STATE OF WEST VIRGINIA
DEPARTMENT OF HEALTH AND HUMAN RESOURCES

Cecil H. Underwood
Governor

January 2, 2001

Joan E. Ohl
Secretary

Berkeley County PSD
Post Office Box 389
Bunker Hill, WV 25413

RE: **Source Water Assessment**
Berkeley County PSD 3300202

Dear Berkeley County PSD,

Thank you for your participation in the West Virginia Bureau for Public Health (WVBPH) Source Water Assessment and Protection (SWAP) Program. Your cooperation in the program is greatly appreciated. This mandated United States Environmental Protection Agency (US EPA) program involves delineating wellhead protection areas, identifying potential contamination sources, and recommending management strategies to protect these sources used for public drinking water supplies. Assessments must be completed for every public water system by 2003 in West Virginia. The WVBPH encourages the development of a local SWAP committee made up of community members, civic groups, youth groups, etc. that will help your community develop and carry out a plan to prevent water quality problems. Please review the enclosed EPA "*Community Involvement in Drinking Water Source Assessments*" (EPA 816-F-00-025 May 2000) for additional information on the SWAP Program.

Enclosed, please find the main products of your initial Source Water Assessment including a detailed SWAP Plan and a Public Summary containing a Susceptibility Analysis. Each groundwater source and the potential sources of contamination surrounding these wells were evaluated by the WVBPH SWAP Program to determine these findings.

☐ SWAP Plan is composed of six steps including introductory materials, reservoir characterization, wellhead delineation, and an inventory of potential contaminant sources. The initial four steps are completed. This plan also contains steps five and six entitled management and contingency planning, respectively. These last two steps need completed by the Berkeley County PSD to conclude this initial assessment. Please reference these last two steps in the bound report (pages 10-13) for guidance to complete this task. SWAP staff are available to meet with you concerning these last two steps if necessary. Please contact the WVBPH within 15 days if you have any concerns about these additional steps to complete or if there are any other significant potential sources of contamination located in this delineated area which the SWAP Program has not listed in this assessment. The target

BUREAU FOR PUBLIC HEALTH
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Source Water Assessment

Public Summary

Berkeley County PSD

PWSID WV3300202

Berkeley County

Prepared by

Department of Health and Human Resources

Bureau for Public Health

West Virginia Office of Environmental Health Services

Environmental Engineering Division

Source Water Assessment and Protection Unit

Introduction

The Source Water Assessment and Protection (SWAP) Program of the West Virginia Bureau for Public Health (BPH) is completing assessments of the contamination threats to all public water sources (private wells are not involved in this effort). This concept of source water protection is a preventative approach and complements the effort of proper treatment and disinfection by the individual water supply systems. This assessment is one step in a multilevel approach to ensure a safe future supply of water by understanding what potential threats exist.

This Source Water Assessment Public Summary is to provide information to support local and state efforts to protect the Berkeley County PSD public drinking water source and to maintain a safe and dependable water supply for the protection of human health by preventing contamination. The costs of these preventative measures will never outweigh the cost of possibly remediating a public water supply.

The emphasis of this assessment is on "source" (well/spring) water rather than the "tap" water. Information on tap water quality is available in the Berkeley County PSD *Consumer Confidence Report* which can be obtained from the Berkeley County PSD by calling (304) 229-5255.

What is the Source of Your Drinking Water?

The Berkeley County PSD water system serves a population in excess of 20,000 people. The main supply is from the LeFevre Spring located at Bunker Hill. There is also a well used in this system located at the Baker Quarry along with a backup supply available from a quarry pond adjacent to the Baker Quarry well. The spring and well combined are pumped to provide an average daily production of about two million gallons per day.

The spring flows at approximately 14,000 GPM. The depth to water in the Quarry well is 93 feet with the total depth of the well being 492 feet. There are some shallow sinkholes in this area and the surface streams will generally lose their water to the subsurface. Surface waters can enter the ground water regime very quickly via direct injection through sinkholes or other fracture or solution openings. The type of flow in karst areas is described as being conduit flow and is delivered via strike oriented cave passages or along fault planes and fault passages. The estimated land area (approximately 3935 acres) that contributes water to the wells is depicted in the attached map as the new Wellhead Protection Area (WHPA). The major land uses in the wellhead area are 49% open brush/grass, 42% forested, 5% row crops and 2% urban. This area includes coverage in both West Virginia and Virginia. The delineated area was determined by the SWAP Program based on prior delineations by two studies conducted by Draper Aden Associates and the West Virginia Rural Water Association. The Rural Water Association delineation was more conservative so the SWAP Program added a portion of it to the delineation conducted by Draper Aden Associates. This can be noted on the second map with the "Added WHPA" blue outline surrounding this additional delineation.

Well/Spring Construction

Wells may vary in their construction characteristics and in the geologic rock types in which they occur. The lack of an effective grout and sanitary seals are avenues by which contaminants from nearby surface water bodies or overland runoff can percolate to wells. Based on onsite reviews and the ground water under the direct influence data the wells integrity were rated generally satisfactory or good, with no visible problems existing during the visit. The State has determined that these wells are under the influence of surface water. It is unknown at this time if the Baker quarry well or the backup well would currently meet the State Water Well Design Standards due to the lack of documentation concerning well construction. The spring does not currently meet the Public Water System Design Standards as it is not housed in a permanent structure.

Water Quality and Water Treatment Information

The water withdrawn from the spring and wells is currently filtered and disinfected prior to distribution. Water quality testing performed by the system on the treated water indicates results are all within the limits set by the state and federal requirements. No raw water analysis is available for this system. All drinking water including bottled water, may reasonably be expected to contain small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. For further information regarding the quality of the system's finished water, please refer to the *Consumer Confidence Report* or call the Environmental Protection Agency's Safe Drinking Water Hotline at ***1-800-426-4791*** or contact your local health provider for more information about contaminants and potential health effects. This system is required to test for Volatile Organic Compounds (VOC), Synthetic Organic Compounds (SOC), Inorganic, Nitrates/Nitrites, and Bacteria on its post treated water.

Evaluation of Significant Potential Sources of Contamination

This assessment evaluates contaminants that may enter the water drawn directly from the well. The contaminants addressed in this assessment include those regulated under the Safe Drinking Water Act as well as those the BPH has determined may present a concern to public health. A description of the significant potential sources of contamination associated with the wellhead area was provided in the original Source Water Assessment and Protection Plan report. Each significant potential source of contamination has been analyzed and prioritized (low, medium, and high) in accordance with their potential to impact the water supply. Potential sources of contamination of high priority are summarized in a table format and map. No contaminants have been found in this source of water.

Sequential Number	Map Code	PCS Category	PCS Name	Associated Chemicals	Threat to GW
1	C-13	Commercial	Equipment rental/repair shop	PH, M, VOC	H
2	C-18	Commercial	Gas Stations	PH, M, VOC, SOC	H
3	C-3	Commercial	Auto repair shops	PH, M, VOC, HM, SOC	H
4	C-19	Commercial	Gas Stations	PH, M, VOC, SOC	H
5	C-18	Commercial	Gas Stations	PH, M, VOC, SOC	H
6	C-7	Commercial	Car dealerships	PH, VOC	H

Source Water Assessment and Protection Activities

Based on this summarized narrative and the attached susceptibility review for each spring and well, the overall susceptibility ranking for the Berkeley County PSD has a higher susceptibility to the identified potential sources of contamination. There does not appear to be much natural protection of this water source which makes it very vulnerable to potential contamination if some type of leak were to occur. For this susceptibility analysis, the State combined the inventory results with other relevant information to decide how likely a water supply may become contaminated by the identified potential sources of contamination. This step makes the assessments useful for communities, since it provides information that local decision-makers use to prioritize approaches for protecting the drinking water supply. It does not mean that these wells are currently contaminated or that these wells are going to be contaminated in the near future, but the potential does exist.

An aquifer protection management program should be developed for the Berkeley County PSD spring and wells. Preferably, the protection plan should be developed for the entire WHPA with the cooperation of neighboring towns, county, and state agencies.

It is recommended that protection and management efforts should focus on obtaining additional information on the sources present to evaluate their risk. The Berkeley County PSD may want to consider the following:

1. Obtain further detailed information concerning the type of leak detection and corrosion protection currently being used at the three gas station underground storage tank facilities. These facilities and any former facilities also need checked to see if there was any history of leaks associated with present or past underground storage tank systems located within the wellhead protection area.

2. Another activity should focus on what type of preventive measures are being conducted at the auto repair shop, the car dealership, the equipment rental business, and along the railroad.

3. Another area of significance is the I-81 Interstate Highway. Although highways are not listed as high risk on the groundwater threat list, they certainly are a high risk for the surface water threat list and since this area has many losing streams, the proximity of a major Interstate certainly makes this shallow karst aquifer high risk in this particular area.

4. Another area of significance is that there is a positive connection already documented by a dye trace between the sink adjacent to the I-81 Welcome Center and the LeFevre Spring.

5. The integrity of the older septic systems located in the WHPA may also need to be evaluated.

The aquifer protection management program may include the distribution of educational materials, site monitoring, land acquisition, etc. The BPH and the West Virginia Rural Water Association (304-562-8585) personnel are available to provide technical assistance to local public water supplies.

How to Obtain Additional Information

This Source Water Assessment Public Summary was completed in December 2000. Individuals interested in learning more about this water system and aquifer/watershed can contact the Berkeley County PSD at (304) 229-5255 or the State Bureau for Public Health at (304) 558-2981. A full length (more detailed version) of the source water assessment is available for review at the Berkeley County PSD and the County Health Department.

Glossary of Terms

Alluvium: *Sediments deposited by moving rivers.*

Aquifer: *A formation, group of formations, or part of a formation that contains sufficient saturated permeable materials to yield sufficient, economical quantities of water to wells and springs.*

Contamination: *The addition to water of any substance or property preventing the use or reducing the usability of the water for ordinary purposes such as drinking, preparing food, bathing, washing, recreation, and cooling.*

Flood Plain: *Any land area susceptible to inundation by flood water from any source.*

100-year Flood Plain: *The area adjoining a river, stream, or water course covered by water in the event of a 100 year flood.*

100 -year Flood: *The flood having a one percent chance of being equaled or exceeded in magnitude in any given years. Contrary to popular belief it is not a flood occurring once every 100 years.*

Infiltration: *The process of, or fluids, entering the soil and recharging aquifers rather than becoming runoff.*

Maximum Contaminant Level (MCL): *Defined as the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.*

Potential Significant Contaminant Source (PSCS):
A facility or container or route of travel that could release a sufficient amount of a harmful contaminant that upon entering an aquifer or surface stream could contaminate it past the level of human health concerns.

Recharge: *Water entering the upper end of a groundwater flow system.*

Remediation: *The removal of contaminants from soil and/or ground water.*

Sensitivity of the Source Water Protection Area (SWPA):
refers to the hydrologic or hydrogeologic characteristics that effect the transport of contaminant from a source of contamination to a well or intake.

Source Water Assessment and Protection (SWAP) Program:
The program established by the 1996 Amendments to the Safe Drinking Water Act (SDWA) which expanded the initial Wellhead Protection Program

to all public drinking water supply systems including surface water systems. This program is to assess, preserve, and protect the source waters which are used to supply water for public drinking water supply systems and to provide a long term availability of an abundant supply of safe water in sufficient quantity for present and future citizens of the State. This program also enables the water supply owners, consumers, and others to initiate and promote actions to protect their drinking water supplies with the developed information.

Source Water Protection Area (SWPA):
refers to the area delineated by the State for a public water system, or including numerous public water systems, whether the source is ground water, surface water or both, as part of the West Virginia SWAP approved by the EPA under section 1453 of the Safe Drinking Water Act.

Susceptibility: *The likelihood that a release from a PSCS would contaminate and render unusable a drinking water supply such as aquifers or surface steams.*

Unconfined Aquifer: *An aquifer over which there is no confining layer.*

Well (s): *refers to ground water intakes including the well structure (i.e., casing, etc) and wellhead.*

Wellhead Protection Area (WHPA):
The surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield. This area is delineated by the State for ground water source public water systems. The former Wellhead Protection Program (WHPP) is now part of the Source Water Assessment and Protection (SWAP) Program.

SUSCEPTIBILITY ANALYSIS

PWSID	SYSTEM NAME	WELL NUMBER
3300202	Berkeley Co PSD	Spring

STEP ONE - WELL CONSTRUCTION

LOW SOURCE INTEGRITY

- (●) NOT CONSTRUCTED TO PWS STANDARDS
- ( ) CONSTRUCTION UNKNOWN
- ( ) SANITARY SURVEY/VULNERABILITY
- ( ) CONSTRUCTED TO STANDARD

STEP TWO - RESERVOIR SENSITIVITY

HIGH SENSITIVITY

- ( ) COAL MINE AREAS - HIGH SENSITIVITY
- ( ) SPRINGS - HIGH SENSITIVITY
- (●) KARST AREAS - HIGH SENSITIVITY
- ( ) ALLUVIAL VALLEYS (unconfined) - HIGH SENSITVITY
- ( ) ALLUVIAL VALLEYS (confined) - MODERATE SENSITIVITY
- ( ) VALLEY AND RIDGE PROVINCE (fracture) - MODERATE SENSITIVITY
- ( ) APPALACHIAN PLATEAU PROVINCE (fracture) - MODERATE SENSITIVITY
- ( ) FOLDED PLATEAU AREA (fracture) - MODERATE SENSITIVITY

STEP 3 - PHYSICAL BARRIER

HIGH POTENTIAL SUSCEPTIBILITY

- (●) LOW SOURCE INTEGRITY VS HIGH AQUIFER SENSITIVITY = HIGH POTENTIAL SUSCEPTIBILITY
- ( ) HIGH SOURCE INTEGRITY VS HIGH AQUIFER SENSITIVITY = MODERATE POTENTIAL SUSCEPTIBILITY
- ( ) LOW SOURCE INTEGRITY VS MODERATE AQUIFER SENSITIVITY = MODERATE SUSCEPTIBILITY
- ( ) HIGH SOURCE INTEGRITY VS MODERATE SENSITIVITY = LOW POTENTIAL SUSCEPTIBILITY

STEP FOUR - LAND USE THREAT

HIGH THREAT TO GROUND WATER

STEP FIVE - WATER QUALITY IMPACT

NO IMPACT FROM MAN MADE CHEMICALS

SUSCEPTIBILITY DETERMINATION

HIGH SUSCEPTIBILITY

- (●) HIGH POTENTIAL SUSCEPTIBILITY VS HIGH CONCERN LAND USE = HIGH
- ( ) HIGH POTENTIAL SUSCEPTIBILITY VS MEDIUM CONCERN LAND USE = HIGH
- ( ) HIGH POTENTIAL SUSCEPTIBILITY VS LOW CONCERN LAND USE = HIGH
- ( ) MODERATE POTENTIAL SUSCEPTIBILITY VS HIGH CONCERN LAND USE = HIGH
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- ( ) LOW POTENTIAL SUSCEPTIBILITY VS LOW CONCERN LAND USE = LOW

SUSCEPTIBILITY ANALYSIS

PWSID	SYSTEM NAME	WELL NUMBER
3300202	Berkeley Co PSD	Baker Well

STEP ONE - WELL CONSTRUCTION

LOW SOURCE INTEGRITY

- ○ NOT CONSTRUCTED TO PWS STANDARDS
- ◉ CONSTRUCTION UNKNOWN
- ○ SANITARY SURVEY/VULNERABILITY
- ○ CONSTRUCTED TO STANDARD

STEP TWO - RESERVOIR SENSITIVITY

HIGH SENSITIVITY

- ○ COAL MINE AREAS - HIGH SENSITIVITY
- ○ SPRINGS - HIGH SENSITIVITY
- ◉ KARST AREAS - HIGH SENSITIVITY
- ○ ALLUVIAL VALLEYS (unconfined) - HIGH SENSITVITY
- ○ ALLUVIAL VALLEYS (confined) - MODERATE SENSITIVITY
- ○ VALLEY AND RIDGE PROVINCE (fracture) - MODERATE SENSITIVITY
- ○ APPALACHIAN PLATEAU PROVINCE (fracture) - MODERATE SENSITIVITY
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- ○ LOW POTENTIAL SUSCEPTIBILITY VS LOW CONCERN LAND USE = LOW

SUSCEPTIBILITY ANALYSIS

PWSID	SYSTEM NAME	WELL NUMBER
3300202	Berkeley Co PSD	BackupWell

STEP ONE - WELL CONSTRUCTION

LOW SOURCE INTEGRITY

- ○ NOT CONSTRUCTED TO PWS STANDARDS
- ◉ CONSTRUCTION UNKNOWN
- ○ SANITARY SURVEY/VULNERABILITY
- ○ CONSTRUCTED TO STANDARD

STEP TWO - RESERVOIR SENSITIVITY

HIGH SENSITIVITY

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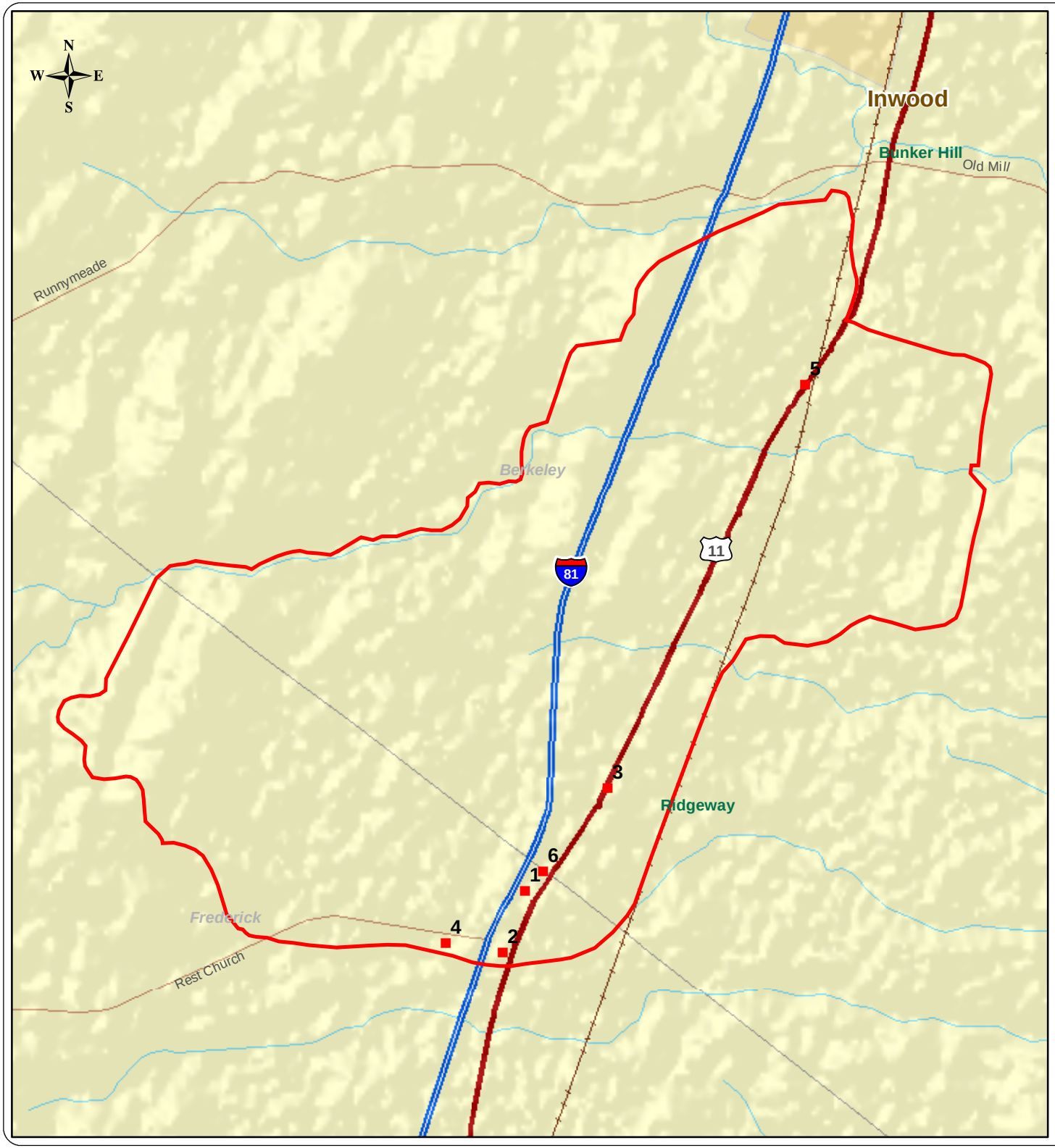

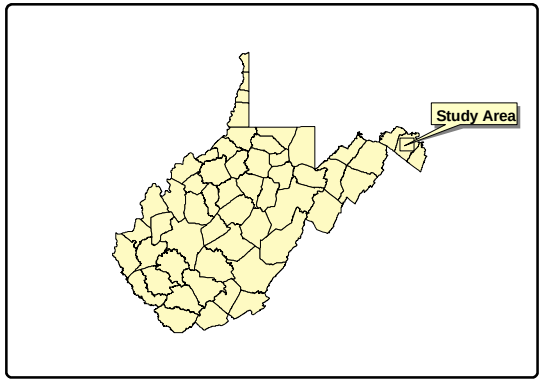

Map Key

Potential Contaminant Sources

- Agriculture
- Commercial
- Industrial
- Municipal
- Residential

Source Water Protection Area

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

Berkeley County PSD - Bunker Hill
WV3300202
Berkeley County

Scale: 1:34,000
Drawn by: JEM
08/21/08

0 0.5 1 Miles