WELLHEAD AREA SURVEY
RICH'S GROCERY
ACHD SITE NO. 18
Barton, 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 Wellhead Survey Area for Rich's Grocery, on the west side of New Georges Creek Road (MD Route 36), and west of Georges Creek in southwestern Allegany County, Maryland. This site, designated No. 18 by ACHD, is served by one six-inch steel-cased production well completed in the local bedrock aquifer.

The draft Maryland Department of the Environment (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." An informal interview with an employee suggested that the limited number of employees, the use of bottled water for brewing coffee, and the lack of consistent clientele combine to make this 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 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 supplies both transient and non-transient in nature. ACHD, in cooperation with MDE, established this program to bring existing non-community supplies into compliance with the coming regulations.

1.2 SCOPE

ALWI prepared this Wellhead Survey Area following ACHD requirements, which followed MDE guidelines for transient system operation and wellhead protection.

photograph conditions surrounding the wellhead 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 A).

3. **Contamination Hazard Assessment** – ALWI identified existing and potential contaminant hazards within the delineated area 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 groundwater contamination.

2.0 HYDROGEOLOGIC FRAMEWORK

ALWI used published information from the United States Geological Survey and the Maryland Geological Survey to identify and describe the characteristics of the local hydrogeologic setting.

2.1 Bedrock Geology

Rich's Grocery is situated within the Appalachian Plateau physiographic province and is underlain by consolidated sedimentary rocks of Pennsylvanian age. The Conemaugh Formation underlies the site and consists of fine-grained sedimentary rock (Cleaves, 1968). These rocks have been gently folded, resulting in broad 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. However, at this location, the bedding planes are nearly horizontal, which suggests that the gentle southwesterly structural plunge may exert greater-than-usual control on deep groundwater flow directions.

Reported well yields within the Conemaugh Formation are sparse but range from 5 to 170 gpm (Slaughter and Darling, 1962). Conemaugh Formation wells completed within sandstone beds generally have a higher yield because the greater competence of the rock allows the development of longer and wider fractures both along and across bedding planes.

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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 is generally 2 to 10 feet, but it varies considerably over short distances. 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 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.

Despite the bedrock's overall hardness and resistance to erosion, hydraulic permeabilities in bedding planes and fracture zones within the Conemaugh Formation may be several times greater than in surrounding less-fractured rock. This intrinsic characteristic portends the possibility for the existence of specific zones with higher-than-normal well yields, higher-than-normal groundwater flow velocities and higher-than-normal susceptibility to groundwater contamination.

3.0 WATER QUALITY ASSESSMENT

Slaughter and Darling (1962) reported the groundwater quality from the Conemaugh Formation as locally variable (iron concentrations range from 0.02 to as much as 6.0 micrograms per liter (mg/l); hardness ranges from 17 to 303 mg/l; and pH ranges from 6.5 to 8.3). 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 groundwater samples on December 16, 1998, in accordance with the MDE sampling procedures specified in COMAR 26.08.05. ALWI collected raw water samples as specified in COMAR 26.04.01.14. 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

ALWI delineated a surveyed area surrounding this site's well 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. The resultant delineation is shown on the "Water Plant Information" survey form (Appendix B). ALWI used a fixed radius of 1,000 feet around the well, which creates an area of approximately 72 acres. Within an assumed 600 gallons per day per acre (gpd/ac) of annualized groundwater recharge (Slaughter and Darling, 1962, Table 37), slightly more than 43,000 gallons per day exists within the aquifer beneath this surveyed area. In actuality, the modest demand of this well is much smaller than the total available in the surveyed area, lending a high degree of conservatism to this analysis.

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 on the accuracy of interviews for this information.

5.1 POTENTIAL HAZARDS AT THE WELLHEAD

Design, construction and present condition are important factors in determining a well's susceptibility to contamination. However, ALWI was unable to observe the well because it was concealed in a closed cylindrical housing to protect from traffic hazards. Accordingly, ALWI could not assess the initial design nor present condition of the casing or grout seal. The owner confirmed the former presence of USTs on-site.

5.2 OTHER LOCAL CONTAMINATION RISKS

The close proximity of the well to Georges Creek and the on-site pond places it at moderate to 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 or bottled water conversion are appropriately driven by economic considerations (the capital and operational costs of domestic-scale filtration vs. the daily consumption of water).

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. **Remnant Petroleum from Former USTs[1] -** Based solely on the report of former on-site USTs, ALWI recommends a single round of analytical testing to confirm the absence of gasoline constituents (e.g., benzene, toluene, ethylbenzene, xylenes, emthyl-tertiary-butyl ether [MTBE], naphthalene, and totals for both gasoline and diesel-range petroleum hydrocarbon compounds) in the raw water supply. Periodic monitoring and other corrective actions as necessary should then continue based on the findings.

2. **Surface Water Influence –** Based on the proximity to Georges Creek and the on-site pond, 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).

3. **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 is unlikely to curtail de-icing practices along New Georges Creek Road (MD Route 36). 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.

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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, monitoring well drilling, and/or other investigative and remedial measures. ALWI suggests that site ownership and ACHD interests consult legal counsel before taking any action that could have adverse financial or environmental liability consequences.

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: Rich's Grocery	2. WAS: 18

3. System Information:

Address: HCR 1, Box 2A
Barton, Maryland

Phone No.: (301) 463-6694

4. ADC Map/Grid: N/A

5. Tax Map/Plat N/A

6. Population:

Transient ____
Regular 1
Total 1+/-

7. Property Information:

Owner's Name: Harold W. Moyer

Address: HCR 1, Box 2A
Barton, Maryland

Phone No. (301) 463-6694

8. No. Service Connections:

9. Type of Facility:

Food Service x
Church ____
Campground ____
Daycare ____
Other (specify) ____

10. Contact Person:

Name: Harold Moyer

Phone No. (301) 463-6694

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

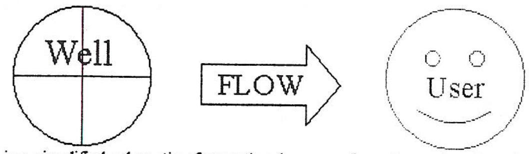
WATER PLANT INFORMATION

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

Disinfection
- Gas Chlorine: ______
- Sodium Hypochlorite ______
- 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?

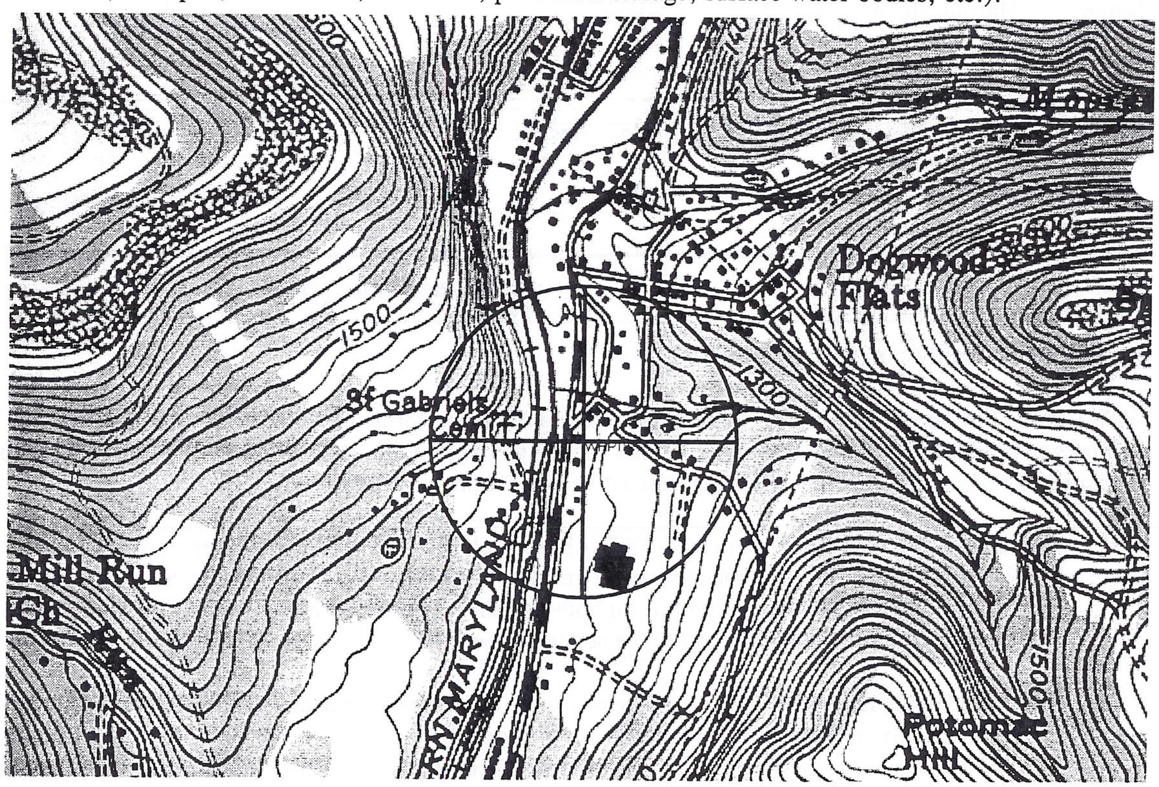
Yes __x__ No _____

WELL INFORMATION

22. Well Information:

Tag Number: not visible
Year Drilled: ______
Casing Depth: ______
Well Depth: ______
Well Yield: ______
Casing Height: ______
Grout Depth: ______
Pitless Adapter? ______
Wiring OK? unknown
Pump OK? unknown

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.):



23. Well Type:

Drilled __x__
Driven ______
Dug ______

25. Aquifer:

Name: Conemaugh______
GAP #: ____________
Confined ______
Unconfined __x__
Semi-confined ______

26. Quantity Used:

Daily Avg (gpd) _600_
Pumping Rate (gpm) unknown
Hours run per day unknown

27. Well Cap:

Type? ______
Seal Tight? unknown
Vented? unknown
Screened? No
Conduit? unknown

28. Casing Diameter:

2" ______
4" ______
6" _x____
Other ______

29. Casing Type:

PVC ______
Metal __x__
Concrete ______