State of West Virginia
Source Water Assessment and Protection Program

Source Water Assessment Report

Holden Water System
Logan County
PWSID: WV3302339

Prepared by:

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

Date: January 2003

Ground Water Public Water Supply Systems

Source Water Assessment and Protection (SWAP) Program

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

What is the Purpose of this Report?

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

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

The emphasis of this assessment is on "source" (well/spring) water rather than the "tap" water. Information on tap water quality is available in the Consumer Confidence Report, which can be obtained from your local water supplier.

This report identifies the significant potential contaminant sources that could threaten source(s) water quality. Your susceptibility ranking does not imply poor water quality. Actual water quality is best reflected by results of regular water tests. Please refer to Table 1 for an informational summary of your public water supply:

Table 1: Public Water Supply Information

PWS Name	Holden Water System
Address	Drawer A
City, State, Zip	Holden, WV 25625
PWSID#	3302339
County	Logan
System Type	Community

What is my Well's Source Water Protection Area?

A well(s) or spring source water protection area (SWPA) is the land around the well where protection activities should be focused. The SWPA is the area that is likely contributing water to the well. Please refer to the attached map for your SWPA.

What is SWAP?

The SWAP, established under the Safe Drinking Water Act, requires every state to:

- Delineate the area from which a public water supply system receives its water;
- Inventory land uses within the recharge areas of all public water supplies;
- Assess the susceptibility of drinking water sources to contamination from these land uses;
- Publicize the results to provide support for improved protection of sources.

The West Virginia BPH will complete all of these components of a source water assessment.

What is Susceptibility?

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

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

How Was my Well's Susceptibility Determined?

Your well(s) susceptibility is based on the following parameters:

- Review of the hydrologic setting (ease of contamination transport through each materials present in the local hydrologic setting);
- Review of the physical integrity of the well;
- Review of available ground water quality data;
- Characterization of the potential significant contaminant sources identified in the SWPA;
- Integration of this information to identify the greatest threats to the source water and suggestions of appropriate protection strategies or activities.

Source of Your Drinking Water - Hydrogeologic Setting

Well/Spring Name	Geologic Setting/Sensitivity
#1 Upper Well (Backup)	Coal Mines - High Sensitivity
#2 Upper Well (Backup)	Coal Mines - High Sensitivity
#1 Junior Mine Well	Coal Mines - High Sensitivity

The Holden Water system serves a population of approximately 1555 people. The supply is from a well into the #1 Junior Mine with two backup wells. The wells are pumped to provide an average daily production of about 206,500 gallons per day. The Coal Mine Areas consists of areas where the underground mining of coal has occurred and has left an underground void and will function as a ground water drain for all of the permeable rocks above it. The mines may store a large quantity of water or may deplete surrounding ground water for an entire area if the mine is draining freely.

The estimated land area (approximately 622.9 acres) that contributes water to the well is depicted in the attached map as the Source Water Protection Area (SWPA). The SWAP program's consultant, Gannett Fleming, used a modified volumetric flow equation with hydrogeologic mapping to determine the source water protection area (delineation). Groundwater flow was determined from structural geology of coalmine maps where applicable. Mine maps and USGS 7.5 minute topographic maps were used in this process as well. The secondary zone represents an area of influence within the coalmine that is outside a five-year time of travel using hydrogeologic calculations.

Due to the complex nature of mines, a secondary delineation area was estimated. This secondary area is considered part of the overall protection management area of the Source Water Assessment and Protection Plan. These secondary delineations have been developed for water systems that utilize mines for their source water and further demarcate a larger area that may be capable of influencing source water quality beyond the area that serves as the primary source water protection area representing a five-year time of travel for groundwater. The secondary area includes the entire up-dip area of the mine works relative to the intake location. In some cases, the mined-out area extends beyond the area depicted on the referenced figures. Contamination in the secondary zone could impact water quality. Contamination introduced anywhere in the entire extent of most mines has the potential to adversely impact water quality at some point after introduction. Care should be taken to protect these valuable resources.

Physical Integrity of Well or Spring

Well/Spring Name	Source Integrity
#1 Upper Well (Backup)	Unknown Construction
#2 Upper Well (Backup)	Unknown Construction
#1 Junior Mine Well	Unknown Construction

Wells may vary in their construction characteristics and in the geologic rock types in which they occur. The lack of an effective grout and sanitary seals are avenues by which contaminants from nearby surface water bodies or overland runoff can percolate to wells. Based on onsite reviews and the ground water under the direct influence data the well integrity was rated generally satisfactory or good, with no visible problems existing during the visit.

Water Quality and Water Treatment Information

Well/Spring Name	**Results**
#1 Upper Well (Backup)	Meets Standards
#2 Upper Well (Backup)	Meets Standards
#1 Junior Mine Well	Meets Standards

This assessment evaluates contaminants that may enter the water drawn directly from the well. The contaminants addressed in this assessment include those regulated under the Safe Drinking Water Act as well as those the BPH has determined may present a concern to public health. The water withdrawn from the well is currently disinfected prior to distribution. Periodic analysis for a variety of bacterial, organic, nitrate, synthetic and inorganic contaminants in the water after treatment have consistently yielded values below the maximum contaminant level (MCL) as regulated by the Safe Drinking Water Act. Drinking water that meets MCL standards is associated with little or no health risk and is considered safe. Because sampling requirements are for treated water, the lack of water quality impacts does not necessarily indicate a lack of contamination. This determination is limited by the sampling that is performed for the water system. There was a peak nitrate level of 13.90 mg/l in 1994. The next highest value is 4.35 mg/l. The MCL for nitrate is 10mg/l. Nitrates occur generally from fertilizer and are found in sewage and wastes from human and/or farm animals. Sodium, sulfate, iron and manganese have all reported sporadic elevated values. In 1994 there was a measurable result for the VOC carbon tetrachloride. Trihalomethanes, a secondary product related to chlorination, has been detected in the finished water.

All drinking water including bottled water may reasonably be expected to contain small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. For further information regarding the quality of the system's finished water, please refer to the Consumer Confidence Report or call the Environmental Protection Agency's Safe Drinking Water Hotline at 1-800-426-4791 or contact your local health provider for more information about contaminants and potential health effects.

Evaluation of Significant Potential Sources of Contamination

The inventory for Holden Water System consists of approximately 31 significant Potential Contaminant Sources (PCS) of which six (6) are considered higher threats to ground water. This only includes the primary area and not the secondary area. Please refer to Table 2 for a listing of these and the attached map for the location of these in the SWPA. Each significant potential

source of contamination has been analyzed and prioritized (low, moderate, and high) in accordance with their potential to impact the water supply. It is important to note that the links between the PCS and the primary contaminant types are not intended to be comprehensive, but only those commonly associated with the PCS. Any potential source may have none, some, or more types of contaminants associated with the chemicals indicated. Threat rankings are a combination of the perceived risk of the release of a contaminant from a land use area, the migration route of the contaminant to the well or spring and the relative public health risk of the contaminant itself. The risk rankings are based on the general nature of their activities and the contaminants associated with them, not on facility specific information, such as management practices. This ranking does not take into consideration any unforeseen releases or the dynamics of new PCS's within the delineated SWPA. A detailed risk assessment of PCS's was beyond the scope of what could be accomplished with available resources and data. A detailed risk analysis is more meaningful when prepared by local decision makers as the bridge from assessment work to protection strategies.

Recommendation for your Source Water Assessment and Protection Activities

Based on this summarized narrative and susceptibility review for each well, the overall susceptibility ranking for Holden Water System indicates a higher susceptibility to the identified potential sources of contamination. For this susceptibility analysis, the State combined the inventory results with other relevant information to decide how likely a water supply may become contaminated by the identified potential sources of contamination. This step makes the assessments useful for communities, since it provides information that local decision-makers use to prioritize approaches for protecting the drinking water supply. It does not mean that these wells are currently contaminated or that these wells are going to be contaminated in the near future, but the potential does exist.

An aquifer protection management program should be developed for the well. Preferably, the protection plan should be developed for the entire SWPA with the cooperation of neighboring towns, county, and state agencies. It is recommended that protection and management efforts should focus on obtaining additional information on the sources present to evaluate their risk. Holden Water System may want to consider the following:

1. Reduce existing chronic threats by obtaining further detailed information concerning Leaking Underground Storage Tanks (LUST's) or other Underground Storage Tanks (UST's) within the SWPA that are now in service or were in the past. This information should include the type of leak detection and corrosion protection currently being used at the facility.

2. Investigate what types of preventative pollution measures are being conducted by the industrial or commercial facilities located within the SWPA. Some facilities may already have developed their Groundwater Protection Plan (GPP) for their facility.

3. The railroad is a threat because of the potential for spills, leaks or derailments. A section of railroad passes adjacent to the SWPA.

4. Inspect the SWPA regularly.

5. Nitrate trends should be analyzed and developed to determine if the concentration is increasing, decreasing, or stable. Nitrates occur generally from fertilizer and are found in sewage and wastes from human and/or farm animals. Drinking water that meets the MCL standard is associated with little or no risk and is considered safe.

6. Implement Land Use Planning tools to influence future developments within the SWPA. One way to accomplish this is to join forces with the county to adopt a zoning ordinance that would govern certain uses that are considered thigh threats to ground water.

7. Provide maps of the SWPA to the Berkeley County Planning Commission to make them aware of the location of proposed development in relation to the water supply source.

8. Establish funds to purchase land banks of critical areas (e.g. around sinkholes, wells, springs) to preserve the areas from future development.

9. Support and encourage the implementation of Best Management Practices for agricultural areas including grazing lands, crop production farms, and orchards. In addition, support information can be provided to residents and commercial users to encourage the reduction in over use of common pesticides and fertilizers.

10. Implement systems for regular collection of hazardous waste from residents

11. Encourage and implement public education about your water supply regarding its susceptibility to contamination and ways to protect. This could come in the form of brochures containing information and advice about ground water and the local terrain. For example, the Berkeley County Health Department has an on-going educational program that is presented to all fourth graders in the county.

12. Support and encourage the identification of contamination incidents by citizens.

13. Include information regarding contamination and source water protection in mailings to homeowners, including non-emergency contact information. Reduce the amount of septic systems in use by extension of the public sewer system or other approved systems.

Next Step:

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

<u>Contingency Planning</u>
A contingency plan documents the system's planned response to interruption of the source water.

Alternative Sources

Information pertaining to alternative water sources focusing on long-term source replacement should the system be required to develop a new source of water due to contamination (or other reasons). This section outlines the most likely sources that can be utilized.

Management Planning

Management planning is the most important element of SWAP. The management plan identifies specific activities that will be pursued by the system to protect their water resources. The system will benefit by taking a proactive approach to source water protection in their source water protection area. It is anticipated that most of the management effort will focus on coordination with government agencies and periodic surveys of the watersheds. It may be necessary to conduct a limited number of special studies to determine actual risk and consequences for selected contaminant sources. This information may be needed before decisions can be made on management activities.

Need additional information?

Visit the WVBPH Web site at www.wvdhhr.org/bph/swap or call 304-558-2981 to obtain additional information or sources of information.

***Disclaimer - The coverage presented in this program are under constant revision as new sites or facilities are added. They may not contain all the potential or existing sites or facilities. The West Virginia Bureau for Public Health is not responsible for the use or interpretation of this information.**

Please report any revisions or updates on either the map or inventory in writing to the WVBPH within 15 days of receipt of this report.

Table 2: Potential Contaminant Sources (PCS)

Sequential Number	Map Code	PCS Category	PCS Name	Associated Chemicals	Threat to GW
1	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
2	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
3	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
4	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
5	I-25	Industrial	Mining: underground	M, T	H
6	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
7	I-24	Industrial	Mining: Surface	M, T	M
8	I-24	Industrial	Mining: Surface	M, T	M
9	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
10	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
11	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
12	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
13	I-24	Industrial	Mining: Surface	M, T	M
14	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
15	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
16	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
17	I-20	Industrial	Machine and metalworking shops	M, VOC, HM, PH, SOC	H
18	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
19	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
20	I-24	Industrial	Mining: Surface	M, T	M
21	I-20	Industrial	Machine and metalworking shops	M, VOC, HM, PH, SOC	H
22	I-25	Industrial	Mining: underground	M, T	H
23	I-24	Industrial	Mining: Surface	M, T	M
24	I-24	Industrial	Mining: Surface	M, T	M
25	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
26	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
27	I-25	Industrial	Mining: underground	M, T	H
28	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L
29	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L

30	C-48	Commercial	Underground Storage Tanks	PH, VOC	H
31	I-27	Industrial	Permitted Discharge Pipe (outfall)	ALL	L

Index to Associated Chemicals are as follows:

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

Glossary of Terms

Alluvium - Sediments deposited by moving rivers.

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

Conjunctive Delineation – In cases where a "groundwater" source is designated as groundwater under the direct influence (GWUDI), an additional delineation in addition to the five (5) year time of travel/recharge delineation for groundwater will be completed. The additional delineation will account for stream segments outside of the groundwater delineation in cases where the area of surface influence is known or reasonably suspected. It should be noted in Karst situations particularly, the surface link is not always an adjacent stream, but could come from a stream miles away. In these cases a conjunctive delineation may not always be performed.

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

Flood Plain - Any land area susceptible to inundation by floodwater from any source.

GWUDI or "Ground Water Under the Direct Influence" - is defined by the EPA as water beneath the surface of the ground with either a significant occurrence of insects or other macro organisms, algae, or large diameter pathogens such as Giardia, lambia or Cryptosporidium or other water characteristic such as turbidity, temperature, pH or conductivity. Systems need to determine the corrective action to comply with SWTR requirements, either filter, infect and monitor in accordance with the SWTR, abandon the source and develop a replacement source, rehabilitate the source to prevent surface water influence.

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

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

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

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

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

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

Physical (Structural) Integrity of the Well or Spring - This analysis evaluates and reviews the integrity of the well or spring structures needed to protect the water source from a Potential Contaminant Source(s). It is recognized that protective well construction characteristics can prevent the occurrence of contamination even in the presence of a Potential Contaminant Source. The design and construction of a well should include casing without cracks; tight joints between lengths of casing; adequate grout between the casing and bore hole and location (floodplain or flooding area). A spring must be protected with a "shoe box" type lid enclosure that is screened and locked to prevent unauthorized entry. Surface water runoff diversion and land use of the recharge area are paramount elements to evaluate. These features provide reasonable assurance that contaminants will not enter the well or spring through any pathway, and allow operators to focus on the potential for contaminants to migrate through the aquifer and enter into the well(s) or spring. However, even a well(s) and springs constructed to the most exacting standards may lose structural integrity with time. Maintenance records of remedial improvements also will be reviewed in evaluation of integrity.

Potential Contaminant Source (PCS) – A facility or activity that stores, uses, or produces chemicals or elements, and that has the potential to release contaminants within a source water protection area.

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

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

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

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

Source Water Assessment and Protection (SWAP) Program - The program established by the 1996 Amendments to the Safe Drinking Water Act (SDWA) which expanded the initial Wellhead Protection Program to all public drinking water supply systems including surface water systems. This program is to assess, preserve, and protect the source waters which are used to supply water for public drinking water supply systems and to provide a long term availability of an abundant supply of safe water in sufficient quantity for present and future citizens of the

State. This program also enables the water supply owners, consumers, and others to initiate and promote actions to protect their drinking water supplies with the developed information.

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

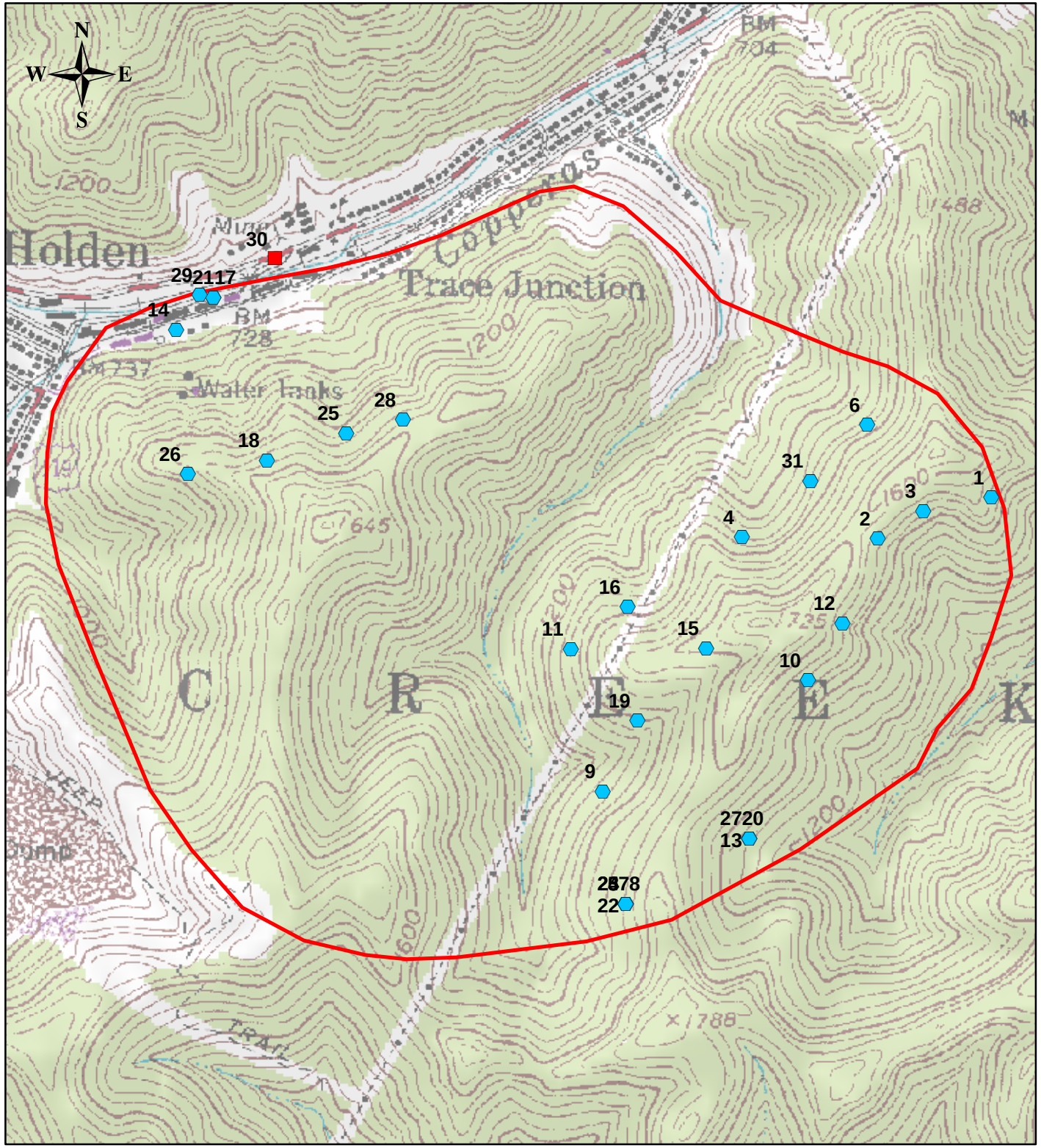
Susceptibility - The likelihood that a release from a PSCS would contaminate and render unusable a drinking water supply such as aquifers or surface steams.

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

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

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

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



Map Key

Potential Contaminant Sources

- Agriculture
- Commercial
- Industrial
- Municipal
- Residential

Source Water Protection Area

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

Holden Water Co.
WV3302339
Logan County

Scale: 1:12,000
Drawn by: JEM
10/27/05

Feet
0 1,000 2,000