SPRING SOURCE AREA SURVEY
POLISH MOUNTAIN MAPLE PRODUCTS
ACHD SITE NO. 76
Flintstone, 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 spring source protection plan for Polish Mountain Maple Products, a commercial bakery located on the west side of John Stewart Road, approximately two miles east of Flintstone in northern Allegany County, Maryland. Indian Polish Mountain is a food preparation/bakery operation. This site, designated No. 76 by ACHD, is served by a spring that issues from an escarpment on the east side of Polish Mountain.

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 operation does not have 25 employees and various people are exposed through food preparation. Therefore this 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 Spring source Protection Programs by individual states under "umbrella" EPA oversight. The EPA approved a statewide Spring source Protection Program developed by MDE in June 1991.

The MDE program originally applied to community well water supplies, only. A newly proposed broadening of the Federal Clean Water Act will have the result of expanding the MDE Spring source Protection Program to encompass non-community well water supplies both transient and non-transient in nature. ACHD, in cooperation with MDE, established this program to bring existing non-community well water supplies into compliance with the coming regulations. At the direction of ACHD, ALWI applied appropriate provisions of the MDE Spring source Protection Program to this spring source assessment.

1.2 SCOPE

ALWI prepared this spring source protection plan following ACHD requirements, which followed MDE guidelines for transient system operation and spring source protection.

1. **Site Reconnaissance, Photographic Documentation and Interviews** – ALWI observed the on-site spring source, 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 spring source 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 WHPA 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 water 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

Polish Mountain is situated within the Valley and Ridge physiographic province and is underlain by consolidated sedimentary rocks of rocks of the late Devonian "Catskill Clastic Wedge". The Brallier and Harrell formations (undifferentiated) underlie the site and consist of fine-grained sedimentary rock (Cleaves and others, 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 water (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 water flow directions.

Reported well yields within the Brallier and Harrell formations are sparse but average 5 gpm (Slaughter and Darling, 1962). 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.

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 ground water 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 water 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 WATER 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 ground water flow and contaminant transport.

Despite the bedrock's overall hardness and resistance to erosion, hydraulic permeabilities in bedding planes and fracture zones within the Brallier and Harrell formations 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 water flow velocities and higher-than-normal susceptibility to water contamination.

3.0 WATER QUALITY ASSESSMENT

Slaughter and Darling (1962) reported the water quality from the Brallier and Harrell formations as locally variable (iron concentrations range from 0.11 to as much as 12 micrograms per liter (mg/l); hardness ranges from 58 to 178 mg/l; and pH ranges from 7.4 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 water 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. ALWI was unable to collect an unbiased raw water bacteria sample. 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 OF SOURCE PROTECTION AREA

ALWI delineated a protection area surrounding this site's spring 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 spring. From this radial area, ALWI then excluded downgradient areas more than 100 feet from the spring source as well as areas unlikely to contribute recharge to the well based on intervening streams and/or drainage divides. 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 25% of the circle (originally 72 acres in size) or 18 acres. Within an assumed 600 gallons per day per acre (gpd/ac) of annualized water recharge (Slaughter and Darling, 1962, Table 37), slightly less than 11,000 gallons per day exists within the aquifer beneath this WHPA. In actuality, the modest demand of this spring (approximately 500 gpd) is more than one full order of magnitude smaller than the total available in the WHPA, 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 boundary of the delineated area. 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 14, 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.

Spring sources for drinking water are 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 are appropriately driven by economic considerations (the capital and operational costs of filtration).

The cistern for water collection also serves as a potential source of contamination. Appropriate sanitation of this structure is important to prevent possible contamination of the water supply with bacteria or other surface water pathogens.. This risk would increase if the UV light were to malfunction.

6.0 CONCLUSION AND RECOMMENDATIONS

ALWI found that the supply is potable relative to the analyses performed. No discharge to water has been confirmed by any of the facilities or practices ALWI observed. Nevertheless, ALWI provides recommendations to assess and mitigate the risk of surface water influence. Property ownership interests should collect and analyze water samples for indicators of water 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, business ownership interests should evaluate the cost and feasibility of retrofitting the existing supply system with appropriate filtration measures to better protect from human health pathogens typically found in surface water (e.g., *Giardia* and *Cryptosporidium*). If no action is taken to investigate and mitigate this risk, all water should be boiled for ten minutes before commercial use and appropriate placarding should be provided so as to warn against use of an untested source for potable purposes.

7.0 SELECTED REFERENCES

Glaser, John D., 1994, Geologic Map of the Flintstone 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: Polish Mountain Maple Products

2. WAS: 76

3. System Information:

Address: Star Route, Box 9

Flintstone, Maryland

Phone No.: (301) 478-2245

4. ADC Map/Grid: N/A

5. Tax Map/Plat: N/A

6. Population:

Transient >25
Regular unknown
Total >25

7. Property Information:

Owner's Name Mr. Richard Grubb

Address: Star Route, Box 9

Flintstone, Maryland

Phone No. (301) 478-2245

8. No. Service Connections:

9. Type of Facility:

Food Service x
Church
Campground
Daycare
Other (specify)

10. Contact Person:

Name: Mr. Richard Grubb

Phone No. (301) 478-2245

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:

Mark W. Eisner

15. Date inspected:

12/14/98

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 __x__

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: spring fed

Year Drilled: _____

Casing Depth: _____

Well Depth: _____

Well Yield: _____

Casing Height: _____

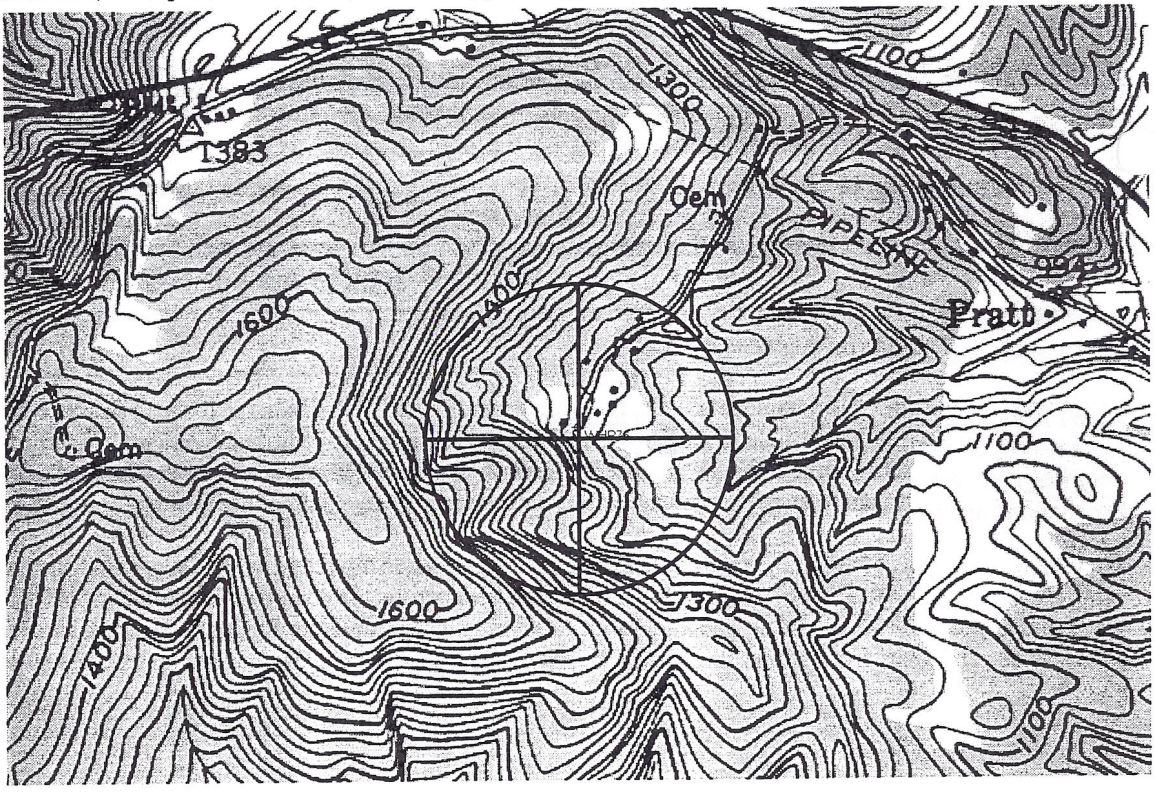
Grout Depth: _____

Pitless Adapter? _____

Wiring OK? _____

Pump OK? _____

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: N/A

Drilled _____
Driven _____
Dug _____

25. Aquifer:

Name: Brallier & Harrell
GAP #: _____
Confined _____
Unconfined _____
Semi-confined _____

26. Quantity Used:

Daily Avg (gpd) _500__
Pumping Rate (gpm) unknown
Hours run per day unknown

27. Well Cap: N/A

Type? N/A
Seal Tight? N/A
Vented? N/A
Screened? N/A_
Conduit OK? N/A_

28. Casing Diameter:
N/A
2" _____
4" _____
6" _____
Other _____

29. Casing Type:
N/A
PVC _____
Metal ____
Concrete____