WELLHEAD SURVEY AREA
MAPLESHADE SPORTSMEN'S CLUB
ACHD SITE NO. 11
Dawson, 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 the Mapleshade Sportsmen's Club, located on the east side of McMullen Highway (U.S. Route 220), and east of an unnamed tributary of the Potomac River in southern Allegany County, Maryland. This site, designated No. 11 by ACHD, is served by one six-inch diameter, PVC-cased production well completed in the local bedrock aquifer.

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." An informal interview with the bartender suggested that the regular clientele (500 weekly), the year-round operations, and the lack of nearby tourist attractions drawing transient customers all combine to suggest that this water system is indeed a non-transient non-community system (NTNC).

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.

1. **Site Reconnaissance, Photographic Documentation and Interviews** – ALWI observed the on-site wellhead, 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 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 B).

3. **Contamination Hazard Assessment** – ALWI identified existing and potential contaminant hazards within the delineated an area of potential concern 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

Mapleshade 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 west, and the groundwater flow direction likely follows. Reported well yields within the Hamilton Group are sparse but average six 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 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 15, 1998, in accordance with the MDE sampling procedures specified in COMAR 26.08.05. 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 15, 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

Design, construction and present condition are important factors in determining a well's susceptibility to contamination. However, no well tag was visible. Accordingly, ALWI could not assess the initial design nor present condition of the casing or grout seal. ALWI observed that the portion of the casing exposed at ground surface appeared intact and was equipped with a conventional pitless-style cap of the type that can sometimes allow insects to enter the well. An upgrade to a more modern cap would provide greater protection against microbial contamination. A watertight cap would also provide greater protection from occasional flooding of the Potomac River. Also, the well casing was made of PVC and is located proximal to the parking lot. In past experience ALWI has observed that PVC casing is sometimes unable to penetrate the required two feet into competent bedrock. This heightens the risk of surficial contaminants entering the water supply.

5.2 OTHER LOCAL CONTAMINATION RISKS

ALWI observed several potential contamination sources in the delineated area. ALWI identified the following potential sources of contamination within the surveyed area: the proximity of the septic system, parking and highway de-icing practices, and the location of the well in a floodplain. ALWI performed a site reconnaissance and conducted limited personal interviews to identify and describe these potential contaminant hazards.

The proximity of the well to the nearby stream and the Potomac River places it at "high risk" for surface water influence as defined in the MDE guidance document. This risk would be better quantified with better information on subsurface borehole conditions (e.g., depth of casing) and 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 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. **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).

2. **Subsurface Disposal Facilities** – Various homes and businesses in the area 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.

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 (SHA) is unlikely to curtail or otherwise change deicing practices on McMullen Highway (U.S. Route 220). 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: Mapleshade Sportsmen's Club

2. WAS: 11

3. System Information:

Address: 15 James Street
Keyser, Maryland
Phone No.: (301) 786-4186

4. ADC Map/Grid: N/A

5. Tax Map/Plat: N/A

6. Population:

Transient 0
Regular 125
Total 125 +/-

7. Property Information:

Owner's Name Doug Courtney
Address: 15 James Street
Keyser, Maryland
Phone No. (301) 786-4186

8. No. Service Connections:

9. Type of Facility:

Food Service x
Church
Campground
Daycare
Other (specify) Club

10. Contact Person:

Name: Doug Courtney
Phone No. (301) 786-4186

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:

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).

2. **Subsurface Disposal Facilities** – Various homes and businesses in the area 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.

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 (SHA) is unlikely to curtail or otherwise change deicing practices on McMullen Highway (U.S. Route 220). 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.

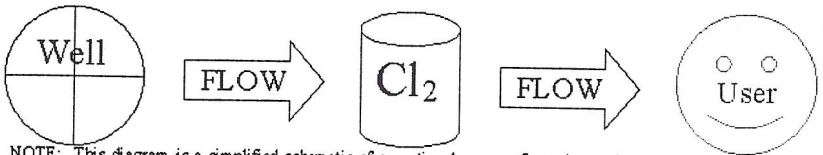
14. Inspected by:	15. Date inspected:	16. System Vulnerability
Mark W. Eisner	12/15/98	Protected _____ Vulnerable Yes (see report)

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 ____ No x

WELL INFORMATION

22. Well Information:

Tag Number: not visible

Year Drilled: ____

Casing Depth: ____

Well Depth: ____

Well Yield: ____

Casing Height: ____

Grout Depth: ____

Pitless Adapter? ____

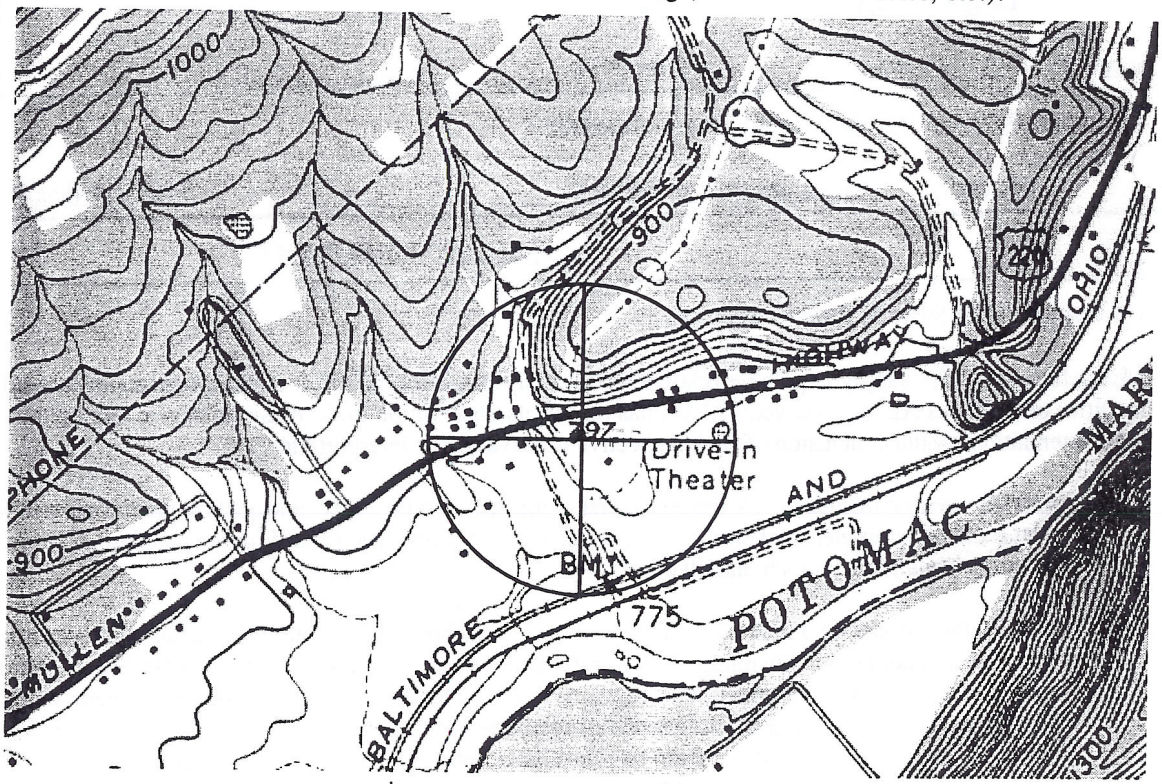
Wiring OK? unknown

Pump OK? unknown

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)	unknown
Hours run per day	unknown

27. Well Cap:

Type?	____
Seal Tight?	O.K.
Vented?	O.K.
Screened?	No
Conduit OK?	O.K.

28. Casing Diameter:

2"	____
4"	____
6"	x
Other	____

29. Casing Type:

PVC	____
Metal	x
Concrete	____