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GROUND WATER PUBLIC SUPPLY SYSTEMS

SOURCE WATER ASSESSMENT AND PROTECTION (SWAP) PROGRAM

Prepared by: West Virginia Bureau for Public Health, SWAP Program

INTRODUCTION

What is the Purpose of this Report?

In accordance with the 1996 amendments to the Safe Drinking Water Act of 1974, the Source Water Assessment and Protection Program of the West Virginia Bureau for Public Health (BPH) is responsible for completing a source water assessment and protection plan for each public water supply system in the state. These plans include a delineation of a Source Water Protection Area (SWPA), and inventory of potential of contamination sources (PCSs). This information is used to determine the susceptibility for each source used by the system. Susceptibility refers to the likelihood of the source to become contaminated.

Susceptibility determination is a preventative step in a multi-barrier approach to ensure a safe dependable supply of water by understanding potential threats. Susceptibility determination complements the effort of proper treatment and disinfection by the individual water supply systems. This report provides information to support local and state efforts to protect public drinking water sources and human health by preventing contamination. Preventative measures are always more cost effective than the remediation or replacement of contaminated water source.

This report identifies the significant PCSs that could threaten system water quality. Your susceptibility ranking does not imply poor water quality. Actual water quality is best reflected by results of regular water tests. A Consumer Confidence Report contains updated water quality information and can be obtained from your local water supplier. Please refer to Table 1 for an informational summary of your public water supply:

Table 1: Public Water Supply Information

PWS Name	Preston County PSD #4
Address	Post Office Box 370
City, State, Zip	Bruceton Mills, WV 26525
PWSID#	WV3303923
County	Preston
System Type	Community

METHODOLOGY

How are Potential Contaminant Sources (PCSs) identified?

In order to identify PCSs, a source water protection area (SWPA) is first delineated. A SWPA is the land around the “source” (e.g. well, spring) where protection activities should be focused; given that this is likely the recharge area contributing water to the well. Please refer to the attached map (Exhibit A) for the Preston County PSD #4 SWPA.

The BPH delineates the SWPA for a ground water system based on a “five year time of travel” methodology. This methodology literally refers to the time that it takes for water to travel to the source through the ground. That is to say that the SWPA boundary is drawn around the recharge area at the point where water percolates into the ground and travels five years to the source. The “five year time of travel” is based on available scientific data. In many cases, a lack of data makes an accurate delineation of the SWPA difficult. It should be noted that contaminants can still enter a source from outside of the SWPA boundary, but it may take longer than five years to reach the source.

Once the SWPA is delineated, BPH identifies PCSs within the area. Because the status and occurrences of PCSs are continually changing, a number of inventories are reviewed to identify both federal and state regulated sites (e.g. NPDES, CERCLIS, etc) and non-regulated land use activities (i.e. industrial, commercial, agricultural, municipal, and residential). While not all PCSs have been field verified, they are included in this report to provide the most comprehensive list possible. The BPH recommends that Preston County PSD further investigate these PCSs for accuracy during the development of the local wellhead protection plan.

Each field verified regulated site and non-regulated land use activity has been assigned a threat level to ground and surface water. The identified PCSs and each corresponding threat level are used to determine the overall source susceptibility.

What is Susceptibility?

Susceptibility is a measure of the potential of a source to become contaminated by land uses and activities within the SWPA. The purpose of a susceptibility analysis is to provide an overview to actions a public water system may take to further reduce the susceptibility to their drinking water supply. Because public water supply wells have been constructed in various hydrologic settings and have a range of potentially significant contaminant sources, best professional judgment has been used in determining the susceptibility of each public water system to contamination. The possibility of a release from PCSs is greatly reduced if Best Management Practices (BMP's) are used. The susceptibility determination for your well did not take into account whether BMP's are being used.

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

How Was my Well's Susceptibility Determined?

In addition to the occurrences of PCSs, your source's susceptibility to contamination is also

based on the hydrologic setting and physical integrity of the well. Thus making a susceptibility determination includes the following activities:

- Review of hydrologic setting (ease of contamination transport through each materials present in the local hydrologic setting);
- Review of physical integrity of the well, through current condition and construction permits to verify that the well was constructed to applicable design standards (integrity may be listed as “unknown” if the construction activities cannot be determined);
- Review of available ground water quality data
- Consideration of interplay among these factors to estimate the sensitivity and susceptibility to the system.

The data obtained through these reviews are integrated with the threat level of the PCSs identified in the SWPA to make a final susceptibility determination, and to provide suggestions of appropriate protection strategies or activities.

SWPA DELINEATION

The Preston County PSD #4 water system serves a population of approximately 3,555 people. The supply is from four (4) wells. The wells are pumped to provide an average daily production of approximately 596,437 gallons, as of September 2007.

The SWPA delineation for the Preston County PSD #4 sources was generated by the West Virginia Rural Water Association. Based on the five year travel time methodology, the SWPA delineation includes approximately 977 acres (Exhibit A).

SUSCEPTIBILITY DETERMINATION RESULTS

Evaluation of Significant Potential Contaminant Sources

The inventory for Preston County PSD #4 consists of two (2) field verified significant PCSs, only one (1) is considered a **high threat** to ground water. Please refer to **Exhibit B** for a listing of the PCS and the attached map (Exhibit A) for the location of the PCS in the SWPA.

Each significant PCS has been analyzed and prioritized (low, moderate, and high) in accordance with their potential to impact the water supply. It is important to note that the links between the PCS and the primary contaminant types are not intended to be comprehensive, but only those commonly associated with the PCS. Any potential source may have none, some, or more types of contaminants associated with the chemicals indicated. Threat rankings are a combination of the perceived risk of the release of a contaminant from a land use area, the migration route of the contaminant to the well or spring and the relative public health risk of the contaminant itself. The risk rankings are based on the general nature of their activities and the contaminants associated with them, not on facility specific information, such as management practices. This ranking does not take into consideration any unforeseen releases or the dynamics of new PCS's within the delineated SWPA.

A detailed risk assessment of PCS's was beyond the scope of what could be accomplished with available resources and data. A detailed risk analysis is more meaningful when prepared by local decision makers as the bridge from assessment work to protection strategies.

Hydrologic Setting

Table 2 provides the hydrologic setting and assigned sensitivity of the setting for the public water source(s) in the system. The Appalachian Plateau Province areas consist of nearly horizontal shales, sandstones and coals. The aquifers may be porous or slightly fractured. According to the State of West Virginia Source Water Assessment and Protection Program susceptibility determination guidelines, sensitivity refers to the potential contaminants' transport, whether due to natural or human factors. Appalachian Plateau is identified as having Moderate Sensitivity.

Table 2: Source of Your Drinking Water - Hydrologic Setting

Well/Spring Name	Hydrologic Setting	Sensitivity
Plant Well #1 (101)	Appalachian Plateau	Moderate
North Well #1 (201)	Appalachian Plateau	Moderate
South Well #1 (301)	Appalachian Plateau	Moderate
South Well #2 (302)	Appalachian Plateau	Moderate

Physical Integrity of Source

Review of the construction permits demonstrated that the wells were constructed in accordance with current design standards (Table 3).

Table 3: Physical Integrity of Source

Well/Spring Name	Source Integrity
Plant Well #1 (101)	Constructed to Standards
North Well #1 (201)	Constructed to Standards
South Well #1 (301)	Constructed to Standards
South Well #2 (302)	Constructed to Standards

The standards are set to prevent the occurrence of contamination even in the presence of PCSs. However, even a well or spring constructed to the most exacting standards may lose structural integrity with time. 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.

The BPH is responsible for overseeing an evaluation referred to as GWUDI or Ground Water Under the Direct Influence of surface water for every public water system. A source may be GWUDI due to contamination to the aquifer, or due to a compromised wellhead structure.

Preston County PSD #4 sources have been evaluated and found to be NOT GWUDI, that is to say that they are not under the influence of surface contaminants.

Water Quality Data

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. The water withdrawn from the well is currently disinfected prior to distribution. Periodic analysis for a variety of bacterial, organic, nitrate, synthetic and inorganic contaminants in the water after treatment have consistently yielded values below the maximum contaminant level (MCL) as regulated by the Safe Drinking Water Act (Table 4).

Table 4: Water Quality and Water Treatment Information

Well/Spring Name	Results
Plant Well #1 (101)	Meets standards
North Well #1 (201)	Meets standards
South Well #1 (301)	Meets standards
South Well #2 (302)	Meets standards

Because sampling requirements are for treated water, the lack of water quality impacts does not necessarily indicate a lack of contamination. This determination is limited by the sampling that is performed for the water system.

While water quality meets standards, a review of the water quality data identified the following chemicals that were detected in the treated water quality analysis in quantities less than regulated MCLs:

- Elevated levels of sodium.
- Xylenes and Ethylbenzene (associated with fuels, paint related products, and adhesives) detected in 2004 and 2006.
- Trihalomethanes (secondary products related to chlorination) detected in 2004 and 2005.
- Barium detected greater than half the MCL in one instance.

In addition to the above contaminants, di(2-ethylhexyl)phthalate (DEHP) was detected in the North Well and the Plant Well in initial water quality testing during well construction. DEHP is a chemical commonly added to plastics for flexibility and frequently occurs in the environment because of its widespread use. Given that DEHP has not been detected since that initial sample, its presence was most likely due to an accidental contamination during the wells construction. Also, when detected DEHP levels were well below MCL, thus its isolated occurrence is not thought to pose a public health threat.

It should be noted that 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.

SUSCEPTIBILITY DETERMINATION CONCLUSION

Final Susceptibility Determination

Based on this summarized narrative and susceptibility review, **the four (4) wells used by Preston County PSD #4, (North Well, Plant Well, South Well 1, and South Well 2) have MODERATE SUSCEPTIBILITY to the identified PCSs.**

Recommendation for your Source Water Assessment and Protection Activities

In making a susceptibility determination, the BPH combined the inventory of PCSs with other relevant information to decide how likely a water supply is to be contaminated. 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.

The following list provides specific recommendations for your source water assessment and protection activities:

- T An aquifer protection management program should be developed for the wells. Preferably, the protection plan should be developed for the entire SWPA 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.
- T Support and encourage the implementation of Best Management Practices for agricultural areas including grazing lands, crop production farms, and orchards. In addition, support information can be provided to residents and commercial users to encourage the reduction in over use of common pesticides and fertilizers.
- T Investigate the source or potential sources of manmade chemicals detected in ground water sources. The area is largely rural and the detections of the chemicals listed in this report is surprising.
- T Inspect the SWPA regularly.
- T Implement Land Use Planning tools to influence future developments within the SWPA. One way to accomplish this is to join forces with the county to adopt a zoning ordinance that would govern certain uses that are considered high threats to ground water.
- T Provide maps of the SWPA to the County Planning Commission or other appropriate county agency to make them aware of the location of proposed development in relation to the water supply source.

- T Establish funds to purchase land banks of critical areas (e.g. around sinkholes, wells, springs) to preserve the areas from future development.
- T Implement systems for regular collection of hazardous waste from residents. For example, the Eastern Panhandle Soil Conservation District and the Berkeley County Solid Waste Authority has helped organize amnesty days in the past where residents could bring in all types of hazardous wastes without threat of punishment.
- T Encourage and implement public education about your water supply regarding its susceptibility to contamination and ways to protect. This could come in the form of brochures containing information and advice about ground water and the local terrain. For example, the Berkeley County Health Department has an on-going educational program that is presented to all fourth graders in the county.
- T Support and encourage the identification of contamination incidents by citizens.
- T Include information regarding contamination and source water protection in mailings to homeowners, including non-emergency contact information. Reduce the amount of septic systems in use by extension of the public sewer system or other approved systems.

NEXT STEP:

The next step in source water protection planning is to prepare or updating Source Water Assessment and Protection (SWAP) Plan. Check with your water system to see if they currently have a protection (Management and Contingency Planning) plan in place. The SWAP plan incorporates this source water delineation and assessment report and the following additional sections:

Contingency Planning

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

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 utilized.

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 source water protection area. 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?

To obtain additional information and/or links, visit the BPH Web site at www.wvdhhr.org/bph/swap or call the SWAP Program at 304-558-2981.

***Disclaimer - The coverage 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 calling the SWAP Program at 304-558-2981.

GLOSSARY OF TERMS

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 of reducing the usability of the water for ordinary purposes such as drinking, preparing food, bathing, washing, recreation, and cooling

GWUDI or "Ground Water Under the Direct Influence" - is defined by the EPA as water beneath the surface of the ground with either a significant occurrence of insects or other macro organisms, algae, or large diameter pathogens such as *Giardia lamblia* or *Cryptosporidium* or other water characteristic such as turbidity, temperature, pH or conductivity.

Hydrogeologic Setting - Evaluates the sensitivity of an aquifer. The likelihood of a contaminant reaching a well or spring is a function of the ground water flows patterns, the rate of flow, the distance to the source and the hydraulic characteristics of the contaminant. The technical factors include the well(s) pumping rate and spring flow, the direction, slope and elevation of the water table, transmissivity and storativity characteristics of the aquifer, overlaying material and recharge rate for ground water systems.

Karst - A term denoting a formation containing soluble rocks, underground solution passages, sinkholes and springs.

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.

Physical Integrity of the Well or Spring – Refers to the design and construction of a well that should include casing without cracks; tight joints between lengths of casing; adequate grout between the casing and bore hole and location (floodplain or flooding area). A spring must be protected with “shoe box” type lid enclosure that is screened and locked to prevent unauthorized entry. These features provide reasonable assurance that contaminants will not enter the well or spring through any pathway, and allow operators to focus on the potential for contaminants to migrate through the aquifer and enter into the well(s) or spring. However, even a well(s) and springs constructed to the most exacting standards may lose structural integrity with time. Maintenance records of remedial improvements also will be reviewed in evaluation of integrity.

Potential Contaminant Source (PCS) - 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.

Public Water System - is any water system or water supply which regularly supplies or offers to supply, piped water to the public for human consumption, if serving at least an average of twenty-five (25) individuals per day for at least sixty (60) days per year, or which has at least fifteen (15) service connections.

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

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

Sensitivity - refers to the hydrologic or hydrogeologic characteristics that affect the transport of the 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 streams.

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

Water quality - Available data will be evaluated to help direct protection activities. If the water quality impact is known, evaluating the source(s) present may help to determine the origin of the contamination and where immediate protection efforts should be focused

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.

EXHIBIT A: MAP OF SOURCE WATER PROTECTION AREA

EXHIBIT B: TABLE OF POTENTIAL CONTAMINANT SOURCES AND THREATS

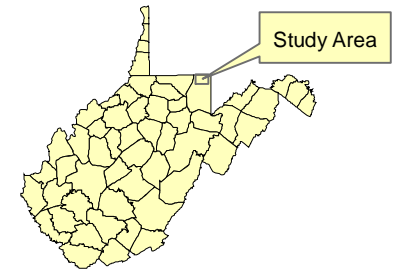
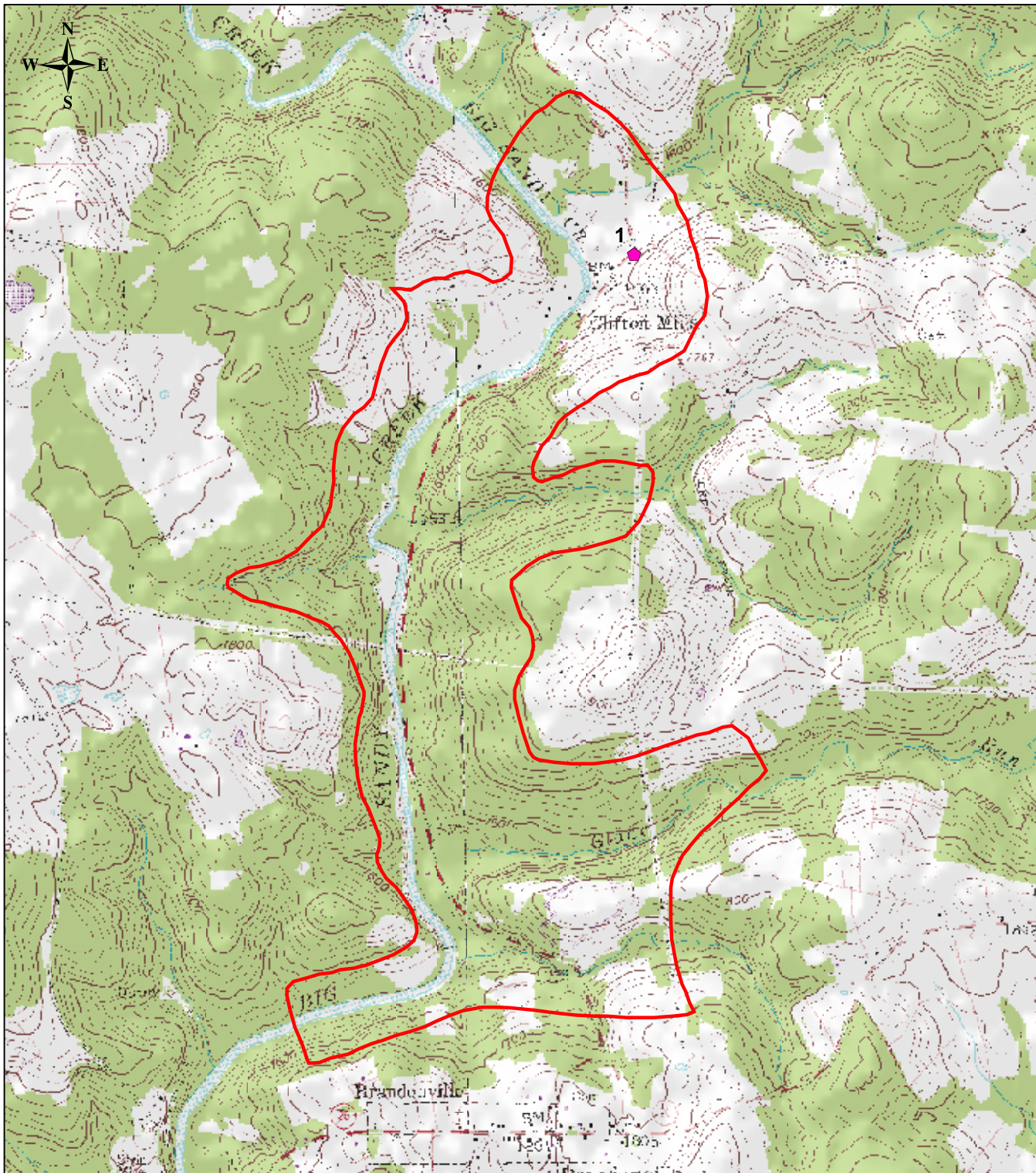
Potential Contaminant Sources (PCS) and Threats

Sequential Number	Map Code	PCS Category	PCS Name	Associated Chemicals	Threat to GW
1	A-17	Agriculture			
2	M-5	Municipal			
3R			NPDES water plant back wash		

Index to Associated Chemicals are as follows:







MP	Microbiological Pathogens: Total/Fecal Coliform, Viruses, Protozoa
NN	Nitrate/Nitrite
VOC	Volatile Organic Compounds
HM	Heavy Metals
M	Metals
SOC	Synthetic Organic Compounds
T	Turbidity
TO	Taste and Odor precursors
R	Radionuclides
PH	Petroleum Hydrocarbons
D	Disinfection byproducts

* Regulated data points are activities that are mandated by a governmental entity.



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.

Preston County PSD 4 WV3303923 Preston County

Scale: 1:24,000
Drawn By: JEM
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