SPRING SOURCE AREA SURVEY
SHYROCK'S GROCERY
ACHD SITE NO. 95
Spring Gap, Allegany County, Maryland

ALWI Project No. AL7N001

1.0 INTRODUCTION

Advanced Land and Water, Inc. (ALWI) was retained by the Allegany County Health Department (ACHD) to prepare a spring source protection plan for Shyrock's Grocery, located on the south side of Oldtown Road, and immediately north of Brice Hollow Run in northern Allegany County, Maryland. This site, designated No. 95 by ACHD, is served by a spring that issues from the base of an embankment on the south side of the property.

The draft MDE "Transient Water Systems Operations Guidance" manual (herein termed the "Guidance Manual") defines a Non-Transient Non-Community (NTNC) Water System as one that "...serves at least 25 regular consumers over 6 months per year." There are only two permanent residents, and little demand beyond that. Therefore this is a transient non-community system (TNC).

1.1 PURPOSE

The Safe Drinking Water Act (SDWA) of 1974 required the U.S. Environmental Protection Agency (EPA) to develop enforceable drinking water quality standards to protect the public health. In 1986, amendments made to the SDWA strengthened provisions for the protection of underground sources of drinking water. These amendments included provisions for establishing Wellhead Protection Programs by individual states under "umbrella" EPA oversight. The EPA approved a statewide Wellhead Protection Program developed by MDE in June 1991.

The MDE program originally applied to community well water supplies, only. A newly proposed broadening of the Federal Clean Water Act will have the result of expanding the MDE Wellhead Protection Program to encompass non-community well water supplies both transient and non-transient in nature. ACHD, in cooperation with MDE, established this program to bring existing non-community well water supplies into compliance with the coming regulations. At the direction of ACHD, ALWI applied appropriate provisions of the MDE Wellhead Protection Program to this spring source assessment.

1.2 SCOPE

ALWI prepared this spring source protection plan following ACHD requirements, which followed MDE guidelines for transient system operation and wellhead protection.

1. **Site Reconnaissance, Photographic Documentation and Interviews –** ALWI observed the on-site spring source, storage, treatment, and distribution infrastructure to the degree exposed without excavation or exposure to personal hazards. ALWI used an ACHD-owned digital camera to photograph conditions surrounding the spring at the time of the field reconnaissance. Said photographs are stored on ACHD's computer system. ALWI interviewed the owner/operator and/or employee(s) to document information on the use patterns, history, and problems associated with the supply.

2. **Baseline Water Quality Assessment** - ALWI purged the water system and collected samples for analysis in the ACHD laboratory that is affiliated with the Maryland Department of Health and Mental Hygiene (DHMH). ALWI performed this fieldwork in accordance with MDE potable water sampling criteria including in-field measurements of turbidity, chlorine, and pH. ACHD selected the analyte list based on countywide experience with potability concerns and the capabilities of the aforementioned laboratory. The analytes included total and fecal coliform bacteria, nitrates, nitrites, iron, sulfur and manganese (Appendix B).

3. **Contamination Hazard Assessment** – ALWI identified existing and potential contaminant hazards within the delineated WHPA based on visual observations and the techniques enumerated above. ALWI ranked these hazards in term of relative risk and provided concrete suggestions for their appropriate address. More generally, herein ALWI provides specific recommendations for source reduction measures, contingency plans, and other methods that may help better protect against occurrences of water contamination.

2.0 HYDROGEOLOGIC FRAMEWORK

Shryock's is situated within the Valley and Ridge physiographic province and is underlain by fine-grained sedimentary rock of Devonian age. The Hamilton Group, which mainly consists of the Marcellus and Needmore shales (Cleaves, 1968). These rocks have been folded and faulted, resulting in synclines (concave-upward folds) and anticlines (convex-upward folds).

In three dimensions, the local rock formations dip at right angles to the direction of plunge of the fold system. In general, dip directions may help govern groundwater (and contaminant) movement directions in the bedrock but plunge directions have less relation. At this location, the bedding planes dip to the east, which suggests that the gentle southwesterly plunge may exert greater-than-usual control on deep groundwater flow directions. Reported well yields within the Hamilton Group are sparse but average 6 gpm (Slaughter and Darling, 1962).

2.2 SAPROLITE AND SOIL MANTLE

Natural chemical weathering of the shallow portion of the bedrock, due to percolating water, has chemically altered many of the original rock-forming minerals to clays and other secondary minerals. This has resulted in the development of shallow saprolite (weathered bedrock) and the overlying soil mantle. The thickness of the soil and saprolite varies considerably over short distances depending on the thickness of Quaternary alluvial deposits and other factors. In highly distances depending on the thickness of Quaternary alluvial deposits and other factors. In highly fractured zones, enhanced groundwater storage and movement has accelerated the breakdown of the rock-forming minerals and has caused formation of a thicker saprolitic deposit.

2.3 AQUIFER RECHARGE

Precipitation infiltrating through the soil and Quaternary alluvium on site and/or in up-gradient areas is the primary source of aquifer recharge to the on-site supply well. Generally, overlying soil horizons act to absorb and then slowly release infiltrating precipitation. However, in areas where fracture zones have formed, percolating groundwater can reach the water table quickly. A portion of the precipitation percolates downward through the soil mantle and then migrates through narrow, interconnected joints, fractures, faults, and cleavage planes in the bedrock.

2.4 GEOLOGY-CONTROLLED GROUNDWATER FLOW

Generally, bedding plane partings and cross-bedding fracture zones (where present) function as both downward and lateral water conduits. Consequently, such zones receive and transmit water at a rate higher than would otherwise be achievable and, accordingly, are preferential conduits for groundwater flow and contaminant transport.

3.0 WATER QUALITY ASSESSMENT

Slaughter and Darling (1962) reported the water quality from the Hamilton Group as locally variable (iron concentrations range from 0.79 to as much as 8.2 micrograms per liter (mg/l); hardness ranges from 213 to 227 mg/l; and pH ranges from 7.1 to 7.7). ALWI interpreted that the slight reddish colors of the local rock exposures as likely attributable to the trace presence of iron.

At this location, ALWI collected baseline water samples on December 16, 1998, in accordance with the MDE sampling procedures specified in COMAR 26.08.05. ALWI was unable to collect raw water samples for bacteria analysis because an effort to do so would have negatively biased the sample. ACHD's laboratory analyzed the samples for those constituents of countywide concern. These included total coliform bacteria as specified in COMAR 26.04.01.11A-C, alkalinity, color, conductance, hardness, iron, manganese, nitrate-nitrite nitrogen (COMAR 26.04.01.14(4)(a)), nitrite nitrogen (COMAR 26.04.01.14(4)(b)), pH, and total dissolved solids. The results are included as Appendix A, and suggest potability relative to the samples collected.

4.0 DELINEATION OF SOURCE PROTECTION AREA

ALWI delineated a protection area surrounding this site's spring using generalized criteria developed by MDE for non-community supplies, as modified by ALWI (with ACHD consent) based on the specific topographic setting of the site. ALWI began by using a fixed radius of 1,000 feet around the spring. From this radial area, ALWI then excluded downgradient areas more than 100 feet from the wellhead as well as areas unlikely to contribute recharge to the well based on intervening streams and/or drainage divides. ALWI also excluded steeply-sloping cross-gradient areas.

The resultant delineation is shown on the "Water Plant Information" survey form (Appendix B) and encompasses approximately 25% of the circle (originally 72 acres in size) or 18 acres. Within an assumed 600 gallons per day per acre (gpd/ac) of annualized groundwater recharge (Slaughter and Darling, 1962, Table 37), slightly less than 11,000 gallons per day exists within the aquifer beneath this WHPA. In actuality, the modest demand of this spring (approximately 500 gpd) is more than one full order of magnitude smaller than the total available in the WHPA, lending a high degree of conservatism to this analysis.

An interview with the owner suggested little if any seasonal peaking in demand, and ALWI used this to interpret little, if any, seasonal fluctuation of the boundary of the delineated area. Negligible nitrate-nitrogen concentrations were detected in the sample ALWI collected. This obviated the need for a nitrate balance assessment.

5.0 CONTAMINANT THREATS ASSESSMENT

ALWI performed a site reconnaissance on December 16, 1998. During the reconnaissance, local land use conditions were observed with emphasis on the potential use, storage and disposal practices of hazardous materials and petroleum products. Such conditions may have included visual evidence for present or former spills, stained or discolored ground surfaces, stressed vegetation, unusual odors, or visible underground storage tank (UST) facilities. Adjacent and nearby properties were also visually scanned for such evidence from the property and nearby public right-of-ways. Off-site properties were not entered. ALWI relied upon the accuracy of historical interview information provided by the owner and his employees to provide context for some of its observations.

5.1 Potential Hazards At the Wellhead

Spring sources for drinking water are at high risk for surface water influence as defined in the MDE guidance document. This risk would be better quantified with better information on the potential for variance in surface water indicator parameters (raw water bacteria; temperature and turbidity) with differing precipitation regimes. Ultimate decisions regarding possible filtration retrofits are appropriately driven by economic considerations (the capital and operational costs filtration).

The spring box for water collection also serves as a potential source of contamination. Appropriate sanitation of this structure is important to prevent possible contamination of the water supply with bacteria or other surface water pathogens. ALWI observed spiders inside the spring box, which heightens the possibility of microbial contamination. Also, deer and other animals may gather at the spring to drink. Therefore the possibility of animal waste entering into the water also exists.

5.2 Other Local Contamination Risks

On December 16, 1998, ALWI observed several potential contamination sources in the delineated WHPA. ALWI identified the following potential sources of contamination within the WHPA: former on-site USTs, the former vehicle maintenance practices at the facility and the storage of junked drums and barrels. ALWI performed a site reconnaissance and conducted limited personal interviews to identify and describe these potential contaminant hazards.

No discharge to groundwater has been confirmed by any of the facilities or practices ALWI observed. ALWI has ranked its observations in decreasing order of overall relative risk. ALWI provides specific recommendations at the conclusion of each respective observation or interpretation.

6.0 CONCLUSION AND RECOMMENDATIONS

ALWI found that the supply is potable relative to the analyses performed. No discharge to groundwater has been confirmed by any of the facilities or practices ALWI observed. ALWI has ranked its observation in decreasing order of overall relative risk. ALWI provides specific recommendations at the conclusion of each respective observation or interpretation.

1. **Surface Water Influence** - Property ownership interests should collect and analyze groundwater samples for indicators of groundwater under the direct influence of surface water (e.g., turbidity, temperature, and bacteria analyses performed daily for four consecutive days immediately after a 0.5-inch rainfall event). Depending on the results of the analyses indicated above, business ownership interests should evaluate the cost and feasibility of retrofitting the existing groundwater supply system with appropriate filtration measures to better protect from human health pathogens typically found in surface water (e.g., *Giardia* and *Cryptosporidium*). If no action is taken to investigate and mitigate this risk, all water should be boiled for ten minutes before commercial use and appropriate placarding should be provided so as to warn against use of an untested source for potable purposes.

2. **Remnant Petroleum from Former USTs -** Based solely on the former on-site USTs[1], ALWI recommends a single round of analytical testing to confirm the absence of gasoline and halogenated solvent constituents. An analysis by EPA Method 502 is likely the most expedient considering the spectrum of compounds possibly present. Periodic monitoring and other corrective actions as necessary should then continue based on the findings.

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[1] Any finding of petroleum-contaminated groundwater must be reported to the MDE Oil Control Program. Such a report would open (or reopen) an Oil Control Program case file. MDE Oil Control Program representatives may order additional sampling. UST tightness testing, UST removal(s), monitoring well drilling, and/or other investigative and remedial measures. ALWI suggests that site ownership and ACHD interest consult legal counsel before taking any action that could have adverse financial or environmental liability consequences.

3. **Former Vehicle Maintenance** – An informal interview suggested that vehicle maintenance was once a service offered at the facility. The nature of services is unknown, but likely included routine fluid changes. Any spill of these fluid may have contaminated the water supply.

4. **Storage of Barrels and Drums** – ALWI observed several junked drums and barrels on-site with unknown contents. A leak in one of these containers could potentially lead to contamination of the water supply. Better storage practices, such as placing the containers in an area with secondary containment, would help eliminate this risk.

5. **Subsurface Disposal Facilities** – Various homes and businesses in Spring Gap doubtlessly have septic systems varying in age and condition. Though the low nitrate concentrations detected in the groundwater sample collected indicate no present release, property ownership interests should embark on a regularly scheduled program of pump-outs. Perhaps a consortium of neighbors could join to negotiate more favorable pricing from septic contractors. When the septic system needs replacement, the tank should be replaced with a seamless model and no facilities should be relocated uphill or within 100 feet of the well.

6. **Highway and Parking Area Deicing** – Highway and parking area deicing practices may increase a seasonal risk of sodium and chloride contamination. The State Highway Administration (SHA) is unlikely to curtail or otherwise change deicing practices on Oldtown Road (Route 51). However, consideration should be given to using non-chemical abrasives on the parking lot for deicing to the degree possible. Baseline and bi-annual sampling for sodium and chlorides should be considered.

7.0 SELECTED REFERENCES

Cleaves, Emery T., Jonathan Edwards Jr. and John D. Glaser, 1968. Geologic Map of Maryland: Maryland Geologic Survey, 1:250,000.

MDE Public Drinking Water Program, 1998, Transient Water System Operations Guidance; Guidance For Counties With Delegated Responsibilities (Draft), 45p.

Slaughter, Turbit H. and John M. Darling, 1963, The Water Resources of Allegany and Washington Counties: Maryland Department of Geology, Mines, and Water Resources, Bulletin 24, p. 408.

NONCOMMUNITY WATER SUPPLY SANITARY SURVEY

1. System Name: Shryock's Grocery	2. WAS: 95

. System Information: Address: Route #1, Box 241 Oldtown, Maryland Phone No.: (301) 478-5157	4. ADC Map/Grid: N/A	5. Tax Map/Plat: N/A
	6. Population: Transient ____ Regular 2 Total 2 +/-	

7. Property Information: Owner's Name Mr. Harry M. Shryock Address: Route #1, Box 241 Oldtown, Maryland Phone No. (301) 478-5157	8. No. Service Connections: 9. Type of Facility: Food Service x Church ____ Campground ____ Daycare ____ Other (specify) ____

10. Contact Person: Name: Harry Shryock Phone No. (301) 478-5157	11. Operator: Name: ____ Cert. No. ____

12. Sample History (Has the system had any violations?):

Bacteria: None apparent or reported   Nitrate: None apparent or reported

SURVEY RESULTS

13. Comments on System, Recommendations:

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14. Inspected by: Mark W. Eisner	15. Date inspected: 12/16/98	16. System Vulnerability Protected ____ Vulnerable Yes (see report)

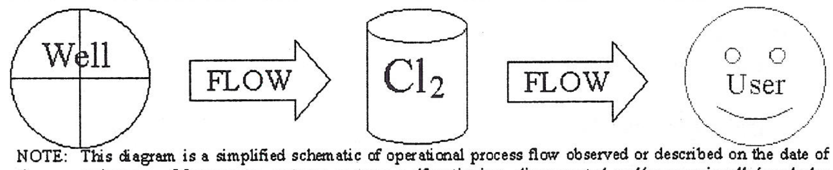
WATER PLANT INFORMATION

17. Type of Treatment: (Check all that apply)

Disinfection
- Gas Chlorine: ______
- Sodium Hypochlorite: x
- Ultraviolet Radiation: ______

Iron Removal: ______
Nitrate Removal: ______
PH Neutralizer: ______
Other: ______
Unknown: ______

18. System Schematic (Process Flow):



NOTE: This diagram is a simplified schematic of operational process flow observed or described on the date of the reconnaissance. Many water systems possess malfunctioning, disconnected and/or occasionally/regularly-bypassed equipment. Actual treatment processes may differ, therefore, from those shown herein.

19. System Storage:

Ground Storage: ______
Elevated Storage: ______
Hydropneumatic Tank: x
Other: ______

20. Storage Capacity:

Typical Domestic

21. Untreated water sampling tap?

Yes _x_ No _____

WELL INFORMATION

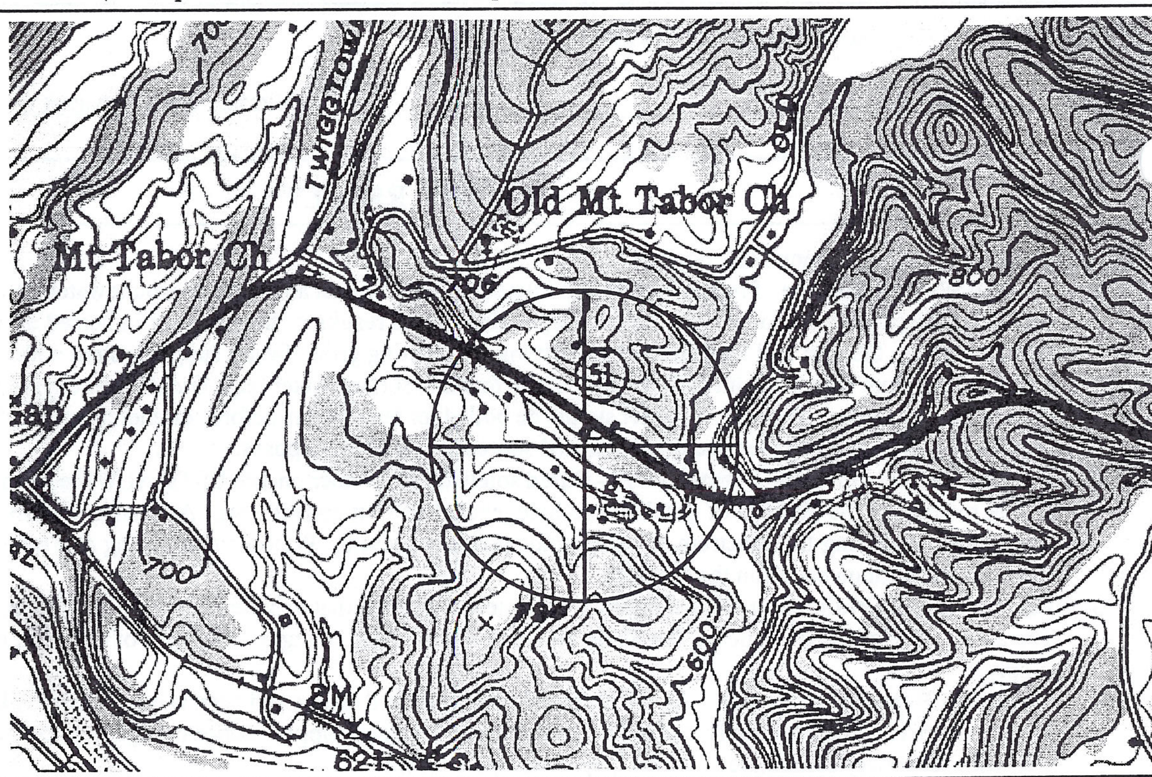
22. Well Information:

Tag Number: spring fed
Year Drilled: ______
Casing Depth: ______
Well Depth: ______
Well Yield: ______
Casing Height: ______
Grout Depth: ______
Pitless Adapter? ______
Wiring OK? unknown
Pump OK? unknown

23. Well Type:

Drilled: x
Driven: ______
Dug: ______

24. Well Location Diagram (1 in. = 1250 ft.) with Approximate Distances from Potential Contaminant Sources (i.e. septic, sewer lines, structures, petroleum storage, surface water bodies, etc.):



25. Aquifer:

Name: Hamilton
GAP #: ______
Confined: ______
Unconfined: x
Semi-confined: ______

26. Quantity Used:

Daily Avg (gpd): <1,000
Pumping Rate (gpm): ______
Hours run per day: ______

27. Well Cap: N/A

Type? ______
Seal Tight?
Vented?
Screened?
Conduit OK?

28. Casing Diameter:
N/A
2": ______
4": ______
6": ______
Other: ______

29. Casing Type:
N/A
PVC: ______
Metal: ______
Concrete: ______