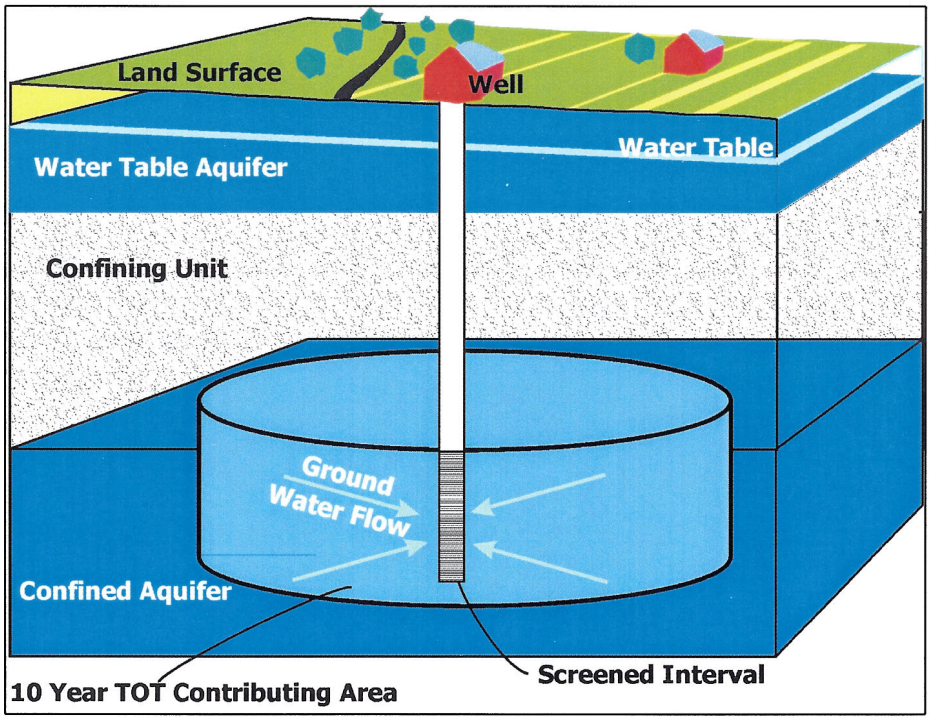
SOURCE WATER ASSESSMENT

FOR THE COMMUNITY WATER SYSTEMS USING CONFINED AQUIFERS IN DORCHESTER COUNTY, MD



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SUMMARY

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for the nine community water systems in Dorchester County using confined aquifers. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to each source, 2) identification of potential sources of contamination within the areas, and 3) determination of the susceptibility of each water supply to contamination. Recommendations for protecting the drinking water supplies conclude this report.

The water supply sources of community systems in this report are naturally protected confined Coastal Plain aquifers. The nine community water systems included in this report are currently using 27 wells that draw from five different confined aquifer systems. The wells are completed in the Piney Point, Patapsco, Magothy, Federalsburg, and Frederica aquifers respectively. The Source Water Assessment areas were delineated by the WSP using EPA approved methods specifically designed for sources in confined aquifers.

Potential point sources of contamination were identified within the assessment areas from field inspections, and contaminant inventory databases. Well information and water quality data were also reviewed. In confined aquifer settings, sources of contamination at the land surface near the wells are generally not a threat unless there is a pathway for direct injection into the deeper aquifer such as through unused wells or along well casings that have no grout seal. Maps showing the wellhead protection areas for each community water system are enclosed at the end of the report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the community water systems are not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. Some naturally occurring contaminants pose a risk to the water supplies that have detected these elements at levels of concern. It was determined that four systems are susceptible to arsenic (based on the new EPA standard). Two systems are susceptible to naturally occurring fluoride, and two systems are susceptible to gross alpha. Seven systems may be susceptible to radon-222 depending on the final MCL that is adopted for this contaminant.

INTRODUCTION

The Water Supply Program has conducted a Source Water Assessment for the nine community water systems in Dorchester County using confined aquifers for their drinking water source. Dorchester County is located on the Delmarva Peninsula along the eastern shore of Maryland. The county is bounded on the north by the Choptank River and Caroline County, on the east by the Nanticoke River, and the State of Delaware, and by the Chesapeake Bay to the south and west. Based on July 2001 data, the total population of Dorchester County is 29,500 persons (MD Assoc. of Counties, 2001/2002). The nine community systems serve a population of approximately 16,846 residents, while the remaining residents in the county obtain their water supply from individual wells. The community systems include the incorporated municipalities of Cambridge, East New Market, and Secretary, one unincorporated area whose water system is owned and operated by the Dorchester County Sanitary District, and five privately owned and operated systems. Individual reports were prepared for the Town's of Hurlock, and Vienna because they utilize unconfined aquifers for their water source, and therefore require a different methodology in delineating their assessment areas. It must be noted that Hurlock also uses a confined aquifer well to supplement its water supply. The community water systems included in this report are shown in Figure 1.

WELL INFORMATION

Well information for each system was obtained from the Water Supply Program's database, site visits, well completion reports, sanitary survey inspection reports, and published reports. A total of twenty-seven wells are used by the nine systems assessed in this report. Sixteen of the wells were drilled in or after 1973 and should comply with Maryland's well construction regulations for grouting and casing. A review of the available well completion report data indicates that two other wells drilled in 1964 were also grouted around their respective casings. Nine wells that were drilled prior to 1973, when current regulations went into effect, may not meet the current construction standards. Table 1 contains a summary of well information for each of the community water systems assessed in this report.

Based on site surveys, the supply wells were generally in good condition. Some of the older wells should have a two-piece well cap installed to prevent contamination from insects through unscreened vents and electrical conduits. Additionally, the casings of the older wells should be inspected for possible integrity issues. A review of the Public Drinking Water Information System (PDWIS) database indicates one unused well each at Secretary, and at Reliance, and Beaver Run Mobile Home Parks respectively. Unused wells that are not exercised regularly, have no pumps, or that are no longer connected to the system may provide a direct pathway for ground water contamination to the aquifers. These wells should be properly abandoned and sealed by a licensed well driller according to the current State regulations.

HYDROGEOLOGY

Ground water flows through pores between gravel, sand, and silt grains in unconsolidated Coastal Plain formations that are used by the community water systems in Dorchester County. An aquifer is any formation that is capable of yielding a significant amount of water. Transmissivity is a measure of the amount of water that an aquifer is capable of producing, and is the product of hydraulic conductivity and aquifer thickness. Confining layers are composed of fine-grained clay and silt material that have very small pore spaces and therefore transmit very little water. Confined aquifers are those formations that are overlain by one or more confining layers. They are recharged very slowly from the water stored in the confining layers above, and from precipitation that infiltrates into the formation where it reaches the ground surface, referred to as the outcrop area.

Dorchester County is underlain by unconsolidated sediments of the Coastal Plain Physiographic Province. The sediments were deposited in a southeasterly thickening wedge extending from the Fall Line (roughly the area east of Interstate 95) to the Continental Shelf. They consist of layers of clay, silt, sand, and gravel that form a regular banded sequence of interbedded aquifers, and confining layers that gently dip to the southeast. The unconsolidated sediments overlie a complex assemblage of crystalline bedrock. The age of the deposits (from oldest to youngest), range from Cretaceous, just above the crystalline basement rocks, to Tertiary, to Quaternary near the land surface (Mack, Webb, & Gardner, 1971). A generalized description of the water bearing properties and lithology of the major aquifers and confining units of Dorchester County is shown in Table 2. The confined aquifers used by the community water systems in this report include the Eocene Series Piney Point Formation, the Patapsco Formation of the Potomac Group, the Upper Cretaceous Magothy Formation, and the Chesapeake Group's Federalsburg aquifer of the Calvert Formation, and Frederica Aquifer of the Choptank Formation respectively. Confining clay units of low permeability that inhibit the infiltration of contaminants from the land surface overlie these aquifers. General descriptions of each aquifer as they increase in depth are shown below. The reader may refer to the referenced reports for additional information.

Choptank Formation (Frederica Aquifer)

The Frederica aquifer of the Choptank Formation is used by the Reliance Mobile Home Park water system. It consists of gray and brown sand and silt with shell marl. The top of the Choptank Formation ranges from 50 feet to about 200 feet below sea level in Dorchester County (Rasmussen & Slaughter, 1957). The Choptank Formation has a relatively low transmissivity and specific capacity. A transmissivity of 6,000 gallons per day (gpd) per foot was reported from an aquifer test conducted in Caroline County (Rasmussen & Slaughter, 1957). The Frederica aquifer is overlain by the Saint Mary's Formation. It consists of clayey silt and silty clay which functions as a confining layer covering about seventy-five percent of Dorchester County.

Calvert Formation (Federalsburg Aquifer)

The old well at East New Market is completed in the Federalsburg aquifer, which is the uppermost aquifer of the Calvert Formation. The thickness of the Calvert Formation beneath Dorchester County is 200 feet. The formation consists of gray diatomaceous silts and clays with interspersed sand lenses. The sands are fine-to-medium-grained, with shell fragments. The top of the Calvert Formation ranges from 100 feet to about 250 feet below sea level in Dorchester County (Rasmussen & Slaughter, 1957). Transmissivity values are moderately low. A test conducted at Easton in Talbot County yielded a transmissivity of 3,500 gpd per foot (Mack, Webb, & Gardner, 1971). The aquifer is overlain by the Choptank Formation where the clayey portions function as a leaky confining unit.

Piney Point Formation

The Piney Point aquifer is used by eight of the nine community water systems in this report. The thickness of the Piney Point Formation is variable, and ranges from a few feet to about 160 feet (Mack, Webb, & Gardner, 1971). The formation consists of medium to course grained olive-green to black slightly glauconitic sand with interbedded clayey layers. The top of the Piney Point Formation ranges from about 300 feet below sea level in the northwest to about 600 feet below sea level in the southwestern areas of Dorchester County, and is about 340 feet below sea level at Cambridge (Figure 3). Transmissivity values in Cambridge range from 25,000 to 45,000 gpd per foot (Mack, Webb, & Gardner, 1971). The Piney Point aquifer is overlain by the Chesapeake Group Formations that function as multiple confining and leaky confining beds to this aquifer. The Piney Point aquifer does not outcrop at the ground surface, and therefore is not directly recharged by precipitation. Recharge is derived from lateral and vertical leakage through adjacent beds.

Magothy Formation

The Cambridge Stone Boundary Well 2 is completed in the Magothy Formation. The thickness ranges from 43 feet to 139 feet (Rasmussen & Slaughter, 1957). The formation consists of medium to course grained white, yellow, and gray sands with irregular lenses of dark clay containing lignite. The top of the Magothy Formation is at about 900 feet below sea level in Cambridge. Transmissivity values at Cambridge were reported at 8,000 gpd per foot, and 15,000 gpd respectively (Mack, Webb, & Gardner, 1971). The Magothy Formation is overlain unconformably by the Matawan Formation that functions as a confining unit in Dorchester County.

Patapsco Formation

Two wells at Cambridge were completed in the Patapsco aquifer (Table 1). The Patapsco Formation consists of fine to medium grained greenish gray sand, with layers of mottled, tough clay. The sands occur in four beds ranging in thickness from 15 to 40 feet. The top of the Patapsco Formation ranges from about 1000 feet to 1500 feet below

sea level in Dorchester County (Mack, Webb, & Gardner, 1971). The Cambridge Nathans Well 3 had a transmissivity of over 16,000 gpd per foot. The Patapsco aquifer is overlain by multiple, younger aquifers and confining units of variable thickness (Table 2). The outcrop area extends from Washington D.C. to Elkton, Maryland in a band of varying width. Between Washington and Baltimore, the outcrop area is between 10 and 20 miles wide.

SOURCE WATER ASSESSMENT AREA DELINEATION

For ground water systems, a Wellhead Protection Area (WHPA) is considered to be the source water assessment area for the system. The community water system WHPAs were delineated by MDE based on the methodology described in Maryland's Source Water Assessment Plan (MDE, 1999). Wells drilled into confined aquifers in the Coastal Plain are to be delineated using a volumetric equation referred to as "The Florida Method". The method is used to calculate the volume of aquifer needed to store the quantity of water pumped from the well for a ten-year period. The equation is as follows:

$$r = \sqrt{\frac{Qt}{\pi n H}}$$

where: r = calculated fixed radius (ft)
Q = pumping rate of well (ft^3 / yr)
t = time of travel in years (yr)
n = aquifer porosity (dimensionless)
H = length of well screen (ft)

A porosity (n) of 25% was assumed for each of the aquifers based on published reports (Fetter, 1988). The pumping rate (Q) is generally the permitted daily average from water appropriation permit information. For systems with multiple wells, the average well pumpage was based on the percentage of use for each well from monthly operating reports over the past two years. The lengths of well screens (H) were obtained from well completion reports and published reports. The sum of the individual screen lengths was used for wells that draw water from multiple screens. The volumetric equation was solved for each well using the pertinent data as shown in Table 3. The resulting WHPAs are radial zones of transport based on a ten-year time of travel (Figures 2a – 2e).

Systems with multiple wells that share the same aquifer and whose radial areas overlap were combined to form one larger WHPA. The protection areas for assessment purposes are located within the aquifer below the confining layers at depths below the land surface. Diagram 1 is a conceptual illustration of a WHPA in a confined Coastal Plain aquifer setting.

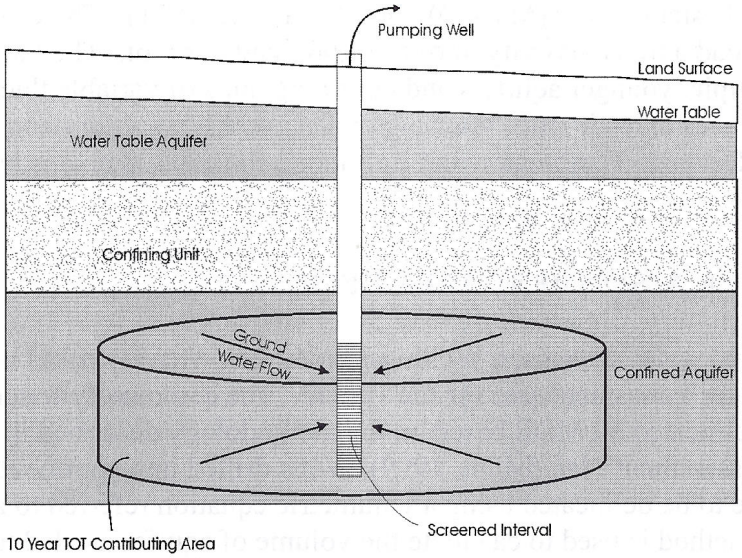

Diagram 1. Conceptual Illustration of a Zone of Transport for a Confined Aquifer

POTENTIAL SOURCES OF CONTAMINATION

Potential sources of contamination are classified as either point or non-point sources. Examples of point sources of contamination are leaking underground storage tanks, landfills, discharge permits, large-scale feeding operations, and known ground water contamination sites. These sites are generally associated with commercial or industrial facilities that use chemical substances that may, if inappropriately handled, contaminate ground water via a discrete point location. Non-point sources of contamination are associated with certain types of land use practices such as the use of pesticides, application of fertilizers, sludge or animal wastes, or septic systems all that may lead to ground water contamination over a larger area. All of the community water systems in this report draw water from confined aquifers. In confined aquifer settings, sources of contamination at the land surface are generally not a threat unless there is a pathway for direct injection into the deeper aquifers such as through unused wells that have not been properly abandoned, or along well casings that have no grout seal.

Potential sources are identified if they fall within the WHPAs for awareness and to ensure that the deep aquifers do not become affected by unused wells or poorly constructed wells completed in the aquifers used by the water suppliers. Table 4 lists the facilities identified from MDE databases as potential sources of contamination and their locations are shown in Figure 2a. Underground storage tank (UST) sites are facilities that store petroleum in underground tanks registered with the MDE Waste Management Administration. Ground water contamination (GWC) sites are facilities with known soil and ground water contamination issues from past or on-going practices that are registered with the MDE Waste Management Administration. Controlled hazardous substance generators (CHS) are facilities that may use or store any hazardous substance on-site. Ground water discharge permits (GWDP) are issued by the MDE Water Management Administration for discharge of wastewater to ground water. Pesticide dealers (PD) are facilities that sell or store large quantities of these chemicals on-site.

The contaminants associated with the types of facilities are based on generalized categories and often the potential contaminant depends on the specific chemicals and processes being used or which had been used at the facility. The potential contaminants for an activity may not be limited to those listed in Table 4. Potential contaminants are grouped as Volatile Organic Compounds (VOC), Synthetic Organic Compounds (SOC), Heavy Metals (HM), and Metals (M).

Facilities located within and near the WHPAs are currently being inspected by MDE staff to determine the potential for contamination to the aquifers of any unpermitted ground water discharges (e.g. open floor drains), and unused wells. An example inspection report is shown in Appendix A. Ground water discharges to the shallow unconfined aquifers should not pose a threat to the deeper confined aquifers. These aquifers are naturally protected from land use activities originating from the ground surface unless there is a pathway for direct injection (e.g. unused wells) into the confined aquifer. Three of the community water systems from this report have one unused well each located within their respective WHPA. No other unused wells were reported from underground injection control (UIC) inspections conducted thus far by MDE staff. However, there may be others (e.g. unused residential wells) that are currently not inventoried, due to limitations in database, and inspection staff resources. Reports of additional sites that were inspected are available from MDE.

Four sites have been identified as having historical or potential soil and shallow ground water contamination concerns within the Cambridge wellhead protection areas. The sites are listed in Table 4, and the locations are mapped in Figure 2a. Appendix B provides general site information and fact sheets for three of these facilities.

Several facilities that have petroleum-related issues are located within the Cambridge WHPAs. These open cases are currently under investigation by the MDE Oil Control Program. The current status of these cases is shown in Appendix C.

None of the above sites should present a water quality threat to any of the community supply wells from this report due to the natural confining clay layers that protect the aquifers from contamination that occurs near the ground surface. Contamination from these sites may threaten the water quality of the shallow unconfined aquifers only. The sites listed in the appendices are for awareness purposes only. The reader may contact the specific programs within the MDE Waste Management Administration for additional information regarding potential contamination sites in Dorchester County.

WATER QUALITY DATA

Water Quality data was reviewed from the Water Supply Program's database and system files for Safe Drinking Water Act contaminants. The State's SWAP defines a threshold for reporting water quality data as 50% of the Maximum Contaminant Level (MCL). If a monitoring result is at or greater than 50% of a MCL, this assessment will

describe the sources of such a contaminant and, if possible, locate the specific sources which are the cause of the elevated contaminant level. The data reported is from finished (treated) water unless otherwise noted. Two of the systems currently do not use water treatment. The treatment methods currently used at the water treatment plants for the remaining seven systems included in this report are summarized in Table 5.

A review of the monitoring data since 1993 indicates that the water supplies for the nine systems in this report meet the drinking water standards with a few exceptions (Table 6). Tables 7a-7d provide a list of all detections above 50% of the respective MCLs. Radon-222 was detected in seven of the systems at levels at or above the more conservative MCL proposed by EPA for regulations in drinking water (Table 7e). However, no standard has been established for radon in drinking water. Volatile organic compounds have been detected at very low levels well below their respective MCLs in the water supplies of two systems. However, subsequent sampling events at these systems have shown no detects of these compounds. Synthetic Organic Compounds were detected at very low levels in three of the systems in this report. One of the contaminants was also found in laboratory blank samples, and therefore does not represent actual water quality of this system. The other SOC was found in one sample only for each system, and one of the treatment plants is currently inactive.

Inorganic Compounds (IOCs)

A review of the available data shows that arsenic, fluoride, nitrate, and thallium were the only IOCs detected at or above 50% of their respective MCLs (Tables 7a – 7d). Thallium was detected in only one sample at Heritage Mobile Home Park in 1998, and was not detected again in three subsequent sampling events. Fluoride was detected over the 50% MCL threshold of 4 parts per million (ppm) at Bonnie Brook, East New Market Plant 2, and Heritage Mobile Home Park respectively (Table 7b). Five subsequent fluoride samples at Bonnie Brook averaged 0.84 ppm. Fluoride was detected from five subsequent sampling events at East New Market Plant 2 at an average of 1.83 ppm.

Arsenic was detected above the MCL repeatedly in four of the nine systems, with the exception of one sample result reported at the MCL threshold (Table 7c). The arsenic standard was recently lowered from 0.050 ppm to 0.010 ppm by the USEPA. With the exception of one detect over the MCL in the Federalsburg aquifer, arsenic was primarily detected in wells drawing from the Piney Point Formation. Nitrate was detected above 50% of the MCL of 10 ppm in 32 samples (four which were above the MCL) collected from 1993 to 2002 at Reliance Mobile Home Park Well 1 (Table 7a). This shallow well was drilled into the unconfined Quaternary System aquifer, and is no longer used. The system now draws from a well completed in the confined Frederica aquifer, and has had no nitrate detections since. No other regulated IOCs were detected at levels of concern for the nine community systems.

Radionuclides

There is currently no MCL for Radon-222, however EPA has proposed an MCL of 300 picocuries per Liter (pCi/L) or an alternate of 4000 pCi/L for community water

systems if the State has a program to address the more significant risk from radon in indoor air. Since an MCL has not been finalized, this report considers the lowest proposed MCL of 300 pCi/L, in an effort to be more conservative and protective of public health. Radon-222 has been detected at levels above 50% of this more conservative proposed MCL in seven of the nine community systems from this report (Table 7e). Gross alpha was detected above 50% of its MCL threshold of 15 pCi/L at Secretary and Heritage Mobile Home Park respectively (Table 7e). No other radiological contaminants were detected at levels of concern for the community water systems in this report.

Volatile Organic Compounds (VOCs)

No VOCs were detected at levels above 50% of their respective MCLs for any of the community water systems in this report. Two systems had VOCs detected at very low levels well below their respective MCLs. The Town of secretary's Plant 1 had one detect of carbon tetrachloride (TCE) of 2 parts per billion (ppb) in 1995 below its MCL of 5 ppb. However, a subsequent sampling event showed no detection of this compound, and the treatment plant is no longer active for this system. Total xylenes, and ethylbenzene detects were reported at Beaver Run Mobile Home Park's Plant 3 in 1997 at very low levels well below their respective MCLs of 10,000 ppb, and 700 ppb respectively. Five subsequent sampling events showed no detects of these compounds. No other VOCs were detected from available sampling results of the remaining seven systems

Synthetic Organic Compounds (SOCs)

No SOCs were detected at levels above 50% of their respective MCLs for any of the community water systems in this report. Di (2-Ethylhexyl) Phthalate was detected at levels well below its MCL of 6 ppb from 1997 water-sampling results at Cambridge. However, this contaminant was found in laboratory blank samples accompanying these detections, and therefore does not represent actual water quality of the system.

Dalapon was detected from one set of available sampling data at Secretary's Plant 1 that is no longer active, and at Reliance Mobile Home Park well below its respective MCL of 200 ppb. Dalapon has been reported in many samples at very low levels across the state, and its reported detections may be an artifact of the testing procedure. No other SOCs were detected from available sampling results for the remaining systems.

Microbiological Contaminants

The community systems have monthly routine bacteriological samples that are collected as required by the Safe Drinking Water Act. Since seven of the water systems disinfect their water at the treatment plants, the finished water data is not indicative of the quality of raw water directly from the well. Total coliform bacteria are not pathogenic, but are used as an indicator organism for other disease-causing microorganisms. Two systems had positive total coliform results in one sample, but several repeat samples were found to be free of total coliforms. No other positive total or fecal coliform results were reported for any of the nine community systems

in this report from samples collected monthly since 1997 (Table 8). Wet weather ground water under the influence of surface water (GWUDI) testing was completed for the now unused unconfined aquifer well at Reliance Mobile Home Park. The results were negative for total and fecal coliforms (Table 9).

SUSCEPTIBILITY ANALYSIS

The wells serving the nine Dorchester County community water systems in this report draw water from confined aquifers. Confined aquifers are naturally protected from land use activities at the ground surface due to the confining layers that provide a barrier for water movement from the surface into the aquifers below. A properly constructed well with the casing extended to the confined aquifer and with sufficient grout should be well protected from contamination at the land surface. A contaminant released in a confined WHPA setting must travel through either the annular space of a poorly grouted well, an unused improperly abandoned well, or an underground injection well drilled into the confined aquifer to potentially contaminate the aquifer. Confined aquifers are recharged very slowly from the water stored in the confining unit above, and from precipitation that infiltrates into the formation where it reaches the ground surface. Generally, water stored in confined aquifers has traveled great distances from its origin at the ground surface.

Some contaminants like radon-222 and the elements arsenic and fluoride are naturally occurring in the aquifers, and may reach concentrations that pose a risk to the water supply. This is generally more problematic in confined aquifer settings than contaminants at the land surface.

The susceptibility analysis of the individual water supplies to each group of contaminants has been completed based on the following criteria: 1) the presence of potential contaminant sources within the WHPA, 2) water quality data, 3) well integrity and 4) the aquifer conditions. Table 10 summarizes the susceptibility of each of the nine systems covered in this report to each of the contaminant groups.

Inorganic Compounds

EPA lowered the MCL for arsenic from 0.050 ppm to 0.010 ppm on February 22, 2002. The regulations will be effective for new sources on or after January 23, 2004. Existing water systems must meet the new standard by January 23, 2006. Arsenic is a naturally occurring element that is present in the aquifer material of four systems at levels greater than this new MCL standard (Table 7c). The higher arsenic concentrations were primarily encountered in the Piney Point Formation.

Based on the natural occurrence of arsenic and its presence at or above this newly established MCL, four systems **are** susceptible to arsenic. The arsenic levels of the remaining five systems were below the newly established 50% MCL threshold, and therefore are **not** susceptible to this contaminant (Table 10).

Fluoride is a naturally occurring element that is present in aquifer material at the community systems in this report with the exception of Reliance Mobile Home Park. As water moves through the aquifer sands, elements such as fluoride are leached into the water. Table 7b shows the systems that had fluoride detections above levels of concern. The average fluoride levels at Bonnie Brook from five subsequent tests since 1995 is 0.84 ppm, below levels of concern. Therefore, Bonnie Brook was determined to be **not** susceptible to fluoride. Conversely, the average fluoride levels at East New Market Plant 2 from five subsequent tests since 1995 is 1.83 ppm. Therefore, this system **is** susceptible to fluoride. Based on available sampling data, the remaining seven systems in this report were determined **not** susceptible to this contaminant.

Thallium is also a naturally occurring element present in aquifer material. It can also be leached from ore-processing sites, or discharged from electronics, glass, and pharmaceutical companies. It was detected in only one sample at Heritage Mobile Home Park in 1999 at 50 percent of its MCL of 0.002 ppm, and was not detected again from three subsequent samples (Table 7d). Therefore, the system was determined **not** to be susceptible to this contaminant.

Iron is a naturally occurring element that was detected in aquifer material above the secondary standard from one sample each at Cambridge Plant 2, and at Bay Country Mobile Home Park respectively. It was detected above 50% of the secondary standard in one sample at Bonnie Brook. The secondary standard for iron is 0.3 ppm. Repeat sampling results at these three systems showed no iron detects. Excessive iron levels can cause taste, color, and odor problems in drinking water as well as iron bacteria build-up around well screens. The iron detects were primarily from wells drilled into the Piney Point Formation.

Nitrate was detected above the 50% MCL threshold of 10 ppm for 28 sampling events, and above the MCL at 4 other sampling events at Reliance Mobile Home Park (Table 7a). Nitrates can leach into shallow ground water aquifers from the application of fertilizers, sludge, animal waste, or from on-site septic system effluent. This contaminant is generally not detected in the water supplies of confined aquifers that are naturally protected from land use activities originating at the ground surface. The nitrate detects shown in Table 7a were from the Reliance M.H.P. Well 1 that draws water from the unconfined Quaternary System aquifer. The system now uses a deeper well drilled into the confined Frederica aquifer, and has since had no nitrate detects.

Based on available water quality data, the only inorganic compounds that the systems in this report were determined susceptible to are arsenic, and fluoride.

Radionuclides

An MCL for radon-222 has not been adopted yet for Maryland. However, the U.S. EPA is proposing an MCL of 300 pCi/L or an alternative of 4000 pCi/L for drinking water if the State has a program to reduce the more significant risk from radon in

indoor air, which is the primary health concern. Radon is present in seven of the nine systems from this report at levels above 50% of the more conservative proposed MCL of 300 pCi/L (Table 7e).

Radon is present in ground water due to the natural radioactive decay of uranium bearing minerals in the sediment that makes up the aquifer material. The EPA has information on proposed regulations for radon in indoor air and drinking water on their web site (http://www.epa.gov/safewater/radon.html). The systems in Table 7e may be susceptible to radon-222 if the more conservative MCL of 300 pCi/L is adopted.

Gross-alpha was detected at levels of concern from samples collected at Secretary, and Heritage Mobile Home Park respectively (Table 7e). Gross-alpha is a measure of alpha radiation, which is emitted from certain radioactive elements such as radium. Due to the positive gross-alpha results coupled with the detections of uranium-226, 228, 234, 235, 238, and radium-226, and 228 at Heritage Mobile Home Park, the two systems are considered susceptible to gross alpha.

No other radiological contaminants were detected at levels of concern for any of the community systems in this report based on available sampling data.

Volatile Organic Compounds

Volatile Organic Compounds (VOCs) have not been detected at 50% of their respective MCLs in any of the community water systems in this report. Facilities that have potential point sources of VOCs (e.g. USTs) are located within the Cambridge WHPAs (Figure 2a, & Table 4). However, none of these sites should present a water quality threat to the supply wells unless there is a potential for direct injection into the aquifer from unused, or improperly abandoned wells. This is due to the natural confining clay layers that protect the aquifers from contamination that occurs near the ground surface. Contamination from these sites should threaten the water quality of the shallow, unconfined aquifers only.

Based on the water quality data, well integrity, and confined aquifer characteristics, the nine systems from this report were determined **not** susceptible to VOCs.

Synthetic Organic Compounds

The sources of SOCs to ground water include point and non-point sources. Non-point sources include pesticides, and herbicides applied to agricultural fields, and residential lawns.

The only contaminants in this group detected at very low levels were di (2-ethylhexyl) phthalate, and dalapon (see Water Quality section). The phthalate detects were attributed to its presence in laboratory blank samples, and therefore do not represent actual water quality. Dalapon was detected once from one set of available sampling results at Secretary's Plant 1 (now unused), and Reliance Mobile Home Park respectively, at levels well below its MCL of 200 ppb. Dalapon is a

herbicide used on orchards, beans, lawns, and road/railway lines. As stated previously in the Water Quality Section, dalapon has been reported in many samples at very low levels across the state, and its reported detections may be an artifact of the testing procedure.

A confined aquifer waiver has been issued for synthetic organic compounds. The waiver permits confined systems to reduce the sampling frequency of SOCs to once every 12 years. Based on the available water quality data, and confined aquifer characteristics, the nine systems in this report were determined **not** susceptible to SOC contamination.

Microbiological Contaminants

Water stored in confined aquifers has traveled great distances through the naturally filtering sands, and is considered "very old". Microbial organisms in ground water generally have a maximum survival time of one year, and therefore they would have long since perished in a confined aquifer setting. Additionally, confined aquifer wells are generally well protected from microbiological contaminants originating from the ground surface due to the overlying protective confining layers.

Raw water monitoring for microbiological contaminants is not required for systems drawing water from confined aquifers because they are considered naturally protected from sources of pathogens at the land surface.

Two of the systems in this report had routine positive total coliform results in one sample (Table 8). However, several repeat samples showed no positive coliform detects. Positive coliform results in confined aquifer wells are likely to be the result of well construction or integrity issues, and are unlikely to be representative of the source water quality of the aquifer. In these instances, the wellheads should be inspected, and any deficiencies should be corrected.

Based on available sampling data, and confined aquifer characteristics, the source water at each of the nine community systems in this report is **not** susceptible to microbiological contaminants.

MANAGEMENT OF THE SOURCE WATER ASSESSMENT AREA

With the information contained in this report, the individual community water system owners as well as the Dorchester County government are in a position to protect their water supplies by staying aware of the areas delineated for source water protection and evaluating future development and land use planning. Specific management recommendations for consideration are listed below. The following recommendations are intended for individual water systems.

Form a Local Planning Team

- The team should represent all the interests in the community, such as the water suppliers, community association officers, the County Health Department, local

planning agencies, local businesses, developers, property owners, and residents within and near the WHPAs. The team should work to reach a consensus on how to protect the water supplies.

Public Awareness and Outreach

- The Consumer Confidence Report should list that this report is available to the general public through their county library, or by contacting the water system operator or MDE.
- Conduct educational outreach to businesses and residents within the WHPAs focusing on potential contaminant sources. Important topics include: (a) compliance with MDE and federal guidelines for gasoline and heating oil USTs, (b) proper hazardous material disposal and storage, and (c) well abandonment regulations and procedures.

Monitoring

- Systems should continue to monitor for all Safe Drinking Water Act contaminants as required by MDE.
- Annual raw water bacteriological testing is a good check on well integrity.

Contingency Plan

- All water system owners should have a Contingency Plan for their water system. COMAR 26.04.01.22 requires all community water systems to prepare and submit for approval a plan for providing a safe and adequate drinking water supply under emergency conditions.

Contaminant Source Inventory Updates/ Inspections

- Water system owners should conduct its own survey of their wellhead protection areas to ensure that there are no additional potential sources of contamination. Updated records of new development within the WHPAs should be maintained.
- Water system operators should have a program for periodic inspections and maintenance of the supply wells and backup wells to ensure their integrity and to protect the aquifers from contamination.
- Unused wells with no potential for use in the future should be properly abandoned and sealed according to current State well construction standards.
- The community systems should work with the Dorchester County Health Department to ensure that there are no other unused wells within the respective WHPAs. An improperly abandoned well may provide a direct route for ground water contamination to an aquifer.

Changes in Use

- Water system owners are required to notify the MDE Water Supply Program if new wells are to be added or if they wish to increase their water useage. The addition of new wells or an increase in pumpage of the existing wells may require revisions to the WHPA.

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OTHER SOURCES OF DATA

Water Appropriation and Use Permits
Public Water Supply Sanitary Survey Inspection Reports
MDE Water Supply Program Oracle® Database
MDE Waste Management Sites Database
MD State Highway Administration Digital Road Maps
ADC® Digital Maps for Dorchester County
USGS Topographic 7.5-Minute Quadrangles

Tables

PWSID 1	PWS NAME	PLANT ID 2	SRC. ID 3	USE CODE 4	SOURCE NAME	WAPID 5	AVE. AMT. (gpd)	WELL PERMIT NO.	WELL DEPTH (ft.)	CASING DEPTH (ft.)	YEAR DRILLED	AQUIFER
0090001	BONNIE BROOK	01	01	P	WELL 1	DO1963G005	26000	DO056055	460	365	1964	PINEY POINT FORMATION
		01	02	P	WELL 2	DO1963G005	26000	DO056056	454	371	1964	PINEY POINT FORMATION
0090002	CAMBRIDGE	01	01	P	STONE BOUNDARY 1	DO1971G005	1400000	DO660026	517	360	1965	PINEY POINT FORMATION
		02	04	P	NATHANS 1	DO1971G005	1400000	DO001427	432	92	1947	PINEY POINT FORMATION
		02	05	P	NATHANS 2	DO1971G005	1400000	DO001645	430	82	1947	PINEY POINT FORMATION
		03	08	P	WASHINGTON 2	DO1971G005	1400000	n/a	405	n/a	1931	PINEY POINT FORMATION
		04	10	P	GLASGOW 1	DO1971G005	1400000	DO881226	505	340	1993	PINEY POINT FORMATION
		03	96	P	WASHINGTON 3	DO1971G005	1400000	DO731028	514	371	1979	PINEY POINT FORMATION
		02	97	P	NATHANS 3	DO1971G205	1750000	DO720014	1500	n/a	1971	PATAPSCO FORMATION
		01	98	P	STONE BOUNDARY 3	DO1971G205	1750000	DO730182	1348	1162	1974	PATAPSCO FORMATION
		01	99	P	STONE BOUNDARY 2	DO1971G105	350000	DO720006	1000	n/a	1971	MAGOTHY FORMATION
0090004	EAST NEW MARKET	01	01	P	WELL 1	DO1974G003	25000	n/a	225	n/a	1916	FEDERALSBURG AQUIFER
		02	02	P	WELL 2	DO1974G203	45000	DO730695	521	463	1977	PINEY POINT FORMATION
0090007	SECRETARY	02	02	P	WELL 3	DO1976G012	160000	DO881759	552	460	1995	PINEY POINT FORMATION
		02	03	P	WELL 2	DO1976G012	160000	n/a	600	450	1977	PINEY POINT FORMATION
0090219	BAY COUNTRY M.H.P.	01	01	P	WELL 1	DO1969G004	21000	DO690040	447	152	1969	PINEY POINT FORMATION
		01	02	P	WELL 2	DO1969G004	21000	DO730040	455	275	1973	PINEY POINT FORMATION
		01	03	P	WELL 3	DO1969G004	21000	DO810793	470	300	1987	PINEY POINT FORMATION

Table 1. Well Information for the Dorchester County Confined Community Supply Wells

PWSID [1]	PWS NAME	PLANT ID [2]	SRC. ID [3]	USE CODE [4]	SOURCE NAME	WAPID [5]	AVE. AMT. (gpd)	WELL PERMIT NO.	WELL DEPTH (ft.)	CASING DEPTH (ft.)	YEAR DRILLED	AQUIFER
0090220	DORCHESTER COUNTRY ESTATES MHP	01	01	P	WELL 1	DO1969G003	7900	DO690025	447	247	1969	PINEY POINT FORMATION
		01	02	P	WELL 2	DO1969G003	7900	DO811183	460	400	1988	PINEY POINT FORMATION
0090221	RELIANCE M.H.P.	01	02	P	WELL 2	DO1968G002	15500	DO920737	295	275	2000	FREDERICA AQUIFER
0090222	BEAVER RUN M.H.P.	01	01	P	WELL 1	DO1976G007	21000	DO730665	498	478	1977	PINEY POINT FORMATION
		01	02	P	WELL 2	DO1976G007	21000	DO810094	500	460	1982	PINEY POINT FORMATION
		02	03	P	WELL 3	DO1976G007	21000	DO810587	500	300	1986	PINEY POINT FORMATION
		02	04	P	WELL 4	DO1976G007	21000	DO810588	500	300	1986	PINEY POINT FORMATION
		03	05	P	WELL 5	DO1976G007	21000	DO882002	507	257	1996	PINEY POINT FORMATION
0090224	HERITAGE M.H.P.	01	01	P	WELL 1	DO1986G001	11000	DO810698	520	495	1986	PINEY POINT FORMATION

Table 1 (continued). Well Information for the Dorchester County Confined Community Supply Wells

[1] PWSID = Public Water System Identification

[2] PLANT ID = Plant Identification. The water point of entry to a system from each well

[3] SRC. ID = Source Identification. Each well is considered a unique water source

[4] P = Production Well

[5] WAPID = Water Appropriation Permit Identification

n/a = not available

Table 2. Geologic formations and their water-bearing properties in Dorchester and Talbot Counties.[1, 2]

System	Series or Group	Formation (range in depth to top of formation, in feet)		Approximate thickness (feet)	Lithologic character	Water-bearing properties
Quaternary	Holocene	0		0–10	Loam soil, alluvial sand and silt, dune sand and peat.	Provides water to a few shallow wells of small yield.
	Pleistocene [3]	Salisbury Formation	Beaverdam facies	0–100+	Unconsolidated, stratified, lenticular deposits of buff sand and silt, gravel and clay. The deposits contain a few erratic boulders; stabilized dunes; thinly stratified crossbedded channel fill; massive, well-sorted beach sands; and possibly marine sands.	An important aquifer which locally contains the most permeable sands in the area. Highly variable yields ranging up to 1,500 gpm. Transmissibility varies from 95,000 to 175,000 gpd per foot where tested.
			Red gravelly facies	0–45+	Slightly cemented, red, orange, and brown gravelly sand. Locally contains hard ledges, a few inches to 2 feet thick, usually at the base. Occurs chiefly as channel fill.	
Tertiary	Upper and middle Miocene (Chesapeake Group)	Manokin aquifer		0–50	Gray sands with gray or blue clayey silt. Occurs only in the southern end of the area beneath Elliott Island and Bishops Head.	Not known to yield water in this area. The sands lie under a marsh cover, and the water may be of undesirable quality.
		St. Marys Formation		0–110+	Predominantly clayey silt and silty clay with some very fine sand and shells.	An aquiclude. A few wells derive water locally from stringer sands in eastern Dorchester county.
		Choptank Formation		0–130	Gray and brown sand and clay, containing shells.	Yields small to moderate quantities of water to wells in eastern Dorchester County. The water is moderately hard and may be irony.
		Calvert Formation		20–300	Gray diatomaceous silts and clays, containing lenses and thin sheets of gray sand and shell beds.	Largely an aquiclude, but contains two or three aquifers which locally yield large quantities of water at Easton, Federalsburg, Hurlock, and Vienna. The quality ranges from usable for some purposes to usable only for limited purposes.
	Eocene	Piney Point Formation (70–620)		2–191	Olive-green to black quartz sand, slightly to moderately glauconitic, predominantly medium to coarse grained, with some lenses of fine sand, silt, and clay, containing foraminifera.	The most important artesian aquifer in the area, yielding over 3 mgd of ground water in Dorchester County and lower Talbot County. Has yielded 1,200 gpm to an individual well at Cambridge. Transmissibility is 15,000 to 45,000 gpd per foot. The quality of water is suitable for most purposes. The water level has been lowered over 90 feet below sea level at Cambridge in a widespread cone of depression which has extended out into Dorchester County and into Talbot County.
		Nanjemoy Formation (75–510)		0–294	Blackish-green, highly glauconitic sand, silt and clay.	A leaky aquiclude in the northwest: probably a tighter confining formation in the southeast.
	Paleocene	Aquia Formation (250–600)		0–231+	Green glauconitic quartz sand, with a few lenses of clay, containing shell fragments, foraminifera, and hardbeds. Limited to western Talbot County and northwestern Dorchester County with an impermeable boundary passing northeastward through Trappe.	An important aquifer, capable of providing moderate quantities of water to many wells. Transmissibility is from 2,000 to 5,000 gpd per foot at sites tested. Yields of wells vary from about 5 to 250 gpm.

From MGS Report of Investigations No. 17 (Mack, Webb, & Gardner, 1971)

Table 2. Geologic formations and their water-bearing properties in Dorchester and Talbot Counties.[1,2]

System	Series or Group	Formation (range in depth to top of formation, in feet)	Approximate thickness (feet)	Lithologic character	Water-bearing properties
Cretaceous	Upper Cretaceous	Monmouth Formation (450–1,100)	34–230	Dark-green glauconitic sand and lead-gray clay containing shells and foraminifera.	An aquiclude. A small quantity of water is obtained from a few wells at Easton.
		Matawan Formation (650–1,200)	98–176	Black micaceous glauconitic clay and brown glauconitic sand.	An aquifer in Talbot County but an aquiclude in Dorchester County.
		Magothy Formation (650–1,400)	43–139	White, yellow, and gray sand interlaminated with gray and brown shale, containing lignite and carbonaceous matter, but no animal fossils.	An aquifer at Cambridge and Easton. Transmissibility ranges from 6,500 to 15,000 gpd per foot. Yields up to 600 gpm to individual wells.
	Potomac Group	Raritan and Patapsco Formations, undifferentiated (900–1,600)	600–1,700	Intercalated thin sands and shales. The sands are generally gray, fine-grained, micaceous, and lignitic. The shales are mottled pale gray, brown, and red in the upper section and gray-brown in the lower.	An aquifer with transmissibility greater than 16,000 gpd/ft. at Cambridge. Sand beds from 1,100 to 1,500 feet deep in four other test holes are probably aquifers.
		Patuxent Formation (1,600–3,300)	600–800	Not explored in this area, but presumed to be extensively present because of its occurrence in deep oil tests in Wicomico and Worcester Counties, and in the outcrop in Cecil County and on the Western Shore.	A potential aquifer. Water quality is unknown but water temperatures may exceed 100° F and water may be mineralized.
Paleozoic and Precambrian		Crystalline complex (2,200–4,200)	unknown	Not penetrated in Dorchester and Talbot Counties, but presumed to be igneous and metamorphic rocks.	Hard crystalline rocks that contain and transmit very little ground water.

[1] Modified from table 10 (Rasmussen and others, 1957).

[2] Geologic nomenclature used in this report is that of the Maryland Geological Survey and differs somewhat from that of the U.S. Geological Survey.

[3] This term includes those deposits termed Pleistocene and Pliocene (?) by Rasmussen and others, (1957). There may be some deposits of Pliocene age included in this category in some areas.

From MGS Report of Investigations No. 17 (Mack, Webb, & Gardner, 1971)

PWSID	SYSTEM NAME	WELLS INCLUDED IN WHPA	AQUIFER	PUMPAGE (Q) (in gpd)	[1]SCREENED INTERVAL (H) (in feet)	[2]DELINEATED WHPA RADIUS (feet)	ACREAGE OF WHPA	COMMENTS
0090001	Bonnie Brook	Wells 1,2	Piney Point Formation	15600, 10400	21, 51	700, 400	44	Two circles merged
0090002	Cambridge	Glasgow 1	Piney Point Formation	28000	150	400	11	
		Stone Boundary 2	Magothy Formation	350000	10	4700	1585	Screen length estimated
		Nathans 3, Stone Boundary 3	Patapsco Formation	770000, 980000	10, 68	7000, 3000	2834	Two circles merged. Truncated at Choptank River
		Stone Boundary 1	Piney Point Formation	322000	105	1400	141	
		Nathans 1, 2, Washington 2, 3	Piney Point Formation	322000, 602000, 56000, 70000	51, 51, 10, 141	2000, 2800, 1900, 600	652	Four circles merged. Truncated at Choptank River
0090004	East New Market	Well 2	Piney Point Formation	45000	58	700	35	
		Well 1	Federalsburg Aquifer	25000	10	1300	121	Screen length estimated
0090007	Secretary	Wells 2,3	Piney Point Formation	81600, 78400	130, 90	700, 800	46	Two circles merged
0090219	Bay Country M.H.P.	Wells 1,2,3	Piney Point Formation	7000, 7000, 7000	20, 20, 30	500, 500, 400	35	Three circles merged
0090220	Dorchester Country Estates M.H.P	Wells 1,2	Piney Point Formation	3950, 3950	13, 20	500, 400	18	Two circles merged
0090221	Reliance M.H.P.	Well 2	Frederica Aquifer	15500	20	700	35	
0090222	Beaver Run M.H.P.	Wells 1,2,3,4,5	Piney Point Formation	3570, 3570, 4620, 4620, 4620	20, 40, 30, 30, 54	400, 300, 400, 400, 300	28	Five circles merged
0090224	Heritage M.H.P.	Well 1	Piney Point Formation	11000	25	600	26	

Table 3. Parameters Used for WHPA Delineations

[1] For conservative purposes, a total well screen length of 10 feet was assumed when screen data was not available

[2] A porosity of 25% was assumed for each of the aquifers based on lithology and as a conservative estimate (Fetter, 1988)

ID[1]	Type	Facility Name	Address	[1]Reference Location	WHPA System Name	Comments	[2]Potential Contaminants
1	UST	Riverview Apartments	602 Water St.	Figure 2a	Cambridge	One 2000 gal. heating oil tank	VOC
2	UST	J. M. Clayton Company	108 Commerce St.	Figure 2a	Cambridge	One 8000 gal. heating oil tank	VOC
3	UST	Harrington & Merryweather	202 High St.	Figure 2a	Cambridge	heating oil tank	VOC
4	UST	National Bank of Cambridge	304 High St.	Figure 2a	Cambridge	Two 1000 gal. heating oil tanks	VOC
5	UST	Rescue Fire Company	305-307 Gay St.	Figure 2a	Cambridge	One 1000 gal. heating oil tank	VOC
6	UST	Zip Mart	405 High Street	Figure 2a	Cambridge	One 12000 & one 6000 gal. gasoline tanks	VOC
7	UST	Cambridge Wire Center	415 High St.	Figure 2a	Cambridge	One 2500 gal. diesel tank	VOC
8	UST	Grace United Methodist Church	501 Race St.	Figure 2a	Cambridge	One 2000 gal. heating oil tank	VOC
9	CHS	Camtec	300 Muir St.	Figure 2a	Cambridge		VOC, SOC, HM
10	UST	Children's Center of Cambridge	508 Elm St.	Figure 2a	Cambridge	One 250 gal. heating oil tank	VOC
11	UST	Personalized Business Services	610 Race St.	Figure 2a	Cambridge	One 550 gal. heating oil tank	VOC
12	UST	Bethel AME Church	623 Pine St.	Figure 2a	Cambridge	One 550 gal. heating oil tank	VOC
13	UST	Haddaway Shell Station	755 Race St.	Figure 2a	Cambridge	One 3000 gal kerosene tank, two 8000 gallon gasoline tanks, and one 5000 gal. diesel tank	VOC
14	GWC	Cambridge Site	311 Trenton St.	Figure 2a	Cambridge	Chlorinated solvents detected in soil and shallow ground water. On-going investigation of nearby dry cleaner as a possible source	VOC
15	CHS	Yacht Maintenance Co.	101 Hayward St.	Figure 2a	Cambridge		VOC, SOC, HM

Table 4. Potential Contaminant Point Sources within WHPAs

ID[1]	Type	Facility Name	Address	[1]Reference Location	WHPA System Name	Comments	[2]Potential Contaminants
16	GWC	Cambridge Town Gas	403 Cherry St.	Figure 2a	Cambridge	Gas plant operations resulted in hydrocarbons, coal tar by-products, and heavy metals entering sub-surface soils and nearby Cambridge Creek. In 1997, 500 tons of hazardous waste,contaminated soils, a tar well, and old equipment were removed from site. Ongoing remedial investigation / feasibility studies to address contamination on adjacent property and Cambridge Creek (see Appendix B).	VOC, HM
17	UST	Souls Harbor Church of God	718 Peachblossom Ave.	Figure 2a	Cambridge	Two 2000 gal. heating oil tanks	VOC
18	CHS	Kerr Mcgee Chemical Corp.	311 Trenton St.	Figure 2a	Cambridge		VOC, SOC, HM
19	CHS	Johnson & Towers Baltimore Inc.	402 E. Cedar St.	Figure 2a	Cambridge		VOC, SOC, HM
20	UST	Stanley A. Feinblum	200A Cedar St.	Figure 2a	Cambridge	One 1000 gal. heating oil tank	VOC
21	CHS	Jess Jrs. & Sons Body Shop	700 Perimore St.	Figure 2a	Cambridge		VOC, SOC, HM
22	UST	Bruce H. MacSorley, Inc.	505 Maryland Ave.	Figure 2a	Cambridge	One 250 gal. heating oil tank	VOC
23	UST	Sailwinds Amoco	511 Maryland Ave.	Figure 2a	Cambridge	One 10000 gal., & one 12000 gal. gasoline tank, one 7000 diesel tank, and one3000 gal. kerosene tank	VOC
24	UST	Sunburst Citgo	220 Sunburst Hwy.	Figure 2a	Cambridge	Two 12000 gal. gasoline tanks, & one 12000 gal diesel tank	VOC
25	UST	Ocean Highway Exxon	324 Sunburst Hwy.	Figure 2a	Cambridge	Two 6000 gal. & one 10000 gal. gasoline tanks	VOC
26	UST	Super Soda Center	106 Cedar St.	Figure 2a	Cambridge	One 6000 gal. & one 15000 gasoline tank, one 4000 gal. kerosene tank, & one 6000 gal. diesel tank	VOC
27	UST	Clare Hughes Real Estate	405 Dorchester Ave.	Figure 2a	Cambridge	One 500 gal. heating oil tank	VOC

Table 4 (continued). Potential Contaminant Point Sources within WHPAs

ID[1]	Type	Facility Name	Address	[1]Reference Location	WHPA System Name	Comments	[2]Potential Contaminants
28	CHS	Exxon #20638	Sunburst Hwy. & Meteor Ave.	Figure 2a	Cambridge		VOC, SOC, HM
29	UST	Wawa #563	601 Sunburst Hwy.	Figure 2a	Cambridge	Three 20000 gal. gasoline tanks	VOC
30	UST	Kool Ice	110 Washington St.	Figure 2a	Cambridge	One 550 gal. heating oil tank	VOC
31	CHS	Robinson Chemical Company	16 Washington St.	Figure 2a	Cambridge		VOC, SOC, HM
32	CHS	Borden Chemical	1 Washington St.	Figure 2a	Cambridge		VOC, SOC, HM
33	CHS	National Can Corporation	100 Goodwill Rd.	Figure 2a	Cambridge		VOC, SOC, HM
34	CHS	Cambridge Wire Cloth Center	Goodwill Rd.	Figure 2a	Cambridge		VOC, SOC, HM
35	CHS	Cambridge Scientific Plant 2	1003 Goodwill Ave.	Figure 2a	Cambridge		VOC, SOC, HM
36	CHS	Dennis Roes Auto Body	522 Race St.	Figure 2a	Cambridge		VOC, SOC, HM
37	CHS	Bill Strawn Chevrolet-Olds	706 Race St.	Figure 2a	Cambridge		VOC, SOC, HM
38	CHS	Dennis Roes Auto Body	730 Race St.	Figure 2a	Cambridge		VOC, SOC, HM
39	UST	Snows Turn Market Inc.	1801 Race St.	Figure 2a	Cambridge	Two 6000 gal. & one 8000 gal. gasoline tanks, one 2000 gal. kerosene tank, & one 4000 gal. diesel tank	VOC
40	UST	Cambridge-South Dorchester High School	2475 Cambridge Beltway	Figure 2a	Cambridge	One 20000 gal. & one 1000 gal. heating oil tank	VOC
41	UST	Dorchester Co. School of Techn.	2465 Cambridge Beltway	Figure 2a	Cambridge	One 20000 gal. heating oil tank	VOC
42	CHS	Cambridge Auto Recycling	Cambridge Beltway	Figure 2a	Cambridge		VOC, SOC, HM
43	UST	Corner Market Sunoco	2600 Cambridge Beltway	Figure 2a	Cambridge	Two 10000 gal. gasoline tanks, one 8000 gal. diesel tank, & one 4000 gal. kerosene tank	VOC
44	CHS	Cambridge S.T.P.	1010 Roselyn Ave.	Figure 2a	Cambridge		VOC, SOC, HM
45	CHS	Alphagaz-SGD-Liquid Air Corp.	149 Woods Rd.	Figure 2a	Cambridge		VOC, SOC, HM
46	CHS	Skipjack Cleaners	730 Cambridge Plaza	Figure 2a	Cambridge		VOC, SOC, HM
47	UST	Woods Road Shell	US Rt. 50 At Woods Rd.	Figure 2a	Cambridge	Three 8000 gal gasoline tanks, & one 8000 gal. diesel tank	VOC
48	UST	Philips Technologies	807 Woods Rd.	Figure 2a	Cambridge	One 20000 gal. heating oil tank	VOC

Table 4 (continued). Potential Contaminant Point Sources within WHPAs

ID[1]	Type	Facility Name	Address	[1]Reference Location	WHPA System Name	Comments	[2]Potential Contaminants
49	CHS, GWC	Western Publishing Co.	Woods Rd.	Figure 2a	Cambridge	One 10000 gal. fuel oil tank was removed. Large oil spill observed by DHMH. Oil contaminated soils & gravel were removed from site. Environmental assessment of site conducted in 1989 (see Appendix B)	VOC, SOC, HM
50	CHS	Mail-Well Graphics	2719 Chesapeake Dr.	Figure 2a	Cambridge		VOC, SOC, HM
51	CHS	Airpax Corp.	Woods Rd.	Figure 2a	Cambridge		VOC, SOC, HM
52	CHS	Chun King Corporation	902 Woods Rd. Ind. Park	Figure 2a	Cambridge		VOC, SOC, HM
53	UST	Coldwater Seafood Corporation	904 Woods Rd.	Figure 2a	Cambridge	One 12000 gal. diesel tank	VOC
54	CHS	Amoco #5158	2721 Ocean Gateway	Figure 2a	Cambridge		VOC, SOC, HM
55	CHS	Alphagaz	Chesapeake Dr.	Figure 2a	Cambridge		VOC, SOC, HM
56	CHS, GWC	Former Eastern Shore Hospital Center (now Hyatt Regency Resort Hotel)	US Rt. 50	Figure 2a	Cambridge	Heavy metals & VOC contamination in soil, shallow ground water, & Shoal Creek. Developers purchased property in 1999 & environmental corrective actions taken as per requirements of Voluntary Cleanup Program. Shallow ground water beneath property cannot be used for any purpose (see Appendix B)	VOC, HM, SOC
57	UST	Cambridge Exxon, Inc.	2801 Ocean Gateway	Figure 2a	Cambridge	Three 10000 gal. gasoline tanks, & one 10000 gal. diesel tank	VOC
58	GWDP	Dave Wilson Buick, Pontiac, GMC	2829 Gypsy Hill Rd.	Figure 2a	Cambridge	Permit for ground water industrial discharge of vehicle wash water to septic system	M
59	PD	Milford Fertilizer Co.	Cambridge	Figure 2a	Cambridge		SOC

Table 4 (continued). Potential Contaminant Point Sources within WHPAs

ID[1]	Type	Facility Name	Address	[1]Reference Location	WHPA System Name	Comments	[2]Potential Contaminants
60	UST	KNS Gas	2721 Ocean Gateway	Figure 2a	Cambridge	Three 10000 gal. gasoline tanks, & one 10000 gal. diesel tank	VOC
61	UST	Sunburst Mobil	2903 Ocean Gateway	Figure 2a	Cambridge	One 10000 gal. & one 8000 gal. gasoline tank, & one 8000 gal. diesel tank	VOC

Table 4 (continued). Potential Contaminant Point Sources within WHPAs

[1] See referenced figure for location

[2] UST = underground storage tanks

CHS = controlled hazardous substance generators, GWDP = ground water discharge permitted sites

GWC = ground water contamination sites, PD = Pesticide Dealers

VOC = volatile organic compounds, SOC = synthetic organic compounds

M = Metals, HM = Heavy Metals

PWSID	SYSTEM NAME	PLANT ID	TREATMENT METHOD	PURPOSE
0090001	BONNIE BROOK	01	HYPOCHLORINATION, POST	Disinfection
0090002	CAMBRIDGE	01	GASEOUS CHLORINATION, POST	Disinfection
		02	GASEOUS CHLORINATION, POST	Disinfection
		03	GASEOUS CHLORINATION, POST	Disinfection
		04	GASEOUS CHLORINATION, POST	Disinfection
0090004	EAST NEW MARKET	01	GASEOUS CHLORINATION, POST	Disinfection
		02	GASEOUS CHLORINATION, POST	Disinfection
0090007	SECRETARY	02	GASEOUS CHLORINATION, POST	Disinfection
0090219	BAY COUNTRY M.H.P.	01	HYPOCHLORINATION, POST	Disinfection
0090220	DORCHESTER COUNTRY ESTATES M.H.P.	01	NO TREATMENT	
0090221	RELIANCE M.H.P.	01	NO TREATMENT	
0090222	BEAVER RUN M.H.P.	01	HYPOCHLORINATION, POST	Disinfection
		02	HYPOCHLORINATION, POST	Disinfection
		03	HYPOCHLORINATION, POST	Disinfection
0090224	HERITAGE M.H.P.	01	GASEOUS CHLORINATION, POST	Disinfection

Table 5. Treatment Methods

PWSID	SYSTEM NAME	PLANT ID	IOCs (except arsenic)		ARSENIC		RADIONUCLIDES		VOCs		SOCs	
			No. of Samples	No. of samples > 50% MCL	No. of Samples	No. of samples > 50% MCL	No. of Samples	No. of samples > 50% MCL	No. of Samples	No. of samples > 50% MCL	No. of Samples	No. of samples > 50% MCL
0090001	BONNIE BROOK	01	16	1	6	0	4	1*	6	0	1	0
0090002	CAMBRIDGE	01	26	0	5	0	4	1*	6	0	2	0
		02	20	0	4	0	4	0	4	0	4	0
		03	21	0	4	0	4	0	5	0	2	0
		04	13	0	4	0	4	0	4	0	2	0
0090004	EAST NEW MARKET	01	15	0	4	1	6	2*	6	0	1	0
		02	9	1	3	3	6	2*	5	0	1	0
0090007	SECRETARY	01	4	0	1	0	3	1*	6	0	1	0
		02	15	0	6	4	5	2*	8	0	4	0
0090219	BAY COUNTRY M.H.P.	01	15	0	5	0	3	1*	7	0	2	0
0090220	DORCHESTER COUNTRY ESTATES M.H.P.	01	14	0	6	0	3	0	7	0	1	0
0090221	RELIANCE M.H.P.	01	36	32	4	0	3	0	9	0	5	0
0090222	BEAVER RUN M.H.P.	01	15	0	4	4	4	1*	6	0	1	0
		02	13	0	2	2	4	1*	6	0	1	0
		03	9	0	2	1	4	1*	7	0	1	0
0090224	HERITAGE M.H.P.	01	14	4	8	8	4	3*	6	0	1	0

Table 6. Summary of Water Quality Results

* Lower proposed MCL for radon-222

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
0090221	RELIANCE M.H.P.	01	NITRATE	10	13-Jul-93	7.1
		01	NITRATE	10	17-Aug-93	7
		01	NITRATE	10	18-Nov-93	7.4
		01	NITRATE	10	2-Jun-94	6.9
		01	NITRATE	10	26-Jul-94	7.4
		01	NITRATE	10	25-Oct-94	6.9
		01	NITRATE	10	14-Feb-95	7.5
		01	NITRATE	10	11-May-95	7.5
		01	NITRATE	10	8-Aug-95	7.4
		01	NITRATE	10	28-Nov-95	5.2
		01	NITRATE	10	14-Mar-96	7.2
		01	NITRATE	10	29-Apr-96	7.3
		01	NITRATE	10	20-Jun-96	7.2
		01	NITRATE	10	25-Jul-96	7.3
		01	NITRATE	10	9-Dec-96	9.3
		01	NITRATE	10	18-Feb-97	8.7
		01	**NITRATE**	**10**	**20-May-97**	**10.1**
		01	NITRATE	10	1-Jun-97	7.3
		01	NITRATE	10	21-Oct-97	7.3
		01	NITRATE	10	8-Jan-98	7.4
		01	NITRATE	10	16-Apr-98	7.1
		01	NITRATE	10	7-Jul-98	6.9
		01	NITRATE	10	6-Oct-98	7.1
		01	NITRATE	10	5-Jan-99	7.7
		01	NITRATE	10	30-Aug-99	7.8
		01	NITRATE	10	17-Apr-00	8.5
		01	NITRATE	10	13-Dec-00	8.1
		01	NITRATE	10	14-Feb-01	7.9
		01	NITRATE	10	29-May-01	8.3
		01	**NITRATE**	**10**	**3-Jan-02**	**10.1**
		01	**NITRATE**	**10**	**11-Feb-02**	**11.6**
		01	**NITRATE**	**10**	**21-Feb-02**	**10.1**

Table 7a. Nitrate Results Detected above 50% of the MCL from a Shallow Well No Longer in Service

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
0090001	BONNIE BROOK	01	FLUORIDE	4	28-Dec-95	2.4
0090004	EAST NEW MARKET	02	FLUORIDE	4	4-Dec-95	2.36
0090224	HERITAGE M.H.P.	01	FLUORIDE	4	4-Dec-93	2.35
		01	FLUORIDE	4	4-Dec-95	2.35
		01	FLUORIDE	4	20-Mar-96	2.08

Table 7b. Fluoride Results Detected above 50% of the MCL

The results in bold print are greater than their respective MCL

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
0090004	EAST NEW MARKET	**01**	**ARSENIC**	**0.010**	**25-Oct-94**	**0.020**
		02	**ARSENIC**	**0.010**	**17-Jul-97**	**0.018**
		02	**ARSENIC**	**0.010**	**11-Mar-98**	**0.020**
		02	**ARSENIC**	**0.010**	**22-Jun-00**	**0.014**
0090007	SECRETARY	**02**	**ARSENIC**	**0.010**	**3-Feb-98**	**0.016**
		02	**ARSENIC**	**0.010**	**4-Dec-98**	**0.015**
		02	**ARSENIC**	**0.010**	**11-May-00**	**0.015**
		02	**ARSENIC**	**0.010**	**23-Jun-03**	**0.013**
0090222	BEAVER RUN M.H.P.	**01**	**ARSENIC**	**0.010**	**14-Jun-93**	**0.020**
		01	ARSENIC	0.010	25-Oct-94	0.010
		01	**ARSENIC**	**0.010**	**5-May-97**	**0.020**
		01	**ARSENIC**	**0.010**	**4-Oct-00**	**0.012**
		02	**ARSENIC**	**0.010**	**5-May-97**	**0.020**
		02	**ARSENIC**	**0.010**	**4-Oct-00**	**0.013**
		03	**ARSENIC**	**0.010**	**5-May-97**	**0.020**
0090224	HERITAGE M.H.P.	**01**	**ARSENIC**	**0.010**	**14-Jun-93**	**0.020**
		01	**ARSENIC**	**0.010**	**25-Oct-94**	**0.020**
		01	**ARSENIC**	**0.010**	**16-Mar-96**	**0.021**
		01	**ARSENIC**	**0.010**	**17-Jul-97**	**0.016**
		01	**ARSENIC**	**0.010**	**16-Mar-98**	**0.021**
		01	**ARSENIC**	**0.010**	**4-Dec-98**	**0.017**
		01	**ARSENIC**	**0.010**	**8-Apr-99**	**0.018**
		01	**ARSENIC**	**0.010**	**12-Mar-02**	**0.019**

Table 7c. Arsenic Results Detected above 50% of the MCL

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
0090224	HERITAGE M.H.P.	01	THALLIUM	0.002	16-Mar-98	0.001

Table 7d. Other IOCs Detected above 50% of the MCL

The results in bold print are greater than their respective MCL

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (pCi/L)	SAMPLE DATE	RESULT (pCi/L)
0090001	BONNIE BROOK	01	RADON-222	300*	2-Aug-00	280
0090002	CAMBRIDGE	01	RADON-222	300*	10-May-00	165
0090004	EAST NEW MARKET	01	RADON-222	300*	11-Apr-94	415
		01	RADON-222	300*	17-Nov-97	285
		02	RADON-222	300*	11-Apr-94	345
		02	RADON-222	300*	17-Nov-97	430
0090007	SECRETARY	01	RADON-222	300*	11-May-00	185
		02	GROSS ALPHA	15	17-Oct-95	8
		02	RADON-222	300*	11-May-00	185
0090219	BAY COUNTRY M.H.P.	01	RADON-222	300*	13-Nov-00	150
0090222	BEAVER RUN M.H.P.	01	RADON-222	300*	17-Nov-97	870
		02	RADON-222	300*	17-Nov-97	765
		03	RADON-222	300*	17-Nov-97	675
0090224	HERITAGE M.H.P.	Distribution	GROSS ALPHA	15	12-Jul-91	9
		01	GROSS ALPHA	15	18-May-00	10
		01	RADON-222	300*	18-May-00	560

Table 7e. Results of Radionuclides Detected above 50% of their respective or Proposed MCL
* Lower proposed MCL

PWSID	PWS NAME	No. of Samples	No. of Positive Samples	Disinfection Treatment?
0090001	BONNIE BROOK	81	1	YES
0090002	CAMBRIDGE	80	0	YES
0090004	EAST NEW MARKET	81	0	YES
0090007	SECRETARY	80	0	YES
0090219	BAY COUNTRY M.H.P.	81	0	YES
0090220	DORCHESTER COUNTRY ESTATES M.H.P.	81	0	NO
0090221	RELIANCE M.H.P.	81	0	NO
0090222	BEAVER RUN M.H.P.	81	0	YES
0090224	HERITAGE M.H.P.	81	1	YES

Table 8. Routine Bacteriological Monitoring Results from System Distribution Since 1997

PWSID	SOURCE NAME	AQUIFER	RAIN AMOUNT (inches)	REMARK	SAMPLE & RAIN DATE	TEMP. (^{O}C)	pH	TURBIDITY (NTU)	TOTAL COLIFORM (col/100ml)	FECAL COLIFORM (col/100ml)
0090221	Well 1	Quaternary	0.5	WET	19-Jan-99	14	6.4	1.2	-1.1	-1.1

Table 9. Raw Water GWUDI Test Results for Unconfined Aquifer Well at Reliance M.H.P.

PWSID	SYSTEM NAME	Is the Water System Susceptible to….						
		Inorganic Compounds (except fluoride & arsenic)	Fluoride	Arsenic	Radionuclides	Volatile Organic Compounds	Synthetic Organic Compounds	Microbiological Contaminants
0090001	BONNIE BROOK	NO	NO	NO	YES*	NO	NO	NO
0090002	CAMBRIDGE	NO	NO	NO	YES* (Pl. 1 only)	NO	NO	NO
0090004	EAST NEW MARKET	NO	YES (Pl. 2 only)	YES	YES*	NO	NO	NO
0090007	SECRETARY	NO	NO	YES	YES*	NO	NO	NO
0090219	BAY COUNTRY M.H.P.	NO	NO	NO	YES*	NO	NO	NO
0090220	DORCHESTER COUNTRY ESTATES M.H.P.	NO	NO	NO	NO	NO	NO	NO
0090221	RELIANCE M.H.P.	YES(Well 1 only)	NO	NO	NO	NO	NO	NO
0090222	BEAVER RUN M.H.P.	NO	NO	YES	YES*	NO	NO	NO
0090224	HERITAGE M.H.P.	NO	YES	YES	YES*	NO	NO	NO

Table 10. Susceptibility Analysis Summary

* Based on the lower proposed MCL of 300 pCi/L for radon-222

Figures

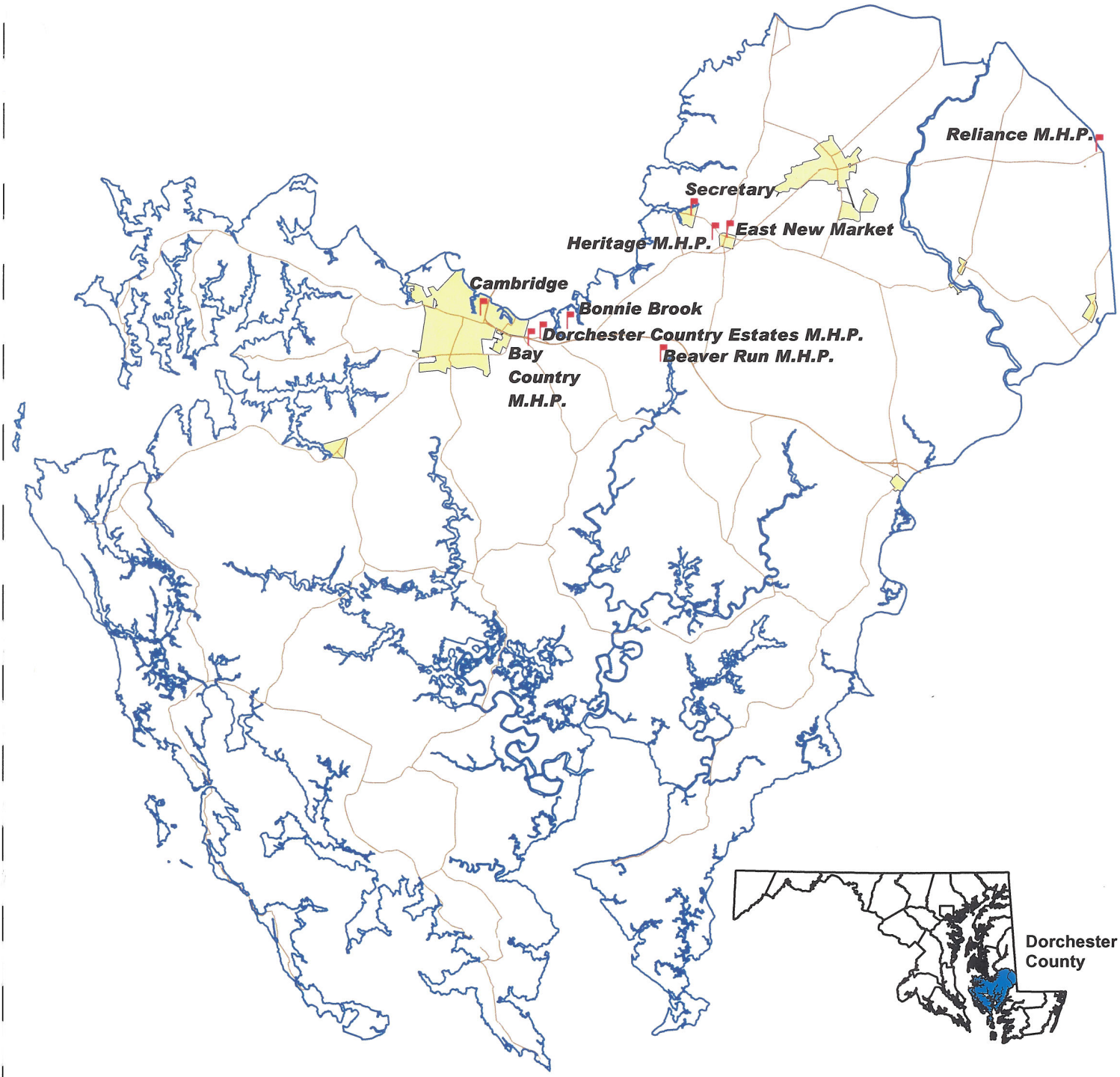

Figure 1. Community Water Systems in Dorchester County, MD Using Confined Aquifers

LEGEND

- Municipal Boundaries
- Dorchester County
- Major Roads

N
W E
S

4.5 0 4.5 Miles

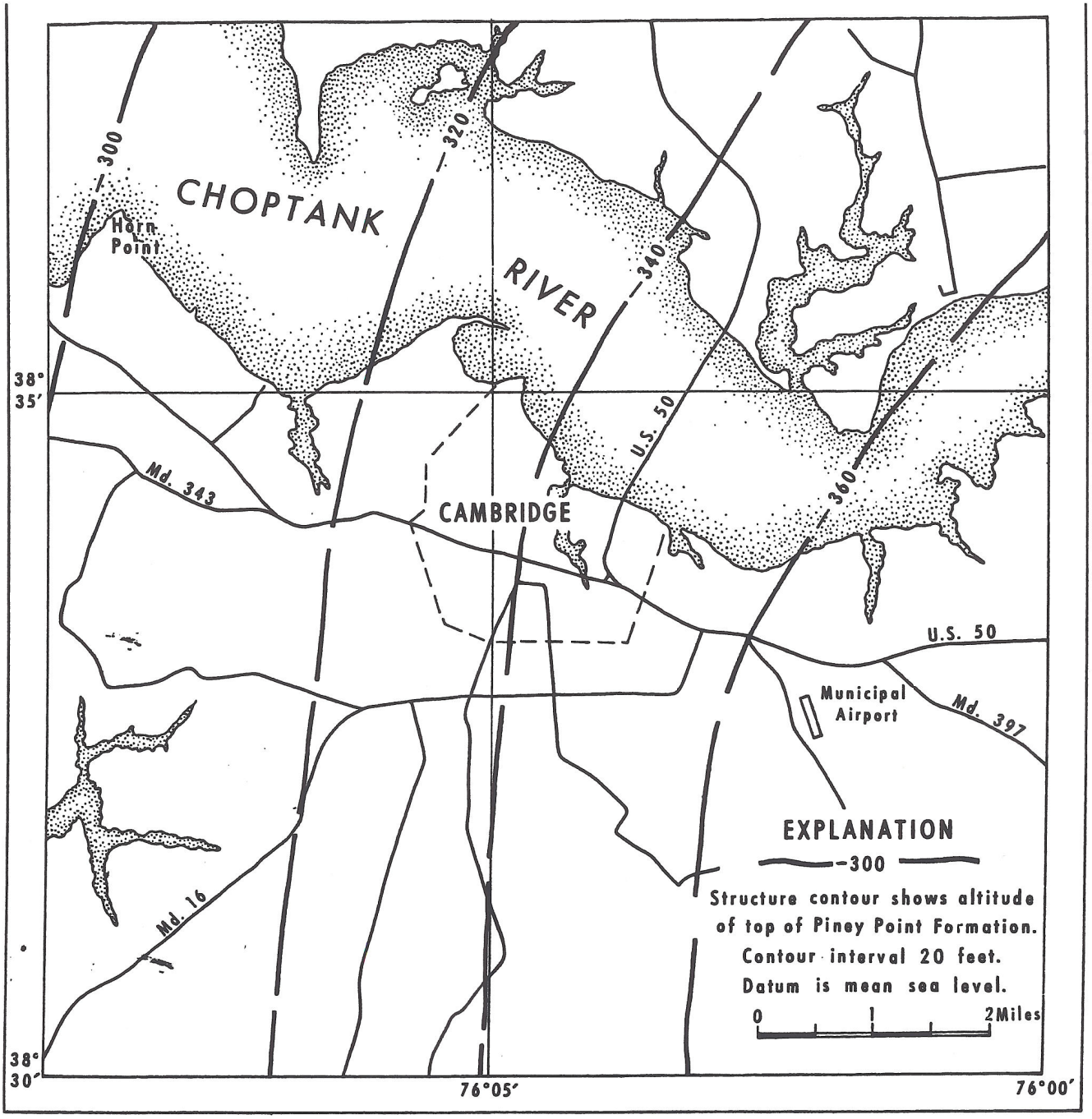

Figure 3 –Map showing the altitude of the top of the Piney Point Formation at Cambridge.

From MGS Report of Investigations No. 17 (Mack, Webb, & Gardner, 1971)

APPENDICES

Appendix A

Report of underground injection control inspections from MDE Ground Water Permits Program

Document Number: 2003-0701bWH

Type of Inspection	Permit Application/Renewal	**Date**	Tuesday, July 01, 2003
Flag/NOV		**Compliance Date**	
Compliance Action		**Type of Non-compliance**	

General Facility Information

Facility Name	Preston Buick Pontiac GMC				
Type of Business	Auto Dealership			**SIC Code**	5511
Contact Person	Walter McNulty			**Title**	Manager
Street Address	2829 Gypsy Hill Road				
City	Cambridge	**Zip Code**	21613	**Phone #**	410-228-0660
County	Dorchester	**Latitude**	38° 33.169' N	**Longitude**	76° 03.075' W
Current Permits	none			**EPSC Number**	

Facility Operations and Domestic Discharge Information

Types of Chemicals Used	Petroleum products	**Types of Wastes Generated**	Petroleum products, vehicle washwater
Manifests/Records ☐	**Parts Washer** ☐	**Housekeeping Score**	Average
Water Supply	Public/Community Supply	**Septic or Sewered?**	Public Sanitary Sewer

Industrial Discharge Information

Surface Discharge ☐	**Floor Drains** ☐	**UIC Well Type**	
Methods of Waste Removal, Treatment, and On-site Disposal	Recycled and hauled away	**Industrial Wastes Going Into Drains**	Sewage

Inspection Information

Recommendations	
Inspection Narrative	I spoke to McNulty today to find out the status of washwater treatment. Within the next two weeks, this facility will hook-up to the sewer from Wal-Mart, across the street. Vehicles have not been washed on-site for 11/2 yrs. Septic system will be shut down and closed once on sewer. They still get seepage into drainfield from heavy rains. They went through 3 different drainfields over the years. Vehicles are taken to Juniors Car Wash on Rte. 50.
Inspector's Name	Susan Allen

Photos/Documents? ☐ **Follow-Up Needed?** ☐

Appendix B

General information of sites with known soil, or shallow aquifer ground water contamination concerns within Dorchester Co. confined community water systems WHPAs from MDE Waste Management Admin.

CAMBRIDGE TOWN GAS (MD-165)
Cambridge, Dorchester County, Maryland

Site Location

The former Manufactured Gas Plant (MGP) site is located at 403 Cherry Street in the town of Cambridge, Dorchester County, Maryland. The site is comprised of two parcels. The parcel on the western side of Cherry Street is 0.4 acre in size, and the parcel on the eastern side is 0.8 acre.

Site History

Available information indicates that a coal-gas manufacturing plant was built on the site in the early 1860s. The MGP was owned and operated by the Cambridge Gas Company, which was part of a consolidation of five power companies known as the Eastern Shore Gas and Electric Company from 1919 until 1948. In 1948, the property was purchased by E.C. Burton, Sr., Chief Executive Officer of Cambridge Gas Company. Mr. Burton sold the property back to the Cambridge Gas Company in 1951. The Cambridge Gas Company merged with the Chesapeake Utilities Corporation in 1986. Delmarva Power (Delmarva) purchased the portion of the property east of Cherry Street in 1987. In mid 1998, Delmarva changed its name to Conectiv.

Gas was produced by the Cambridge MGP first by coal carbonization and later by the carbureted water gas process. The facility was subsequently used for storage and distribution of propane from the late 1940s through the 1960s. While in operation, activities at the MGP site included processes that resulted in common contaminants such as polycyclic aromatic hydrocarbons (PAHs), dibenzofuran, phenol and metabolites, mercury, iron and xylenes entering on-site soils, nearby surface water and sediments. These same contaminants have been found in the soils of the property north of and adjacent to the Cambridge Town Gas site.

Environmental Investigations

In 1985, the Maryland Department of Health and Mental Hygiene (DHMH) conducted a Preliminary Assessment (PA) on the site, focusing on the 75,500 cubic foot gas holder located on the western side of Cherry Street. Records indicate that approximately 6 inches of tar-like sludge was identified at the bottom of the gas holder. Without admission to any legal liability, Delmarva had the sludge disposed of as hazardous waste.

In 1990, the Haliburton NUS Corporation conducted a limited investigation of the MGP site based on available historical and regional data. This investigation was performed at the request of the US Environmental Protection Agency and was inconclusive.

In 1994, the adjacent landowner, Todd Seafoods, Inc. had two soil samples collected within 15 feet of the Cambridge Town Gas northern property boundary. Analytical results yielded total petroleum hydrocarbon (TPH) concentrations of 55,000 mg/kg and lead concentrations of 163 mg/kg. In addition, a laboratory chromatogram reportedly showed evidence of other heavy hydrocarbon compounds in that sample. Following the Todd Seafoods, Inc. report, Delmarva contracted Groundwater and Environmental Services, Inc. to conduct a Phase I Environmental Audit, which was inconclusive.

In 1995, MDE conducted a Site Investigation (SI) of the former MGP. Samples were collected from the on-site soils of both the facility and the Todd Seafoods, Inc. property. In addition, surface water and sediment samples were collected from Cambridge Creek, a Use II Fishery and water recreation area. Delmarva Power split samples with MDE, with the exception of the samples collected on the Todd Seafoods, Inc. property. Results indicated that elevated concentrations of TPH type contaminants were found in on-site soils from both the Todd Seafoods, Inc. and the Delmarva Power properties and from the sediments of Cambridge Creek.

The results of the 1995 MDE SI prompted Delmarva to further characterize the former MGP facility. In 1996, eleven exploratory borings were completed at the site to determine the presence and distribution of contaminants in the subsurface soils. The results of the drilling operations indicated that significant contamination was present in the tar well area and in the northeastern portion of the facility. The levels of

TPH contamination from four of the borings ranged from 20,320 mg/Kg to 58,800 mg/Kg. Delmarva installed an interlocking sheetpiling as a bulkhead keyed in at 25 feet below ground surface to control erosion of the Delmarva shoreline and also reduce the migration of contaminants into Cambridge Creek. The sheetpiling was not installed as a remedial measure.

In February 1997, fourteen test pits were excavated by Delmarva to further delineate the contaminated subsurface and the tar well. Composite samples were collected at this time and the results confirmed the presence of high concentrations of TPH and PAH coal tar by-products.

In December 1997, Delmarva initiated a removal action on the contaminated property. The objectives of the removal were to excavate and dispose of the tar well, and to remove contaminated soils as well as any structures and equipment that remained on site from the gas processing operation. When the removal was complete, approximately 500 tons of hazardous waste concrete, brick, soil and other debris was transported to a hazardous waste landfill in Model City, New York. Additionally, while the removal was taking place, two tar tanks filled with product were uncovered. The smaller of the two tanks had a holding capacity of about 200 gallons. This tank contained an estimated 25 gallons of tar product which was removed from the site. The larger tank was partially buried, so the full tank size could not be readily determined.

In June 1998, the large tank and the estimated 1000 gallons of product contained in it, was removed from the site and the product was sent to a tar recycler. Shortly thereafter, Delmarva Power became known as Conectiv.

In October 1998, a meeting was held between MDE and Conectiv in which Conectiv indicated that they were not knowledgeable of any business relationship with Chesapeake Utilities Corporation and wanted to see other Potential Responsible Parties that may have contributed to the contamination at and adjacent to the site investigated. MDE indicated that it would like to see Conectiv investigate off-site contamination, most notably, to the north (Mike Todd property). Conectiv also inquired about the types of cleanup programs sponsored or offered by MDE and indicated that they were going to explore options under the Voluntary Cleanup Program (VCP) or the State Brownfields Program.

Current Status

Connectiv and Chesapeake Utilities are working to develop a Remedial Investigation/Feasibility Study to address the contamination on the Todd Seafood Property and the sediments in Cambridge Creek.

Contact

Arthur O'Connell, Chief	Site Assessment/State Superfund Division Maryland Department of the Environment	(410)-537-3493

MD-290
Dorchester County

1961	Western Publishing Co. purchased the property.
1982	DHMH observed an oil spill at the site.
1983	State oil-handling and air management permits obtained.
1986	Western Publishing obtained City of Cambridge wastewater discharge permit.
1989	MDE prepared an Environmental Priorities Initiative/Preliminary Assessment report.
	Questionable and improper handling of waste materials reported to Air Management Administration and HSWMA's Enforcement Division.

WESTERN PUBLISHING COMPANY
Cambridge, Maryland

Site Location

The Western Publishing Company is located at Woods Road in an industrial part of the City of Cambridge, Dorchester County, Maryland. U.S. Route 50 is about ¼ mile northeast of the property. The site is surrounded by the Airpax Company and a vacant building to the east, Cambridge Wire Cloth to the west, three commercial enterprises to the south, and an 84 Lumber Company on the south. The facility occupies 11 acres and is comprised of one main building that housed the administrative offices, the production area and warehouse.

Four storage tanks were located north of the building near the parking lot. One 10,000-gallon underground storage tank stored #4 fuel oil for firing the boilers, and was also used for mixing the fuel oil with the still bottoms from the recovery still plant. This tank was subsequently removed. Three 1,500-gallon aboveground storage tanks are located at the facility. However, only one tank is currently being used to store roller wash. The fourth aboveground storage tank was an empty 20,000-gallon tank that purportedly was never used by Western Publishing and has been removed.

Site History

The Phillips family previously owned the Western Publishing site as far back as 1910. The company was involved in several businesses that included food processing. Deed records show that Consolidated Foods Corporation sold the property to Western Publishing Company in May 1961. Western Publishing used the property for commercial printing and binding. The waste products from the processes were used oil, spent solvent, fountain solution, used plates, solvent vapor, dryer exhaust, and scrap paper.

The company had a wastewater discharge permit from the City of Cambridge, first obtained in 1986; a state oil-handling permit; and five State air management permits obtained in 1983.

Environmental Investigations

In March 1982, the Maryland Department of Health and Mental Hygiene (DHMH) observed an oil spill in a drum storage area outside the Western Publishing building. The contaminated area was approximately 700 square feet. Western Publishing cleaned up three 30-gallon drums of oil-contaminated soil and gravel from the area and disposed of it at the Dorchester County Landfill Site #3 on April 16, 1982.

In 1989, the Maryland Department of the Environment's Hazardous and Solid Waste Management Administration (MDE HSWMA) prepared an *Environmental Priorities Initiative/ Preliminary Assessment* report of the Western Publishing facility. During the site inspection, HSWMA noted that the company mixed waste still bottoms with the fuel oil for burning in boilers, and referred the information to MDE's Air Management Administration for investigation of a potential air permit violation. The Air Management Administration responded that they notified Western Publishing that any waste fluid burning at the facility should cease and desist immediately, and were preparing a corrective order to that effect. The HSWMA also noted that soiled absorbent material was disposed of in an on-site dumpster that went to the Dorchester County landfill. The observation was referred to HSWMA's Enforcement Division for investigation. In December 1997, the site was purchased by Mail-Well Graphics, Inc., which currently operates the facility.

Current Status

This site is on the State Master List that identifies potential hazardous waste sites in Maryland. The Master List includes sites currently identified by the Environmental Protection Agency's (EPA) Comprehensive Environmental Response, Compensation and Liability Information System. EPA has given the site a designation of No Further Remedial Action Planned (NFRAP). The designation of NFRAP by EPA does not mean that MDE has reached the same conclusion concerning further investigation at the site. The information contained in the fact sheet presents a summary of past investigations and site conditions currently known to MDE.

Facility Contact

Arthur O'Connell, Chief	Site and Brownfields Assessments/State Superfund Division Maryland Department of the Environment	410-537-3493
Richard Johnson, Chief	Hazardous Waste Enforcement Division Maryland Department of the Environment	410-537-3400

Eastern Shore Hospital Center
Route 50
Cambridge, Maryland
(Voluntary Cleanup Program)

Dorchester County	
Pre-1912	Two farms operated on the property.
1915	The original hospital was constructed.
1915-late 1990s	The hospital operated at the property. Portions of the property were used for farming.
3/1999	Three applicants applied to VCP seeking inculpable person status.
4/1999	Maryland Department of the Environment (MDE) approved the three VCP applications.
7/1999	MDE approved a response action plan for the property.
8/1999-10/1999	Soil excavation activities conducted. Contaminated soils disposed of off-site.
10/12/1999	MDE issued a Certificate of Completion.

Site Description

This 351-acre property was operated by the State of Maryland, Department of Health and Mental Hygiene as a psychiatric hospital since 1915. Approximately thirty-eight buildings were located on the property, including administrative buildings, dormitories, maintenance facilities, and single family residences, along with farmed land, woodlands, wetlands, and streams.

The Choptank River borders the property to the north. A residential community is located east of the site. Commercial businesses located along Route 50 border the property to the south. Shoal Creek, the Cambridge Wastewater Treatment Plant and a shopping center are located west of the property. Municipal water is available, but residences to the east rely on groundwater for potable water.

Site History

Two farms operated at the property until it was purchased by the State of Maryland in 1912. The original hospital was constructed in 1915, including English Hall, Unit 1, Unit 2, and the power plant. Until recently, portions of the site had been farmed by patients or local farmers.

Dredge spoils from the Choptank River were piled on the property until discontinued in approximately 1988. The spoils were contained within a six foot high bermed area on the southwest portion of the property.

Environmental Concerns

Environmental investigations at the property identified several areas of concern, including heavy metal contamination in soil, groundwater, and surface water; polycyclic aromatic hydrocarbon (PAH) contamination in soil near the power plant; and volatile organic compound (VOC) contamination in soil and groundwater.

Analysis of painted surfaces at the site identified lead-based paint on interior and exterior surfaces of many buildings. Based on the results of the lead-based paint survey, soil samples were collected in the vicinity of thirty buildings. Laboratory analysis of the soil samples revealed elevated concentrations of lead in the vicinity of five of the buildings.

Heavy metals, including lead, selenium, cadmium, arsenic, and manganese were identified in surface water samples collected from Shoal Creek. These substances were present at concentrations above the Toxic Substances Criteria for Ambient Surface Waters, which are intended for the protection of aquatic life.

Elevated concentrations of PAHs were identified in a surface soil sample collected in the vicinity of the smoke stack at the power plant. Consequently, eight additional surface and subsurface soil samples were collected in this area to determine the extent of the contamination. The analytical results indicate that the PAH contamination is confined to the surface soils in an area adjacent to the eastern wall of the power plant.

Elevated concentrations of VOCs were identified in the vicinity of the maintenance building. Contamination in this area was determined to be the result of a former leaking underground storage tank used for gasoline.

Localized areas of contamination were also identified in other areas of the property. Minor petroleum hydrocarbon contamination and heavy metal contamination were identified in some areas in association with aboveground storage tanks, current and former underground storage tanks, a debris pile, and a burn pit (used to dispose of unusable paint).

Voluntary Cleanup Program (VCP) Status

On March 10, 1999, separate applications were submitted to the VCP by Chesapeake Resort, LLC, Chesapeake Communities, LLC, and the Maryland Economic Development Corporation (MEDCO). The application packages indicated that Chesapeake Resort, LLC would purchase the entire Eastern Shore Hospital Center property. Chesapeake Communities, LLC would purchase portions of the property from Chesapeake Resort, LLC for development of residential units. MEDCO would lease portions of the property for development and operation of a golf course, marina, hotel, and related facilities.

The Department approved the three applications on April 8, 1999 with inculpable person status for each. The Department also notified the applicants that a response action plan had to be developed for remediation of the contamination at the site.

A proposed response action plan was submitted on behalf of the applicants on May 3, 1999. The plan proposed excavation and off-site disposal of contaminated soils in areas of the property that could pose an unacceptable risk to human health or the environment. The Department approved the response action plan on July 27, 1999.

All site excavation activities and off-site disposal of drummed hazardous wastes and electrical transformers were completed by October 4, 1999. A final report documenting the removal activities was submitted to the Department.

On October 12, 1999, the Department issued a Certificate of Completion to each of the three participants. The certificates were conditioned on the use of the property for limited residential purposes, defined as unrestricted use of the property, except for groundwater. Shallow groundwater beneath the property may not be used for any purpose. Use of deep groundwater at the property is unrestricted. Deep groundwater at the property will be monitored for a minimum of five years.

Appendix C

Report of open cases within WHPAs from MDE Oil Control Program

CASE NO.	NAME	LOCATION, ZIP CODE	STATUS AS OF DECEMBER 2003
03-0341DO	PHILLIPS HARDWARE BUILDING	300 ACADEMY STREET CAMBRIDGE, 21613	Leaking underground storage tank (LUST) on-site. On-going remedial action by MDE Oil Control Program
03-0639DO	GARY L. JONES	2910 OCEAN GATEWAY CAMBRIDGE 21613	Above ground storage tank release
03-0657DO	PHILLIPS HARDWARE, INC.	200 GAY STREET CAMBRIDGE, 21613	Leaking underground storage tank (LUST) on-site. On-going remedial action by MDE Oil Control Program
03-0693DO	ZION UNITED METHODIST CHURCH	612 LOCUST ST. CAMBRIDGE, 21613	Underground storage tank (UST) removed. Small release of oil found in sump. On-going investigation by MDE Oil Control Program
03-1188DO	DORCHESTER COUNTY	516 RACE ST. CAMBRIDGE, 21613	Dumping on-site. On-going monitoring by the Oil Control Program
04-0263DO	BESSIE MCKINNEY RESIDENCE	405 CAMPER ST. CAMBRIDGE, 21613	Ten gallon above ground storage tank release.
04-0286DO	THE JUDY CENTER	1405 GLASGOW ST. CAMBRIDGE, 21613	UST removed. Minimal to no contamination observed.
04-0569DO	REAR OF BLDG.	531-533 POPLAR ST. CAMBRIDGE, 21613	Improperly abandoned UST
90-2585DO	CITY OF CAMBRIDGE	RACE & CEDAR ST. CAMBRIDGE, 21613	UST removed from property.
91-2473-DO	COCA-COLA BOTTLING CO. OF CAMBRIDGE	11 WASHINGTON ST. CAMBRIDGE, 21613	UST removed from property.
97-1082DO	SUPER SODA CENTER INC.	106 CEDAR ST. CAMBRIDGE, 21613	Petroleum spill at the ground surface.
98-1246DO	WHEATLEY TRUCKING	120 BROHAWN AVE. CAMBRIDGE, 21613	Ground water contamination as detected from a well on this property. On-going monitoring by the Oil Control Program.

MDE Oil Control Program Open Cases within Dorchester County Confined Community Water Systems Wellhead Protection Areas

CASE NO.	NAME	LOCATION, ZIP CODE	STATUS AS OF DECEMBER 2003
98-1264DO	WILSON & MCGINNIS P.A.	206 DORCHESTER AVE. CAMBRIDGE, 21613	Ground water contamination as detected from a well on this property. On-going monitoring by the Oil Control Program.
98-1984DO	IMMANUEL UNITED CHURCH	900 PEACH BLOSSOM AV. CAMBRIDGE, 21613	UST removed from property.
98-2201DO	CAMBRIDGE RECREATION CENTER	504 POPLAR ST. CAMBRIDGE, 21613	UST removed from property.
99-1270DO	CHARLES JACKSON	601 WASHINGTON ST. CAMBRIDGE, 21613	UST removed from property.

(continued) MDE Oil Control Program Open Cases within Dorchester County Confined Community Water Systems Wellhead Protection Areas

Appendix D

Executive Summaries for confined community systems

EXECUTIVE SUMMARY
BONNIE BROOK

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for the nine community water systems in Dorchester County using confined aquifers, including the Bonnie Brook community supply. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination within the areas, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The water supply sources of the community systems in this report are naturally protected confined aquifers of the Atlantic Coastal Plain physiographic province. The Bonnie Brook water system is currently using two wells that pump water from the Piney Point Formation. The wellhead protection area was delineated by the WSP using U.S. EPA's approved methods specifically designed for water supplies in confined aquifers.

Potential point sources of contamination were identified within the assessment areas from field inspections, and contaminant inventory databases. Well information and water quality data were also reviewed. Figure 2b shows the wellhead protection area for Bonnie Brook.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Bonnie Brook water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The susceptibility of the water supply to radon-222, a naturally occurring element, will depend on the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
CAMBRIDGE

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for the nine community water systems in Dorchester County using confined aquifers, including the Cambridge community supply. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination within the areas, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The water supply sources of the community systems in this report are naturally protected confined aquifers of the Atlantic Coastal Plain physiographic province. The Cambridge water system is currently using nine wells that pump water from the Piney Point, Patapsco, and Magothy Formations respectively. The wellhead protection areas were delineated by the WSP using U.S. EPA's approved methods specifically designed for water supplies in confined aquifers.

Potential point sources of contamination were identified within the assessment areas from field inspections, and contaminant inventory databases. Well information and water quality data were also reviewed. Figure 2a shows the Cambridge wellhead protection areas with potential contaminant sources.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Cambridge water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The susceptibility of the water supply to radon-222, a naturally occurring element, will depend on the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
EAST NEW MARKET

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for the nine community water systems in Dorchester County using confined aquifers, including the East New Market community supply. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination within the areas, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The water supply sources of the community systems in this report are naturally protected confined aquifers of the Atlantic Coastal Plain physiographic province. The East New Market water system is currently using two wells that pump water from the Federalsburg aquifer, and the Piney Point Formation respectively. The wellhead protection areas were delineated by the WSP using U.S. EPA's approved methods specifically designed for water supplies in confined aquifers.

Potential point sources of contamination were identified within the assessment areas from field inspections, and contaminant inventory databases. Well information and water quality data were also reviewed. Figure 2d shows the wellhead protection areas for East New Market.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the East New Market water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The water supply is susceptible to naturally occurring arsenic (based on the new EPA standard). The Piney Point well (Plant 2) is susceptible to naturally occurring fluoride. The susceptibility of the water supply to radon-222, a naturally occurring element, will depend on the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
SECRETARY

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for the nine community water systems in Dorchester County using confined aquifers, including the Town of Secretary's community supply. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination within the areas, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The water supply sources of the community systems in this report are naturally protected confined aquifers of the Atlantic Coastal Plain physiographic province. The Town of Secretary's water system is currently using two wells that pump water from the Piney Point Formation. The wellhead protection area was delineated by the WSP using U.S. EPA's approved methods specifically designed for water supplies in confined aquifers

Potential point sources of contamination were identified within the assessment areas from field inspections, and contaminant inventory databases. Well information and water quality data were also reviewed. Figure 2d shows the wellhead protection area for Secretary.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that Secretary's water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The water supply is susceptible to naturally occurring arsenic (based on the new EPA standard), and to gross alpha. The susceptibility of the water supply to radon-222, a naturally occurring element, will depend on the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
BAY COUNTRY MOBILE HOME PARK

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for the nine community water systems in Dorchester County using confined aquifers, including the Bay Country Mobile Home Park community supply. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination within the areas, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The water supply sources of the community systems in this report are naturally protected confined aquifers of the Atlantic Coastal Plain physiographic province. The Bay Country Mobile Home Park water system is currently using three wells that pump water from the Piney Point Formation. The wellhead protection area was delineated by the WSP using U.S. EPA's approved methods specifically designed for water supplies in confined aquifers.

Potential point sources of contamination were identified within the assessment areas from field inspections, and contaminant inventory databases. Well information and water quality data were also reviewed. Figure 2a shows the Bay Country Mobile Home Park's wellhead protection area with potential contaminant sources.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Bay Country Mobile Home Park water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The susceptibility of the water supply to radon-222, a naturally occurring element, will depend on the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
DORCHESTER COUNTRY ESTATES MOBILE HOME PARK

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for the nine community water systems in Dorchester County using confined aquifers, including the Dorchester Country Estates Mobile Home Park community supply. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination within the areas, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The water supply sources of the community systems in this report are naturally protected confined aquifers of the Atlantic Coastal Plain physiographic province. The Dorchester Country Estates Mobile Home Park water system is currently using two wells that pump water from the Piney Point Formation. The wellhead protection area was delineated by the WSP using U.S. EPA's approved methods specifically designed for water supplies in confined aquifers.

Potential point sources of contamination were identified within the assessment areas from field inspections, and contaminant inventory databases. Well information and water quality data were also reviewed. Figure 2a shows the Dorchester Country Estates Mobile Home Park's wellhead protection area with potential contaminant sources.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Dorchester Country Estates Mobile Home Park water supply is not susceptible to any of the contaminant groups due to the protected nature of confined aquifers.

EXECUTIVE SUMMARY
RELIANCE MOBILE HOME PARK

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for the nine community water systems in Dorchester County using confined aquifers, including the Reliance Mobile Home Park community supply. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination within the areas, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The water supply sources of the community systems in this report are naturally protected confined aquifers of the Atlantic Coastal Plain physiographic province. The Reliance Mobile Home Park water system is currently using one well that pumps water from the Frederica Aquifer. The wellhead protection area was delineated by the WSP using U.S. EPA's approved methods specifically designed for water supplies in confined aquifers.

Potential point sources of contamination were identified within the assessment areas from field inspections, and contaminant inventory databases. Well information and water quality data were also reviewed. Figure 2e shows the wellhead protection area for Reliance Mobile Home Park.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the production well for the Reliance Mobile Home Park water supply is not susceptible to any of the contaminant groups due to the protected nature of confined aquifers. The now unused Well 1 is susceptible to nitrate contamination.

EXECUTIVE SUMMARY
BEAVER RUN MOBILE HOME PARK

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for the nine community water systems in Dorchester County using confined aquifers, including the Beaver Run Mobile Home Park community supply. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination within the areas, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The water supply sources of the community systems in this report are naturally protected confined aquifers of the Atlantic Coastal Plain physiographic province. The Beaver Run Mobile Home Park water system is currently using five wells that pump water from the Piney Point Formation. The wellhead protection area was delineated by the WSP using U.S. EPA's approved methods specifically designed for water supplies in confined aquifers.

Potential point sources of contamination were identified within the assessment areas from field inspections, and contaminant inventory databases Well information and water quality data were also reviewed. Figure 2c shows the wellhead protection area for the Beaver Run Mobile Home Park.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Beaver Run Mobile Home Park water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The water supply is susceptible to naturally occurring arsenic (based on the new EPA standard). The susceptibility of the water supply to radon-222, a naturally occurring element, will depend on the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
HERITAGE MOBILE HOME PARK

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for the nine community water systems in Dorchester County using confined aquifers, including the Heritage Mobile Home Park community supply. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination within the areas, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The water supply sources of the community systems in this report are naturally protected confined aquifers of the Atlantic Coastal Plain physiographic province. The Heritage Mobile Home Park water system is currently using one well that pumps water from the Piney Point Formation. The wellhead protection area was delineated by the WSP using U.S. EPA's approved methods specifically designed for water supplies in confined aquifers.

Potential point sources of contamination were identified within the assessment areas from field inspections, and contaminant inventory databases. Well information and water quality data were also reviewed. Figure 2d shows the wellhead protection area for Heritage Mobile Home Park.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Heritage Mobile Home Park water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The water supply is susceptible to naturally occurring arsenic (based on the new EPA standard), fluoride, and gross alpha. The susceptibility of the water supply to radon-222, a naturally occurring element, will depend on the final MCL that is adopted for this contaminant.