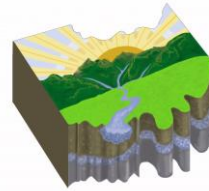


Drinking Water Source Assessment for the Buckeye Water District Public Water System



*Protecting
Ohio's Drinking
Water Sources*

SUMMARY

Source Water Assessment and Protection. The following report for the Buckeye Water District Wellsville Plant (“Wellsville”) was compiled as part of the Source Water Assessment and Protection Program for Ohio. This program is intended to identify drinking water protection areas and provide information on how to reduce the risk of contamination of the waters within those areas. The goal of the program is to ensure the long term availability of abundant and safe drinking water for the present and future citizens of Ohio.

The Safe Drinking Water Act Amendments of 1996 established the national Source Water Assessment and Protection Program, targeting drinking water sources for all public water systems in the United States. A public water system is a facility that provides drinking water to 15 or more service connections or that regularly serves at least 25 people a day for at least 60 days a year, whether from an underground well or spring, or from an above ground stream or reservoir. The requirement does not address residential wells or cisterns. In Ohio there are approximately 4,600 public water systems.

Background. Buckeye Water District operates a community public water system that serves a population of approximately 10,300 people. The source is surface water from two intakes located at river mile 47.25, approximately 800 feet off the shoreline. The system’s treatment capacity is approximately 4.0 million gallons per day, with an average production of 1.29 million gallons per day.

Protection Areas. The drinking water source protection area for the surface water source is shown in the following figure. This report includes the results of an inventory of various potential contaminant sources within the drinking water source protection area. Possible impacts to the surface water source include spills/releases from upstream industries, railways and highways, pipelines beneath the river, and from barges on the river.

Protective Strategies. The ultimate goal of source water assessment is implementation of protective strategies that will better protect the drinking water source. However, a single community cannot by itself have a significant impact on a source like the Ohio River.

Recognizing this, in 2012, representatives from Buckeye Water District, Steubenville, and Toronto met to consider what they could do collectively to lessen impacts on the river’s water quality from other uses the river provides: industrial transport, industrial cooling, discharge of waste-water, recreation, etc. Over the course of six meetings, they developed a joint source water protection plan that was endorsed by Ohio EPA in November, 2013 as meeting the requirements of Ohio’s Source Water Protection Program.

The centerpiece of the joint source water protection plan is regular (annual or biannual)

update meetings between public water suppliers and representatives of the various local industries. Public water suppliers also will improve communications with the county EMA. Other planned activities focus on increasing public information. By working together, the public water suppliers can pursue similar goals without overlap, and can share the effort involved.

For More Information. Additional information on Buckeye Water District's joint source water protection plan can be obtained at the Buckeye Water District website (<http://www.epa.ohio.gov/Portals/28/documents/swap/UpperOhioRiverFINAL.pdf>)

Current information on the quality of the treated water supplied by the Buckeye Water District is available in the Consumer Confidence Report (CCR) for the Buckeye Water District. The CCR is distributed annually and reports the most current detected contaminants and any associated health risks from data collected during the past five years. For the latest CCR, visit <http://www.buckeyewater.com/>.

How to Use this Assessment

Clean and safe drinking water is essential to everyone. Protecting the source of drinking water is a wise and cost-effective investment. The purpose of this drinking water source assessment is to provide information your community can use to develop a local Drinking Water Protection Program. The Drinking Water Source Assessment benefits your community by providing the following:

A basis for focusing limited resources within the community to protect the drinking water source(s).

The assessment provides your community with information regarding activities within the Assessment Area that potentially affect the quality of Buckeye Water District's drinking water. It is within this area that a release of contaminants, from a spill or improper usage, may travel through the watershed and reach the surface water intake. By examining where the source waters are most sensitive to contaminants, and where potential contaminants are located, the assessment identifies the potential risks that should be addressed first.

A basis for informed decision-making regarding land use within the community.

The assessment provides your community with a significant amount of information regarding where your drinking water comes from (the source) and what the risks are to the quality of that source. This information allows your community planning authorities to make informed decisions regarding proposed land uses within the Assessment Area that are compatible with both your drinking water resource and the vision of growth embraced by your community.

A start to a comprehensive plan for the watershed and source water area.

This assessment can be the beginning of a comprehensive plan for the water resource, one that addresses all of the uses the water resource provides. An ecologically healthy lake, stream and watershed will provide a stable, high quality resource for drinking water.

For information about developing a local Drinking Water Source Protection Program, please contact the Ohio EPA Division of Drinking and Ground Waters at (614) 644-2752 or visit the Division's web site at <http://www.epa.ohio.gov/ddagw/swap.aspx>

1.0 INTRODUCTION

The 1996 Amendments to the Safe Drinking Water Act established a program for states to assess the drinking water source for all public water systems. The Source Water Assessment and Protection (SWAP) Program is designed to help Ohio's public water systems protect their sources of drinking water from becoming contaminated.

The purpose of this assessment is to identify where and how the Buckeye Water District Wellsville Plant ("Wellsville") source waters are at risk of contamination. The report

- identifies drinking water protection areas,
- examines the characteristics of the watershed and water quality,
- inventories the potential contaminant sources within those areas, and
- discusses the susceptibility of the source water to contamination.

Finally, the report suggests actions that the public water supplier and local community are taking to reduce the risk of contaminating their source of drinking water and ensure the long-term availability of abundant and safe drinking water resources.

Results and recommendations presented in this report are based on the information available at the time of publication. Ohio EPA recognizes that additional information may become available in the future that could be used to more accurately determine the drinking water source protection area. Also, changes in land use will occur over time. The report should be used as a starting point to develop a plan to protect drinking water resources.

This report was originally written by Kelvin Rogers, Division of Surface Water, Ohio EPA, Northeast District Office. The 2016 revision was completed by Barb Lubberger (text) and Jeff Lewis (mapping), Division of Drinking and Ground Waters, Central Office, Ohio EPA.

2.0 PUBLIC WATER SYSTEM DESCRIPTION

The Buckeye Water District operates a community public water system that serves a population of 10,300 people residing in the Village of Wellsville and surrounding areas. The source of water is the Ohio River, with two intakes located at river mile 47.25. The system's treatment capacity is currently 4 million gallons per day, with an average daily production of 1.29 million gallons per day.

The raw water is pumped five miles to an 8 million gallon raw water reservoir. Treatment includes flocculation and sedimentation, followed by filtering through four cluster sand filters, then pumping to a 400,000 gallon clear well. Sodium permanganate is added for oxidation, and lime for pH adjustment. Chlorine and fluoride

are added before pumping to distribution. During warm months, powdered activated carbon is used to control taste and odor.

3.0 DELINEATION ZONES

Due to the size and complex nature of the Ohio River, a layered delineation system consisting of three protection zones was developed by a team led by the Ohio River Valley Water Sanitation Commission (ORSANCO). The protection zones for the Buckeye Water District are illustrated in Figure 1 and are described as follows:

The **Source Water Area** (Zone 3) is the entire portion of the Ohio River drainage basin upstream from the Buckeye Water District intakes.

The **Zone of High Concern** (Zone 2) extends one-quarter mile downstream of the Buckeye Water District intakes and upstream of the intakes to the East Liverpool water intake. This zone includes the major tributaries. The lateral extent of Zone 2 includes all subwatersheds that are adjacent to the banks of the Ohio River and major tributaries and drain into this stretch of the Ohio River.

The **Zone of Critical Concern** (Zone 1) is a subset of Zone 2. It is identical in length, but more limited in lateral extent, being one-quarter mile wide on either bank of the Ohio River and the major tributaries. In this area, a contamination event could quickly affect the water supply, so the area warrants a careful inventory (including visual inspection) and specific planning for the kinds of spills and other emergencies that could potentially occur at the sites located in this area. In this area, potential contaminant sources from U.S. EPA and Ohio EPA databases (mostly regulated facilities and permitted discharges) are identified and mapped.

Much of the assessment activity undertaken for this report was focused on Zone 1, which, for the purposes of this report, will be referred to as the “assessment area”.

4.0 HYDROLOGIC SETTING

The Ohio River Basin encompasses portions of 14 states in an area of more than 200,000 square miles, which constitutes more than 5 percent of the total United States land mass. The Ohio River itself, formed in Pittsburgh at the confluence of the Allegheny and Monongahela Rivers, is 981 miles long and flows through or borders six states - Illinois, Indiana, Kentucky, Ohio, Pennsylvania, and West Virginia. More than 25 million people reside in the Ohio River Basin, or approximately 10 percent of the total U.S. population. Of these, nearly 3 million people use the Ohio River as a source of drinking water from 32 public water system intakes. In Ohio, there are 29,570 square miles of watershed that drain to the Ohio River and more than 7,114,446 Ohioans living in this area, according to the 2000 U.S. Census.

The Ohio River serves as the drinking water source for the Buckeye Water District. The water system intake is located 12 miles upstream from the Toronto Intake, and 7 miles downstream from the East Liverpool intake on the Ohio River. Annual average

precipitation in the assessment area is approximately 40 inches, of which 14.5 inches becomes surface runoff. The assessment area is located in the Western Allegheny Plateau ecoregion.

The greatest portion of the watershed draining to the Ohio River upstream from the Buckeye Water District intakes is outside Ohio, in Pennsylvania and West Virginia.

According to the Ohio State University Extension Fact Sheet of Carroll, Harrison and Jefferson Counties, there are 8 major soil types in Carroll and Jefferson Counties. The majority of these soils are well-drained to moderately well-drained clays and loams, derived from siltstone and limestone, on gentle to very steep slopes. A significant amount of land in Jefferson County, and a smaller amount in Carroll County consists of surface mine spoils, where native soil has been removed. Some of these areas have been reclaimed, and then graded, and covered with a thin layer of acid or calcareous soil material.

Figure 1 shows the entire Ohio River watershed upstream of the Buckeye Water District water intake. Little Yellow Creek empties into the Ohio River adjacent to the intakes. Minor tributaries just upstream from the intakes include Wells Run, Carpenter Run, and Dry Run. Little Beaver Creek, which is the closest upstream major tributary, empties into the Ohio River on the Pennsylvania side of the Ohio-Pennsylvania border.

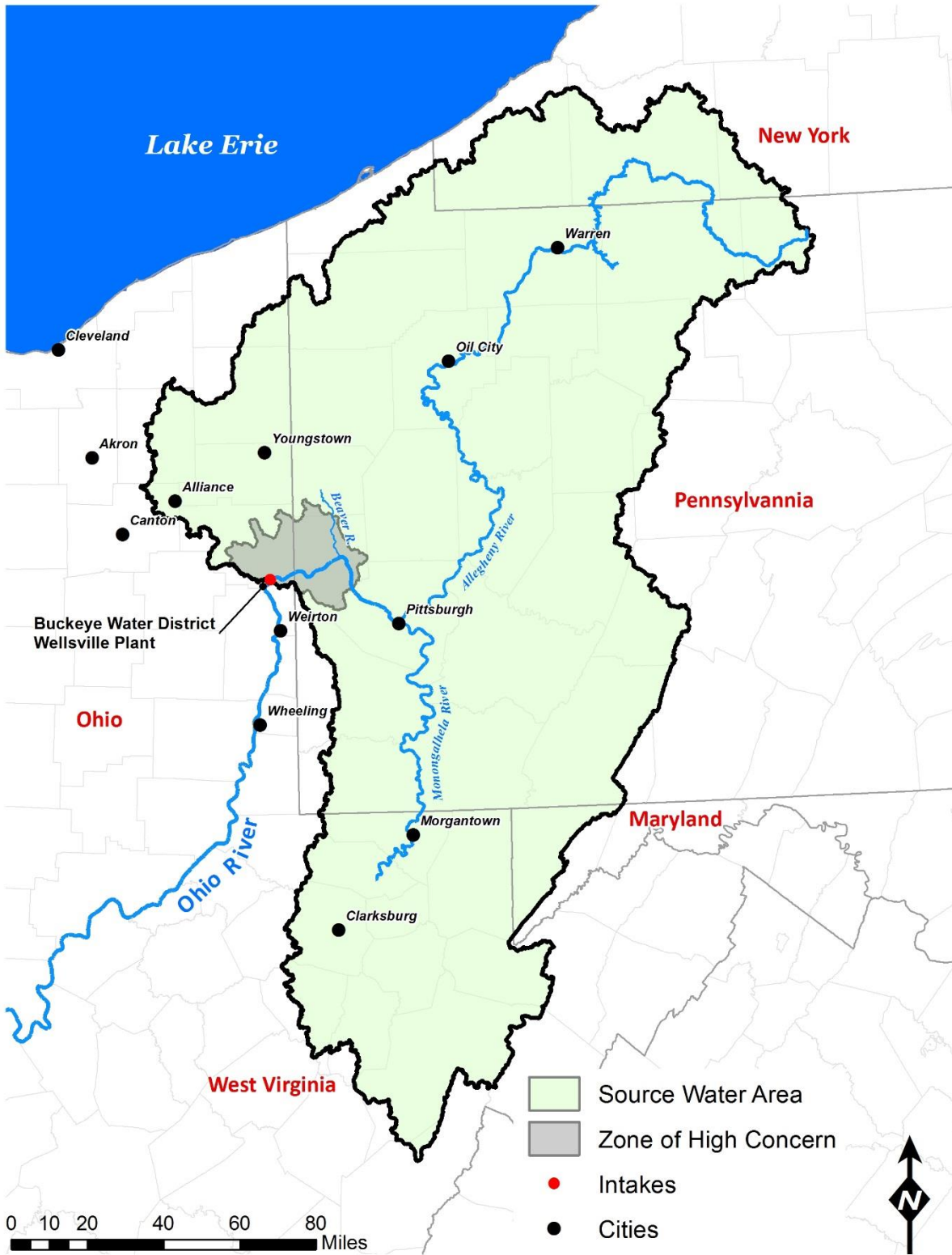


Figure 1 – Source Water Area for Buckeye Water District – Wellsville

Figure 2 shows the land use for the entire protection area. The predominant land use is deciduous forest, found in 47.5% of the area. Agriculture accounts for the majority of the remaining protection area, with pasture/hay farms in 33% and row crops in 10.7% of the area. This information was generated by the Ohio Department of Natural Resources using Landsat imagery.

5.0 WATER QUALITY

Drinking Water Quality Monitoring Summary

The Buckeye Water District conducts daily screening on raw and treated water for pH, hardness, alkalinity, fluoride and chlorine residual. Raw water is tested every 4-8 hours and finished water is tested continuously. Sampling results from treated water are reported to Ohio EPA by the public water supplier at least on a monthly basis.

Constituents commonly detected in the drinking water are primarily related to the reaction of chlorine with organic material during the treatment process, such as haloacetic acids and trihalomethanes. Copper and lead, which are detected at consumer taps, are primarily related to corrosion of household plumbing systems, not the source water quality or the treatment process. Chlorine and fluoride are detected because they are added to water for disinfection and strengthening teeth. None of these constituents exceeded the Maximum Contaminant Limit for drinking water during 2015.

Buckeye Water District completes a Consumer Confidence Report (CCR) each year that summarizes what kinds of constituents were detected in the treated water, and at what levels for the preceding year. The most recent CCR can be viewed at <http://www.buckeyewater.com/>.

Biological and Chemical Monitoring in the Ohio River and its Tributaries

ORSANCO Monitoring. The Ohio River Valley Sanitation Commission (ORSANCO) conducts water quality monitoring in the Ohio River. ORSANCO is an interstate commission representing eight states and the federal government. Monitoring activities include biological (aquatic surveys) and physical/chemical sampling and analysis of river conditions. Every two years ORSANCO reports on Ohio River water quality conditions as part of U.S EPA 305(b) program requirements. Below is a brief summary of water quality conditions as reported in ORSANCO's most recent "Assessment of Ohio River Water Quality Conditions 2010-2014" dated June 2016. This report is available from ORSANCO (www.orsanco.org).

Aquatic Life Use Monitoring. ORSANCO reports that the entire Ohio River fully supports the aquatic life use based on fish population surveys and water chemistry data. Water quality violations for Total Iron were found in the Zone of Critical Concern for Buckeye Water District in the East Liverpool area approximately five (5) miles upstream of the District's intakes. From 2010-2014, three of 34 samples (9%) exceeded the aquatic life criteria (1500 ug/l) for Total Iron.

Contact Recreation Use Monitoring. Bacteria (*E. coli*) sampling data collected and assessed by ORSANCO indicates approximately two-thirds of the Ohio River is classified as impaired. Sample locations upstream of Buckeye Water District intakes including sites at river mile 40.2, 41.2 and 44.8 currently do not support contact recreation use due to elevated bacteria sample results.

Public Water Supply Monitoring. ORSANCO chemical water quality data is used to evaluate public water supply (PWS) use conditions. This includes data from ORSANCO's Bimonthly and Clean Metals Sampling Programs. Based on an assessment of this and other PWS data, ORSANCO has designated the entire Ohio River as fully supporting the PWS use. A closer examination of human health water quality sampling in the area around Buckeye Water District revealed no violations.

Fish Consumption Monitoring. Ohio River fish consumption assessment is based on ORSANCO fish tissue data as well as water chemistry sampling. ORSANCO reports that the entire Ohio River is designated as impaired (partially supporting) fish consumption use for PCBs and dioxin. ORSANCO assessment of mercury data indicates the entire river fully supports fish consumption use for mercury.

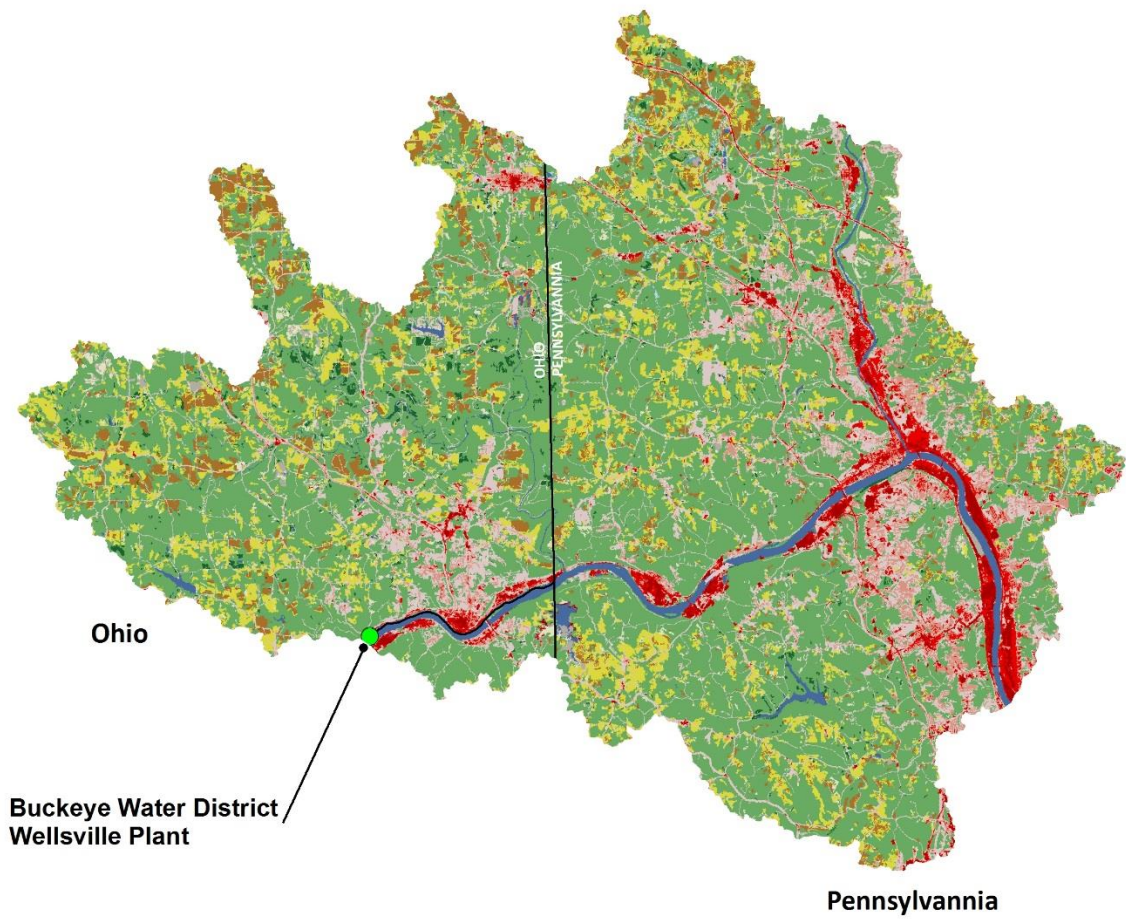
There is a statewide mercury advisory for all Ohio water bodies. There are also specific sport fish consumption advisories listed for the Ohio River within the Buckeye Water District Zone of Critical Concern. Refer to the State of Ohio Sport Fish Health and Consumption Advisory web site at <http://www.epa.state.oh.us/dsw/fishadvisory/index.aspx> for additional details.

Ohio EPA Total Maximum Daily Load (TMDL) Monitoring. Ohio EPA conducted comprehensive physical, chemical and biological monitoring in portions of the Buckeye Water District SWAP area as part of the 1999 Little Beaver Creek and 2005 Yellow Creek water quality surveys. These surveys were conducted in support of Ohio EPA's TMDL program.

Water quality concerns identified during the Little Beaver Creek survey included organic enrichment/low dissolved oxygen, siltation, nutrients, salinity, total dissolved solids and chlorides. Sources contributing to these concerns included agricultural activities (row crop production), municipal and industrial NPDES discharges, failing home sewage treatment systems and nearby surface and subsurface mining impacts. The TMDL report for Little Beaver Creek was approved by U.S. EPA on September 28, 2005.

Water quality concerns identified during the Yellow Creek water quality survey included acid mine drainage, nutrient (algal production) and elevated bacteria. Sources included surface and subsurface mining, small reservoirs (dam releases), agricultural activities and failing home sewage treatment systems. The TMDL report for Yellow Creek was approved by U.S. EPA on March 18, 2010.

Additional details on these TMDL projects are available from Ohio EPA's web site at <http://epa.ohio.gov/dsw/tmdl/index.aspx>.



















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|---|--|
|  Unclassified |  Evergreen Forest |
|  Open Water |  Mixed Forest |
|  Developed, Open Space |  Shrub/Scrub |
|  Developed, Low Intensity |  Herbaceous |
|  Developed, Medium Intensity |  Hay/Pasture |
|  Developed, High Intensity |  Cultivated Crops |
|  Barren Land |  Woody Wetlands |
|  Deciduous Forest |  Emergent Herbaceous Wetlands |



Figure 2 – Land Cover for Buckeye Water District – Wellsville Source Water Area Zone of High Concern (source: National Land Cover Database, 2011. MRLC Consortium.)

6.0 POTENTIAL CONTAMINANT SOURCES

A review of available regulated facility data bases conducted in 2003 located scores of potential contaminant sources within the assessment area for Buckeye Water District. However, the most significant were determined to be the industrial facilities handling large amounts of regulated substances. These include Quaker State former refinery, Homer Laughlin, The Linde Group, Heritage-WTI, Little Blue Run Lake, Allegheny-Ludlum Steel, and Beaver Valley Nuclear Power Plant. In addition, the transportation network is a potential source of contamination through vehicular accidents that release hazardous materials

There are numerous loading and unloading facilities associated with barge traffic on the river which are potential contaminant sources of greatest concern, because a single spill could release extremely large amounts of regulated substances. Finally, combined sewer overflow dischargers on the Ohio River may release untreated sewage into the Ohio River during precipitation events. The 2003 SWAP assessments for Toronto found 217 permitted outlets for combined sewer overflows in the City of Pittsburgh alone, located about 62 miles upstream from Buckeye Water District's intakes.

7.0 SUSCEPTIBILITY ANALYSIS

For the purposes of source water assessments, all surface waters are considered to be susceptible to contamination. By their nature surface waters accessible and can be readily contaminated by chemicals and pathogens with relatively short travel times from the source to the intake. Based on the information compiled for this assessment, the Buckeye Water District's protection area is susceptible to spills/releases from upstream industries, railways and highways, pipelines beneath the river, and from barges on the river. While the source water for the Wellsville public water system is considered susceptible to contamination, historically, the Buckeye Water District has effectively treated this source of water to meet drinking water quality standards.

8.0 PROTECTIVE STRATEGIES

The ultimate goal of source water assessment is implementation of protective strategies that will better protect the drinking water source. However, a single community cannot by itself have a significant impact on a source like the Ohio River. Recognizing this, in 2012, representatives from Buckeye Water District, Steubenville, and Toronto met to consider what they could do collectively to lessen impacts on the river's water quality from other uses the river provides: industrial transport, industrial cooling, discharge of wastewater, recreation, etc. Over the course of six meetings, they developed a joint source water protection plan that was endorsed by Ohio EPA in November, 2013 as meeting the requirements of Ohio's Source Water Protection Program.

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Other planned activities focus on increasing public information.
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