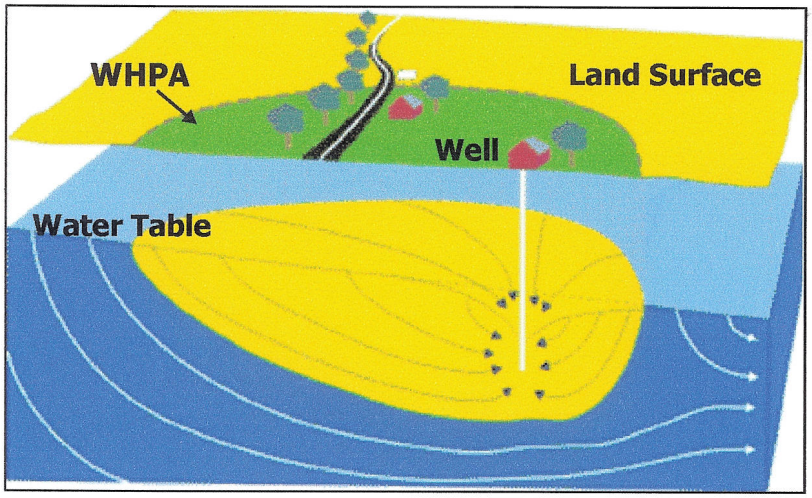
SOURCE WATER ASSESSMENT

FOR THE GREENRIDGE UTILITIES WATER SUPPLY

HARFORD COUNTY, MD



Prepared By
Maryland Department of the Environment
Water Management Administration
Water Supply Program
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MDE

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SUMMARY

The Maryland Department of the Environment Water Supply Program (WSP) has conducted a Source Water Assessment for the Greenridge Utilities water system. 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 for the Greenridge Utilities water supply is an unconfined, Piedmont aquifer known as the Port Deposit Gneiss. The privately owned and operated water company currently uses fifteen wells in three well fields to obtain their drinking water. A fourth well field has not been connected to the system to date. The Source Water Assessment area for the Greenridge Utilities wells were delineated 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 use 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 of the Greenridge Utilities water supply was based on the review of the water quality data, potential sources of contamination, aquifer characteristics, and well integrity. It was determined that the Greenridge Utilities water supply is susceptible to contamination by nitrates, and to radionuclides, but is not susceptible to volatile organic compounds (VOCs), synthetic organic compounds (SOCs), microbiological contaminants, and other regulated inorganic compounds (IOCs).

INTRODUCTION

Greenridge Utilities is a privately owned and operated Water Company serving homes in the Greenridge subdivision near Fountain Green, Maryland. The Water Company was purchased by Utilities, Inc. in 1994. The Greenridge Subdivision is located approximately 2 miles East of Bel Air in Harford County (Figure 1). The Greenridge water supply system serves a population of 2,228 and has about 825 connections. Three well fields currently supply the water. The utility is also connected to the Harford County Department of Public Works water system. Additional supply is available from the County for distribution flushing and during emergency (e.g. low flow) conditions. The three wells in a fourth well field are unused and have not been connected to the system to date.

WELL INFORMATION

A review of the available well completion reports and sanitary surveys indicates that all of the wells in Well Fields 1 and 2 with the exception of Well 2-3 were drilled prior to the implementation of the State's well construction regulations in 1973. No grouting records are available for these wells. Well Fields 3 and 4 and Well 2-3 were drilled after 1973 and meet the well construction standards. Table 1 is a summary of the available well construction data.

PLANT	SOURCE NAME	PERMIT	TOTAL DEPTH (ft.)	CASING DEPTH (ft.)	AQUIFER
1	Greenridge 1-1	Not available	*170	*60	Port Deposit Gneiss
1	Greenridge 1-2	Not available	*125	*46	Port Deposit Gneiss
1	Greenridge 1-3	Not available	*260	N/A	Port Deposit Gneiss
2	Greenridge 2-1	HA-67-0446	147	22	Port Deposit Gneiss
2	Greenridge 2-2	HA-67-0541	147	28	Port Deposit Gneiss
2	Greenridge 2-3	HA-88-1801	350	60	Port Deposit Gneiss
2	Greenridge 2-4	Not available	*147	N/A	Port Deposit Gneiss
2	Greenridge 2-5	Not available	*177	*25	Port Deposit Gneiss
3	Greenridge 3-1	Not available	*340	*20	Port Deposit Gneiss
3	Greenridge 3-2	Not available	*180	*20	Port Deposit Gneiss
3	Greenridge 3-3	Not available	*180	*20	Port Deposit Gneiss
3	Greenridge 3-4	Not available	*330	*20	Port Deposit Gneiss
3	Greenridge 3-5	HA-73-6693	300	22	Port Deposit Gneiss
3	Greenridge 3-6	HA-88-1813	350	33	Port Deposit Gneiss
3	Greenridge 3-7	HA-88-1812	325	41	Port Deposit Gneiss
3	Greenridge 3-8	HA-73-6829	150	31	Port Deposit Gneiss
3	Greenridge 3-9	HA-81-3996	300	38	Port Deposit Gneiss
3	Greenridge 3-10	HA-81-3997	320	38	Port Deposit Gneiss
3	Greenridge 3-11	HA-81-3998	320	41	Port Deposit Gneiss
3	Greenridge 3-12	HA-81-3999	380	57	Port Deposit Gneiss
[illegible]	Greenridge 4-1	HA-88-1919	325	61	Port Deposit Gneiss
	Greenridge 4-2	HA-88-1918	350	50	Port Deposit Gneiss
	Greenridge 4-3	HA-88-1920	300	40	Port Deposit Gneiss
*Based on well data reported in R.E. Wright Assoc., Inc. (1991) Table 1					

Table 1. Greenridge Utilities Well Information

The well locations are shown on Figure 1. Currently, Wells 3-1, 3-3, 3-5, and 3-6 are standby wells and are out of service due to manganese levels that are above secondary standards. Well 3-9 is currently being used as a monitoring well. Wells 4-1, 4-2, and 4-3 have not been connected to the system and are unused also due to the presence of manganese. All of the wells are very low yielding with pumping rates ranging from 1 - 20 gallons per minute (gpm). There are three water treatment plants. The wells that are associated with each plant are shown on Table 1. Well 1-1 is located inside the Plant 1 treatment building. All of the other wells are outside and in the vicinity of their respective treatment plants. According to a hydrogeologic evaluation conducted by R.E. Wright Assoc., Inc. (REWAI, 1991) former Wells 3-6, and 3-7 were abandoned in 1991. A former well in Well Field 2 was properly abandoned and sealed on September 9, 1996 for Utilities, Inc. as per State regulations.

HYDROGEOLOGY

The Greenridge area lies within the Eastern Piedmont Physiographic Province and is underlain by the Port Deposit Gneiss geologic formation (Table 1). The Port Deposit Gneiss is of Paleozoic age and consists of gneissic biotite quartz diorite, hornblende-biotite quartz diorite, and biotite granodiorite (MGS, 1968). The formation is a moderately to strongly deformed intrusive complex of foliated and strongly sheared schistose rocks (MGS, 1968). Well logs indicate that the gneissic bedrock at Greenridge is overlain by about 20 to 60 feet of residual soils and saprolite.

Ground water in this geologic setting comes from precipitation that enters the porous and permeable weathered overburden soils and then flows through joints and fractures in the rock (Dingman & Ferguson, 1956). The ground water flow may be in several directions at varying velocities due to the size, orientation and extent of these fractures. Ground water boundaries typically follow watershed boundaries, as ground water elevation is generally a subdued mirror of topographic relief. The fractured rock aquifer in the Greenridge area is unconfined.

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. Ground water flow in unconfined fractured rock aquifers is complex and cannot be accurately modeled by a homogeneous analytical model. Therefore, the WHPA was delineated using the topographic watershed drainage area that contributes to the wells (MDE, 1999).

The well field recharge area boundaries were originally delineated by R.E. Wright Associates, Inc. (REWAI, 1991) and subsequently used by Frederick Ward Associates, Inc. (FWAI) as part of a Wellhead Protection Plan for the Greenridge Subdivision (FWAI, 1997). The topography and watershed drainage area in the vicinity of the wells was considered. The Greenridge area lies near the top of a gently rolling topography with elevations ranging from 350 to 430 feet above mean sea level. The general ground water flow direction in the westerly site areas is to the southwest towards Bynum Run. The easterly site areas drain to the southeast towards Broad Run. The delineated WHPA is considered the areas in which any contaminant present could ultimately reach the wells. A similar WHPA that encompasses the four well fields was delineated for this assessment report. The combined WHPA is irregularly shaped and has an overall area of 227 acres (Figure 2). Note that the wells in Well Field 4 are unused and have not been connected to the system to date.

The current Water Appropriation Permit issued by the MDE Water Rights Division for the Greenridge Subdivision is for an average daily pumpage of 178,000 gallons per day (gpd). The Greenridge wells are very low yielding. As mentioned in the Introduction, additional supply is available from Harford County during emergency conditions and for distribution maintenance.

POTENTIAL SOURCES OF CONTAMINATION

For this assessment, MDE Waste and Water Management databases were reviewed, staff consulted, and field inspections conducted, to identify potential sources of contamination in and around the Greenridge WHPA. In addition, on November 1, 2000, MDE staff completed a field survey of the Greenridge WHPA and wells, and interviewed a Utilities, Inc. System Operator, Mr. Walter McConnell, regarding any water quality concerns and potential ground water contamination sources in the area. The primary water quality concerns for this system are naturally occurring manganese and radon, and periodically high nitrate levels. This will be discussed in detail later in the report.

A review and consultation with MDE Waste and Water Management Administration Program databases and personnel was conducted. Currently, there is no record of any registered leaking underground storage tanks (LUSTs), hazardous waste sites, ground water contamination sites, solid waste facilities, and pesticide dealers within the Greenridge WHPA. A ground water discharge general permit (No. 95-HT-9526) was issued to Greenridge Utilities to release treated hydrostatic testing water from fire hydrants and the storage standpipe to the ground. The discharged water is treated and therefore should pose no threat to the underlying ground water aquifer.

The Royal Farm/Enroy Gas and Exxon Stations near the intersection of Churchville and Fountain Green Roads are located outside and to the Northwest of the WHPA and therefore, should pose no threat to the wells (Figure 2). The MDE Oil Control Program completed a compliance inspection of the Royal Farm Station during the installation of the USTs. The tanks and installation meet current State regulations. There is no record of any former contaminant sources at this location, since the site was undeveloped prior to the construction of the Royal Farm Store.

A field inspection within and near the WHPA was conducted to determine the potential of any unpermitted ground water discharges (e.g. open floor drains) to the fractured rock aquifer. No ground water discharges were reported since there are no industrial or commercial facilities located within the WHPA.

Other sources within the WHPA that may potentially contaminate the fractured rock aquifer are unregulated residential heating oil USTs, and the local roads. Fountain Green Road (MD Rt. 543) is of particular concern in the event of a petroleum or chemical spill due to its close proximity to the supply wells (Figure 2). Chemical or petroleum spills may enter the storm drain system outfalling into the recharge areas, and may possibly impact the ground water. Lawn maintenance and landscaping activities on residential land are potential non-point sources of nitrates and Synthetic Organic Compounds (SOCs) to the Greenridge water supply.

Based on the Maryland Office of Planning's 1997 Harford County Land Use Map, the land use within the WHPA is as follows:

LAND USE	TOTAL AREA (Acres)	PERCENT OF WHPA
Medium Density Residential	162.3	71
Commercial	31.5	14
Cropland	2.0	1
Forest	11.5	5
Barren Land	19.7	9

Table 2. Land Use Summary Within the WHPA

The breakdown of land use within the WHPA is shown in Figure 3. Note that residential land accounts for 71% of the WHPA. Also note that the commercial land shown on Table 2 is the Fountain Green Elementary School property.

A review of the Maryland Office of Planning 1994 Harford County Sewerage Coverage Map indicates that 97% (219.7 acres) of the WHPA is in the existing or planned service area (Figure 4). The remaining 3% (7.3 acres) of the WHPA have no plans for public sewerage. Figure 3 shows that the areas with no planned service are predominately agricultural. Currently, some of the homes in the older subdivisions of Greenridge utilize private septic systems. Septic systems are sources of nitrates and potential sources of microbial pathogens to the ground water. Connecting the homes to public sewerage service should address this potential risk.

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 data described is from the finished (treated) water unless otherwise noted. The treatment currently used at Greenridge is post hypochlorination for disinfection, polyphosphate for manganese sequestration and corrosion control on the pipes, and pH adjustment for corrosion control. The pH adjustment is done through the addition of caustic soda. The treated water is stored in a 529,000-gallon standpipe storage tank.

In accordance with Maryland's SWAP, data from the treatment plants was compared with the Maximum Contaminant Levels (MCLs). If the monitoring data is greater than 50% of a MCL, the written assessment will describe the sources of such a contaminant and, if possible, locate the specific sources that are the cause of the elevated contaminant level. A review of the monitoring data since 1993 for Greenridge Utilities finished water indicates that the system's water supply meets the drinking water standards. Nitrate was the only enforceable contaminant that was detected above 50% of the MCL since 1993. In addition, radon-222 was also detected above 50% of the proposed MCLs. These are discussed in more detail below.

Inorganic Compounds (IOCs)

The only regulated IOC detected above 50% of the MCL is nitrate. Tables 3a, 3b, and 3c summarize the nitrate detects above 50% of the MCL for each of the Greenridge Utilities Plants.

CONT. ID	CONTAMINANT NAME	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
1040	NITRATE	10	03-Feb-93	5.4
1040	NITRATE	10	06-Jul-93	8.8
1040	NITRATE	10	16-Aug-94	5.65
1040	NITRATE	10	15-Nov-94	6.5
1040	NITRATE	10	17-Jan-96	6.8
1040	NITRATE	10	18-Jul-96	7.5
1040	NITRATE	10	07-Jan-97	7.03
1040	NITRATE	10	17-Apr-97	7.05
1040	NITRATE	10	16-Jul-97	7.1
1040	NITRATE	10	05-Oct-98	6.68
1040	NITRATE	10	06-Oct-98	5.7

Table 3a. IOC Results Above 50% of the MCL for Greenridge Utilities Plant 1 Wells, Finished Water Since 1993

CONT. ID	CONTAMANT NAME	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
1040	NITRATE	10	11-Apr-95	5.14
1040	NITRATE	10	17-Jan-96	5
1040	NITRATE	10	18-Jul-96	5.7
1040	NITRATE	10	07-Jan-97	5
1040	NITRATE	10	22-Apr-98	7.59
1040	NITRATE	10	08-Jul-98	5.19

Table 3b. IOC Results Above 50% of the MCL for Greenridge Utilities Plant 2 Wells, Finished Water Since 1993

CONT. ID	CONTAMINANT NAME	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
1040	NITRATE	10	21-Feb-94	6.32
1040	NITRATE	10	20-Apr-94	6.62
1040	NITRATE	10	07-Nov-95	5
1040	NITRATE	10	17-Jan-96	6.02
1040	NITRATE	10	18-Jul-96	7.5
1040	NITRATE	10	07-Jan-97	6.27
1040	NITRATE	10	17-Apr-97	7.43
1040	NITRATE	10	21-Jan-98	5.24
1040	NITRATE	10	06-Oct-98	5.1
1040	NITRATE	10	13-Jan-99	5

Table 3c. IOC Results Above 50% of the MCL for Greenridge Utilities Plant 3 Wells, Finished Water Since 1993

The MCL for nitrate is 10 parts per million (ppm). The average nitrate detects since 1993 for Plants 1, 2, and 3 are 5.2 ppm, 4.1 ppm, and 5.3 ppm respectively.

Manganese is a naturally occurring element that is present within the Port Deposit Gneiss fractured rock aquifer at Greenridge Utilities. Special raw water sampling conducted in 1997 showed manganese levels ranging from 0.001 to 1.06 ppm. Well Field 3 results showed the highest levels of manganese. Wells 3-1, 3-3, 3-5, and 3-6 detects ranged from 0.13 to 1.06 ppm respectively. These wells were inactivated from the system, and are currently on standby. The finished water secondary maximum contaminant level (SMCL) for manganese is 0.05 ppm (EPA, 1996). Initial sampling results from the three wells in Well Field 4 also showed manganese detections. Therefore, these wells were not placed on-line to date.

Manganese levels that exceed 0.05 ppm can result in drinking water that has an undesirable taste, odor, and discoloration. Utilities, Inc. is currently attempting to control the levels with the addition of a polyphosphate for sequestering the manganese. The utility also increased the distribution flushing from 2 to 4 times per year.

Volatile Organic Compounds (VOCs)

The only regulated VOC detects that have been reported over the past ten years of available sampling data are the disinfection by-products known as trihalomethanes (THMs). Disinfection by-products are the result of a reaction between chlorine used for disinfection and organic material in the water supply. VOCs are generally reported in parts-per-billion (ppb). Low-level detects of bromodichloromethane (0.6 ppb), chloroform (2 ppb), and dibromochloromethane (1 ppb) were reported once on 3/25/95 for Plant 1. Higher levels of bromodichloromethane (22.5 ppb), chloroform (83.6 ppb), and dibromochloromethane (3.6 ppb) were reported once on 9/27/99 for Plant 3. Elevated levels of THMs are typically detected in finished water at Surface Water Plants. Since Greenridge Utilities occasionally use water from Harford County to supplement their supply, the THM detects may be attributed to surface water in the distribution. No THMs were detected from 5 sets of sampling data since 1990 for Plant 2. Additionally, no bromoform detects were reported from available sampling results for any of the Greenridge Plants. Trihalomethanes are currently regulated for systems serving a population of over 10,000. The current MCL for regulated systems is 100 ppb for the total of these four VOCs. By the year 2003, this MCL total will be reduced to 80 ppb.

Chloromethane was detected once at Plant 1 on 3/25/95 at 1 ppb. Chloromethane is an unregulated VOC that currently has no MCL.

Synthetic Organic Compounds (SOCs)

Dinoseb was detected at Plants 2 and 3 on 10/06/98 at 0.15 ppb and 0.07 ppb respectively. The MCL for Dinoseb is 7 ppb.

DI (2-Ethylhexyl) phthalate was detected at Plants 1, 2, and 3 on 10/06/98 at 0.5 ppb, 0.6 ppb, and 0.7 ppb respectively. The MCL for this SOC is 6 ppb. Low levels of phthalate ester are often found in the laboratory blanks and therefore probably do not represent actual water quality of the system.

Radionuclides

Gross alpha was detected at 2 picocuries per Liter (pCi/L) on 4/1/92. The MCL for gross alpha is 15 pCi/L. Currently, there is no MCL for radon-222. EPA has proposed a MCL of 300 pCi/L and an alternate MCL of 4000 pCi/L. The detections of radon-222 for Greenridge Utilities water supply that are over 50% of the proposed MCLs are shown on Table 4.

PLANT ID	CONT. ID	CONTAMINANT NAME	PROPOSED MCL (pCi/L)	SAMPLE DATE	RESULT (pCi/L)
1	4004	RADON-222	300 or 4000	27-Mar-97	1930
2	4004	RADON-222	300 or 4000	27-Mar-97	3235
2	4004	RADON-222	300 or 4000	05-Jun-97	2770
3	4004	RADON-222	300 or 4000	27-Mar-97	2255

Table 4. Radon-222 Results Above 50% of the Proposed MCLs for Plants 1-3, Finished Water Since 1993

Microbiological Contaminants

Raw water sampling was conducted for each of the Greenridge Utilities production wells to determine the sensitivity of these wells to surface water. Samples were collected in December 1998 following 0.6 inches of rainfall from each of the Well Field 2 wells. Dry weather samples were collected on 11/17/98 from each of the production wells in Well Fields 1 and 3 as required. All results were negative for the presence of total and fecal coliform.

SUSCEPTIBILITY ANALYSIS

Greenridge Utilities wells draw water from an unconfined aquifer. In general, water supplies in unconfined aquifers are susceptible to contamination from land use activities. Therefore, continued routine monitoring of contaminants is essential in assuring a safe drinking water supply. The criteria that was used to conduct the susceptibility analysis is as follows: (1) evaluation of available water quality data, (2) review of the contaminant sources within the WHPA, (3) evaluation of the aquifer characteristics, (4) evaluation of the well integrity, and (5) evaluation of the likelihood of change to the natural conditions.

Inorganic Compounds (IOCs)

Nitrate levels have periodically exceeded the 50% MCL threshold since 1993 (Tables 3a, 3b, and 3c). Other regulated IOCs have not been detected above 50% of the MCL at Greenridge Utilities based on available sampling data since 1993. A review of the sampling data does not show any specific trends in the nitrate concentrations. Sources of nitrate can generally be traced back to land use. Fertilization of agricultural fields and residential lawns, and on-site septic systems are non-point sources of nitrate in ground water. Table 2 shows that only 1% of the WHPA is currently agricultural land. Of the 71% of the WHPA that is medium density residential (Table 2), some of these homes still use private septic systems. Nitrates are present in domestic wastewater as a result of the conversion of organic nitrogen compounds to inorganic nitrate. Excess nitrate from manure and fertilizer that is not used by lawns or crops leaches into the ground water during recharge periods. Nitrates present in Greenridge Utilities water source are likely related to private septic systems, residential lawns and gardens, and past agricultural practices.

Based on the above analysis, Greenridge Utilities water supply **is** susceptible to nitrate contamination, but is **not** susceptible to other regulated IOCs.

Volatile Organic Compounds (VOCs)

Review of sampling data reported since 1990 indicates that no regulated VOCs have ever been detected at Greenridge Utilities other than the disinfection by-products discussed earlier in the Water Quality Section. There are currently no commercial facilities located within the WHPA that pose any VOC threats to the wells (Figure 2). However, since 71% of the WHPA is residential land, leaking home heating oil tanks have the potential to contaminate ground water with VOCs. Additionally, due to the close proximity of some of the wells to Fountain Green Road (Figure 2), petroleum and chemical spills are a potential VOC threat.

Chloromethane was detected in 1995 at very low levels (1 ppb) in finished water at Plant 1. There is no MCL for chloromethane at the present time, however, EPA has set a Drinking Water Equivalent Limit (DWEL) health advisory of 100 ppb for this contaminant (EPA, 1996). Chloromethane is used as a refrigerant. The WHPA at Well Field 1 is 100% residential property (Figure 3) and therefore, the possible source of this contaminant may have been from the outdoor storage of refrigerators and/or air conditioning units near the wells. Since the contaminant was only detected once in 1995 at very low levels, it does not appear to be a significant risk to the water supply.

Based on the sampling data reported since 1990 and the absence of any known VOC contaminant sources located within the WHPA, the Greenridge Utilities water supply is **not** susceptible to VOC contamination. However, since the wells at Greenridge draw water from an unconfined, fractured rock aquifer, periodic sampling for VOCs should be continued.

Synthetic Organic Compounds (SOCs)

The current land use indicates that non-point sources exist within the WHPA that could potentially contaminate the water supply with SOCs. Residential areas account for 71% of the WHPA based on 1997 land use (Figure 3). Pesticides and chemicals used on residential lawns and gardens are a potential threat. However, typical lawn maintenance herbicides are very biodegradable and should not pose a significant SOC risk if applied properly. Additionally, only 1% of the land within the WHPA is agricultural (Table 2). The wells at Greenridge Utilities draw from an unconfined fractured rock aquifer. Based on three sets of data since 1995, no SOC detects close to the 50% MCL threshold were reported for Greenridge Utilities. Low levels of dinoseb at Plants 2 and 3 were reported on 10/06/98. Dinoseb is a herbicide and an insecticide sprayed on soybeans and vegetables. The levels of these contaminants were just above the minimum detection limit and therefore do not pose an immediate water quality threat.

Based on the above analysis, Greenridge Utilities water supply is **not** susceptible to SOC contamination.

Radionuclides

Gross alpha radiation was detected at low levels in water samples at Greenridge Utilities. The results are less than 50% of the 15 pCi/L MCL. Radon-222 was also detected in finished water at levels above 50% the proposed MCLs at all 3 Plants in March and June 1997 (Table 4). The source of radon in ground water can be traced back to the natural occurrence of uranium in bedrock. Radon is prevalent in ground water throughout the Piedmont region of Maryland due to radioactive decay of uranium bearing minerals in the bedrock (Bolton, 1996).

Greenridge Utilities water supply **is** susceptible to radon due to the natural occurrence of this contaminant within the aquifer.

Microbiological Contaminants

The nearest natural surface water body to Greenridge Utilities Well Field 1 is an unnamed stream about 1500 feet to the southeast that flows into Bynum Run (Figure 2). Additionally, a pond is located within 100 feet of Well 2-1 at Well Field 2 (Figure 2). Field observation also revealed small, intermittent streams within Well Field 3. Based on raw water coliform sampling data, the wells were determined **not** to be susceptible to protozoans or bacteriological contaminants. The wells may be susceptible to viral contaminants, as these are much smaller, can survive longer, and may not be as effectively filtered by the aquifer as protozoans and bacteria. Future monitoring will be needed to determine susceptibility to viruses.

MANAGEMENT OF THE WHPA

Local Planning Team

- A Wellhead Protection Plan (WHPP) was developed for Greenridge Utilities in 1997 by Frederick Ward Associates, Inc. (FWAI, 1997). Representatives from Harford County Health Department, MDE, Stephen Homes, Inc., Utilities, Inc., and Frederick Ward Associates, Inc reviewed the plan. MDE recommended that the strategies in the plan be implemented to protect the well field from contamination. The WHPP recommendations are as follows:

Recommended Management Strategies (from FWAI, 1997)

- Place signs along the WHPA boundary in order to make the public aware of the WHPA.
- Educate surrounding landowners about the safe storage of chemicals, proper vehicle maintenance practices, and also the effects of over fertilizing their yards.
- Map locations of stormwater runoff discharge points upstream of the WHPA.
- Develop a spill response plan in concert with the local Fire Department and other emergency response teams.
- Provide new home buyers with information concerning the WHPA through cooperation with the builder

Ordinance

- Harford County required Stephen Homes, Inc. and Greenridge Utilities Water Company to implement the WHPP recommendations prior to approving the development of the final plat of Greenridge II homes. The above recommendations are currently being implemented.

Additional recommendations by MDE are as follows:

Monitoring

- Continue annual nitrate sampling and note any increase in concentrations of nitrate.
- Continue to monitor for all Safe Drinking Water Act Contaminants as required by MDE.
- Annual sampling for microbiological contaminants is a good check on well integrity.

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. Greenridge Utilities is connected to the Harford County Public Works water system. Additional supply is available from the County during emergency conditions.

Changes in Use

- Any increase in pumpage or the addition of new wells to the system may require revisions to the WHPA. The system is required to contact the Water Supply Program when an increase in pumpage is applied for or when new wells are being considered.

Contaminant Source Inventory Updates / Well Inspections

- The utility should conduct its own detailed survey to ensure that there are no other potential sources of contamination within the WHPA. Updated records of new development within the WHPA should be maintained.
- The utility should conduct regular inspections of the supply wells to ensure their integrity, and to protect the aquifer from surficial contamination.
- The utility should properly abandon and seal all unused wells in accordance with COMAR 26.04.04.11 regulations.

REFERENCES

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MDE Waste Management Sites Database
Department of Natural Resources 1994 Digital Orthophoto Quarter Quadrangles for Bel Air SW and Bel Air SE
USGS 7.5 Minute Series Topographic Map, Bel Air Quadrangle
Maryland Geological Survey (MGS) 1968 Geologic Map of Maryland
Maryland Office of Planning 1997 Harford County Land Use Map
Maryland Office of Planning 1994 Harford County Sewerage Coverage Map

FIGURES

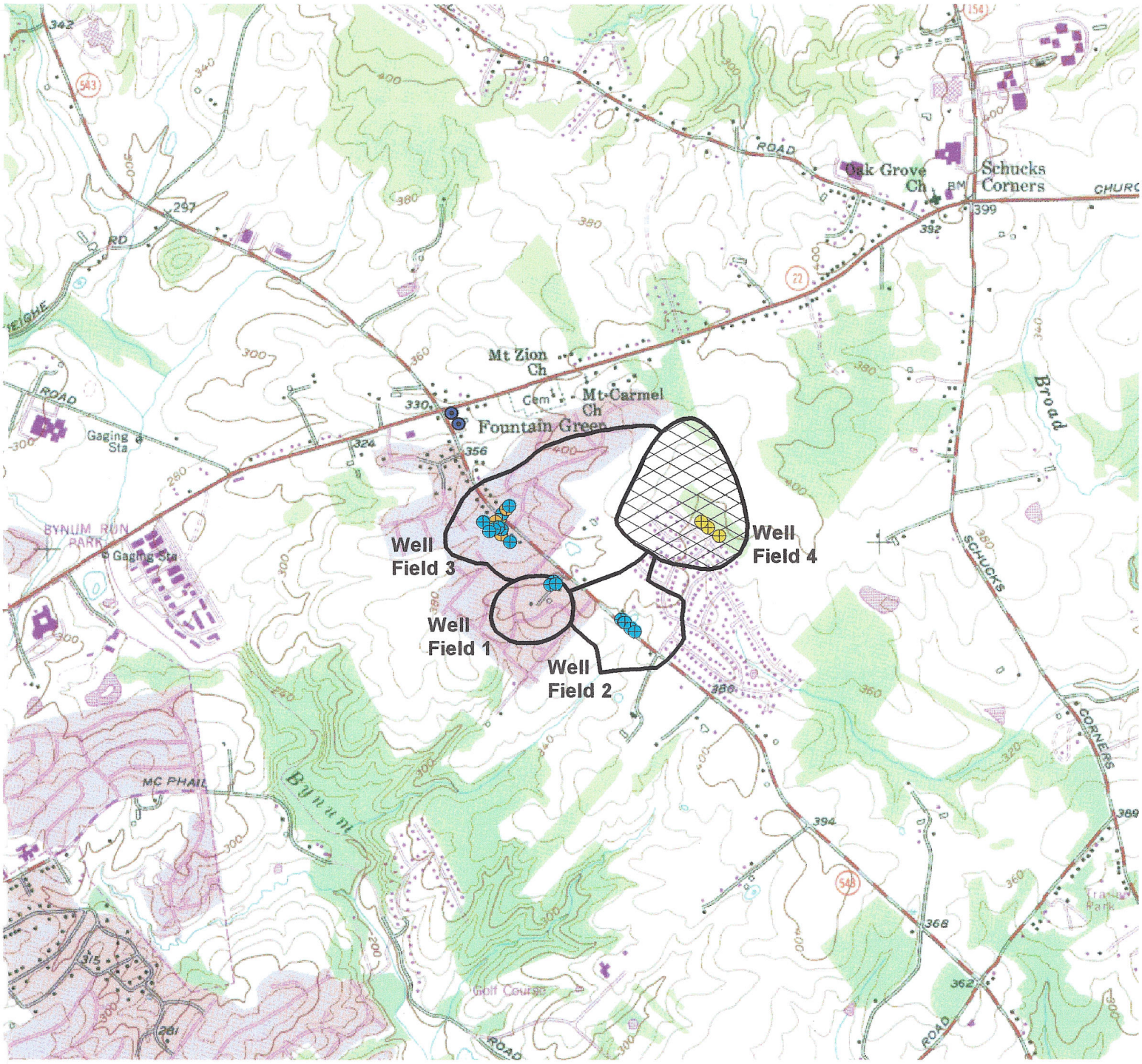

Figure 2. Greenridge Utilities Wellhead Protection Area With Potential Sources of Contamination

Source: USGS 7.5 Minute Series Topographic Map, Bel Air Quadrangle

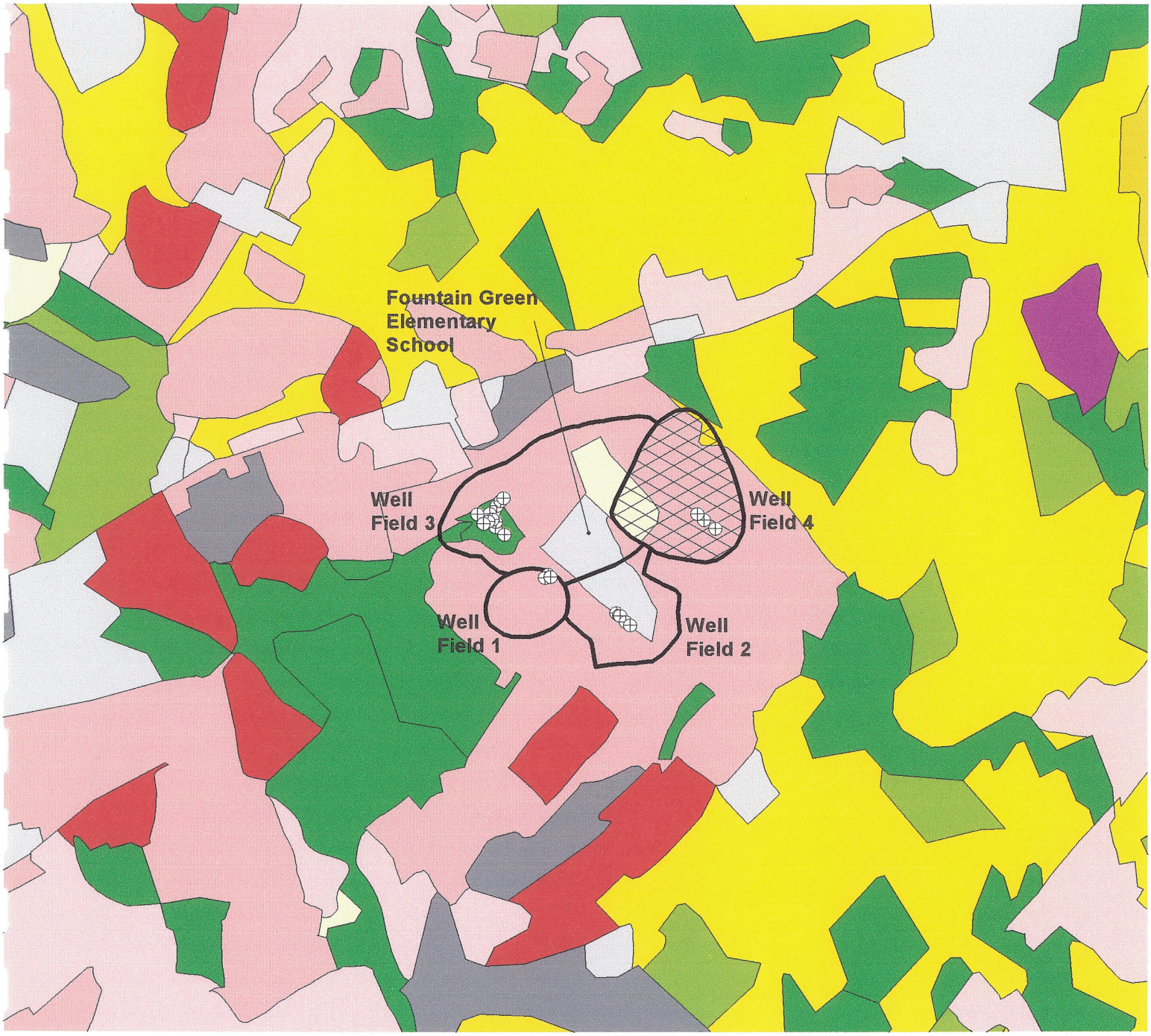

Figure 3. Land Use Map of Greenridge Utilities Wellhead Protection Area

LEGEND

Land Use

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Open Urban Land
- Cropland
- Pasture
- Orchards
- Forest
- Feeding Operations
- Barren Land

WHPAs

- Active Well Field
- Unused Well Field
- Greenridge Utilities Wells

2000 0 2000 Feet

N

Source: MD Office of Planning 1997 Harford County Land Use Map

Figure 4. Sewer Service Area Map of Greenridge Utilities Wellhead Protection Area

LEGEND

Sewerage Coverage

- No Planned Service Area
- Existing Service Area
- Planned Service Area Within 5 Yrs.
- Planned Service Area Within 6 - 10 Yrs.

WHPAs

- Active Well Fields
- Unused Well Field
- Greenridge Utilities Wells

0 2000 Feet

N

Source: MD Office of Planning 1994 Harford County Sewerage Coverage Map