WELLHEAD AREA SURVEY
LITTLE ORLEANS GROCERY AND BAR
ACHD SITE NO. 75
Belle Grove, 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 Little Orleans Grocery and Bar (the Grocery), located on the north side of High Germany Road, 0.1 mile east of the southern terminus of Orleans Road at its intersection with Orleans-Oldtown Road, in southeastern Allegany County, Maryland. The Grocery operates a bar and offers water to fill portable containers used by campers and hunters. This site, designated No. 75 by ACHD, is served by one 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." On December 3, ALWI observed approximately twelve patrons at the bar at mid-afternoon. Considering hunting season and the remote location of this facility, ten is likely an appropriately conservative estimate of average daily patronage with many of the patrons local to the area. Though proprietor reports that the population served may swell to 300 tourists on a peak summertime weekend, this site is a TNC system.

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 B).

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 Grocery is situated within the Appalachian Valley and Ridge physiographic province and is underlain by sedimentary rocks of late Devonian age. 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 no relation. At this location, the

bedding planes dip moderately steeply to the east-southeast. Deep groundwater flow directions likely follow.

Reported local well yields are sparse but range from 5 to 10 gpm. 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 3, 1999, in accordance with the MDE sampling procedures specified in COMAR 26.08.05. . ALWI observed that the bar area's water is chlorinated but the fill station for campers and hunters provided a raw water source. Considering the objectives of the study, ALWI collected raw water samples from the vessel fill station 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 that the samples collected at the portable cooler-fill tap are bacteriologically non-potable. ALWI understands that ACHD has proceeded to resample and did not find bacteria upon recheck. Nevertheless, consideration should be given to disinfecting this basement supply line (or reconfiguring the on-site plumbing arrangement to provide continuous treatment in the manner of the supply line that serves the bar) or discontinuing the practice of making water available to the public who may use it without boiling or other point-of-use treatment.

The supply appears to be at "moderate risk" for surface water influence as defined in the MDE guidance document. This is based on proximity to Fifteen Mile Creek and the Potomac River. According to the guidance document and assuming that this ravine represents a surface water body, two sets of wet weather samples are required to confirm the absence of surface water pathogens.

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. ALWI began by using a fixed radius of 1,000 feet around the well. From this radial area, ALWI then excluded areas across Fifteen Mile Creek and the Potomac River.

The resultant delineation is shown on the "Water Plant Information" survey form (Appendix B) and encompasses approximately 20% of the circle (originally 72 acres in size) or 15 acres. Within an assumed 600 gallons per day per acre (gpd/ac) of annualized groundwater recharge (Slaughter and Darling, 1962, Table 37), over 9,000 gallons per day exists within the aquifer beneath this surveyed area. In actuality, the modest demand of this well (doubtlessly less than 300 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 3, 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.

5.2 Other Local Contamination Risks

Based on observation and interview information, on December 3, 1998, ALWI assessed several potential contamination sources in the delineated area. ALWI identified the following potential sources of contamination within the surveyed area: possible remnant surficial and subsurface fuel spills from former USTs, possible stormwater infiltration along the well's casing, salt from road deicing, and a risk of well casing damage based on its proximity to the edge of the road.

5.0 CONCLUSION AND RECOMMENDATIONS

ALWI found that the supply used for filling portable water vessels was bacteriologically non-potable. Absent the possibility of sampling error, ALWI recommends that this supply be retrofitted with disinfection equipment or that the practice of furnishing untreated water for public consumption be discontinued.

No discharge to groundwater has been confirmed by any of the facilities or practices ALWI observed. Nevertheless, ALWI provides recommendations to assess the risk from the following hazards:

1. **Remnant Petroleum from Former USTs** - Until approximately 1988, gasoline was stored in USTs and sold on site. On-site personnel indicated that the USTs and associated systems were removed and found to be "in good shape." No supporting documentation was provided. Given the proximity of the former UST(s) to the well and its/their understood long history of use, a single round of analytical testing to confirm the absence of gasoline and fuel oil constituents (e.g., benzene, toluene, ethylbenzene, xylenes, naphthalene, and total gasoline- and diesel-range petroleum hydrocarbon compounds seems appropriate. Consideration should also be given to a solvent scan by EPA Method 524 considering the junked vehicle and parts storage practices on-site whether or not analyses are performed, ALWI recommends that site personnel fully drain and properly dispose of all hazardous materials and petroleum products before storing vehicles and parts on-site. Periodic monitoring and other corrective actions as necessary should then continue based on the findings.

2. **Roadway and Parking Area Deicing** – Highway and parking area deicing practices may increase a seasonal risk of sodium and chloride contamination. The Allegany County Roads Department is unlikely to curtail or otherwise change deicing practices. 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.

3. **Vehicular Casing Damage** - ALWI observed that the roadside position of the well placed at risk of vehicular damage. ALWI recommends that barriers be erected and maintained around the wellhead so as to better protect it against vehicular damage.

4. **Surface Water Influence** - Property ownership interests should collect and analyze groundwater samples for the potential presence 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, site ownership interests may find greater cost-effectiveness in converting to bottled sources of potable water. Retrofitting the existing groundwater supply with filtration or other costly treatment measures, if warranted by the supplemental analyses recommended herein, may not be cost-effective considering the nature and quantity of on-site uses. If the site owner concurs, appropriate placarding should be provided so as to warn against use of an untested source for potable purposes.

6.0 SELECTED REFERENCES

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: Orleans Grocery

2. WAS: 75

System Information:

Address: Route 1, Box 171

Little Orleans, Maryland

Phone No.: (301) 478-2701

4. ADC Map/Grid: N/A

5. Tax Map/Plat: N/A

6. Population:

Transient 300
Regular
Total 300

7. Property Information:

Owner's Name Mr. William Schoenadel

Address: Route 1, Box 171

Little Orleans, Maryland

Phone No. (301) 478-2701

8. No. Service Connections:

9. Type of Facility:

Food Service x
Church
Campground
Daycare
Other (specify)

10. Contact Person:

Name: Mr. William Schoenadel

Phone No. (301) 478-2701

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:

No discharge to groundwater has been confirmed by any of the facilities or practices ALWI observed. Nevertheless, ALWI provides recommendations to assess the risk from the following hazards:

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4. **Surface Water Influence** - Property ownership interests should collect and analyze groundwater samples for the potential presence 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].

14. Inspected by: Mark W. Eisner

15. Date inspected: 12/03/98

16. System Vulnerability

Protected Vulnerable yes (see report)

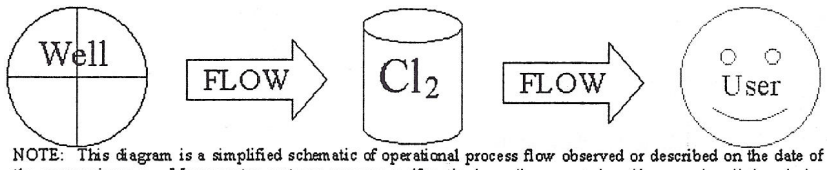
WATER PLANT INFORMATION

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

Disinfection
- Gas Chlorine: _____
- Sodium Hypochlorite _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: not visible

Year Drilled: _____

Casing Depth: _____

Well Depth: _____

Well Yield: _____

Casing Height: _____

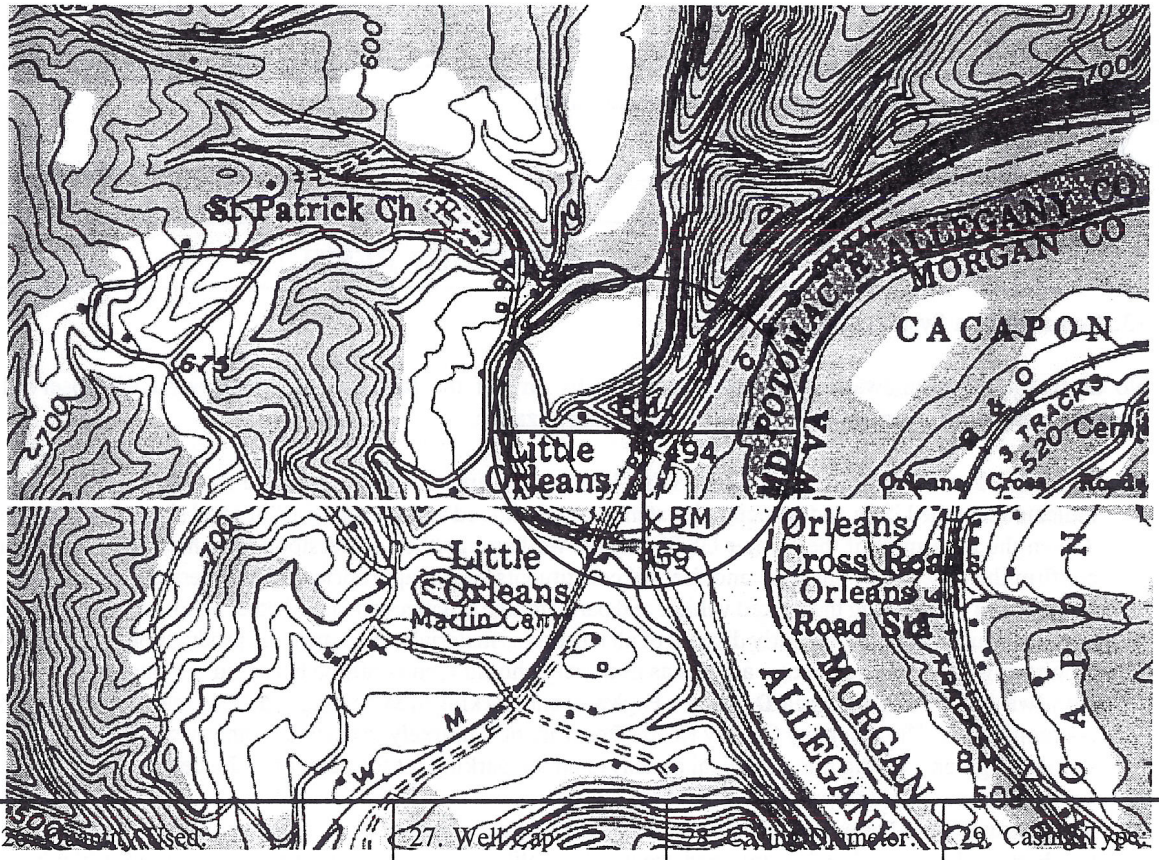
Grout Depth: _____

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: Devonian
GAP #: _____
Confined _____
Unconfined _x_____
Semi-confined _____

26. Quantity Used:

Daily Avg (gpd) 500
Pumping Rate (gpm) 5 - 10
Hours run per day _____

27. Well Cap:

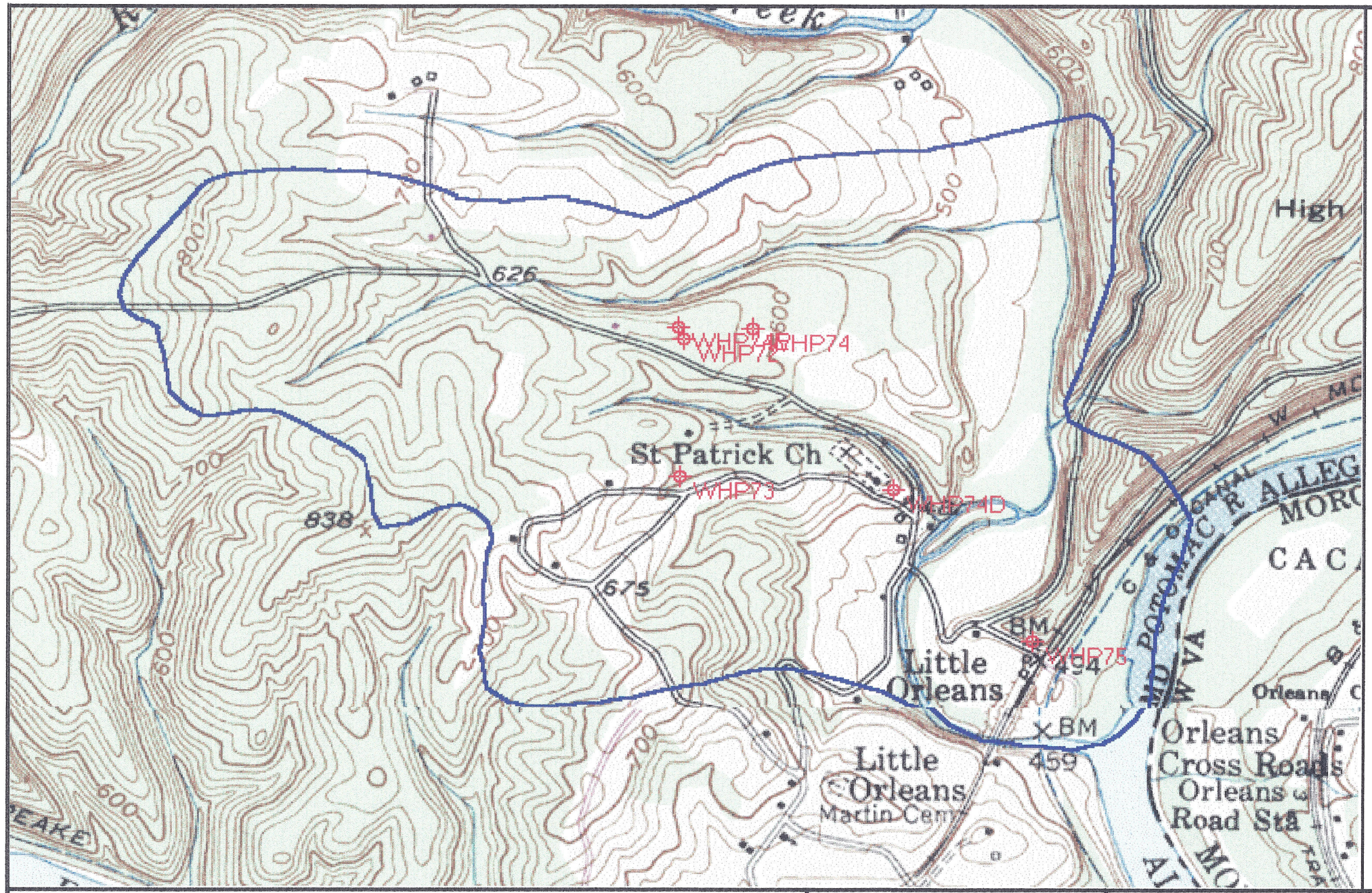
Type? _____
Seal Tight? O.K.
Vented? O.K.
Screened? No
Conduit OK? O.K.

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**
72 →	Campground Well A
73	Campground Well B
74	Campground Well C
74D	Campground Well D
74E	Campground Well E
75	Orleans Grocery

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"=1600 FT

0 — 1600 — 3200

Notes:

1 Base map imported from digital USGS topographic quadrangle maps for Artemas and Paw Paw, 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 5.
Composite Source Water Protection Area
Little Orleans

October, 1999