

**WELLHEAD AREA SURVEY
PEER'S TAVERN AND RESTAURANT
ACHD SITE NO. 94
Town Creek, 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 Area Survey for Peer's Tavern and Restaurant (Peer's), located on the north side of Oldtown Road and north of the intersection of the Potomac River in southern Allegany County, Maryland. This site, designated No. 94 by ACHD, is served by one 6 inch diameter 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 the husband-and-wife ownership team suggested that the number of customers (20 daily on average) suggest that this system 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 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 Area Survey 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 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

The Tavern is situated within the Appalachian Valley and Ridge physiographic province and is underlain by sedimentary rocks of late Devonian age. The Hampshire Formation underlies the site and is part of the Catskill clastic wedge and consists of red-colored sandstones and lesser amounts of shale (Glaser, 1994). These rocks have been intensely folded and faulted, resulting in alternating synclines (concave-upward folds) and anticlines (convex-upward folds).

In three dimensions, the rock formations of such folds dip at right angles to the direction of plunge of the entire 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 moderately steeply to the east (Glaser, 1994). Deep groundwater flow directions likely follow.

Reported well yields within the Hampshire Formation are sparse but range from 2 to 8 gpm. Hampshire Formation wells completed within sandstone 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.

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 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 Hampshire 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 regional water quality as slightly irony (0.01 to as much as 0.12 micrograms per liter (mg/l), soft (19 to 77 mg/l), and slightly acidic to moderately alkaline

(pH range of 6.3 to 8.7). 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 groundwater samples on December 2, 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 an area of potential concern 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. ALWI began by using a fixed radius of 1,000 feet around the well. 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. Because the light and infrequent use of the well also likely correlates to a cone-of-depression of limited areal extent, 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 33% of the circle (originally 72 acres in size) or 24 acres. Within an assumed 600 gallons per day per acre (gpd/ac) of annualized groundwater recharge (Slaughter and Darling, 1962, Table 37), over 14,000 gallons per day exists within the aquifer beneath this surveyed area. In actuality, the modest demand of this well (doubtlessly less than 1,000 gpd) is more than one full order of magnitude smaller than the surveyed area, 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 surveyed area boundary. 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 2, 1998, and took supplemental photographs late in December. 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. 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 overland flow arising from the occasional flooding of the Potomac River and its neighboring tributaries.

5.2 OTHER LOCAL CONTAMINATION RISKS

ALWI observed several potential contamination sources in the delineated area, none of which appeared present to a grave or immediate concern. ALWI identified the following potential sources of contamination: on-site ASTs and an OST. No discharge to groundwater has been confirmed by any of the facilities or practices ALWI observed.

The proximity of the well to the Potomac appears to place 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 cost and inconvenience associated with the conversion to bottled sources of potable 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). Depending on the outcome

of the analyses, property ownership interest may consider conversion to bottled sources to be more cost-effective than a filtration retrofit.

2. **On-Ground Storage Tank** – ALWI observed one on-ground storage tank (OST). The OST appeared in good condition. However, because the tank is in contact with the ground, it may be difficult to detect leaks before a significant amount has infiltrated into the soil. ALWI recommends converting this to an AST by placing the tank on legs so that it is no longer in contact with the ground.
3. **Above Ground Storage Tank** – ALWI observed two on-site above ground storage tanks (ASTs). These ASTs appeared in good condition. ALWI recommends regular maintenance of this fuel storage and delivery system, including development of specific protocols to be employed in case of a leak or overflow.
4. **Subsurface Disposal Facilities** – Various homes and businesses along MD Route 51 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. 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.
5. **Parking Area Deicing** – Parking area deicing practices may increase a seasonal risk of sodium and chloride contamination. 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

- Glaser, John D., 1994, Geologic Map of the Oldtown Quadrangle, Allegany County, Maryland: Maryland Geological Survey, 1:24,000.
- 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: Peer's Tavern and Restaurant | | 2. WAS: 94 | |
| . System Information: Address: <u>Route 1, Box 376</u> <u>Oldtown, Maryland</u> Phone No.: <u>(301) 478-5354</u> | | 4. ADC Map/Grid: N/A | 5. Tax Map/Plat: N/A |
| | | 6. Population: Transient <u>20</u> Regular <u>unknown</u> Total <u>unknown</u> | |
| 7. Property Information: Owner's Name <u>Ms. Reta Robey</u> Address: <u>Route 1, Box 376</u> <u>Oldtown, Maryland</u> Phone No. <u>(301) 478-5354</u> | | 8. No. Service Connections: | |
| | | 9. Type of Facility: Food Service <u>x</u> Church _____ Campground _____ Daycare _____ Other (specify) _____ | |
| 10. Contact Person: Name: <u>Reta Robey</u> Phone No. <u>(301) 478-5354</u> | 11. Operator: Name: _____ Cert. No. _____ | | |
| 12. Sample History (Has the system had any violations?): Bacteria: <u>None apparent or reported</u> Nitrate: <u>None apparent or reported</u> | | | |

SURVEY RESULTS

13. Comments on System, Recommendations:

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 outcome of the analyses, property ownership interest may consider conversion to bottled sources to be more cost-effective than a filtration retrofit.
2. **On-Ground Storage Tank** – ALWI observed one on-ground storage tank (OST). The OST appeared in good condition. However, because the tank is in contact with the ground, it may be difficult to detect leaks before a significant amount has infiltrated into the soil. ALWI recommends converting this to an AST by placing the tank on legs so that it is no longer in contact with the ground.
3. **Above Ground Storage Tank** – ALWI observed two on-site above ground storage tanks (ASTs). These ASTs appeared in good condition. ALWI recommends regular maintenance of this fuel storage and delivery system, including development of specific protocols to be employed in case of a leak or overflow.
4. **Subsurface Disposal Facilities** – Various homes and businesses along MD Route 51 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. 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.
5. **Parking Area Deicing** – Parking area deicing practices may increase a seasonal risk of sodium and chloride contamination. 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.

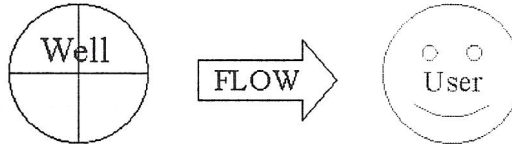
| | | |
|-------------------------------------|---------------------------------|--|
| 14. Inspected by: Mark W. Eisner | 15. Date inspected: 12/03/98 | 16. System Vulnerability Protected _____ Vulnerable <u>Yes (see report)</u> |
|-------------------------------------|---------------------------------|--|

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 _____
- Other _____

20. Storage Capacity:

Typical Domestic

21. Untreated water sampling tap?

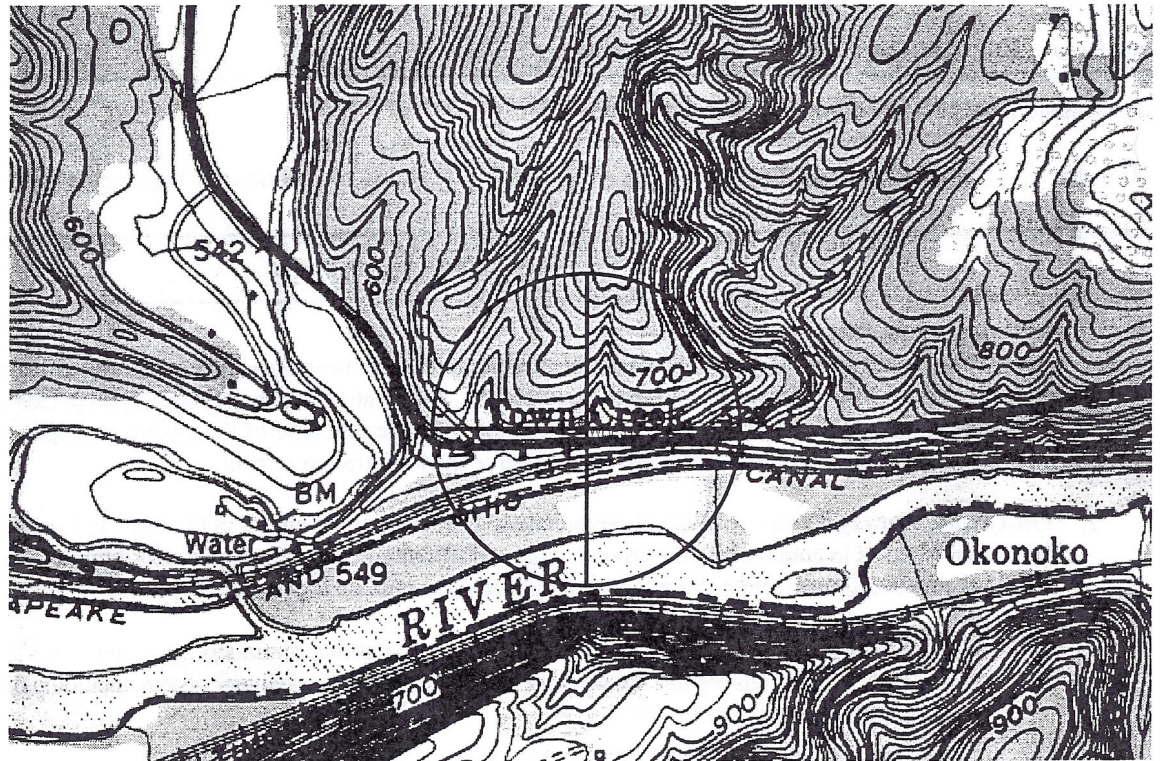
Yes No _____

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 _____
- Driven _____
- Dug _____

25. Aquifer:

- Name: Hampshire
- GAP #: _____
- Confined _____
- Unconfined _____
- Semi-confined _____

26. Quantity Used:

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

27. Well Cap:

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

28. Casing Diameter:

- 2" _____
- 4" _____
- 6" _____
- Other _____

29. Casing Type:

- PVC _____
- Metal _____
- Concrete _____