Final

Source Water Assessment

for the

Woodlawn – Old 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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LIST OF ACRONYMS AND ABBREVIATIONS

AST	Aboveground Storage Tank
BMP	Best Management Practice
CCL	Contaminant Candidate List
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CHS	Controlled Hazardous Substances
COMAR	Code of Maryland Regulations
CREP	Conservation Reserve Program
DWEL	Drinking Water Equivalent Level
ft	Foot/Feet
gal	Gallon(s)
gpd	Gallon(s) Per Day
gpm	Gallon(s) Per Minute
GPS	Global Positioning System
GWUDI	Ground Water Under Direct Influence
IOC	Inorganic Compound
L	Liter(s)
LUST	Leaking Underground Storage Tank
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDE	Maryland Department of the Environment
mg	Milligram(s)
MGS	Maryland Geological Survey
MHP	Mobile Home Park
mrem	Millirem(s)
MTBE	Methyl-Tert-Butyl-Ether
PCB	Polychlorinated Biphenyls
pCi	Picocurie(s)
PWSID	Public Water System Identification
SDWA	Safe Drinking Water Act
SDWR	Secondary Drinking Water Regulations
SOC	Synthetic Organic Compound

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

SWAP	Source Water Assessment Plan
SWPA	Source Water Protection Area
µg	Microgram(s)
USEPA	U.S. Environmental Protection Agency
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 Woodlawn-Old Mobile Home Park (MHP) water system in Cecil County, Maryland. This water system is identified as Public Water System Identification (PWSID) 0070241 by the Maryland Department of the Environment (MDE). EA has performed this study under Purchase Order No. U00P3200205, as authorized by the 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 Woodlawn-Old MHP's water supply is the Port Deposit Gneiss, which is an unconfined crystalline rock aquifer. The Source Water Protection Area (SWPA) for the two ground-water supply wells was delineated using the watershed delineation method for fractured bedrock wells. The area of the SWPA is based on land topography, nearby streams, and a calculation of the total ground-water contributing area during a drought. The SWPA is approximately 177 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 biphenyl (PCB) containing electricity transformers, above ground fuel oil storage tanks, and septic systems were observed within the SWPA. In addition, a Leaking Underground Storage Tank (LUST) site was observed north of to the SWPA. Well information and water quality data were also reviewed.

The susceptibility analysis for the Woodlawn-Old 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 Woodlawn-Old MHP water supply is highly susceptible to radon-222, and total coliform bacteria, moderately susceptible to volatile organic compounds, and has a low susceptibility to synthetic organic compounds, inorganic compounds, and other radionuclides.

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 Woodlawn-Old 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 Woodlawn-Old MHP water system serves the communities of Woodlawn (new and old) Mobile Home Parks in Cecil County. The supply wells for the system are located within the development. The Woodlawn-Old MHP water system serves a population of 150 with 56 connections. The water is supplied by two wells (Figure 1).

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 1951 and 1973, respectively. Well 2 was drilled in accordance with the State's current well construction standards, which were implemented in 1973. Well 1 was completed above grade adjacent to a pump house. The wellhead is surrounded on three sides by approximately 1 ft high brick walls and on the fourth side by the pumphouse, which could allow for surface water ponding and infiltration. Well 2 was observed within a pump house. Both wellheads were observed secure and in good repair.

According to the MDE Public Water Supply Inspection Report, the system is interconnected to the Woodlawn – New MHP water system. The pumping rates of the wells are unknown. Table 1 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	Woodlawn Old 1	CE008498	84	unknown	Port Deposit Gneiss
02	Woodlawn Old 2	CE730731	165	50	Port Deposit Gneiss

According to the MDE Public Water Supply Inspection Report for the water system dated February 2002, the operator of the water system is Donna A. Costango.

Currently, the ground water is not treated. The ground water is stored in 14 bladder tanks (approximately 75-gal each) prior to distribution.

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 Woodlawn-Old MHP is from production wells drilled into the Port Deposit Gneiss Formation. The Port Deposit Gneiss Formation is described as a "moderately to strongly deformed intrusive complex composed of gneissic biotite quartz diorite, hornblende-biotite quartz diorite, and biotite granodiorite, with all rocks foliated and some strongly sheared" [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. The water table in the aquifer generally mimics the surface topography. The availability of ground water in the crystalline rock of the area depends on the nature and distribution of secondary openings resulting from fracturing and weathering. The yield of a well in crystalline rock depends primarily on the amount of fracture openings penetrated by the well. The well yield range of 43 wells in the Port Deposit Gneiss ranges from 2 to 100 gallons per minute (gpm) with 35 percent of the wells having well yields greater than 10 gpm. The range of specific capacity, which relates well yield to drawdown, of 43 wells in the Port Deposit Gneiss range from less than 0.1 to 4.0 gallons per minute per foot of drawdown (Otton et al. 1988).

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 Protection Area (SWPA) for the system. Consistent with the recommended delineation in the Maryland SWAP (MDE 1999), the watershed drainage area that contributes ground water to the supply wells methodology was used.

This original delineation shape was then modified by accounting for surface water bodies, topography, significant land features, and by using a conservative calculation of total ground-water recharge during a drought. For conservative purposes, a drought condition recharge value of 400 gpd per acre (or approximately 5.4 inches per year) was used to estimate the total ground-water contribution area required to supply the wells.

For Woodlawn-Old MHPs, the current Water Appropriation Permit issued by the MDE Water Rights Division is for an average of 25,000 gpd for the total of the two wells. To determine the total ground-water contribution area during a drought, the following equation was used:

Recharge Area (acre) = Average Use (gpd)/Drought Condition Recharge (gpd/acre)

From the equation above, the total ground-water contributing area during a drought is approximately 63 acres. The delineated SWPA is approximately 177 acres (Figure 2), and is therefore adequate to meet the average daily ground-water usage during a drought.

3. INVENTORY OF POTENTIAL CONTAMINANTS WITHIN THE DELINEATED AREA

A field survey was performed on 7 November 2002 to confirm potential sources of contamination identified in MDE databases around the ground-water wells. These databases include the Comprehensive Environmental Response, Compensation, and Liability Act Information System (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

Septic system drain fields were observed on-site and a wastewater lagoon exists north of the development across Camp Meeting Ground Road. Septic system discharge could contain contaminants if there is insufficient treatment of biological contaminants such as coliforms and inorganic compounds such as nitrogen. Septic system discharge could also contain contaminants that the systems were not designed to treat, such as solvents and fuels.

Several 275-gal above ground residential heating oil tanks (ASTs) were observed throughout the Woodlawn-Old MHP development within the SWPA. Failure of an AST could impact the ground water with petroleum hydrocarbons.

Two pole-mounted electrical transformers were identified within the Woodlawn-Old MHP development. Prior to 1977, many transformers contained polychlorinated biphenyls (PCB) fluid as an insulator. It is possible that the transformers on site contain PCBs. If the transformer leaks, the PCB oil could eventually leach through the soil overburden into the ground-water aquifer.

The Water Witch Fire Company maintains above ground fuel oil tanks at their facility northwest of the SWPA. Failure of an AST could impact the ground water with petroleum hydrocarbons.

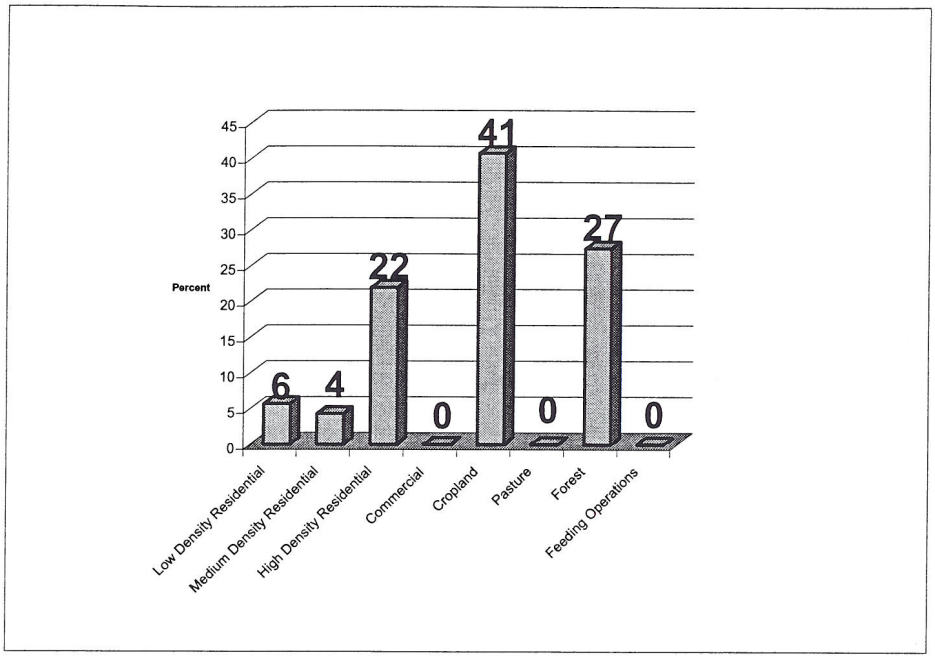
Landhope Farms, a listed leaking underground storage tank site exists outside the SWPA to the north. Dependent on the nature and extent of release at this property, the ground-water aquifer could become impacted by petroleum hydrocarbons.

3.2 NON-POINT SOURCES

In addition to the above point-sources, non-point source agricultural lands and an orchard were observed north of the SWPA.

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 (Figure 3). A summary of the percent and acreage of each type of land use is presented in the graphs below:

PERCENTAGE OF EACH LAND USE TYPE



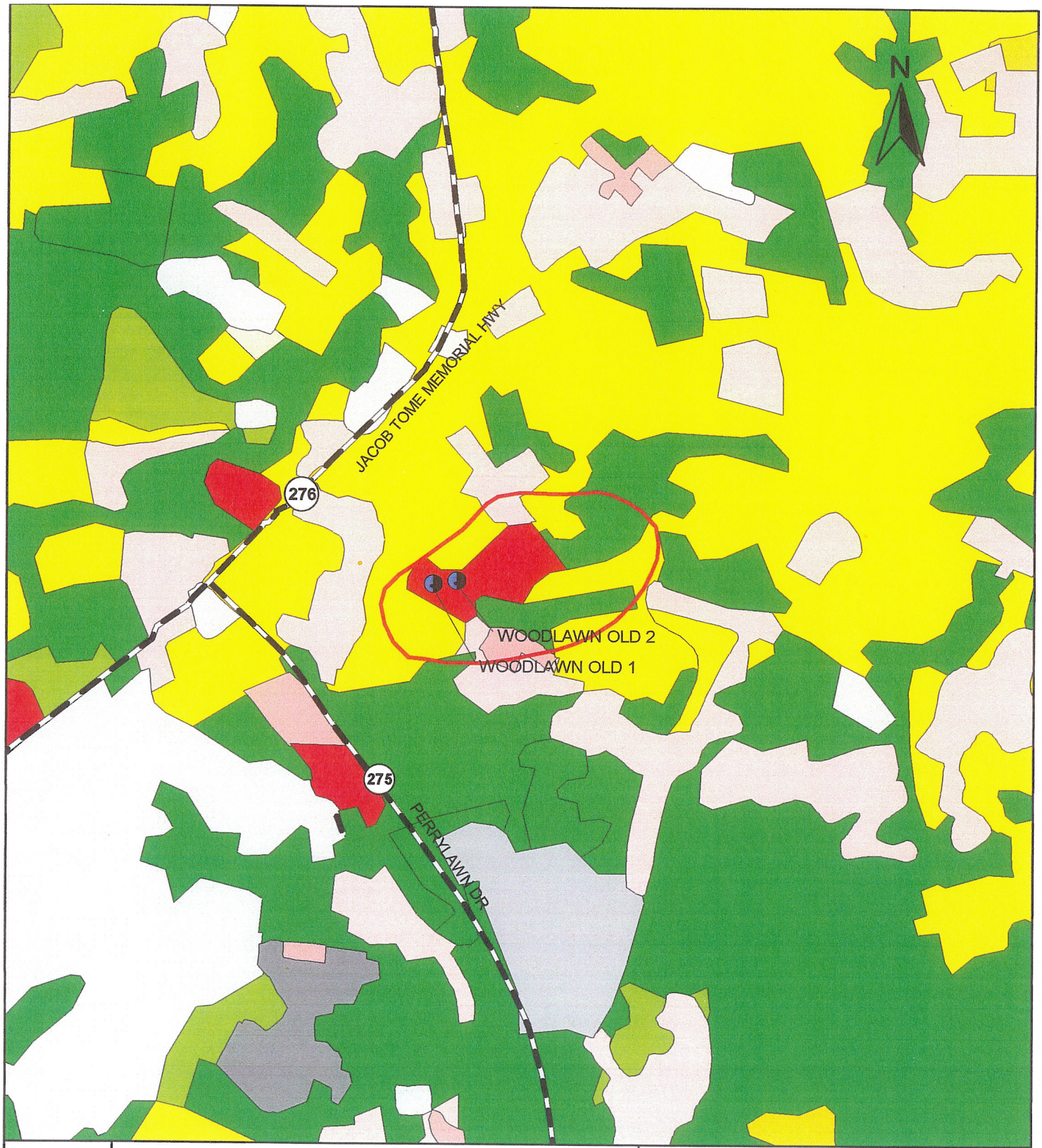


Figure 3. Woodlawn Old MHP Land Use Map of the Source Water Protection Area

Source Water Assessment Program
2003

Scale: 1000 0 1000 2000 Feet

Source: Maryland Office of Planning, 2000.

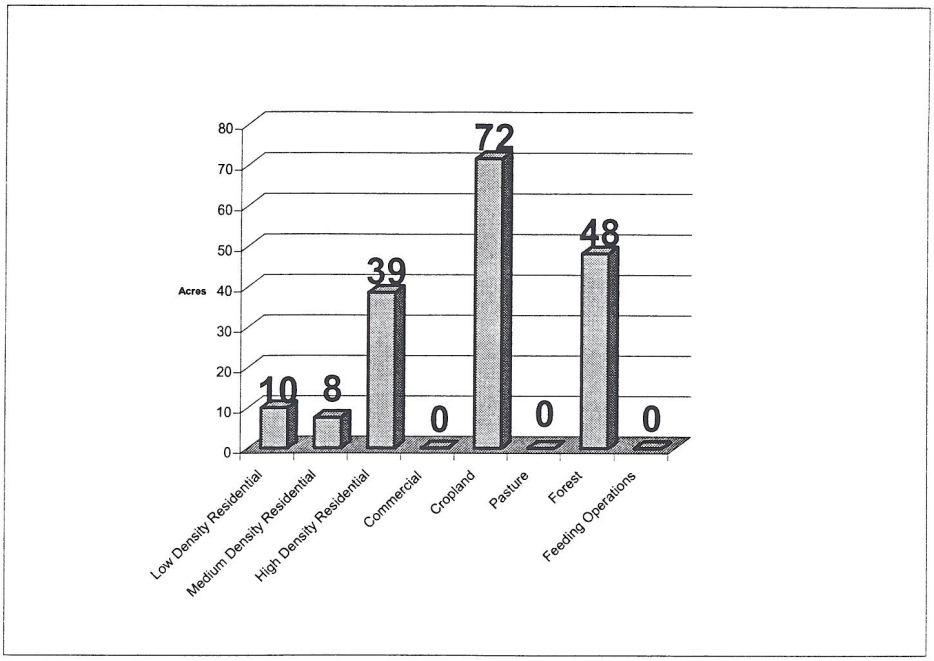
Legend:

- MHP Wells
- SWPA Boundary
- Major Roads

Land Use

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Extractive
- Open Urban Land
- Cropland
- Pasture
- Orchards
- Forest

ACREAGE OF EACH LAND USE TYPE



From an interpretation of the graphs above, cropland (72 acres) and residential areas (57 acres) account for almost all of the SWPA (177 acres). The use of fertilizers and pesticides (SOCs) in croplands and on residential area lawns is common. Therefore, there is potential for the migration of potential contaminants into the ground water from these land uses.

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 approximately 93 percent of the SWPA does not have public sewer service and approximately 7 percent is either on public sewer service or is under construction.

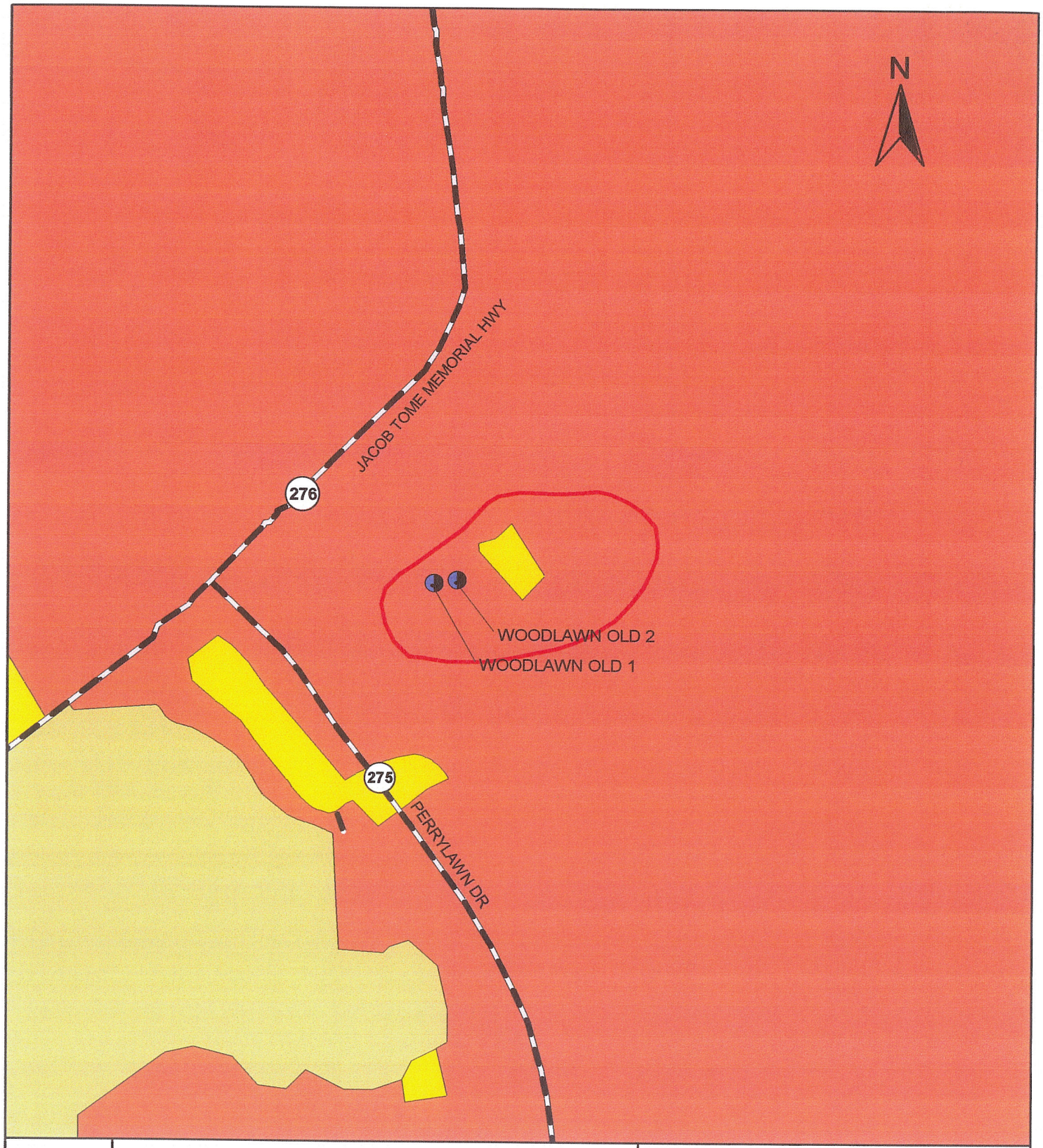


Figure 4. Woodlawn Old MHP Sewer Service Map of the Source Water Protection Area

Source Water Assessment Program
2003

Legend:

- MHP Wells
- SWPA Boundary
- Major Roads

Sewer

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

Source: Maryland Office of Planning, 1993.

Scale: 1000 0 1000 2000 Feet

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 1990 to 2002 has been performed for Woodlawn-Old 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

One ground-water sample collected on 16 July 1996 was reported with a pH of 5.8. This is below the SDWR range of 6.5 to 8.5. 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 volatile organic compounds (VOCs) were reported in the ground-water samples above 50 percent of the USEPA MCL.

Methyl-tert-butyl-ether (MTBE) is presently on the USEPA Contaminant Candidate List (CCL) for evaluation of whether placement on the Primary Drinking Water Standards list is warranted. Due to its presence on the CCL, MTBE currently has no MCL; however, the USEPA has an advisory level of 20 to 40 µg/L for the compound. MTBE, an additive in gasoline, was detected in the ground-water samples at concentrations ranging from 1.0 to 2.5 µg/L. The presence of MTBE in the ground-water aquifer is likely a result of a leaking gasoline underground storage tank.

4.3 SYNTHETIC ORGANIC COMPOUNDS

No synthetic organic compounds (SOCs) were reported in the ground-water samples above 50 percent of the USEPA MCL.

Low-levels of di(2-ethylhexyl) phthalate were reported in ground-water samples ranging from 0.58 to 1.8 µg/L. Di(2-ethylhexyl) phthalate is a common laboratory cross contaminant and has a USEPA MCL of 6 µg/L.

4.4 INORGANIC COMPOUNDS

No inorganic compounds (IOCs) were reported in the ground-water samples above 50 percent of the USEPA MCL.

Copper and lead were detected in the June 2001 water sample at concentrations of 0.011 mg/L and 0.007 mg/L, respectively. The USEPA's Action Levels for copper and lead has been set at 1.3 mg/L and 0.015 mg/L. USEPA is requiring water systems to control the corrosiveness of their water if the copper and lead concentration at home taps exceeds an Action Level. However, the reported concentrations were below the Action Levels.

Low-levels of nitrate were reported in ground-water samples, which ranged from 0.75 to 4.8 mg/L. Low levels of nitrite were also reported in ground-water samples, which ranged from 0.002 to 0.003 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 could occur due to the influx of agricultural animal waste, agricultural chemicals or fertilizers, and/or septic system effluent into the drinking water.

Also, a low-level of sulfate was reported in a ground-water sample collected in July 1996 at 4.9 mg/L, which is below the SDWR standard of 250 mg/L. 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.

4.5 MICROBIOLOGICAL CONTAMINANTS

Monthly ground-water sampling and analysis is performed for total and fecal coliform bacteria as per the Total Coliform Rule.

A routine water sample submitted for analysis in September 1999 was reported to contain total coliform bacteria. The sample was not reported to contain fecal coliform bacteria. A repeat ground-water sample was collected and analyzed, and the presence of total coliform was confirmed.

Five of six routine water samples submitted for analysis in October 1999 were also reported to contain total coliform bacteria. No fecal coliform was reported in any of these samples. However, no repeat water samples were collected and analyzed to confirm or deny the presence or absence of total coliform bacteria.

Routine water samples collected and analyzed in September and November 2000 were reported to contain total coliform bacteria. No fecal coliform was reported in either of these samples. However, no repeat samples were reported to contain total coliform bacteria.

Four of five routine water samples submitted for analysis in December 2000 were reported to contain total coliform bacteria. One of the five routine samples was reported to contain fecal coliform bacteria. One repeat water sample collected and analyzed in December 2000 was not reported to contain total or fecal coliform bacteria.

No other samples collected monthly since January 1997 through August 2002 were reported to contain coliform bacteria.

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.

Surface water that directly recharges the aquifer through major fractures in rock does not pass through by the soil overburden that both filters and contains beneficial microorganisms that break down potential contaminants. 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.

From an assessment of the GWUDI ground-water results by MDE, the ground-water supply for Woodlawn-Old MHP is not under the direct influence of surface water.

4.6 RADIONUCLIDES

The MCL used for comparing detections of Radon-222 was 300 picocuries per liter (pCi/L). This MCL is a proposed MCL established by USEPA since there is no current MCL for this contaminant. However, if a state has a program to address the more significant risk from radon

in indoor air, then 4,000 pCi/L can be used as an alternate MCL. For the purpose of this investigation, the more conservative number was utilized. Radon-222 was detected above the more conservative proposed MCL and greater than 50 percent of the less conservative MCL of 4,000 piC/L in one water sample from March 2001 as shown in Table 2.

TABLE 2. SUMMARY OF RADON-222 ANALYSIS

Plant ID	Sample Date	Contaminant Name	Result	Unit
01	22-Feb-00	Radon-222	**660**	piC/L
01	26-Mar-01	Radon-222	**635**	piC/L
02	26-Mar-01	Radon-222	**3,650**	piC/L

ND = Not Detected.
Shaded values are greater than the more conservative MCL.

Additionally, gross alpha was detected below 50 percent of the MCL in one sampling event in March 2001 at 1 pCi/L. The presence of these contaminants is generally attributed to decay of naturally occurring minerals like uranium in the metamorphic rock aquifer.

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 Woodlawn-Old 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 VOCs were reported above 50 percent of the MCL.

The only VOC reported in any of the water samples analyzed was MTBE. The low levels of MTBE reported (less than 3 µg/L) are most likely the result of a gasoline release into the subsurface. Because of the chemical properties of MTBE, it moves faster and farther than other gasoline constituents such as benzene or xylenes.

The reported concentrations could be the lead edge of the dissolved phase plume of gasoline constituents. A known LUST site (Land Hope Farms Gas Station) has been reported and observed near the SWPA. However, the LUST site is over one-half of a mile away of the supply wells and releases at the site may not be cause of the MTBE in the ground water. The MTBE concentrations reported could also be the result of an unreported spill of gasoline within the SWPA.

Based on the water quality data reviewed and the presence of a known LUST site that may cause VOC contamination near the SWPA, the water supply at Woodlawn-New MHP is moderately susceptible to VOCs.

5.2 SYNTHETIC ORGANIC COMPOUNDS

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

Only the SOC di(2-ethylhexyl)phthalate was reported in four water samples at a level well below the MCL and is most likely the result of laboratory cross contamination.

The only point sources that could impact the ground water with SOCs within the SWPA are from heating oil tanks observed onsite. The possible use of herbicides and pesticides on croplands and residential area lawns within the SWPA can be considered a potential non-point source of SOCs. However, no SOCs common to pesticides and herbicides have been reported in any of the water samples submitted for analysis. Most SOCs have a high affinity to sorb to soil particles and are not likely to infiltrate into the ground-water aquifer.

Based on the water quality data reviewed and the absence of point sources of SOCs, the water supply at Woodlawn-Old MHP 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.

Approximately 93 percent of the SWPA is not served by public sanitary sewer systems. The domestic wastewater is treated through septic systems, which can cause nitrate pollution in ground water. However, no concentrations of nitrate have been reported above 5 mg/L and no significant upward trend in the reported nitrate concentrations in the water samples have been observed over time.

Copper and lead levels reported in the water samples were below the USEPA's Action Levels.

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

5.4 RADIONUCLIDES

Radon-222 was reported at concentrations of 660, 635, and 3,650 pCi/L, which are significantly higher than the more conservative proposed MCL of 300 pCi/L.

While the presence of gross alpha particles and radon-222 are generally attributed to decay of naturally occurring minerals like uranium in the aquifer (Bolton 1996), the concentration of radon-222 is much higher than the proposed MCL. However, this proposed rule is not enforceable and MDE is waiting for the USEPA's final rule to determine how radon will be regulated for public water systems (USEPA 1999).

Based on the natural occurrence of radionuclides in the ground water in the Piedmont region and the water quality data, the water supply at Woodlawn-Old MHP is highly susceptible to radon-222 and has a low susceptibility to other radionuclides.

5.5 MICROBIOLOGICAL CONTAMINANTS

Total coliform bacteria were reported in the water samples during the routine and repeat water sampling events.

Total coliforms are a group of closely related bacteria that are generally harmless. They are natural and common inhabitants of soil and surface water bodies. However, they are not generally found in ground water that is free of surface water or fecal contaminants (USEPA 2001). Therefore, if total coliforms are reported in water samples, there may be a direct pathway between surface water and the ground water.

Fecal coliforms are a subset of total coliforms and are a good indicator of surface water contamination, and of the potential presence of waterborne pathogens associated with fecal contamination (USEPA 2001). Fecal coliform bacteria was reported in the water sample from December 2000; however, no fecal coliform bacteria was reported in the subsequent repeat water sample.

From an assessment of GWUDI ground-water results by MDE, the ground-water supply for Woodlawn-Old MHP is not under the direct influence of surface water.

From documentation reviewed, one of the supply wells was constructed prior to 1973, the year that proper well construction standards were required. However, due to the brick structure surrounding Well 1 and its age, it is possible for surface water to collect around the well and infiltrate into the subsurface along the casing.

Based primarily on the water quality review (the reported detections of total coliform) and the age and construction of the supply Well 1, the water supply at Woodlawn-Old MHP is highly susceptible to total coliform bacteria.

6. RECOMMENDATIONS FOR PROTECTING THE WATER SUPPLY

With the information contained in this report, Woodlawn-Old 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.

The management of the mobile home park should also contact the owner of the electricity transformers observed on site to assess whether they contain PCB oil.

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 the activities that could have impacts to 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 management of 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. Additional sampling for radiological contaminants (specifically radon-222) should be performed to monitor and document levels until the USEPA determines how to regulate the radionuclides in public water supplies.

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

The management of the mobile home park should also contact the MDE Oil Control Program for the status of LUST sites within or adjacent to the SWPA.

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 could provide a pathway for contaminants to the aquifer.

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

A concrete pad should be poured around Well 1 inside the brick structure to prevent surface water ponding and infiltration.

6.8 COOPERATIVE EFFORTS WITH OTHER AGENCIES

The management of the mobile home park may request the assistance of the University of Maryland Agricultural Extension Service, Soil Conservation Service to work with the nearby farmers to adopt Best Management Practices (BMPs) for cropland located within the SWPA.

The nearby farmers can also participate in the New Conservation Reserve Program (CREP) applicable to the cropland located within the SWPA. 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.

Appendix A

Detected Compounds in Ground-Water Samples

SUMMARY OF DETECTED COMPOUNDS IN WOODLAWN MHP (OLD) WATER SAMPLES				
Plant ID	**Sample Date**	**Contaminant Name**	**Result**	**Unit**
Volatile Organic Compounds				
01	22-Feb-00	METHYL-TERT-BUTYL-ETHER	1.8	ug/L
02	24-Apr-00	METHYL-TERT-BUTYL-ETHER	1.8	ug/L
02	14-Aug-00	METHYL-TERT-BUTYL-ETHER	2.5	ug/L
02	02-Oct-00	METHYL-TERT-BUTYL-ETHER	2.4	ug/L
01	26-Mar-01	METHYL-TERT-BUTYL-ETHER	1.9	ug/L
02	26-Mar-01	METHYL-TERT-BUTYL-ETHER	1.3	ug/L
01	04-Jun-02	METHYL-TERT-BUTYL-ETHER	1	ug/L
02	04-Jun-02	METHYL-TERT-BUTYL-ETHER	1	ug/L
Synthetic Organic Compounds				
01	29-Dec-95	DI(2-ETHYLHEXYL) PHTHALATE	1	ug/L
01	16-Jul-96	DI(2-ETHYLHEXYL) PHTHALATE	0.58	ug/L
01	26-Mar-01	DI(2-ETHYLHEXYL) PHTHALATE	1.8	ug/L
02	26-Mar-01	DI(2-ETHYLHEXYL) PHTHALATE	1.5	ug/L
Inorganic Compounds				
01	10-Mar-96	BARIUM	0.016	mg/L
02	25-Jun-01	COPPER	0.011	mg/L
01	10-Mar-96	FLUORIDE	0.0609	mg/L
01	10-Mar-96	FLUORIDE	0.076	mg/L
02	25-Jun-01	LEAD	0.007	mg/L
01	13-Dec-93	NITRATE	1.2	mg/L
01	15-Dec-94	NITRATE	0.75	mg/L
01	23-Aug-95	NITRATE	3.1	mg/L
01	16-Jul-96	NITRATE	4.2	mg/L
01	12-Dec-96	NITRATE	1.7	mg/L
01	18-Dec-97	NITRATE	2.1	mg/L
01	06-Dec-98	NITRATE	1.28	mg/L
01	06-Dec-98	NITRATE	4.28	mg/L
01	22-Nov-99	NITRATE	1.91	mg/L
01	22-Nov-99	NITRATE	3.97	mg/L
01	23-Nov-99	NITRATE	3.97	mg/L
02	23-Nov-99	NITRATE	1.91	mg/L
01	22-Feb-00	NITRATE	4.7	mg/L
01	18-Dec-00	NITRATE	1.93	mg/L
02	18-Dec-00	NITRATE	4.53	mg/L
01	26-Mar-01	NITRATE	2.3	mg/L
01	26-Mar-01	NITRATE	4.8	mg/L
01	25-Jun-01	NITRATE	1.87	mg/L
01	25-Jun-01	NITRATE	3.99	mg/L
02	25-Jun-01	NITRATE	1.87	mg/L
01	24-Jun-02	NITRATE	3.81	mg/L
01	16-Jul-96	NITRITE	0.002	mg/L
01	22-Feb-00	NITRITE	0.003	mg/L

SUMMARY OF DETECTED COMPOUNDS IN WOODLAWN MOBILE HOME PARK (OLD) WATER SAMPLES				
Plant ID	**Sample Date**	**Contaminant Name**	**Result**	**Unit**
Inorganic Compounds				
01	16-Jul-96	SODIUM	6.8	mg/L
01	26-Mar-01	SODIUM	6.57	mg/L
01	26-Mar-01	SODIUM	7.05	mg/L
01	16-Jul-96	SULFATE	4.9	mg/L
General Water Quality Parameters				
01	16-Jul-96	pH	5.8	s.u.
Radionuclides				
01	26-Mar-01	GROSS ALPHA	1	pCi/L
01	22-Feb-00	RADON-222	660	pCi/L
01	26-Mar-01	RADON-222	635	pCi/L
02	26-Mar-01	RADON-222	3650	pCi/L
Microbiological Contaminants				
NA	1-Sep-99	TOTAL COLIFORM (ROUTINE)	Positive	
NA	1-Sep-99	TOTAL COLIFORM (REPEAT)	Positive	
NA	1-Oct-99	TOTAL COLIFORM (ROUTINE)	Positive	
NA	1-Oct-99	TOTAL COLIFORM (ROUTINE)	Positive	
NA	1-Oct-99	TOTAL COLIFORM (ROUTINE)	Positive	
NA	1-Oct-99	TOTAL COLIFORM (ROUTINE)	Positive	
NA	1-Oct-99	TOTAL COLIFORM (ROUTINE)	Positive	
NA	1-Sep-00	TOTAL COLIFORM (ROUTINE)	Positive	
NA	1-Nov-00	TOTAL COLIFORM (ROUTINE)	Positive	
NA	1-Dec-00	TOTAL COLIFORM (ROUTINE)	Positive	
NA	1-Dec-00	TOTAL COLIFORM (ROUTINE)	Positive	
NA	1-Dec-00	TOTAL COLIFORM (ROUTINE)	Positive	
NA	1-Dec-00	TOTAL COLIFORM (ROUTINE)	Positive	
NA	1-Dec-00	FECAL COLIFORM (ROUTINE)	Positive	

s.u. – standard units.
NA – not applicable