WELLHEAD AREA SURVEY
DALE'S PIT STOP
ACHD SITE NO. 2
McCoole, 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 Dale's Pit Stop, located on the west side of McMullen Highway (U.S. Route 220), in southern Allegany County, Maryland Dale's Pit Stop is a small convenience store with gasoline sales and public restrooms. This site, designated No. 2 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." The small number of employees (2 total) and the lack of extensive food preparation suggests that 25 regular customers are not exposed, though overall service likely exceeds this from a purely volumetric perspective. Therefore, this site 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 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

Dale's Pit Stop is situated within the Valley and Ridge physiographic province and is underlain by fine- grained shales, locally mapped as the Marcellus and Needmore formations of Devonian age. (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 groundwater flow directions likely follow. Reported well yields within the Hamilton Group are sparse but average 6 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 the saprolite and soil mantle 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 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 Marcellus and Needmore shales 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 (doubtlessly less than 1,000 gpd) 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 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.

ALWI identified the following potential sources of contamination within the surveyed area: underground storage tanks (USTs), stormwater infiltration along the well's casing, salt from road deicing, and an adjacent agricultural area. ALWI performed a site reconnaissance and conducted limited personal interviews to identify and describe these potential contaminant hazards.

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 tags were visible. Accordingly, ALWI could not assess the initial design or present condition of the casing or grout seal. ALWI observed that the top of each well casing terminates below grade. This in apparent violation of several provisions[1] within COMAR 26.04.04.07F. An interview also indicated that the well is 55 feet deep. This shallow depth makes the well drought susceptible. With a limited amount of available drawdown, the well may go dry in extreme drought situations.

5.2 OTHER LOCAL CONTAMINATION RISKS

ALWI observed several potential contamination sources in the delineated area. No discharge to groundwater has been confirmed by any of the facilities or practices ALWI observed. ALWI has

[1] This regulation prohibits frost pits, requires pitless adapters and specifies that the finished height of well casings extend at least 8 inches above natural grade.

ranked its observations in decreasing order of overall relative risk. ALWI provides specific recommendations at the conclusion of each respective observation or interpretation.

5.2.1 Underground Storage Tanks

Gasoline is sold at this facility. The USTs at this facility were upgraded in 1994 when a remediation project took place. However, there was no closure confirmation from MDE. Based on past experience, ALWI has observed that UST sites may achieve compliance and pass leakage detection tests even with low to moderate degrees of subsurface petroleum contamination. A new well is known to be contaminated with petroleum, and is only used for washing vehicles and equipment. However, reportedly the new well has not been tested for petroleum contamination. Given the proximity of the UST field to the well, analytical testing to confirm the absence of gasoline and diesel oil constituents (e.g., benzene, toluene, ethylbenzene, xylene, methyl-tertiary-butyl ether [MTBE], naphthalene, and totals for gasoline- range petroleum hydrocarbon compounds) seems appropriate[2]. 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.

Ideally, such testing should occur during late winter and again in late summer to assess variances due to seasonal differences in groundwater elevation. Periodic monitoring and other corrective actions as necessary should then continue based on the findings.

5.2.2 Other Potential Hazards

1. **Subsurface Well Completion** – The new well should be retrofitted with a pitless adapter and casing extended to above-grade with care taken to adhere to casing grouting requirements in so doing. Access for pump repairs and replacements should be maintained as well.

2. **Subsurface Disposal Facilities** – Older septic tanks of the type likely present may have seams. Though the low nitrate concentrations in groundwater indicate no present release, property ownership interest should embark on a regularly scheduled program of pump-outs. When the septic systems 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. **Vehicle Lifts** – ALWI observed bay doors at this facility, which indicate that vehicle service was once provided here. ALWI assumes that hydraulic vehicle lifts may have been located in the former shop area and may remain beneath metal trap doors located in the floor of the

[2] Any finding of petroleum-contaminated groundwater must be reported to the MDE Oil Control Program. Such a report would open (or reopen) an Oil Control Program case file. MDE Oil Control Program representatives may order additional sampling, UST tightness testing, UST removal(s), monitoring well drilling, and/or other investigative and remedial measures. ALWI suggests that site ownership and ACHD interests consult legal counsel before taking any action that could have adverse financial or environmental liability consequences.

convenience store. No visible leakage or spillage of hydraulic oil associated with the lifts was observed at floor level. According to COMAR 26.10.02.02.B (3), hydraulic lift tanks are exempt from UST regulatory registration and reporting requirements. However, releases from hydraulic lift systems may be regulated. ALWI recommends that the subfloor lifts, if present, be removed and properly closed.

4. **Adjacent Agricultural Property** – Possible contamination hazards may arise from farming practices on the neighboring property. Farming practices may degrade the water quality through the introduction of pesticides, herbicides or other compounds to the groundwater. Accordingly, ALWI recommends baseline sampling for the presence of pesticides and herbicides. Periodic monitoring may be necessary based on the findings.

6.0 CONCLUSION AND RECOMMENDATIONS

ALWI did not find acute conditions suggesting non-potability of a type warranting immediate reporting, resampling, or other emergency corrective action. ALWI developed the recommendations within this section following MDE guidelines but also in light of site-specific practicalities. For example, ALWI acknowledges that the on-site well cannot be relocated so far from the USTs to eliminate all risk of petroleum contamination of the groundwater supply. ALWI also acknowledges that the UST operations are essential to the existing commercial operation.

6.1 SUPPLEMENTAL INVESTIGATIVE MEASURES

Property ownership interests should collect and analyze groundwater samples for the potential presence of contaminants likely originating from on-site operations (e.g. petroleum constituents, sodium and chloride, and 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]. Petroleum constituent sampling should be repeated during both seasonal high and low water table conditions, then repeated annually or more frequently if warranted by the findings.

6.2 SOURCE REDUCTION MEASURES

Depending on the results of the analyses indicated above, property owner 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 groundwater continues to be relied upon for potable supply purposes, the following source reduction measures should be considered:

1. **Remain Vigilant About Fuel Handling and Storage** – Property ownership interests should remain abreast of UST and AST systems regulations. Any release or suspected release should

trigger an additional round of sampling with continued monitoring at more frequent intervals until the hazard is abated.

2. **Use Discretion in Parking Lot Deicing** - The degree to which the use of conventional road salt should be predicated on existing sodium and chloride concentrations. A wise precaution would involve the use of non-chemical abrasives to replace some salt usage. The degree of salt in the mix can be guided, in part, on sampling results.

3. **Abandon and Seal Old Well** – The old well encounters petroleum contamination. Its bore could provide a conduit for the subsurface migration of petroleum by cross-contamination. Any unneeded well is a potential short-circuit pathway for groundwater contamination. This well should be abandoned and sealed pursuant to COMAR 26.04.04.11D(1 and 2)[3].

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.

[3] These regulations specify well abandonment in cases where (1) the well may "act as a channel for the interchange of waters of undesirable quality with those whose quality is desirable" and/or (2) the well may be a "...potential source of pollution of waters of the State".

NONCOMMUNITY WATER SUPPLY SANITARY SURVEY

1. System Name: Dale's Pit Stop

2. WAS: 2

3. System Information:

Address: 22409 McMullen Highway

Rawlings, Maryland

Phone No.: (301) 786-4399

4. ADC Map/Grid: N/A

5. Tax Map/Plat: N/A

6. Population:

Transient 10
Regular 2
Total 12

7. Property Information:

Owner's Name Mr. Dale L. McIntyre

Address: 22409 McMullen Highway

Rawlings, Maryland

Phone No. (301) 724-1870

8. No. Service Connections:

9. Type of Facility:

Food Service x
Church
Campground
Daycare
Other (specify)

10. Contact Person:

Name: Dale McIntyre

Phone No. (301) 786-1870

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:

1. **Subsurface Well Completion** – The wells should be retrofitted with a pitless adapter and casing extended to above-grade with care taken to adhere to casing grouting requirements in so doing. Access for pump repairs and replacements should be maintained as well.

2. **Subsurface Disposal Facilities** – Older septic tanks of the type likely present may have seams. Though the low nitrate concentrations in groundwater indicate no present release, property ownership interest should embark on a regularly scheduled program of pump-outs. When the septic systems 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. **Vehicle Lifts** – ALWI observed bay doors at this facility, which indicate that vehicle service was once provided here. ALWI assumes that hydraulic vehicle lifts may have been located in the shop area. No visible leakage or spillage of hydraulic oil associated with the lifts was observed at floor level. According to COMAR 26.10.02.02.B (3), hydraulic lift tanks are exempt from UST regulatory registration and reporting requirements. However, releases from hydraulic lift systems may be regulated. ALWI recommends that the subfloor lifts be removed and properly closed.

4. **Adjacent Agricultural Property** – Possible contamination hazards vary with farming practices on the neighboring property. Farming practices may degrade the water quality through the introduction of pesticides, herbicides, or other compounds to the groundwater. Accordingly, ALWI recommends baseline sampling for the presence of pesticides and herbicides. Periodic monitoring may be necessary based on the findings. The neighboring farmer should be advised of the results and may need to minimize spraying or switch to less hazardous chemicals.

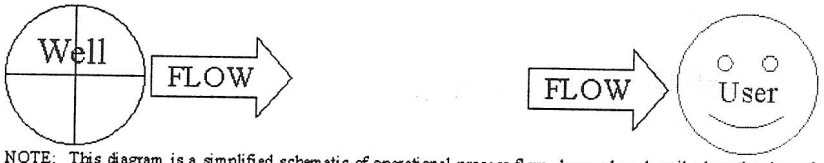
14. Inspected by:	15. Date inspected:	16. System Vulnerability
Mark W. Eisner	12/15/98	Protected _____ Vulnerable Yes (see report)

WATER PLANT INFORMATION

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

Disinfection	
Gas Chlorine:	____
Sodium Hypochlorite	____
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: not visible

Year Drilled: ____

Casing Depth: ____

Well Depth: 40 feet

Well Yield: ____

Casing Height: ____

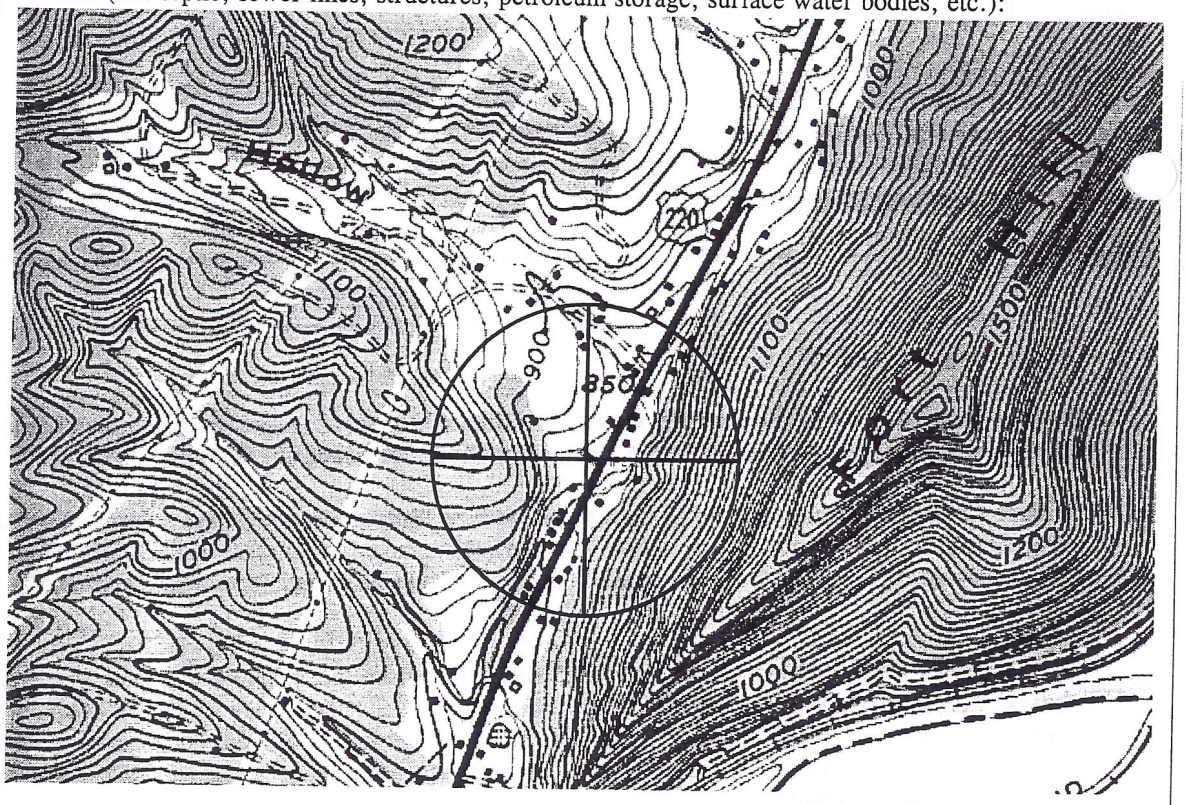
Grout Depth: ____

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: Hamilton

GAP #: ____

Confined	____
Unconfined	x
Semi-confined	____

26. Quantity Used:

Daily Avg (gpd)	500
Pumping Rate (gpm)	____
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	____