WELLHEAD AREA SURVEY
OLDTOWN VOLUNTEER FIRE DEPARTMENT
ACHD SITE NO. 93
Oldtown, 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 Oldtown Volunteer Fire Department (VFD), located on the south side of Opessa Street and immediately northwest of Mill Run southern Allegany County, Maryland. This site, designated No. 93 by ACHD, is served by one 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." The Fire Hall holds community events such as bingo and monthly dinners. An informal interview suggested that the number of regular attendees of community functions (30 weekly for bingo, 50 monthly for dinners) combined with the fact that fires can occur at any time of year suggest that this system is 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 the 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 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

The Fire Hall is situated within the Valley and Ridge physiographic province and is underlain by fine-grained sedimentary rock of Devonian age. The Marcellus and Needmore formations (undifferentiated) underlie the site and mainly consist of shales (Glaser, 1994). 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 on deep groundwater flow likely follow.

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

Historic water quality data for the Marcellus and Needmore formations is unavailable. At this location, ALWI collected baseline groundwater samples on December 15, 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.

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 2, 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. An existing well completion report for one of the wells (Appendix C) suggests the following:

1. **Casing and Cap** - Steel casing (approximately 6 in. in diameter) was set within a 10-inch diameter hole to approximately 34 feet below ground surface (BGS). ALWI observed that the grout around the wellhead was cracked. Stormwater and other liquids may enter these cracks and enter the well, entraining microbial contaminants from the surface. Fixing the grout would lessen the possibility of stormwater infiltration and avoid potential contamination.

2. **Water Bearing Zones** – A single water bearing fracture was encountered at 50 feet below grade. 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 the occasional flooding of Mill Run and Seven Springs Run.

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 the location of the well in a floodway. No discharge to groundwater has been confirmed by any of the facilities or practices ALWI observed.

The proximity of the well to Mill Run 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 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 conversions to bottled sources of potable supply 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. **Conditions at Wellhead** – Cracked grouting and a lack of an insect-proof cap raise the possibility that contaminants could enter this supply from the nearby land surface. Regrouting and upgrading the cap would mitigate this risk.

3. **Above Ground Storage Tank** – ALWI observed two above ground storage tanks (ASTs) that contained diesel fuel. 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 overfill.

4. **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: Oldtown Volunteer Fire Department, Inc.

2. WAS: 93

. System Information:

Address: P.O. Box 83

Oldtown, Maryland

Phone No.: (301) 478-5151

4. ADC Map/Grid: N/A

5. Tax Map/Plat: N/A

6. Population:

Transient 80
Regular unknown
Total unknown

7. Property Information:

Owner's Name Oldtown Vol. Fire Dept.

Address: P.O. Box 83

Oldtown, Maryland

Phone No. (301) 478-5151

8. No. Service Connections:

9. Type of Facility:

Food Service _____
Church _____
Campground _____
Daycare _____
Other (specify) Fire Dept.

10. Contact Person:

Name: Oldtown Vol. Fire Dept

Phone No. (301) 478-5151

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.

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14. Inspected by:

Mark W. Eisner

15. Date inspected:

12/03/98

16. System Vulnerability

Protected _____ Vulnerable Yes (see report)

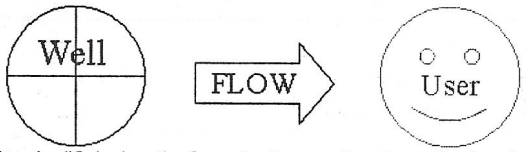
WATER PLANT INFORMATION

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

Disinfection
- Gas Chlorine: _____
- Sodium Hypochlorite _____
- 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: AL-94-0024

Year Drilled: 1994

Casing Depth: 34

Well Depth: 90

Well Yield: 40

Casing Height: 1

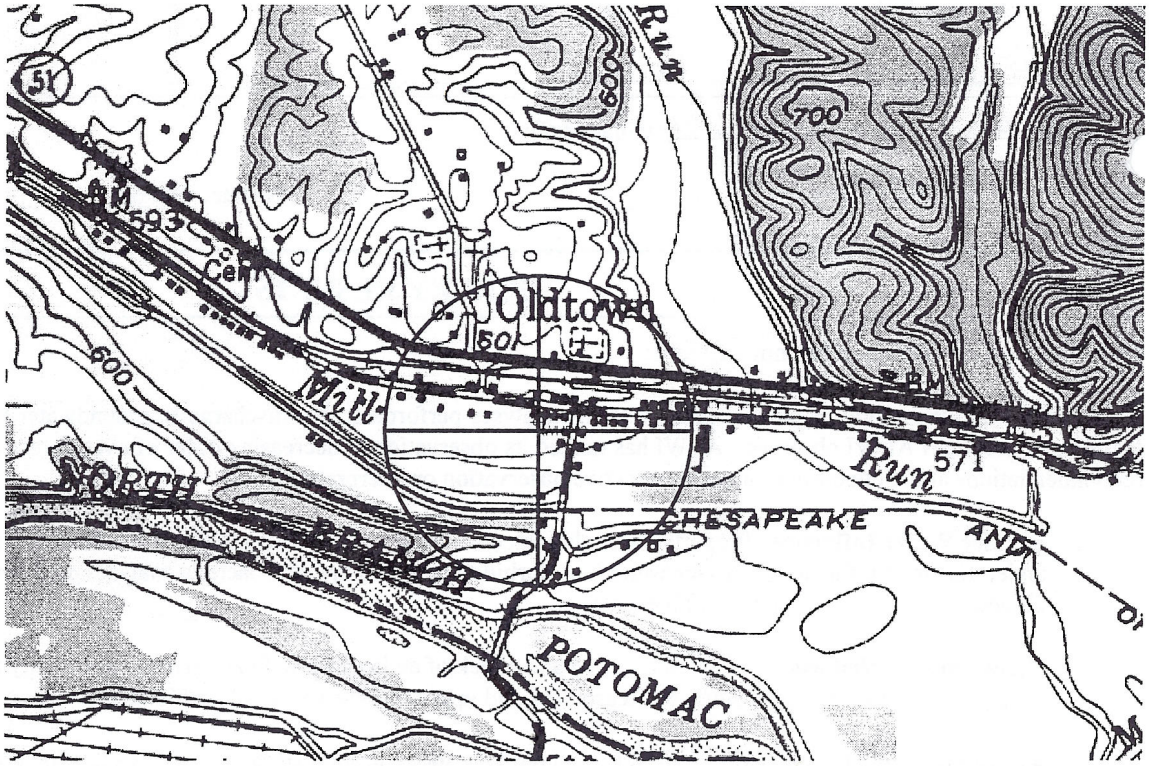
Grout Depth: 34

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: Marcellus & Needmore
GAP #: _____
Confined _____
Unconfined _x_
Semi-confined _____

26. Quantity Used:

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

27. Well Cap:

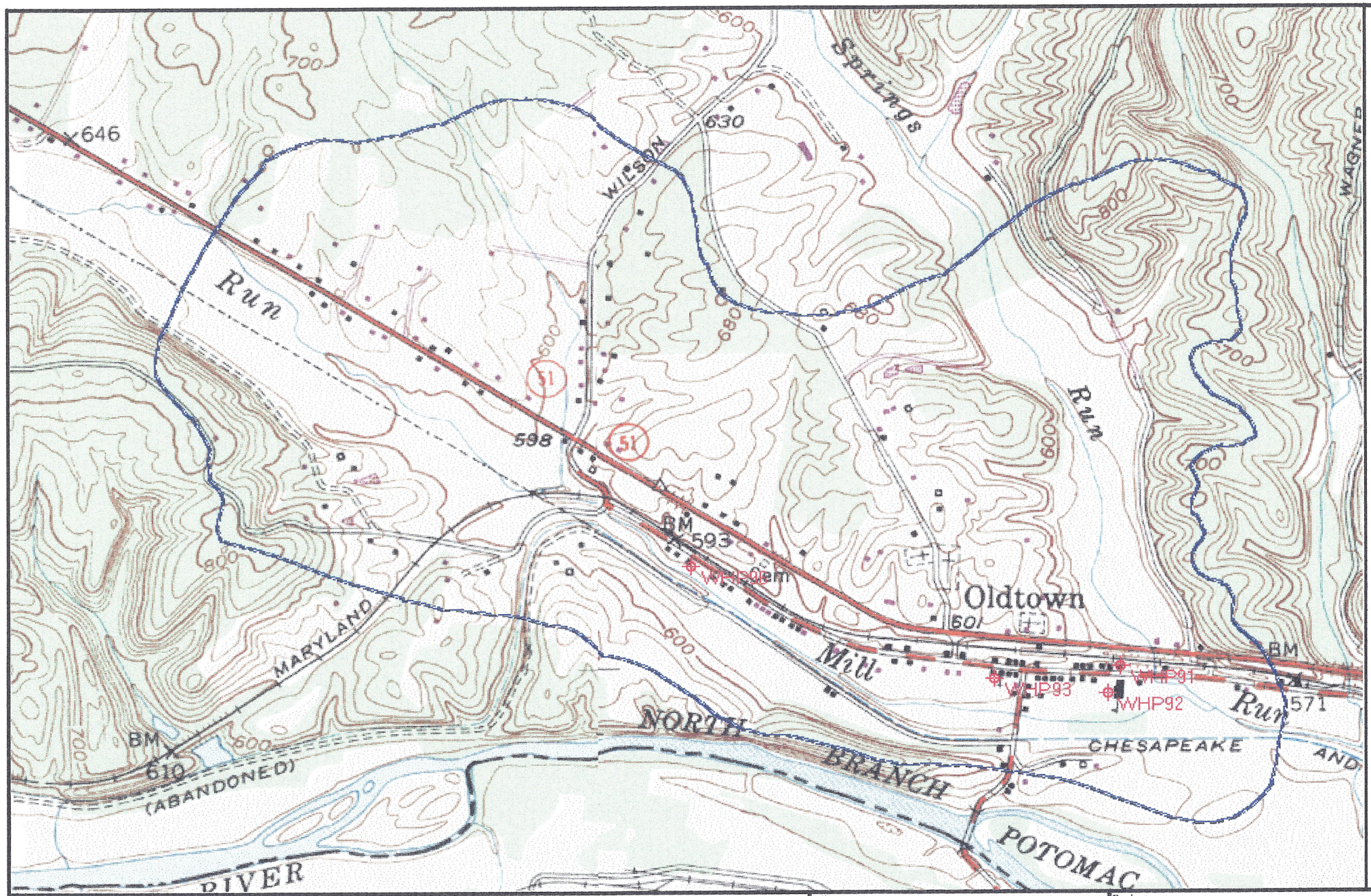
Type? _____
Seal Tight? O.K.
Vented? O.K.
Screened? No
Conduit OK? O.K.

28. Casing Diameter:

2" _____
4" _____
6" _x_
Other _____

29. Casing Type:

PVC _____
Metal __x__
Concrete _____



Preliminary Draft

Subject to Revision

N

EXPLANATION:

	TNC or NTNC well
91	Oldtown General Store
92	Oldtown School
93	Oldtown VFD
96	Oldtown VFW #9451

topographically-constrained sourced water protection area [includes areas within 1,000 feet of each surveyed well unless clear hydrogoelogic evidence suggested a need for a site-specific modificaiton of this MDE criterion.

APPROXIMATE SCALE 1"=2000 FT

0 — 2000 — 4000

Notes:

1 Base map imported from digital USGS topographic quadrangle maps for Oldtown and Patterson Creek, MD (1974 revision), provided to ALWI under liscence by Maptech, Inc.

2 This figure is integral to a written report and should only be used in that context.

3 This figure is solely intended to facilitate regulatory review and is not intended to be used for boundary verification, well location or survey control purposes.

Client:

ALLEGANY COUNTY HEALTH DEPARTMENT

ADVANCED Land and Water, Inc. (Global Environmental Solutions)

Project:

NON-COMMUNITY GROUNDWATER SOURCE ASSESSMENT PROGRAM

Prepared Pursuant to the Requirements of:

MD DEPT. OF THE ENVIRONMENT

PUBLIC DRINKING WATER PROGRAM

Figure 6. Composite Source Water Protection Area for Oldtown

October, 1999