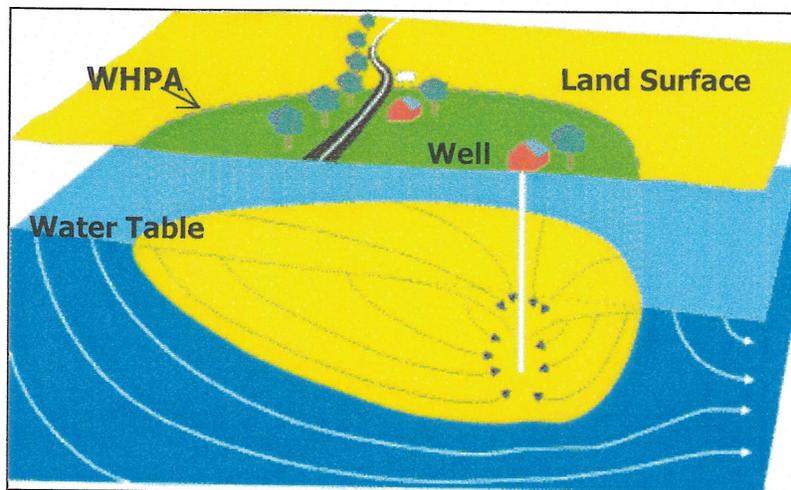


**SOURCE WATER ASSESSMENT
FOR ASHLEYS TRAILER PARK
CARROLL COUNTY, MD**



**Prepared By
Water Management Administration
Water Supply Program
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SUMMARY

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for Ashleys Trailer Park. The required components of this report as described in Maryland's Source Water Assessment Plan (SWAP) are: 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Ashleys Trailer Park's water supply is an unconfined fractured rock aquifer, known as the Upper Pelitic Schist of the Wisshickon Formation. The system currently uses five wells to obtain its drinking water. The Source Water Assessment Area was delineated by the Water Supply Program using U.S. EPA approved methods specifically designed for each source.

Potential sources of contamination within the assessment area were identified based on site visits, database reviews and land use maps. Well information and water quality data were also reviewed. Figures showing land uses and potential contaminant sources within the Source Water Assessment Area and an aerial photograph of the well locations are enclosed at the end of the report.

The susceptibility analysis for Ashleys Trailer Park's water supply is based on a review of the water quality data, potential sources of contamination, aquifer characteristics, and well integrity. It was determined that Ashleys Trailer Park's water supply is susceptible to contamination by nitrates, arsenic, volatile organic compounds and radon, but not to synthetic organic compounds, microbiological contaminants, other inorganic compounds or other radionuclides.

INTRODUCTION

Ashleys Trailer Park is located about six miles south of the City of Westminster in Carroll County (figure 1). The trailer park owns and operates its water supply system that serves 150 persons. The trailer park is served by five wells and three water treatment plants. Well No. 6, located near Well No. 1 is planned for use in the future. Water from Well No. 1 is treated at Plant 1, Well Nos. 2 and 3 at Plant 2 and Well Nos. 4 and 5 at Plant 3.

WELL INFORMATION

Well information was obtained from the Water Supply Program's database, site visits, well completion reports, sanitary survey inspection reports and published reports. A review of well data and sanitary surveys of the water system indicates that all the Ashleys Trailer Park wells were drilled prior to 1973, when the State's well construction regulations went into effect, and may not meet current construction standards. Well information is shown in Table 1 below.

PLANT ID	SOURCE ID	SOURCE NAME	PERMIT NO	TOTAL DEPTH (ft)	CASING DEPTH (ft)	YEAR DRILLED
01	01	Ashley TP 1	N/A	125	N/A	Prior to 1973
02	02	Ashley TP 2	N/A	190	N/A	Prior to 1973
02	03	Ashley TP 3	N/A	180	N/A	Prior to 1973
03	04	Ashley TP 4	N/A	140	N/A	Prior to 1973
03	05	Ashley TP 5	CL-66-0521	280	24	1966

Table 1. Ashleys Trailer Park's Well Information.

The trailer park has a Water Appropriation Permit that allows it to use an average of 10,000 gallons per day (gpd) and 12,000 gpd in the month of maximum use. Based on the reported pumpage in 2001, Ashleys Trailer Park used an average of 5100 gpd and 5400 gpd in the month of maximum use.

HYDROGEOLOGY

The Ashleys Trailer Park lies in the Piedmont physiographic province and is underlain by the Upper Pelitic Schist of the Wissahickon Formation. The Upper Pelitic Schist is an unconfined, fractured rock aquifer composed of albite-chlorite-muscovite quartz schist with sporadic thin beds of laminated micaceous quartzite (Cleaves, et al, 1968). In this type of setting, the underlying crystalline rocks have negligible primary porosity and permeability and ground water is stored in and moves through fractures in the rocks. Ground water flow rates depend upon the openness of the fractures and their degree of interconnection. Unconsolidated overburden (saprolite) above the crystalline rock frequently has much greater primary porosity and permeability than the rock has, allowing additional ground water to be stored

(Duigon, 1994). Ground water systems in crystalline rock tend to be localized and flow is within topographic divides towards the nearest perennial streams. (Bolton, 1998).

SOURCE WATER ASSESSMENT AREA DELINEATION

For ground water systems, a Wellhead Protection Area (WHPA) is considered to be the source water assessment area for the system. The WHPA for Ashleys Trailer Park's water supply was delineated by the WSP. Hydrogeologic mapping was the method used for the delineation. This is the methodology recommended for fractured rock aquifers in the EPA approved Maryland's Source Water Assessment Plan (1999) for systems with a appropriation permit to use an average equal to or greater than 10,000 gpd from fractured rock aquifers.

The delineated WHPA represents the recharge area for Ashleys Trailer Park wells (figure 2). The WHPA is the watershed drainage area that contributes to the wells. The boundary of the WHPA is based on the ground water flow direction and ground water divides inferred from topography, ground water discharge areas and permitted withdrawal rates. The total area of the Ashleys Trailer Park WHPA is about 45 acres, which is sufficient to support the annual recharge needed to supply the wells for the trailer park.

POTENTIAL SOURCES OF CONTAMINATION

Potential sources of contamination are classified as either point or non-point sources. Examples of point sources of contamination are leaking underground storage tanks, landfills, discharge permits, large-scale feeding operations, and CERCLA sites. These sites are generally associated with commercial or industrial facilities that use chemical substances that may, if inappropriately handled, contaminate ground water via a discrete point location. Non-point sources of contamination are associated with certain types of land use practices such as use of pesticides, application of fertilizers or animal wastes, or septic systems that may lead to ground water contamination over a larger area.

Point Sources

A review of MDE contaminant databases and a field survey of the WHPA revealed just one point source of contamination located near the southeast corner of the WHPA boundary (figure 2). This site is an auto service facility (Wastler) and be a potential source of volatile organic compounds (VOCs). MDE's Ground Water Permits Program conducted an inspection of this facility and found open floor drains going to the drainfield. A Notice of Violation was issued and the facility was informed that the floor drains had to be sealed.

Non-point Sources

The Maryland Office of Planning's 2000 digital land use map for Carroll County was used to determine the predominant types of land use in the WHPA (figure 3).

Table 2 shows the land use categories in the WHPA. The three largest land uses in the WHPA are commercial land (41%), which is the area occupied by the trailer park, cropland (36%) and residential land (17%).

LAND USE CATEGORIES	TOTAL AREA (acres)	PERCENTAGE OF WHPA
Low Density Residential	7.07	15.74
Commercial (trailer park)	18.54	41.26
Cropland	15.97	35.54
Forest	3.35	7.46
Total	44.93	100.00

Table 2. Land Use Summary for the WHPA.

Commercial and residential areas may be a source of nitrates and SOCs if fertilizers and pesticides are not used carefully for lawns and gardens. Cropland is commonly associated with nitrate loading of ground water. Cropland also represents a potential source of SOCs depending on fertilizing practices and use of pesticides. The property adjacent to the trailer park on the west side is a horse farm (cropland) and may be a source of nitrate and microbiological contaminants to the ground water.

A review of the Maryland Office of Planning's 1995 Carroll County Sewer Map indicates that the entire WHPA has no planned sewer service. Hence Ashleys Trailer Park and the residential and farm properties in the WHPA have onsite septic systems for waste disposal. Onsite septic systems may be potential sources of the nitrates and microbiological contaminants to the supply wells.

WATER QUALITY DATA

Water Quality data was reviewed from the Water Supply Program's database and system files for Safe Drinking Water Act contaminants. The State's SWAP defines a threshold for reporting water quality data as 50% of the Maximum Contaminant Level (MCL). If a monitoring result is at or greater than 50% of a MCL, this assessment will describe the sources of such a contaminant and, if possible, locate the specific sources which are the cause of the elevated contaminant level. All data reported is from the finished (treated) water unless otherwise noted. The only treatment that Ashleys Trailer Park currently uses is hypochlorination (post) for disinfection.

A review of the monitoring data since 1993 for Ashleys Trailer Parks water supply indicates that it meets the current drinking water standards. The water quality sampling results are summarized in Table 3. It must be noted that the radionuclide numbers used in this table include detections of radon-222 using the lower proposed MCL of 300 picoCuries/liter (pCi/L).

PLANT NO	Nitrate		SOCs		VOCs		IOCs (except nitrate)		Radionuclides	
	No. of Samples Collected	No. of samples > 50% MCL	No. of Samples Collected	No. of samples > 50% MCL	No. of Samples Collected	No. of samples > 50% MCL	No. of Samples Collected	No. of samples > 50% MCL	No. of Samples Collected	No. of samples > 50% MCL
01	30	23	3	0	10	0	7	2	3	1
02	23	19	4	0	13	0	4	0	2	1
03	17	14	2	0	7	0	3	0	2	1

Table 3. Summary of Water Quality Samples for Ashleys Trailer Parks Water Supply.

Inorganic Compounds (IOCs)

The only IOCs detected at or above 50% of the MCL were nitrate and arsenic. The MCL for nitrate is 10 ppm. The IOC detections above 50% of the MCL in Ashleys Trailer Park's water supply are shown in Tables 4a, b and c.

PLANT ID	CONTAMINANT NAME	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
01	NITRATE	10	17-Feb-93	6.9
01	NITRATE	10	19-May-93	7.4
01	NITRATE	10	11-Nov-93	10.1
01	NITRATE	10	9-Jan-94	5.83
01	NITRATE	10	16-Nov-94	6.32
01	NITRATE	10	8-Feb-95	5.6
01	NITRATE	10	8-May-95	5.62
01	NITRATE	10	21-Aug-95	6.02
01	NITRATE	10	20-Nov-95	6.51
01	NITRATE	10	11-Feb-97	6.79
01	NITRATE	10	2-Apr-97	7.2
01	NITRATE	10	3-Feb-98	7.42
01	NITRATE	10	7-Apr-98	5.5
01	NITRATE	10	7-Jul-98	5.46
01	NITRATE	10	5-Oct-98	5.95
01	NITRATE	10	7-Jan-99	5.3
01	NITRATE	10	16-Feb-99	5.6
01	NITRATE	10	20-Jul-99	5.5
01	NITRATE	10	11-Jan-00	5.2
01	NITRATE	10	18-Apr-00	5.1
01	NITRATE	10	21-Aug-00	5.1
01	NITRATE	10	19-Dec-00	5.3
01	NITRATE	10	15-Jan-02	5.5
01	ARSENIC	0.01	28-Feb-02	0.005
01	ARSENIC	0.01	28-Feb-02	0.005

Table 4a. IOC results above 50% of the MCL for Ashleys Trailer Park Plant 1.

PLANT ID	CONTAMINANT NAME	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
02	NITRATE	10	8-Feb-95	5.9
02	NITRATE	10	8-May-95	8.36
02	NITRATE	10	21-Aug-95	7.85
02	NITRATE	10	16-Jan-96	5.7
02	NITRATE	10	11-Apr-96	7.3
02	NITRATE	10	16-Sep-97	6.61
02	NITRATE	10	3-Feb-98	5.26
02	NITRATE	10	7-Apr-98	5.6
02	NITRATE	10	7-Jul-98	5.92
02	NITRATE	10	5-Oct-98	5.13
02	NITRATE	10	7-Jan-99	6.3
02	NITRATE	10	16-Feb-99	7.3
02	NITRATE	10	20-Jul-99	6.4
02	NITRATE	10	11-Jan-00	7.1
02	NITRATE	10	18-Apr-00	5.1
02	NITRATE	10	21-Aug-00	6.5
02	NITRATE	10	19-Dec-00	5
02	NITRATE	10	27-Feb-01	6.3
02	NITRATE	10	19-Feb-02	5.6

Table 4b. IOC results above 50% of the MCL for Ashleys Trailer Park Plant 2.

PLANT ID	CONTAMINANT NAME	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
03	NITRATE	10	8-Feb-95	9.76
03	NITRATE	10	21-Aug-95	5.51
03	NITRATE	10	20-Nov-95	6.94
03	NITRATE	10	27-Nov-95	7.1
03	NITRATE	10	16-Jan-96	7.18
03	NITRATE	10	7-Jan-99	6.1
03	NITRATE	10	16-Feb-99	5.8
03	NITRATE	10	15-Apr-99	7.2
03	NITRATE	10	20-Jul-99	6.2
03	NITRATE	10	18-Apr-00	5.2
03	NITRATE	10	21-Aug-00	5.6
03	NITRATE	10	30-Oct-00	6.1
03	NITRATE	10	19-Dec-00	5.2
03	NITRATE	10	15-Jan-02	5.9

Table 4c. IOC results above 50% of the MCL for Ashleys Trailer Park Plant 3.

Volatile Organic Compounds (VOCs)

No VOCs above 50% of the MCL have been detected in Ashleys Trailer Park's water supply since 1993. The only VOCs detected were methyl-tert-butyl-ether (MTBE) and chloroform. Currently, MTBE does not have an MCL but has a taste and odor threshold of 20 ppb. Initial detections in 1997 were at 3 ppb with

latest detections in 2002 dropping off to 0.6 ppb. Chloroform was detected at levels ranging from 1.2 ppb to 0.6 ppb. Chloroform is a one of four disinfection byproducts known as trihalomethanes (THMs). The current MCL for regulated systems is 80 ppb for the total of all the THMs. Disinfection byproducts are the result of a reaction between the chlorine used for disinfection and organic material in the water supply.

Synthetic Organic Compounds (SOCs)

No SOC's above 50 % of the MCL have been detected in Ashleys Trailer Park's water supply. 2, 4-D, Dalapon and di(2-ethylhexyl)phthalate have been detected at levels well below 50% of their respective MCLs. A review of the SOC results indicated that the phthalate was found in the laboratory blanks and therefore their detections do not represent actual water quality. Dicamba, an unregulated SOC was also detected at levels of 0.246 ppb and 0.26 ppb.

Radionuclides

No radionuclides above 50% of the existing MCLs have been detected in Ashleys Trailer Park's water supply. Radon-222 was detected in 1996 at each of the treatment plants (table 5). At present there is no MCL for radon-222, however EPA has proposed an MCL of 300 pCi/L and an alternate MCL of 4000 pCi/L for community water systems if the State has a program to address the more significant risk from radon in indoor air.

PLANT ID	CONTAMINANT NAME	PROPOSED MCL (pCi/L)	SAMPLE DATE	RESULT (pCi/L)
01	RADON-222	300/4000	18-Mar-96	2445
02	RADON-222	300/4000	18-Mar-96	2955
03	RADON-222	300/4000	18-Mar-96	3545

Table 5. Radon results above 50% of the lower proposed MCL for Ashleys Trailer Park Water Supply.

Microbiological Contaminants

Raw water samples were collected and tested for bacteria from all the five wells to determine whether these sources are ground water under the influence of surface water (GWUDI). None of the samples for these wells had any coliform bacteria.

SUSCEPTIBILITY ANALYSIS

Ashleys Trailer Park's wells obtain water from an unconfined fractured-rock aquifer. Wells in unconfined aquifers are generally vulnerable to any activity on the land surface that occurs within the WHPA. Therefore, managing this area to minimize the risk to the supply and continued routine monitoring of contaminants is essential in assuring a safe drinking water supply. The susceptibility of the wells to contamination is determined for each group of contaminants based on the following criteria: (1) available water quality data, (2) presence of potential contaminant sources in the

WHPA, (3) aquifer characteristics, (4) well integrity, and (5) the likelihood of change to the natural conditions.

In the Piedmont region, if a well is constructed properly with the casing extended to competent rock and with sufficient grout, the saprolite serves as a natural filter and protective barrier. Properly constructed wells with no potential sources of contamination in their WHPA should be well protected from contamination. The susceptibility of the water supply to the various types of contaminants is summarized in Table 6.

Inorganic Compounds (IOCs)

Nitrate has been detected in Ashleys Trailer Park's water supply above 50% of the MCL (tables 4a, b, c). Sources of nitrate can generally be traced to land use. Onsite septic systems are non-point sources of nitrate in ground water. Fertilization of cropland and residential properties are also non-point sources in ground water. The entire WHPA does not have public sewer, but onsite septic systems. A review of the nitrate monitoring data indicates that there are no increasing or decreasing trends in nitrate levels for Ashleys Trailer Park's water supply.

Arsenic has been detected at levels 50% of the MCL at Plant 1 (table 4a). Sources of arsenic may be wood preservatives, agricultural pesticides, insecticides, and a variety of industrial uses.

Based on the above analysis, Ashleys Trailer Park's water supply is susceptible to nitrate and arsenic contamination but is **not** susceptible to other inorganic compounds.

Volatile Organic Compounds (VOCs)

Only one potential source of VOC was detected in the WHPA (figure 2). MTBE has been detected in Ashleys Trailer Park water supply since 1997. MTBE is used as an additive to gasoline for cleaner burning. A major road passes through the middle of the WHPA. Runoff from the road and the parking lots may be a source of the MTBE. A review of the MTBE data indicates that the concentration of MTBE in the water supply appears to be decreasing.

Based on the above analysis, Ashleys Trailer Park's water supply is susceptible to VOC contamination.

Synthetic Organic Compounds (SOCs)

Dicamba, 2, 4-D, and Dalapon were detected at very low concentrations in 1995 and 1999. All three SOC are used as herbicides. No SOC have been detected in samples taken in 2002. Improper application of pesticides in the trailer park property, residential properties and cropland can be sources of SOC.

Based on the above analysis, Ashleys Trailer Park's water supply is **not** susceptible to SOC contamination.

Radionuclides

No radionuclides above 50% of the MCL have been detected in Ashley's Trailer Park's water supply. Radon-222 has been detected at levels higher than 50% of the higher proposed MCL. Radon is prevalent in ground water due to the radioactive decay of uranium bearing minerals in the bedrock (Bolton, 1996).

Based on the above analysis, Ashley's Trailer Park's water supply is susceptible to radon but **not** to other radionuclides.

Microbiological Contaminants

Based on raw water bacteriological data none of the Ashley Trailer Park wells were determined to be under the direct influence of surface water. Hence these wells are **not** susceptible to any microbiological contaminant present at the surface including *Giardia* and *Cryptosporidium*.

CONTAMINANT TYPE	Are Contaminant Sources present in the WHPA?	Are Contaminants detected in WQ samples at 50% of the MCL	Is Well Integrity a Factor?	Is the Aquifer Vulnerable?	Is the System Susceptible to the Contaminant
Nitrate	YES	YES	NO	YES	YES
Arsenic	NO	YES	NO	YES	YES
Inorganic Compounds (except nitrate and arsenic)	NO	NO	NO	YES	NO
Volatile Organic Compounds	YES	NO	NO	YES	YES
Synthetic Organic Compounds	NO	NO	NO	YES	NO
Radionuclides (except radon)	NO	NO	NO	YES	NO
Radon	YES	YES	NO	YES	YES
Microbiological Contaminants	YES	NO	NO	YES	NO

Table 5. Susceptibility Summary for Ashley's Trailer Park's water supply.

MANAGEMENT OF THE WHPA

Form a Local Planning Team

- The team should represent all the interests in the community like the owners and operators Ashleys Trailer Park, residents, other property owners in the WHPA, and Carroll County Planning and Health Departments.
- MDE has grant money available for countywide Wellhead Protection projects.

Public Awareness and Outreach

- The Consumer Confidence Report should include a summary of this report and information that this report is available to the general public through their county library, or MDE.
- Placing signs at the WHPA boundaries is a good way to make the public aware of protecting their source of water supply. The County has placed signs at WHPA boundaries along several county roads and may be able to assist in this effort.

Cooperative Efforts with Other Agencies

- Farmers can participate in the New Conservation Reserve Program (CREP) applicable to the cropland located within a WHPA. Government funding is available to qualified farmers equal to the cost and financial benefit of farming the area. The Natural Resources Conservation Service is responsible for determining the relative environmental benefits of each acre offered for participation.

Monitoring

- Continue to monitor for all Safe Drinking Water Act contaminants as required by MDE.
- Annual raw water bacteriological testing is a good way to determine integrity of the wells.

Land Acquisition/Easements

- Loans are available for the purchase of property or easements for the protection of the water supply. Eligible property must lie within the designated WHPA. Loans are currently being offered at zero percent interest and zero points. Contact the WSP for more information.

Contingency Plan

- COMAR 26.04.01.22 regulations require all community water systems to prepare and submit for approval a plan for providing a safe and adequate drinking water supply under emergency conditions.

Changes in Use

- Any increase in pumpage or addition of new wells to the system may require revision of the WHPA. The system is required to contact the Water Supply

Program when an increase pumpage is applied for or when new wells are being considered.

Contaminant Source Inventory/Well Inspection

- The system owners should review the potential sources of contaminants within the WHPA and update them if necessary, including a consideration of historical uses.
- Periodic inspections and a regular maintenance program for the supply wells will ensure their integrity and protect the aquifer from contamination.
- Wells that are not planned for use anymore should be abandoned according to State well construction standards.

REFERENCES

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- Nutter, L. J., and Otton, E. G., 1969, Ground-Water Occurrence in the Maryland Piedmont: Maryland Geological Survey Report of Investigations No. 10, 56p.
- U.S. Environmental Protection Agency, 1991, Delineation of Wellhead Protection Areas in Fractured Rocks: Office of Water and Drinking Water, EPA/570/9-91-009, 144 p.

OTHER SOURCES OF DATA

Water Appropriation and Use Permit: CL1963G004
Public Water Supply Inspection Reports
MDE Water Supply Program Oracle Database
MDE Waste Management Sites Database
Carroll County WHP Database
Department of Natural Resources Digital Orthophoto Quarter Quadrangle: Winfield SE
USGS Topographic 7.5 Minute Winfield Quadrangle
Maryland Office of Planning 2000 Carroll County Land Use Map
Maryland Office of Planning 1995 Carroll County Sewer Map

FIGURES



Figure 3. Land Use Map of the Ashleys Trailer Park Wellhead Protection Area



Base Map: Maryland Office of Planning 2000 Land Use Map of Carroll County