Final

Source Water Assessment

for the

Whispering Pines Mobile Home Park Water System

Cecil County, Maryland

Prepared for:

Maryland Department of the Environment
Water Management Administration
Water Supply Program
1800 Washington Boulevard, Suite 625
Baltimore, Maryland 21230-1719

Prepared by:

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May 2003

Project No. 61726.01

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5/30/03

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May 2003

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LIST OF ACRONYMS AND ABBREVIATIONS

CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CHS	Controlled Hazardous Substances
COMAR	Code of Maryland Regulations
DWEL	Drinking Water Equivalent Level
ft	Foot/Feet
gpd	Gallon(s) Per Day
gpm	Gallon(s) Per Minute
GPS	Global Positioning System
GWUDI	Ground Water Under Direct Influence
GPTRAC	General Particle Tracking
IOC	Inorganic Compound
L	Liter(s)
LUST	Leaking Underground Storage Tank
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
mg	Milligram(s)
MGS	Maryland Geological Survey
MHP	Mobile Home Park
mrem	Millirem(s)
PCB	Polychlorinated Biphenyls
PWSID	Public Water System Identification
SDWA	Safe Drinking Water Act
SDWR	Secondary Drinking Water Regulations
SOC	Synthetic Organic Compound
SWAP	Source Water Assessment Plan
SWPA	Source Water Protection Area
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WHPA	Wellhead Protection Area

EXECUTIVE SUMMARY

EA Engineering, Science, and Technology was tasked to perform a Source Water Assessment for the Whispering Pines Mobile Home Park (MHP) water system in Cecil County, Maryland. This water system is identified as Public Water System Identification (PWSID) 0070213 by the Maryland Department of the Environment (MDE). EA has performed this study under Purchase Order No. U00P3200205, as authorized by MDE.

The required components of this report as described in Maryland's Source Water Assessment Plan (SWAP) are:

- Delineation of the area that contributes water to the source
- Identification of potential sources of contamination
- Determination of the susceptibility of the water supply to contamination
- Recommendations for protecting the drinking water supply

The source of the Whispering Pines MHP's water supply is the Potomac Group, which is an unconfined Coastal Plain unconsolidated aquifer. The Source Water Protection Area (SPWA) for the two ground-water supply wells was delineated using the Wellhead Protection Area (WHPA) Code for unconfined, unconsolidated aquifers. Each of the 1-year time-of travel SWPAs is 6 acres and the 10-year time-of-travel SWPA is 92 acres.

Potential point and non-point sources of contamination within the assessment area were identified based on site visits, a review of MDE's databases, and a review of sewer service area and land use maps. Potential polychlorinated biphenyls (PCB) containing electricity transformers and an inactive supply well were observed within the SWPA. Near the SWPA are a Leaking Underground Storage Tank (LUST) site and a landfill. Residential areas account for a majority of the SWPA and can be considered a non-point source of contaminants. Well information and water quality data were also reviewed.

The susceptibility analysis for the Whispering Pines MHP 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 the Whispering Pines MHP water supply has a low susceptibility to volatile organic compounds, synthetic organic compounds, inorganic compounds, radiological compounds, and microbiological contaminants.

Recommendations to protect the ground-water supply include creating a SWPA protection team, resident awareness, and communication with county officials about future planning and land use.

1. INTRODUCTION

EA Engineering, Science, and Technology was tasked to perform a Source Water Assessment for the Whispering Pines Mobile Home Park (MHP) water system in Cecil County, Maryland. EA has performed this study under Purchase Order No. U00P3200205, as authorized by the Maryland Department of the Environment (MDE).

The Whispering Pines MHP water system serves the community of the Whispering Pines MHP in Cecil County. The supply wells for the system are located within the development. The Whispering Pines MHP water system serves a population of 325 with 98 connections. The water is supplied by two active wells.

1.1 GROUND-WATER SUPPLY SYSTEM INFORMATION

A review of the well data and sanitary surveys of the system indicates that well numbers 1 and 2 were drilled in 1972 and 1973, respectively, and therefore it is unknown whether the wells were drilled in accordance with the State's current well construction standards, which were implemented in 1973. The wells have a total average yield of 21,400 gallons per day (gpd). An additional inactive well (CE731638) was identified from the Public Drinking Water Information System and reportedly has not been abandoned. Both active supply wells were observed to be secure and in good repair. Both wells were completed outdoors and above grade. Currently, the ground water is not treated prior to distribution. Table 1 below contains a summary of the well construction data.

TABLE 1. WELL INFORMATION

Source ID	Source Name	Permit No.	Total Depth (ft)	Casing Depth (ft)	Aquifer
01	Whispering Pines 1	CE730101	125	120	Potomac Group
02	Whispering Pines 2	CE730323	129	121	Potomac Group

1.2 HYDROGEOLOGY

Cecil County has two distinct physiographic provinces, the Piedmont and the Atlantic Coastal Plain, divided by the Fall Line. In the northern third of the county, Precambrian to early Paleozoic crystalline igneous and metamorphic rock of the Piedmont province are exposed at the surface. In the southern two-thirds of the county, the crystalline rocks are overlain by Coastal

Plain deposits consisting largely of unconsolidated pebbly sand, sand, sandy clay, and clay. The deposits form a wedge-shaped mass of materials that range in thickness from inches along the Fall Line to as much as 1,600 ft in the southeastern corner of the County (Overbeck et al. 1958).

The ground water used by the Whispering Pines MHP is from production wells drilled into the Potomac Group Formation. The Potomac Group formation is described as "Interbedded quartzose gravels; protoquartzitic to orthoquartzitic argillaceous sands; and white, dark gray and multicolored silts and clays" [Maryland Geological Survey (MGS) 1968].

The source of the ground water in Cecil County is from precipitation in the form of rainfall or snow melt (Otton et al. 1988). The ground water in the sands of the Coastal Plain resides in between the grains of the unconsolidated sediment. The water table in the aquifer generally mimics the surface topography. Yields of wells in the Potomac Group range from 0.5 to 703 gallons per minute (gpm) and the median is 30 gpm. Specific capacities range from less than 0.1 to 40 gallons per minute per foot of drawdown and the median is 1.1 gallons per minute per foot of drawdown.

2. DELINEATION OF THE AREA CONTRIBUTING WATER TO SOURCE

For ground-water systems, a Wellhead Protection Area (WHPA) is considered to be the source water assessment area for the system. Consistent with the recommended delineation in the Maryland SWAP (MDE 1999) for an unconfined Coastal Plain Aquifer such as the Potomac Group, the USEPA WHPA Code Version 2.0 was utilized. To provide the greatest resolution for the modeling efforts, the semi-analytical General Particle Tracking (GPTRAC) Module was selected. Per the MDE SWAP guidance, a 1-year time-of-travel and a 10-year time-of-travel were assessed.

The semi-analytical GPTRAC module delineates time-related capture zones for pumping wells in homogenous aquifers with steady state and uniform ambient ground-water flow. Effects of well interference are accounted for in this module (USEPA 1991).

The GPTRAC module requires the following inputs:

- Transmissivity in ft^2/day
- Ground-water withdrawal rate in ft^3/day
- Ground-water gradient (ft/ft)
- Ground-water flow angle (degrees)
- Aquifer thickness (ft)

The value used for transmissivity (735 ft^2/day) was chosen based on the average transmissivity values (720 ft^2/day) from pumping tests in Elkton (Otton et al 1988), the average specific capacity value (3.7 gpm/ft * 192.5 = 715 ft^2/day) from Elkton pumping tests (Overbeck et al 1958), and average transmissivity values from the United States Geological Survey (USGS) website for the Potomac aquifer (approximately 1,000 ft^2/day).

The current Water Appropriation Permit rate issued by the MDE Water Rights Division for the total of the two wells is 21,400 gpd or 2,861 ft^3/day, which was used as the ground-water withdrawal rate.

The ground-water gradient of 0.0006 ft/ft was used from a data interpretation from historical ground-water levels (Willey et al. 1987).

A ground-water flow angle of 315 degrees, which is a southeast direction, was selected. This is based on the local ground-water flow direction towards branches of Mill Creek.

Aquifer thickness for each well was based on the total depth minus the bottom of steel casing. The values for total depth and bottom of casing are shown in Table 1.

The capture zones from the WHPA Code model efforts for both the 1- and 10-year time-of-travel scenarios are shown on Figure 2. Each of the 1-year time-of-travel capture zones is approximately 6 acres. The 10-year time-of-travel capture zone is approximately 92 acres.

3. INVENTORY OF POTENTIAL CONTAMINANTS WITHIN THE DELINEATED AREA

A field survey was performed on 6 November 2002 to confirm potential sources of contamination identified in MDE databases near the ground-water wells. These databases include Comprehensive Environmental Response, Compensation, and Liability Act Information System the (CERCLIS), which includes National Priority List (Superfund) sites, Maryland Registered Underground Storage Tank (UST) sites, Maryland Leaking Underground Storage Tank (LUST) sites, landfills, pesticide dealers, ground-water discharge permits, Colonial Tanks, and Controlled Hazardous Substances (CHS) generator sites.

During the field survey, other sources of potential contamination not in the MDE databases were noted and the location was surveyed using a Global Positioning System (GPS) receiver for mapping purposes (Figure 2).

3.1 POINT SOURCES

Three pole-mounted electrical transformers were identified within the development and within the 1-year and 10-year-time source water protection area (SWPA). Prior to 1977, many transformers contained polychlorinated biphenyls (PCB) fluid as an insulator. It is possible that the transformers on-site contain PCB. If the transformer leaks, the PCB oil could eventually leach through the soil overburden into the ground-water aquifer.

The Cecil County Central Landfill exists to the south of the 10-year time-of-travel SWPA and on the opposite side of a stream, which can be a natural boundary to prevent contaminant migration. Contaminants from this site could include volatile organic compounds (VOCs), synthetic organic compound (SOCs), and inorganic compounds (IOCs).

An inactive well that has not been abandoned was reported at the MHP. Over time, a well that is not maintained can become a pathway for surface water infiltration and contaminants into the ground-water aquifer.

A listed underground storage tank site, Wilson Fuel Farm, exists just outside the 10-year time-of-travel SWPA to the east. If the integrity of these USTs were to be compromised, the ground-water aquifer could be impacted by petroleum hydrocarbons.

3.2 NON-POINT SOURCES

Using the Maryland Office of Planning's 2000 Land Use/Land Cover map for Cecil County, potential non-point sources within the SWPA area were also evaluated by land use designation. This assessment was performed by overlaying the SWPA shape over the land use coverage layer in ArcView GIS (Figure 3). A summary of the percent and acreage of each type of land use is presented in Table 2.

TABLE 2. SUMMARY OF LAND USE IN THE SOURCE WATER PROTECTION AREA OF WHISPERING PINES MOBILE HOME PARK

	1-Year Time-of-Travel				10-Year Time-of-Travel	
Well Number	1		2		1,2	
	Percent	Acres	Percent	Acres	Percent	Acres
Low Density Residential	82.9	5.0	72.2	4.3	50.6	46.4
Medium Density Residential	3.0	0.2	0.7	0.0	6.0	5.5
High Density Residential	0.0	0.0	0.0	0.0	0.0	0.0
Commercial	14.0	0.8	27.1	1.6	5.4	4.9
Cropland	0.0	0.0	0.0	0.0	0.0	0.0
Pasture	0.0	0.0	0.0	0.0	0.0	0.0
Forest	0.1	0.0	0.0	0.0	37.9	34.7
Feeding Operations	0.0	0.0	0.0	0.0	0.0	0.0
Total Acreage		6.0		6.0		91.5

From an interpretation of Table 2, low-density residential areas (5.0 acres) account for a majority of the SWPA for well No. 1 (6.0 acres). Low-density residential (4.3 acres) and commercial (1.6 acres) areas account for the majority of the SWPA for well No. 2 (6.0 acres). Non-point sources of pollution from residential areas could include lawn pesticides, fertilizers, and septic systems. Therefore, there is some potential for the migration of potential contaminants from non-point sources into the ground water in the 1-year time-of-travel SWPA.

Low-density residential (46 acres) and forest areas (35 acres) account for a majority of the 10-year time-of-travel SWPA (92 acres). Non-point sources of pollution from residential areas could include lawn pesticides, fertilizers, and septic systems. The only non-point source of pollution generally associated with forests is from logging activities. Therefore, there is some potential for the migration of potential contaminants from non-point sources into the ground water in the 10-year time-of-travel SWPA.

Using the 1993 Maryland Office of Planning's Cecil County sewerage coverage, potential non-point sources from other septic system users in the SWPA were assessed (Figure 4). By overlaying the SWPA on the sewerage coverage layer in ArcView GIS, it was determined that

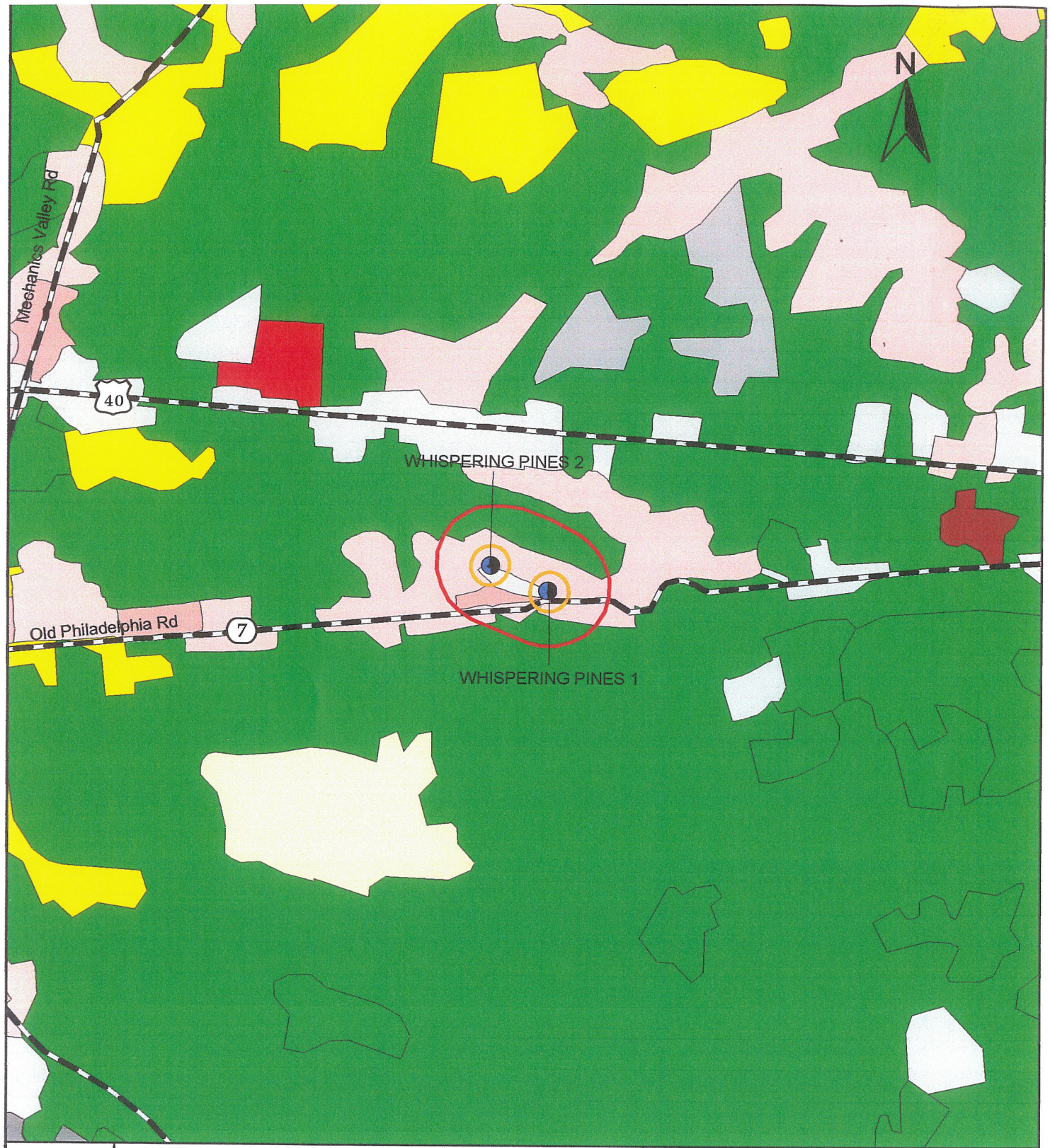

Figure 3. Whispering Pines MHP Land Use Map of the Source Water Protection Area

Source Water Assessment Program
2003

Scale: 1000 0 1000 2000 Feet

Source: Maryland Office of Planning, 2000.

Legend:

- MHP Wells
- SWPA Boundary, 1 yr Time of Travel
- SWPA Boundary, 10 yr Time of Travel
- Major Roads

Land Use

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial
- Extractive
- Cropland
- Forest
- Barren Land

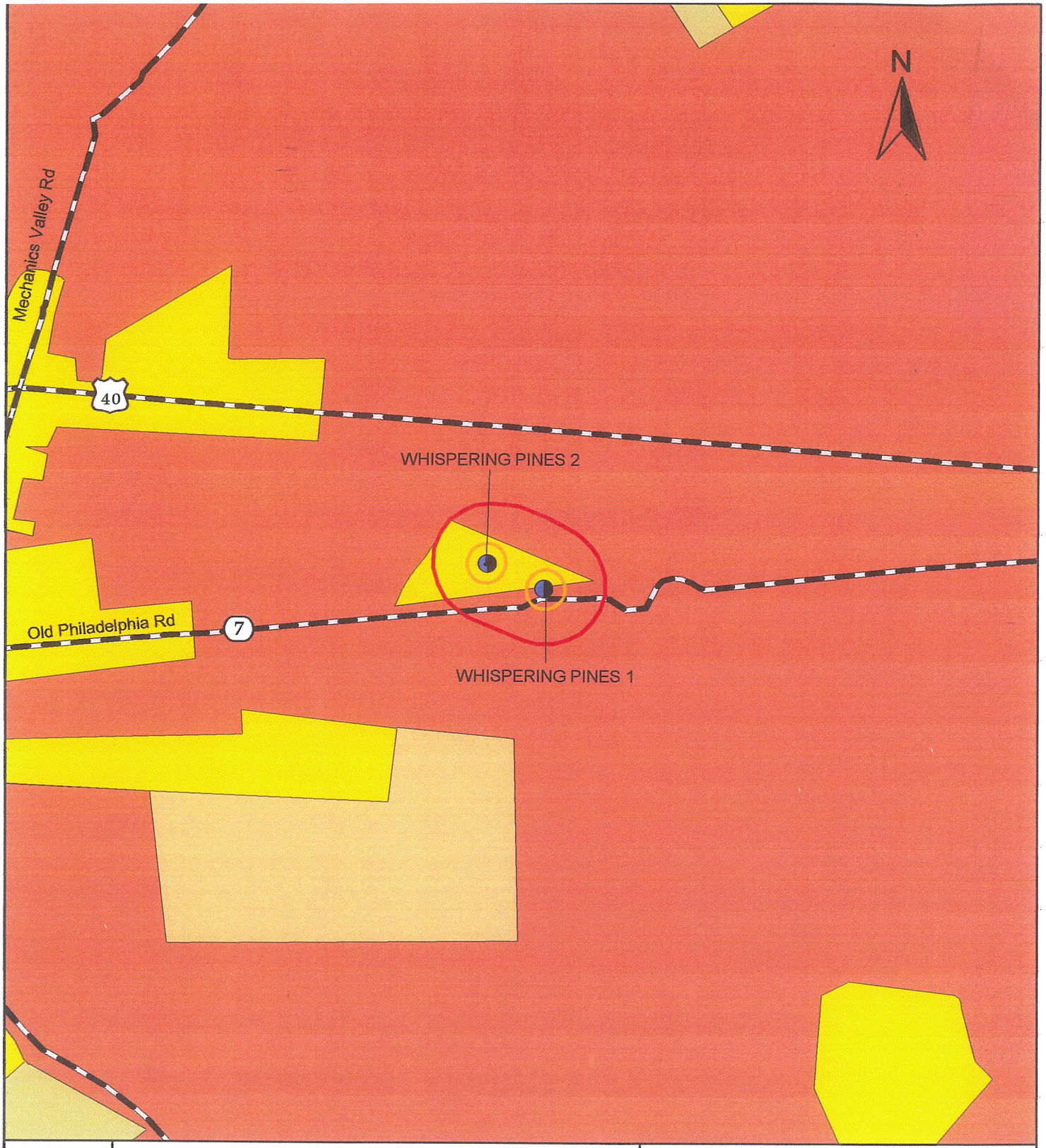

Figure 4. Whispering Pines MHP Sewer Service Map of the Source Water Protection Area

Source Water Assessment Program
2003

Legend:

- MHP Wells
- SWPA Boundary
- SWPA Boundary, 1 yr Time of Travel
- Major Roads

Sewer

- No planned service area
- Existing service area
- Area programmed for service within 5 years
- Area programmed for service within 5 to 10 years

Source: Maryland Office of Planning, 1993.

Scale: 1000 0 1000 2000 Feet

approximately 64 percent of the 10-year time-of-travel SWPA does not have public sewer service while 36 percent is on public sewer service.

4. REVIEW OF WATER QUALITY DATA

Water quality data was obtained from the MDE Water Supply Program database of Safe Drinking Water Act (SDWA) contaminants. The results reported are for finished (treated) ground water (unless noted).

A review of the water quality data from 1991 to 2002 has been performed for Whispering Pines MHP's finished water samples. All detected compounds from ground-water samples collected are shown in Appendix A.

Ground-water analytical results were compared to 50 percent of the United States Environmental Protection Agency (USEPA) Maximum Contaminant Levels (MCLs) or the USEPA Secondary Drinking Water Regulations (SDWR). If no MCL or SDWR is available, the Drinking Water Equivalent Level (DWEL) was substituted as recommended by the USEPA Office of Water.

4.1 GENERAL WATER QUALITY PARAMETERS

Two ground-water samples collected on 3 October 1996 were reported with pH of 5.1 and 5.2 units, below the SDWR range of 6.5 to 8.5 units. These are the only two samples reportedly analyzed for pH from 1991 to 2002. SDWR parameters are non-enforceable federal guidelines regarding cosmetic effects, such as tooth or skin discoloration, or aesthetic effects, such as taste, odors, or color.

4.2 VOLATILE ORGANIC COMPOUNDS

No VOCs were reported in any of the ground-water samples analyzed.

4.3 SYNTHETIC ORGANIC COMPOUNDS

No SOCs were reported in any of the ground-water samples analyzed.

4.4 INORGANIC COMPOUNDS

Mercury is a primary drinking water standard parameter. Mercury was detected at the MCL in the December 1995 ground-water sample as illustrated in Table 3.

TABLE 3. SUMMARY OF MERCURY ANALYSIS

Plant ID	Sample Date	Contaminant Name	Result	Unit
01	06-Dec-95	Mercury	0.002	mg/L
02	06-Dec-95	Mercury	ND	mg/L
01	03-Oct-96	Mercury	ND	mg/L
02	03-Oct-96	Mercury	ND	mg/L
01	05-Oct-99	Mercury	ND	mg/L
02	05-Oct-99	Mercury	ND	mg/L

ND = Not Detected.
Shaded values are greater than 50 percent of the MCL.

The USEPA MCL for Mercury is 0.002 mg/L. Mercury present in drinking water may be a result of the erosion of natural deposits, discharge from refineries or factories or runoff from landfills and agricultural operations.

Low levels of nitrate were reported in ground-water samples, which ranged from 1 to 1.67 mg/L. Low levels of nitrite were also reported in ground-water samples, which ranged from 0.007 to 0.008 mg/L. Nitrate and nitrite are USEPA primary drinking water standard parameters with a USEPA MCL of 10 and 1 mg/L, respectively. Elevated levels may occur due to the influx of agricultural animal waste, agricultural chemicals or fertilizers, and/or septic system effluent into the ground water.

Arsenic was reported in the June 2002 sample at a concentration of 0.0034 mg/L. This concentration is below the current MCL of 0.050 mg/L and is below the revised MCL of 0.010 mg/L, which will become effective on 23 January 2006. No arsenic was reported in a September 2002 ground-water sample.

4.5 MICROBIOLOGICAL CONTAMINANTS

No total or fecal coliform has been detected in samples of the water system's finished water collected from January 1997 to August 2002.

To assess the potential of Ground Water Under the Direct Influence (GWUDI) of surface water, ground-water sampling records (during dry and storm conditions) in MDE databases were assessed and information from Public Water Supply Inspection Reports were reviewed.

If significant variances in the ground-water results from dry and storm conditions are observed, it is possible that the ground water is under the direct influence of surface water. Surface water

that directly recharges the aquifer does not pass through the soil overburden that both filters and contains beneficial microorganisms that break down potential contaminants.

From an assessment of the GWUDI ground-water results by MDE from June, July, and August 1998, the ground-water supply for Whispering Pines MHP is not under the direct influence of surface water.

4.6 RADIONUCLIDES

No radionuclides were reported in the ground-water samples above 50 percent of the USEPA MCL.

However, gross alpha was detected below 50 percent of the MCL of 15 picocuries per liter (pCi/L) in three sampling events ranging from 1 to 3 pCi/L.

No radon-222 data is available for this system to date.

5. SUSCEPTIBILITY ANALYSIS

To evaluate the susceptibility of the ground-water source to contamination, the following criteria were used:

1. available water quality data
2. presence of potential contaminant sources in the SWPA
3. aquifer characteristics
4. well integrity
5. the likelihood of change to the natural conditions

The aquifer that supplies Whispering Pines MHP's drinking water is an unconfined aquifer.

For the Susceptibility Analysis in this report, rankings of "high," "moderate," and "low" susceptibility to contamination were utilized after a review of current information. However, other SWAP reports for the State of Maryland also utilized rankings of "is," "may be," and "is not" susceptible to contamination. For consistency between the ranking systems, the following details their equivalence. The ranking of "highly susceptible" is equivalent to "is susceptible," "moderately susceptible" is equivalent to "may be susceptible," and "low susceptibility" is equivalent to "is not susceptible."

5.1 VOLATILE ORGANIC COMPOUNDS

No point sources of VOC contamination were observed or reported within the 10-year time-of-travel SWPA. While a listed LUST site is within one-quarter mile of the SWPA to the east, no VOC concentrations were reported in any of the water samples analyzed.

Based on the recent water quality data reviewed and the lack of sources within the SWPA that may cause VOC contamination, the water supply at Whispering Pines MHP has a low susceptibility to VOCs.

5.2 SYNTHETIC ORGANIC COMPOUNDS

Electricity transformers (that may contain PCB oil) were observed within the 10-year time-of-travel SWPA. However, no SOC concentrations were reported in any of the water samples analyzed. Most SOCs, including PCB, have a high affinity to sorb to soil particles rather than dissolving into water. According to the well information, there is approximately 125 ft of unconsolidated sediments between the surface and the top of the well screens in the aquifer. Therefore, it is unlikely that minor surface spills of SOC would affect the ground-water quality.

Based on the recent water quality data reviewed and the lack of sources within the SWPA that may cause SOC contamination, the water supply at Whispering Pines has a low susceptibility to SOCs.

5.3 INORGANIC COMPOUNDS

No IOC concentrations were reported above 50 percent of the MCL in any of the water samples analyzed with the exception of mercury in a December 1995 water sample, which was reported with a concentration at the MCL of 0.002 mg/L. No concentrations of mercury have been reported in the subsequent water sample analysis.

Approximately 64 percent of the 10-year time-of-travel SWPA does not use public sanitary sewer systems. Residential and commercial areas use on-site septic systems, which can cause nitrate pollution in ground water. However, no concentrations of nitrate have been reported above 2 mg/L (the MCL for nitrate is 10 mg/L) and no upward trend in the reported nitrate concentrations in the water samples have been observed over time.

Based on the water quality data reviewed and the lack of observed point sources of IOCs, the water supply at Whispering Pines MHP has a low susceptibility to IOCs.

5.4 RADIONUCLIDES

Low levels of radionuclides in ground water are often from the decay of naturally occurring minerals such as uranium in the aquifer sediment (Bolton 1996). However, no radionuclides have been reported above 50 percent of the MCL from available water quality samples analyzed.

Based on a review of the available water quality data, the water supply at Whispering Pines MHP has a low susceptibility to radionuclides.

5.5 MICROBIOLOGICAL CONTAMINANTS

No coliform bacteria have been detected in the water samples. From an assessment of GWUDI ground-water results by MDE, the ground-water supply for Whispering Pines MHP is not under the direct influence of surface water. From documentation reviewed, the supply wells were constructed around 1973, the year that current well construction standards were required. All the wellheads were observed to be in good repair. An inactive well was reported at the MHP and has not been abandoned.

Based on the water quality review, the water supply at Whispering Pines MHP has a low susceptibility to microbiological contaminants.

6. RECOMMENDATIONS FOR PROTECTING THE WATER SUPPLY

With the information contained in this report, Whispering Pines MHP has a basis for better understanding of the risks to its drinking water supply. Being aware of the SWPA, knowing potential contaminant sources, evaluating current and future development, working with agricultural producers and soil conservation agencies, and effective outreach and education are examples of management practices that will help protect the water supply.

Recommendations for the protection of the ground-water supply are intended for the mobile home park owner and its residents. Specific management recommendations for consideration are listed below.

6.1 PROTECTION TEAM

The management of the mobile home park should be aware of the SWPA limits and evaluate the possible effects to the quality of the ground water prior building or making any changes.

6.2 PUBLIC AWARENESS AND OUTREACH

The management of the mobile home park should consider discussing with property owners and businesses located within the SWPA activities that may impact the ground water and its quality.

The management of the mobile home park should also consider sending pamphlets, flyers, or bill stuffers to its residents to educate them about the SWPA. An example pamphlet, "Gardening in a Wellhead Protection Area," is available from MDE. The residents should also be encouraged to notify the mobile home park management of any significant spills from gasoline or any other potentially hazardous substances.

Placing signs at the SWPA boundaries is an effective way to make the public aware of protecting their source of water supply, and to help in the event of spill notification and response.

The Executive Summary of this report should also be listed in the Consumer Confidence Report for the water system, and should also indicate that the report is available to the general public by contacting the MHP owner, the local library, or MDE.

6.3 PLANNING/NEW DEVELOPMENT

The mobile home park should also inform the Cecil County Health and Planning Departments of any concerns to future development or zoning changes of properties that are within the SWPA.

6.4 MONITORING

The management of the mobile home park should continue to monitor the ground water for all SWDA contaminants as required by MDE.

Annual raw water sampling for microbiological contaminants is a good way to check the integrity of the well.

6.5 CONTINGENCY PLAN

As required by the Code of Maryland Regulations (COMAR) 26.04.01.22, all water system owners are required to prepare and submit for approval a plan to provide safe drinking water under emergency conditions.

6.6 CHANGES IN USES

The management of the mobile home park should inform the Water Supply Program at MDE of any changes to pumping rates and when a change in the number of wells used is anticipated. Any changes to the pumping rate and/or the number of supply wells will affect the size and shape of the SWPA.

6.7 CONTAMINANT SOURCE INVENTORY UPDATES/INSPECTIONS

The management of the mobile home park should conduct its own survey of the SWPA to ensure that there are no additional potential sources of contamination.

A regular inspection and maintenance program of the supply wells should be considered to prevent a failure in the well's integrity, which may provide a pathway for contaminants to the aquifer.

Unused wells that are no longer connected to the distribution system should be abandoned and sealed as per COMAR 26.04.04.11. Unused wells can provide a pathway for contaminants to the aquifer. One unused well was reported at the MHP and needs to be abandoned as soon as possible.

Depressions around the wellheads should be filled and graded to prevent surface water ponding that may occur during rain events. This will help to prevent surface water infiltration into the well.

7. REFERENCES

The following sources of information were consulted as a part of this investigation:

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7. United States Environmental Protection Agency (USEPA). 2001. *A Small Systems Guide to the Total Coliform Rule.* Office of Water. EPA 816-R-01-017A. June.

8. Willey, R.E., R.A. McGregor, J. de Grouchy, and M.D. Tompkins, 1987. *Hydrologic Data for Cecil County, Maryland.* Maryland Geological Survey. Basic Report No. 16.

SOURCES OF DATA

Water Appropriation and Use Database
Public Water Supply Inspection Reports
Monitoring Reports
MDE Water Supply Program Oracle Database
MDE Waste Management Sites Database
Maryland Office of Planning 2000 Cecil County Land Use Map
Maryland Office of Planning 1993 Cecil County Land Use Map
USGS Topographic 7.5 minute Quadrangle Map – 1992 North East, Maryland Quad

Appendix A

Detected Compounds in Ground-Water Samples

SUMMARY OF DETECTED COMPOUNDS IN THE WHISPERING PINES MOBILE HOME PARK WATER SAMPLES				
Plant ID	**Sample Date**	**Contaminant Name**	**Result**	**Unit**
Inorganic Compounds				
01	03-Jun-02	ARSENIC	0.0034	mg/L
01	06-Dec-95	BARIUM	0.03	mg/L
02	06-Dec-95	BARIUM	0.02	mg/L
02	06-Dec-95	CHROMIUM	0.004	mg/L
01	06-Dec-95	MERCURY	0.002	mg/L
01	04-Feb-93	NITRATE	1.3	mg/L
02	25-Jan-94	NITRATE	1.24	mg/L
01	09-Jan-95	NITRATE	1.31	mg/L
02	09-Jan-95	NITRATE	1.62	mg/L
02	17-Jan-96	NITRATE	1.16	mg/L
01	03-Oct-96	NITRATE	1	mg/L
02	03-Oct-96	NITRATE	1	mg/L
02	08-Jan-97	NITRATE	1.67	mg/L
01	07-Jan-98	NITRATE	1.65	mg/L
02	07-Jan-98	NITRATE	1.8	mg/L
01	06-Jan-99	NITRATE	1	mg/L
02	06-Jan-99	NITRATE	1.6	mg/L
01	05-Oct-99	NITRATE	1.5	mg/L
02	05-Oct-99	NITRATE	1.6	mg/L
01	12-Jan-00	NITRATE	1.5	mg/L
02	12-Jan-00	NITRATE	1.1	mg/L
01	06-Jul-00	NITRATE	1.2	mg/L
02	06-Jul-00	NITRATE	1.3	mg/L
01	11-Jan-01	NITRATE	1.2	mg/L
02	11-Jan-01	NITRATE	1.3	mg/L
01	02-Jan-02	NITRATE	1.1	mg/L
02	02-Jan-02	NITRATE	1.3	mg/L
01	03-Oct-96	NITRITE	0.008	mg/L
02	03-Oct-96	NITRITE	0.007	mg/L
01	03-Oct-96	SODIUM	19.6	mg/L
02	03-Oct-96	SODIUM	18.1	mg/L
01	05-Oct-99	SODIUM	6.91	mg/L
02	05-Oct-99	SODIUM	7.22	mg/L
General Water Quality Parameters				
01	03-Oct-96	pH	5.1	s.u.
02	03-Oct-96	pH	5.2	s.u.
Radionuclides				
00	25-Nov-92	GROSS ALPHA	1.5	pCi/L
00	11-Feb-97	GROSS ALPHA	1	pCi/L
01	27-Jun-01	GROSS ALPHA	2	pCi/L
02	27-Jun-01	GROSS ALPHA	3	pCi/L

s.u. – standard units.