which were inaccessible due to their location on private property. Some PCSs, while on public property, were inaccessible due to locked gates that prevented vehicular access.

What Is Susceptibility?

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

The possibility of a release from PCSs is greatly reduced if best management practices, also referred to as BMPs, are utilized. However, the susceptibility determination for a particular intake does not take into account whether or not BMPs are being utilized.

Susceptibility of a drinking water intake does not mean a customer will drink contaminated water. Water suppliers protect the 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 customer's water tap.

How Was The Water Supply Susceptibility Determined?

The susceptibility of the Deep Water PSD is based on the following components:

- Resource Characterization;
- Summary of Raw and Finished Water Quality; and
- Summary of Chemical and Biological Water Quality.

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. The following four (4) resource characteristics were analyzed and 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 the infiltration rate of the soil increases (that is, as more precipitation soaks in rather than running off), the contaminant loads associated with the reduced runoff should decrease.

Table 3 provides a summary of the associated soil groups.

Table 3: Summary of Soil Associations is the WSDA*

Soil Associations	Soil Drainage	Topographic Setting
MkE3 – Muskingum	Well drained	Very steep
Sr – Steep rock land	Well drained	Very steep
DsF – Dekalb and Gilpin	Well drained	Very steep
MnF – Muskingum	Well drained	Very steep
MnE – Muskingum	Well drained	Very steep
MkF – Muskingum	Well drained	Very steep
St – Strip mine spoil	Well drained	Gently sloping
GIF – Gilpin	Well drained	Very steep
MkD – Muskingum	Moderately Drained	Nearly level
GID – Gilpin	Well Drained	Gently sloping
CpB – Cookport	Moderately to Well drained	Nearly level
ShE – Shelocta	Moderately drained	Gently sloping
DcD – Dekalb channery	Moderately drained	Gently sloping

*This information is limited to the WSDA within the state boundaries of West Virginia.

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 water has taken in order to reach a stream channel, the greater the chance the water has to deposit and filter the contaminants that may occur. **Table 4** provides an analysis of the size, shape, and slope, of the Deep Water WSDA.

Table 4: Hydrologic Setting

Size of WSDA (mi. ²)	8,326
Shape of WSDA	Large & Irregular
Stream Length (Main Stem) (mi.)	5.45
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 WSDA, the average stream gradients of the main stem, the average rainfall, the nearest relevant USGS stream gauge, the distance to the stream gauge, the topographic position of the stream gauge, the annual mean discharge, the high flow, and the low flow.

Table 5: Movement of Water

Number of Stream Miles (mi.)	6,864.63
Average Stream Gradient (Main Stem)	.0031 ft./mi.
Average Rainfall (in.)	41.00
Nearest Relevant USGS Stream Gauge (mi.)	03193000 Kanawha River @ Kanawha Falls
Distance to Relevant USGS Stream Gauge (mi.)	2.7
USGS Stream Gauge Topographic Position	Upstream
Annual Mean Discharge (cfs)	11,970
Highest Daily Mean Flow (cfs)	163,000 (8/15/40)
Lowest Daily Mean Flow (cfs)	970 (9/30/53)

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 obtained and reviewed. This data was collected as part of the WVBPH, and the West Virginia Department of Environmental Protection, also known as the WVDEP, implementation of the Federal Safe Drinking Water Act and Clean Water Act. Water Quality Data, hereinafter referred to as WQD, was then evaluated to help provide direct indicators 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, also known as raw water, that was conducted by the water supplier. Additional water data, including ambient water chemistry, biological criteria, and monitoring, and habitat were evaluated. The sampling requirements for public water systems vary depending on the type of system and the federal regulated testing requirements. As a result, the lack of water quality impacts may indicate the lack of a certain sampling measures rather than a lack of potential contamination.

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

The following is a summary of WQD for the Deep Water PSD's water treatment plant and associated service area. The water source for the water treatment plant is the surface water drawn from the Kanawha River. The water treatment plant is located in Deep Water, West Virginia and currently has one (1) certified class II operator. The plant treats 92 gallons per minute and averages nine (9) hours per day of operation. The water production varies from 30,000 to 40,000 treated gallons per day. Not only do they produce water for the serve area, they sell water to the West Virginia Water Company for Montgomery Heights. The Deep Water PSD has met all federal and state water standards and requirements for the past two (2) years. The Deep Water PSD also has reported no violations during the same time period.

Summary of Chemical and Biological Water Quality Results from the West Virginia DEP

The following is a summary of water quality data for the Deep Water PSD. The water source for the Deep Water PSD is the surface water drawn from the Kanawha River. The test results for the past five (5) years indicate detectable levels of inorganic compounds. Three (3) of the inorganic compounds that were detected repeatedly were nitrate, sodium, and sulfate. The sodium compound had a concentration level of 58.8 milligrams per liter (mg/L) for one (1) of the five (5) years that testing data was available. The sodium had nearly the same concentration for the four (4) remaining years. A large portion of the volatile organic compounds that were tested for had detectable

levels with low concentrations. At no time were any of the contaminants that were tested for above the limits of the water standards set by federal or state governing agencies.

Summary of Other Available Chemical and Biological Water Quality Data

Water quality data from an environmental resource group was not available.

Potential Significant Contaminant Sources (PCSs):

Inventory of Potential Significant Contaminant Sources

The purpose for providing an inventory of certain types of land uses, a listing of PCSs, and activities within the SWAP area is to aid in reducing the risk posed to the general public's drinking water supply. The following provides information regarding the methodology used to generate the inventories.

The inventory portion of the SWAP consists of two (2) 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 PCSs in the ZCC. The detailed source inventory is conducted to verify existing PCSs and to identify new PCSs that were not captured in the broad regulated source inventory and to field verify the PCSs in the ZCC. PCSs located during the inventory are found on Figure 2.

A detailed risk-assessment of the PCSs 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 PCSs.

- **Summary of the Detailed Inventory**

Table 6 is a summary of the detailed inventory of potential significant contaminant sources (PCSs) in the ZCC. The detailed source inventory was conducted to identify PCSs that were not identified in the existing database review and to verify the location of the PCSs within the ZCC.

Table 6: Summary of PCSs within the ZCC

Potential Contaminant Source	Total PCSs	Percent (%)
Agriculture	1	3.5
Residential	0	0.00
Municipal	3	10.3
Commercial	11	37.9
Industrial	14	48.3

- **Transportation Network**

A summary of the transportation network is shown in **Table 7**. 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 WSDA. **Table 8** is a summary of the transportation network stream crossings in the WSDA. Please note that miles of railroad tracks could be less due to decommissioning of the previously mentioned railroad tracks. In addition, the 1,372 stream crossings provide the opportunity for an accidental spill / release of materials to get directly into the stream drainage network. Source water protection efforts should be directed towards the establishment of an effective and efficient emergency response plan if one does not currently exist.

Table 7: Transportation Network Summary for WSDA*

	Within 100 feet of Stream	Total
Miles of Interstate (mi.)	7.4	122.1
Miles of Primary Roads (mi.)	29.9	945.9
Miles of Secondary Roads (mi.)	2.7	95.0
Miles of Railroads (mi.)	84.9	779.6

*This information is limited to the WSDA within the state boundaries of West Virginia.

Table 8: Transportation Network Stream Crossings in the WSDA*

	Interstate	Primary Roads	Secondary Roads	Railroads
Number of Stream Crossings	94	524	52	702

*This information is limited to the WSDA within the state boundaries of West Virginia.

- **General Land Use**

The general land use analysis will provide an indication of which land uses are predominate throughout the SWAP area, near the water intake, or adjacent to the rivers, streams, lakes, and reservoirs. The land use in the SWAP area is shown in **Table 9**. The total acreage contained within the Deep Water WSDA is approximately 5,328,686 acres and the total acreage contained within the Deep Water ZCC is approximately 1,772 acres.

Table 9: General Land Use

LAND USE	WSDA* (acres)	WSDA (%)	ZCC Area (acres)	ZCC (%)
Shrub Land	14,337.11	0.49	1.78	0.02
Woodland	2,328,596.02	79.82	6,213.58	73.86
Water	33,618.57	1.15	1,235.87	14.69
Roads	694.55	0.02	0	0
Power lines	4,798.68	0.16	32.25	0.38
Urban	58,046.10	1.99	599.14	7.12
Agriculture	441,619.71	15.14	126.77	1.51
Barren	23,569.30	0.81	175.92	2.09
Wetland	12,010.16	0.41	27.35	0.33

*This information is limited to the WSDA within the state boundaries of West Virginia.

SWAPP Area Assessment and Protection Activities

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

- ✓ The steep topographic setting, and the size of the WSDA present an increased potential for contamination. In addition, the 1,372 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.

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 Deep Water PSD 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?

Visit the BPH web site at www.wvdhhr.org/bph/swap or call 304-558-2981 to obtain additional information.

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:

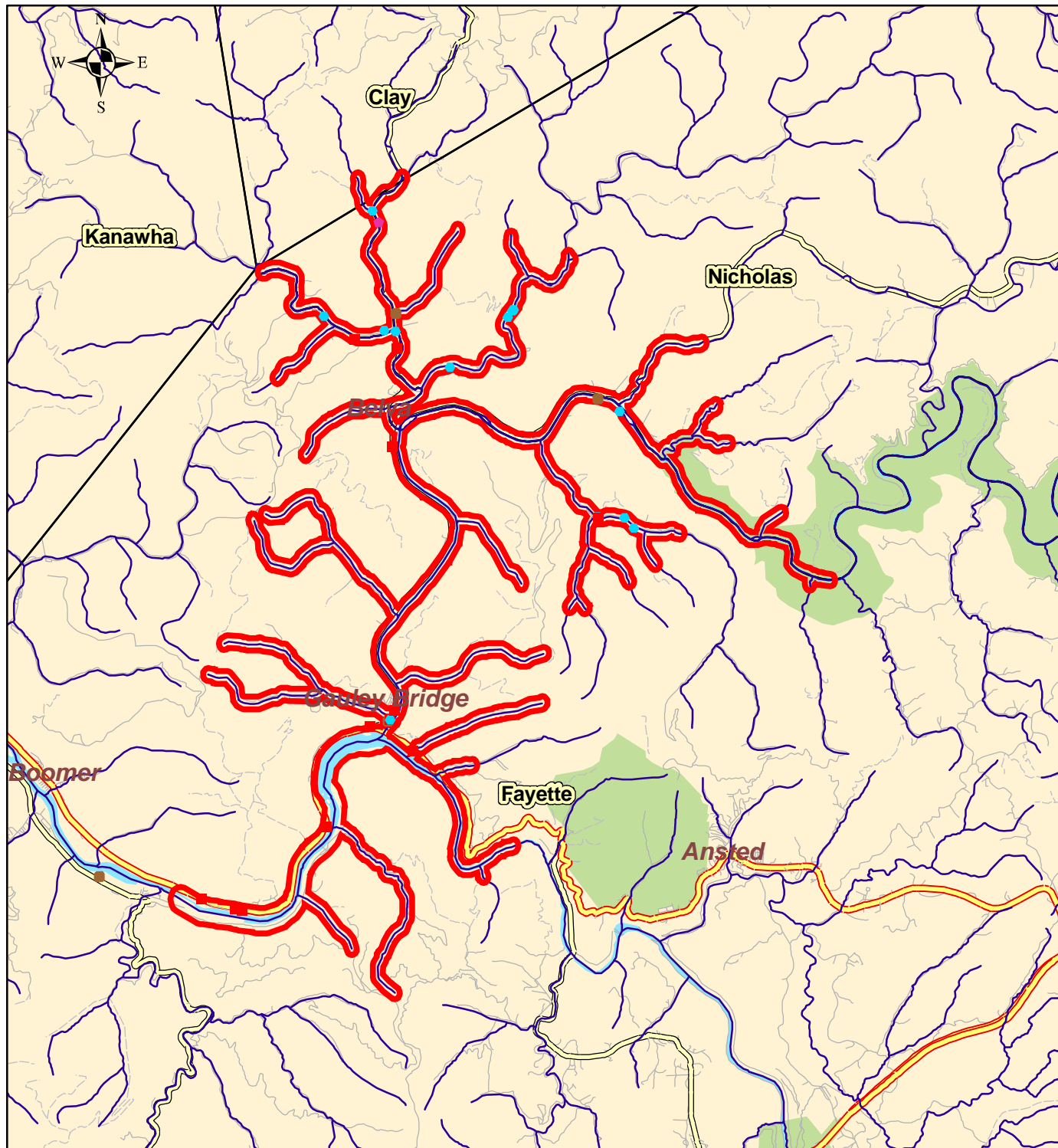
Best Management Practices (BMPs) are operational procedures used to prevent or reduce pollution.

Potential Significant Contaminant Source (PCS) 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.

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 services 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.



Map Key

Potential Contaminant Sources

- Agriculture
- Commercial
- Industrial
- Municipal
- Residential
- Zone of Critical Concern

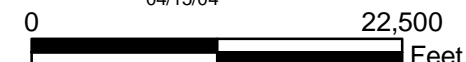


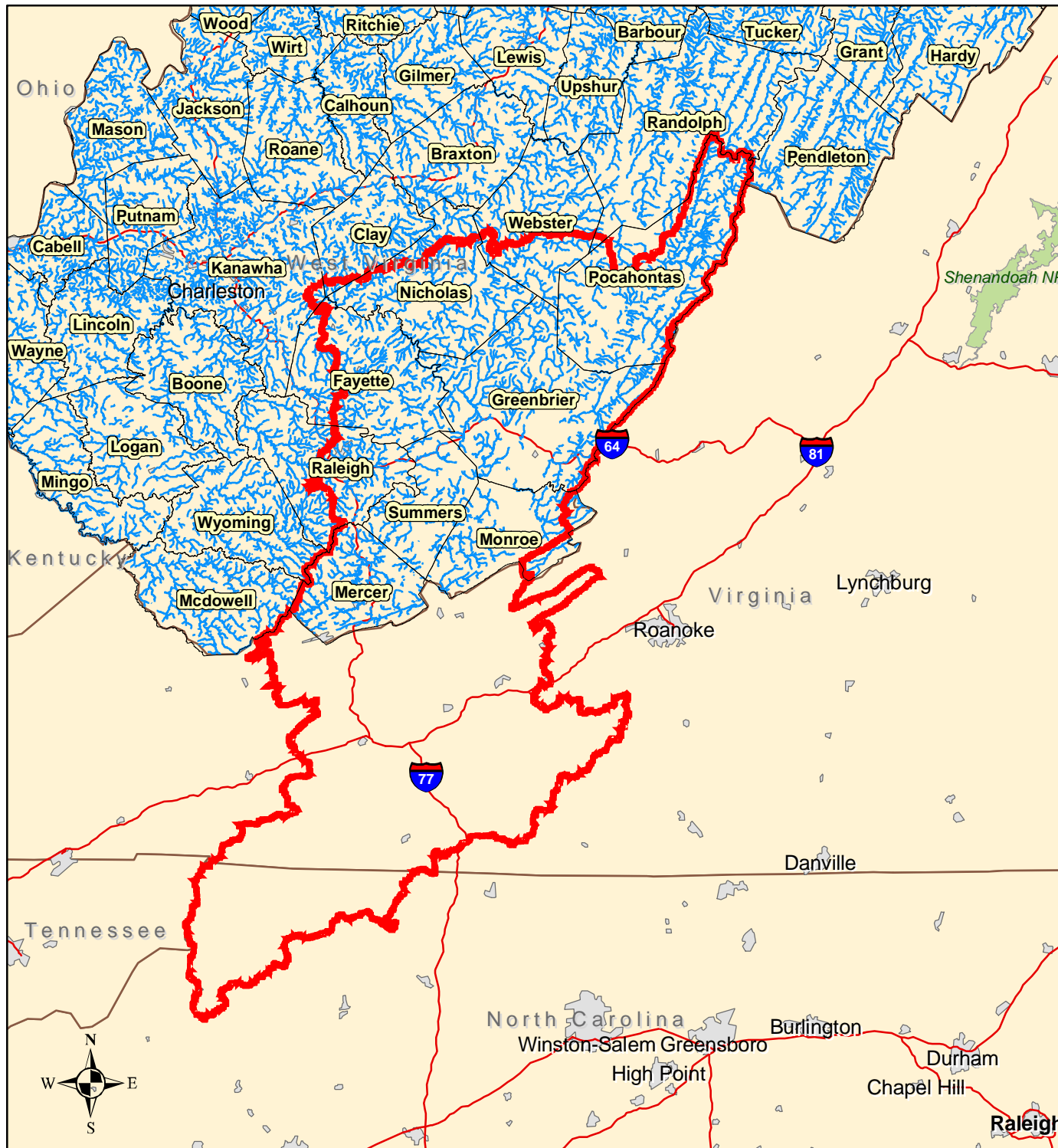
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Source locations not included for reasons of security

Deep Water PSD Zone of Critical Concern WV3301009 Fayette County

Scale: 1:140,000
Drawn by: ACS
04/15/04





Map Key

 Watershed Delineation Area



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Source locations not included for reasons of security

Deep Water PSD Watershed Delineation Area WV3301009 Fayette County

Scale: 1:1,900,000
Drawn by: ACS
03/23/04

