Source Water Protection Plan

Berkeley Springs Water Works

PWSID 3303301

Morgan County, West Virginia

July 2016

THRASHER

SOURCE WATER PROTECTION PLAN
FOR THE
BERKELEY SPRINGS WATER WORKS
PWSID No. WV3303301

Prepared By:

Project Engineer

THE THRASHER GROUP, INC.

600 White Oaks Boulevard
Bridgeport, West Virginia 26330
www.thrashereng.com
Phone: 304-624-4108 Fax: 304-624-7831

I certify the information in this Source Water Protection Plan is complete and accurate to the best of my knowledge.

Authorizing Signatory:

Scott E. Merki

Scott Merki
Mayor

6/22/16
Date

Date of Submission

Funding By:

Office of Environmental Health Services
West Virginia Department of Health and Human Resources

THRASHER PROJECT No. 101-010-1046.805

- CONTENTS -

EXECUTIVE SUMMARY **1**

PURPOSE **2**

BACKGROUND: WV Source Water Assessment and Protection Program **3**

STATE REGULATORY REQUIREMENTS **3**

SYSTEM INFORMATION **4**

WATER TREATMENT AND STORAGE **5**

DELINIATIONS **8**

PROTECTION TEAM **9**

POTENTIAL SIGNIFICANT SOURCES OF CONTAMINATION **12**

Confidentiality of PSSCs 12

Local and Regional PSSCs 13

Prioritization of Threats and Management Strategies 18

IMPLEMENTATION PLAN FOR MANAGEMENT STRATEGIES **18**

EDUCATION AND OUTREACH STRATEGIES **26**

CONTINGENCY PLAN **31**

Response Networks and Communication 32

Operation During Loss of Power 32

Future Water Supply Needs 34

Water Loss Calculation 35

EARLY WARNING MONITORING SYSTEM **37**

SINGLE SOURCE FEASIBILITY STUDY **39**

COMMUNICATION PLAN **40**

CONCLUSION & RECOMMENDATIONS **42**

List of Tables

Table 1. System Information 5
Table 2. Water Treatment Information 6
Table 3. Surface Water Sources 7
Table 4. Ground Water Sources 7
Table 5. Watershed Delineation 9
Table 6. Protection Team 11
Table 7. Locally Identified Potential Significant Sources of Contamination 15
Table 8. Critical Areas 20
Table 9. PSSC Management Strategies 21
Table 10. Education and Outreach Implementation Plan 27
Table 11. Water Shortage Response Capability 32
Table 12. Generator Capacity 33
Table 13. Future Water Supply Needs 34
Table 14. Water Loss Information 36
Table 15. Early Warning Monitoring System Capabilities 37

List of Appendices

Figures ..... Appendix A
Early Warning Monitoring System Information ..... Appendix B
Communication Plan ..... Appendix C
Single Source Feasibility Study ..... Appendix D
Supporting Documentation ..... Appendix E

EXECUTIVE SUMMARY

Berkeley Springs Water Works (Berkeley Springs) has developed this Source Water Assessment and Protection (SWAP) Program to assess, preserve, and protect the raw water source used to for their Public drinking Water Supply System (PWSS) and to provide long term availability of an abundant supply of safe water in sufficient quantity for present and future citizens of the Town of Bath and surrounding areas of Morgan County, West Virginia.

This water system treats water to meet federal and state drinking water standards, conventional treatment does not fully eradicate all potential contaminants but conventional methods are often very expensive. This SWAPP describes Berkeley Springs' efforts and proposals to protect its source of drinking water in accordance with Safe Drinking Water Act (SDWA) standards and all code changes specific to PWSS's utilizing surface water sources or surface water influenced groundwater sources

Under the amended and new codes, each existing public water utility using surface water or ground water influenced by surface water as a source must have completed or updated a source water protection plan by July 1, 2016, and must continue to update their plan every three years. New plans are also required when there is a significant change in the Potential Sources of Significant Contamination (PSSC) within the Zone of Critical Concern (ZCC). The code also requires that public water utilities include details regarding PSSCs, protection measures, system capacities, contingency plans, and communication plans.

Berkeley Springs' water treatment facility obtains surface water from the springs of Berkeley Springs State Park for treatment. The plant has a treatment capacity of 720,000 gallons per day (GPD) and pumps approximately sixteen (16) hours per day producing an average of 316,900 GPD. Berkeley Springs maintains five (5) treated water storage tanks totaling 1,086,000 gallons and one (1) 20,000 gallon raw water storage tank. Currently, the water system is experiencing 17% unaccounted for water; however, the utility is conducting leak detection and making necessary repairs to reduce unaccounted for water. Berkeley Springs currently maintains a 240 kW generator to provide power service to the raw water intake and treatment facility. The two (2) booster stations in the distribution system require electrical service upgrades to connect to a generator.

The primary requirements for Berkeley Springs' PWSS SWAPP are as follows:

Delineate of the Source Water Protection area, based on a five hour travel time to the intake,

Develop and inventory the confidential, local and regional potential contamination sources,

Determine of the PWSS's susceptibility to contamination,

Make the assessment available to the public in the form of management strategies, education, and outreach strategies and

Organize a protection team involving public stakeholders, such as representatives from emergency services, local health department, etc.

Develop a contingency plan, identifying options available to the utility to detect and react to short and/or long term water interruption, or incidents of spill or contamination

PURPOSE

The goal of the West Virginia Bureau for Public Health (WV BPH) source water assessment and protection (SWAP) program is to prevent degradation of source waters which may preclude present and future uses of drinking water supplies to provide safe water in sufficient quantity to users. The most efficient way to accomplish this goal is to encourage and oversee source water protection on a local level. Every aspect of source water protection is best addressed by engaging local stakeholders.

The intent of this document is to describe what Berkeley Springs has done, is currently doing, and plans to do to protect its source of drinking water. Although this water system treats the water to meet federal and state drinking water standards, conventional treatment does not fully eradicate all potential contaminants, and treatment that goes beyond conventional methods is often very expensive. By completing this plan, Berkeley Springs acknowledges that implementing measures to prevent contamination can be a relatively economical way to help ensure the safety of the drinking water.

What are the benefits of preparing a Source Water Protection Plan?

Fulfills the requirement for public water utilities to complete or update their source water protection plan.

Identifies and prioritizes potential threats to the source of drinking water; and establishes strategies to minimize the threats.

Plans for emergency responses to incidents that compromise the water supply by contamination or depletion, including how the public, state, and local agencies will be informed.

Plans for future expansion and development, including establishing secondary sources of water.

Ensures conditions to provide the safest and highest quality drinking water to customers at the lowest possible cost.

Provides more opportunities for funding to improve infrastructure, purchase land in the protection area, and other improvements to the intake or source water protection areas.

BACKGROUND: WV Source Water Assessment and Protection Program

Since 1974, the federal Safe Drinking Water Act (SDWA) has set minimum standards on the construction, operation, and quality of water provided by public water systems. In 1986, Congress amended the SDWA. A portion of those amendments was designed to protect the source water contribution areas around groundwater supply wells. This program eventually became known as the Wellhead Protection Program (WHPP). The purpose of the WHPP is to prevent pollution of the source water supplying the wells.

The Safe Drinking Water Act Amendments of 1996 expanded the concept of wellhead protection to include surface water sources under the umbrella term of "Source Water Protection". The amendments encourage states to establish SWAP programs to protect all public drinking water supplies. As part of this initiative, states must explain how protection areas for each public water system will be delineated, how potential contaminant sources will be inventoried, and how susceptibility ratings will be established.

In 1999, the WVBPH published the West Virginia Source Water Assessment and Protection Program, which was endorsed by the United States Environmental Protection Agency. Over the next few years, WVBPH staff completed an assessment (i.e., delineation, inventory and susceptibility analysis) for all of West Virginia's public water systems. Each public water system was sent a copy of its assessment report. Information regarding assessment reports for Berkeley Springs can be found in **Table 1**.

STATE REGULATORY REQUIREMENTS

On June 6, 2014, §16.1.2 and §16.1.9a of the Code of West Virginia (1931) was reenacted and amended by adding three new sections designated §16.1.9c, §16.1.9d and §16.1.9e. The changes to the code outline specific requirements for public water utilities that draw water from a surface water source or a groundwater source influenced by surface water.

Under the amended and new codes, each existing public water utility using surface water or ground water influenced by surface water as a source must have completed or updated a source water protection plan by July 1, 2016, and must continue to update the plan every three years. Existing source water protection plans have been developed for many public water utilities in the past. If available, these plans were reviewed and considered in the development of this updated plan. Any new water system established after July 1, 2016 must submit a source water protection plan before they begin operation. A new plan is also required when there is a significant change in the Potential Sources of Significant Contamination (PSSC) within the Zone of Critical Concern (ZCC).

The code also requires that public water utilities include details regarding PSSCs, protection measures, system capacities, contingency plans, and communication plans. Before a plan can be approved, the local health department and public will be invited to contribute information for consideration. In some instances, public water utilities may be asked to conduct independent studies of the source water protection area and specific threats to gain additional information.

SYSTEM INFORMATION

Berkeley Springs Water Works is classified as a state regulated public utility and operates a public water system serving the Town of Bath and surrounding areas of Morgan County, West Virginia. A public water system is defined as:

> *"Any water supply or system which regularly supplies or offers to supply water for human consumption through pipes or other constructed conveyance, if serving at least an average of twenty-five individuals per day for at least sixty days per year, or which has at least fifteen service connections, and shall include:*
>
> *i. Any collection, treatment, storage and distribution facilities under the control of the owner or operator of the system and used primarily in connection with the system*
>
> *ii. Any collection or pretreatment storage facilities not under such control which are used primarily in connection with the system."*

A public water utility is defined as, "any public water system which is regulated by the West Virginia Public Service Commission."

For purposes of this source water protection plan, public water systems are also referred to as public water utilities. Information on the population served by this utility is presented in **Table 1** on the following page.

Table 1. System Information

Administrative office location:	271 Wilkes Street, Suite A Berkeley Springs, West Virginia 25411		
Is the system a public utility, according to the Public Service Commission rule?	Public Utility Municipality		
Date of Most Recent Source Water Assessment Report:	December 2002		
Date of Most Recent Source Water Protection Plan:	January 11, 2011		
Population served directly:	**Customers**		**Total Population**
	Residential 1,142 Commercial 189 Industrial 189 Public Authorities 27 **Total 1,359**		3,629
Bulk Water Purchaser Systems:	**System Name**	**PWSID Number**	**Population**
	N/A	N/A	N/A
Total Population Served by the Utility:	3,629		
Does the utility have multiple source water protection areas (SWPAs)?	Yes		
How many SWPAs does the utility have?	2		

WATER TREATMENT AND STORAGE

As required, Berkeley Springs has assessed their system (e.g., treatment capacity, storage capacity, unaccounted for water, contingency plans) to evaluate their ability to provide drinking water and protect public health.

Table 2 contains information on the water treatment methods and capacity of the utility. Information about the surface water sources from which Berkeley Springs draws water can be found in **Table 3**. If the utility draws water from any groundwater sources to blend with the surface water, the information about these ground water sources can be found in **Table 4**.

Table 2. Water Treatment Information

Water Treatment Process (List in order)	Intake at Berkeley Springs State Park ↓ Raw Water Tank ↓ DelPAC 2020 & Pre-Chlorination ↓ Filtration ↓ Clear Well
Current Treatment Capacity (GPD)	720,000
Current Average Production (GPD)	316,900
Maximum Quantity Treated and Produced (GPD)	521,400
Minimum Quantity Treated and Produced (GPD)	199,700
Average Hours of Operation in One Day	16
Maximum Hours of Operation in One Day	22
Minimum Hours of Operation in One Day	10
Number of Storage Tanks Maintained	5 Treated Water 1 Raw Water **6 Total**
Total Gallons of Treated Water Storage (gal.)	1,086,000
Total Gallons of Raw Water Storage (gal.)	20,000

Table 3. Surface Water Sources

Intake Name	SDWIS #	Local Name	Describe Intake	Name of Water Source	Date Constructed/ Modified	Frequency of Use (Primary/ Backup/ Emergency)	Activity Status (Active/ Inactive)
IN001	IN001	Spillway Channel	Surface Water Intake beginning at the Ladies' Spring at Berkeley Springs State Park into the raw water storage tank	Berkeley Springs*	Late 1800s C 2000 M	Primary	Active

Table 4. Ground Water Sources

Does the utility blend with groundwater?					Utility is a GWUDI system				
Well/Spring Name	SDWIS #	Local Name	Date Constructed/ Modified	Completion Report Available (Yes/No)	Well Depth (ft)	Casing Depth (ft)	Grout (Yes/No)	Frequency of Use (Primary/ Backup/ Emergency)	Activity Status (Active/ Inactive)
Covered Basin Spring (Lord Fairfax Spring)	SP003	Lord Fairfax Spring	See Above	No	N/A	N/A	N/A	Primary	Active
Ladies Spring	SP001	Ladies Spring	See Above	No	N/A	N/A	N/A	Backup	Inactive
Gentlemen's Spring	SP002	Gentlemen's Spring	See Above	No	N/A	N/A	N/A	Backup	Inactive

**Berkeley Springs source water originates from springs; however, the spillway trough at the intake is an open surface channel.*
(C) – Constructed (M) - Modified

DELINIATIONS

For surface water systems, delineation is the process used to identify and map the drainage basin that supplies water to a surface water intake. This area is generally referred to as the Source Water Protection Area (SWPA). 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. The SWPA for surface water is distinguished as a Watershed Delineation Area (WSDA) for planning purposes; and the Zone of Peripheral Concern (ZPC) and Zone of Critical Concern (ZCC) are defined for regulatory purposes.

The WSDA includes the entire watershed area upstream of the intake to the boundary of the State of West Virginia border or a topographic boundary. The ZCC for a public surface water supply is a corridor along streams within the watershed that warrants more detailed scrutiny due to its proximity to the surface water intake and the intake's susceptibility to potential contaminants within that corridor. The ZCC is determined using a mathematical model that accounts for stream flows, gradient and area topography. The limits of the ZCC are based on a five-hour time-of-travel of water in the streams to the water intake, plus an additional one-quarter mile below the water intake. The width of the ZCC is 1,000 feet measured horizontally from each bank of the principal stream and five hundred feet measured horizontally from each bank of the tributaries draining into the principal stream. Ohio River ZCC delineations are based on ORSANCO guidance and extend 25 miles above the intake and one-quarter mile below the intake. The Ohio River ZCC delineations include 1,320 feet (one-quarter mile) measured from the bank of the main stem of the Ohio River and 500 feet on tributary.

The ZPC for a public surface water supply source and for a public surface water influenced groundwater supply source is a corridor along streams within a watershed that warrants scrutiny due to its proximity to the surface water intake and the intake's susceptibility to potential contaminants within that corridor. The ZPC is determined using a mathematical model that accounts for stream flows, gradient and area topography. The length of the zone of peripheral concern is based on an additional five-hour time-of-travel of water in the streams beyond the perimeter of the ZCC, which creates a protection zone of ten hours above the water intake. The width of the zone of peripheral concern is 1,000 feet measured horizontally from each bank of the principal stream and 500 feet measured horizontally from each bank of the tributaries draining into the principal stream.

For groundwater supplies there are two types of SWPA delineations: 1) wellhead delineations and 2) conjunctive delineations, which are developed for supplies identified as groundwater under the direct influence of surface water. A wellhead protection area is determined to be the area contributing to the recharge of the groundwater source (well or spring), within a five year time of travel. A conjunctive delineation combines a wellhead protection area for the hydrogeological recharge and a connected surface area contributing to the wellhead.

Information and maps of the WSDA, ZCC, ZPC and Wellhead Protection Area for this public water supply were provided to the utility and are attached to this report. See **Appendix A**. Other information about the WSDA is shown in **Table 5**.

Table 5. Watershed Delineation Information

Size of WSDA (mi.2)	5.5
River Watershed Name (8-digit HUC)	Conococheague-Opequon (02070004)
Size of Zone of Critical Concern (Acres)	1,668
Size of Zone of Peripheral Concern (Acres) (Include ZCC area)	N/A
Method of Delineation for Groundwater Sources	Conjunctive Delineation as provided by WVBPH
Area of Wellhead Protection Area (Acres)	2,208

PROTECTION TEAM

One important step in preparing a source water protection plan is to organize a source water protection team that will help develop and implement the plan. The legislative rule requires that water utilities make every effort to inform and engage the public, local government, local emergency planners, the local health department, and affected residents at all levels of protection plan development. The West Virginia Bureau for Public Health (WVBPH) recommends that water utilities invite representatives from these organizations to join the protection team, which will ensure that they are given an opportunity to contribute in all aspects of Source Water Protection Plan development. Public water utilities should document their efforts to engage representatives and provide an explanation if any local stakeholder is unable to participate. In addition, other local stakeholders may be invited to participate on the team or to

contribute information. These individuals may be emergency response personnel, local decision makers, business and industry representatives, land owners (of land in the protection area), and additional concerned citizens.

The administrative contact for Berkeley Springs is responsible for assembling the protection team and ensuring that members are provided the opportunity to contribute to the development of the plan. The acting members of the protection team are listed in **Table 6**.

The role of the protection team members will be to contribute information to the development of the source water protection plan, review draft plans, make recommendations to ensure accuracy and completeness, and when possible, to contribute to the implementation and maintenance of the protection plan. The protection team members are chosen as trusted representatives of the community served by the water utility and may be designated to access confidential data that contains details about local Potential Significant Sources of Contamination (PSSCs). The input of the protection team will be carefully considered by the water utility when making final decisions relative to the documentation and implementation of the source water protection plan.

Berkeley Springs will be responsible for updating its Source Water Protection Plan and will rely upon input from the protection team and the public to better inform their decisions. To find out how you can become involved as a participant or contributor, visit the utility website or call the utility phone number, which are provided in **Table 6**.

Table 6. Protection Team

Name	Representing	Title	Phone Number	Email
Monica Whyte	West Virginia Bureau of Public Health	Environmental Resource Specialist III	[redacted]	monica.a.whyte@wv.gov
Alma Gorse	Morgan County Planning Commission	County Planner	[redacted]	agorse@morgancountywv.gov
Bill Clarke	Region 9 Planning and Development Council	Executive Director	[redacted]	bclark@region9wv.org
Chris Chapman	Bath Town Council	Councilman	[redacted]	cwchapman27@msn.com
Terry Largent	Berkeley Springs Water Works	Chief Water Operator	[redacted]	water.town@hotmail.com
Codi Ford	Town of Bath	Town of Bath Municipal Court Clerk	[redacted]	court@wvdsl.net
Jack Soronen	Morgan County Planning Commision	President	[redacted]	jack@starwv.com
Date of first protection Team Meeting		April 13, 2016 (open to public)		
Efforts to engage local stakeholders and explain absence of required stakeholders:		A public meeting was held on April 13, 2016 to provide an overview of the source water protection planning process and an additional public meeting was held on June 22, 2016 to present the draft SWPP. The April meeting was advertised in local newspapers for two weeks prior to the meeting dates and on the radio. The June 22 meeting was also advertised in the local newspapers and on the radio.		

POTENTIAL SIGNIFICANT SOURCES OF CONTAMINATION

This Source Water Protection Plan provides a complete and comprehensive list of PSSCs contained within the Source Water Protection Area (SWPA) based upon information obtained from the West Virginia Department of Environmental Protection (WVDEP), the WVBPH, and the West Virginia Division of Homeland Security and Emergency Management (WVDHSEM). Additionally, the consultants completed a review of aerial imagery and sought information from the protection team to identify PSSCs not contained in the agency-provided databases and to confirm the accuracy of the databases. A facility or activity is listed as a PSSC if it has the potential to release a contaminant that could impact a nearby public water supply. PSSC designation does not necessarily indicate that any release has occurred.

WVBPH provided a database of PSSCs located in the Berkeley Water Works SWPA. These data are organized into two types, SWAP PSSCs and Regulated Data. SWAP PSSCs are those that have been collected and verified by the WVBPH SWAP program during previous field investigations to form source water assessment reports and source water protection plans. Regulated PSSCs are derived from federal and state regulated databases, and may include data from WVDEP, US Environmental Protection Agency, WVDHSEM, and from out of state data sources. A list of PSSCs found in WVBPH databases can be found in **Appendix A**.

Confidentiality of PSSCs

A list of PSSCs contained within the SWPA should be included in source water protection plans. However, the exact location, characteristics, and approximate quantities of contaminants shall only be made known to one or more designees of the public water utility and maintained in a confidential manner. In the event of a chemical spill, release, or other related emergency, information pertaining to the contaminant shall be immediately disseminated to any emergency responders reporting to the site. The designees for Berkeley Springs are identified in the communication planning section of the Source Water Protection Plan.

PSSC data from some agencies, like WVDHSEM and WVDEP, may be restricted due to the sensitive nature of the data. Location data will be provided to the public water utility. To obtain specific details regarding contaminants, water utilities should contact the Local Emergency Planning Commission (LEPC) or agencies directly. While the maps and lists of the PSSCs and regulated sites are to be maintained in a confidential manner, these data are provided in **Appendix A** for internal review and planning uses only.

Local and Regional PSSCs

For the purposes of this Source Water Protection Plan, local PSSCs are PSSCs identified by the water utility and local stakeholders that were not included in the PSSCs lists distributed by the WVBPH and other agencies. There are two reasons why local PSSCs may be identified. First, it is possible that threats exist from unregulated sources or land uses that have not already been inventoried and do not appear in regulated databases. A PSSC inventory should identify all contaminant sources and land uses in the delineated SWPA, therefore, each public water utility should investigate their protection areas for local PSSCs. Local PSSCs are also identified when a public water utility expands their PSSC inventory efforts to include the watershed delineation area (WSDA). Utilities may consider collaborating with upstream communities to identify and manage regional PSSCs.

When conducting local and regional PSSC inventories, utilities should consider that some sources may be obvious like aboveground storage tanks, landfills, livestock confinement areas, highway or railroad right of ways, and sewage treatment facilities. Others are harder to locate like abandoned cesspools, underground tanks, French drains, dry wells, or old dumps and mines.

Information on any new or updated PSSCs identified by Berkeley Springs that do not already appear in datasets from the WVBPH can be found in **Table 7**.

Berkeley Spring PSSCs

Berkeley Springs and consultants reviewed intake locations and the delineated watershed to verify the existence of PSSCs provided by the WVBPH and to identify new PSSCs. Additionally, a number of facilities that were included in WVBPH databases were no longer in operation; these have been removed from the PSSC list included in **Appendix A** so that attention can be focused on those facilities that currently have potential for contamination of the source water. Regulated PSSCs not included in the tables in **Appendix A** include eleven (11) facilities in the RCRA/Superfund database removed because they had been included for construction permits that were expired years ago, three (3) facilities which had incorrect spatial locations in the Superfund/RCRA database and are located outside of the watershed, and five (5) facilities that are currently closed—two of which are operating under new ownership and have been included in the list of locally identified PSSCs (**Table 7**). Information gathered from permit files and from interviews with protection team members was used to determine which facilities are currently operational. A survey of facilities located in areas outside of the watershed was completed to ensure that any facilities with a high risk of contaminating the source water do not exist

outside of the Berkeley Springs watershed, but within a close enough proximity that contamination could occur.

PSSC risk ratings described in the WVBPH guidance documentation and input from the protection team were utilized to prioritize sources. Because the source for Berkeley Springs is a groundwater source under the direct influence of surface water, both risk scores for groundwater and surface water sources were reviewed. The PSSCs with highest risk scores for groundwater were Ford's Mobile Home Park with a drain field disposal septic system, the West Virginia Department of Highways maintenance yard, which has aboveground storage tanks and underground storage tanks, and Sunshine Dry Cleaners. Although Sunshine Cleaners is no longer open, it is possible that chemicals remain onsite. Additional PSSCs with high surface water risk scores include aboveground storage tanks at the Berkeley County Schools bus garage. The SWAP database also lists aboveground storage tanks at the State Park bath house; however, these storage tanks are not documented in the WVDEP Aboveground Storage Tanks Database. The presence of these tanks and their contents should be investigated.

In addition, almost 200 residences were identified within the watershed protection area in areas not served by public sewer lines. These are assumed to have septic systems. While the relative risk of an individual septic system is low, due to the large number of septic systems in the area, these collectively should be considered as a potential for contamination.

The Town of Bath and the watershed protection area for its drinking water source is located in an area characterized by karst geology. Karst formations lie immediately to the west of the watershed protection area. Due to the nature of karst limestone topography, a contaminant may be quickly transported from its source to groundwater supplies. The predominant karst area near the Berkeley Springs wellhead protection area is currently un-developed; however, future development in this area could pose a threat to the drinking water source. This area will be monitored for new developments.

Table 7. Locally Identified Potential Significant Sources of Contamination

PSSC No.	Map Code	Site Name	Site Description	Comments
		U.S.Silica	U.S. Silica Plant and Mining Areas	The US Silica plant located in the SWPA produces silica sand, kaolin clay, aplite, and related industrial minerals. There are at least three quarries associated with US Silica that are no longer being mined in the SWPA. Chemicals and/or hazardous materials from the facility could contaminate source waters should an accident occur such as a spill or leak.
C-10	C-10-3	Site of new Tractor Supply	Currently a construction site, will be the home of Tractor Supply store	During construction, Solvents; asbestos; paints; glues and other adhesives; waste insulation; lacquers; tars; sealants; epoxy waste; miscellaneous chemical wastes. BPH risk: groundwater 2.6 and surface water 3.5.
C-15	C-15-1	Hunter-Anderson Funeral Home	Funeral home	Formaldehyde; wetting agents; fumigants; solvents. BPH risk: groundwater and surface water 1.7.
C-15	C-15-2	Hesley Funeral Home	Funeral home	Formaldehyde; wetting agents; fumigants; solvents. BPH risk: groundwater and surface water 1.7.
C-25	C-25-2	Junkyard	Formerly Ours Auto Sales, currently a junkyard.	Oils, antifreeze, and other automobile fluids may leak from the used autos and contaminate the source waters if not cleaned up and disposed of properly. BPH risk: groundwater 3.6 and surface water 3.4.

C-3	C-3-4	Pit Stop Service Center	Auto repair and service station	Oils, antifreeze, and other automobile fluids can cause contamination of groundwater sources if not cleaned up and disposed of properly. BPH risk: groundwater and surface water 2.7.
C-47	C-47	Eddy's Tire Service	Many old tires, stored oil onsite	Metals. BPH risk: groundwater 2.4 and surface water 2.8.

Table 7. Locally Identified Potential Significant Sources of Contamination (*Continued*)

PSSC No.	Map Code	Site Name	Site Description	Comments
C-49	C-49	Utility substation	Power substation	PCBs from transformers and capacitors; oils; solvents; wood preservatives (creosote and pentachlorophenol); sludges; acid solution; metal plating solutions (chromium, nickel, cadmium); herbicides from utility rights-of-way. BPH risk: groundwater 2.7 and surface water 2.9.
C-5	C-5-2	Steve's Autobody	Auto body shop	Waste oils; solvents; acids; paints; automotive wastes; miscellaneous cutting oils. BPH risk: groundwater 2.1 and surface water 2.8
C-5	C-5-3	Napa Auto Parts	Auto parts store	Waste oils; solvents; acids; paints; automotive wastes; miscellaneous cutting oils. BPH risk: groundwater 2.1 and surface water 2.9
C-7	C-7-3	Douglas Auto Sales	Car dealership	Automotive wastes; waste oils; solvents; miscellaneous wastes. BPH risk: groundwater 1.3 and surface water 1.2.
C-9	C-9	Cemetery	Cemetery	Leachate; arsenic; lawn and garden maintenance chemicals. BPH risk: groundwater 1.8 and surface water 1.2.
M-27	M-27-2	Apple Valley Waste	Trash removal and recycling	Residential and commercial solid wast residues. BPH risk: groundwater 2.2 and surface water 2.3.

Table 7. Locally Identified Potential Significant Sources of Contamination (Continued)

PSSC No.	Map Code	Site Name	Site Description	Comments
M-6	M-6	Berkeley Springs VFD	Fire station	Petroleum hydrocarbons and volatile organic compounds. BPH risk: groundwater 1.3 and surface water 1.2.
A-22	Not labeled individually on map.	Agricultural land use	13 sites including small-scale crops, pastures, and ponds	Pesticides and other chemicals used for farm operations can migrate into the water supply. Areas used for disposal of animal waste or burying dead livestock can also cause contamination of the source water. Increased nutrient load from these sources in surface water may result in algal growth. Algal presence may result in taste and odor issues. If stressed some algae also releases toxic chemicals that could cause a threat to human health. BPH risk: variable.
R-4	Not labeled individually on map.	Residences	197 total residences located outside of the area served by the public sewer system were identified. It is assumed that each has a septic system.	Common Household Products: Household cleaners; oven cleaners; drain cleaners; toilet cleaners; disinfectants; metal polishes; jewelry cleaners; shoe polishes; synthetic detergents; bleach; laundry soil and stain removers; spot removers and dry cleaning fluid; solvents; lye or caustic soda; household pesticides; photochemicals; printing ink, other common products. Wall and Furniture Treatments: Paints; varnishes; stains; dyes; wood preservatives (creosote); paint and lacquer thinners; paint and varnish removers and deglossers; paintbrush cleaners; floor and furniture strippers. Mechanical Repair and Other Maintenance Products: Automotive wastes; waste oils; diesel fuel; kerosene; #2 heating oil; grease; degreasers for driveways and garages; metal degreasers; asphalt and roofing tar; tar removers; lubricants; rustproofers; car wash detergents; car waxes and polishes; rock salt; refrigerants. BPH risk: 2.3

Prioritization of Threats and Management Strategies

Following identification of local concerns, the utility developed a management plan that identifies specific activities that will be pursued by the public water utility in cooperation and concert with the WVBPH, local health departments, local emergency responders, LEPCs, and other agencies or organizations to protect the source water from contamination.

Depending on the number of PSSCs identified, it may not be feasible to develop management strategies for all of the PSSCs in the Source Water Protection Area (SWPA). The identified PSSCs have been prioritized by potential threat to water quality, proximity to the intake(s), and local concern. The highest priority PSSCs can be addressed first in the initial management plan. Lower ranked PSSCs can be addressed in the future as time and resources allow. To assess the threat to the source water, water systems should consider confidential information about each PSSC. This information may be obtained from state or local emergency planning agencies, Tier II reports, facility owners, facility groundwater protection plans, spill prevention and response plans, results of field investigations, and other sources.

In addition to identifying and prioritizing PSSCs within the SWPA, local source water concerns may also focus on critical areas. For the purposes of this Source Water Protection Plan, a critical area is defined as an area that is identified by local stakeholders and can lie within or outside of the watershed protection area. Critical areas may contain one or more PSSC(s) which would require immediate response to address a potential incident that could impact the source water. For Berkeley Springs, the karst groundwater recharge area is a critical area.

A list of priority PSSCs was selected and ranked by the Berkeley Springs Water Works protection team. This list reflects the concerns of this specific utility and contains PSSCs not previously identified. **Table 8** contains a description of why each critical area or PSSC is considered a threat and what management strategies the utility is either currently using or could use in the future to address each threat.

IMPLEMENTATION PLAN FOR MANAGEMENT STRATEGIES

Berkeley Springs Water Works reviewed the recommended strategies listed in their previous Source Water Protection Plan to consider if any of them should be adopted and incorporated in this updated plan. The system has also developed an implementation plan for the priority concerns listed in **Table 8**. **Table 9** provides a brief statement summarizing the status of the recommended strategies and includes strategies from a previous plan that are being incorporated in this plan update. Management strategies that address potential sources of contamination in the watershed that were not determined to be the

highest priorities are also included in **Table 9**. Strategies that pertain to the highest priority sources will be addressed first, and those focused on lower priorities will be implemented as time and funding allow.

Berkeley Springs Water Works has considered management strategies to address potential contaminants within its SWPA. Additionally, the utility's protection team has developed implementation plans, including responsible personnel and timelines, for each strategy. The implementation plan and potential cost of each strategy were estimated and are presented in **Table 9**. Additional meetings may be needed during the initial effort to complete activities, after which the protection team should consider meeting annually to review and update the Source Water Protection Plan. A system of regular updates should be included in every implementation plan.

Proposed commitments and schedules may change but should be well documented and reported to the local stakeholders.

Previous Plan Status

There were 15 management strategies recommended in the existing plan. 12 of these are included in this plan. Some of them have been adapted to more accurately describe the current needs of the system.

Table 8. Critical Areas

PSSC or Critical Area	Priority	Reason for Concern
Groundwater and surface water vulnerability to future development and mining activities in karst groundwater recharge area	1	Currently, the karst groundwater recharge area located outside of the Berkeley Springs watershed is currently primarily undeveloped. However, if new developments occur, the source could be impacted. Given that the water system is located in karst geology, the groundwater is susceptible to contamination much like a surface water source. Future development within the area could result in reduced water quality and/or quantity. Mining activities occur within the WHPA.
West Virginia Division of Highways equipment garage and Berkeley County Schools bus garage aboveground storage tanks	2	Aboveground storage tanks contain large amounts of chemicals that, if the tanks are not maintained appropriately or an accident occurs, could leak and contaminate the drinking water source.

Table 9. PSSC Management Strategies

PSSC or Critical Area	Management Activity	Description of Activity	Responsible Party	Status/ Schedule	Estimated Cost
U.S. Silica Plant and Mining Areas	Reach out to U.S. Silica	Contact the US Silica Plant to determine if they have a Groundwater Protection Plan (GPP) for review. These plans are required for industry that may impact groundwater and will contain measures that are also protective of the surface water. Coordinate with company emergency preparedness personnel to insure that they are aware of the water source and what to do in case of an emergency. Ask for copies of the facilities Materials Safety Data Sheets (MSDS) for the chemicals used/stored on site. The MSDS sheets are information sheets provided by the manufacturer explaining how to deal with first aid, and spills of the chemical product. A facility should have a central location of these sheets and provide them if requested by the public or emergency responders. Determine current use of quarry sites and future plans for mining areas. Consider discussing the purchase of the closed quarries within the protection area for development as parks.	Berkeley Springs Water Works Terry Largent	Ongoing	Minimal
All contaminants during power outages	Backup Generators	In the event of a power outage that affects the water treatment plant, Berkeley Springs Water Works will need another source of power. Berkeley Springs Water Works will provide backup generators to function at full capacity during power outages.	Berkeley Springs Water Works Terry Largent	Submitted grants for two new generators two years ago, part of the system's five-year plan. Terry will revisit in one month.	Significant up-front cost. If necessary, repair or replacement could be significant in the long term.

Any contaminant during an emergency situation	Develop Emergency Response Plan	Berkeley Springs Water Works has developed a formal Emergency Response Plan (ERP). It will be kept up and followed. AS part of the ERP Berkeley Springs Water Works will connect with local fire departments and county emergency services on a regular basis. The emergency response agencies will be informed of the extent of the SWPA. This will ensure that all the agencies are in constant communication with one another and prepared in the event of an emergency. Berkeley Springs Water Works will ensure that sufficient system operational measures are taken to prevent introduction of contaminated surface water during flood periods. During a heavy precipitation event, floodwater, which can carry contaminants from chemicals to fecal matter with it, may impact the intake. The system is familiar with the types of flood conditions that could impact the intake and will monitor flood predictions and close the intake when necessary.	Berkeley Springs Water Works	Completed. Update annually.	None.

Table 9. PSSC Management Strategies (*Continued*)

PSSC or Critical Area	Management Activity	Description of Activity	Responsible Party	Status/ Schedule	Estimated Cost
Historic dry cleaners	Communicate with PSSC owner	Contact the current or previous owners of Sunshine Dry Cleaners to determine what chemicals and solvents were used at their facility and whether they have implemented any spill prevention or containment strategies for these materials to protect against contamination of soils and groundwater. Also try determining if any leaks or spills have occurred in the past and whether there are any remediation activities ongoing at the site. Request Safety Data Sheets and Tier II forms for any chemicals stored onsite. A template letter that can be used to contact the facility owner is included in **Appendix F**.	Berkeley Springs Water Works	Within six months.	Minimal.
Any contaminant	Education of Maintenance Staff	Operations personnel are aware of the vulnerability of the source and take precautions to identify contaminants and reduce potential impacts from contamination. Administrative contact and operator should continue to communicate with maintenance staff the importance of preventing and cleaning up spills at the water plant.	Berkeley Springs Water Works	Plan in place.	Minimal.
Electrical substation	Communicate with PSSC owner	Contact Allegheny Power to determine if they have a spill/leak prevention program for their substations. Also determine their procedure should contamination occur. Communicate the boundaries of the SWPA to raise awareness with the utility company to ensure BMPs are followed. Request Safety Data Sheets and Tier II forms for any chemicals stored onsite. A template letter that can be used to contact the facility owner is included in **Appendix F**.	Berkeley Springs Water Works Codi Ford	Within six months.	Minimal.

Table 9. PSSC Management Strategies (*Continued*)

PSSC or Critical Area	Management Activity	Description of Activity	Responsible Party	Status/ Schedule	Estimated Cost
Any contaminant mixed in flood waters	Flood hazard plan	Insure that the system operation measures are taken to prevent introduction of contaminated surface water during flood periods. Intake shuts down during floods	Berkeley Springs Water Works	Plan already in place.	Minimal.
Those associated with future developments, especially in groundwater recharge area	Monitor future development	Berkeley Springs Water Works will establish a process for notification from entities contemplating new activities in the karst areas surrounding the Berkeley Springs watershed. The utility will coordinate with the Morgan County Planning Commission to monitor proposed land use changes and development to determine if any adverse effects on short- or long-term water quality may occur. Work with property owners to identify land uses that could threaten the source water. Ask to be included in discussions as a stakeholder and to be allowed to provide insight on BMPs to protect the source. It is in the best interest for the landowners as well as the community for the drinking water source to be protected and available to future development. The Morgan County Planning Commission may consider zoning restrictions in this area. A letter template that can be used to initiate communications is included in **Appendix F**.	Berkeley Springs Water Works, in collaboration with the Morgan County Planning Commission	Ongoing.	Minimal.

Table 9. PSSC Management Strategies (*Continued*)

PSSC or Critical Area	Management Activity	Description of Activity	Responsible Party	Status/ Schedule	Estimated Cost
Gas stations, auto repair shops, car dealerships, school bus garage, and historic gas stations	Communicate with PSSC owners	Communicate with station and shop owners the need for them to properly dispose of oil and other automobile products. Ask them to institute best management practices (BMPs) to contain and clean up spills. Monitor compliance with state environmental regulations. Provide owners or operators with copies of material on underground storage tank maintenance. Ensure that owners install secondary containment around aboveground storage tanks and/or chemical storage areas. These facilities may already be implementing BMPs for monitoring and/or containing a potential leak or spill and may be reviewed. Consider whether operating or historic stations and shops are compliant with rules regarding USTs and leaking underground storage tanks (LUSTs). If you suspect an issue with an UST or LUST, contact the WVDEP at (304) 926-0499 and ask for the Underground Storage Tank Staff for an inspection. Request copies of SDSs and Tier II forms for all chemicals stored onsite. A letter template that can be used to initiate communications with facility owners is included in **Appendix F**.	Berkeley Springs Water Works, Codi Ford	Begin communications within six months.	Minimal.

Table 9. PSSC Management Strategies (*Continued*)

PSSC or Critical Area	Management Activity	Description of Activity	Responsible Party	Status/ Schedule	Estimated Cost
Potential commercial and residential development	Long term protection of water source	In an effort to protect and sustain the quality and quantity of their source, Town of Bath (legal party for Berkeley Springs Water Works) will continue to partner with local community leaders to obtain funding sources in support of new infrastructure described in the Rural Water Report. Continue to support Warm Springs PSD in the development of another source for drinking water in the area to meet increasing water demands of new development in and near Berkeley Springs.	Berkeley Springs Water Works in collaboration with local political leaders	Ongoing.	Significant for infrastructure improvements.
Residential septic systems	Septic Tanks, and Public and Private Sewer Systems	Provide information regarding contamination and source water protection in mailings to homeowners and include non-emergency contact information. Outreach materials will encourage them to have their septic system inspected regularly and pumped every 5-10 years as needed. Also, the USEPA provides a complete guide for residents to maintain their septic systems, for the guide, visit: http://epa.gov/owm/septic/pubs/homeowner_guide_long.pdf The utility will encourage Warm Springs PSD (sewer provider for the city) to consider reducing the amount of septic systems in use by extension of the public sewer system. If expansion of the existing wastewater system is not feasible, consider alternate treatment such as decentralized and/or cluster wastewater systems.	Berkeley Springs Water Works, City of Bath, and Morgan County Health Department	Ongoing.	Minimal.

EDUCATION AND OUTREACH STRATEGIES

The goal of education and outreach is to raise awareness of the need to protect drinking water supplies and build support for implementation strategies. Education and outreach activities will also ensure that affected citizens and other local stakeholders are kept informed and provided an opportunity to contribute to the development of the Source Water Protection Plan. Berkeley Springs Water Works has created an Education and Outreach plan that describes activities it has either already implemented or could implement in the future to keep the local community involved in protecting their source of drinking water. This information can be found in **Table 10**.

Table 10. Education and Outreach Implementation Plan

Education and Outreach Strategy	Description of Activity	Responsible Protection Team Member	Status/ Schedule	Comments	Estimated Cost
Public Meeting	Berkeley Springs Water Works will hold an informational meeting with local residents about source water protection efforts. The meeting will increase awareness of the connection between land use and drinking water quality.	Berkeley Springs Water Works	Host meetings annually.	2016 meetings were held on April 13, 2016 and June 15, 2016.	Minimal.
Agricultural land fact sheets	Berkeley Springs Water Works will work with the County Extension Service, the Soil and Water Conservation District, and/or the Natural Resource Conservation Service to provide copies of fact sheets covering BMPs for nutrient management, pesticide use, pest management, waste oil disposal, safe chemical handling and/or safe chemical storage.	Berkeley Springs Water Works, with assistance from Susie Campbell at NRCS and Alana Hartman at WVDEP	Share information on website or Facebook annually.	Information can be found at the following web addresses: WVU Hampshire County Extension http://morgan.ext.wvu.edu/ West Virginia Conservation Agency http://www.wvca.us/ National Resources Conservation Agency http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/ EPA brochure: http://www.sourcewatercollaborative.org/downloads/AgFieldtoFaucet-BR-v3f.pdf Example from Montana: http://dnr.mo.gov/pubs/pub1338.pdf	Minimal

Table 10. Education and Outreach Implementation Plan (Continued)

Education and Outreach Strategy	Description of Activity	Responsible Protection Team Member	Status/ Schedule	Comments	Estimated Cost
Brochures, pamphlets and letters	Berkeley Springs Water Works will provide an informational brochure at the town office and post information on the town Facebook page. These will alert the recipients of the need for source water protection and conservation. Businesses that use greater-than household quantities of regulated substances may receive a different letter. Several organizations provide information and resources on the internet, related to certain source water concerns and PSSCs. The PWS will consider obtaining these materials when needed, to educate the community.	Town of Bath Municipal Court Clerk Codi Ford	Post information at town office and post on Facebook annually.	The links below provide educational materials that can be distributed: http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/citizeninvolvementinsourcewaterprotection.cfm http://www2.epa.gov/sites/production/files/2014-06/documents/growthwater.pdf http://www.nesc.wvu.edu/pdf/WW/publications/pipline/PL_Su08.pdf http://www.epa.gov/owm/septic/pubs/homeowner_guide_long.pdf	Minimal
Media Campaign	Berkeley Springs Water Works will create public service announcements about source water protection that can be aired on local radio stations.	Berkeley Springs Water Works	Beginning in 2016 and then annually.	See above outreach and communications strategies for resources with information that can be included in a public service announcement.	Minimal

Table 10. Education and Outreach Implementation Plan (Continued)

Education and Outreach Strategy	Description of Activity	Responsible Protection Team Member	Status/ Schedule	Comments	Estimated Cost
Consumer Confidence Report	Berkeley Springs Water Works publishes a Consumer Confidence Report (CCR) annually, as required by the Safe Drinking Water Act. The CCR is available to all water customers. The CCR describes the source water for the system, the levels of contaminants in the source water, the EPA safe contaminant levels, and information about Cryptosporidium. The system will also include information about their source water protection program.	Berkeley Springs Water Works	Annually	The following paragraph or similar paragraph will be included in the CCR: Berkeley Springs Water Works is committed to protecting its drinking water sources. The drinking water for Berkeley Springs is sourced from a spring. We updated our Source Water Protection Plans (SWPP) in 2016, based on the requirements of Senate Bill 373. The SWPP includes physical actions to protect the drinking water sources such as ensuring that the source spring is secured, and planning actions such as creating an emergency response plan. It also includes an assessment of potential sources of contamination. The SWPPs were developed by the Water Department in collaboration with a local source water protection team, and with the involvement of the public. Please contact Berkeley Springs Water Works to learn more about source water protection.	Minimal

Table 10. Education and Outreach Implementation Plan (Continued)

Education and Outreach Strategy	Description of Activity	Responsible Protection Team Member	Status/ Schedule	Comments	Estimated Cost
County Fair	Berkeley Springs Water Works will consider providing information on source water protection for the Morgan County Planning Commission booth at the County Fair, should they have one.	Morgan County Planning Commission, Monica Whyte at WVBPH will provide materials.	Beginning in 2016		Minimal
Interagency Coordination	Berkeley Springs Water Works will participate with health, utilities, and fire department that meet with the Local Emergency Planning Commission as needed, so that these agencies are aware of boundaries of the SWPA and are in constant communication with one another.	Berkeley Springs Water Works	On an as needed basis.	There is a current effort to establish monthly meetings involving these agencies.	Minimal.
Plant Tours	Berkeley Springs Water Works will provide tours of the water plant to interested organizations such as watershed groups, schools, and civic organizations as requested. Berkeley Springs Water Works will consider organizing a tour with local emergency responders to make them familiar with the facilities so they are prepared in the event of an emergency.	Berkeley Springs Water Works	Ongoing.		None.