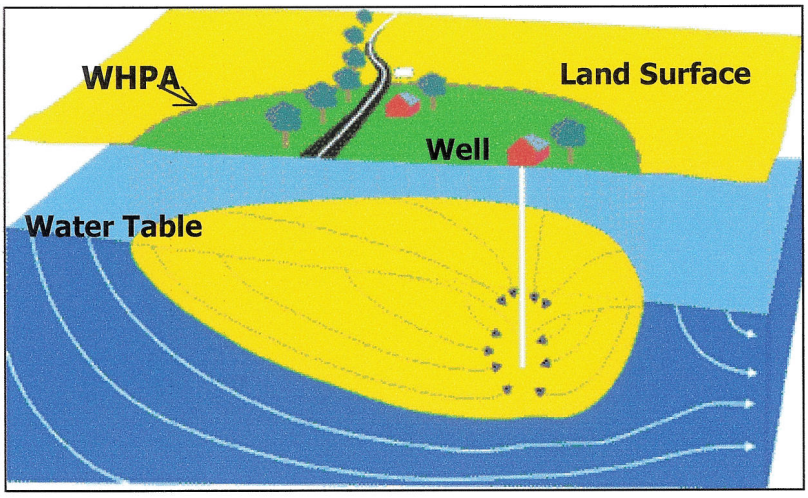
SOURCE WATER ASSESSMENT

FOR MILLINGTON ELEMENTARY SCHOOL

KENT COUNTY, MD



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Water Management Administration
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MDE

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SUMMARY

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for Millington Elementary School. The major 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) an inventory of potential sources of contamination, and (3) determining the susceptibility of the water supply to contamination. Recommendations for management of the assessment area conclude this report.

The source of Millington Elementary School's water supply is an unconfined aquifer in the Coastal Plain. Two wells are currently being used to pump the water out of the aquifer. The Source Water Assessment Area for Millington Elementary School's wells were delineated by the WSP using a delineation method specifically designed for a source pumping an average of less than 10,000 gallons per day.

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

The susceptibility analysis of Millington Elementary School's water supply is based on a review of the water quality data, potential sources of contamination, aquifer characteristics, and well integrity. It was determined that Millington Elementary School's water supply is not susceptible to inorganic compounds, volatile organic compounds, synthetic organic compounds or microbiological contaminants.

INTRODUCTION

A review of the Water Supply Program's (WSP) database indicated that there are three active small systems in Kent County. Maryland's Source Water Assessment Plan (MDE, 1999), defines a "small system" as a community or a nontransient noncommunity system that has a water appropriation permit of less than 10,000 gallons per day (gpd). Since the three systems are located in different areas of the county (figure 1) individual source water assessments were conducted rather than a regional one. This source water assessment deals with Millington Elementary School.

Millington Elementary School is a county owned school located on the northern outskirts of the Town of Millington. It is classified as a nontransient noncommunity system. The school owns and operates its own water system that serves a population of 230. The water is supplied by two wells (Nos. 1 and 2).

WELL INFORMATION

A review of the well data and sanitary surveys, indicates that the supply wells) were drilled in October 1973 and May 1978 in accordance with Maryland's well construction standards that were implemented in 1973. Both the wells were grouted with cement. Table 1 provides a summary of the well information.

SOURCE ID	SOURCE NAME	PERMIT NUMBER	TOTAL DEPTH	CASING DEPTH	AQUIFER NAME
1	Millington E.S.Well 1	KE730124	150'	140'	Aquia Formation
2	Millington E.S.Well 2	KE730699	138'	118'	Aquia Formation

Table 1. Millington Elementary School Well Information.

The wells are pumped alternately in three-month cycles. Well Nos. 1 and 2 are capable of producing 23 gallons per minute (gpm) and 43 gpm respectively. A site inspection revealed that the well caps and casing looked all right. The wells are located in low-lying area that may be subject to ponding. Mr. Francis George who operates the water system for the school indicated that a new seal had been placed on Well No. 2.

HYDROGEOLOGY

Millington Elementary School's wells draw water from a Coastal Plain aquifer known as the Aquia aquifer. Based on a review of hydrogeologic data the Aquia aquifer is considered unconfined in the Millington area. It is overlain by the sands of the Columbia aquifer. The Aquia aquifer is a fine to coarse, glauconitic quartz sand which locally contains clayey layers, shell beds, cemented zones, and highly weathered zones (Drummond, 1998). The top of the Aquia aquifer in the vicinity of the school is around sea level and the bottom about 200 feet below sea level. Based on a potentiometric surface map (Drummond, 1998), the main ground water flow direction in the Aquia aquifer in the Millington Elementary School area is south towards the southeast.

50% of the MCL, the written assessment will describe the source of such a contaminant, and, if possible, locate the specific sources, which are the cause of the elevated contaminant level. A review of the monitoring data since 1991 for Millington School indicates that the school's water supply currently meets the drinking water standards.

Inorganic Compounds (IOCs)

No IOCs above 50% of the MCL have been detected in Millington Elementary School's water supply since1993. Table 2 lists the IOCs detected in Millington Elementary School's water supply since 1993. MCLs have not been established for sodium, iron, sulfate and chloride. The secondary standard for iron is 3ppm and 250 ppm for sulfate and choride. Secondary standards are levels established to indicate when taste, odor or color of the water may be offensive.

CONTAMINANT ID	CONTAMINANT NAME	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
1041	NITRITE	1	17-Jan-96	0.003
1055	SULFATE	None	17-Jan-96	5.4
1028	IRON	None	15-Apr-96	0.6
1028	IRON	None	24-Jul-96	0.66
1055	SULFATE	None	3-Sep-96	6
1017	CHLORIDE	None	3-Sep-96	4
1028	IRON	None	1-Mar-99	0.77
1052	SODIUM	None	1-Mar-99	3.46

Table 2. IOC detects in Millington Elementary School's water supply.

Volatile Organic Compounds (VOCs)

No VOCs above 50% of the MCL have been detected in the School's water supply since 1991. The only VOC that has been detected is 1,2-dichloroethane at levels of 1ppb (October 1997) and 0.6 ppb (July 1999). The MCL for 1,2-dichloroethane is 5 ppb.

Synthetic Organic Compounds (SOCs)

No SOCs above 50% of the MCL have been detected in the water supply since 1993.The only SOC that has been detected in the School's water supply is di(ethylhexyl)phthalate at 0.5 ppb. The MCL for this SOC is 6 ppb. The phthalate was also found in the laboratory blank and can be attributed to a laboratory error and not to the water supply at Millington Elementary School.

Radionuclides

Radon-222 was measured in a sample collected on 2/26/01 at 135 picoCuries/Liter (pCi/L). At present there is no MCL for radon-222. EPA has proposed an MCL of 300 pCi/L and an alternate MCL of 4000 pCi/L for States that have an indoor air abatement program.

Microbiological Contaminants

Total coliform bacteria were detected on February 9, 2001 during routine sampling. Repeat sampling on February 19, 2001 confirmed the presence of total coliform and

the system was issued a violation. No fecal coliform bacteria were detected. The School chlorinated the water system and had more samples taken. On March 14, 2001 the violation was lifted when results from the latest bacteriological samples showed the absence of total coliform bacteria.

SUSCEPTIBILITY ANALYSIS

Millington Elementary School's wells obtain 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 information that was used to conduct the susceptibility analysis is as follows: (1) available water quality data, (2) presence of potential contaminant sources in the WHPA, (3) aquifer characteristics, (4) well integrity and (5) the likelihood of change to the natural conditions.

Inorganic Compounds (IOCs)

No regulated IOCs have been detected in Millington Elementary School's water supply since 1993. Only unregulated IOCs like iron, sodium, sulfate and chloride have been detected. These IOCs are naturally occurring constituents of the aquifer sediments. Application of fertilizers on school property can result in non- point sources of nitrate in ground water. Mr. George indicated that the school does not use any fertilizer on the property. Onsite septic systems are also sources of nitrate in ground water. No known onsite septic systems are present in the WHPA.

Based on the above analysis, Millington Elementary School's water supply is currently **not** susceptible to IOC contamination.

Volatile Organic Compounds (VOCs)

The only VOC that has been detected is 1,2-dichloroethane at levels well below 50% of the MCL. 1,2-dichloroethane is an organic solvent and also used as a fumigant. There have been no detections of this VOC since 1999 and no sources of this VOC were identified in the WHPA during a field inspection.

Based on the above analysis, Millington Elementary School's water supply is **not** susceptible to VOC contamination.

Synthetic Organic Compounds (SOCs)

Sampling data since 1993 indicate that no SOCs have been detected in the water supply. According to the school maintenance personnel no pesticides are used for any landscape activities on school property.

Based on the above analysis, Millington Elementary School's water supply is **not** susceptible to SOC contamination.

Radionuclides

Radon-222 has been detected at 135 pCi/L in Millington Elementary School's water supply. The level detected is below 50% of one of the proposed MCLs for radon-222 of 300 pCi/L. Radon is prevalent in the ground water due to the radioactive decay of uranium bearing minerals in the aquifer sediments.

Based on the above analysis, Millington Elementary School's water supply is **not** susceptible to radiological contaminants.

Microbiological Contaminants

Millington Elementary School's water supply does not have disinfection for treatment of its raw water, so bacteriological sampling results reflect the quality of raw water. The presence of total coliform in recent bacteriological test samples was attributed to either a broken seal in Well No. 2 or a failed backflow preventer valve in the fire sprinkler system. The school has fixed both these problems and retesting showed no coliform in the samples. The wells are located in low-lying area that may be subject of flooding.

Based on the above, the wells are **not** susceptible to protozoans or bacteriological contaminants. The wells may be susceptible to viruses, as these are much smaller, can survive longer, and may not be as effectively filtered by the aquifer as protozoans and bacteria.

MANAGEMENT OF THE WHPA

Form a Local Planning Team

- The County Board of Education should work with the County Health Department to implement a regional wellhead protection plan. Source water assessments are also being completed for other small public water systems (transient) in the Millington area. Hence a local team representing all the interests in the community, such as the water suppliers, local planning agencies, local businesses, developers, farmers and local residents, and the two county agencies mentioned above should get together to implement wellhead protection.

Public Awareness and Outreach

- Information from this report or pamphlets and flyers to school personnel and students, and any farmers and property owners in the WHPA will help educate them about Wellhead Protection.
- Placing road signs at WHPA boundaries are an effective way making the public aware of land use and water quality.

Monitoring

- Continue to monitor for all Safe Drinking Water Act contaminants are required y MDE.

Contaminant Source Inventory/Well Inspections

- Periodic inspections and a regular maintenance program for the well will ensure its integrity and protect the aquifer from contamination.
- Consider regrading the area around the wells so that surface water flows away from the wells and prevent ponding.

Changes in Use

- Any increase in pumpage or addition of a new well to the system may require revision of 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.

REFERENCES

Drummond, D. D., 1998, Hydrogeology, Simulation of Ground-Water Flow, and Ground-Water Quality of the Upper Coastal Plain Aquifers in Kent County, Maryland: Maryland Geological Survey Report of Investigations No. 68, 76 p.

Maryland Department of the Environment, Water Supply Program, 1999, Maryland's Source Water Assessment Plan, 36 p.

Tompkins, M. D., Cooper, B. F., and Drummond, D. D., 1994, Ground-Water and Surface-Water Data for Kent County, Maryland: Maryland Geological Survey Basic Data Report No. 20, 155 p.

United States Environmental Protection Agency, Office of Ground-Water Protection, 1987, Guidelines for Delineation of Wellhead Protection Areas.

SOURCES OF DATA

Water Appropriation and Use Permit No. KE1971G008
Public Water Supply Inspection Reports
Monthly Operating Reports
Monitoring Reports
MDE Water Supply Program Oracle Database
MDE Waste Management Sites Database
Department of Natural Resources Digital Orthophoto Quarter Quadrangles: Chestertown SE and SW 3-25-95
Maryland Office of Planning 1997 Land Use Map
Maryland Office of Planning 1995 Kent County Sewerage Coverage

FIGURES

Figure 1. Location of Small Systems in Kent County.