SOURCE WATER PROTECTION PROGRAM
BENEFITING THE LAVALE WATER SYSTEM
(PWSID 001-0016) ALLEGANY COUNTY, MARYLAND

ALWI Project No. MD7S075

August 8, 2013

PREPARED FOR THE

LAVALE SANITARY DISTRICT

IN PARTIAL FULFILLMENT OF MARYLAND DEPARTMENT OF THE ENVIRONMENT IFB SOLICITATION NO. U00R1400308

Global Environmental Solutions
ADVANCED Land and Water, Inc.
7540 Main Street, Suite 7 • Sykesville, MD 21784
PHONE 410-795-4626 • FAX 410-795-4611 • www.alwi.com

SOURCE WATER PROTECTION PROGRAM
BENEFITING THE LAVALE WATER SYSTEM
(PWSID 001-0016) ALLEGANY COUNTY, MARYLAND

ALWI Project No. MD7S075

August 8, 2013

Prepared for the

LAVALE SANITARY DISTRICT

Reviewed and Approved By:

Mark W. Eisner, P.G.
President

Prepared and Submitted By:

David L. Pielmeier
Operations Manager

TABLE OF CONTENTS
ALWI Project No. MD7S075

LIST OF TABLES, FIGURES AND APPENDICES
ALWI Project No. MD7S075

TABLES

FIGURES

APPENDICES

SOURCE WATER PROTECTION PROGRAM
BENEFITING THE LAVALE WATER SYSTEM (PWSID 001-0016)
ALLEGANY COUNTY, MARYLAND

ALWI PROJECT NO. MD7S075

1.0 INTRODUCTION

Advanced Land and Water, Inc. (ALWI) was engaged by the Maryland Department of the Environment (MDE) to assist 12 community groundwater systems, including the LaVale Sanitary District (the System), in developing and implementing Source Water Protection Programs (SWPPs). These programs will help protect public health by identifying implementable measures to address existing and potential contaminant threats to groundwater supplies of safe drinking water.

In 2004, the MDE Water Supply Program developed a source water assessment and wellhead protection plan for the System. At the time of the previous assessment, the System was served by five supply wells and two surficial springs.

We updated the previous source water assessment for currency, following technical guidance and advice received from the Water Supply Program. Notwithstanding this, source water assessment is an intrinsically dynamic process. The currency of this assessment continuously is affected by new data, changing regulations and the evolving experience and professional judgment of those involved in developing and implementing this assessment and the recommendations herein.

1.1 PURPOSE

Maryland's Source Water Assessment Program was approved by the U.S. Environmental Protection Agency (EPA) in November 1999, and the initial source water assessment for the System was completed in 2004. The 2004 assessment included recommendations for ongoing management and protection, as well as periodic updates to reflect changes to the water system, appropriation permit and/or land uses within Source Water Protection Areas (SWPAs), as they may periodically occur.

While these past efforts recommended certain source protection and management concepts, MDE determined that the System be included in our current work based on an agency perception of its ongoing vulnerability to potential groundwater contamination. Accordingly, the overall purpose of this work is to assist the System in developing a SWPP, including specific guidance on implementing feasible source protection measures.

One of our project goals was to review the data from System water quality monitoring reports to verify that the recommendations listed in this SWPP reduce contaminants according to MDE guidelines. With the assent of System representatives, the SWPP effort now underway was intended to implement many of these recommendations. Specifically, MDE suggested that we focus on considerations of the compatibility of existing and future natural resources development

projects within the SWPAs. Such natural resources projects may include but are not necessarily restricted to coal mines, natural gas wells and timbering operations.

1.2 REGULATORY FRAMEWORK FOR SOURCE WATER ASSESSMENT

ALWI followed MDE's source water assessment and wellhead protection guidelines, which stem from The Safe Drinking Water Act (SDWA) of 1974 and its later amendments, which established wellhead protection programs for each state under the oversight of the EPA. The 1996 Amendments to the SDWA mandated that MDE develop a Source Water Assessment Program. MDE completed such a Source Water Assessment in 2004 (Appendix A). In September of 2011, ALWI was awarded the SWPP contract. The System's participation in the SWPP was voluntary, and not a regulatory requirement under the SDWA.

1.3 BACKGROUND INFORMATION

The LaVale water system (PWSID 001-0016), which is operated by the LaVale Sanitary Commission, currently serves approximately 5,500 people using 2,515 connections. An unconfined, consolidated sedimentary rock aquifer serves as the source of water for the five wells and two springs. Based on July to October 2011 flow data provided by the System, the wells generally contribute between 50 - 75% of the System's water while the springs (primarily Laber Spring 1) add the remaining 25 - 50%. However, the wells and springs only provide 30-40% of the water used by the System. The remaining 60-70% is purchased from and supplied by the City of Cumberland's Surface Water Treatment Plant. The water from the City of Cumberland originates from the Lake Koon and Gordon reservoirs, which are located in the Cumberland Valley Township of Pennsylvania. The reservoirs are fed by Evitts Creek, Growden Run, Oster Run and several unnamed tributaries.

The System's wells are completed within the Pocono Group sandstones, while the two springs issue from the Lower Mississippian siltstones and shales. Treatment for these sources occurs at the Red Hill Water Treatment Plant. The wells and springs identified in the previous assessment remain in regular use, with the exception of Well 5, which reportedly has sedimentation problems. System representatives indicated that there are no present plans to rehabilitate and use Well 5.

In 2004, MDE recommended that the System form a local planning committee to implement a source water protection plan, while continuing to monitor contaminants listed in the SWDA (Appendix A). Additionally, in 2004 MDE recommended that:

- The casings of LaVale Wells 1, 2 and 3 should be extended above the ground surface to prevent surface water from entering the wells.

- Unused Well 5 should be properly abandoned and sealed by a certified well driller, according to state well construction standards.

- The System should resolve the existing dispute with an adjacent homeowner and purchase the property in the area of Laber Spring 1.

Many of these recommendations, along with others listed in the 2004 MDE report, were not implemented. Herein we update these recommendations based on updated data, steering committee discussions, applicable present guidelines and our professional experience.

1.4 DELINEATIONS REMAIN UNCHANGED FROM 2004 ASSESSMENT

ALWI reviewed the 2004 SWPA delineations for conformity to present site conditions, operational practices and current MDE guidance. Updates to SWPAs were not necessary since there has been no change to the Town's water appropriation permit since 2004. One new source, Well 6, was added in 2007 and is located within the downgradient limit of Zone 1 such that the SWPA does not need to be revised. SWPAs are depicted on Figures 1 and 2. Delineation methods are discussed in Appendix A and provide for two zones of protection generally based on:

- **Zone 1** - Topographically-interpreted recharge area needed to support the existing System water appropriation; and

- **Zone 2** - The upgradient zone of groundwater capture potentially contributing to Zone 1, irrespective of recharge area considerations and appropriation limitations.

2.0 CONTAMINANT THREATS ASSESSMENT

ALWI performed regulatory database reviews, a field reconnaissance and limited interviews to update the 2004 inventory of potential sources of contamination within the SWPAs delineated by MDE. We considered both point and non-point sources of contamination. Additionally, MDE specifically suggested that we consider the compatibility of existing and future natural resources development projects within the SWPAs. Such natural resources projects may include but are not necessarily restricted to coal mines, natural gas wells and timbering operations.

2.1 STATE ENVIRONMENTAL DATABASE REVIEW

MDE provided ALWI the following state-maintained environmental databases to incorporate into point-source hazard inventories, with the date of database publication provided parenthetically as follows:

- Municipal and Industrial Groundwater Discharge Permits (6/14/2012);

- Pesticide Dealers (1/12/2012);

- Land Restoration Program Sites (Voluntary Control Program and Comprehensive Environmental Response, Compensation, and Liability Act) (1/16/2012);

- MDE Oil Control Program databases (10/14/2011);

- Supplemental database listing of solid waste facilities, wood waste disposal sites and other hazardous waste generators (2/2012); and

- Resource Conservation and Recovery Act sites (6/18/2012).

The databases helped with interpretations of groundwater susceptibility, in that the listed facilities may be generators of hazardous materials, petroleum products and/or other drinking water contaminants. Results of this review are integrated with the susceptibility discussion in Chapter 3 of this report.

2.2 FIELD RECONNAISSANCE WITHIN SWPAS

ALWI performed a visual reconnaissance within the SWPAs on December 19, 2011. During this reconnaissance, local land use conditions were observed with emphasis on the potential use, storage and disposal practices of hazardous materials and petroleum products near the sources and elsewhere within the delineated SWPAs. Such conditions may have included visual evidence of present or former spills, stained or discolored ground surfaces, stressed vegetation, unusual odors or visible underground storage tank appurtenances. Adjacent and nearby properties were visually scanned to the degree practicable from public rights-of-way.

Though ALWI did not observe specific contamination threats warranting further investigation or corrective action, (1) such threats may exist that remain undetected because of limitations in the methods employed (concealed visual evidence, etc.) and/or (2) new threats may develop in the future. ALWI notes that the SWPAs are extensively forested, inaccessible by vehicle and not visible without substantial trespassing on private property. The possibility of concealed point-source contamination hazards remains, consequently. For these reasons, the measures employed herein for identifying contaminant threats and point/non-point hazards should be repeated periodically for the assessment to remain current.

The System's production wells appeared to possess good physical integrity, though Wells 1 through 3 had inadequate casing stick-up for being proximal to Braddock Run; subsurface or invasive work of a confirmatory nature was not a component of the scope for this contract. Wells 1 through 4 are located in well houses, whereas Wells 5 and 6 are outside. The wells are enclosed within a gated complex. During our visit, System operators were able to identify the location of Laber Spring 2, though immediate access to both springs was limited because they are located on private property inaccessible to the System or ALWI. We did not observe evidence of direct contamination emanating from areas in the general vicinity of the springs.

In 2004, MDE reported that the casing of LaVale Wells 1 through 3 terminated at or near the ground surface. Their proximity to Braddock Run (approximately within 100 feet) makes these wells more susceptible to flooding during heavy rains, which may allow contaminated surface water to enter through or around the casings. No new well construction information has been made available since the 2004 MDE report. As such, these wells may have integrity issues due to their age and construction, potentially making them susceptible to surface water contamination.

2.3 POTENTIAL POINT SOURCE CONTAMINATION HAZARDS

On December 19, 2011, ALWI performed an update to MDE's 2004 point source hazard reconnaissance. In so doing, we observed the existence (or continuing existence) of the point source hazards discussed, herein. Our inventory includes only those potential point source hazards located within the LaVale SWPAs. The results of our updated point source hazard inventory included listing from three general sources of information: (1) hazards listed in the 2004 MDE report, (2) listings from various State databases, and (3) our December 2011 reconnaissance (Table 1, Figure 1). Broadly, categories of point source hazards included:

- **Controlled Hazardous Substances (CHS) Generators** - Rish Equipment and the Jenkins Collision Center were CHS generators identified in the LaVale SWPAs.

- **Mining Surface Water Discharge Permit Sites** - In the 2004 MDE report, MDE identified four mines with active surface water discharge permits. While these mines were not identified during our field reconnaissance, which was limited to generating an inventory from public right-of-way as explained below, we have included these sites for conservatism. Discharge from such mines may potentially be laden with heavy metals that could contaminate surface and/or groundwater sources.

- **Groundwater Contamination and Sanitary Waste Landfills** - The Hoffman Landfill is approximately 22 acres in size and is an inactive former coal strip mine that was filled with industrial and municipal wastes between 1967 and 1971. According to the MDE Waste Management Administration, monitoring wells indicate that the leachate contains vinyl chloride and nickel. The landfill is on the far western side of SWPA Zone 2. It is also listed in the Land Restoration Program Site Database.

- **Miscellaneous Sites** - Most of the System's point source hazards fall into this broader category and include facilities such as the Hillside Animal Hospital, Clarysville Volunteer Fire Company, 84-Lumber, Hoffman Tunnel, etc.

ALWI did not observe direct visual evidence of coal mines, natural gas drilling operations or large-scale timbering in the accessible portions of the SWPA. Again we note that observations were limited to public rights-of-way and that such land uses frequently occur in remote areas that are difficult to see and challenging to access without trespassing.

2.4 POTENTIAL NON-POINT-SOURCE CONTAMINATION HAZARDS

To evaluate the hazard represented by non-point sources of contamination, MDE guidance suggests consideration and mapping of the public sewer service area and land use data within the SWPAs. Pertinent land use acreages and percentages by SWPA are listed in Table 2. Each of these has implications in terms of non-point contaminant sources (e.g., septic systems).

Potential sources of non-point-source contamination may include but are not restricted to:

- **Septic System Discharges** - These include nitrate- and bacteria-laden discharges concordant with the intended design of septic systems. They also can include the inappropriate discharge of hazardous and other regulated liquids through such systems, arising from ignorance or intent. For this reason, MDE guidance suggests consideration and mapping of the public sewer service area(s), with the inference that those areas not sewered are on septic systems. Sewer system maps available from the Maryland Department of Planning (MDP)[1] (Figures 1 and 2) suggest that approximately 82% of the SWPA lies outside of the sewered area. The four active System wells exist outside of the mapped sewer service area.

- **Sewer System Leaks** - Data provided by the MDP indicate that the sewer service area runs along the southern side of Braddock Run through the LaVale SWPAs, along Route 40 and Interstate 68. Leaking sewer lines, particularly if the system is aged, may impart a groundwater contamination risk, as well as a surface water risk given the systems proximity to Braddock Run. Such leaks may increase concentrations of contaminants (e.g., nitrate, phosphate, organic carbon, coliform and fecal bacteria and surface water pathogens) in both Braddock Run and System sources. In 2001, an MDE Water Supply Program complaint record reported that sewer spills into Braddock Run were a common event, with over 40 combined sewer overflow points associated with the Cumberland Wastewater System. It is possible that such discharge from overflow points and leaking sections of the sewer line upgradient of the LaVale System sources may enter Braddock Run and, hypothetically, the System sources under the direct influence of surface water (a condition known as "GWUDI"). A report by the Cumberland Times-News in June 2011 indicates that $1.25 million was granted to the LaVale Sanitary Commission for rehabilitation of the Braddock Run Interceptor and to "fund corrections to the wastewater collection system."

- **Agriculture** - Fertilization of cultivated fields, livestock wastes, and agri-chemical releases constitute the primary sources of groundwater contamination from agricultural sources. Agricultural lands within the SWPAs may be sources of nutrients (including nitrates), herbicides, insecticides and/or animal wastes. Land use coverage maps (Figures 1 and 2) indicate that only 11% of the SWPA is in agricultural use.

- **Energy and Other Natural Resources Operations** - Natural resources extraction and utilization activities possibly could imperil water quality based on similar occurrences reported elsewhere in the country. Major timbering operations, coal mines, and natural gas exploration and production operations may warrant greater scrutiny and/or protective measures before they come to exist or expand within the SWPAs. Land use coverage maps may not reflect the full extent of such existing and planned land uses, but suggest that no land within the SWPA is classified as "mined land." Some suggestions relating to such future operations are offered in Chapter 6 herein.

- **Sediment and Stormwater** - Commercial and industrial land uses, particularly those with substantial impervious areas, may contribute to contaminant- and sediment-laden stormwater

[1] We have found that actual sewer service areas may differ greatly from those provided by the MDP.

within the SWPA. Available mapping data suggests that 3% of the SWPA is in such land uses. Timbering practices, particularly clear cutting, may increase stream water turbidity and sedimentation and increase leaching of nutrients (such as nitrate) from soils following cutting. Mined lands may be potential contributors of heavy metal laden water. In addition, highway spills, including accidental automobile discharges along Interstate 68 and/or U.S. Route 40, may act as non-point sources of various synthetic or volatile organic compounds.

- **Heating Fuel Use and Storage** - Liquid petroleum products commonly are used as a heating fuel. Though the extent of reliance on heating fuels within the SWPA is unknown, and determining the degree to which heating oil is used was outside of the scope of this SWPP, it is safe to assume that some use exists within the SWPA. Leaks and spills associated with the use and storage of heating fuels may expose System sources to hydrocarbon contamination.

Sources of the information summarized above included 2010 land use Geographic Information System data obtained from the MDP and data collected at the time of our field reconnaissance. Table 2 reflects dominant land uses by type, within each delineated zone. Figures 3 and 4 reflect this information, by SWPA, in pie chart form.

3.0 CONTAMINANT SUSCEPTIBILITY

ALWI completed a review of available groundwater quality records, integrated with other findings herein, to support an assessment of groundwater contaminant susceptibility. MDE guidance suggests using water quality analytical records to define a threshold for regarding a water source being "susceptible" to a given contaminant as being either:

- When the concentrations exceed 50% of the Maximum Contaminant Level (MCL) for 10% or more of the documented samples for a regulated contaminant and/or

- When a persistent but lower concentration is either increasing or chemically appears associated with an unknown or unexpected source.

In addition to these water quality data considerations, ALWI also considered the following factors in evaluating overall susceptibility:

- The spatial position of sources of potential contamination relative to sources and SWPAs,

- Observed conditions of wellhead integrity and housekeeping, and

- The natural chemical properties of the source water within contributing aquifers.

3.1 WATER QUALITY DATA REVIEW PROCEDURES

ALWI completed the susceptibility assessment in accordance with the following step-wise procedure:

1. **Obtain and Filter Water Quality Databases** - ALWI reviewed available electronic databases of water quality analyses provided by MDE for the period 2003 to 2011. The raw databases were filtered to isolate contaminants affecting System groundwater supplies.

2. **Consider Chemical Classes and Sampling Conditions** - The furnished databases were developed by MDE as an incidence of operational compliance record-keeping. They contained analytical records for inorganic compounds (IOCs) including radiological species, volatile organic compounds (VOCs), synthetic organic compound (SOCs) and disinfection byproducts (DBPs). In most cases, the available water quality records only reflect post-treatment, composite water samples rather than raw groundwater sources, unless otherwise noted. As such, mixing, blending and treatment efficacy is reflected, but well-by-well raw water quality trends are not. Generally the absence of comprehensive analytical results of raw groundwater samples hampered correlating specific water quality findings to specific wells.

3. **Review of MDE Paper Files** - To gain a more thorough understanding of raw water quality by well, ALWI supplemented the MDE databases with raw groundwater quality laboratory reports available in MDE paper files. Specifically, we were able to obtain IOC, VOC and SOC data for Well 6 from June of 2007.

4. **Identify "Exceedance" Instances** - To identify water quality sample exceedances, we compared each specific analytical result to published MCLs (in COMAR 26.04.01 as of September 2011). Guided by MDE, we judged that a concentration greater than 50% of a given MCL should be considered an "exceedance." Procedurally, this was accomplished by sorting the database by analyte and concentration.

5. **Assess Frequency and Relative Percentage of Exceedance Instances** - The number of times that a given analyte was detected in a concentration greater than 50% of its respective MCL was discerned in terms of overall frequency, percentage of total number of samples and date range of exceedance. Contaminants with results equaling or exceeding 50% of the MCL more than 10% of the time were considered *prima facie* susceptible. ALWI also considered changes in contaminant trends over time, both for those that did and did not equal or exceed 50% of the MCL more than 10% of the time.

6. **Integration** - ALWI then considered these identified exceedances in the context of the results of the contamination hazard reconnaissance to correlate water quality results to specific field observations suggestive of a condition of susceptibility.

As discussed in the following subsections, we found the groundwater supply to be susceptible to DBP precursors, radon and surface water pathogens.

3.2 FINDINGS OF SUSCEPTIBILITY

As supported by data made available by MDE, ALWI found that the LaVale water sources appear susceptible to DBP precursors, radon and surface water pathogens. We suggest additional and repeated sampling and analyses for these parameters and constituents, as the amount of data supporting these determinations seems scant.

- **DBP Precursors** - DBPs form in the LaVale distribution system as a consequence of mixing chlorine (used for water disinfection in the treatment system) with organic and/or inorganic matter in drinking water. One of the most common measure of DBPs is Total Trihalomethanes (TTHMs), which is reported as the sum of several closely-related chlorinated methane compounds. TTHM exceeded the 50% MCL threshold (40µg/L [micrograms per liter]) in 7 of the 42 samples. Another common measure of DBPs is Total Haloacetic Acid (THAA), which is reported as the sum of several closely-related acetic acids. THAA exceeded the 50% MCL threshold in 10 out of 42 samples, in which one sample exceeded the MCL of 60 µg/L. DBPs, including TTHMs and THAAs, do not themselves occur in groundwater, naturally or otherwise (unless in the rare circumstance of a distribution system leak). DBP precursors likely originate from organic matter from a combination of forested and limited agricultural lands, as well as residential septic discharge, particularly for failing systems. If present, leaking sewer lines or overflow points may also act as a source of DBP precursors.

- **Radon 222** - One analysis performed in 2007 reflects a radon concentration of 451 picocuries per liter (pCi/L) in the distribution system, approximately 50% higher than the standard of 300 pCi/L proposed in 1999; currently, there is no MCL for radon. The radioactive decay of naturally occurring uranium-bearing minerals in the bedrock probably is the source of the radon.

- **Total Coliform** - On January 1, 2011, one out of ten post-treatment composite samples tested positive for coliform bacteria. Regulations mandate that water be retested when a positive sample is observed. Four additional samples tested that day had negative results. Since these results are post-treatment, they do not necessarily reflect conditions within the wells themselves. As supported by MDE's previous GWUDI susceptibility findings, it is our professional opinion that LaVale's sources (all except Well 5, which should be abandoned) remain susceptible to both coliform and fecal bacteria contamination. Such a condition may arise from runoff during precipitation events (coupled with the GWUDI status of System sources), failing septic systems, agricultural and/or residential runoff and damaged sewer lines (if present), for which overflow points have already been indicated.

- **Surface Water Pathogens** - Available sample results for indirect indicators of surface water (total dissolved solids and turbidity) suggest a condition of groundwater susceptibility. In the 2004 report, MDE determined that the two springs and all active wells, with the exception of Well 5, are GWUDI. The GWUDI condition makes the raw water in System sources susceptible to harmful pathogens, including cryptosporidium and giardia. Note that this condition does not constitute distribution system vulnerability because of surface water filtration at the treatment plant. In Chapter 6 we recommend collecting additional raw samples directly from groundwater wells in the future so as to help distinguish between susceptible surface and groundwater sources.

Only a single water sample for raw turbidity was available from MDE's electronic databases. In June 2007, Well 6 had a concentration of 5.1 Nephelometric Turbidity Unit (NTU), exceeding the MCL of 5.0 NTU. Analysis of post-treatment composite data from the plant between July

2011 and October 2011 suggested that turbidity concentrations were well below the 50% MCL threshold (Appendix B). MDE also provided a single sample for total dissolved solids from Well 6 in 2007, with a concentration of 630 milligrams per liter (mg/L), exceeding the Secondary MCL of 500 mg/L. ALWI was unable to supplement this data point with any additional information from MDE or the Red Hill Water Treatment Plant.

3.3 OTHER GROUNDWATER CONSTITUENTS

Other than indicated herein, we did not otherwise find the System susceptible to groundwater contaminants of natural or anthropogenic origin, as supported below:

- **Di(2-ethylhexyl) phthalate** - This SOC was detected between 2007 and 2008, but was well below the 50% MCL threshold. Di(2-ethylhexyl) phthalate is often found in laboratory blanks, but is also used as a plasticizer for PVC piping and other polymers, such as rubber (EPA, n.d.a).

- **Iron and Manganese** - Inorganic compounds detected at greater than trace amounts were iron and manganese. A 2007 sample possessed an iron concentration of 1.07 mg/L, which is over three times the secondary MCL of 0.3 mg/L. The same sample had a manganese concentration of 0.75 mg/L, which is 15 times the secondary MCL of 0.05 mg/L. Iron and manganese are naturally occurring elements in many fractured rock aquifers. Iron can also come from aging and corroding well casings and water pipes. The secondary MCL exists for aesthetic purposes; no health hazard is associated.

3.4 PENTACHLOROPHENOL

This SOC was not detected in 2007, but was detected in 2008 with a concentration of 0.17 µg/L, far below the 50% MCL threshold of 0.5 µg/L. While the System sources technically are not susceptible, we nevertheless recommend that System operators conduct more frequent testing for pentachlorophenol, as discussed in Chapter 4. Pentachlorophenol is commonly used as a wood preservative and used to be an herbicide until it was banned for this use in 1987 by the EPA.

Pentachlorophenol may originate from possible groundwater leachate arising from the outdoor storage of treated wood products (such as lumber distributors), historic agricultural practices, stockpiles of treated wooden electrical poles or historic (but no longer present) lumber treatment and/or drying facilities.

4.0 STEERING COMMITTEE INTERACTIONS

ALWI met with the LaVale Steering Committee on Wednesday, May 30, 2012. The Steering Committee was comprised of members representing the System and Allegany County. Specific members included:

- Mr. David Wendt (Secretary/Treasurer, LaVale Sanitary Commission),

- Mr. David Dorsey (Acting Planning Coordinator; Allegany County), and

- Mr. Mike Garner (MDE Water Management Administration Mining Program).

ALWI presented a slide show (Appendix C) summarizing the basis for then-current but nevertheless preliminary recommendations related to water quality issues. Salient topics of discussion included:

1. **Marginal and Uncertain Conditions of Groundwater Susceptibility** - None of the available groundwater quality data suggested an acute condition of obvious susceptibility warranting immediate action or concern. Discussions then focused on DBPs, considering their presence in water samples collected from the Red Hill Water Treatment Plant. DBP precursors usually are more common in surface supplies than in groundwater supplies. However, surface water has been shown to influence the water withdrawn from both springs, as well as Wells 1 through 4 and 6. We recommend additional and source-specific sampling for DBPs and radon before corrective or protective measures are otherwise contemplated.

2. **Continued Monitoring of Pentachlorophenol** - We cautioned the System to continue monitoring of pentachlorophenol due to its recent increase in concentration above pre-existing records. If concentrations continue to increase, we recommended that the System consider a hydrogeological investigation to determine the source and/or to contemplate an appropriate treatment method.

3. **Recommended Change to Existing Ordinance -** We recommended a change to existing Allegany County Ordinance(s) to restrict/prohibit incompatible land uses in the SWPAs. Specifically, we recommended prohibiting natural resources development projects (e.g., coal mining, natural gas well exploration, logging, etc.) in the SWPAs. These recommendations were not accepted. Mr. Garner of MDE added his opinion that the permit application process for coal mines would protect against unreasonably impactful land uses.

4. **Potential Benefits of an Alternate Groundwater Source -** We presented to the Steering Committee potential pitfalls of having all of their wells in the same general area. Generally, having all of their wells within the same well field leaves the System vulnerable to a catastrophic contamination event compromising all of their wells. In Chapter 6, we recommend consideration of constructing an alternative groundwater source in a differing watershed.

5. **Abandonment of Unused/Unneeded Wells** - ALWI discussed the hazards associated with unused wells that may remain present in the SWPAs. We recommended that unused wells (Well 5 in particular) be abandoned unless plans exist to rehabilitate Well 5 and bring it back into service without undue delay. System representatives indicated that plans exist to accept this recommendation.

6. **Wellhead Security** - At the time of our reconnaissance, we came to learn that Laber Spring 1 existed on the property of an uncooperative neighbor. We were told that unsuccessful negotiations for unfettered access to the spring took place and that the property owner had no interest in selling the System lands surrounding the spring. Accessing the spring at this time

would constitute unlawful trespass, and consequently the System remains without direct access to Laber Spring 1. We also discussed the benefit of constructing a locked well house or bunker around Well 6 (and around Well 5 should the System plan to maintain it).

7. **Public Workshop** - We discussed the prospect of a public workshop, and its benefit in garnering proactive buy-in regarding measures such as newly contemplated ordinances. The Steering Committee felt that a workshop is not necessary because no new or revised ordinance was contemplated. In the circumstance the County ordinance comes to be revised, that process entails an administrative public notification process.

5.0 ALLEGANY COUNTY COLLECTIVE ORDINANCE §360-84

Most of the Steering Committee discussion focused on existing and potential proscriptive measures to protect System water sources from potentially incompatible land uses in the up-gradient and surrounding SWPA. ALWI suggested the appropriateness of a specific and customized source water protection ordinance, which could be implemented by the County. System representatives felt disinclined to advocate or support additional land use restrictions beyond those already mandated in State regulations and existing County ordinances, largely because of the perception that such restrictions might be regarded as economically onerous by the regulated community (i.e., land owners and developers).

5.1 APPLICABILITY OF ALLEGANY ORDINANCE

Discussion then evolved to the applicability of existing protective measures embodied in Allegany County Collective Ordinance §360-84 (the "Allegany Ordinance;" Appendix D). This ordinance refers to the Allegany County Conservation District, termed the "C Conservation District" in the Allegany Ordinance (http://ecode360.com/14700058). It seems designed to protect, among other things, public supply watersheds. Assuming its applicability to wells and springs as well as surface water impoundments, this ordinance appears to protect the System sources by requiring or prohibiting the following:

- Site plan approval (for a land development project with a SWPA) requires the avoidance or mitigation of public supply watersheds.

- Permitted land uses include but are not restricted to various agricultural and residential buildings, airports, sawmills and communication towers. Conditions for allowable special exceptions are set forth in the Allegany Ordinance §360-83 (Appendix D), "A Agriculture, Forestry and Mining Districts" (http://ecode360.com/14700020).

- In "areas specifically identified as public supply watersheds", developers need approval from the county Board of Appeals to undertake any of the permitted uses or special exceptions outlined in §360-83. ALWI acknowledges that left unclear is whether "public supply watersheds" are intended to include groundwater and spring water SWPAs, or merely are areas up-gradient from surface water impoundments. A County representative on the Steering Committee felt it was the latter.

5.2 DISCUSSION OF RECOMMENDED ORDINANCE REVISIONS

ALWI recommends (Chapter 6) that the System work with the County to clarify whether the existing ordinance and code includes groundwater and spring water SWPAs within the definition of "public supply watersheds." If not or if ambiguous, the County ordinance should be amended to specify groundwater and spring water supply protections.

The Ordinance is silent with regard to potentially incompatible SWPA land uses associated with energy resources exploration and development. Coal and natural gas exploration programs and production facilities may cause the release or migration of groundwater contaminants (and surface water contaminants as well). Notwithstanding the Steering Committee's desire not to revise existing protective measures or to create new economic restrictions, ALWI must recommend that such land uses be prohibited in the SWPAs via further amendment to the County ordinance.

6.0 RECOMMENDATIONS

ALWI proposes the following recommendations for consideration. We endeavored to consider matters of cost and practicality in forming these recommendations. The need and order of these easily could change based on investigative findings, available funding and other System priorities.

6.1 INVESTIGATIVE RECOMMENDATIONS

Below, in order of decreasing priority, we provide a list of measures that we recommend for consideration, funding and implementation. We recommend execution of these to help verify certain findings that presently are tenuous because of limited data, the budget supporting this SWPP effort and/or the non-invasive nature of SWPP development efforts.

1. **Continue Monitoring Contaminant Concentrations** - The System should continue monitoring specific contaminants in the drinking water given either a finding of susceptibility (i.e., DBPs, radon and surface water pathogens) or a recent increase in concentration above pre-existing records (i.e., pentachlorophenol). In the case of pentachlorophenol, if concentrations continue to increase, the System could consider a hydrogeological investigation to determine the source of the pentachlorophenol.

2. **Sample Water Sources Directly** - ALWI recommends direct sampling of raw, individual sources. Collecting raw water samples directly from each well, as opposed to treatment or distribution plants, makes it easier to identify and interpret water quality results, allowing for a more accurate susceptibility analysis. Sampling from raw sources reduces erroneous interpretations and allows more accurate identification of potential point sources of contamination.

6.2 REMEDIAL RECOMMENDATIONS

Below we provide a list of remedial recommendations, again presented in decreasing order of our present sense of their relative importance, implementation feasibility (including cost) and benefit.

1. **Limit DBPs in the Distribution System -** The System should evaluate water treatment methods and chemicals to limit potentially unneeded chlorination, or consider adopting a different chemical or treatment process. These actions may refine existing treatment methods and may reduce the incidence of DBPs in the distribution system. Since LaVale has numerous GWUDI sources, the System can also ask the County to ensure that adequate riparian buffer zones exist between Braddock Run (and its adjoining tributaries) and both residential and agricultural lands. These zones would act as natural filters for both surface runoff and subsurface flow, reducing concentrations of inorganics, such as nitrate, that would otherwise increase eutrophication and the in-stream generation of organic matter. A buffer zone also may reduce the leaching of organic carbon from soils surrounding the stream, as deforested land contributes more dissolved organic carbon (a DBP precursor) to surrounding water bodies than does forested land. Finally, the System can use the previously mentioned funding (Section 2.4) to address possibly leaking sections of the sewer system upgradient of the LaVale sources and overflow points.

2. **Rehabilitate and Reconstruct, or Abandon and Seal Well 5** - Well 5, along with any other unused well(s)[2], should be properly abandoned and sealed by a certified well driller according to current State well construction standards. Unused wells that have not been properly abandoned may act as additional conduits for surficial contamination (at the land surface or at depth when casing or grouting integrity is compromised), to enter the aquifer.

3. **Extend Casing Stick-ups Where Appropriate** - System Wells 1 - 3 casing stick-ups terminate near the ground surface. Notwithstanding the presence of well houses, this inadequate stick-up leaves these wells susceptible to flooding, given the proximity of Braddock Run. The process of welding casing stick-up extensions to these wells is a relatively simple and inexpensive recommendation that the System should strongly consider.

6.3 PROTECTIVE RECOMMENDATIONS

Below we provide a list of protective recommendations, again presented in decreasing order of our present sense of their relative importance, implementation feasibility (including cost) and benefit.

ALWI agrees that the existing Allegany County Ordinance seems to provide minimally adequate protection for the LaVale SWPAs. At present the Ordinance does not include a definition for

[2] MDE's well database indicates that another System well potentially exists, but is not in use (Tag No. AL-81-0099). If this well exists, it should be abandoned along with Well 5. If the System has a record of the well being abandoned already, they should furnish such information to MDE so their database can be updated.

"public supply watershed." It would be better if the Ordinance clearly included groundwater and spring water SWPAs within a broad definition of "public supply watershed" and it also would be better if it prohibited energy resources development and clear cutting projects in such watersheds. Notwithstanding the System's understood hesitancy to support the recommended ordinance revisions, our protective recommendations must remain as follows:

1. **Limit Incompatible, Upgradient Land Uses** - ALWI judges that the greatest measure of source water protection would arise from the protection of upgradient watershed areas from incompatible land uses. Based on the setting of the System, we further judge that the most likely form of potentially incompatible land use would be that of operations and facilities associated with energy resources exploration and development and forest clear cutting. Coal and natural gas exploration and production facilities may cause the release or migration of groundwater and surface water contaminants. Best would be if such land uses were prohibited in the SWPA.

2. **Alternatives to Land Use Restrictions -** If prohibition is infeasible or untenable, ALWI would recommend conservative and comprehensive baseline water quality analyses of the System sources before any such energy project is approved to begin, as well as monitoring throughout the project's lifetime. Strictures requiring the energy facilities to apply and use the best available protective techniques and technologies should be considered as well.

3. **Purchase Land Surrounding Laber Spring 1** - As MDE recommended in 2004, the System should resolve the dispute with the adjacent homeowner and purchase the property surrounding Laber Spring 1. In addition to easier access, this will allow protection of the lands adjacent to this source from incompatible land uses.

4. **Enclose Well 6 Within a Well House or Bunker -** Constructing a well house or bunker around Well 6 will reduce exposure to surficial contamination (at the land surface) while deterring unauthorized access to the well. Well houses and/or bunkers should have locks to further improve site security.

5. **Construct Diversion Ditches Upgradient of Springs -** Spring and springhouse rehabilitation should be considered once the System resolves the dispute with the adjacent homeowner, if possible. As mentioned in the 2004 MDE report, the System should construct a diversion ditch upgradient of each spring to prevent surface water flow from entering collection boxes.

6. **Develop and Permit an Alternate Groundwater Source -** Considering that the System's wells are within the same well field, a circumstance whereby the local source water becomes badly contaminated could compromise an overwhelming proportion (50 - 75%) of the System's water supply (not including water supplied by Cumberland). The remaining 25 - 50% of the System's source water comes almost entirely from Laber Spring 1. Site access and security is inadequate for both spring sources (ideally the System would have unfettered access to all of their sources). Should the System desire less reliance on these sources for the reasons mentioned above, we recommend development of a new source within a differing watershed. Doing so may also relieve the System of costs associated with individual sources

found to be contaminated and in need of unique treatment. Having a well in a physically differing location than the existing wells would better guard against an existing or future contaminant release affecting the entire water supply. We are of the opinion that a carefully designed and purposefully executed drilling program could lessen and possibly eliminate the risk of surface water influence upon a well positioned in this area. If this recommendation is accepted, a future edition of this report should encompass the new source location as well.

7. **Creation of a Spill Notification System** - The potential exists for surficial spills to infiltrate the soil surface and percolate into the unconfined aquifer from which the wells and springs draw their water. A spill notification system along Interstate 68 and U.S. Route 40 would give water plant managers notice of potential contaminants that could impact drinking water quality. This would allow them ample time to design and incorporate preventative measures to reduce the impact of these spills. Though the wells are located on the opposite side of Braddock Run, the wells are GWUDI and are likely susceptible to contamination that enters or passes below the shallow stream.

8. **Other Protective Measures** - The following are secondary, beneficial goals as SWPA prohibitions:

   - No intensive, agricultural land uses or groundwater discharge permittees;
   - Public awareness and community outreach measures (homeowner focused) with a particular focus on septic system maintenance and the potential risks to supply sources that arise from their influence to surface water and surface water contaminants; and
   - Proper abandonment of unwanted and unneeded wells (via enforcement).

7.0 REFERENCES

Source Water Assessment Eight Ground Water Community Water Systems for Allegany County, Maryland.

Staff Reports M. (2011, June 1). State Grants Provide for Sewer System Upgrades. *Cumberland Times-News*. http://times-news.com/local/x1326418865/State-grants-provide-for-sewer-system-upgrades