

Source Water Protection Plan

Boone Raleigh Public Service District

PWSID 3300315

Boone County

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In cooperation with:

Boone Raleigh PSD Public Service District

WV Bureau for Public Health, Source Water Assessment and Protection Program

Region III Planning and Development Council and

Potesta and Associates, Inc.



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**Note: Portions of this plan relative to the contingency and single source alternative study were completed by The Thrasher Group. Their complete report is included as Appendix D.

I certify the information in the source water protection plan is complete and accurate to the best of my knowledge.



Signature of responsible party or designee authorized to sign for water utility:

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07/01/2016

Date of Submission (mm/dd/yyyy):

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SOURCE WATER PROGRAM ACRONYMS

AST	Aboveground Storage Tank
BMP	Best Management Practices
ERP	Emergency Response Plan
GWUDI	Ground Water Under the Direct Influence of Surface Water
LEPC	Local Emergency Planning Committee
OEHS/EED	Office of Environmental Health Services/Environmental Engineering Division
PE	Professional Engineer
PSSCs	Potential Source of Significant Contamination
PWSU	Public Water System Utility
RAIN	River Alert Information Network
RPDC	Regional Planning and Development Council
SDWA	Safe Drinking Water Act
SWAP	Source Water Assessment and Protection
SWAPP	Source Water Assessment and Protection Program
SWP	Source Water Protection
SWPA	Source Water Protection Area
SWPP	Source Water Protection Plan
WARN	Water/Wastewater Agency Response Network
WHPA	Wellhead Protection Area
WHPP	Wellhead Protection Program
WSDA	Watershed Delineation Area
WVBPH	West Virginia Bureau for Public Health
WVDEP	West Virginia Department of Environmental Protection
WVDHHR	West Virginia Department of Health and Human Resources
WVDHSEM	West Virginia Division of Homeland Security and Emergency Management
ZCC	Zone of Critical Concern
ZPC	Zone of Peripheral Concern

1.0 PURPOSE

The goal of the West Virginia Bureau of Public Health (WVBPH) 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. Many aspects of source water protection may be best addressed by engaging local stakeholders.

The intent of this document is to describe what Boone Raleigh PSD 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, Boone Raleigh PSD acknowledges that implementing measures to minimize and mitigate contamination can be a relatively economical way to help ensure the safety of the drinking water.

1.1 WHAT ARE THE BENEFITS OF PREPARING A SOURCE WATER PROTECTION PLAN?

- Fulfilling the requirement for the public water utilities to complete or update their source water protection plan.
- Identifying and prioritizing potential threats to the source of drinking water; and establishing strategies to minimize the threats.
- Planning for emergency response to incidents that compromise the water supply by contamination or depletion, including how the public, state, and local agencies will be informed.
- Planning for future expansion and development, including establishing secondary sources of water.
- Ensuring conditions to provide the safest and highest quality drinking water to customers at the lowest possible cost.
- Providing more opportunities for funding to improve infrastructure, purchase land in the protection area, and other improvements to the intake or source water protection areas.

2.0 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 were designed to protect the source water contribution areas around ground water 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 Boone Raleigh PSD can be found in **Table 1**.

3.0 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 outlines specific requirements for public water utilities that draw water from a surface water source or a surface water influenced groundwater source.

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. 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 start to operate. 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.

4.0 SYSTEM INFORMATION

Boone Raleigh PSD is classified as a state regulated public utility and operates a community public water system. A community public water system is a system that regularly supplies drinking water from its own sources to at least 15 service connections used by year round residents of the area or regularly serves 25 or more people throughout the entire year. For purposes of this source water protection plan, community public water systems are also referred to as public water utilities. Information on the population served by this utility is presented in **Table 1** below.

Table 1. Population Served by Boone Raleigh PSD

Administrative office location:	P.O. Box 245 Sylvester, WV 25193		
Is the system a public utility, according to the Public Service Commission rule?	Yes; Community Public Water System		
Date of Most Recent Source Water Assessment Report:	February 2003		
Date of Most Recent Source Water Protection Plan:	March 2011		
Population served directly:	653 Total Customers		
Bulk Water Purchaser Systems:	System Name	PWSID Number	Population
	N/A	N/A	N/A
Total Population Served by the Utility:	653 Total Customers 1,600 Total Population		
Does the utility have multiple source water protection areas (SWPAs)?	No		
How many SWPAs does the utility have?	1		

*The information provided in this table is all or partially provided from the Source Water Protection Contingency Plan completed by Potesta and Associates, Inc. in 2015. The study is included as Appendix D.

5.0 WATER TREATMENT AND STORAGE

As required, Boone Raleigh PSD 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 sources from which Boone Raleigh PSD 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. Boone Raleigh PSD Water Treatment Information

Water Treatment Processes (List All Processes in Order)	Coagulation, Flocculation, Settling, Filtration and Disinfection
Current Treatment Capacity (gal/day)	432,000 GPD
Current Average Production (gal/day)	236,172 GPD (PSD reported 170,001 in 2016)
Maximum Quantity Treated and Produced (gal)	390,300 GPD (PSD reported 170,001 in 2016)
Minimum Quantity Treated and Produced (gal)	116,100 GPD
Average Hours of Operation	12 hours per day
Maximum Hours of Operation in One Day	16 hour per day
Minimum Hours of Operation in One Day	8 hours per day
Number of Storage Tanks Maintained	3
Total Gallons of Treated Water Storage (gal)	313,100 GAL
Total Gallons of Raw Water Storage (gal)	0 GAL**

*The information provided in this table is all or partially provided from the Source Water Protection Contingency Plan completed by Potesta and Associates, Inc. in 2015. The study is included as Appendix D.

** Ignoring small storage available in raw water pump station(s) or pre-sedimentation tank(s).

Table 3. Boone Raleigh PSD 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)
Raw Water Intake	N/A	N/A	-	Big Coal River	1936 (C)	Primary	Active

*The information provided in this table is all or partially provided from the Source Water Protection Contingency Plan completed by Potesta and Associates, Inc. in 2015. The study is included as Appendix D.

Table 4. Boone Raleigh PSD Groundwater Sources

Does the utility blend with groundwater?					No				
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)
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

6.0 DELINEATIONS

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 length of the ZCC is 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 zone of critical 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. 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 zone of critical concern, 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, or GWUDIs. 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 hydrogeologic 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. Figures**. Other information about the WSDA is shown in **Table 5**.

Table 5. Watershed Delineation Information

Size of WSDA (Indicate units)	227 square miles
River Watershed Name (8-digit HUC)	Coal River Watershed (05050009)
Size of Zone of Critical Concern (Acres)	17,711 acres
Size of Zone of Peripheral Concern (Acres) (Include ZCC area)	45,723 acres
Method of Delineation for Groundwater Sources	N/A
Area of Wellhead Protection Area (Acres)	N/A

7.0 PROTECTION TEAM

One important step in preparing a source water protection plan is to organize a source water protection team who 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 the development of the protection plan. WVBPH recommends that the water utility 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 contribute information to be considered. 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 Boone Raleigh PSD 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 and make recommendations to ensure accuracy and completeness, and when possible contribute to 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 the local potential sources of significant contamination. 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.

Boone Raleigh PSD will be responsible for updating the source water protection plan and 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 Member and Contact Information

Name	Representing	Title	Phone Number	Email
Inza Hapney	Boone Raleigh PSD	Office Manager	[REDACTED]	Inza1958@yahoo.com
Robert Wiseman	Boone Raleigh PSD	Maintenance Manager	[REDACTED]	-
Ted Carter	Boone Raleigh PSD	WTP Chief Operator	[REDACTED]	-
David Hodge	Whitesville Fire Department and Ambulance	Chief	[REDACTED]	-
Nicole Hinzman	Boone County Health Department	-	[REDACTED]	-
-	Boone County Emergency Planner	-	[REDACTED]	-
Date of first protection Team Meeting		June 24, 2016		
Efforts made to inform and engage local stakeholders (public, local government, local emergency planners, local health department, and affected residents) and explain absence of recommended stakeholders:		The Boone Raleigh PSD organized a protection team meeting and public presentation for June 24, 2016. Members of the protection team were present except for the representatives from the health department and emergency planners. These representatives should be included in future meetings and revisions to the source water protection plan. Additional information is provided for the public presentation in Table 10.		

8.0 POTENTIAL SOURCES OF SIGNIFICANT CONTAMINATION

Source water protection plans should provide a complete and comprehensive list of the potential sources of significant contamination (PSSC) contained within the ZCC based upon information obtained from the WVBPH, working in cooperation with the West Virginia Department of Environmental Protection (WVDEP) and the West Virginia Division of Homeland Security and Emergency Management (WVDHSEM). A facility or activity is listed as a PSSC if it has the potential to release a contaminant that could potentially impact a nearby public water supply, and it does not necessarily indicate that any release has occurred.

The list of PSSCs located in the SWPA is organized into two types: 1) SWAP PSSCs, and 2) 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 state data sources.

8.1 CONFIDENTIALITY OF PSSCS

A list of the PSSCs contained within the ZCC should be included in the source water protection plan. 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 Boone Raleigh PSD are identified in the communication planning section of the source water protection plan.

PSSC data from some agencies (ex., WVDHSEM, WVDEP, etc.) may be restricted due to the sensitive nature of the data. Locational data will be provided to the public water utility. However, to obtain specific details regarding contaminants, (such as information included in Tier II reports), 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. Figures** for internal review and planning uses only.

8.2 LOCAL AND REGIONAL PSSCS

For the purposes of this source water protection plan, local PSSCs are those that are identified by local stakeholders in addition to the PSSCs lists distributed by the WVBPH and other agencies. Local stakeholders may identify local PSSCs for two main reasons. The first is that it is possible that threats exist from unregulated sources and land uses that have not already been inventoried and do not appear in regulated databases. For this reason each public water utility should investigate their protection area for local PSSCs. A PSSC inventory should identify all contaminant sources and land uses in the delineated ZCC. The second reason local PSSCs are identified is because public water utilities may consider expanding the PSSC inventory effort outside of the ZCC into the ZPC and WSDA if necessary to properly identify all threats that could impact the drinking water source. As the utility considers threats in the watershed they 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 above ground 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.

Boone Raleigh PSD reviewed intake locations and the delineated SWPAs to verify the existence of PSSCs provided by the WVBPH and identify new PSSCs. If possible, locations of regulated sites within the SWPA were confirmed. Information on any new or updated PSSCs identified by Boone Raleigh PSD that do not already appear in datasets from the WVBPH can be found in **Table 7**.

Table 7. Locally Identified Potential Sources of Significant Contamination

PSSC Number	Map Code	Site Name	Site Description	Relative Risk Score	Comments
-	-	-	-	-	-

8.3 PRIORITIZATION OF POTENTIAL THREATS AND MANAGEMENT STRATEGIES

Once the utility has identified local concerns, they must develop 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, LEPC and other agencies and organizations to protect the source water from contamination.

Depending on the number identified, it may not be feasible to develop management strategies for all of the PSSCs in the SWPA. The identified PSSCs can be 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 owner, facility groundwater protection plans, spill prevention response plans, results of field investigations, etc.

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 ZCC. Critical areas may contain one or more PSSCs which would require immediate response to address a potential incident that could impact the source water.

A list of priority PSSCs was selected and ranked by the Boone Raleigh PSD Protection Team. This list reflects the concerns of this specific utility and may contain PSSCs not previously identified and not within the ZCC or ZPC. **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.

9.0 IMPLEMENTATION PLAN FOR MANAGEMENT STRATEGIES

Boone Raleigh PSD 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. **Table 9** provides a brief statement summarizing the status of the recommended strategies. **Table 9** also lists strategies from a previous plan that are being incorporated in this plan update.

When considering source management strategies and education and outreach strategies, this utility has considered how and when the strategies will be implemented. The initial step in implementation is to establish responsible parties and timelines to implement the strategies. The water utility, working in conjunction with the protection team members, can determine the best process for completing activities within the projected time periods. 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. If possible, utilities should include cost estimates for strategies to better plan for implementation and possible funding opportunities. Boone Raleigh PSD has developed an implementation plan for the priority concerns listed in **Table 8**. The responsible team member, timeline, and potential cost of each strategy are presented in **Table 9**. Note: Because timelines may change, future plan updates should describe the status of each strategy and explain the lack of progress.

Table 8. Priority PSSCs or Critical Areas

PSSC or Critical Area	Priority Number	Reason for Concern
Coal Industry	1	Mining industry upstream of intake is heavily developed. Also, mining activities are increasing within SWPA. Spills had been problematic in the past. There is a sludge pond located upstream of intake. Surface water protection practices for local mining industry may not be known.
Highways	2	Sections of the roadway pass through the SWPA, and potential spills are a concern.
Railroad Tracks	3	A section of railroad passes through the SWPA, and potential spills or leaks are a concern. Other surface water systems in West Virginia (including one in Kanawha County) have seen impact to source water as a result of spills from railroad accidents.
Vandalism	4	Vandals could damage facilities, including raw water system. Vandals have broken into the plant previously, and stolen the raw water pumps.
Sanitary Septic Systems, Home Aeration Units, and Wastewater Treatment Systems	5	Discharge from smaller, failing sanitary systems can pose a possible contamination threat, including the introduction of fecal coliform into source water.
Oil and Gas Wells	6	Drilling of gas wells within the SWPA and areas upstream is increasing, including drilling of Marcellus Shale wells. Drilling of some Marcellus Shale wells can produce large volumes of brine water, and can produce water with chemical additives used for fracturing and constituents such as benzene and certain radioactive elements. Uncontrolled spills and releases could introduce contaminants into source water. Some constituents in brine, including bromides, have the potential to increase total trihalomethane formation.
Future Development	7	Extent and type of future development, including potential impacts on source water, is not known at this time.

Table 9. Priority PSSC Management Strategies

PSSC or Critical Area	Management Activity	Responsible Protection Team Member	Status/Schedule	Comments	Estimated Cost
Previous Plan Status	There were management strategies recommended in the existing plan to address 7 PSSCs or critical areas. These strategies are ongoing to continue to address concerns. These are incorporated in this plan update and listed below.	-	-	-	-
Coal Mining Activities	Review public information at West Virginia Department of Environmental Protection (WVDEP) on existing and proposed coal mining development, including results of NPDES sampling, probable hydrologic consequences (PHCs), subsidence control plans, etc.	PWS Chief Operator / Town Council Member	In the future if needed.	The WVDEP retains copies of protection plans that can be obtained through Freedom of Information Act requests.	Minimal (Freedom of Information Act charges, mileage).
	Maintain contact with WVDEP inspectors and notify WVDEP of noted adverse impacts to source water. Establish/maintain relationship with local coal industry officials and local emergency planners to ensure that Boone Raleigh PSD is contacted in the event of an accidental release or coal slurry impoundment failure.	PWS Chief Operator / Town Council Member	Ongoing	-	No direct cost; an ongoing annual effort is required.
Railroad Tracks and Highways	Consider installing signage just off railroad right-of-way with emergency contact numbers. This would also help raise awareness of railroad personnel and motorist that they are traveling through a source water protection zone while providing them with a call number in an emergency.	PWS Chief Operator	In the future if needed.	See Table 10	Minimal cost to install signs
	Better coordination of emergency response with local first responders, including raising awareness for the need to protect drinking water supplies.	PWS Chief Operator	Begin immediately	Work with local fire department and transportation department with spill response planning.	No direct cost. An ongoing annual effort is required.
	Regular inspections of the roadways and railways to identify if spillage is occurring. Maintain records of identified leaks and spills.	PWS Chief Operator and Staff	Begin immediately.	-	Minimal (fee).

PSSC or Critical Area	Management Activity	Responsible Protection Team Member	Status/Schedule	Comments	Estimated Cost
	Contact fire department and other first responders on boom availability. If none (or if unsuitable), evaluate purchase of booms for in-stream spill containment.	PWS Chief Operator	Begin immediately	-	Undetermined, but can typically cost up to \$10,000.
Vandalism	Evaluate improving security, including installing fencing and adding security cameras at WTP and intake.	PWS Chief Operator	When resources are available	-	Fencing: Undetermined, but security fencing prices of \$30/foot to \$45/foot are typical. Security Cameras: Cost will vary, but is expected to range from \$5,000 to \$15,000.
	Install signage at intake, in visible places to general public, identifying this as a source water area and warning that tampering with this installation is a federal offense, and potentially providing a notice regarding video surveillance. Include emergency contact numbers. Note: Similar signs already exist at the WTP.	PWS Chief Operator / PSD Board	When resources are available	There are "basic" signs located at the WTP.	Typically \$1,000 to \$2,000. WVDHHR can provide "basic" signs at no cost.
Sanitary Septic Systems, Wastewater Treatment	Support study and planning of sanitary sewer system extensions and upgrades along the Coal River watershed and tributaries upstream of intake to extend service to these areas and eliminate failing wastewater treatment systems.	PSD General Manager / County Commission	As required.	-	Undetermined. Supporting extensions may not involve direct cost.
	Raise awareness at Boone and Raleigh County Commission and applicable sanitary sewer utilities for need for source water protection to increase support for proposed sanitary sewer system extensions and upgrades.	PWS Chief Operator / PSD General Manager / County Commission	Ongoing	Utilize map included in this report. See Table 10 for information on educational brochure.	N/A
	Evaluate enhanced fecal coliform testing of surface water to better identify sources of fecal coliform contamination.	PWS Chief Operator / PSD General Manager	In future if needed	-	Enhanced testing costs can range from \$1,000 and up depending on program.

PSSC or Critical Area	Management Activity	Responsible Protection Team Member	Status/Schedule	Comments	Estimated Cost
Oil and Gas Wells	Review public information on surface water protection practices for oil and gas industry to raise PWS staff awareness of surface water protection practices of oil and gas industry.	PWS Chief Operator / Town Council Member	In future if needed	The West Virginia Department of Environmental Protection retains copies of protection plans that can be obtained through Freedom of Information Act requests.	Minimal (Freedom of Information Act charges, mileage).
	Evaluate increased sampling of water quality for parameters (e.g., chlorides, bromides, TDS) associated with oil and gas industry to better assess whether source water quality is being impacted by oil and gas industry, and help develop baseline data of water quality.	PWS Chief Operator	In future if needed.	-	Enhanced testing costs can range from \$1,000 and up depending on program.
	3. Evaluate installing into source water, upstream of intake, monitoring equipment to provide early warning of possible brine or other spills into source water and help develop water quality data of source water.	PWS Chief Operator / Town Council Member	Evaluation complete	-	See early warning monitoring section.
	Maintain contact with other neighboring public water systems, to receive input on effects of anticipated Marcellus Shale and gas well drilling, and track status of regulations through such organizations as WVDHHR, West Virginia Rural Water Association (WVRWA), West Virginia Department of Environmental Protection (WVDEP), and West Virginia Public Service Commission (WVPSC).	PWS Chief Operator / WTP Operator	Ongoing.	Public water systems to the north have taken an intensive interest in proposed gas well development of Marcellus Shale.	Minimal. Possible cost for registration at seminars/conferences, mileage, lodging, etc.
Future Development	Raise awareness of city and/or county government by providing SWPA map and educational brochure to help decision making with respect to future development.	PWS Chief Operator	In future if needed.	Utilize map included in this report. See Table 10 for information on education brochure.	N/A

PSSC or Critical Area	Management Activity	Responsible Protection Team Member	Status/Schedule	Comments	Estimated Cost
Yearly Windshield Survey	Water utility staff will perform a yearly “windshield survey” of the zone of critical concern. They will note changes in land use, water quality, and other developments that may have occurred since the previous year’s survey. These changes will be documented and reflected in future source water protection plan updates.	Water utility staff	Yearly, next survey in 2017	-	Minimal cost associated with staff time
Regular Coordination with Emergency Managers	Local emergency planners have access to confidential chemical contaminant information in Tier II reports from facilities in the SWPA. The utility should coordinate with the local emergency planners to gain an understanding of potential contaminants to better prepare for a spill event. Utility staff will continue to communicate with these emergency services groups on a regular basis, especially when there is not an ongoing emergency. They will invite the local emergency planners to meet yearly as part of the Source Water Protection Team.	Water utility staff emergency personnel	Yearly during regular Protection Team Meetings	-	Minimal cost associated with staff time
Yearly Source Water Protection Team Meetings	The Protection Team will meet on a yearly basis to discuss any changes that might have occurred within the watershed or to find replacements for members who can no longer participate.	Source Water Protection Team	Yearly, next meeting in 2017	-	Minimal cost associated with staff time

10.0 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. Boone Raleigh PSD 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	<p>The water system held an informational meeting with local residents to inform the public about source water protection efforts. A representative from Tetra Tech presented information about the source water protection plan at the public meeting. A flier was provided to notify the public of a meeting. The flyer and a sign in sheet is provided in Appendix E.</p>	Office Manager	June 24, 2016	<p>Future meetings could be structured as a water fair/public event with drinking water displays and activities. This could be combined with activities of the local watershed associations.</p>	Minimal cost related to operator time.
Consumer Confidence Report	<p>The water system publishes a Consumer Confidence Report (CCR) annually, as required by the Safe Drinking Water Act, which is sent to all water customers. Information concerning the Source Water Assessment is included in the CCR. In the future, the system will include a reference to this source water protection plan and how customers can access a copy.</p>	Utility Staff	Yearly	<p>This would be in addition to required Source Water Assessment information, including source of water and susceptibility to contamination.</p>	CCR required by SDWA, included in annual budget.
Outreach Letters and Brochure	<p>Send a letter and/or brochure providing educational information to residences and businesses. 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. See Appendix E for example letters and a brochure.</p> <p>The Source Water Collaborative has released an educational brochure building tool to assist with creating custom brochures targeting local decision makers. This tool is available at: http://www.yourwateryourdecision.org and may assist in community planning and development.</p>	PWS Chief Operator and Staff	In future if resources are available.	-	Minimal.
Plant Tours	<p>Provide tours of the water plant to interested organizations such as watershed groups, schools,</p>	Operator	Regularly, as requested	<p>Organize a tour with local Emergency Responders to make them familiar with the facilities in the event of an emergency. The</p>	Minimal cost associated

Education and Outreach Strategy	Description of Activity	Responsible Protection Team Member	Status/Schedule	Comments	Estimated Cost
	and civic organizations. Tours will continue to be offered as requested.			operator has provided these tours in the past and will continue to do so.	with operator's time
School Curricula	<p>Work with the school system to incorporate source water activities into the school curricula.</p> <p>Visit school or invite students for a plant tour to tie in with school curricula.</p> <p>Ask the school to include message in school newsletter to raise awareness about source water protection and conservation.</p>	Utility Staff	Yearly, as requested by local schools.	Operator will initiate effort, locate the appropriate individuals in school and/or on local school board. Can provide websites with free education materials to promote source water protection and conservation. Also operator may visit school or invite students for a plant tour to tie in with classroom materials.	Minimal costs. Would require time to coordinate, visit classroom and provide tour.

11.0 CONTINGENCY PLAN

The goal of contingency planning is to identify and document how the utility will prepare for and respond to any drinking water shortages or emergencies that may occur due to short and long term water interruption, or incidents of spill or contamination. During contingency planning, utilities should examine their capacity to protect their intake, treatment, and distribution system from contamination. They should also review their ability to use alternative sources and minimize water loss, as well as their ability to operate during power outages. In addition, utilities should report the feasibility of establishing an early warning monitoring system and meeting future water demands.

Isolating or diverting any possible contaminant from the intake for a public water system is an important strategy in the event of an emergency. One commonly used method of diverting contaminants from an intake is establishing booms around the intake. This can be effective, but only for contaminants that float on the surface of the water. Alternatively, utilities can choose to pump floating contaminants from the water or chemically neutralize the contaminant before it enters the treatment facility.

Public utilities using surface sources should be able to close the intake by one means or another. However, depending upon the system, methods for doing so could vary greatly and include closing valves, lowering hatches or gates, raising the intake piping out of the water, or shutting down pumps. Systems should have plans in place in advance as to the best method to protect the intake and treatment facility. Utilities may benefit from turning off pumps and, if possible, closing the intake opening to prevent contaminants from entering the piping leading to the pumps. Utilities should also have a plan in place to sample raw water to identify the movement of a contaminant plume and allow for maximum pumping time before shutting down an intake (See Early Warning Monitoring System). The amount of time that an intake can remain closed depends on the water infrastructure and should be determined by the utility before an emergency occurs. The longer an intake can remain closed in such a case, the better.

Raw and treated water storage capacity also becomes extremely important in the event of such an emergency. Storage capacity can directly determine how effectively a water system can respond to a contamination event and how long an intake can remain closed. Information regarding the water shortage response capability of Boone Raleigh PSD is provided in **Table 11**.

11.1 RESPONSE NETWORKS AND COMMUNICATION

Statewide initiatives for emergency response, including source water related incidents, are being developed. These include the West Virginia Water/Wastewater Agency Response Network (WV WARN, see <http://www.wvwarn.org/>) and the Rural Water Association Emergency Response Team (see <http://www.wvrwa.org/>). Boone Raleigh PSD has analyzed its ability to effectively respond to emergencies and this information is also provided in **Table 11**.

Table 11. Boone Raleigh PSD Water Shortage Response Capability

Can the utility isolate or divert contamination from the intake or groundwater supply?	No
Describe the utility’s capability to isolate or divert potential contaminants:	The utility can raise and lower the raw water intake pump approximately 2 ft. in the river if the operators are notified of a contamination on the Big Coal River.
Can the utility switch to an alternative water source or intake that can supply full capacity at any time?	No
Describe in detail the utility’s capability to switch to an alternative source:	N/A

Can the utility close the water intake to prevent contamination from entering the water supply?	Yes
How long can the intake stay closed?	32 hours (with treated water storage at capacity) 16 hours (with treated water storage at half capacity)
Describe the process to close the intake:	Not provided in study.
Describe the treated water storage capacity of the water system:	The utility has three storage tanks available for treated water with a total capacity of 313,100 gallons.
Is the utility a member of WVRWA Emergency Response Team?	Yes
Is the utility a member of WV-WARN?	No
List any other mutual aid agreements to provide or receive assistance in the event of an emergency:	N/A

*The information provided in this table is all or partially provided from the Source Water Protection Contingency Plan completed by Potesta and Associates, Inc. in 2015. The study is included as Appendix D.

11.2 OPERATION DURING LOSS OF POWER

Boone Raleigh PSD analyzed its ability to operate effectively during a loss of power. This involved ensuring a means to supply water through treatment, storage, and distribution without creating a public health emergency. Information regarding the utility's capacity for operation during power outages is summarized in **Table 12**.

Table 12. Generator Capacity

What is the type and capacity of the generator needed to operate during a loss of power?	Cummins Onan Engine 125 amps (24 KV one phase, 36 KV three phase)
Can the utility connect to generator at intake/wellhead? If yes, select a scenario that best describes system.	Yes, wired for portable generator
Can the utility connect to generator at treatment facility? If yes, select a scenario that best describes system.	Yes
Can the utility connect to a generator in distribution system? If yes, select a scenario that best describes system.	Yes, wired for portable generator
Does the utility have adequate fuel on hand for the generator?	From suppliers

What is your on-hand fuel storage and how long will it last operating at full capacity?		Gallons	Hours
		N/A	N/A
Provide a list of suppliers that could provide generators and fuel in the event of an emergency:	Supplier		Phone Number
	Generator	N/A	Number not provided
	Fuel	Roger's	Number not provided
Does the utility test the generator(s) periodically?		Yes	
Does the utility routinely maintain the generator?		Yes	
If no scenario describing the ability to connect to generator matches the utility's system or if utility does not have ability to connect to a generator, describe plans to respond to power outages:		N/A	

*The information provided in this table is all or partially provided from the Source Water Protection Contingency Plan completed by Potesta and Associates, Inc. in 2015. The study is included as Appendix D.

11.3 FUTURE WATER SUPPLY NEEDS

When planning for potential emergencies and developing contingency plans, a utility needs to not only consider their current demands for treated water but also account for likely future needs. This could mean expanding current intake sources or developing new ones in the near future. This can be an expensive and time consuming process, and any water utility should take this into account when determining emergency preparedness. Boone Raleigh PSD has analyzed its ability to meet future water demands at current capacity, and this information is included in **Table 13**.

Table 13. Future Water Supply Needs for Boone Raleigh PSD

Is the utility able to meet water demands with the current production capacity over the next 5 years? If so, explain how you plan to do so.	Yes; no population growth is expected in the next five years.
If not, describe the circumstances and plans to increase production capacity:	N/A

*The information provided in this table is all or partially provided from the Source Water Protection Contingency Plan completed by Potesta and Associates, Inc. in 2015. The study is included as Appendix D.

11.4 WATER LOSS CALCULATION

In any public water system there is a certain percentage of the total treated water that does not reach the customer. Some of this water is used in treatment plant processes such as back washing filters or flushing piping, but there is usually at least a small percentage that goes unaccounted for. To measure and report on this unaccounted for water, a public utility must use the method described in the Public Service Commission's rule,

Rules for the Government of Water Utilities, 150CSR7, section 5.6. The rule defines unaccounted for water as the volume of water introduced into the distribution system less all metered usage and all known non-metered usage which can be estimated with reasonable accuracy.

To further clarify, metered usages are most often those that are distributed to customers. Non-metered usages that are being estimated include usage by fire departments for fires or training, un-metered bulk sells, flushing to maintain the distribution system, and water used for backwashing filters and cleaning settling basins. By totaling the known metered and non-metered uses the utility calculates unaccounted for water. Note: To complete annual reports submitted to the PSC, utilities typically account for known water main breaks by estimating the amount of water lost. However, for the purposes of the source water protection plan, any water lost due to leaks, even if the system is aware of how much water is lost at a main break, is not considered a use. Water lost through leaks and main breaks cannot be controlled during a water shortages or other emergencies and should be included in the calculation of percentage of water loss for purposes of the source water protection plan. The data in **Table 14** is taken from the most recently submitted Boone Raleigh PSD PSC Annual Report.

Table 14. Water Loss Information

Total Water Pumped (gal)		86,255,000
Total Water Purchased (gal)		0
Total Water Pumped and Purchased (gal)		86,255,000
Water Loss Accounted for Except Main Leaks (gal)	Mains, Plants, Filters, Flushing, etc.	3,242,000
	Fire Department	0
	Back Washing	0
	Blowing Settling Basins	0
Total Water Loss Accounted For Except Main Leaks (gal)		3,242,000
Water Sold- Total Gallons (gal)		26,402,000
Unaccounted For Lost Water (gal)		42,611,000
Water lost from main leaks (gal)		14,000,000
Total gallons of Unaccounted for Lost Water and Water Lost from Main Leaks (gal)		56,611,000
Total Percent Unaccounted For Water and Water Lost from Main Leaks		66%
If total percentage of Unaccounted for Water is greater than 15%, please describe any measures that could be taken to correct this problem:		Development of an active leak detection program. Identify leaks with lead detector. They also have asked WV Rural Water Association for assistance. Alpha Mine engineers have also contributed to leak detection.

*This information is from the 2014 Public Service Commission Annual Report for Boone Raleigh PSD.

11.5 EARLY WARNING MONITORING SYSTEM

Public water utilities are required to provide an examination of the technical and economic feasibility of implementing an early warning monitoring system. Implementing an early warning monitoring system may be approached in different ways depending upon the water utility’s resources and threats to the source water. A utility may install a continuous monitoring system that will provide real time information regarding water quality conditions. This would require utilities to analyze the data to establish what condition is indicative of a contamination event. Continuous monitoring will provide results for a predetermined set of parameters. The more parameters that are being monitored, the more sophisticated the monitoring equipment will need to be. When establishing a continuous monitoring system, the utility should consider the logistics of placing and maintaining the equipment, and receiving output data from the equipment.

Alternately, or in addition, a utility may also pull periodic grab samples on a regular basis, or in case of a reported incident. The grab samples may be analyzed for specific contaminants. A utility should examine their PSSCs to determine what chemical contaminants could pose a threat to the water source. If possible, the utility should plan in advance how those contaminants will be detected. Consideration should be given to where samples will be collected, the preservations and hold times for samples, available laboratories to analyze samples, and costs associated with the sampling event. Regardless of the type of monitoring (continuous or grab), utilities should collect samples for their source throughout the year to better understand the baseline water quality conditions and natural seasonal fluctuations. Establishing a baseline will help determine if changes in the water quality are indicative of a contamination event and inform the needed response.

Every utility should establish a system or process for receiving or detecting chemical threats with sufficient time to respond to protect the treatment facility and public health. All approaches to receiving and responding to an early warning should incorporate communication with facility owners and operators that pose a threat to the water quality, with state and local emergency response agencies, with surrounding water utilities, and with the public. Communication plays an important role in knowing how to interpret data and how to respond.

Boone Raleigh PSD has analyzed its ability to monitor for and detect potential contaminants that could impact its source water. Information regarding this utility’s early warning monitoring system capabilities is provided in **Table 15** and in **Appendix B**.

Table 15. Early Warning Monitoring System Capabilities

<p>Does your system currently receive spill notifications from a state agency, neighboring water system, local emergency responders, or other facilities? If yes, from whom do you receive notices?</p>	<p>Yes, directly from coal companies if a release occurs and also from local emergency responders.</p>	
<p>Are you aware of any facilities, land uses, or critical areas within your protection areas where chemical contaminants could be released or spilled?</p>	<p>Yes</p>	
<p>Are you prepared to detect potential contaminants if notified of a spill?</p>	<p>No</p>	
<p>List laboratories (and contact information) on whom you would rely to analyze water samples in case of a reported spill.</p>	<p>Laboratories</p>	
	<p>Name</p>	<p>Contact</p>
	<p>REI Consultants</p>	<p>(304) 255-2500</p>
<p>WV Office of Lab Services</p>	<p>(304) 558-3530</p>	
<p>Do you have an understanding of baseline or normal conditions for your source water quality that accounts for seasonal fluctuations?</p>	<p>Yes</p>	

Does your utility currently monitor raw water (through continuous monitoring or periodic grab samples) at the surface water intake or from a groundwater source on a regular basis?		Yes
Provide or estimate the capital and O&M costs for your current or proposed early warning system or upgraded system.	Monitoring System	Hach sc1000 (B-2)
	Capital	\$ 35,000
	Yearly O & M	No provided
Do you serve more than 100,000 customers? If so, please describe the methods you use to monitor at the same technical levels utilized by ORSANCO.		No

*The information for this table was not completed in the Source Water Protection Contingency Plan completed by Potesta and Associates, Inc. in 2015. The study is included as Appendix D.

12.0 SINGLE SOURCE FEASIBILITY STUDY

If a public utility's water treatment plant is supplied by a single-source intake in a surface water source or a surface water influenced source of supply, the submitted source water protection plan must also include an examination and analysis of the technical and economic feasibility of alternative sources of water to provide continued safe and reliable public water service in the event that its primary source of supply is detrimentally affected by contamination, release, spill event or other reason. These alternatives may include a secondary intake, two days of additional raw or treated water storage, an interconnection with neighboring systems, or other options identified on a local level. Note: a suitable secondary intake would be required to draw water supplies from a substantially different location or water source.

To accomplish this requirement, utilities should examine all existing or possible alternatives and rank them by their technical, economic, and environmental feasibility. To have a consistent and complete method for ranking alternatives, WVBPH has developed a feasibility study guide. The guide provides several criteria to consider for each category, organized in a Feasibility Study Matrix. By completing the Feasibility Study Matrix, Boone Raleigh PSD has demonstrated the process used to examine the feasibility of each alternative and document scores that compare the alternatives. The Feasibility Study matrix and summary of the results are presented in an alternatives feasibility study attached as **Appendix D**.

13.0 COMMUNICATION PLAN

Boone Raleigh PSD has also developed a Communication Plan that documents the manner in which the public water utility, working in concert with state and local emergency response agencies, shall notify the local health agencies and the public of the initial spill or contamination event and provide updated information related to any contamination or impairment of the system's drinking water supply. The initial notification to the public will occur in any event no later than thirty minutes after the public water system becomes aware of the spill, release, or potential contamination of the public water system. A copy of the source water protection plan and the Communication Plan has been provided to the local fire department. Boone Raleigh PSD will update the Communication Plan as needed to ensure contact information is up to date.

Procedures should be in place to effectively react to the kinds of catastrophic spills that can reasonably be predicted at the source location or within the SWPA. The chain-of-command, notification procedures and response actions should be known by all water system employees.

The WVBPH has developed a recommended communication plan template that provides a tiered incident communication process to provide a universal system of alert levels to utilities and water system managers. The comprehensive Communication Plan for Boone Raleigh PSD is attached as **Appendix C** for internal review and planning purposes only.

The West Virginia Department of Environmental Protection is capable of providing expertise and assistance related to prevention, containment, and clean-up of chemical spills. The West Virginia Department of Environmental Protection Emergency Response 24-hour Phone is 1-800-642-3074. The West Virginia Department of Environmental Protection also operates an upstream distance estimator that can be used to determine the distance from a spill site to the closest public water supply surface water intake.

14.0 EMERGENCY RESPONSE SHORT FORM

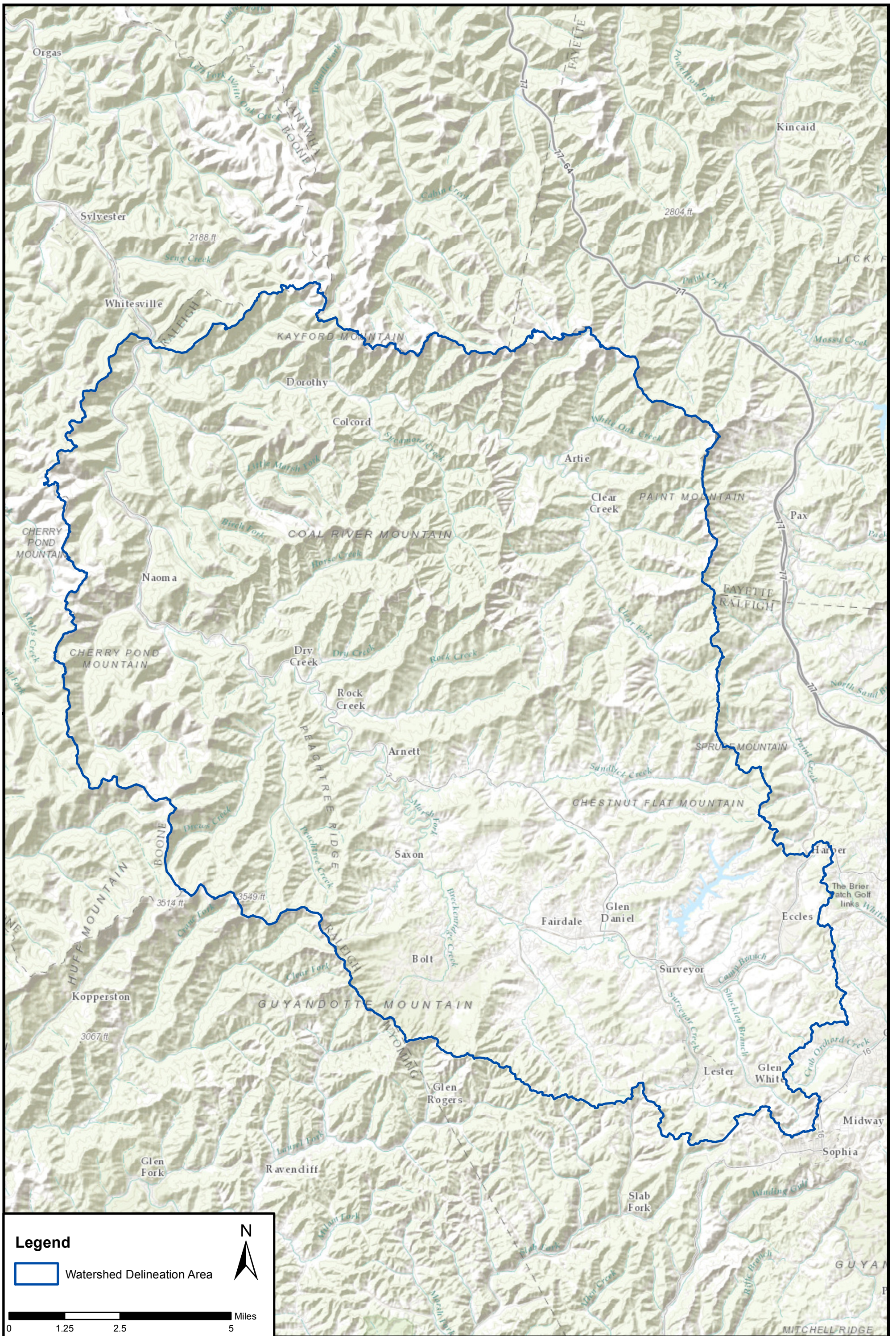
A public water utility must be prepared for any number of emergency scenarios and events that would require immediate response. It is imperative that information about key contacts, emergency services, and downstream water systems be posted and readily available in the event of an emergency. Elements of this source water protection plan, such as the contingency planning and communication plan, may contain similar information to the utility's emergency response plan. However, the emergency response plan is to be kept confidential and is not included in this source water protection plan. An Emergency Short Form is included in **Appendix C** to support the Communicate Plan by providing quick access to important information about emergency response and are to be used for internal review and planning purposes only.

15.0 CONCLUSION


This report represents a detailed explanation of the required elements of Boone Raleigh PSD's Source Water Protection Plan. Any supporting documentation or other materials that the utility considers relevant to their plan can be found in **Appendix E**.

This source water protection plan is intended to help prepare community public water systems all over West Virginia to properly handle any emergencies that might compromise the quality of the system's source water supply. It is imperative that this plan is updated as often as necessary to reflect the changing circumstances within the water system. The protection team should continue to meet regularly and continue to engage the public whenever possible. Communities taking local responsibility for the quality of their source water is the most effective way to prevent contamination and protect a water system against contaminated drinking water. Community cooperation, sufficient preparation, and accurate monitoring are all critical components of this source water protection plan, and a multi-faceted approach is the only way to ensure that a system is as protected as possible against source water degradation.

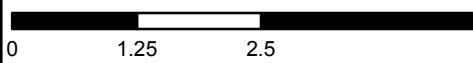
APPENDIX A. FIGURES



Legend

 Watershed Delineation Area



 Miles
0 1.25 2.5 5

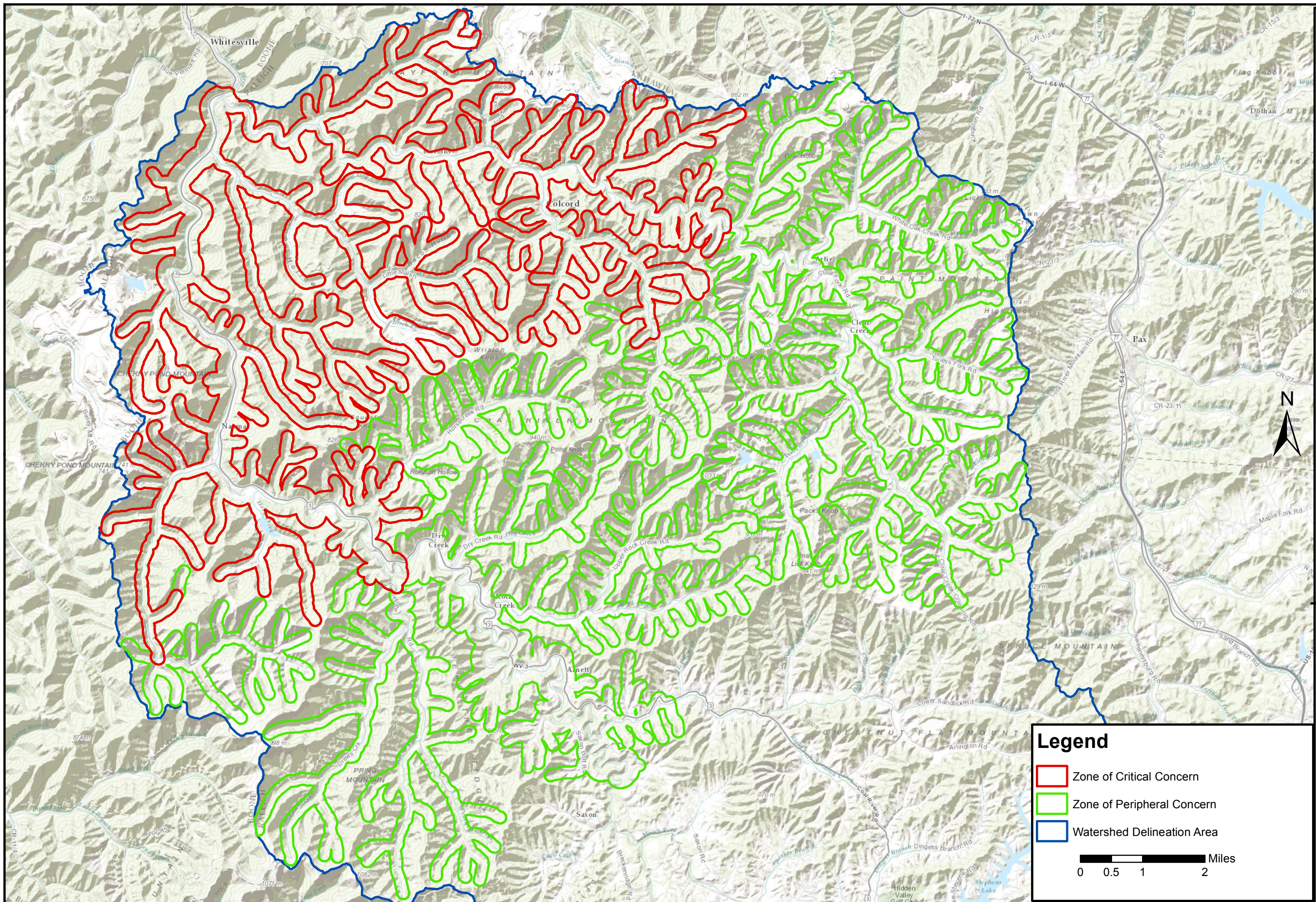
TETRA TECH
803 Quarrier Street, Suite 400
Charleston, WV 25301

Boone Raleigh PSD
PWSID: WV3300315
Source Water Protection Plan

Figure A-1. Watershed Delineation Area

CREATED BY: CEM

DATE: 06/14/16



**Figure A-2. Zone of Critical Concern/
Zone of Peripheral Concern**

**Boone Raleigh PSD
PWSID: WV3300315
Source Water Protection Plan**

TETRA TECH
803 Quarrier Street, Suite 400
Charleston, WV 25301



CREATED BY: CEM DATE:06/14/16

Legend

- Zone of Critical Concern
- Zone of Peripheral Concern
- Watershed Delineation Area

0 0.5 1 2 Miles

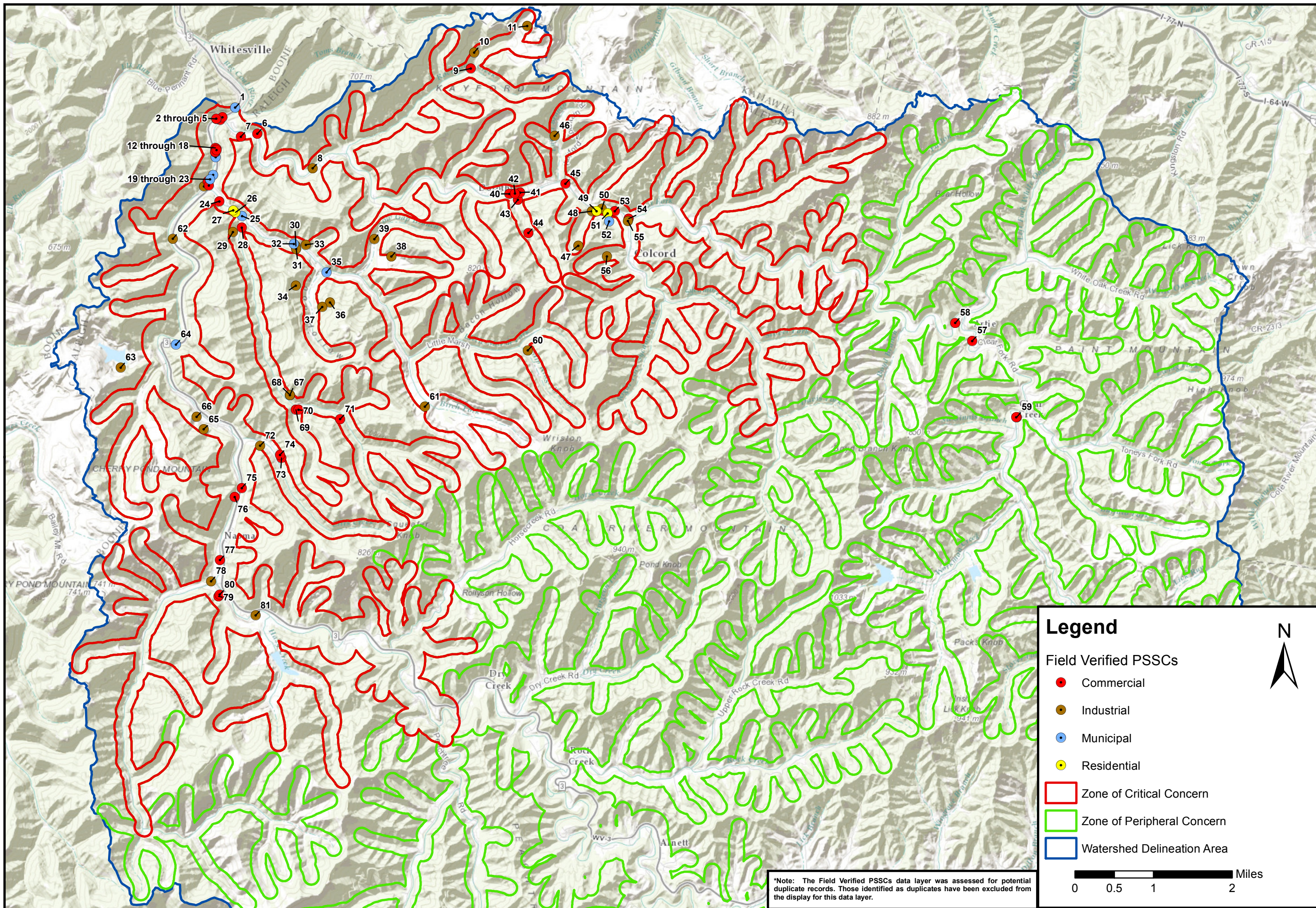


Figure A-3. Field Verified PSSCs

CREATED BY: CEM DATE:06/14/16

**Boone Raleigh PSD
PWSID: WV3300315
Source Water Protection Plan**

Legend

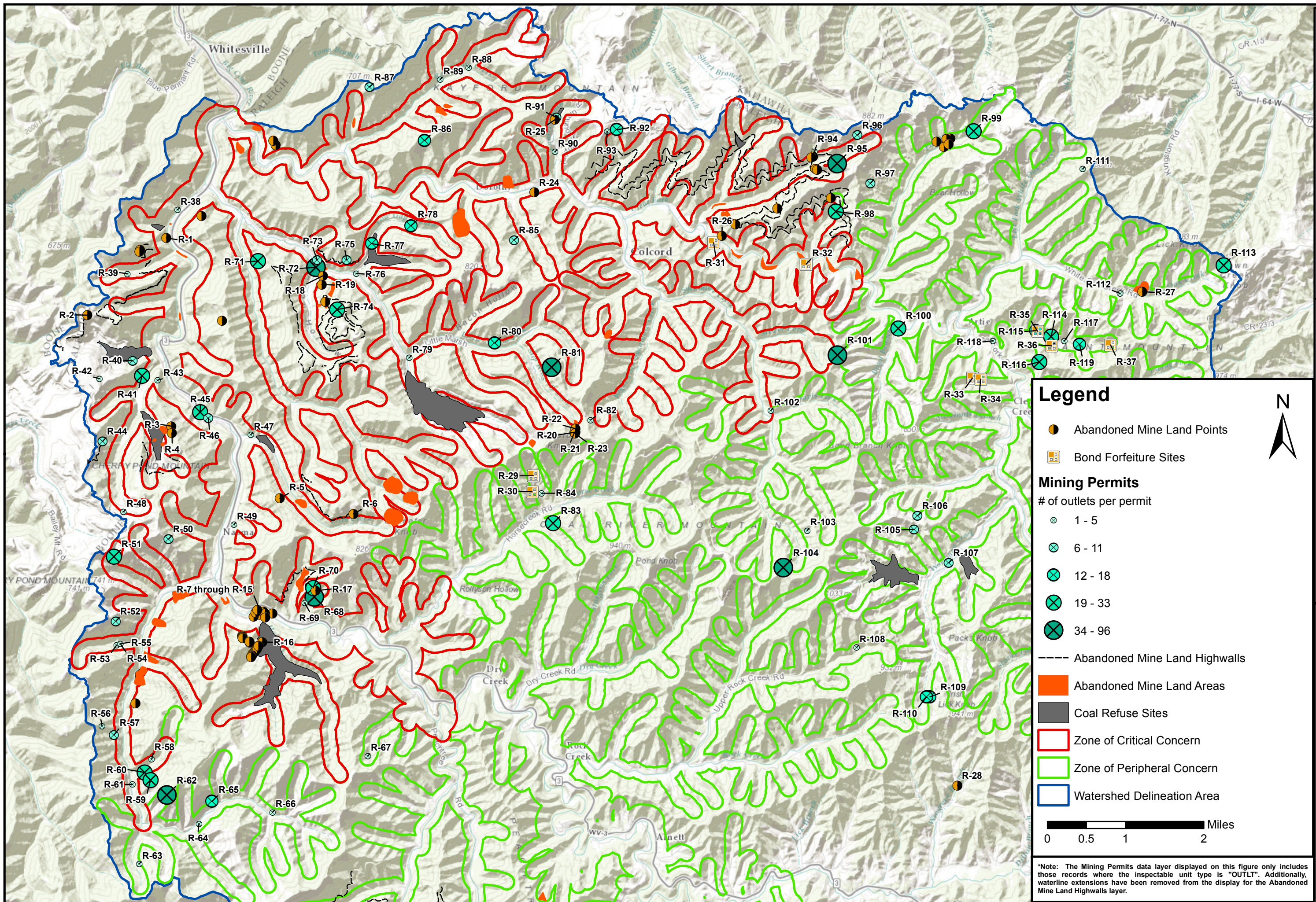
- Field Verified PSSCs
 - Commercial
 - Industrial
 - Municipal
 - Residential
- Zone of Critical Concern
- Zone of Peripheral Concern
- Watershed Delineation Area

N

Miles

0 0.5 1 2

*Note: The Field Verified PSSCs data layer was assessed for potential duplicate records. Those identified as duplicates have been excluded from the display for this data layer.



Legend

- Abandoned Mine Land Points
- Bond Forfeiture Sites

Mining Permits

of outlets per permit

- 1 - 5
- 6 - 11
- 12 - 18
- 19 - 33
- 34 - 96

- Abandoned Mine Land Highwalls
- Abandoned Mine Land Areas
- Coal Refuse Sites
- Zone of Critical Concern
- Zone of Peripheral Concern
- Watershed Delineation Area

0 0.5 1 2 Miles

*Note: The Mining Permits data layer displayed on this figure only includes those records where the inspectable unit type is "OUTLT". Additionally, waterline extensions have been removed from the display for the Abandoned Mine Land Highwalls layer.

Figure A-4. Selected Sources: Abandoned Mine Land Points, Highwalls, and Areas, Bond Forfeiture Sites, Mining Permits, and Coal Refuse Sites

Boone Raleigh PSD
 PWSID: WV3300315
 Source Water Protection Plan

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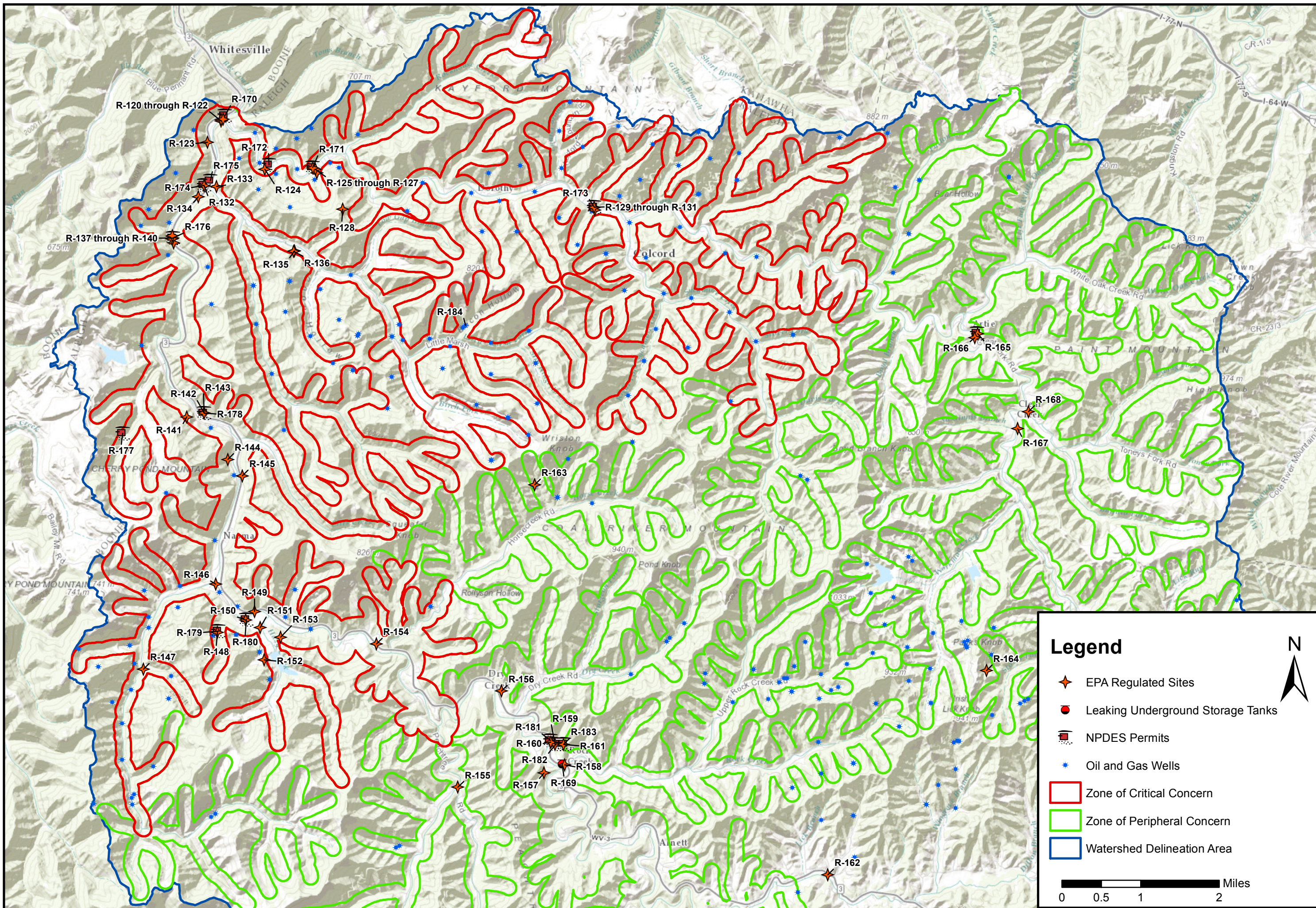


Figure A-5. Selected Sources: EPA Regulated Sites, Leaking Underground Storage Tanks, NPDES Permits and Oil/Gas Wells

**Boone Raleigh PSD
PWSID: WV3300315
Source Water Protection Plan**

TETRA TECH
803 Quarrier Street, Suite 400
Charleston, WV 25301

DATE:06/14/16

CREATED BY: CEM

Legend

- EPA Regulated Sites
- Leaking Underground Storage Tanks
- NPDES Permits
- Oil and Gas Wells
- Zone of Critical Concern
- Zone of Peripheral Concern
- Watershed Delineation Area

0 0.5 1 2 Miles



TETRA TECH
803 Quarrier Street, Suite 400
Charleston, WV 25301

**Boone Raleigh PSD
PWSID: WV3300315**

Source Water Protection Plan

Figure A-6

Aboveground Storage Tanks

CREATED BY: JAW

DATE: 6/22/2016

Lists of Potential Sources of Significant Contamination

Boone Raleigh PSSC Summary

PSSC Layer	In ZCC	Around ZCC	In ZPC	Around ZPC	In Watershed
AML Points	20	40	13	5	11
Aboveground Storage Tanks	176	66	93	82	154
Bond Forfeitures	2	2	12	5	4
Leaking Underground Storage Tanks	1				2
Mining Outlets	32	31	24	22	19
NPDES Permits	47	34	98	82	425
ERIS Wells	93	78	50	81	223
USEPA Regulated Sites	33	5	11	6	82
Field Verified PSSC	77	5	4		

Table A-1: WVBPH Source Water Database and Locally Identified Potential Sources of Significant Contamination.

Map Label	PSSC Name	PSSC Description	Comment	Map Type	Map Code	Relative Risk Score
1	Boone Raleigh PSD	Drinking Water Treatment Plants	drinking water treatment plant	M-5	Municipal	1.5
2	Massey Body Shop	Auto repair shops	4+ bays, trucks, tire piles - auto body shop	C-3	Commercial	2.7
3	Marathon	Gas Stations	gas station	C-18	Commercial	2.9
4	County Route 3	Highway	highway	M-7	Municipal	6.2
5	Hannah's Pain & Body	Body shops	auto body shop	C-5	Commercial	2.8
6	Bridge construction	Construction areas	1 excavator regrading stream bank - CONSTRUCTION COMPLETE	C-10	Commercial	3.5
7	Rebuilders Battery Service	Underground Storage Tanks	electric substation	C-48	Commercial	3.0
8	WALHONDE VILLAGE SEWER SYSTEM	Permitted Discharge Pipe (outfall)	Ind Other	I-27	Industrial	5.1
9	CATENARY COAL CO	Other		C-53	Commercial	
10	Lagoon 1	Industrial pipelines		I-15	Industrial	6.0
11	Mine 2, Panther Deep Mile, Regulated	Mining: Surface	active, surface	I-24	Industrial	5.2
12	Exxon	Gas Stations	gas station	C-18	Commercial	2.9
13	Whitesville Fire Department	Fire Stations	fire station	M-6	Municipal	1.2
14	PETTUS DAIRY QUEEN	Tire Dumps		C-47	Commercial	2.8

Map Label	PSSC Name	PSSC Description	Comment	Map Type	Map Code	Relative Risk Score
15	PETTUS DAIRY QUEEN	Other		C-53	Commercial	
16	PETTUS DAIRY QUEEN	Other		C-53	Commercial	
17	Pettus Dairy Queen	Above Ground Storage Tanks		C-1	Commercial	6.8
18	PETTUS DAIRY QUEEN	Other		C-53	Commercial	
19	PETTUS PLANT	Permitted Discharge Pipe (outfall)	Storm Water Industrial (GP)	I-27	Industrial	5.1
20	B&M Oil Company	Heating oil companies	oil company with six 2000 gal ASTs	C-22	Commercial	3.2
21	RAL CO. BOONE CO. TECH	Schools		M-21	Municipal	1.5
22	RAL. CO BOONE CO. TECH Boat services/repair refinishing	Boat services/repair refinishing		C-4	Commercial	2.3
23	RAL.CO. BOONE CO. TECH Sewage sludge/Biological Solids application	Sewage sludge/Biological Solids application		M-22	Municipal	5.0
24	Equipment yard 1	Equipment rental/repair shop	truck staging area	C-13	Commercial	2.1
25	Marfork Coal Office	Highway		M-7	Municipal	6.2
26	Marfork Coal Office	Septic Systems (leach field)*		R-6	Residential	2.1
27	Marfork Coal Office	Residential (single family homes)		R-4	Residential	2.3
28	Equipment Yard 2	Equipment rental/repair shop	tanks, cylinders, scrap metal, ASTs	C-13	Commercial	2.1
29	Marfork Coal Office	Wells: oil and gas		I-40	Industrial	2.8
30	Marfork Coal Company - Mine 5	Mining: underground	active, shaft	I-25	Industrial	4.8
31	Marfork Coal - Prep Plant	Mining: Surface		I-24	Industrial	5.2
32	Marfork Coal - Prep Plant	Highway		M-7	Municipal	6.2
33	Marfork Coal - Prep Plant	Wells: oil and gas		I-40	Industrial	2.8
34	Marfork Coal - Outpost East	Wells: oil and gas		I-40	Industrial	2.8
35	Marfork Coal - Outpost East	Highway		M-7	Municipal	6.2
36	Marfork Coal - Outpost East	Mining: Surface		I-24	Industrial	5.2
37	Marfork Coal - Outpost East	Wells: oil and gas		I-40	Industrial	2.8
38	Marfork Coal Company - Mine 6	Mining: underground	mining activities	I-25	Industrial	4.8
39	Marfork Coal - Low Gap	Mining: Surface		I-24	Industrial	5.2
40	PINNACLE ROCK COAL CORPORATION	Other		C-53	Commercial	
41	PINNACLE ROCK COAL CORPORATION	Other		C-53	Commercial	
42	AEP Dorothy Substation	Utility Substation Transformers	Power Substation	C-49	Commercial	2.9
43	PINNACLE ROCK COAL CORPORATION	Other		C-53	Commercial	
44	PINNACLE ROCK COAL CORPORATION	Other		C-53	Commercial	
45	BATTLE RIDGE COMPANIES	Other		C-53	Commercial	

Map Label	PSSC Name	PSSC Description	Comment	Map Type	Map Code	Relative Risk Score
46	Mine 3, Elk Run Coal, Regulated	Mining: underground	mining activities	I-25	Industrial	4.8
47	PEAKE OPERATING COMPANY API 81-00910	Wells: oil and gas	Inaccessible not surveyed	I-40	Industrial	2.8
48	PEAKE OPERATING COMPANY API 81-00826	Wells: oil and gas	Inaccessible not surveyed	I-40	Industrial	2.8
49	Homeschool Village	Septic Systems (discharging to stream or surface)	Inaccessible-private property. Waste Water Lagoon shown on figure. Bradley PSD provides service to approximately 25 homes/establishments in the Homeschool Village area.	R-5	Residential	5.7
50	The Home School campus near discharge pipe	Permitted Discharge Pipe (outfall)	GPS point taken on road because no access to site	I-27	Industrial	5.1
51	Homeschool Village	Residential (multi-units)	Inaccessible-private property. According to PWS staff the Homeschool Village is a development constructed in the late 1970s.	R-3	Residential	2.7
52	Well No. 1	Wells: water supply	Inaccessible not surveyed	M-31		
53	Clear Fork Medical Clinic	Medical/dental offices/clinics	clinic is closed according to PWS staff	C-31	Commercial	1.1
54	Historic gas station	Historic gas stations	Not sure if tanks have been removed or not.	C-23	Commercial	3.0
55	Blazer Energy gas well and coal waste pile	Wells: oil and gas	Road to site flooded	I-40	Industrial	2.8
56	PEAKE OPERATING COMPANY API 81-00598	Wells: oil and gas	Inaccessible not surveyed	I-40	Industrial	2.8
57	CLEARFORK ELEMENTARY SCHOOL	Other		C-53	Commercial	
58	TUCK'S PLACE	Other		C-53	Commercial	
59	BUTCH'S STORE #2	Gas Stations		C-18	Commercial	2.9
60	Marfork Coal - Slip Ridge Mine	Mining: Surface		I-24	Industrial	5.2
61	Lagoon 2	Industrial pipelines	tailings pile, 4 ASTs	I-15	Industrial	6.0
62	EUNICE SUBDIVISION	Permitted Discharge Pipe (outfall)	Sewage General	I-27	Industrial	5.1
63	Lagoon 3	Industrial pipelines	active, surface	I-15	Industrial	6.0
64	CSX Railroad	Railroad Tracks (right of way)	railroad tracks	M-17	Municipal	4.9
65	MONTCOAL COMMUNITY/SUBD.	Permitted Discharge Pipe (outfall)	Sewage General	I-27	Industrial	5.1
66	Performance Coal Company - Mine 7	Mining: underground	active, shaft, lagoons, loading racks, inactive water treatment plant	I-25	Industrial	4.8

Map Label	PSSC Name	PSSC Description	Comment	Map Type	Map Code	Relative Risk Score
67	Marfork Coal Company - Mine 4	Mines: abandoned	abandoned, one lagoon	I-23	Industrial	5.0
68	Marfork Coal Company - Mine 1	Mines: abandoned	abandoned	I-23	Industrial	5.0
69	Marfork Coal Company	Other	mining activities	C-53	Commercial	
70	Marfork Coal Company	Other	mining activities	C-53	Commercial	
71	Marfork Coal Company	Other	mining activities	C-53	Commercial	
72	Mine 8	Mining: underground	active, further up valley, 2+ shafts, transformer station, equipment storage yard, conveyor system	I-25	Industrial	4.8
73	Performance Coal Company	Other	mining activities	C-53	Commercial	
74	Performance Coal Company	Other	mining activities	C-53	Commercial	
75	Performance Coal Company	Other	mining activities	C-53	Commercial	
76	Performance Coal Company	Other	mining activities	C-53	Commercial	
77	Performance Coal Company	Other	mining activities	C-53	Commercial	
78	EQT gas pipeline	Public Utilities (phone, gas, electric power)	gas pipeline	I-30	Industrial	3.1
79	Performance Coal Company	Other	mining activities	C-53	Commercial	
80	Performance Coal Company	Other	mining activities	C-53	Commercial	
81	Mine 9	Mining: underground	active, shaft, conveyor system, water treatment plant, crusher	I-25	Industrial	4.8

Table A-2: Select Abandoned Mine Land Points

Map Label*	PADNUMBER	PADNAME	PROBKEY**
R-1	WV000125	EUNICE COMPLEX	HEF
R-2	WV000684	BUFFY STRUCTURES	EF
R-3	WV000699	MONTCOAL STRUCTURES & REFUSE	HEF
R-4	WV000699	MONTCOAL STRUCTURES & REFUSE	HEF
R-5	WV000701	STICKNEY STRUCTURE	HEF
R-6	WV000687	ELLIS CREEK EQUIPMENT	EF
R-7	WV006073	SUNDIAL (HATFIELD) REFUSE PILE	HEF
R-8	WV006073	SUNDIAL (HATFIELD) REFUSE PILE	HEF
R-9	WV006073	SUNDIAL (HATFIELD) REFUSE PILE	HEF
R-10	WV006073	SUNDIAL (HATFIELD) REFUSE PILE	HEF
R-11	WV006073	SUNDIAL (HATFIELD) REFUSE PILE	HEF
R-12	WV006073	SUNDIAL (HATFIELD) REFUSE PILE	HEF
R-13	WV006073	SUNDIAL (HATFIELD) REFUSE PILE	HEF
R-14	WV006073	SUNDIAL (HATFIELD) REFUSE PILE	HEF
R-15	WV006073	SUNDIAL (HATFIELD) REFUSE PILE	HEF
R-16	WV006073	SUNDIAL (HATFIELD) REFUSE PILE	HEF
R-17	WV006073	SUNDIAL (HATFIELD) REFUSE PILE	HEF
R-18	WV000642	MARSH STRUCTURES AND PORTALS	HEF
R-19	WV000642	MARSH STRUCTURES AND PORTALS	HEF
R-20	WV001009	SLIP RIDGE BRANCH	HEF
R-21	WV001009	SLIP RIDGE BRANCH	HEF
R-22	WV001009	SLIP RIDGE BRANCH	HEF
R-23	WV001009	SLIP RIDGE BRANCH	HEF
R-24	WV005667	DOROTHY (DILLON) DRAINAGE	DI
R-25	WV001002	LAUREL BRANCH FAN	HEF
R-26	WV001001	AMEAGLE COMPLEX	HEF
R-27	WV001940	WHITE OAK CREEK COMPLEX	HEF
R-28	WV001018	IRISH LICK IMPOUNDMENTS	DI

*There are a total of 89 AML Points in the WSDA.
 78 points are within or around the ZCC and ZPC. 50 Portals were not labeled.

****PROBKEY**

HEF
DI
EF

Problem Key

Hazardous Equipment & Facility
 Dangerous impoundment
 Equipment Facility

Table A-3: Bond forfeiture sites in and around the ZCC and ZPC.

Reg_Label	COMPANY	PERMIT	COUNTY	DATE_REVOK	ERIS
R-29	BICKFORD MINING	U-78-85	Raleigh	3/12/1997	U007885
R-30	BICKFORD MINING INC.	U-44-83	Raleigh	2/5/1997	U004483
R-31	HILLCREST INDUSTRIES, INC.	P-5-84	Raleigh	3/24/1986	P058400
R-32	HILCREST INDUSTRIES., INC.	R-1-81	Raleigh	3/1/1986	R000181
R-33	CONCORD COAL CORP.	D-10166	Raleigh		D010166
R-34	CONCORD COAL CORP.	UO-117	Raleigh	1/1/1985	U011700
R-35	SOUTHEAST LEASING, INC.	U-3023-87	Raleigh	10/24/1996	U302387
R-36	SOUTHEAST LEASING, INC.	U-3003-89	Raleigh	10/24/1996	U300389
R-37	SOUTHEAST LEASING, INC.	S-3024-87	Raleigh	10/24/1996	S302487

Note: Only those sites located in and around the ZCC and ZPC were labeled. There are 16 sites in the watershed that were not labeled.

Table A-4: Mining Permits in and around the ZCC and ZPC.

Map Label	permit	Responsible party	Type	Number of Outlets
R-38	WV1014986	ELK RUN COAL COMPANY INC	HPUGD	4
R-39	WV1016873	INDEPENDENCE COAL COMPANY INC	HPU	3
R-40	WV1016890	INDEPENDENCE COAL COMPANY INC	HPU	10
R-41	WV1014226	PERFORMANCE COAL COMPANY	HPUGD	21
R-42	WV1015848	ELK RUN COAL COMPANY INC	HPUGD	2
R-43	WV1021826	MARFORK COAL COMPANY INC	HPUGD	1
R-44	WV0057312	PERFORMANCE COAL COMPANY	HPUGD	7
R-45	WV0064556	PERFORMANCE COAL COMPANY	HPUGD	21
R-46	WV0097250	PERFORMANCE COAL COMPANY	LOADO	10
R-47	WV1012584	PERFORMANCE COAL COMPANY	REFUS	2
R-48	WV0050229	PERFORMANCE COAL COMPANY	HPUST	2
R-49	WV0063266	PERFORMANCE COAL COMPANY	HPUPR	4
R-50	WV1019465	INDEPENDENCE COAL COMPANY INC	HPUGD	7
R-51	WV1019228	INDEPENDENCE COAL COMPANY INC	HPU	24
R-52	WV1029711	INDEPENDENCE COAL COMPANY INC	HPU	8

Map Label	permit	Responsible party	Type	Number of Outlets
R-53	WV1012711	PERFORMANCE COAL COMPANY	HPUGD	4
R-54	WV1019007	INDEPENDENCE COAL COMPANY INC	HPUGD	4
R-55	WV1019627	INDEPENDENCE COAL COMPANY INC	HPUGD	3
R-56	WV1029975	INDEPENDENCE COAL COMPANY INC	HPU	3
R-57	WV1001159	PERFORMANCE COAL COMPANY	HPUGD	6
R-58	WV1022148	MARFORK COAL COMPANY INC	HPUST	1
R-59	WV1015061	INDEPENDENCE COAL COMPANY INC	HPUGD	20
R-60	WV1024426	MARFORK COAL COMPANY INC	HPU	23
R-61	WV1014358	PERFORMANCE COAL COMPANY	HPUGD	3
R-62	WV1019163	ALEX ENERGY INC	HPU	43
R-63	WV1009061	EASTERN ASSOCIATED COAL, LLC	HPUGD	5
R-64	WV0066711	EASTERN ASSOCIATED COAL, LLC	HPUGD	5
R-65	WV1015036	INDEPENDENCE COAL COMPANY INC	HPUGD	14
R-66	WV1019376	INDEPENDENCE COAL COMPANY INC	HPUGD	1
R-67	WV1022342	MARFORK COAL COMPANY INC	HPUGD	2
R-68	WV0042846	GOALS COAL COMPANY	HPUPR	46
R-69	WV1014404	PERFORMANCE COAL COMPANY	HPU	5
R-70	WV1014994	PERFORMANCE COAL COMPANY	HPUGD	22
R-71	WV1014633	MARFORK COAL COMPANY INC	HPUPR	24
R-72	WV1013301	MARFORK COAL COMPANY INC	HPUGD	50
R-73	WV1015354	MARFORK COAL COMPANY INC	HPUGD	7
R-74	WV1014528	MARFORK COAL COMPANY INC	HPUGD	20
R-75	WV1001477	MARSH FORK DEVELOPMENT CO	HPU	7
R-76	WV1014781	MARFORK COAL COMPANY INC	REFUS	4
R-77	WV1014773	MARFORK COAL COMPANY INC	HPUGD	18
R-78	WV1014838	MARFORK COAL COMPANY INC	HPUGD	14
R-79	WV1015044	MARFORK COAL COMPANY INC	REFUS	1
R-80	WV1024337	MARFORK COAL COMPANY INC	HPU	15
R-81	WV1021788	MARFORK COAL COMPANY INC	HPU	48
R-82	WV0094188	PRINCESS BEVERLY COAL CO	HPU	1

Map Label	permit	Responsible party	Type	Number of Outlets
R-83	WV1021729	MARFORK COAL COMPANY INC	HPUGD	24
R-84	WV0096873	BICKFORD MINING INC	HPU	5
R-85	WV0096521	PINNACLE ROCK COAL CORP	HPUGD	9
R-86	WV1019309	CATENARY COAL COMPANY LLC	HPU	15
R-87	WV1022563	CATENARY COAL COMPANY LLC	HPU	11
R-88	WV1014684	CATENARY COAL COMPANY LLC	HPU	1
R-89	WV1014765	ELK RUN COAL COMPANY INC	HPUGD	5
R-90	WV1014803	ELK RUN COAL COMPANY INC	HPUGD	5
R-91	WV1014897	ELK RUN COAL COMPANY INC	HPUGD	6
R-92	WV0053236	LCC WEST VIRGINIA, LLC	HPUST	14
R-93	WV1012461	LCC WEST VIRGINIA, LLC	HPUST	4
R-94	WV1027689	COAL RIVER MINING, LLC	HPUGD	2
R-95	WV1015133	ALEX ENERGY INC	HPU	96
R-96	WV1019422	ALEX ENERGY INC	HPU	6
R-97	WV0091057	BICKFORD MINING INC	HPUGD	11
R-98	WV1001906	LODESTAR ENERGY, INC.	HPU	22
R-99	WV1014951	ALEX ENERGY INC	HPU	21
R-100	WV0093530	CLEAR FORK COAL COMPANY	HPUGD	24
R-101	WV1026801	MARFORK COAL COMPANY INC	HPU	51
R-102	WV1019104	MARFORK COAL COMPANY INC	HPUGD	5
R-103	WV0002062	CONSOLIDATION COAL COMPANY	HPU	1
R-104	WV1022024	MARFORK COAL COMPANY INC	HPU	46
R-105	WV1002384	CLEAR FORK COAL COMPANY	HPUGD	11
R-106	WV1022547	MARFORK COAL COMPANY INC	HPU	7
R-107	WV0061671	CLEAR FORK COAL COMPANY	HPUPR	9
R-108	WV0064416	CLEAR FORK COAL COMPANY	HPUST	2
R-109	WV0063355	CLEAR FORK COAL COMPANY	HPUST	14
R-110	WV0096601	CLEAR FORK COAL COMPANY	HPUGD	13
R-111	WV1015214	ALEX ENERGY INC	HPU	1
R-112	WV0028452	KINGSTON RESOURCES INC	HPUPR	5

Map Label	permit	Responsible party	Type	Number of Outlets
R-113	WV1012487	REVELATION ENERGY LLC	HPU	26
R-114	WV1000799	MOSSY EAGLE LLC	HPU	22
R-115	WV1000861	SOUTHEAST LEASING INC	HPU	17
R-116	WV1001345	LODESTAR ENERGY, INC.	HPU	33
R-117	WV1001990	SOUTHEAST LEASING INC	HPU	4
R-118	WV1009397	SOUTHEAST LEASING INC	HPU	5
R-119	WV1019198	PIONEER FUEL CORPORATION	HPU	14

Table A-5: List of Responsible Parties operating 20 or more oil and gas wells in source water protection areas.

Responsible Party	ZCC	Around ZCC	ZPC	Around ZPC	WSDA	Total
NEW RIVER ENERGY CORPORATION	5	5	5	5	5	25
BEREA OIL & GAS CORP	6	6	6	6	6	30
CLOWSER PRODUCTION COMPANY	6	6	6	6	6	30
JACKSON RESOURCES CO	6	6	6	6	6	30
ENERGY SEARCH INC.	5	5	5	5	11	31
ALLEGHENY & WESTERN ENERGY CORP	7	7	7	7	7	35
EMAX OIL COMPANY	10	10	10	15	11	56
VITRUVIAN EXPLORATION, LLC	9	9	9	9	32	68
COLUMBIA NATURAL RESOURCES, LLC	19	27	8	8	10	72
ENERGY CORPORATION OF AMERICA	22	16	14	14	16	82
EXCO RESOURCES (WV), INC.	32	22	15	15	20	104
CABOT OIL & GAS CORPORATION	19	18	22	29	42	130
PENN VIRGINIA OIL AND GAS CORPORA	20	21	27	38	28	134
EQT PRODUCTION COMPANY	29	38	23	22	23	135
DOMINION TRANSMISSION INC	33	33	33	35	57	191
OXY USA, INC.	40	40	40	40	41	201
PEAKE OPERATING COMPANY	50	40	34	34	76	234
DOMINION EXPLORATION & PRODUCTION	29	31	58	59	67	244
BLAZER ENERGY CORPORATION	68	57	47	45	44	261
OPERATOR UNKNOWN	100	100	100	100	101	501

Table A-6: USEPA Facilities in and around the ZCC and ZPC.

Map Label	Primary Name	Location	City	Conveyor
R-120	HANNAHS PAINT & BODY SHOP	RTE 3 1/2 MI E OF WHITESVILLE	WHITESVILLE	RCRAINFO
R-121	PETROLEUM PRODUCTS, INC. WHITE	12224 COAL RIVER ROAD	WHITESVILLE	NPDES
R-122	MASSEY BODY SHOP	12188 COAL RIVER RD	WHITESVILLE	RCRAINFO
R-123	AEP-JARROLD STATION	UNKNOWN	PETTUS	ICIS
R-124	BRADLEY PSD - WALHONDE #2 WWTP	CLEAR FORK ROAD/CO ROUTE 1	BRADLEY	CWNS
R-125	BRADLEY PSD - WALHONDE #1 WWTP	CLEAR FORK ROAD, CR 1	BRADLEY	CWNS
R-126	BRADLEY PSD - WALHONDE SUBDIVI	WALHONDE VILLAGE	BRADLEY	NPDES
R-127	WALHONDE VILLAGE SEWER SYSTEM	PO BOX 1063	SOPHIA	ICIS
R-128	DAMERON- SUNDIAL 46KV RELOCATI	UNKNOWN	WHITESVILLE	ICIS
R-129	BRADLEY PSD - HOME SCHOOL WWTP	CLEAR FORK ROAD/CR 1	BRADLEY	CWNS
R-130	BRADLEY PSD - HOME SCHOOL SUBD	HOME SCHOOL VILLAGE	BRADLEY	NPDES
R-131	HOME SCHOOL VILLAGE	UNKNOWN	COLCORD	ICIS
R-132	PETTUS PLANT	RT 3	PETTUS	NPDES
R-133	JARROLD 46 KV LINE EXTENSION	UNKNOWN	WHITESVILLE	ICIS
R-134	PETTUS BOTTOM BRIDGE S341-	COUNTY ROUTE 3/29	WHITESVILLE, IN BOONE C	ICIS
R-135	MARFORK COAL CO	MARFORK RD RT 3/1	WHITESVILLE	EIS
R-136	MARFORK COAL COMPANY	ROUTE 3/1	PETTUS	AIRS/AFS
R-137	BRADLEY PSD - EUNICE WWTP	COAL RIVER ROAD/CR 3	BRADLEY	CWNS
R-138	BRADLEY PSD - EUNICE SUBDIVISI	UNKNOWN	BRADLEY	NPDES
R-139	EUNICE SUBDIVISION	STAR RT 1434	WHITESVILLE	ICIS
R-140	MONTCOAL WATERLINE EXTENSION P	UNKNOWN	MONTCOAL	ICIS
R-141	PERFORMANCE COAL COMPANY	130 FRONTIER STREET	MONTCOAL	AIRS/AFS
R-142	MONTCOAL COMMUNITY/SUBD.	P.O. BOX 69	NAOMA	NPDES
R-143	MONTCOAL BATHHOUSE	UNKNOWN	MONTCOAL	ICIS
R-144	MARSH FORK HIGH SCHOOL	UNKNOWN	NAOMA	ICIS
R-145	PERFORMANCE COAL COMPANY	RT 3	MONTCOAL	RCRIS
R-146	EDWIGHT TRUSS BRIDGE S341-3/2-	UNKNOWN	NAOMA	ICIS
R-147	HAZY CREEK (SPOUSE) PORTAL	UNKNOWN	WHITESVILLE	ICIS
R-148	SUNDIAL (HATFIELD) REFUSE PILE	SUNDIAL (HATFIELD)	SUNDIAL	ICIS

Map Label	Primary Name	Location	City	Conveyor
R-149	MARSH FORK ELEMENTARY SCHOOL	8801 COAL RIVER ROAD	NAOMA	FRS
R-150	MARSH FORK MIDDLE SCHOOL	8801 COAL RIVER ROAD	NAOMA	NPDES
R-151	GOALS COAL CO	STATE ROUTE 3	SUNDIAL	EIS
R-152	PEABODY COAL CO	RT 3	SUNDIAL	RCRIS
R-153	KANAWHA-BAILEYSVILLE 138 KV LI	UNKNOWN	SUNDIAL, WV	ICIS
R-154	LIQUI-SOL, LLC	7844 COAL RIVER ROAD	NAOMA	FRS-GEOCODE
R-155	DREWS CREEK WATER PROJECT	10,10/1,10/2,10/3,10/4, &	NAOMA	ICIS
R-156	DRY CREEK HARDWOODS INC	PO BOX 186	DRY CREEK	ICIS
R-157	MOUNT VIEW SCHOOL	NO. 3 CRANSTON ST	BECKLEY	ICIS
R-158	LITTLE GENERAL STORE #2365	5783 COAL RIVER RD	ROCK CREEK	FRS
R-159	MARSH FORK ELEM SCHOOL	UNKNOWN	ROCK CREEK	ICIS
R-160	MARSH FORK ELEM SCHOOL WWTP	5960 COAL RIVER RD	ROCK CREEK	NPDES
R-161	WASTE SITE FOR NEW MARSH ELEME	UNKNOWN	ROCK CREEK	ICIS
R-162	HILL'S GARAGE	2941 COAL RIVER ROAD	ARNETT	FRS-GEOCODE
R-163	BICKFORD MINING, INC. (U-44-83	UNKNOWN	NAOMA	ICIS
R-164	PERFORMANCE COAL COMPANY.	UNKNOWN	STICKNEY	ICIS
R-165	CLEAR FORK DISTRICT ELEMENTARY	CLEAR CREEK	CLEAR CREEK	NPDES
R-166	CLEARFORK DISTRICT ELEMENTARY	105 ADAIR ST	BECKLEY	ICIS
R-167	IRENE'S GROCERY - ID # 4-110180	3894 CLEAR FORK RD	BECKLEY	LUST-ARRA
R-168	FORMER IRENE'S GROCERY	CLEAR FORK RD.	CLEAR CREEK	FRS

Table A-7: Leaking Underground Storage Tank sites in or around the ZCC and ZPC without record of cleanup being complete.

Map Label	WVID	Leak	Facility Name	Address	City	Confirmed	Cleanup Initiated	Cleanup Complete
R-169	4104856	10-004	LITTLE GENERAL # 2365	5779 COAL RIVER RD, WV RT 3	ROCK CREEK	01/13/2010	01/13/2010	09/03/2010

Table A-8: Select NPDES permits* in and around the ZCC and ZPC.

Map Label	Permit	Facility name	Description	Permit type	Responsible Party
R-170	1283-09-081	One Stop # 6	5W32 - Septic Systems(Drain Field Disposal Mthd)	UIC Sewage	M & J OPERATIONS LLC
R-171	WVG551443	BRADLEY PSD - Walhonde Subdivision #1	Sewage General	Sewage	BRADLEY PSD
R-172	WVG551444	BRADLEY PSD - Walhonde Subdivision #2	Sewage General	Sewage	BRADLEY PSD
R-173	WVG551442	BRADLEY PSD - Home School Subdivision	Sewage General	Sewage	BRADLEY PSD
R-174	WVG610005	PETTUS PLANT	Storm Water Industrial (GP)	Industrial	B & M OIL CO
R-175	0375-01-081	Raleigh-Boone Technical Center (Raleigh Co. BOE)	5W32 - Septic Systems(Drain Field Disposal Mthd)	UIC Sewage	RALEIGH CNTY BD OF ED
R-176	WVG551445	BRADLEY PSD - Eunice Subdivision	Sewage General	Sewage	BRADLEY PSD
R-177	0894-05-081	Montcoal Complex	5X13 - Mining, Sand, or Other Backfill Wells	Mining Underground Injection Control	PERFORMANCE COAL COMPANY
R-178	WVG550055	MONTCOAL COMMUNITY/SUBD.	Sewage General	Sewage	PERFORMANCE COAL COMPANY
R-179	WVR104388	Sundial (Hatfield) Refuse	Storm Water Construction (GP)	Industrial	WVDEP OFFICE OF ABANDONED MINE LANDS & RECLAMATION
R-180	WVG551136	Marsh Fork Offices	Sewage General	Sewage	JARRELL, GARY W
R-181	WVG551464	Marsh Fork Elem School WWTP	Sewage General	Sewage	RALEIGH CNTY BD OF ED
R-182	WVR105427	MARSH FORK ELEM SCHOOL	Storm Water Construction (GP)	Industrial	RALEIGH COUNTY BD OF ED
R-183	WVR105636	WASTE SITE FOR NEW MARSH ELEMENTARY SCHOOL	Storm Water Construction (NOI)	Industrial	PERSINGER, ROGER & DEBRA

*Note there were 686 sites permitted through NPDES. The majority of these were septic seals (647) and were not given labels. Only those sites in and around the ZCC and the ZPC were labeled.

Table A-9: Permitted Marcellus Shale Gas wells in the ZCC.

Map Label	API	Responsible Party	Well Status	Farm Name	Well Number
R-184	081-01436	EXCO RESOURCES (WV), INC.	AC	WESTERN POCAHONTAS PROP.	DOROTHY 47NDS

APPENDIX B. EARLY WARNING MONITORING SYSTEM FORMS

Appendix B-Form B

Proposed Early Warning Monitoring System Worksheet- Surface Water Source

Describe the type of early warning detection equipment that could be installed, including the design.
N/A
Where would the equipment be located?
N/A
What would the maintenance plan for the monitoring equipment entail?
N/A
Describe the proposed sampling plan at the monitoring site.
N/A
Describe the proposed procedures for data management and analysis.
N/A

Note: Information was not provided to answer the questions in the preceding table. The following excerpt is from the Source Water Protection Contingency Plan from Potesta and Associates, Inc.

Early warning monitoring systems are used by SWPs to continuously monitor incoming source water. These systems allow WTP operators to anticipate changes to the treatment process required to react to storms, algal blooms, industrial discharge, chemical spills, reservoir stratification/de-stratification, construction activity, sewage spills and certain other natural or manmade occurrences. Boone Raleigh PSD does not have an early warning monitoring system. POTE STA obtained a price quote from HACH Company for an early warning monitoring system with various options. The quote is presented in **Appendix [D]**. In essence, installation of the early warning system represents a tradeoff between cost and capabilities. The more capabilities (e.g., the number of probes) a system contains, the higher the cost to implement the system. POTE STA reviewed the quote and identified the probe options for the recommended features. These recommended features are presented in the following table.

Line Item (per Quote in Appendix C)	Part Number	Feature Description	Price
1	580800	Back panel/trough/level (required): This item is a secure casing used to house the probes. WTP staff can go to the trough and check on all of the probes.	\$ 4,500

Line Item (per Quote in Appendix C)	Part Number	Feature Description	Price
2	LXV400.99.1A082	Module, probe (6 sensor), SC1000	\$ 1,344
4	LXV402.99.00002	Db Module, display w/o GSM, SC1000: These two line items consist of the sc1000 probe module that can accept six sensors, and the universal controller display module. An operator can just plug in the monitor and it is ready to use without special software configuration. These items include alarms and memory backup.	\$ 2,770
3	YAB018	Card, internal sc1000, 4mA inputs: This item includes additional analog communication capabilities for the controller.	\$ 908
5	9020000	ASSY, PROBE, LDO Model 2, HACH: Probe for dissolved oxygen.	\$ 1,804
6	DRD1R5-WDMP	Oxidation Reduction Potential (ORP) Sensor, Ryton, WDMP Mounting: Probe for ORP.	\$ 904
7	DPD1R1-WDMP	pH Sensor, Ryton, WDMP Mounting: Probe for pH.	\$ 840
8	LXV423.99.10000	SOLITAX t-line sc/immersion probe 0.001-4000 NTU; wiper; PVC: Probe for turbidity.	\$ 3,474
9	LXV418.99.50002	Db Ultraviolet Absorbance Sensor (UVAS) sc PROBE, 5 mm; Probe for UVAS.	\$ 17,305
14	WRTUPGSOLITAX	Instrument startup and two onsite calibrations per year.	\$ 941
Total Cost:			\$ 34,790
SAY:			\$ 35,000

Note: Costs presented above include installation by Hach Company. However, they would not include all installation costs, such as extension of conduit from raw water source to the laboratory, and “soft” costs required to specify and bid the equipment.

SWPs may purchase probes in stages as funds become available. The five probes listed in the table above can monitor a broad range of changes in source water. Sudden changes in dissolved oxygen can indicate toxic conditions that effect algal respiration or increased levels of bacteria using up the oxygen. An ORP sensor may indicate sudden changes for oxidative or reducing species introduced into the water. The acid/base relationships within source water can be monitored by a pH sensor. Turbidity is a measure of suspended solids, which may indicate spills of solids, chemical compounds or increased bacterial levels. An UVAS probe is used to watch for sudden changes in organic load that would require alternative treatment procedures. As Boone Raleigh PSD increases their early warning monitoring capabilities, an additional probe to monitor oil in water could be purchased through HACH for approximately \$17,500.

APPENDIX C. COMMUNICATION PLAN TEMPLATE

Communication Plan

Boone Raleigh Public Service District

PWSID 3300315

Boone County

June 2016

ACKNOWLEDGMENTS:

This plan was developed to meet certain requirements of the Source Water and Assessment Protection Program (SWAPP) for the State of West Virginia, as directed by state laws and regulations.

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INTRODUCTION

Legislative Rule 64CSR3 requires public water systems to develop a Communication Plan that documents how public water suppliers, working in concert with state and local emergency response agencies, shall notify state and local health agencies and the public in the event of a spill or contamination event that poses a potential threat to public health and safety. The plan must indicate how the public water supplier will provide updated information, with an initial notification to the public to occur no later than thirty minutes after the supplier becomes aware that the spill, release or potential contamination of the public water system poses a potential threat to public health and safety.

The public water system has responsibility to communicate to the public, as well as to state and local health agencies. This plan is intended to comply with the requirements of Legislative Rule 64CSR3, and other state and federal regulations.

TIERS REPORTING SYSTEM

This water system has elected to use the *Tiered Incident / Event Reporting System* (TIERS) for communicating with the public, agencies, the media, and other entities in the event of a spill or other incident that may threaten water quality. TIERS provides a multi-level notification framework, which escalates the communicated threat level commensurate with the drinking water system risks associated with a particular contamination incident or event. TIERS also includes a procedural flow chart illustrating key incident response communication functions and how they interface with overall event response / incident management actions. Finally, TIERS identifies the roles and responsibilities for key people involved in risk response, public notification, news media and other communication.

TIERS provides an easy-to-remember five-tiered **A-B-C-D-E** risk-based incident response communication format, as described below. Table 1 provides also associated risk levels.

A = Announcement. The water system is issuing an announcement to the public and public agencies about an incident or event that may pose a threat to water quality. Additional information will be provided as it becomes available. As always, if water system customers notice anything unusual about their water, they should contact the water system

B = Boil Water Advisory. A boil water advisory has been issued by the water system. Customers may use the water for showering, bathing, and other non-potable uses, but should boil water used for drinking or cooking.

C = Cannot Drink. The water system asks that users not drink or cook with the water at this time. Non-potable uses, such as showering, bathing, cleaning, and outdoor uses are not affected.

D = Do Not Use. An incident or event has occurred affecting nearly all uses of the water. Do not use the water for drinking, cooking, showering, bathing, cleaning, or other tasks where water can come in contact with your skin. Water can be used for flushing commodes and fire protection.

E = Emergency. Water cannot be used for any reason.

Tier	Tier Category	Risk Level	Tier Summary
A	Announcement	Low	The water system is issuing an announcement to the public and public agencies about an incident or event that could pose a threat to public health and safety. Additional information will be provided as it becomes available.
B	Boil Water Advisory	Moderate	Water system users are advised to boil any water to be used for drinking or cooking, due to possible microbial contamination. The system operator will notify users when the boil water advisory is lifted.
C	Cannot Drink	High	System users should not drink or cook with the water until further notice. The water can still be used for showering, bathing, cleaning, and other tasks.

D	Do Not Use	Very High	The water should only be used for flushing commodes and fire protection until further notice. More information on this notice will be provided as soon as it is available.
E	Emergency	Extremely High	The water should not be used for any purpose until further notice. More information on this notice will be provided as soon as it is available.

COMMUNICATION TEAM

The Communication Team for the water system is listed in the table below, along with key roles. In the event of a spill or other incident that may affect water quality, the water system spokesperson will provide initial information, until the team assembles (if necessary) to provide follow-up communication.

Water system communication team members, organizations, and roles.

Team Member Name	Organization	Phone	Email	Role
Inza Hapney	Boone Raleigh PSD	██████████	Inza1958@yahoo.com	Primary Spokesperson
Robert Wiseman	Boone Raleigh PSD	██████████	-	Secondary Spokesperson
JD Douglas	WVDHHR St. Albans District	304-722-0611	J.D.Douglas@wv.gov	Member
David Hodge	Whitesville VFD	██████████	-	Member

In the event of a spill, release, or other incident that may threaten water quality, members of the team who are available will coordinate with the management staff of the local water supplier to:

- Collect information needed to investigate, analyze, and characterize the incident/event
- Provide information to the management staff, so they can decide how to respond
- Assist the management staff in handling event response and communication duties
- Coordinate fully and seamlessly with the management staff to ensure response effectiveness

COMMUNICATION TEAM DUTIES

The communication team will be responsible for working cooperatively with the management staff and state and local emergency response agencies to notify local health agencies and the public of the initial spill or contamination event. The team will also provide updated information related to any contamination or impairment of the source water supply or the system's drinking water supply.

According to Legislative Rule 64CSR3, the initial notification to the public will occur no later than thirty minutes after the public water system becomes aware that the spill, release or potential contamination of the public water system poses a potential threat to public health and safety.

As part of the group implementing the Source Water Protection Plan, team members are expected to be familiar with the plan, including incident/event response and communication tasks. Specifically, team members should:

- Be knowledgeable on elements of the Source Water Protection Plan and Communication Plan
- Attend team meetings to ensure up-to-date knowledge of the system and its functions
- Participate in periodic exercises that “game out” incident response and communication tasks
- Help to educate local officials, the media, and others on source water protection
- Cooperate with water supplier efforts to coordinate incident response communication
- Be prepared to respond to requests for field investigations of reported incidents
- Not speak on behalf of the water supplier unless designated as the system’s spokesperson

The primary spokesperson will be responsible for speaking on behalf of the water system to local agencies, the public, and the news media. The spokesperson should work with the management staff and the team to ensure that all communication is clear, accurate, timely, and consistent. The spokesperson may authorize and/or direct others to issue news releases or other information that has been approved by the system's management staff. The spokesperson is expected to be on call immediately when an incident or event which may threaten water quality occurs. The spokesperson will perform the following tasks in the event of a spill, release, or other event that threatens water quality:

- Announce which risk level (A, B, C, D, or E) will apply to the public notifications that are issued (see example press releases)
- Issue news releases, updates, and other information regarding the incident/event
- Use the news media, email, social media, and other appropriate information venues
- Ensure that news releases are sent to local health agencies and the public
- Respond to questions from the news media and others regarding the incident/event
- Appear at news conferences and interviews to explain incident response, etc.

INCIDENT / EVENT COMMUNICATION PROCEDURE

The flow chart in this section illustrates how the water system will respond when it receives a report that a spill, release, or other contamination event may have occurred. Key elements of the flow chart are described below.

Communication with agencies, the public, and the media during threat incidents

Upon initial notification of the incident/event, system managers and staff will collect information and verify the need for further investigation. Only properly trained personnel will perform onsite investigations if permitted by emergency responders. If further investigation is warranted, and the initial facts support it, the water system spokesperson will issue a public communication statement consistent with the threat level. In addition, water system personnel and partners will be dispatched to conduct reconnaissance, a threat assessment, and a threat characterization, if present. This work may include:

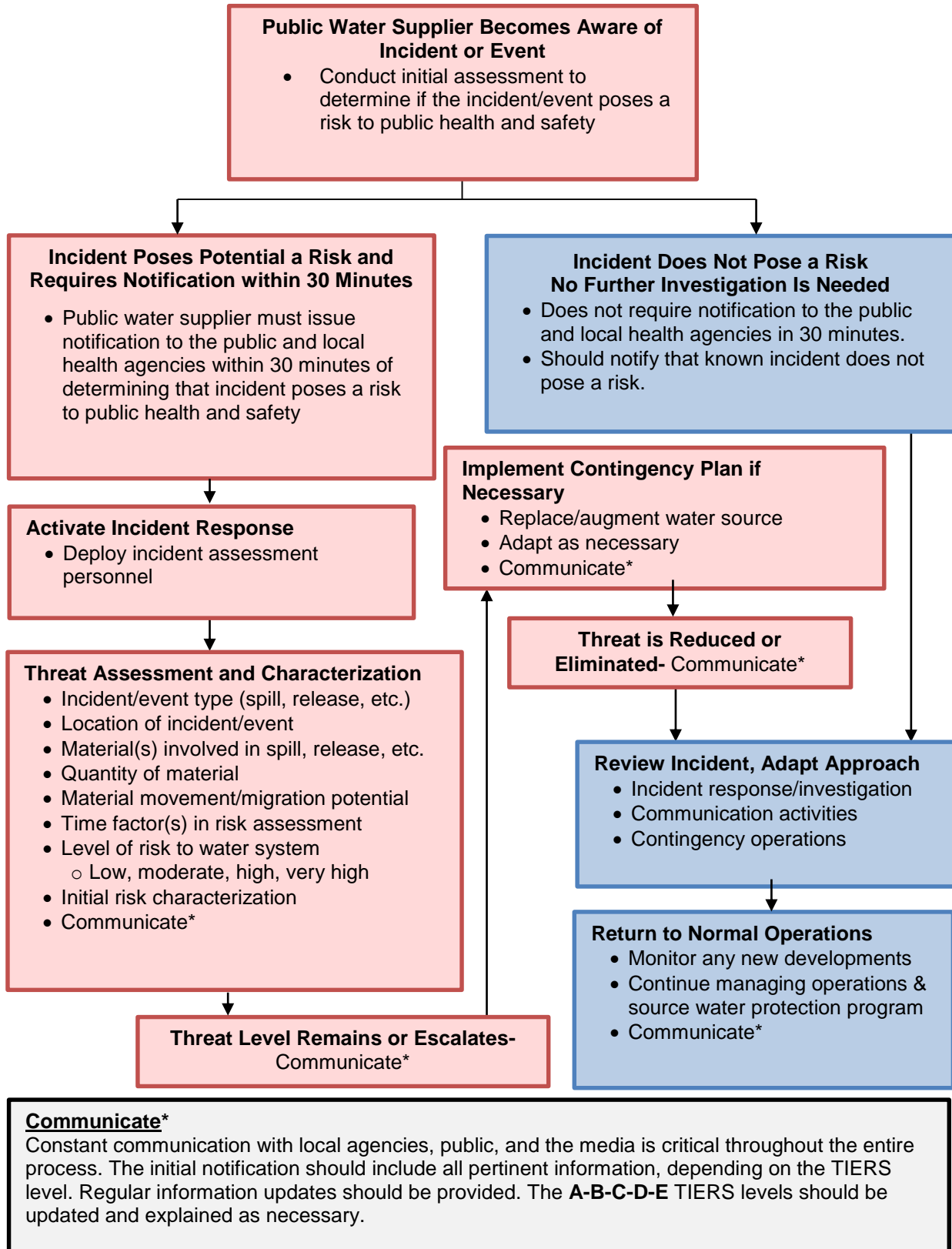
- Verification of the incident/event type (spill, release, etc.)
- Location of incident/event
- Type of material(s) involved in spill, release, etc.
- Quantity of material involved
- Potential of the material to move, migrate, or be transported
- Relevant time factor(s) in the risk assessment (e.g., downstream movement rate)
- Overall level of risk to water system, whether low, moderate, high, or very high
- Development of the initial risk characterization

As the flow chart indicates, several iterative cycles will occur after the initial threat assessment, including communication with local agencies and the public, further investigation of the incident, possible implementation of the water system's contingency plan, and eventual elimination of the threat and a return to normal operations. Communication activities during this period will include:

- The initial release (i.e., **Announcement, Boil Water Advisory, Cannot Drink, Do Not Use, or Emergency**, see attached example press releases)
 - Sent to local health agencies, the public, and the news media within 30 minutes
- Notification of the local water system's source water protection and communication teams
 - If warranted by initial findings regarding the spill, release, or incident
- Notification of the WV Bureau of Public Health
 - As required
- Periodic information updates, as incident response information is received
- Updates to the applicable A-B-C-D-E advisory tier, as necessary

If time permits and the need arises, after the threat level is reduced, the water system staff, the communication and source water protection teams, and their partners may conduct a post-event review and assessment. The purpose of the review is to examine the response to the incident, relevant communication activities, and overall outcomes. Plans and procedures may be updated, altered, or adapted based on lessons learned through this process.

TIERS FLOW CHART



EMERGENCY SHORT FORMS

Emergency Communication Information

	Name	Phone Number	Email	
Designated spokesperson:	Inza Hapney	██████████	Inza1958@yahoo.com	
Alternate spokesperson:	Robert Wiseman	██████████	-	
Designated location to disseminate information to media:	Sylvester Town Hall			
Methods of contacting affected residents:	Contact is made by word of mouth, posted notices, notices on television and radio, message on Facebook and use of a phone tree system where once customers are notified they pass the information to additional people.			
Media contacts:	Name	Title	Phone Number	Email
	WCHS	Television	304-346-5358	-
	WQBE	Radio	304-344-9700	-

Emergency Services Contacts

	Name	Emergency Phone	Alternate Phone	Email
Local Police	John Gross	██████████	911	-
Local Fire Department	Whitesville FD	304-854-1197	911	-
Local Ambulance Service	Whitesville FD	304-854-1197	911	-
Hazardous Material Response Service	Whitesville FD	304-854-1197	911	-

Key Personnel

	Name	Title	Phone	Email
Key staff responsible for coordinating emergency response procedures?	Ted Carter	Chief Operator	██████████	-
	Inza Hapney	Office Manager	██████████	Inza1958@yahoo.com
Staff responsible for keeping confidential PSSC information and releasing to emergency responders:	Ted Carter	Chief Operator	██████████	-
	Inza Hapney	Office Manager	██████████	Inza1958@yahoo.com

Sensitive Populations

Other communities that are served by the utility:	NA			
Major user/sensitive population notification:	Name	Emergency Phone	Alternate Phone	
	Schools and restaurants	-	-	
EED District Office Contact:	Name	Phone	Email	
	JD Douglas	304-722-0611	J.D.Douglas@wv.gov	
OEHS Readiness Coordinator	Warren Von Dollen	304-356-4290 (main) 304-550-5607 (cell)	warren.r.vondollen@wv.gov	
Downstream Water Contacts:	Water System Name	Contact Name	Emergency Phone	Alternate Phone
	Lincoln PSD	Tammy Flowers	██████████	
Are you planning on implementing the TIER system?	Yes			

Emergency Response Information

	Name	Phone
List laboratories available to perform sample analysis in case of emergency:	REI Consultants	(304) 255-2500
	WV Office of Lab Services	(304) 558-3530
Has the utility developed a detailed Emergency Response Plan in accordance with the Public Health Security Bioterrorism Preparedness and Response Pan Act of 2002?	Yes	
When was the Emergency Response Plan developed or last updated?	2016	

PRESS RELEASE ATTACHMENTS

TIERS Levels A, B, C, D, and E

**UTILITY ISSUED NOTICE – LEVEL A
PUBLIC WATER SYSTEM ANNOUNCEMENT
A WATER SYSTEM INVESTIGATION IS UNDERWAY**

On _____ at ____:____ AM/PM, the _____ Water System began investigating an incident that may affect local water quality.

The incident involves the following situation at this location:

There are no restrictions on water use at this time. As always, if water system customers notice anything unusual about their water – such as abnormal odors, colors, sheen, etc. – they should contact the water system at _____.

At this time there is no need for concern if you have consumed or used the water.

Regular updates will be provided about this Announcement as water system staff continue their investigation. Again, there are no restrictions on water use at this time.

State Water System ID# _____ Date Distributed: _____

UTILITY ISSUED NOTICE – LEVEL B

BOIL WATER ADVISORY

A BOIL WATER ADVISORY IS IN EFFECT

On _____ at ____:____ am/pm, a water problem occurred causing contamination of your water. The areas that are affected are as follows:

Entire Water System or Other: _____

CONDITIONS INDICATE THERE IS A HIGH PROBABILITY THAT YOUR WATER IS CONTAMINATED. TESTING HAS NOT OCCURRED TO CONFIRM OR DENY THE PRESENCE OF CONTAMINATION IN YOUR WATER.

What should I do?

- **DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST.** Bring all water to a boil, let it boil for one minute, and let it cool before using, or use bottled water. Boiled or bottled water should be used for drinking, making ice, brushing teeth, washing dishes, bathing, and food preparation **until further notice.** Boiling kills bacteria and other organisms in the water.

What happened?

- **The problem is related to** _____

What is being done?

- **The water system is taking the following action:** _____

What should a customer do if they have consumed or used the water?

- _____

We will inform you when you no longer need to boil your water. We anticipate resolving the problem within _____ hours/days. For more information, please contact _____ at _____ or _____ at _____.

General guidelines on ways to lessen the health risk are available from the EPA Safe Drinking Water Hotline at 1 (800) 426-4791.

Please share this information others who use this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice was distributed by _____

State Water System ID# _____ Date Distributed: _____

UTILITY ISSUED NOTICE – LEVEL C
“CANNOT DRINK” WATER NOTIFICATION
A LEVEL C WATER ADVISORY IS IN EFFECT

On _____ at ____:____ am/pm, a water problem occurred causing contamination of your water. The areas that are affected are as follows:

Entire Water System or Other: _____

CONDITIONS INDICATE THERE IS A HIGH PROBABILITY THAT YOUR WATER IS CONTAMINATED. TESTING HAS NOT OCCURRED TO CONFIRM OR DENY THE PRESENCE OF CONTAMINATION IN YOUR WATER.

What should I do?

- **DO NOT DRINK THE WATER.** You can't drink the water, but you can use it for showering, bathing, toilet-flushing, and other non-potable purposes.
- **BOILING WILL NOT PURIFY THE WATER.** Do not drink the water, even if it is boiled. The type of contamination suspected is not removed by boiling.

What happened?

- The problem is related to _____

What is being done?

- The water system is taking the following action: _____

What should a customer do if they have consumed or used the water?

- _____

We will inform you when the water is safe to drink. We anticipate resolving the problem within _____ hours/days. For more information – or to report unusual water conditions such as abnormal odors, colors, sheen, etc. – please contact _____ at _____ or _____ at _____.

Please share this information others who use this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice was distributed by _____

State Water System ID# _____ Date Distributed: _____

UTILITY ISSUED NOTICE – LEVEL D
“DO NOT USE” WATER NOTIFICATION
A LEVEL D WATER ADVISORY IS IN EFFECT

On _____ at ____:____ am/pm, a water problem occurred causing contamination of your water. The areas that are affected are as follows:

Entire Water System or Other: _____

CONDITIONS INDICATE THERE IS A HIGH PROBABILITY THAT YOUR WATER IS CONTAMINATED. TESTING HAS NOT OCCURRED TO CONFIRM OR DENY THE PRESENCE OF CONTAMINATION IN YOUR WATER.

What should I do?

- **DO NOT DRINK THE WATER.** The water is contaminated.
- **DO NOT SHOWER OR BATHE IN THE WATER.** You can't use the water for drinking, showering, or bathing. It can be used for toilet flushing and firefighting.
- **BOILING WILL NOT PURIFY THE WATER.** Do not use the water, even if it is boiled. The type of contamination suspected is not removed by boiling.

What happened?

- The problem is related to _____

What is being done?

- The water system is taking the following action: _____

What should a customer do if they have consumed or used the water?

- _____

We will inform you when the water is safe to drink. We anticipate resolving the problem within _____ hours/days. For more information – or to report unusual water conditions such as abnormal odors, colors, sheen, etc. – please contact _____ at _____ or _____ at _____.

Please share this information others who use this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice was distributed by _____

State Water System ID# _____ Date Distributed: _____

UTILITY ISSUED NOTICE – LEVEL E
EMERGENCY WATER NOTIFICATION
A LEVEL E WATER ADVISORY IS IN EFFECT

On _____ at ____:____ am/pm, a water problem occurred causing contamination of your water. The areas that are affected are as follows:

Entire Water System or Other: _____

CONDITIONS INDICATE THERE IS A HIGH PROBABILITY THAT YOUR WATER IS CONTAMINATED. TESTING HAS NOT OCCURRED TO CONFIRM OR DENY THE PRESENCE OF CONTAMINATION IN YOUR WATER.

What should I do?

- **DO NOT DRINK THE WATER.** The water is contaminated.
- **DO NOT USE THE WATER FOR ANY PURPOSE!** You can't use the water for drinking, showering, or bathing, or any other use – not even for toilet flushing.
- **BOILING WILL NOT PURIFY THE WATER.** Do not use the water, even if it is boiled. The type of contamination suspected is not removed by boiling.

What happened?

- The problem is related to _____

What is being done?

- The water system is taking the following action: _____

What should a customer do if they have consumed or used the water?

- _____

We will inform you when the water is safe to drink. We anticipate resolving the problem within _____ hours/days. For more information – or to report unusual water conditions such as abnormal odors, colors, sheen, etc. – please contact _____ at _____ or _____ at _____.

Please share this information others who use this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice was distributed by _____

State Water System ID# _____ Date Distributed: _____

EMERGENCY CONTACT INFORMATION

State Emergency Spill Notification

1-800-642-3074

Office of Emergency Services

<http://www.wvdhsem.gov/>
Charleston, WV- (304) 558-5380

WV Bureau for Public Health Office of Environmental Health Services (OEHS)

www.wvdhhr.org/oehs

Readiness Coordinator- Warren Von Dollen

Phone; 304-356-4290

Cell; 304-550-5607

E-mail; warren.r.vondollen@wv.gov

Environmental Engineering Division Staff
Charleston, Central Office (304) 558-2981
Beckley, District 1 (304) 256-6666
St. Albans, District 2 (304) 722-0611
Kearneysville, District 4 (304) 725-9453
Wheeling, District 5 (304) 238-1145
Fairmont, District 6 (304) 368-2530

National Response Center - Chemical, Oil, & Chemical/Biological Terrorism

1-800-424-8802

WV State Fire Marshal's Office

1-800-233-3473

West Virginia State Police

1-304-746-2100

WV Watch – Report Suspicious Activity

1-866-989-2824

DEP Distance Calculator

<http://tagis.dep.wv.gov/pswcheck/>

APPENDIX D. SINGLE SOURCE FEASIBILITY STUDY

ENGINEERING STUDY FOR CONTINGENCY PLANNING

*Boone Raleigh Public Service District
PWSID No. WV3300315*

Prepared for:

Boone Raleigh Public Service District
PO Box 245
Sylvester, West Virginia 25193

Prepared by:

Potesta & Associates, Inc.
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Project No. 0101-15-0023-010

August 28, 2015



(This document contains 22 pages, plus appendices.)

POTESTA

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LIST OF ACRONYMS

4-methylcyclohexanemethanol	MCHM
Bureau for Public Health	BPH
Code of State Rule	CSR
Federal Emergency Management Agency	FEMA
Monthly Operational Reports.....	MOR
Oxidation Reduction Potential.....	ORP
Potesta & Associates, Inc.....	POTESTA
Public Service District	PSD
Regional Intergovernmental Council.....	RIC
Safe Drinking Water Act	SDWA
Source Water Assessment and Protection.....	SWAP
Source Water Protection Plan.....	SWPP
Source Water Provider	SWP
State Historic Preservation Office	SHPO
Ultraviolet Absorbance Sensor	UVAS
United States Army Corp of Engineers	USACE
United States Fish and Wildlife Service.....	USFWS
United States Geologic Survey	USGS
Water Treatment Plant	WTP
West Virginia American Water	WVAW
West Virginia Department of Environmental Protection.....	WVDEP
West Virginia Department of Health and Human Resources	WVDHHR
West Virginia Division of Highways.....	WVDOH
West Virginia Geologic and Economic Survey	WVGES
West Virginia Infrastructure & Jobs Development Council.....	IJDC
West Virginia Public Lands Corporation.....	PLC
West Virginia Public Service Commission.....	PSC

ENGINEERING STUDY FOR CONTINGENCY PLANNING

Boone Raleigh Public Service District PWSID No. WV3300315

1.0 INTRODUCTION

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. 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 SDWA required states to develop and implement a Source Water Assessment and Protection (SWAP) program designed to evaluate the vulnerability of public drinking water systems to possible sources of contamination, and encourages states to work with these systems in developing protection and management plans. In 1999, the West Virginia Department of Health and Human Resources (WVDHHR) published the West Virginia Source Water Assessment and Protection Program, which was endorsed by the United States Environmental Protection Agency. Although Boone Raleigh Public Service District (Boone Raleigh PSD) treats its 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. The purpose of a Source Water Protection Plan (SWPP) is to describe what the source water provider (SWP) has done, is currently doing, and plans to do to protect its source of drinking water. Boone Raleigh PSD completed an SWPP on March 23, 2011.

On January 9, 2014, approximately 7,500 gallons of 4-methylcyclohexanemethanol (MCHM) leaked out of an aboveground storage tank, owned by Freedom Industries, Inc., which was situated on the east bank of the Elk River. The liquid MCHM entered the Elk River approximately 1.5 miles upstream of West Virginia American Water's (WVAW) source water intake for over 300,000 people in the Charleston, West Virginia area. The potable water supply was adversely impacted. In response to the Freedom Industries, Inc. leak, Senate Bill 373 (containing the Public Water Supply Protection Act §22-31) was approved by the 2014 Legislature and signed into law by Governor Earl Ray Tomblin on April 1, 2014. The law officially took effect on June 6, 2014. The Bureau for Public Health (BPH) submitted rule revisions for Legislative Rule 64 Code of State Rule (CSR) 3 Public Water Systems to the Secretary of State's office with respect to source water protection planning enacted in Senate Bill 373. The Public Water Supply Protection Act and Legislative Rule 64CSR3 requires SWPs, such as Boone Raleigh PSD, to update their SWPP. This update requires an engineering study which details a technical and economic examination of alternative source water options in the event the provider's source water is contaminated (i.e., single source analysis) in addition to other water system information.

The West Virginia Legislature appointed monies to the BPH, a division of WVDHHR, to financially assist SWPs with updates required in Senate Bill 373. The BPH in turn transferred a portion of the monies to the various regional planning and development councils, including the Regional Intergovernmental Council (RIC) in South Charleston, West Virginia, to procure and manage engineering firms providing engineering services associated with updating SWPPs. Potesta & Associates, Inc. (POTESTA) was selected by RIC to prepare this Engineering Study for Contingency Planning for the Updated Source Water Assessment and Protection Plan Report. This will assist Boone Raleigh PSD with the required engineering portions of the SWPP update. The SWPP update is due to the Commissioner of the BPH on or before July 1, 2016 as stated in §64-3 (14.3, 14.6.b-g).

2.0 GENERAL METHODOLOGY

The object of the report was to evaluate and determine alternative source water options to supply Boone Raleigh PSD in the event of spill or contamination of the primary source water supply. Additionally, the report examines other water system information required by the updated SWPP report due to the Commissioner of the BPH by July 1, 2016. Included in the effort was:

1. Met with Boone Raleigh PSD staff in order to garner knowledge of Boone Raleigh PSD's water supply system.
2. Reviewed water utility annual reports; BPH sanitary surveys; monthly operational reports (MORs); "West Virginia Department of Environmental Protection (WVDEP) GIS Resources for 7Q10 Flow Estimates, May 18, 2015"; West Virginia Geologic & Economic Survey's online coal mapping tool; "West Virginia Mine Pool Atlas," submitted by West Virginia Geologic and Economic Survey (WVGES), May 2012; and "Aquifer-Characteristics Data for West Virginia," U.S. Geologic Survey (USGS) Water-Resources Report 01-4036, 2001.
3. Reviewed Appendix E-Feasibility Study Guidance Document and the associated Feasibility Matrix provided by WVDHHR.
4. Completed identification and feasibility matrix evaluation of alternative source water options.
5. Performed a more detailed study of highest scoring alternative source water option(s) identified by the feasibility matrix, including preparing more detailed rationalization of certain alternative source water options and their estimates of cost.
6. Compiled and/or summarized other Boone Raleigh PSD water system information:
 - a. SWP's ability to isolate or divert contaminated waters from its water supply, and identification of the amount of raw water storage capacity.

- b. SWP's ability to switch to an alternative water source or surface water intake in the event of contamination.
 - c. SWP's capability to close its water supply in the event the primary water source is contaminated and identification of the duration of time it can keep the water supply closed without creating a public health emergency.
 - d. SWP's examination of existing available storage capacity and how its existing available storage capacity compares to Boone Raleigh PSD's normal daily usage including total treated water storage, raw water storage and the number of hours of supply capacity.
 - e. An examination of technical and economic feasibility of implementing an early warning monitoring system.
 - f. An analysis of Boone Raleigh PSD's ability to operate effectively during power outages including means to supply water through treatment, storage and distribution without creating a public emergency. This step included reviewing the BPH's Emergency Generator Data table that was provided to POTESTA.
 - g. An estimation of the calculated level of unaccounted for water, and if the calculated water is greater than 15 percent, identification of measures the SWP is actively taking to reduce the level of water loss.
 - h. Boone Raleigh PSD's ability to meet future water supply needs by expanding a current source or developing a new one, including a description of current plan and pumping capacity and projections for growth over the next five years that would exceed the current system capacity.
7. Contacted Raleigh County Public Service District to obtain information on their system.
 8. Prepared this report in draft format and forwarded it to Boone Raleigh PSD for review and comment.
 9. Met with Boone Raleigh PSD as a follow-up to the draft submittal of the report to receive comments on the draft report.
 10. Revised and finalized this report after receiving comments from Boone Raleigh PSD.
 11. Presented this report at a September 2015 meeting.

3.0 BOONE RALEIGH PSD SYSTEM SUMMARY

Boone Raleigh PSD operates a community public water system which can be summarized as follows:

Boone Raleigh PSD System Characteristics	Values
Raw Water Intake on the Big Coal River Adjacent to the WTP	N/A
Customers	653
Treatment Capacity	432,000 GPD (300 GPM)
Average Daily Production (MOR 2014)	236,172 GPD (164 GPM)
Maximum Daily Production (MOR 2014)	390,300 GPD (271 GPM)
Raw Water Storage Capacity	0 Gallons*
Treated Water Storage Capacity	313,100 Gallons

* Ignoring small storage available in raw water pump station(s) or presedimentation tank(s).

Among the challenges facing the Boone Raleigh PSD are the age of the WTP which was constructed in 1936 and the location of the WTP in the floodplain. Boone Raleigh PSD has selected a site for a new WTP located approximately 1.5 miles downstream on the Big Coal River from the current site.

4.0 SINGLE SOURCE ANALYSIS

Boone Raleigh PSD is supplied by a single source. Therefore, POTESTA performed an evaluation to determine technically and economically feasible option(s) for Boone Raleigh PSD. The evaluation process included using the feasibility matrix provided by the WVDHHR. The feasibility matrix allowed POTESTA to evaluate several options at a "high level" using multiple criteria identified by WVDHHR. The options included:

1. Construct or establish a secondary or backup surface water intake (herein called Option A1) or wells (Option A2) which would draw water from a substantially different location or water source.
2. Construct additional raw water storage capacity (Option B1) or treated water storage capacity (Option B2) to provide at least two days of additional system storage based on the plant's maximum level of production experienced within the last year and following Public Water Systems Design Standards §64-77-9.1.a, §64-77-9.4.

3. Create or construct operational interconnection(s) with another SWP to allow the SWP to receive its water from a different source of supply or supply (herein called Option C).
4. Create or construct other alternative(s) (referred to as Option D) available to the SWP to secure safe and reliable alternative supplies during a period its primary source of supply is unavailable or negatively impacted for an extended period.

If Boone Raleigh PSD already had multiple sources, then Boone Raleigh PSD was also required to evaluate the SWP's ability to meet the utility's demands independently for 30, 60, 90 or more days. However, Boone Raleigh PSD obtains its water from a single source and, therefore, POTESTA did not complete this evaluation.

If one or more of the options were determined to be technologically or economically feasible, POTESTA then performed a detailed study analysis on the comparative costs, risks and benefits of implementing alternative source water options as described in Section 4.3.

4.1 Descriptions of Alternative Source Water Options

The following summarizes the evaluated alternative source water options in more detail:

4.1.1 Backup Intake (Option A1)

POTESTA considered various streams in the Boone Raleigh PSD WTP area to assess whether they were a feasible alternative source water option for a backup intake. Clear Fork was identified as a potential stream for a backup intake due to its obvious size and associated higher flow and its proximity to the WTP. POTESTA reviewed the 7Q10 (lowest average discharge over a period of one week with a recurrence interval of 10 years) and found that the Clear Fork 7Q10 of 0.89 cubic feet per second (575,222 gallons per day) is greater than Boone Raleigh PSD's maximum plant flow rate in 2014 of 390,300 gallons per day.

Clear Fork is a large tributary of the Big Coal River. The confluence of the Big Coal River and Clear Fork is just upstream of the WTP. If contamination occurs on the Big Coal River, there is a good probability the contamination originated on Clear Fork. While the flow on Clear Fork could supply Boone Raleigh PSD with the required water quantity, Clear Fork may not be separate enough from the Big Coal River. Additionally, a new WTP could be built in the future, approximately 1.5 miles downstream on the Big Coal River, thereby, making a Clear Fork intake obsolete. Based on these factors, utilization of a backup intake was deemed not desirable and hence not feasible, and therefore, Option A1 was scored "zero" when entered into the feasibility matrix.

4.1.2 Wells (Option A2)

In order to evaluate the technical and economic feasibility of a ground water well field as an alternative source water option for Boone Raleigh PSD, POTESTA referred to "*The Aquifer-Characteristics Data for West Virginia, Water-Resources Investigations Report*

01-4036, which was prepared to assist BPH delineate well-head (source water) protection areas for public-supply wells and well fields in West Virginia in 2001. Report 01-4036's Appendix details specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia. POTEITA used specific well data from Report 01-4036's Appendix to estimate well yields within close proximity to Boone Raleigh's water treatment plant (see table below).

Site Identification Number	Longitude	Latitude	County	Hydrogeologic Unit (Aquifer)	Well Depth (ft)	Discharge (gpm)	Draw Down (ft)	Specific Capacity (gpm/ft)	Transmissivity (ft ² /d)
375943081304601	37°59'43"	81°30'46"	Boone	Kanawha Formation	94	30	2.28	2.34	510
375739081311101	37°57'39"	81°31'11"	Raleigh	Kanawha Formation	151	30	3.55	8.45	2,300
375745081302201	37°57'45"	81°30'22"	Raleigh	Kanawha Formation	150	30	5.5	5.45	1,500

The three well values indicate a typical discharge of 30 gallons per minute per well. We have used this value to estimate what a typical well yield would be near Boone Raleigh PSD. Boone Raleigh PSD's maximum production day in 2014 was 271 GPM. This would indicate a need for approximately nine wells in order to supply Boone Raleigh with 271 GPM. Such a well field would have a high capital cost, along with being complex to operate given the limited automatic controls of the WTP, would almost certainly locate wells in existing commercial/residential areas, and would require ongoing costs to maintain adequate well yields. In addition, the chemistry of ground water commonly varies significantly from nearby surface water possibly resulting in undesirable conditions (taste, color, odor, etc.) unless additional treatment was added. Based on these factors, utilization of wells (i.e., a well field) was deemed not desirable and hence not feasible. Since POTESTA arrived at this conclusion when evaluating wells for all engineering studies for the RIC SWP's, Option A2 was not entered into the project feasibility matrix for any SWP.

4.1.3 Raw Water Storage (Option B1)

Boone Raleigh PSD does not currently have any significant raw water storage capacity. Two days supply of water storage estimated from the WTP's maximum level of production in one day (2014) is approximately 780,600 gallons. Boone Raleigh PSD's current treated water storage capacity is 313,100 gallons (see Section 4.1.4). Therefore, Boone Raleigh PSD needs an additional 467,500 gallons of water storage to have two days system storage at the WTP's maximum production level in 2014. POTESTA considered increasing raw water storage capacity by adding a raw water reservoir and adding raw water storage tanks. A raw water reservoir was not considered due to the steep surrounding hillsides, "urban" setting of the WTP, ongoing maintenance of a reservoir if located in a floodplain, and the uncertainty surrounding the WTP location in the future. Accordingly, raw water tankage was selected as an input for the feasibility matrix. The "rule of thumb" cost for a 500,000-gallon raw water tank (rounded up from 467,500 gallons) was input into the feasibility matrix and includes costs for the tank and roof (further study might eliminate the need for such a roof), foundation work, mobilization, property demolition, electrical, and other factors. This storage tank would be located within close proximity to the WTP. Due to limited space near the WTP, it is believed that land acquisition including demolition of existing structures would be necessary.

The preliminary opinion of total estimated project (i.e., capital) cost for this option is presented in **Appendix B**.

4.1.4 Treated Water Storage (Option B2)

Boone Raleigh PSD Treated Water Storage Tanks	Gallons
Seng Creek Tank	51,600
Sylvester Tank	111,500
Whitesville Tank	150,000
<i>Total Treated Water Storage:</i>	<i>313,100</i>

Senate Bill 373 sets forth that the submitted plan shall include an examination and analysis of the technical and economic feasibility of constructing additional raw water storage capacity and/or treated water storage capacity, to provide at least two days of system storage based on the plant's maximum level of production experienced within the past year as an alternative source water option. Boone Raleigh PSD is deficient 467,500 gallons of treated water based on two days of maximum production in 2014, as noted in Section 4.1.3.

POTESTA evaluated additional raw water tankage rather than water tanks storing treated water because adding 467,500 gallons of treated water tankage as set forth in Senate Bill 373. One reason for this is that such a large increase in additional storage may not allow adequate turnover of the treated water as set forth in §64-77-9.4. A lack of adequate turnover can create water quality issues with treated water in the distribution system. Similarly, Appendix E-Feasibility Study Guidance Documents provided by WVDHHR notes that studies examining the alternative of additional raw and/or treated water must comply with existing design standards regulating treated water storage, including minimum storage capacity and adequate turn-over requirements (§64-77-9.1.a, §64-77-9.4). More importantly, POTESTA believes that relying solely on treated water storage is not prudent as much of the storage may not be available when required. The storage may not be available at certain times of the day due to diurnal demand patterns, and due to the fact that water main failures, leaks, etc. can rapidly deplete water storage volumes.

Based on this design standards constraint, adding 467,500 gallons of treated water was deemed not feasible and, therefore, Option B2 was scored "zero" when entered into the feasibility matrix.

4.1.5 Interconnection with WVAW (Option C1)

WVAW has a water supply distribution to the north of Boone Raleigh PSD. Their lines end approximately 3000 feet from the Boone Raleigh PSD system. Creating an interconnection with WVAW was entered into the feasibility matrix due to WVAW's existing water line along State Route 3's close proximity to Boone Raleigh PSD's existing water system. POTESTA used Boone Raleigh PSD's maximum production day in 2014 of 390,300 GPD (271 GPM) to perform a preliminary hydraulic calculation which indicated an 8-inch water line from WVAW's system is required to sustain the daily flow. POTESTA then reviewed mapping of WVAW's existing system to identify the line sizes from their Seth Water Storage Tank to the end of the WVAW system. POTESTA identified approximately 17,800 feet of existing 6-inch water line that would need to be replaced (upgraded) with 8-inch water line in order to meet the flow demand of Boone Raleigh PSD's system and have less of a pressure fluctuation impact on WVAW's existing customers during the emergency pumping to Boone Raleigh PSD system. After the upgrade, the interconnection would consist of approximately 3,000 feet of 8-inch water line to connect WVAW's system to Boone Raleigh PSD's system. POTESTA considered the water line components along with a meter vault, a bypass (with a pressure reducing valve) installed at Boone Raleigh PSD's Elk Run booster station, and an emergency concrete pumping pad to allow for the use of a portable pump capable of pumping water from WVAW's system to Boone Raleigh PSD's system. A portable pump is necessary because Boone Raleigh PSD is on a higher pressure gradient (based on the elevation of Boone Raleigh's Sylvester tank, which would be near the interconnection point). During an emergency, the bypass at the Elk Run Booster Station

would be opened to allow water to flow back to Boone Raleigh PSD's Whitesville Tank. POTE STA has developed a preliminary opinion of total estimated project (i.e., capital) cost for this option, which is presented in **Appendix B**.

It should be noted that as of the time of this report, WVAW has not been officially approached or agreed to provide the amount of water described above. An agreement would have to be developed with WVAW and approved by the WV PSC, and possibly WVDHHR. Such an agreement is outside the scope of this study.

4.1.6 Interconnection with Raleigh County PSD (Option C2)

Boone Raleigh PSD lies near another SWP, Raleigh County PSD that lies generally to the south. Raleigh County PSD purchases water from Glen White-Trap Hill PSD (who Raleigh County PSD recently agreed to operate and maintain) while Glen White-Trap Hill PSD purchases their water from Beckley Water Company. Raleigh County PSD purchases water from Glen White-Trap Hill PSD near Dameron, located approximately 20 miles south of Whitesville. Water then flows through (generally south) a 6-inch water line until just south of Whitesville. Raleigh County PSD has three water storage tanks along this approximate 20-mile stretch. The Sundial Tank is the closest tank to Boone Raleigh PSD. Due to system hydraulics, Raleigh County PSD has limited inflow of water to the Sundial Tank to 30 GPM. If water flows into the Sundial Tank at a higher rate than 30 GPM, certain Raleigh County PSD customers' pressure drops to unacceptable levels. In addition, Raleigh County PSD has limited inflow to the next tank to the north (i.e., the Dry Creek Tank) to 100 GPM for the same reasons as the inflow limitation on the Sundial Tank. Both of these limitations (30 GPM and 100 GPM) are below Boone Raleigh PSD's 2014 average daily production of 164 GPM. Given that the third Raleigh County PSD tank is located near Dameron, it is believed that upgrades to the Raleigh County PSD system would have to extend for approximately 20 miles. POTE STA believes this is not feasible, and Option C2 was not entered into the feasibility matrix

4.1.7 Other Alternative Source Water Option: Abandoned Mine Pool Withdrawal (Option D)

The Boone Raleigh PSD water treatment plant is located within close proximity to several abandoned deep mines. POTE STA used the WVGES's website, to identify options for accessing abandoned mines for source water. Once several options were identified, POTE STA contacted the permittee of the abandoned mines, Alpha Natural Resources, Inc., to inquire about water quality and quantity in the abandoned mines within close proximity to the Boone Raleigh PSD WTP. Alpha Natural Resources, Inc.'s staff identified Low Gap Powellton No. 1 Mine as a potential alternative source water option for Boone Raleigh PSD.

The interactive coal bed mapping application from WVGES indicates the Low Gap Powellton Mine No. 1 is located in the No. 2 Gas coal seam. The No. 2 Gas coal seam dips toward the direction of Boone Raleigh PSD WTP, indicating a large quantity of pooled water may be present in the abandoned mine void at the location that is close to the Boone Raleigh WTP. Additionally, POTE STA referred to the West Virginia Mine Pool Atlas Report, a two-year study

(submitted to the WVDEP and WVGES) which evaluated abandoned coal mines as a potential groundwater source. Low Gap Powellton No. 1 Mine was identified in the West Virginia Mine Pool Atlas Report as a potentially/partially flooded underground mine that was greater than 500 acres in area. The West Virginia Mine Pool Atlas Report estimated the potential storage as 339,780,000 gallons.

The mine pool can be accessed by drilling. The mine void elevation is higher than the WTP; therefore, after a borehole is created, the water should gravity feed to the WTP. A “steerable” long-hole drill could horizontally drill into the mine void. The hole would then be cased and grouted and a valve would be installed. The water flow would be controlled through a valve. The most common cause for the WTP to be shut down is flooding. When the Big Coal River is flooded, Boone Raleigh PSD staff cannot reach the raw water pump until the water subsides. Reportedly, this type of flooding occurs approximately seven times per year. An advantage of the Abandoned Mine Pool Withdrawal option is the flexibility it provides for Boone Raleigh PSD staff to bypass the raw water pump during flooding conditions and continue to run the WTP.

POTESTA has developed a preliminary opinion of total estimated project (i.e., capital) cost for this option, which is presented in **Appendix B** and includes connection to water source; longhole drilling including casing, grouting, and valve installation; access road and site preparation; along with approximately 2000 linear feet of raw water line including roadway crossing and horizontal directional drilling. POTESTA utilized a higher contingency on this option, as less historic bid data exists to help in developing cost estimates.

Note: At this time, we are awaiting provision of water quality data from Alpha Natural Resources, Inc. to help confirm that the quality of water in the Low Gap Powellton No. 1 Mine is reasonable for use as a source water.

4.2 Feasibility Matrix Result Summary

POTESTA used the feasibility matrix to rank alternative source water options that “passed” the first evaluation described in Section 4.1. The feasibility matrix addresses economic, technical and environmental criterion, as noted in the feasibility matrix in **Appendix A**. Table 4.2 presents a summary of the alternative source water options in the feasibility matrix (also included are the options that did not “pass” the initial evaluation). Table 4.2 presents the option ranking per the feasibility matrix score, the preliminary opinion of total estimated project (i.e., capital) cost and advantages and disadvantages. Option D – Abandoned Mine Pool Withdrawal, ranked the highest.

It should be noted that total budget year cost to operate and maintain Boone Raleigh PSD is a required data input field in the feasibility matrix. POTESTA used the total operation and maintenance expenses located on Page 603D of Boone Raleigh PSD’s Annual Report for Year Ended 2014 to fill the data field. “Rule of thumb” cost estimates were used to fill additional input fields in the feasibility matrix. In some cases, POTESTA developed estimates of costs for

other SWP systems being studied by POTEITA, and interpolated or extrapolated those costs to alternative source water options being studied at Boone Raleigh PSD.

Table 4.2: Summary of Alternative Source Water Options, Including Feasibility Matrix Results

Alternative Source Water Option	Option Ranking per Feasibility Matrix Score In Appendix A	Summary of Major Construction *	Preliminary Opinion of Total Estimated Project (i.e., Capital) Cost	Advantages	Disadvantages
Backup Intake (Option A1)	N/A	N/A	N/A	N/A	N/A
Well (Option A2)	N/A	N/A	N/A	N/A	N/A
Raw Water Storage (Option B1)	3	<ul style="list-style-type: none"> ◆ Tank ◆ Foundation ◆ Valving/Piping ◆ Site Work ◆ Property Demolition 	\$1,500,000	<ul style="list-style-type: none"> ◆ Lower capital cost than interconnection. ◆ Raw water readily available. 	<ul style="list-style-type: none"> ◆ Permitting difficulty. ◆ In a commercial and residential area. ◆ Negative aesthetic impacts. ◆ Future uncertainty of the water treatment plant location. ◆ Potential odor issues.
Treated Water Storage (Option B2)	N/A	N/A	N/A	N/A	N/A
Interconnection (Option C1)	2	<ul style="list-style-type: none"> ◆ 20,800 Feet 8-inch Water Line ◆ Emergency Pump Station Pad ◆ Bypass/Pressure Reducing Valve 	\$2,000,000	<ul style="list-style-type: none"> ◆ Interconnection could allow for flexibility on retirement of WTP. 	<ul style="list-style-type: none"> ◆ High capital costs. ◆ Portable pump required.
Abandoned Mine Pool Withdrawal (Option D)	1	<ul style="list-style-type: none"> ◆ Site Prep and Access Road ◆ Longhole Drill (Case, Grout, Valve) ◆ 2000 Feet 8-inch Water Line 	\$500,000	<ul style="list-style-type: none"> ◆ Moderate capital costs. ◆ Adds flexibility to bypass raw water pump when flooding occurs. 	<ul style="list-style-type: none"> ◆ Future uncertainty of the water treatment plant location.

* Quantities approximate.

4.3 Detailed Study Analysis

The two highest rated alternative source water options were:

Option C1 – Interconnection

Option D – Abandoned Mine Pool Withdrawal

Generally, both options have high estimated capital costs that will likely have rate impacts to the customer base (assuming monies are borrowed). The significantly lower estimated capital cost for the Abandoned Mine Pool Withdrawal option will likely result in significantly less impacts to customer rates. The fact that a properly sized interconnection with another SWP could allow flexibility in retirement of Boone Raleigh PSD's older WTP would help in obtainment of regulatory approvals for this option.

One concern regarding the Abandoned Mine Pool Withdrawal option is that it might not be serviceable if the WTP is moved to another location approximately 1.5 miles away. Accordingly, POTESTA reviewed Abandoned Mine Withdrawal availability near the potential new WTP location. Boone Raleigh PSD's potential new WTP location is near the Whitesville sewage treatment plant, downstream on the Big Coal River approximately 1.5 miles from the current WTP. POTESTA used WVGES website to determine if there are any potential abandoned mines near the new WTP site that are potentially/partially flooded. The No. 5 Mine located in the No. 2 Gas coal seam was listed in the Mine Pool Atlas Report as potentially/partially flooded underground mine greater than 500 acres in area. The Mine Pool Atlas Report estimated potential storage at the No. 5 Mine as 672,370,000 gallons. (The water quality of the No. 5 Mine has not been evaluated thus far.) Accordingly, a similar Mine Pool Withdrawal Option may still be viable even if the WTP moves.

5.0 OTHER WATER SYSTEM INFORMATION REQUIRED FOR UPDATED SOURCE WATER ASSESSMENT PROTECTION PLAN REPORT

5.1 Ability to Isolate or Divert Contaminated Waters

Boone Raleigh PSD obtains its source water from an intake on the Big Coal River. Boone Raleigh PSD does not employ diversion booms to isolate or divert contaminated waters from its supply. There is an overhead steel structure with a rail and cable used to lower the raw water pump into the Big Coal River. If the operators are notified of a contamination on the Big Coal River, they can raise and lower a pump approximately 2 feet in the river. Boone Raleigh PSD does not have any significant raw water storage capacity (for purposes of this evaluation, POTESTA ignored raw water that may be in the treatment process).

5.2 Ability to Switch to Alternative Water Source or Surface Water Intake

Boone Raleigh PSD does not have a second water source or second surface water intake available to switch to in the event of contamination of its primary source water.

5.3 Ability to Close Water Supply, Duration of Closure, and Examination of Existing Storage Capacity

Boone Raleigh PSD has the ability to close its intake when the operators receive notification of contamination on the Big Coal River. Treated water storage fluctuates over time due to demand, water loss, production, leaks and other factors. To estimate the duration of time Boone Raleigh PSD can keep its intake closed before the system loses water, POTE STA reviewed two data points for treated water storage: Full capacity and 50 percent capacity. Boone Raleigh PSD does not have any significant raw water storage capacity; therefore, for this evaluation, we assumed their supply capacity is based on their treated water storage. If system demand was at Boone Raleigh PSD's average 2014 production rate and their treated water storage was full, they could keep their intake closed for 32 hours. If their treated water storage was half full (50 percent capacity) and Boone Raleigh PSD's demand was at their 2014 average production rate, portions of their system would start to lose water in approximately 16 hours. A summary of this evaluation is presented in the table below.

Boone Raleigh PSD	Values	Hours of Supply
Treated Water Capacity (full capacity)	313,100 gallons	32
Treated Water Capacity (50% capacity)	156,550 gallons	16
Raw Water Storage Capacity	0 gallons	0
Average Production (2014)	164 GPM	N/A

Hours of supply would reduce substantially if Boone Raleigh PSD had to close their intake during demand equal to their maximum production day in 2014. It should also be noted that our estimate of hours of supply, as presented above, assumes that Boone Raleigh PSD can "match" volumes of water in any given tank with their demands. Typically, these are not equal (i.e., tank volumes will deplete at different rates), so it is possible that certain customers could lose water quicker than the hours of supply described above.

5.4 Early Warning Monitoring System Implementation

Early warning monitoring systems are used by SWPs to continuously monitor incoming source water. These systems allow WTP operators to anticipate changes to the treatment process required to react to storms, algal blooms, industrial discharge, chemical spills, reservoir stratification/de-stratification, construction activity, sewage spills and certain other natural or manmade occurrences. Boone Raleigh PSD does not have an early warning monitoring system. POTE STA obtained a price quote from HACH Company for an early warning monitoring system with various options. The quote is presented in **Appendix C**. In essence, installation of the early warning system represents a tradeoff between cost and capabilities. The more capabilities (e.g., the number of probes) a system contains, the higher the cost to implement the system. POTE STA reviewed the quote and identified the probe options for the recommended features. These recommended features are presented in the following table.

Line Item (per Quote in Appendix C)	Part Number	Feature Description	Price
1	580800	Back panel/trough/level (required): This item is a secure casing used to house the probes. WTP staff can go to the trough and check on all of the probes.	\$ 4,500
2	LXV400.99.1A082	Module, probe (6 sensor), SC1000	\$ 1,344
4	LXV402.99.00002	Db Module, display w/o GSM, SC1000: These two line items consist of the sc1000 probe module that can accept six sensors, and the universal controller display module. An operator can just plug in the monitor and it is ready to use without special software configuration. These items include alarms and memory backup.	\$ 2,770
3	YAB018	Card, internal sc1000, 4mA inputs: This item includes additional analog communication capabilities for the controller.	\$ 908
5	9020000	ASSY, PROBE, LDO Model 2, HACH: Probe for dissolved oxygen.	\$ 1,804
6	DRD1R5-WDMP	Oxidation Reduction Potential (ORP) Sensor, Ryton, WDMP Mounting: Probe for ORP.	\$ 904
7	DPD1R1-WDMP	pH Sensor, Ryton, WDMP Mounting: Probe for pH.	\$ 840
8	LXV423.99.10000	SOLITAX t-line sc/immersion probe 0.001-4000 NTU; wiper; PVC: Probe for turbidity.	\$ 3,474
9	LXV418.99.50002	Db Ultraviolet Absorbance Sensor (UVAS) sc PROBE, 5 mm; Probe for UVAS.	\$ 17,305
14	WRTUPGSOLITAX	Instrument startup and two onsite calibrations per year.	\$ 941
Total Cost:			\$ 34,790
SAY:			\$ 35,000

Note: Costs presented above include installation by Hach Company. However, they would not include all installation costs, such as extension of conduit from raw water source to the laboratory, and "soft" costs required to specify and bid the equipment.

SWPs may purchase probes in stages as funds become available. The five probes listed in the table above can monitor a broad range of changes in source water. Sudden changes in dissolved oxygen can indicate toxic conditions that effect algal respiration or increased levels of bacteria using up the oxygen. An ORP sensor may indicate sudden changes for oxidative or reducing species introduced into the water. The acid/base relationships within source water can be monitored by a pH sensor. Turbidity is a measure of suspended solids, which may indicate spills of solids, chemical compounds or increased bacterial levels. An UVAS probe is used to watch for sudden changes in organic load that would require alternative treatment procedures. As Boone Raleigh PSD increases their early warning monitoring capabilities, an additional probe to monitor oil in water could be purchased through HACH for approximately \$17,500.

5.5 Ability to Operate During a Power Outage

Generators are commonly used by SWPs to provide power in the event of a power outage. POTESTA reviewed the Emergency Generator Data provided by WVDHHR and information provided by Boone Raleigh PSD staff. POTESTA then prepared the summary table below.

Water System	Power Requirements	Generator
Water Treatment Plant <ul style="list-style-type: none"> ▪ Raw Water Pump ▪ High Server Pumps 	10 Hp Flygt (2) 20 Hp Grundfos	Cummins Onan Engine 125 amps (24 KV one phase, 36 KV three phase)
Elk Run Booster Station	(2) 7.5 Hp Goulds	Same as WTP generator
Seng Creek Booster Station	(2) 10 Hp	Same as WTP generator

There were discrepancies between DHHR's table and the generator Boone Raleigh PSD's staff reported was onsite. Therefore, POTESTA listed the more recent information obtained from Boone Raleigh PSD's staff. Boone Raleigh PSD has one portable generator for the water treatment plant and two booster stations. The portable generator is described in the table above. Boone Raleigh PSD has one raw water pump and two high service pumps at the WTP. The portable generator is undersized for the WTP as it can only run the raw water pump and one of the two high service pumps at a time.

The derecho of June 29, 2012 is a historical reference in which Boone Raleigh PSD was without power at the WTP and two booster stations for five days. During the derecho, the National Guard and the Federal Emergency Management Agency (FEMA) provided a second generator to Boone Raleigh PSD on the second day which allowed them to continue to run throughout the five-day power outage. Boone Raleigh PSD has reported that, if a FEMA (or other) second generator was not available, their process to fill the system would start by running the WTP to fill up the Whitesville tank. Then they would move the generator to the Elk Run booster station to fill up the Sylvester tank and finally they would move the generator to the Seng Creek booster station to fill up the Seng Creek tank. Boone Raleigh PSD staff estimate that with the existing portable generator, they could continue to provide water to the system for three days. The booster stations have to be wired to the generator; however, Boone Raleigh PSD has an electrician on staff.

The most common cause for plant shut down is flooding. When the Big Coal River is flooded, the Boone Raleigh PSD staff cannot reach the raw water pump until the water subsides. Reportedly, this type of flooding occurs approximately seven times per year. The Boone Raleigh PSD staff runs the WTP 16 hours per day to keep the system full. If the WTP is shut down due to flooding, the Boone Raleigh PSD staff estimate the Sylvester tank would go dry in approximately 23 hours and then customers would start to lose water.

5.6 Unaccounted for Water

Boone Raleigh PSD reports unaccounted for water loss at 49.4 percent on their Water Utility Annual Report 2014. Boone Raleigh PSD staff state that due to the age of the WTP and method by which water is metered overstates the unaccounted for water. The water production is metered between the filters and the clear well, and backwashing occurs from the clearwell and hence they believe that the metering system does not account for water lost due to backwashing. Much of the distribution system is old. There are many causes for water loss in the aging system: old water lines, overflows occurring at Whitesville and Sylvester tanks, lack of telemetry to prevent overflows, and other factors. Boone Raleigh PSD continues to fix line breaks as they are made aware of the breaks. They do not have an active leak identification and correction system.

5.7 Ability to Meet Future Water Supply

Boone Raleigh PSD has added mine bathhouses to their system in recent years which has increased system demand. However, there is no expected population growth in the next five years.

6.0 CONCLUSIONS AND RECOMMENDATIONS

POTESTA offers the following conclusions and recommendations:

1. Using an Abandoned Mine Pool Withdrawal as an alternative source water option was ranked the highest option on the feasibility matrix. Boone Raleigh PSD should pursue this option.
2. Using a different Abandoned Mine Pool may still be viable even if Boone Raleigh PSD elects to retire their WTP after constructing a new WTP near the Whitesville sewage treatment plant.
3. Creating a properly sized interconnection with WVAW could allow for retirement of Boone Raleigh PSD's aging WTP, and divestment of the operation and maintenance of the distribution system. WVAW might fund some or all of the interconnection.
4. Boone Raleigh PSD would benefit from an additional generator that is sized appropriately to run the entire WTP. The Cummins Onan generator could then be used alternatively between the two booster stations.
5. On a side note, Boone Raleigh PSD is approximately 160,000 gallons deficient (treated water storage) of the required two days of average production required in §64-77-9.a.2. However, WVDHHR has not cited this in their sanitary surveys for Boone Raleigh PSD during our study. Boone Raleigh PSD staff recommended demolishing the Old Whitesville Tank (no longer in service as it has been replaced by the New Whitesville

Tank), and constructing another water storage tank at that site. The Old Whitesville Tank reportedly contains asbestos and the additional cost is factored into the demolition cost. POTESTA has developed a preliminary opinion of total estimated project (i.e., capital) cost to demolish the Old Whitesville Tank and replace it with a 160,000-gallon tank, which is presented in **Appendix D**.

6. If Boone Raleigh PSD elects to pursue an option, a more detailed study should be completed to estimate costs and rate impacts to customers.
7. Boone Raleigh PSD should develop and implement an active leak detection program, as this will also be beneficial to source water protection for the same reason the water system improvements project will be.
8. Boone Raleigh PSD should consider purchasing an early warning monitoring system with the five probes outlined in Section 5.4.

7.0 CLOSING

This report has been prepared to aid Boone Raleigh PSD with engineering portions of the SWPP update due July 1, 2016 as stated in §64-3 (14.3, 14.6.b-g). Its scope is limited to the specific project and location described herein and represents our understanding of factors as presented in this report. If these factors change as additional data concerning this study is obtained, we should be informed so that we may examine the data and, if necessary, modify or revise the conclusions and recommendations presented in this report.

APPENDIX A

Feasibility Matrix

Boone-Raleigh PSD

PWSID: WV3300315

June 29, 2015

Matrix Completed By:

Potesta & Associates, Inc.

Criteria	Question	Backup Intake	Feasibility	Interconnection	Feasibility	Treated Water Storage	Feasibility	Raw Water Storage	Feasibility	Other-Abandoned Mine Pool Withdrawal	Feasibility
Economic Criteria											
	What is the total current budget year cost to operate and maintain the PWSU (current budget year)?	N/A		\$217,550		N/A		\$217,550		\$217,550	
Operation and Maintenance (O&M) Costs	Describe the major O&M cost requirements for the alternative	N/A	0	Stand by costs, minimum monthly bill from SWP, pipeline maintenance, line flushing, laboratory analysis	2	N/A	0	Potential mining (cost not included below), laboratory analysis, tank inspection and cleaning	2	Laboratory analysis, access road maintenance, pipeline maintenance	2
	What is the incremental cost to operate and maintain the alternative?	N/A	0	\$4,100	2	N/A	0	\$5,000	2	\$5,000	2
	Cost comparison of the incremental O&M cost to the current budgeted costs (%)	N/A	0	1.88%	2	N/A	0	2.30%	2	2.30%	2
O&M-Feasibility Score			0.0		2.0		0.0		2.0		2.0
	Describe the capital improvements required to implement the alternative.	N/A		Upgrade and Extend WVAW water lines and install meter. Annualized capital cost approximated (i.e., rounded value) using assumed 3.0% for 30 years		N/A		Build 500,000 gallons storage near WTP. Annualized capital cost approximated (i.e., rounded value) using assumed 3.0% for 30 years		Site Preparation, Access Road, and Longhole Drill to install Water Line from Abandoned Mine to the Water Treatment Plant. Annualized capital cost approximated (i.e., rounded value) using assumed 3.0% for 30 years.	
Capital Costs	What is the total capital cost for the alternative?	N/A	0	\$2,000,000	1	N/A	0	\$1,500,000	1	\$500,000	2
	What is the annualized capital cost to implement the alternative, including land and easement costs, convenience tap fees, etc.?	N/A	0	\$101,000	1	N/A	0	\$76,500	1	\$25,000	2
	Cost comparison of the alternatives annualized capital cost to the current budgeted costs (%)	N/A	0	46.43%	1	N/A	0	35.16%	1	11.49%	2
Capital Cost-Feasibility Score			0.0		1.0		0.0		1.0		2.0
Technical Criteria											
Permitting	Provide a listing of the expected permits required and the permitting agencies involved in their approval	N/A	0	DHHR, USACE, DNR-PLC, SHPO, USFWS, PSC, UDC, WVDEP, WVDOH	3	N/A	0	DHHR, SHPO, PLC, UDC, PSC	1	DHHR, USACE, DNR-PLC, SHPO, USFWS, PSC, UDC, WVDEP, WVDOH	2
	What is the timeframe for permit approval for each permit?	N/A	0	365 Days Cumulative	3	N/A	0	365 Days Cumulative	1	365 Days Cumulative	2
	Describe the major requirements in obtaining the permits (environmental impact studies, public hearings, etc.)	N/A	0	Prepare and submit clearance letters and permit applications and certificate of convenience. Public hearings possible, depending on PSC and funding source	3	N/A	0	Prepare and submit clearance letters and permit applications, and certificate of convenience. Public hearings possible, depending on PSC and funding source	1	Prepare and submit clearance letters and permit applications, and certificate of convenience. Public hearings possible, depending on PSC and funding source. Landowner and WVDEP approval required.	2
	What is the likelihood of successfully obtaining the permits?	N/A	0	High, as PSC approval believed likely	3	N/A	0	Low	1	High	2
	Does the implementation of the alternative require regulatory exceptions or variances?	N/A	0	No	3	N/A	0	No	2	No	2
Permitting-Feasibility Score			0.0		3.0		0.0		1.2		2.0

Criteria	Question	Backup Intake	Feasibility	Interconnection	Feasibility	Treated Water Storage	Feasibility	Raw Water Storage	Feasibility	Other-Abandoned Mine Pool Withdrawal	Feasibility
Flexibility	Will the alternative be needed on a regular basis or only used intermittently?	N/A	0	Intermittently, although transition to permanent use likely	1	N/A	0	Intermittently	1	Intermittently	2
	How will implementing the alternative affect the PWSU's current method of treating and delivering potable water, including meeting Safe Drinking Water Act regulations? (ex. In the case of storage, will the alternative increase the likelihood of disinfection byproducts?)	N/A	0	Believed minimal, although some increased likelihood of disinfection byproducts	1	N/A	0	Unclear, but could have adverse impacts including increasing likelihood of disinfection byproducts.	1	Believed minimal, as treatment chemicals likely on-site if source water chemistry changes.	2
Flexibility-Feasibility Score			0.0		1.0		0.0		1.0		2.0
Resilience	Will the alternative provide any advantages or disadvantages to meeting seasonal changes in demand?	N/A	0	No	2	N/A	0	No	2	No	2
	How resistant will the alternative be to extreme weather conditions such as drought and flooding?	N/A	0	Availability of supply from WVAW could be impacted by weather or other factors	1	N/A	0	Less resistant in cold weather, as risk of freezing in cold weather	2	Resistant	2
	Will the alternative be expandable to meet the growing needs of the service area?	N/A	0	Yes	2	N/A	0	No	2	Yes	2
Resilience-Feasibility Score			0.0		1.7		0.0		2.0		2.0
Institutional Requirements	Identify any agreements or other legal instruments with governmental entities, private institutions, or other PWSU required to implement the alternative	N/A	0	WVAW agreement necessary	1	N/A	0	None	2	Alpha Natural Resources (ANR) agreement necessary	2
	Are any development/planning restrictions in place that can act as a barrier to the implementation of the alternative?	N/A	0	No	2	N/A	0	Yes, limited space in commercial and residential area	1	No	2
	Identify potential land acquisitions and easements requirements	N/A	0	Land acquisition and easements required	2	N/A	0	Land acquisition would be required and could be difficult.	1	Land acquisition and easements required	2
Institutional Requirements-Feasibility Score			0.0		1.7		0.0		1.3		2.0
Environmental Criteria											
Environmental Impacts	Identify any environmentally protected areas or habitats that might be impacted by the alternative	N/A	0	None identified	2	N/A	0	None identified	2	None identified	2
Environmental Impacts-Feasibility Score			0.0		2.0		0.0		2.0		2.0
Aesthetic Impacts	Identify any visual or noise issues caused by the alternative that may affect local land uses	N/A	0	None	2	N/A	0	Negative Aesthetic: 500,000 gallon tank required in "urban" portion of Whitesville	1	None	2
	Identify any mitigation measures that will be required to address aesthetic impacts	N/A	0	None	2	N/A	0	None	2	None	2
Aesthetic Impacts-Feasibility Score			0.0		2.0		0.0		1.5		2.0
Stakeholder Issues	Identify the potential stakeholders affected by the alternative	N/A	0	Customers, SWP, WVAW	1	N/A	0	Customers	1	Customers, ANR	1
	Identify the potential issues with stakeholders for and against the alternative	N/A	0	May be resistance connecting to WVAW, potential rate impact	1	N/A	0	Potential rate impact	1	Rate impacts	1
	Will stakeholder concerns represent a significant barrier to implementation (or assistance) of the alternative?	N/A	0	Yes	1	N/A	0	Yes	1	Yes	1
Stakeholder Issues-Feasibility Score			0.0		1.0		0.0		1.0		1.0
Comments		N/A		Economic Criteria: Incremental O&M costs for interconnection is based on the WVAWC Rate Schedule for a 3-inch water meter, effective October 11, 2013		N/A		NA		NA	

Instructions: Using the expanded instructions in the "FEASIBILITY STUDY GUIDANCE DOCUMENT", complete the white and gray input cells. Rank each criteria based on the evidence provided and best professional judgement. Rank the criteria 0-3, assuming 0=not feasible and 3=most feasible. The password to edit fillable cells is "swap".

Scoring:

0 – Not feasible. Criterion cannot be met by this alternative and removes the alternative from further consideration.

1 – Feasible but difficult. Criterion represents a significant barrier to successful implementation but does not eliminate it from consideration.

2 – Feasible. Criterion can be met by the alternative.

3 – Very Feasible. Criterion can be easily met by the alternative.

Feasibility Matrix

Boone-Raleigh PSD

PWSID: WV3300315

Date: June 29, 2015

Completed By: Potesta & Associates, Inc.

Alternative Strategy Description	Economic Criteria					Technical Criteria							Environmental Criteria						Final Score	Total Capital Cost	Comments	
	Operation and Maintenance Costs	Capital Costs	Total	Total %	Weighted Total	Permitting	Flexibility	Resilience	Institutional Requirements	Total	Total %	Weighted Total	Environmental Impacts	Aesthetic Impacts	Stakeholder Issues	Total	Total %	Weighted Total				
Backup Intake	0.0	0.0	0.0	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0%	0.0%	0.0%	N/A	N/A	N/A
Interconnection	2.0	1.0	3.0	50.0%	20.0%	3.0	1.0	1.7	1.7	7.3	61.1%	24.4%	2.0	2.0	1.0	5.0	55.6%	11.1%	55.6%	\$2,000,000	Economic Criteria: Incremental O&M costs for interconnection is based on the WVAWC Rate Schedule for a 3-inch water meter, effective October 11, 2013.	
Treated water storage	0.0	0.0	0.0	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0%	0.0%	0.0%	N/A	N/A	N/A
Raw Water Storage	2.0	1.0	3.0	50.0%	20.0%	1.2	1.0	2.0	1.3	5.5	46.1%	18.4%	2.0	1.5	1.0	4.5	50.0%	10.0%	48.4%	\$1,500,000	NA	
Other-Abandoned Mine Pool Withdrawal	2.0	2.0	4.0	66.7%	26.7%	2.0	2.0	2.0	2.0	8.0	66.7%	26.7%	2.0	2.0	1.0	5.0	55.6%	11.1%	64.4%	\$500,000	NA	

Scoring:

- 0 – Not feasible. Criterion cannot be met by this alternative and removes the alternative from further consideration.
- 1 – Feasible but difficult. Criterion represents a significant barrier to successful implementation but does not eliminate it from consideration.
- 2 – Feasible. Criterion can be met by the alternative.
- 3 – Very Feasible. Criterion can be easily met by the alternative

APPENDIX B

**PRELIMINARY OPINION OF
TOTAL ESTIMATED CAPITAL COST FOR
RAW WATER STORAGE (OPTION B1)**

*Regional Intergovernmental Council
SWPP - Boone Raleigh PSD*

Item	Description	Unit	Quantity	Unit Price	Estimated Cost
1	Mobilization/Insurance/Bonding	LS	1	\$ 40,000.00	\$ 40,000.00
2	Property Demolition	LS	1	\$ 40,000.00	\$ 40,000.00
3	500,000 Gallon Tank (including roof)	LS	1	\$ 600,000.00	\$ 600,000.00
4	Foundation	LS	1	\$ 90,000.00	\$ 90,000.00
5	Valve Vault/Piping	LS	1	\$ 14,000.00	\$ 14,000.00
6	Electrical	LS	1	\$ 21,000.00	\$ 21,000.00
7	Site Work (grading/stone)	LS	1	\$ 4,000.00	\$ 4,000.00
8	Fence	LF	300	\$ 45.00	\$ 13,500.00
9	Gate	EA	1	\$ 750.00	\$ 750.00
10	Connection to Existing Water Line	EA	1	\$ 2,500.00	\$ 2,500.00
11	8" DIP Class 50 Water Line	LF	500	\$ 60.00	\$ 30,000.00
12	Pavement Restoration	LF	500	\$ 100.00	\$ 50,000.00
	Subtotal:				\$ 905,750.00
	Contingency (20%):				\$ 181,150.00
	Soft Costs (30%):				\$ 326,070.00
	TOTAL:				\$ 1,412,970.00
	SAY:				\$ 1,500,000

- Notes: 1. Soft costs include engineering, legal, accounting, administrative, land acquisition and other non-construction items.
2. Additional monies would be required if telemetry/controls or mixer required.
3. The unit price of water line includes valving and casing.
4. Assumed a standpipe raw water storage tank. Savings could be realized if a ground level tank was deemed adequate.

**PRELIMINARY OPINION OF
TOTAL ESTIMATED CAPITAL COST FOR (OPTION C1)
INTERCONNECTION WITH WVAW**

*Regional Intergovernmental Council
SWPP - Boone Raleigh PSD*

Item	Description	Unit	Quantity	Unit Price	Estimated Cost
1	Connection to Existing Water Line	EA	2	\$ 2,500.00	\$ 5,000.00
2	8" DIP Class 50 Water Line Replacement	LF	17,800	\$ 60.00	\$ 1,068,000.00
3	8" DIP Class 50 Water Line Interconnection	LF	3,000	\$ 40.00	\$ 120,000.00
4	Meter Vault	LS	1	\$ 10,000.00	\$ 10,000.00
5	Bypass at Elk Run Booster Station	LS	1	\$ 10,000.00	\$ 10,000.00
6	Emergency Pumping Pad and Valving	LS	1	\$ 25,000.00	\$ 25,000.00
	Subtotal:				\$ 1,238,000.00
	Contingency (20%):				\$ 247,600.00
	Soft Costs (30%):				\$ 445,680.00
	TOTAL:				\$ 1,931,280.00
	SAY:				\$ 2,000,000

Notes: 1. If a permanent Booster Station is required, it is estimated that an additional \$125,000 will be required.

2. The unit price of water line includes valves, pavement restoration, and service setting and fire hydrant reconnections.

3. Soft costs includes engineering, legal, accounting, administrative, land acquisition, and other non-construction costs.

**PRELIMINARY OPINION OF
TOTAL ESTIMATED CAPITAL COST (OPTION D)
FOR MINE POOL WITHDRAWAL**

*Regional Intergovernmental Council
SWPP - Boone Raleigh PSD*

Item	Description	Unit	Quantity	Unit Price	Estimated Cost
1	Connection to Water Source	EA	1	\$ 2,500.00	\$ 2,500.00
2	Longhole Drill	LS	1	\$ 85,000.00	\$ 85,000.00
3	Access Road and Site Preparation	N/A	N/A	N/A	N/A
3A	Mobilization / Demobilization	LS	1	\$ 5,000.00	\$ 5,000.00
3B	Clearing / Grubbing	AC	0.5	\$ 4,500.00	\$ 2,250.00
3C	Excavation	CY	250	\$ 15.00	\$ 3,750.00
3D	Rock Excavation	CY	50	\$ 20.00	\$ 1,000.00
3E	Waste Disposal	CY	300	\$ 6.00	\$ 1,800.00
3F	Seeding	AC	0.25	\$ 2,500.00	\$ 625.00
3G	Access Road	TN	50	\$ 35.00	\$ 1,750.00
3H	Pad Surface	TN	55	\$ 35.00	\$ 1,925.00
4	16" Steel Casing, Bore and Jack Roadway Crossing	LF	80	\$ 180.00	\$ 14,400.00
5	8" HDPE DR 17 Raw Water Line, Directionally Drilled	LF	400	\$ 200.00	\$ 80,000.00
6	8" HDPE DR 17 Raw Water Line	LF	1600	\$ 40.00	\$ 64,000.00
	Subtotal:				\$ 264,000.00
	Contingency (40%):				\$ 105,600.00
	Soft Costs (30%):				\$ 110,880.00
	TOTAL:				\$ 480,480.00
	SAY:				\$ 500,000

Notes: 1. Soft costs includes engineering, legal, accounting, administrative, land acquisition, and other non-construction costs.

APPENDIX C



Be Right™

Quotation

Quote Number: 100085723v2

Use quote number at time of order to ensure that you receive prices quoted

Hach Company
 PO Box 608
 Loveland, CO 80539-0608
 Phone: (800) 227-4224
 Email: quotes@hach.com
 Website: www.hach.com

Quote Date: 06/05/15

Quote Expiration: 08/04/15

POTESTA & ASSOCIATES, INC.
 7012 MACCORKLE AVE SE
 CHARLESTON, WV 25304

Name: Angela K. Pugh
 Phone: (304)342-1400
 Email: akpugh@potesta.com

Customer Account Number: 829990

Sales Contact: Rocky Bragg Email: rbragg@hach.com Phone: 800-227-4224

PRICING QUOTATION

Line	Part Number	Description	Qty	Extended Price
1	580800	Back panel/Trough/Level (required)	1	4,500.00
2	LXV400.99.1A082	MODULE, PROBE (6 SNSR), SC1000	1	1,344.00
3	YAB018	CARD, INTERNAL SC1000, 4 mA INPUTS	1	908.00
4	LXV402.99.00002	db MODULE, DISPLAY W/O GSM, SC1000	1	2,770.00
5	9020000	ASSY, PROBE, LDO MODEL 2, HACH	1	1,804.00
6	DRD1R5-WDMP	ORP Sensor, Ryton, WDMP Mounting	1	904.00
7	DPD1R1-WDMP	pH Sensor, Ryton, WDMP Mounting	1	840.00
8	LXV423.99.10000	SOLITAX t-line sc/immersion probe 0.001-4000 NTU; wiper;PVC	1	3,474.00
9	LXV418.99.50002	db UVAS sc PROBE, 5mm	1	17,305.00
10	WRTUPGWDMP	Comprehensive warranty upgrade includes: Instrument start-up, all parts, labor, and travel for on-site repairs, 4 on-site calibrations per year, factory recommended maintenance (including required parts), unlimited technical support calls, and free firmware updates. On-site response for "down" instrument repairs is typically 3 business days. Standard business hours are 8am-5pm M-F local time, excluding holidays. Please see service terms and conditions for additional details on our service plans, and to ensure you have an opportunity to review our environmental and safety requirements.	1	1,916.00
11	WRTUPGSC1000	Comprehensive warranty upgrade includes: Instrument start-up, all parts, labor, and travel for on-site repairs, 1 on-site factory recommended maintenance (including required parts), unlimited technical support calls, and free firmware updates. On-site response for "down" instrument repairs is typically 3 business days. Standard business hours are 8am-5pm M-F local time, excluding holidays. Please see service terms and conditions for additional details on our service plans, and to ensure you have an opportunity to review our environmental and safety requirements.	1	233.00
2	WRTUPGLDO2	Comprehensive warranty upgrade includes: Instrument start-up, all parts, labor, and travel for on-site repairs, 1 on-site visit for cleaning, inspection, air calibration, and factory recommended maintenance (including required parts), unlimited technical support calls, and free firmware updates. On-site response for "down" instrument repairs is typically 3 business days. Standard business hours are 8am-5pm M-F local time, excluding holidays. Please see service terms and conditions for additional details on our service plans, and to ensure you have an opportunity to review our	1	440.00

Line	Part Number	Description	Qty	Extended Price
		environmental and safety requirements.		
13	WRTUPGGLPHORP	Comprehensive warranty upgrade includes: Instrument start-up, all parts, labor, and travel for on-site repairs, 1 on-site calibration per year, factory recommended maintenance (including required parts), unlimited technical support calls, and free firmware updates. On-site response for "down" instrument repairs is typically 3 business days. Standard business hours are 8am-5pm M-F local time, excluding holidays. Please see service terms and conditions for additional details on our service plans, and to ensure you have an opportunity to review our environmental and safety requirements.	2	442.00
14	WRTUPGSOLITAX	Comprehensive warranty upgrade includes: Instrument start-up, all parts, labor, and travel for on-site repairs, 2 on-site calibrations per year, factory recommended maintenance (including required parts), unlimited technical support calls, and free firmware updates. On-site response for "down" instrument repairs is typically 3 business days. Standard business hours are 8am-5pm M-F local time, excluding holidays. Please see service terms and conditions for additional details on our service plans, and to ensure you have an opportunity to review our environmental and safety requirements.	1	941.00
15	WRTUPGUVAS	Comprehensive warranty upgrade includes: Instrument start-up, all parts, labor, and travel for on-site repairs, 2 on-site calibrations per year, factory recommended maintenance (including required parts), unlimited technical support calls, and free firmware updates. On-site response for "down" instrument repairs is typically 3 business days. Standard business hours are 8am-5pm M-F local time, excluding holidays. Please see service terms and conditions for additional details on our service plans, and to ensure you have an opportunity to review our environmental and safety requirements.	1	1,028.00
Grand Total			5	18,529.00

TERMS OF SALE

Freight: Ground Prepay and Add

FOB: Hach's facility

All purchases of Hach Company products and/or services are expressly and without limitation subject to Hach Company's Terms & Conditions of Sale ("Hach TCS"), incorporated herein by reference and published on Hach Company's website at www.hach.com/terms. Hach TCS are contained directly and/or by reference in Hach's offer, order acknowledgment, and invoice documents. The first of the following acts constitutes an acceptance of Hach's offer and not a counteroffer and creates a contract of sale "Contract" in accordance with the Hach TCS: (i) Buyer's issuance of a purchase order document against Hach's offer; (ii) acknowledgement of Buyer's order by Hach; or (iii) commencement of any performance by Hach pursuant to Buyer's order. Provisions contained in Buyer's purchase documents (including electronic commerce interfaces) that materially alter, add to or subtract from the provisions of the Hach TCS are not part of the Contract.

Due to international regulations, a U.S. Department of Commerce Export License may be required. Hach reserves the right to approve specific shipping agents. Wooden boxes suitable for ocean shipment are extra. Specify final destination to ensure proper documentation and packing suitable for international transport. In addition, Hach may require: 1) A statement of intended end-use; 2) Certification that the intended end-use does not relate to proliferation of weapons of mass destruction (prohibited nuclear end use, chemical / biological weapons, missile technology); and 3) Certification that the goods will not be diverted contrary to U.S. law.

ORDER TERMS:

- Terms are Subject to Credit Review
- Please reference the quotation number on your purchase order.
- Sales tax is not included. Applicable sales tax will be added to the invoice based on the U.S. destination, if applicable provide a resale/exemption certificate.
- Shipments will be prepaid and added to invoices unless otherwise specified.
- Equipment quoted operates with standard U.S. supply voltage.
- Hach standard terms and conditions apply to all sales.
- Additional terms and conditions apply to orders for service partnerships.
- Prices do not include delivery of product. Reference attached Freight Charge Schedule and Collect Handling Fees.
- Standard lead time is 30 days.
- This Quote is good for a one time purchase.

Sales Contact:

Name: Rocky Bragg
 Title: Regional Sales Manager
 Phone: 800-227-4224
 Email: rbragg@hach.com

Prepared By:

Name: Rachel Le Blanc
 Title: Field Sales Support Specialist II
 Phone: 800-227-4224 X 6274
 Email: rleblan@hach.com



Be Right™

Quotation Addendum

HACH COMPANY

Headquarters

P.O. Box 389
5600 Lindbergh Drive
Loveland, CO 80539-0389

Purchase Orders

PO Box 608
Loveland, CO 80539-0608

WebSite: www.hach.com

U.S.A.

Phone: 800-227-4224
Fax: 970-669-2932
E-Mail: orders@hach.com
quotes@hach.com
techhelp@hach.com

Export

Phone: 970-669-3050
Fax: 970-461-3939
Email: intl@hach.com

Remittance

2207 Collections Center Drive
Chicago, IL 60693

Wire Transfers

Bank of America
231 S. LaSalle St.
Chicago, IL 60604
Account: 8765602385
Routing (ABA): 071000039

ADVANTAGES OF WORKING WITH HACH

<p><u>Technical Support</u> Provides post-sale instrumentation and application support</p> <ul style="list-style-type: none"> ✓ Hach's highly skilled Technical Support staff is dedicated to helping you resolve technical issues before, during and after the sale. ✓ Available via phone, e-mail, or live online chat at Hach.com! ✓ Toll-free phone: 800-227-4224 ✓ E-mail: techhelp@hach.com <p>www.Hach.com</p>	<p><u>SIRR Delivery Program</u> The Scheduled Inventory Reagent Replacement (SIRR) Program offers an uninterrupted supply of reagents</p> <ul style="list-style-type: none"> ✓ Lower inventory costs and fresh supplies ✓ Reduced paperwork -- one purchase order for the entire year ✓ Automatic shipments on your schedule ✓ Easier budgeting <p>www.Hach.com/sirr</p>	<p><u>Hach WarrantyPlus™ Upgrade</u> Instrument Protection and Service</p> <ul style="list-style-type: none"> ✓ Savings of more than 20% versus a "pay as you go" approach ✓ Freedom from maintenance ✓ Worry-free compliance with Hach's certification ✓ Fixed maintenance budget for the entire year <p>www.Hach.com/warrantyplus</p>
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ADVANTAGES OF SIMPLIFIED FREIGHT

<p><u>Safe & Fast Delivery</u></p> <ul style="list-style-type: none"> ✓ Receive tracking numbers on your order acknowledgement ✓ Hach will assist with claims if an order is lost or damaged in shipment 	<p><u>Save Time -- Less Hassle</u></p> <ul style="list-style-type: none"> ✓ No need to set up deliveries for orders or to schedule pickup ✓ Hach ships simplified freight orders as the product is available at no additional cost 	<p><u>Save Money</u></p> <ul style="list-style-type: none"> ✓ No additional invoice to process -- save on time and administrative costs ✓ Only pay shipping once, even if multiple shipments are required
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STANDARD SIMPLIFIED FREIGHT CHARGES ^{1, 2, 3}						Collect ⁴ Handling Fee Effective 8/16/2014
Total Price of Merchandise Ordered	Standard Surface (Mainland USA)	Second Day Delivery (Mainland USA)	Next Day Delivery (Mainland USA)	Pricing Effective 8/16/2014		
				Second Day Delivery (Alaska & Hawaii)	Next Day Delivery (Alaska & Hawaii)	
\$0.00 - \$49.99	\$11.99	\$29.99	\$54.99	\$44.95	\$85.45	\$7.79
\$50.00 - \$199.99	\$17.79	\$52.45	\$98.97	\$71.64	\$136.19	\$7.99
\$200.00 - \$449.99	\$30.89	\$79.43	\$161.79	\$100.23	\$195.06	\$8.47
\$450.00 - \$749.99	\$41.67	\$108.95	\$216.68	\$136.20	\$263.73	\$8.89
\$750.00 - \$999.99	\$52.77	\$114.40	\$239.39	\$141.65	\$267.00	\$9.17
\$1,000.00 - \$2,249.99	\$66.39	\$130.75	\$255.01	\$154.73	\$307.33	\$9.49
\$2,250.00 - \$4,999.99	\$79.47	\$174.35	\$294.25	\$181.98	\$336.76	\$11.32
\$5,000.00 - \$9,999.99	\$112.79	\$201.60	\$338.94	\$213.59	\$365.10	\$16.83
Over \$10,000	2% of Net Order Value	4% of Net Order Value	6% of Net Order Value	4% of Net Order Value	6% of Net Order Value	\$29.49

- Freight charges shown are only applicable to orders billing and shipping to U.S. destinations. Freight charges will be prepaid and added to invoice. Freight for the Reagent Delivery Program is charged on each shipment release and is based on the total price of each shipment release. Freight charges are subject to change without notice.
- Additional freight charges will be applied to orders containing bulky and/or especially heavy orders. Refrigerated and all weather Samplers do not qualify for simplified freight charges, and are considered heavy freight. Dissolved Oxygen Sensors can be damaged if exposed to temps below freezing, causing sensor failure. Must be shipped over night or 2nd day air during the cold weather months.
- Orders shipping to Alaska or Hawaii: Additional freight charges may be applied at time of order processing. Second Day and Next Day delivery is not available to all destinations.
- Hach Company will assess a collect handling fee on orders with collect freight terms. This handling fee covers the additional costs that Hach Company incurs from processing and managing collect shipments.

SALES TAX

Sales Tax is not included in the attached quotation. Applicable sales and usage taxes will be added to your invoice, at the time of order, based on U.S. destination of goods, unless a valid resale/exemption certificate for destination state is provided to the above address or fax number, attention of the Tax Dept.

TERMS & CONDITIONS OF SALE FOR HACH COMPANY PRODUCTS AND SERVICES

This document sets forth the Terms & Conditions of Sale for goods manufactured and/or supplied, and services provided, by Hach Company of Loveland, Colorado ("Hach") and sold to the original purchaser thereof ("Buyer"). Unless otherwise specifically stated herein, the term "Hach" includes only Hach Company and none of its affiliates. Unless otherwise specifically stated in a previously-executed written purchase agreement signed by authorized representatives of Hach and Buyer, these Terms & Conditions of Sale establish the rights, obligations and remedies of Hach and Buyer which apply to this offer and any resulting order or contract for the sale of Hach's goods and/or services ("Products").

- 1. APPLICABLE TERMS & CONDITIONS:** These Terms & Conditions of Sale are contained directly and/or by reference in Hach's offer, order acknowledgment, and invoice documents. The first of the following acts constitutes an acceptance of Hach's offer and not a counteroffer and creates a contract of sale ("Contract") in accordance with these Terms & Conditions: (i) Buyer's issuance of a purchase order document against Hach's offer; (ii) acknowledgement of Buyer's order by Hach; or (iii) commencement of any performance by Hach pursuant to Buyer's order. Provisions contained in Buyer's purchase documents (including electronic commerce interfaces) that materially alter, add to or subtract from the provisions of these Terms & Conditions of Sale are not a part of the Contract.
- 2. CANCELLATION:** Buyer may cancel goods orders subject to fair charges for Hach's expenses including handling, inspection, restocking, freight and invoicing charges as applicable, provided that Buyer returns such goods to Hach at Buyer's expense within 30 days of delivery and in the same condition as received. Buyer may cancel service orders on ninety (90) day's prior written notice and refunds will be prorated based on the duration of the service plan. Inspections and re-statement fees may apply upon cancellation or expiration of service programs. Seller may cancel all or part of any order prior to delivery without liability if the order includes any Products that Seller determines may not comply with export, safety, local certification, or other applicable compliance requirements.
- 3. DELIVERY:** Delivery will be accomplished FCA Hach's facility located in Ames, Iowa or Loveland, Colorado, United States (Incoterms 2010). For orders having a final destination within the U.S., legal title and risk of loss or damage pass to Buyer upon transfer to the first carrier. For orders having a final destination outside the U.S., legal title and risk of loss or damage pass to Buyer when the Products enter international waters or airspace or cross an international frontier. Hach will use commercially reasonable efforts to deliver the Products ordered herein within the time specified on the face of this Contract or, if no time is specified, within Hach's normal lead-time necessary for Hach to deliver the Products sold hereunder. Upon prior agreement with Buyer and for an additional charge, Hach will deliver the Products on an expedited basis. Standard service delivery hours are 8 am - 5 pm Monday through Friday, excluding holidays.
- 4. INSPECTION:** Buyer will promptly inspect and accept any Products delivered pursuant to this Contract after receipt of such Products. In the event the Products do not conform to any applicable specifications, Buyer will promptly notify Hach of such nonconformance in writing. Hach will have a reasonable opportunity to repair or replace the nonconforming product at its option. Buyer will be deemed to have accepted any Products delivered hereunder and to have waived any such nonconformance in the event such a written notification is not received by Hach within thirty (30) days of delivery.
- 5. PRICES & ORDER SIZES:** All prices are in U.S. dollars and are based on delivery as stated above. Prices do not include any charges for services such as insurance; brokerage fees; sales, use, inventory or excise taxes; import or export duties; special financing fees; VAT, income or royalty taxes imposed outside the U.S.; consular fees; special permits or licenses; or other charges imposed upon the production, sale, distribution, or delivery of Products. Buyer will either pay any and all such charges or provide Hach with acceptable exemption certificates, which obligation survives performance under this Contract. Hach reserves the right to establish minimum order sizes and will advise Buyer accordingly.
- 6. PAYMENTS:** All payments must be made in U.S. dollars. For internet orders, the purchase price is due at the time and manner set forth at www.hach.com. Invoices for all other orders are due and payable NET 30 DAYS from date of the invoice without regard to delays for inspection or transportation, with payments to be made by check to Hach at the above address or by wire transfer to the account stated on the front of Hach's invoice, or for customers with no established credit, Hach may require cash or credit card payment in advance of delivery. In the event payments are not made or not made in a timely manner, Hach may, in addition to all other remedies provided at law, either: (a) declare Buyer's performance in breach and terminate this Contract for default; (b) withhold future shipments until delinquent payments are made; (c) deliver future shipments on a cash-with-order or cash-in-advance basis even after the delinquency is cured; (d) charge interest on the delinquency at a rate of 1-1/2% per month or the maximum rate permitted by law, if lower, for each month or part thereof of delinquency in payment plus applicable storage charges and/or inventory carrying charges; (e) repossess the Products for which payment has not been made; (f) recover all costs of collection including reasonable attorney's fees; or (g) combine any of the above rights and remedies as is practicable and permitted by law. Buyer is prohibited from setting off any and all monies owed under this from any other sums, whether liquidated or not, that are or may be due Buyer, which arise out of a different transaction with Hach or any of its affiliates. Should Buyer's financial responsibility become unsatisfactory to Hach in its reasonable discretion, Hach may require cash payment or other security. If Buyer fails to meet these requirements, Hach may treat such failure as reasonable grounds for repudiation of this Contract, in which case reasonable cancellation charges shall be due Hach. Buyer grants Hach a security interest in the Products to secure payment in full, which payment releases the security interest but only if such payments could not be considered an avoidable transfer under the U.S. Bankruptcy Code or other applicable laws. Buyer's insolvency, bankruptcy, assignment for the benefit of creditors, or dissolution or termination of the existence of Buyer, constitutes a default under this Contract and affords Hach all the remedies of a secured party under the U.C.C., as well as the remedies stated above for late payment or non-payment.
- 7. LIMITED WARRANTY:** Hach warrants that Products sold hereunder will be free from defects in material and workmanship and will, when used in accordance with the manufacturer's operating and maintenance instructions, conform to any express written warranty pertaining to the specific goods purchased, which for most Hach instruments is for a period of twelve (12) months from delivery. Hach warrants that services furnished hereunder will be free from defects in workmanship for a period of ninety (90) days from the completion of the services. Parts provided by Hach in the performance of services may be new or refurbished parts functioning equivalent to new parts. Any non-functioning parts that are repaired by Hach shall become the property of Hach. No warranties are extended to consumable items such as, without limitation, reagents, batteries, mercury cells, and light bulbs. All other guarantees, warranties, conditions and representations, either express or implied, whether arising under any statute, law, commercial usage or otherwise, including implied warranties of merchantability and fitness for a particular purpose, are hereby excluded. The sole remedy for Products not meeting this Limited Warranty is replacement, credit or refund of the purchase price. This remedy will not be deemed to have failed of its essential purpose so long as Hach is willing to provide such replacement, credit or refund.
- 8. INDEMNIFICATION:** Indemnification applies to a party and to such party's successors-in-interest, assignees, affiliates, directors, officers, and employees ("Indemnified Parties"). Hach is responsible for and will defend, indemnify and hold harmless the Buyer Indemnified Parties against all losses, claims, expenses or damages which may result from accident, injury, damage, or death due to Hach's breach of the Limited Warranty. This indemnification is provided on the condition that the Buyer is likewise responsible for and will defend, indemnify and hold harmless the Hach Indemnified Parties against all losses, claims, expenses or damages which may result from accident, injury, damage, or death due to the negligence or misuse or misapplication of any goods or services by the Buyer or any third party affiliated or in privity with Buyer.
- 9. PATENT PROTECTION:** Subject to all limitations of liability provided herein, Hach will, with respect to any Products of Hach's design or manufacture, indemnify Buyer from any and all damages and costs as finally determined by a court of competent jurisdiction in any suit for infringement of any U.S. patent (or European patent for Products that Hach sells to Buyer for end use in a member state of the E.U.) that has issued as of the delivery date, solely by reason of the sale or normal use of any Products sold to Buyer hereunder and from reasonable expenses incurred by Buyer in defense of such suit if Hach does not undertake the defense thereof, provided that Buyer promptly notifies Hach of such suit and offers Hach either (i) full and exclusive control of the defense of such suit when Products of Hach only are involved, or (ii) the right to participate in the defense of such suit when products other than those of Hach are also involved. Hach's warranty as to use patents only applies to infringement arising solely out of the inherent operation of the Products according to their applications as envisioned by Hach's specifications. In case the Products are in such suit held to constitute infringement and the use of the Products is enjoined, Hach will, at its own expense and at its option, either procure for Buyer the right to continue using such Products or replace them with non-infringing products, or modify them so they become non-infringing, or remove the Products and refund the purchase price (prorated for depreciation) and the transportation costs thereof. The foregoing states the entire liability of Hach for patent infringement by the Products. Further, to the same extent as set forth in Hach's above obligation to Buyer, Buyer agrees to defend, indemnify and hold harmless Hach for patent infringement related to (x) any goods manufactured to the Buyer's design, (y) services provided in accordance with the Buyer's instructions, or (z) Hach's Products when used in combination with any other devices, parts or software not provided by Hach hereunder.
- 10. TRADEMARKS AND OTHER LABELS:** Buyer agrees not to remove or alter any indicia of manufacturing origin or patent numbers contained on or within the Products, including without limitation the serial numbers or trademarks on nameplates or cast, molded or machined components.



11. **SOFTWARE.** All licenses to Hach's separately-provided software products are subject to the separate software license agreement(s) accompanying the software media. In the absence of such terms and for all other software, Hach grants Buyer only a personal, non-exclusive license to access and use the software provided by Hach with Products purchased hereunder solely as necessary for Buyer to enjoy the benefit of the Products. A portion of the software may contain or consist of open source software, which Buyer may use under the terms and conditions of the specific license under which the open source software is distributed. Buyer agrees that it will be bound by any and all such license agreements. Title to software remains with the applicable licensor(s).

12. **PROPRIETARY INFORMATION; PRIVACY:** "Proprietary Information" means any information, technical data or know-how in whatever form, whether documented, contained in machine readable or physical components, mask works or artwork, or otherwise, which Hach considers proprietary, including but not limited to service and maintenance manuals. Buyer and its customers, employees and agents will keep confidential all such Proprietary Information obtained directly or indirectly from Hach and will not transfer or disclose it without Hach's prior written consent, or use it for the manufacture, procurement, servicing or calibration of Products or any similar products, or cause such products to be manufactured, serviced or calibrated by or procured from any other source, or reproduce or otherwise appropriate it. All such Proprietary Information remains Hach's property. No right or license is granted to Buyer or its customers, employees or agents, expressly or by implication, with respect to the Proprietary Information or any patent right or other proprietary right of Hach, except for the limited use licenses implied by law. Hach will manage Customer's information and personal data in accordance with its Privacy Policy, located at <http://www.hach.com/privacypolicy>.

13. **CHANGES AND ADDITIONAL CHARGES:** Hach reserves the right to make design changes or improvements to any products of the same general class as Products being delivered hereunder without liability or obligation to incorporate such changes or improvements to Products ordered by Buyer unless agreed upon in writing before the Products' delivery date. Services which must be performed as a result of any of the following conditions are subject to additional charges for labor, travel and parts: (a) equipment alterations not authorized in writing by Hach; (b) damage resulting from improper use or handling, accident, neglect, power surge, or operation in an environment or manner in which the instrument is not designed to operate or is not in accordance with Hach's operating manuals; (c) the use of parts or accessories not provided by Hach; (d) damage resulting from acts of war, terrorism or nature; (e) services outside standard business hours; (f) site prework not complete per proposal; or (g) any repairs required to ensure equipment meets manufacturer's specifications upon activation of a service agreement.

14. **SITE ACCESS / PREPARATION / WORKER SAFETY / ENVIRONMENTAL COMPLIANCE:** In connection with services provided by Hach, Buyer agrees to permit prompt access to equipment. Buyer assumes full responsibility to back-up or otherwise protect its data against loss, damage or destruction before services are performed. Buyer is the operator and in full control of its premises, including those areas where Hach employees or contractors are performing service, repair and maintenance activities. Buyer will ensure that all necessary measures are taken for safety and security of working conditions, sites and installations during the performance of services. Buyer is the generator of any resulting wastes, including without limitation hazardous wastes. Buyer is solely responsible to arrange for the disposal of any wastes at its own expense. Buyer will, at its own expense, provide Hach employees and contractors working on Buyer's premises with all information and training required under applicable safety compliance regulations and Buyer's policies. If the instrument to be serviced is in a Confined Space, as that term is defined under OSHA regulations, Buyer is solely responsible to make it available to be serviced in an unconfined space. Hach service technicians will not work in Confined Spaces. In the event that a Buyer requires Hach employees or contractors to attend safety or compliance training programs provided by Buyer, Buyer will pay Hach the standard hourly rate and expense reimbursement for such training attended. The attendance at or completion of such training does not create or expand any warranty or obligation of Hach and does not serve to alter, amend, limit or supersede any part of this Contract.

15. **LIMITATIONS ON USE:** Buyer will not use any Products for any purpose other than those identified in Hach's catalogs and literature as intended uses. Unless Hach has advised the Buyer in writing, in no event will Buyer use any Products in drugs, food additives, food or cosmetics, or medical applications for humans or animals. In no event will Buyer use in any application any Product that requires FDA 510(k) clearance unless and only to the extent the Product has such clearance. Any warranty granted by Hach is void if any goods covered by such warranty are used for any purpose not permitted hereunder.

16. **EXPORT AND IMPORT LICENSES AND COMPLIANCE WITH LAWS:** Unless otherwise specified in this Contract, Buyer is responsible for obtaining any required export or import licenses. Hach represents that all Products delivered hereunder will be produced and supplied in compliance with all applicable laws and regulations. Buyer will comply with all laws and regulations applicable to the installation or use of all Products, including applicable import and export control laws and regulations of the U.S., E.U. and any other country having proper jurisdiction, and will obtain all necessary export licenses in connection with any subsequent export, re-export, transfer and use of all Products and technology delivered hereunder. Buyer will not sell, transfer, export or re-export any Hach

Products or technology for use in activities which involve the design, development, production, use or stockpiling of nuclear, chemical or biological weapons or missiles, nor use Hach Products or technology in any facility which engages in activities relating to such weapons. Buyer will comply with all local, national, and other laws of all jurisdictions globally relating to anti-corruption, bribery, extortion, kickbacks, or similar matters which are applicable to Buyer's business activities in connection with this Contract, including but not limited to the U.S. Foreign Corrupt Practices Act of 1977, as amended (the "FCPA"). Buyer agrees that no payment of money or provision of anything of value will be offered, promised, paid or transferred, directly or indirectly, by any person or entity, to any government official, government employee, or employee of any company owned in part by a government, political party, political party official, or candidate for any government office or political party office to induce such organizations or persons to use their authority or influence to obtain or retain an improper business advantage for Buyer or for Hach, or which otherwise constitute or have the purpose or effect of public or commercial bribery, acceptance of or acquiescence in extortion, kickbacks or other unlawful or improper means of obtaining business or any improper advantage, with respect to any of Buyer's activities related to this Contract. Hach asks Buyer to "Speak Up!" if aware of any violation of law, regulation or our Standards of Conduct ("SOC") in relation to this Contract. See <http://danaher.com/integrity-and-compliance> and www.danaherintegrity.com for a copy of the SOC and for access to our Helpline portal.

17. **FORCE MAJEURE:** Hach is excused from performance of its obligations under this Contract to the extent caused by acts or omissions that are beyond its control of, including but not limited to Government embargoes, blockages, seizures or freeze of assets, delays or refusals to grant an export or import license or the suspension or revocation thereof, or any other acts of any Government; fires, floods, severe weather conditions, or any other acts of God; quarantines; labor strikes or lockouts; riots; strife; insurrections; civil disobedience or acts of criminals or terrorists; war; material shortages or delays in deliveries to Hach by third parties. In the event of the existence of any force majeure circumstances, the period of time for delivery, payment terms and payments under any letters of credit will be extended for a period of time equal to the period of delay. If the force majeure circumstances extend for six months, Hach may, at its option, terminate this Contract without penalty and without being deemed in default or in breach thereof.

18. **NON ASSIGNMENT AND WAIVER:** Buyer will not transfer or assign this Contract or any rights or interests hereunder without Hach's prior written consent. Failure of either party to insist upon strict performance of any provision of this Contract, or to exercise any right or privilege contained herein, or the waiver of any breach of the terms or conditions of this Contract will not be construed as thereafter waiving any such terms, conditions, rights, or privileges, and the same will continue and remain in force and effect as if no waiver had occurred.

19. **LIMITATION OF LIABILITY:** None of the Hach Indemnified Parties will be liable to Buyer under any circumstances for any special, treble, incidental or consequential damages, including without limitation, damage to or loss of property other than for the Products purchased hereunder; damages incurred in installation, repair or replacement; lost profits, revenue or opportunity; loss of use; losses resulting from or related to downtime of the products or inaccurate measurements or reporting; the cost of substitute products; or claims of Buyer's customers for such damages, howsoever caused, and whether based on warranty, contract, and/or tort (including negligence, strict liability or otherwise). The total liability of the Hach Indemnified Parties arising out of the performance or nonperformance hereunder or Hach's obligations in connection with the design, manufacture, sale, delivery, and/or use of Products will in no circumstance exceed in the aggregate a sum equal to twice the amount actually paid to Hach for Products delivered hereunder.

20. **APPLICABLE LAW AND DISPUTE RESOLUTION:** The construction, interpretation and performance hereof and all transactions hereunder shall be governed by the laws of the State of Colorado, without regard to its principles or laws regarding conflicts of laws. If any provision of this Contract violates any Federal, State or local statutes or regulations of any countries having jurisdiction of this transaction, or is illegal for any reason, said provision shall be self-deleting without affecting the validity of the remaining provisions. Unless otherwise specifically agreed upon in writing between Hach and Buyer, any dispute relating to this Contract which is not resolved by the parties shall be adjudicated in order of preference by a court of competent jurisdiction (i) in the State of Colorado, U.S.A. if Buyer has minimum contacts with Colorado and the U.S., (ii) elsewhere in the U.S. if Buyer has minimum contacts with the U.S. but not Colorado, or (iii) in a neutral location if Buyer does not have minimum contacts with the United States.

21. **ENTIRE AGREEMENT & MODIFICATION:** These Terms & Conditions of Sale constitute the entire agreement between the parties and supersede any prior agreements or representations, whether oral or written. No change to or modification of these Terms & Conditions shall be binding upon Hach unless in a written instrument specifically referencing that it is amending these Terms & Conditions of Sale and signed by an authorized representative of Hach. Hach rejects any additional or inconsistent Terms & Conditions of Sale offered by Buyer at any time, whether or not such terms or conditions materially alter the Terms & Conditions herein and irrespective of Hach's acceptance of Buyer's order for the described goods and services.

* * *



APPENDIX D

**PRELIMINARY OPINION OF
TOTAL ESTIMATED CAPITAL COST FOR
TREATED WATER STORAGE
OLD WHITESVILLE TANK REPLACEMENT**

*Regional Intergovernmental Council
SWPP - Boone Raleigh PSD*

Item	Description	Unit	Quantity	Unit Price	Estimated Cost
1	Mobilization/Insurance/Bonding	LS	1	\$ 31,000.00	\$ 31,000.00
2	Existing Tank Demolition	LS	1	\$ 35,000.00	\$ 35,000.00
3	160,000 Gallon Tank (including roof)	LS	1	\$ 280,000.00	\$ 280,000.00
4	Foundation	LS	1	\$ 61,000.00	\$ 61,000.00
5	Valve Vault/Piping	LS	1	\$ 14,000.00	\$ 14,000.00
6	Electrical / Telemetry	LS	1	\$ 45,000.00	\$ 45,000.00
7	Site Work (grading/stone)	LS	1	\$ 4,000.00	\$ 4,000.00
8	Fence	LF	300	\$ 45.00	\$ 13,500.00
9	Gate	EA	1	\$ 750.00	\$ 750.00
10	Connection to Existing Water Line	EA	1	\$ 2,500.00	\$ 2,500.00
11	8" DIP Class 50 Water Line	LF	100	\$ 60.00	\$ 6,000.00
	Subtotal:				\$ 492,750.00
	Contingency (20%):				\$ 98,550.00
	Soft Costs (30%):				\$ 177,390.00
	TOTAL:				\$ 768,690.00
	SAY:				\$ 800,000

Notes: 1. Soft costs include engineering, legal, accounting, administrative, land acquisition and other non-construction items.

2. Additional monies would be required if mixer required.

3. Price of water line includes valving.

APPENDIX E. SUPPORTING DOCUMENTATION

Meeting Notes

Boone Raleigh PSD

June 24, 2016

Attendees: See sign in sheet for participants from community. Also in attendance were Richard Shaver of the WVDHHR and Mindy Ramsey of Tetra Tech, Inc.

Mindy provided an overview of the source water protection plan requirements and explained Tetra Tech's role to compile the source water protection plan components from the original plan by Potesta and the contingency plan by Potesta. She also explained that she will assist with the requirement to engage and inform local stakeholders. Lastly, she explained the purpose of the meeting was to review the existing draft plan to obtain answer to some questions and verify the existing information.

During a review of the draft document, the following areas were discussed specifically.

- a. Delineations (ZCC, ZPC, and watershed), Protection Team, Priority PSSCs, Management Strategies, Communication Plan
- b. Completing/Clarifying Information
 - i. Protection team participants, titles, telephone numbers, and emails for participants (Table 6)
 - ii. Provide overview of PSSCs (see next page)
 - iii. Are all concerns addressed? (Table 8) The mine is probably the most likely source of contamination. They have a close relationship with the mine and are regularly notified if there is a release. The mining engineers have also assisted with leak detection. Participants confirmed that railways and railyards are a concern. There is a package plant in the protection area.
 - iv. Are management strategies appropriate to commit effort? (Table 9)
 - v. Education and outreach strategies appropriate to commit effort? (Table 10)
 - vi. Discuss the communication plan and team members(Appendix C)
 - vii. Discuss Emergency Short Forms(p. C-6) Mindy will send Inza the forms to complete. Inza explained that when there is an emergency they contact the news, radio, Facebook, and utilize a phone tree system in which sensitive populations are contacted first.

GET INVOLVED IN SOURCE WATER PROTECTION

Boone Raleigh Water PSD has developed a Source Water Protection Plan to comply with recent state legislation regarding drinking water. All public water utilities that use surface water sources must complete and submit a plan by July 1, 2016.



-Source Water Protection Plans are valuable tools to help any public water system plan for and manage water emergencies. Development of these plans relies on the involvement of water utility personnel, local government officials, emergency managers, health department representatives, and local community leaders.

-Your water system is committed to informing and engaging the public during development and implementation of this plan. You are invited to attend the PSD board meeting to learn about the plan. Now is your chance to provide your input.

To learn more, please attend the board meeting on
[June 24, 2016 at 12:00 noon](#)

For more information about the plan contact:
Phone: 304-854-0584

Tetra Tech, Inc.
803 Quarrier Street, Suite 400, Charleston, WV 25301
Tel 304-414-0054 Fax 304-720-2334 tetratech.com

SOURCE WATER PROTECTION PLANNING

Water Utility: Boone Raleigh PSD

page 1 of

Date: 6/24/16

Sign In Sheet

Name	Address	Phone Number
Anna Chapney	P.O. Box 174 Sylvester WV 25193	[REDACTED]
Camee For Chance	P.O. Box 174, SYLVESTER WV 25193	[REDACTED]
Parker Koff	P.O. Box 361 Whitesville WVA 25209	[REDACTED]
Henry Kayakoff Jr	DHHR, BPH, OETS 350 Capitol St., Rm. 313 Charleston, WV 25301-37	[REDACTED]
R.K. Shaver	P.O. Box 485 Sylvester	[REDACTED]
MANUEL P. ARYON	PO Box 716 Whitesville WV 25209	[REDACTED]
Robert Wiseman		[REDACTED]
		[REDACTED]
		[REDACTED]
		[REDACTED]
		[REDACTED]
		[REDACTED]
		[REDACTED]
		[REDACTED]
		[REDACTED]

Example Letter to Business for SURFACE WATER

Month/Day/Year

Local Business Owner

Address

City, West Virginia Zip Code

Dear Local Business Owner,

This letter is to make you aware that you own or regulate properties and/or resources within or near the Source Water Protection Area for our community's drinking water. This protection area was developed for the [PUBLIC UTILITY] by the West Virginia Department of Health and Human Resources and provided in a source water assessment report and protection plan.

Our drinking water is supplied from a surface water source. Chemicals used in industrial processes, highway maintenance, agricultural and municipal land uses can contaminate surface water. Water used in these processes and draining from sites can carry contaminants to surface water. These substances can enter the surface water through improper management or accidental incidents. The [PUBLIC UTILITY] water system can be protected from any contamination that enters the surface water if alerted to an incident immediately. Once alerted, the operators can shut down the intake. If not shut down, a contaminant could be drawn into the water system, possibly endangering public health and resulting in a costly cleanup.

[PUBLIC UTILITY] is asking all businesses, landowners, utilities, and agencies located, owning, or regulating properties within the protection area to follow all regulations as required by state and federal laws, report any spills to appropriate officials, and implement best management practices within operations to prevent the improper management of any materials that could contaminate the surface water resources. Ideally facilities will formally include notification to the [PUBLIC UTILITY] in their own Emergency Response Plan.

In addition, [PUBLIC UTILITY] is creating a local program to identify "Partners in Source Water Protection." Participation in the program will mean that your facility would make a good faith effort to cooperate with [PUBLIC UTILITY] in a contamination event from your site to identify protocols to detect contamination and support response to clean up the contaminants.

[PUBLIC UTILITY] thanks you for your cooperation and assistance. If you have any questions or would like to review the drinking water source assessment report or protection plan, or if you would be willing to partner with the water system, please contact [PUBLIC UTILITY].

Sincerely,

Example Letter to Resident for Surface Water

Month/Day/Year

Local Resident

Address:

Dear Local Resident,

This letter is to make you aware that your residence is located within or near the [PUBLIC UTILITY] Drinking Water Source Protection Area. This protection area was developed by the West Virginia Department of Health and Human Resources and provided in a drinking water source assessment report and a protection plan.

Our source of drinking water is supplied by surface water that draining from the watershed in which you reside. Liquid substances such as automotive products, fuel oil, cleaning fluids, pharmaceutical, pesticides, fertilizers, and sediments are common water contaminants. These substances can enter the water through improper disposal methods. Improper disposal methods include pouring chemicals on the ground, down a sink or toilet connected to a septic system, or down storm drains. Any contamination that enters the water resources will force the [PUBLIC UTILITY] to implement additional costly measures in order to assure the water supplied to local customers is safe to drink.

[PUBLIC UTILITY] is asking all residents living within the protection area to report any spills to appropriate officials and prevent the improper disposal of any liquids that could contaminate the water resources. In addition, residents should have septic systems inspected and maintained regularly to protect the source water.

[PUBLIC UTILITY] thanks you for your cooperation and assistance. If you have any questions or would like to review the [PUBLIC UTILITY] source water assessment report or protection plan, please contact [PUBLIC UTILITY].

Sincerely,

*Do your part to keep
contaminants out of our
children's source water!*



Contaminants

Cleaning Products

Automotive Products

Fuel Oil

Furniture Strippers

Oil-based Paints

Sewage

Lawn and Garden Products

Sediments

Pharmaceuticals

Source Water Links

www.wvdhhr.org/oehs/eed/swap/
www.epa.gov/safewater/index.html
www.epa.gov/watersense/
<http://orsanco.org>

For Kids

www.epa.gov/safewater/kids/index.html
www.epa.gov/watersense/kids/index.html
www.groundwater.org/kids/



Contacts

WV Department of Health and Human Resources
Source Water Assessment and Protection Program
350 Capitol Street, Room 313
Charleston, WV 25301-3713
phone: (304) 558-2981
fax: (304) 558-4322
e-mail: EEDSourceWaterProtection@wv.gov

*Do Your Part
Protect Your
Source Water
Protect Your
Health*



Prepared by Tetra Tech
In cooperation with the WVDHHR Source Water
Assessment and Protection Program

Drinking water is essential for life. Learn what you can do to protect your drinking water sources.

Making choices to protect and conserve the source of your drinking water will help keep you, your family, and neighbors safe and healthy now and in the future.

Do Your Part to Protect Source Water

- ✓ Recycle used oil and other automotive products at a service center. Don't pour them on the ground or down storm drains. Storm drains can lead directly to your source water.
- ✓ Fix leaks from your automobile and clean up spills.
- ✓ Apply fertilizers and pesticides as directed. Consider natural alternatives to chemicals.
- ✓ Don't flush pharmaceuticals. Dispose by mixing with coffee grounds or kitty litter, sealing in a container, and placing in the trash. Organize a collection day with a pharmacy and local police department.
- ✓ Take unwanted household chemical waste, such as cleaners, oils, and paints to proper waste collection sites. Don't dump down your sink, toilet, or storm drains. Consider organizing a collection day in your community.
- ✓ Check for leaks at heating fuel tanks and install pads to catch accidental leaks or spills.
- ✓ Report unused water wells to your utility or WVDHHR.
- ✓ Inspect your septic system regularly and pump every 5-10 years.



Do Your Part to Conserve Source Water

- ✓ Turn off the water when you brush your teeth and take shorter showers.
- ✓ Wash full loads of clothes and dishes.
- ✓ Don't use your toilet to flush trash.
- ✓ Fix leaking faucets, toilets, and lines. Consider installing toilets, faucets, and appliances designed to save water.
- ✓ Water your lawn and garden in the morning. Consider installing a rain barrel at your downspouts to collect rain to water your lawn and garden, instead of using treated water.
- ✓ Use native plants in landscape that don't need extra watering. Use mulch to hold moisture.
- ✓ Don't let your garden hose run when washing your car.
- ✓ Don't panic if you are asked to conserve during a drought. Your utility will respond to water shortages based on your normal water use. Running extra water in your home during a drought will make it more difficult to respond to the water shortage.



Conserving water saves on your monthly bill now. Protecting your source water will save on treatment costs later.