# State of West Virginia
# Source Water Assessment and Protection Program

# Source Water Assessment Report

## Kermit Water Department
## Mingo County
## PWSID: WV3303003

**Prepared by:**

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

**Date: May 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.*
*May 2004 Report Revised – WV Bureau for Pubic 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 | Kermit Water Department |
| PWS Address | P.O. Box 385<br>Kermit, West Virginia<br>25674 |
| PWS ID Number | WV3303003 |
| County | Mingo |
| 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 Kermit Water Department's intake(s) to potential contamination are listed in **Table 2**.

**Table 2: Intake Information**

| Facility Name | Source Name | Design Meets Regulations | Susceptibility Ranking |
|---|---|---|---|
| Kermit Water Dept. | Tug Fork River | Yes | High |

RDZ assessed the source water treated by the Kermit Water Department 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 21, 2002, RDZ began conducting the field reconnaissance survey for the Kermit ZCC. This field reconnaissance survey consisted of the verification of existing potential significant contaminant sources, hereinafter referred to as PCSs, through the use of 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. Seven (7) existing PCSs were identified and surveyed and 32 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. Both an existing conditions site map and a new conditions site map identifying all the known PCSs in the Kermit ZCC is included in the Appendix of this report.

  Most of the PCSs located in the ZCC had either a high threat or a low threat to the source water. Of the PCSs analyzed, 43 percent (43%) would be considered a high threat and while 54 percent (54%) would be considered a low threat. Fifty-six percent (56%) of the PCSs were commercial sites, while municipal sites comprised another 25 percent (25%). A majority of the commercial sites are classified as either car washes or gas stations. In addition to field verification of existing PCS, the above information is also a result of a combination of information verification methods, including business directory research, agency database research, and a windshield survey, being conducted for the Kermit ZCC. Figure 2 shows the locations of the identified and surveyed PCSs on a USGS topographical map.

- **Personnel Interviews**

  Personnel interviews were conducted by RDZ on November 21, 2002 at sites where PCSs were located and at the water treatment plant in the Kermit ZCC. Interviews with personnel from the Kermit 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 did exist in the Kermit ZCC they were a result of the lack of accessible roads. There were also areas that were inaccessible due to their location on private property. Some PCSs were inaccessible due to locked gates that prevented vehicular access.

- **Miscellaneous Notes**

  The Marcum Junkyard, which was located in the Kermit ZCC, spans one-half mile (1/2 mi.) on both sides of the highway.

## 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 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 811,923.35 acres in the Tug Fork River Watershed (Figure 1). The WSDA includes the entire watershed area upstream of the intake, and includes waters from the State of West Virginia and the State of Virginia. The perimeter of the catchment area provides the water to the water treatment plant's supply intake. The WSDA for the Kermit area consisted mainly of commercial land uses.

- **Zone of Critical Concern**

  The second type of delineation is the Zone of Critical Concern. Figure 2 shows the Kermit ZCC area, which covers approximately 7,297.15 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. There were a few inaccessible areas within the Kermit ZCC that were a result of the lack of accessible roads. There were also areas which were inaccessible due to their location on private property. Some areas of the ZCCs were inaccessible due to locked gates that prevented vehicular access. No sewered areas existed within the Kermit ZCC.

## 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 Kermit Water Department 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 in the WSDA***

| Soil Associations | Soil Drainage | Topographic Setting |
|---|---|---|
| 13 – Yeager fine | Moderately drained | Gently sloping |
| 17B – Urban land-Kanawha | Moderately drained | Gently sloping |
| 44F – Five block | Well drained | Well drained |
| 49F – Berks | Well drained | Very steep |
| 5B – Udorthents | Moderately drained | Nearly level |
| 80 – Udorthents | 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 Kermit WSDA.

**Table 4: Hydrologic Setting**

| | |
|---|---|
| Size of WSDA(mi.$^2$) | 1,268.63 |
| Shape of WSDA | Long and Narrow |
| Stream Length (Main Stem) (mi.) | 122 |
| Average Watershed Slope | 10-30% |

**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.) | 1,656.07 |
| Average Stream Gradient (Main Stem) | 15.06 ft./mi. |
| Average Rainfall (in.) | 45 |
| Nearest Relevant USGS Stream Gauge (mi.) | 03214500 Tug Fork at Kermit |
| Distance to Relevant USGS Stream Gauge (mi.) | 2.4 |
| USGS Stream Gauge Topographic Position | Downstream |
| Annual Mean Discharge (cfs) | 1,197 (2002) |
| Highest Daily Mean Flow (cfs) | 34,300 (3/5/1917) |
| Lowest Daily Mean Flow (cfs) | 14 (10/23/1930) |

**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 was also 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 water quality data for the Kermit Water Department's water treatment plant. The water source for the plant is surface water drawn from the Tug Fork River. Upon review of the available water data, the Kermit Water Department system had no violations during 2001 and reported that they met all federal and state standards for the same time period. On no occasions did the observed concentrations exceed the established MCLs for the parameters set for the finished water. For any additional information concerning the quality of the finished water, please review the Consumer Confidence Report.

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

The following is a summary of water quality data for the Kermit Water Department's service area. The water source for the plant is surface water drawn from the Tug Fork River. Test results for inorganic compounds over the past five (5) years indicate high concentrations of sodium and sulfate. The sulfate contaminant had a concentration of 320 milligrams per liter (mg/L) and was repeatedly detected at 230 mg/L. The following is a list of the volatile organic compounds which were repeatedly detected over the past five (5) years of testing: chloroform, bomodichloromethane, bromofluorobenzene, bromoform, and naphthalene. Other volatile organic compounds were not detected based upon the water data available.

## Summary of Other Available Chemical and Biological Water Quality Data

Additional WQD from outside sources other than the water treatment plants or the WVBPH were 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 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 | 0 | 0 |
| Residential | 2 | 5 |
| Municipal | 10 | 25 |
| Commercial | 22 | 56 |
| Industrial | 5 | 12.8 |

- **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 500 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.) | 0 | 0 |
| Miles of Primary Roads (mi.) | 9.90 | 204.17 |
| Miles of Secondary Roads (mi.) | 1.22 | 27.70 |
| Miles of Railroads (mi.) | 73.34 | 302.22 |

*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 | 0 | 125 | 13 | 362 |

*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 Kermit WSDA is approximately 811,923.35 acres and the total acreage contained within the Kermit ZCC is approximately 7,297.15 acres.

**Table 9: General Land Use**

| LAND USE | WSDA*(acres) | WSDA (%) | ZCC Area (acres) | ZCC (%) |
|---|---|---|---|---|
| Shrub Land | 6,373.04 | 1.21 | 135.22 | 3.26 |
| Woodland | 486,869.25 | 92.75 | 3,323.52 | 80.16 |
| Water | 2,283.36 | 0.43 | 71.61 | 1.73 |
| Roads | 0 | 0 | 0 | 0 |
| Power lines | 2,350.30 | 0.45 | 0 | 0 |
| Urban | 10,020.14 | 1.91 | 164.35 | 3.96 |
| Agriculture | 6,640.80 | 1.27 | 242.41 | 5.85 |
| Barren | 10,339.28 | 1.97 | 208.61 | 5.03 |
| Wetland | 65.83 | 0.01 | 0.44 | 0.01 |

*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 Kermit Water Department 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 500 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 Kermit Water Department 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 or sources of information can be obtained by calling or visiting the BPH web site at www.wvdhhr.org/bph/swap or phoning 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.*

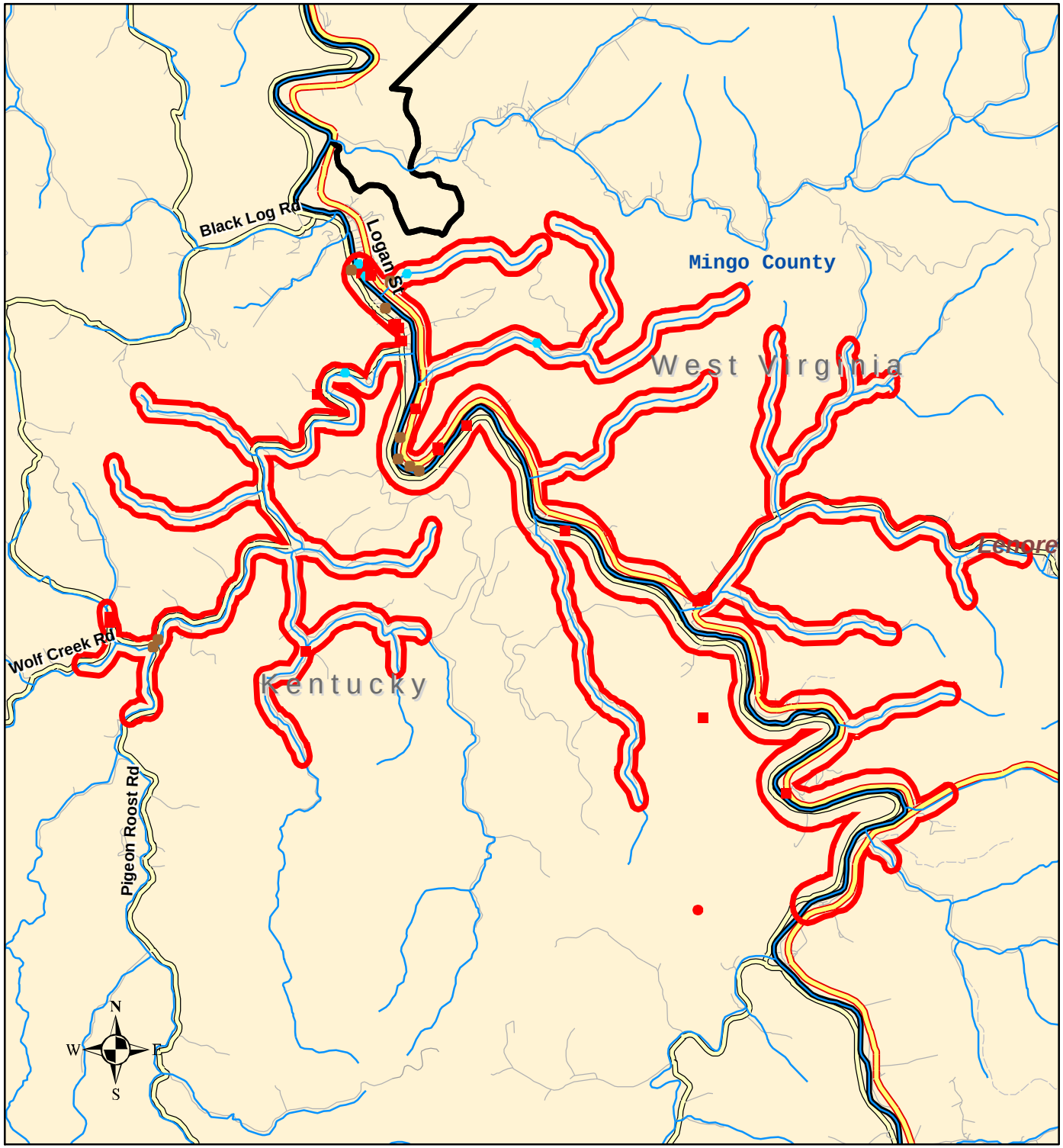
**Glossary:**

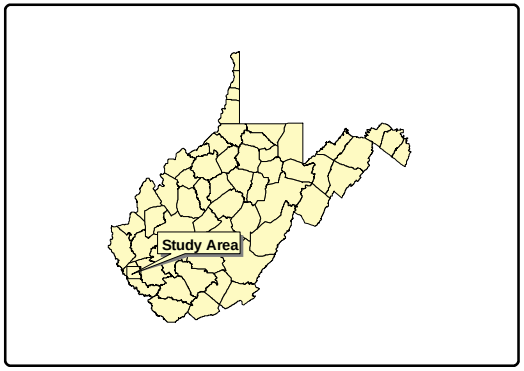
Best Management Practices (BMPs) are operational procedures used to prevent or reduce pollution.

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 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.

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.




## Map Key

**Potential Contaminant Sources**

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

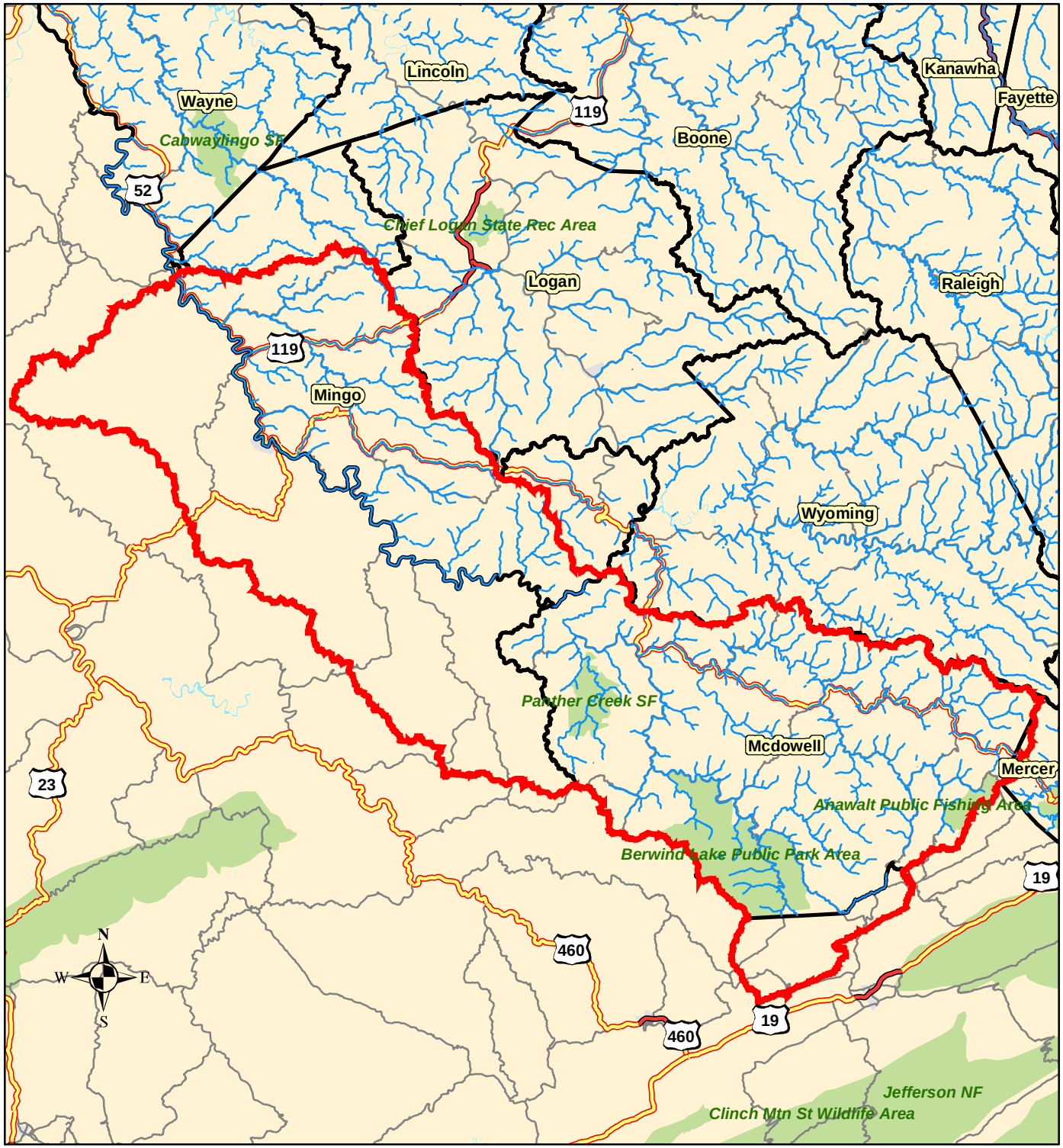
This map is provided as a public service by the West Virginia Bureau for Public Health. The Bureau makes NO representation regarding completeness or accuracy of the data hereon. Efforts are made to verify and update the data used to generate this map. However, with data sets of this size and nature,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

Source locations not included for reasons of security

# Kermit
# Zone of Critical Concern
# WV3303003
# Mingo County

Scale: 1:90,000
Drawn by: ACS
04/14/04

0 16,000 Feet





## Map Key

Watershed Delineation Area

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Source locations not included for reasons of security

# Kermit
# Watershed Delineation Area
# WV3303003
# Mingo County

Scale: 1:640,000
Drawn by: ACS
04/13/04

0 130,000 Feet