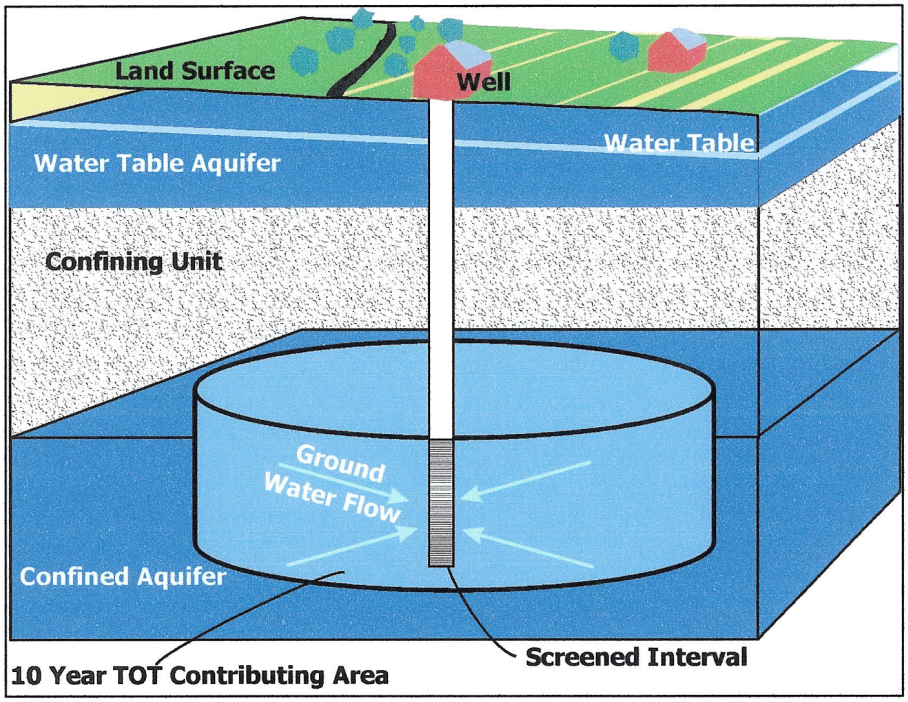
SOURCE WATER ASSESSMENT

FOR NONTRANSIENT NONCOMMUNITY WATER SYSTEMS

IN CHARLES COUNTY, MD



Prepared By
Water Management Administration
Water Supply Program
February 2006

MDE

Robert L. Ehrlich, Jr.
Governor

Kendl P. Philbrick
Secretary

Michael S. Steele
Lt. Governor

Jonas A. Jacobson
Deputy Secretary

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTD.)

Figures

TABLE OF CONTENTS (CONTD.)

Figures (contd)

Appendix

SUMMARY

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for twenty-five nontransient noncommunity water systems in Charles County. 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 the nontransient noncommunity systems in Charles County are naturally protected confined aquifers of the Atlantic Coastal Plain physiographic province. The twenty-five nontransient noncommunity water systems included in this report are currently using thirty-three wells that pump water from two different confined aquifer systems. The Source Water Assessment areas were delineated by the WSP using U.S. EPA approved methods specifically designed for sources in confined aquifers.

Potential point sources of contamination were researched and identified within the assessment areas from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. Maps and aerial photographs showing Source Water Assessment areas are included in this 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 water systems are not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers.

INTRODUCTION

The Water Supply Program has conducted a Source Water Assessment for the twenty-five nontransient noncommunity water systems in Charles County. A nontransient noncommunity (NTNC) water systems is one that regularly serves at least twenty-five of the same individuals over six months per year. Examples of NTNC water systems are schools, daycare facilities, office buildings and commercial facilities. Charles County is located in the southern part of the State, west of the Chesapeake Bay and south of Washington, D. C. Its total population, reported in July 2001 is 125,800 (Md. Assoc. of Counties, 2001/2002). The twenty-five NTNC systems serve a population of approximately 11,000 individuals (table 1). The NTNC 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 thirty-three wells are currently used for the twenty-five NTNC water systems included in this report. There are also four stand-by wells, one unused well and one well yet to be put into production associated with these twenty-five systems. Twenty-four of these wells were drilled after 1973 and should comply with Maryland's well construction regulations. The remaining fifteen wells were drilled prior to 1973, when current regulations went into effect, and may not meet the current construction standards. Table 2 contains a summary of well information for each of the systems.

Based on site visits, most wells were in good condition and appeared to be regularly maintained, sealed and protected to insure integrity. Some of the older wells had a one-piece well cap, which may present a possible route of contamination (insects) through unscreened vents and electrical holes. This situation can be easily remedied with the installation of a new two-piece sanitary well cap to prevent contamination. Another common threat to wells observed during field inspections are unused wells in the same aquifer as the production wells. Several water systems have wells that are not in use regularly due to pump or screen problems, or were drilled as test wells during new well construction (table 2). As long as these wells are sealed with a tight cap, and the pumps are exercised regularly they pose little threat to the production wells. However, unused wells, with loose caps, no pumps or with no potential for use in the future should be rectified or permanently abandoned and sealed by a licensed well driller because they represent a pathway for contamination to the deep aquifer. Wells that are properly grouted and without pumps may be useful for long-term monitoring. Access to such wells should be restricted through locked caps and/or other security measures.

HYDROGEOLOGY

Ground water flows through pores between gravel, sand and silt grains in unconsolidated sedimentary rock aquifers such as those used by the NTNC water systems in Charles County. An aquifer is any formation that is capable of yielding a significant amount of water. The transmissivity is a measure of the amount of water an aquifer is capable of producing and is related to the hydraulic conductivity and the thickness of the aquifer. A confining layer is generally composed of fine material such as clay and silt, which transmits relatively very little water. Confined aquifers are those formations that are overlain by a confining unit or below. Confined aquifers are recharged from the water stored in the confining unit above and from precipitation that infiltrates into the formation where it is exposed at the surface.

Charles County lies within the Atlantic Coastal Plain physiographic province. This province, which in Maryland includes roughly the area east of Interstate 95, is underlain by unconsolidated clastic sediments of Lower Cretaceous to recent age, which thicken to the southeast so that they appear wedge-shaped. These sediments crop out in a concentric band that lies parallel to the Fall Line which marks the western boundary of the Coastal Plain. The NTNC water systems pump water from both the Magothy Patapsco Formations. These aquifers have been studied considerably and hydrologic, lithologic and geochemical data is available in several Maryland Geological Survey reports ((1955, 1966, 1971, 1983, 1990 and 1999). The descriptive material below is summarized from these reports and the reader is referred to them for further information.

Magothy Formation

The Magothy Formation is used by six of the NTNC water systems. The Magothy Formation dips southeastward at 28 to 30 feet per mile. The top of the formation ranges from 100 feet below sea level northwest of Waldorf to 600 below sea level feet near Benedict. The Magothy Formation consists of medium to coarse-grained quartz sand with some associated silty clay. The sand ranges in color from light gray to blue or pink. Some dark minerals and lignitic material give it a salt and pepper appearance. In the Waldorf area the thickness of the aquifer is about 90 feet. It thins eastward and is about 30 feet thick at Chalk Point. The average thickness of the Magothy Formation in Charles County is estimated to be about 40 feet. The transmissivity of the Magothy aquifer ranges from less than 100 ft^2/day near the edge of the aquifer's extent to 4000 ft^2 /day in eastern part of the county. The Magothy is overlain by layer of dark clay of the Mattawan Formation.

Patapsco Formation

The Patapsco Formation is more widely used than the Magothy Formation in Charles County. Nineteen NTNC systems in Charles County pump water from this aquifer. The Patapsco Formation is divided into the upper and lower Patapsco aquifers. The two are separated by confining layer of low permeable clay. All the nineteen NTNC systems are using the lower Patapsco aquifer as their source of water supply. The upper Patapsco aquifer is very silty and clayey with interbedded thin sands, and is not

used much as a source of water supply except in the Waldorf area where it is known as the St. Charles Aquifer. The lower Patapsco aquifer is composed of alternating layers of fine to coarse, light gray and brown sand, and tough clay. The depth to the top of the aquifer ranges from 68 feet below sea level at Indian Head to more than 1,300 feet below sea level in the eastern part of Charles County. Aquifer thickness ranges from approximately 60 feet at Indian Head to more than 150 feet in north-central Charles County. In the Waldorf area the lower Patapsco aquifer has been referred to as the La Plata aquifer system.

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 WHPAs were delineated using the methodology described in Maryland's Source Water Assessment Plan (MDE, 1999) for confined aquifers in the Coastal Plain.

Systems using an average of ≥ 10,000 gallons per day: The area was determined by using a method often referred to as the "Florida Method". The area is a radial zone of transport within the aquifer and is based on a 10-yr time of travel (TOT), the pumping rate and the screened interval(s) f the well or wells included in the WHPA, and the porosity of the aquifer (see illustration below for conceptual model). The WHPA's were calculated using the following volumetric equation:

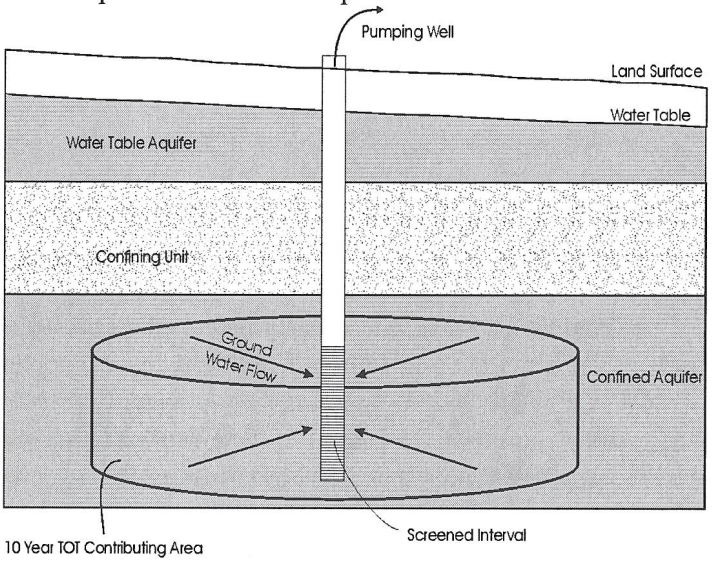
$$r = \sqrt{\frac{Qt}{\pi n H}}$$

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

Table 3 gives the values used and the calculated radius for each water system's WHPA. The pumping rate (Q) used is generally the permitted daily average. Except for the water systems using very large quantities, when a system has more than one well, the wells usually alternate pumpage. Therefore, the total appropriated amount was used in the calculation for each well, since, in theory each well could produce a zone of transport based on the average pumping rate if the other wells were not available. For the Morgantown Generating Station, the permitted amount was split between wells based on the reported pumpage in the monthly operating reports submitted to MDE the past year. For the College of Southern Maryland the permitted daily average was split evenly between the three wells.

A conservative estimate of porosity (n) of 25% was used for each of the aquifers based on published reports. The lengths of the well screens (H) were obtained from well completion reports. In the instance that there were multiple screens, the sum of the individual screen lengths was used. Using these parameters the radius was calculated wit

the above equation for the WHPA delineation (table 3). Circles around each of the wells the appropriate calculated radius represents the WHPA and are shown in figure 2. The circles represent the aquifer zone of transport in the subsurface as illustrated above



Conceptual illustration of a zone of transport for a confined aquifer

Systems using < 10,000 gallons per day (gpd): The assessment area is a fixed radius of 600 ft, This radius was calculated assuming a minimum aquifer thickness of 20 ft, porosity of 0.25 and an average daily pumpage of 10,000 gpd.

POTENTIAL SOURCES OF CONTAMINATION

In confined aquifer settings, sources of contamination at land surface 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 are not intact or have no grout seal.

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 CERCLA 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 land use practices that may lead to ground water contamination over a larger area. All potential sources of contamination are identified at the land surface and therefore have the potential to impact only the shallow water table aquifer. Therefore, as long as there is no potential for direct injection into the deeper confined aquifers, the water supply used by the NTNC systems should be well protected from ground water contamination.

Potential point sources of contamination are identified if they fall within the WHPA for awareness and to ensure that the deep aquifer does not become affected by unused

wells or poorly constructed wells in the water supply aquifer. Table 4 lists the facilities identified from MDE databases and field surveys as potential sources of contamination ad their locations are shown in Figures 2 through 22. Underground storage tanks (USTs) sites are facilities that store petroleum/heating oil in site in underground tanks registered with MDE's Waste Management Administration. Controlled Hazardous Substance Generators (CHS) are facilities that may use or store any hazardous substance on site. Ground Water Discharge Permits (GWD) are issued by MDE's Water Management Administration for discharge of wastewater to ground water. Wastewater treatment plants (DISCH) treat wastes generated by a facility and discharge the treated wastewater to a stream/river. CERCLA sites are Superfund sites that have a history of ground water contamination due to improper disposal of hazardous waste. Miscellaneous sites (MISC) are those facilities like funeral homes and maintenance shops that handle chemicals and other hazardous substances.

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 at the individual 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), Nitrates (N) and Microbiological Pathogens (MP) and Perchlorate (PER)

WATER QUALITY DATA

Water Quality data was reviewed from the Water Supply Program's database for Safe Drinking Water Act (SDWA) contaminants. All data reported is from the finished (treated) water unless otherwise noted. 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 greater than 50% of the MCL, this report will describe the sources of such a contaminant and, if possible, locate the specific sources that are the cause of the elevated contaminant level. All data reported is from the finished (treated) water unless otherwise noted. Table 5 summarizes the various treatment methods used at the water treatment plants for each of the twenty-five NTNC water systems.

A review of the monitoring data for the twenty-five NTNC systems indicates that currently the water supplies meet the drinking water standards. Table 6 summarizes the water quality results for each of the water systems by contaminant group.

Inorganic Compounds (IOCs)

A review of the data shows that IOCs above 50% of the MCL were only reported for in only three instances in 449 samples. T.C Martin Elementary School (PWSID 1080030) had a one-time detection of nitrate, above 50% of the MCL and Dr. Thomas Higdon Elementary School (PWSID 1080031) had one time detections of arsenic and beryllium above 50% of the MCLs (table 7a) and it is possible that the one time detections of these compounds could have been a laboratory or sampling error.

Volatile Organic Compounds (VOCs)

A review of the data shows that the only VOC detected above 50% of the MCL was methylene chloride at in a sample taken for PWSID 1080038 (table 7b). The sample was invalidated since methylene chloride was detected in the laboratory blank. Low levels of trihalomethanes (THMS) have been detected in several systems. THMS are disinfection byproducts which are produced by the reaction between chlorine used for disinfection and organic material in the water supply.

Synthetic Organic Compounds (SOCs)

A review of the data shows that only one SOC, di(ethylhexyl)phthalate, has been detected above 50% of an MCL two times in one system (table 7c). This SOC was also found in the laboratory blank on the dates that the samples were collected. Hence these detects are not believed to represent the water supply for this system.

Microbiological Contaminants

Routine bacteriological monitoring is conducted in the finished water for each water system on a quarterly basis and measures total coliform bacteria. Since eighteen of the water systems disinfect their water at the treatment plant, the finished water data does not give much indication 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. A major breach of the system or the aquifer would likely cause a positive total coliform result despite disinfection and would require follow-up total and fecal coliform analysis. Three water systems had positive total coliform in their routine bacteriological samples (table 8). Follow-up samples for all the three systems showed no positive total coliform.

SUSCEPTIBILITY ANALYSIS

The wells serving the NTNC water systems included in Charles County pump water from confined aquifers. Confined aquifers are naturally well protected from activity on the land surface due to the confining layers that provide a barrier for water movement from the surface into the aquifer below. A properly constructed well with the casing extended to the confining layer above the aquifer and with sufficient grout should be well protected from contamination at the land surface. The only instance in which a contaminant at the surface would impact the water supply is through direct injection into the aquifer from within the WHPA. This could occur via poorly constructed wells, wells out of use that penetrate the aquifer and underground injection wells drilled into the aquifer.

The susceptibility of the source water to contamination is determined for each group of contaminants based on the following criteria: 1) the presence of natural and anthropogenic contaminant sources within the WHPA, 2) water quality data, 3) well integrity, and 4) the aquifer conditions. The susceptibility analysis is summarized for each water system in table 9.

Inorganic Compounds

There were no IOCs that were detected above 50% of the MCL in repeated samples. Due to the naturally protected characteristics of the confined aquifers and the water quality data, the NTNC water systems are considered **not susceptible** to inorganic compounds.

.Volatile Organic Compounds

Volatile organic compounds (VOCs) have not been detected at 50% of any MCL in any of the systems. Sources of VOCs are present in the WHPAs of several systems (figures 2-3l), but the water supplies are protected from these contaminants due to the confined nature of the aquifers. Water quality data supports the protective nature of the aquifers.

Based on the above discussion, the community systems are **not susceptible** to contamination by VOCs.

Synthetic Organic Compounds

Synthetic organic compounds (SOCs) have not been detected in the water supplies except for one low level detection of PCB in one system. Subsequent sampling showed no detects of PCB in that system. The systems have all been issued a confined waiver for monitoring for SOCs. SOC sources are generally pesticides and herbicides and some industrial solvents. Due to the confined nature of the aquifer, these sources do not pose a threat to the water supply.

Based on lack of contaminant sources and aquifer type, the water supplies are **not susceptible** to SOCs.

Microbiological Contaminants

Confined aquifers are naturally protected from sources of pathogens at the land surface. Total coliform bacteria were found in only four samples out of 1302 samples collected. Inspection of the wells showed that thirty-six of thirty-nine wells were not subject to flooding. Therefore, two NTNC water systems (with three wells between them) may be susceptible to microbiological contaminants.

MANAGEMENT OF THE SOURCE WATER ASSESSMENT AREA

The information contained in this report provides a basis for understanding the risks to contamination of the water supplies for the twenty-five NTNC water systems in Charles County. Since all the systems use confined aquifers, maintaining wells and ensuring that they meet current well construction standards is most critical for future water quality protection. Specific management recommendations for consideration are listed below:

Public Awareness and Outreach

- Conduct educational outreach to facilities and businesses 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

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

Contaminant Source Inventory Updates/ Inspections/ Maintenance

- Conduct a survey of the WHPA and inventory any potential sources of contamination, including unused wells that may not have been included in this report. Keep records of new development within the WHPA and new potential sources of contamination that may be associated with the new use.
- Work with the County Health Department to ensure that there are no unused wells within the WHPA. An improperly abandoned well can be a potential source of contamination to the aquifer.
- Water operation personnel should have a program for periodic inspections and maintenance of the supply wells and backup wells to ensure their integrity and protect the aquifer from contamination.
- Well drilled prior to 1973 that do not meet current construction standards should be upgraded to protect them from contamination associated with poor or outdated construction
- Two-piece insect-proof well caps should be installed on to wells that have one-piece caps.

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. An increase in use or the addition of new wells may require revisions to the WHPA.

REFERENCES

Andreasen, D. C., 1999, The geohydrology and water-supply Potential of the lower Patapsco aquifer and Patuxent aquifers in the Indian Head-Bryans Road Area, Charles County, Maryland: Maryland Geological Survey Report of Investigations No. 69, 119 p.

Andreasen, D. C., and Mack, F. K., 1998, Evaluation of the geohydrology and water-supply potential of the lower Patapsco and Patuxent aquifers in the Indian Head-Bryans Road area, Charles County, Maryland: Initial findings: Maryland Geological Survey Open-File Report 98-02-9, 50 p.

Bolton, D.W., 1996, Network Description and Initial Water-Quality Data from a Statewide Ground-Water-Quality Network in Maryland: Maryland Geological Survey Report of Investigations No. 60, 167 pp.

Chappelle, F. H., and Drummond, D. D., 1983, Hydrogeology, digital stimulation, and geochemistry of the Aquia and Piney Point-Nanjemoy aquifer system in Southern Maryland: Maryland Geological Survey Report of Investigations No. 38, 100 p.

Curtin, S. E., and Dine, J. R., 1995, Ground-water level data in southern Maryland: Maryland Geological Survey Basic Data Report 21, 365 p.

Fleck, W. B., and Wilson, J. M., 1990, Geology and hydrologic assessment of Coastal Plain aquifers in the Waldorf area, Charles County, Maryland – Water-supply potential of the aquifers: Maryland Geological Survey Report of Investigations No. 53 p. 39-98.

Maryland Association of Counties, 2001/2002 Directory of County Officials, 419 p.

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

Otton, E. G., 1955, Ground-water resources of the southern Maryland Coastal Plain: Maryland Geological Survey Department of Geology, Mines and Water Resources Bulletin 15, 347 p.

Slaughter, T. H., and Laughlin, C. P., 1966, Records of wells and springs, chemical Analyses, and selected well logs in Charles County, Maryland: Maryland Geological Survey Basic Data Report 2, 93 p.

Slaughter, T. H., and Otton, E. G., 1968, Availability of ground water in Charles County, Maryland: Maryland Geological Survey Bulletin 30, 100p.

U.S. Environmental Protection Agency, 1991, Wellhead Protection Strategies for Confined-Aquifer Settings: Office of Ground Water and Drinking Water, EPA/570/9-91-008, 168 pp.

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
Department of Natural Resources Digital Orthophoto Quarter Quadrangles
USGS Topographic 7.5 Minute Quadrangles for Charles County
Maryland Department of Planning 2002 Charles County Land Use Map
Maryland Department of Planning 2002 Charles County Sewer Map

TABLES

FIGURE 1 ID	PUBLIC WATER SYSTEM ID (PWSID)	SYSTEM NAME	POPULATION SERVED
1	1080002	CHARLES COUNTY VO-TECH	705
2	1080005	SOUTHERN MARYLAND CHRISTIAN ACADEMY	204
3	108007	GALE-BAILEY ELEMENTARY SCHOOL	402
4	1080013	BEL ALTON MULTI-SERVICE CENTER	25
5	1080014	J.C. PARKS ELEMENTARY SCHOOL	827
6	1080015	LACKEY HIGH SCHOOL	1,150
7	1080016	MALCOLM ELEMENTARY SCHOOL	446
8	1080017	MATTAWOMAN W.W.T.P.	31
9	1080018	MATTHEW HENSON MIDDLE SCHOOL	663
10	1080019	MCDONOUGH HIGH SCHOOL	1,381
11	1080021	MT. HOPE ELEMENTARY SCHOOL	325
12	1080022	NAVAL RESEARCH LAB- BLOSSOM PT.	120
13	1080023	PICCOWAXEN MIDDLE SCHOOL	460
14	1080025	STAR OF THE SEA SCHOOL	230
15	1080026	ST. MARY'S SCHOOL	240
16	1080027	ST. PETER'S SCHOOL	493
17	1080029	THUNDERBIRD APARTMENTS	60
18	1080030	T.C. MARTIN ELEMENTARY SCHOOL	514
19	1080031	DR. THOMAS HIGDON ELEMENTARY SCHOOL	373
20	1080032	MORGANTOWN GENERATING STATION	230
21	1080033	GRACE BRETHREN CHRISTIAN SCHOOL	500
22	1080036	CHILDREN'S CORNER, INC.	30
23	1080038	COLLEGE OF SOUTHERN MD	1220
24	1080039	STUMP NECK ANNEX	300
25	1081098	COOKSEY'S CORNER	60

Table 1. Nontransient Noncommunity Water Systems in Charles County

PWSID	SYSTEM NAME	SOURCE ID	USE CODE	WELL NAME	WAPID	AVE. GPD	WELL PERMIT NO.	TOTAL DEPTH (ft)	CASING DEPTH (ft)	YEAR DRILLED	AQUIFER
1080002	CHARLES CO. VO-TECH.	1	P	VO-TECH WELL 1	CH1969G005	15000	CH700077	509	389	1970	PATAPSCO FORMATION
		2	U	VO-TECH WELL 2	CH1969G005	15000	CH690105	917	390	1969	PATAPSCO FORMATION
1080005	SOUTHERN MARYLAND CHRISTIAN ACADEMY	1	P	WELL #1	CH1979G042	1300	CH732837	469	359	1981	MAGOTHY FORMATION
		3	P	NEW WELL #2	CH2001G008	1300	CH944386	469	420	2001	MAGOTHY FORMATION
1080007	GALE-BAILEY ELEMENTARY SCHOOL	2	P	GALE-BAILEY E.S. WELL #1	CH1969G002	6000	CH810970	321	294	1984	PATAPSCO FORMATION
		3	P	GALE-BAILEY E.S. WELL #2	CH1969G002	6000	CH811443	322	294	1985	PATAPSCO FORMATION
1080013	BEL ALTON MULTISERVICE CTR	1	P	JUDE HOUSE WELL	CH1977G017	1300	CH038346	585	560	1960	PATAPSCO FORMATION
		2	F	MULTI SERV CTR WELL	CH1977G017	1300	CH945204	797	742	2003	PATAPSCO FORMATION
1080014	J.C. PARKS ELEMENTARY	1	P	J.C. PARKS E.S. WELL	CH1967G008	3500	CH941165	684	642	1997	PATAPSCO FORMATION
1080015	LACKEY HIGH SCHOOL	2	P	LACKEY H. S NEW WELL	CH1968G009	10000	CH942659	730	570	1999	PATAPSCO FORMATION
1080016	MALCOLM ELEMENTARY SCHOOL	1	P	MALCOLM E.S. WELL2	CH1977G012	9600	CH810816	616	586	1984	MAGOTHY FORMATION
		2	P	MALCOLM E.S. WELL 1	CH1977G012	9600	CH017619	620	591	1955	MAGOTHY FORMATION
1080017	MATTAWOMAN W.W.T.P.	3	P	MATTAWOMAN WTP # 3 [P LOT]	CH1976G007	1200	CH942328	640	420	1998	PATAPSCO FORMATION
		4	S	MATTAWOMAN WTP # 4 [WTP]	CH1976G007	1200	CH943255	615	435	2000	PATAPSCO FORMATION
1080018	MATTHEW HENSON MIDDLE SCHOOL	1	P	MATTHEW HENSON M.S. WELL	CH1984G004	6000	CH026304	270	255	1957	PATAPSCO FORMATION
1080019	MCDONOUGH HIGH SCHOOL	1	S	MCDONOUGH H.S. WELL 1	CH1975G001	35000	CH730498	532	325	1974	PATAPSCO FORMATION
		2	P	MCDONOUGH H. S. WELL 2	CH1975G001	35000	CH941547	600	560	1998	PATAPSCO FORMATION
1080021	MT. HOPE ELEMENTARY SCHOOL	1	P	MT HOPE E.S. WELL	CH1977G013	7000	CH941606	237	210	1997	PATAPSCO FORMATION

Table 2. Well Information for Nontransient Noncommunity Water Systems in Charles County

PWSID	SYSTEM NAME	SOURCE ID	USE CODE	WELL NAME	WAPID	AVE. GPD	WELL PERMIT NO.	TOTAL DEPTH (ft)	CASING DEPTH (ft)	YEAR DRILLED	AQUIFER
1080022	NAVAL RESEARCH LAB BLOSSOM PT	1	P	NAVAL RESEARCH LAB WELL	CH1960G001	2500	CH038741	455	449	1960	PATAPSCO FORMATION
1080023	PICCOWAXEN MIDDLE SCHOOL	1	P	PICCOWAXEN M.S. WELL	CH1975G004	25000	CH730569	584	375	1975	PATAPSCO FORMATION
1080025	STAR OF THE SEA SCHOOL	1	P	STAR OF THE SEA SCHOOL WELL	CH1961G007	6500	CH044247	637	344	1961	PATAPSCO FORMATION
1080026	ST. MARYS SCHOOL	1	P	ST. MARY'S SCHOOL	CH1961G007	6500	CH003838	680	398	1949	MAGOTHY FORMATION
1080027	ST. PETERS SCHOOL	1	P	ST PETERS SCHOOL	CH2000G011	5200	CH942857	524	444	1999	MAGOTHY FORMATION
1080029	THUNDERBIRD APARTMENTS	1	P	APARTMENT WELL	CH1953G001	7200	CH680032	390	272	1968	PATAPSCO FORMATION
1080030	T.C. MARTIN ELEMENTARY SCHOOL	2	P	T.C. MARTINE E.S. WELL	CH1967G006	8000	CH670066	631	593	1967	MAGOTHY FORMATION
1080031	DR. THOMAS HIGDON ELEMENTARY SCHOOL	1	P	DR. THOMAS HIGDON E.S. WELL	CH1987G028	4000	CH812742	700	660	1988	PATAPSCO FORMATION
1080032	MORGANTOWN GENERATING STATION	1	P	PEPCO 1	CH1967G011	700000	CH670104	329	218	1967	PATAPSCO FORMATION
		2	P	PEPCO 2	CH1967G011	700000	CH731350	280	194	1977	PATAPSCO FORMATION
		4	P	PEPCO 4	CH1967G011	700000	CH943763	1125	1080	2001	PATAPSCO FORMATION
		5	P	PEPCO NEW #3	CH1967G011	700000	CH944710	1146	944	2002	PATAPSCO FORMATION
1080033	GRACE BRETHREN CHRISTIAN SCHOOL	1	S	WELL 1 MAIN WELL, BY OFFICE	CH1983G004	4500	CH810839	575	420	1984	MAGOTHY FORMATION
		2	P	WELL 2 CHURCH/SCHOOL WELL	CH1983G004	4500	CH943893	581	470	2001	MAGOTHY FORMATION
1080036	CHILDRENS CORNER, INC.	1	P	CHILDRENS CORNER WELL	NOT KNOWN		CH811515	490	440	1986	PATAPSCO FORMATION

Table 2 (contd). Well Information for Nontransient Noncommunity Water Systems in Charles County

PWSID	SYSTEM NAME	SOURCE ID	USE CODE	WELL NAME	WAPID	AVE. GPD	WELL PERMIT NO.	TOTAL DEPTH (ft)	CASING DEPTH (ft)	YEAR DRILLED	AQUIFER
1080038	COLLEGE OF SOUTHERN MD - MAIN CAMPUS	1	P	BU WELL (NO 1)	CH1968G001	18000	CH700010	643	405	1969	PATAPSCO FORMATION
		2	P	TC WELL (NO 2)	CH1968G001	18000	CH700008	536	410	1969	PATAPSCO FORMATION
		3	P	ST WELL (NO 3)	CH1968G001	18000	CH920636	700	350	1993	PATAPSCO FORMATION
1080039	STUMP NECK ANNEX	1	P	SN 12 BLDG 2012	CH1971G105	25000	CH041102	331	280	1961	PATAPSCO FORMATION
		2	S	SN 43	CH1971G105	25000	N/A	454		1961	PATAPSCO FORMATION
1081098	COOKSEY'S CORNER	1	P	PARKING LOT WELL	CH1986G017	400	CH812101	475	400	1987	PATAPSCO FORMATION

Table 2 (contd). Well Information for Nontransient Noncommunity Water Systems in Charles County

PWSID = Public Water System ID Number
SOURCE ID = Unique Identifier Number for Well
USE CODE: P = Production, S = Standby, F = Future, U = Unused
WAPID = Water Appropriation Permit Number
AVE GPD = Average Gallons Per Day (Permitted)

PWSID	SYSTEM NAME	SOURCE NAME	Well Pumpage (Q) in gpd	Well Pumpage (Q) in ft^3/yr	Screened Interval (H) in feet	Calculated Radius for WHPA in feet	Acreage of WHPA	Comments on WHPA
108002	CHARLES CO. VO-TECH	VO-TECH WELL 1	10000	487903	8	900	58.12	Only 1 well in use
1080015	LACKEY HIGH SCHOOL	LACKEY H S NEW WELL	10000	487903	50	600	25.83	Acual calculated radius 353 ft
1080019	MCDONOUGH HIGH SCHOOL	MCDONOUGH H S WELL 1	35000	1707659	35	800	45.92	Wells 1 and 2 circles merged
		MCDONOUGH H S WELL 2	35000	1707659	30	900		
1080023	PICCOWAXEN MIDDLE SCHOOL	PICCOWAXEN M S WELL	25000	1219757	40	700	35.16	
1080032	MORGANTOWN GENERATING STATION	WELL1	154000	7513701	10	3100	849.79	Wells 1,2, 3,and 4 circles merged
		WELL2	154000	7513701	10	3100		
		WELL3	196000	9562892	43	1700		
		WELL4	196000	9562892	40	1800		
1080038	COLLEGE OF SOUTHERN MD	TC WELL	6000	292742	15	600	25.83	
		BU WELL	6000	292742	15	600	50.78	BU and ST Well's circles merged
		ST WELL	6000	292742	43	600		
1080039	STUMP NECK ANNEX	SN 12 BLDG 2012	25000	1219757	30	800	84.26	SN 12 BLDG 2012 and SN 43 Well's circles merged
		SN 43	25000	1219757	30	800		

Table 3 Parameters used for WHPA delineations for systems pumping > 10,000 gallons per day

ID*	Type	Facility Name	Address	Reference Location*	WHPA System Name	Potential Contaminants	Remarks
1	UST	Charles County Vo-Tech	7775 Marshall Corner Rd	Figure 2	Charles Co Vo-Tech	VOC	2 tanks
2	UST	James Craik Elem School	7725 Marshall Corner Rd	Figure 2	Charles Co Vo-Tech	VOC	1 tank
3	UST	Southern Maryand Christian Academy	9805 Faith Baptist Church Rd	Figure 3	Southern Maryland Christian Academy	VOC	1 tank
4	GWD	Gail-Bailey Elementary School	4740 Pisgah Rd	Figure 4	Gail-Bailey Elementary School	MP, N	Permit No 97-DP-072
5	AST	Bel Alton Multiservice Ctr.	Rte 301 South	Figure 5	Bel Alton Mutlservice Ctr	VOC	2 tanks
6	UST	Matthew Henson Middle School	3535 Livingston Rd	Figure 6	Matthew Henson Middle School	VOC	1 tank
7	UST	J. C. Parks Elementary School	3505 Livingson Rd	Figure 6	J. C. Parks Elementary School	VOC	1 tank
8	MISC	Thornton Funeral Home	3430 Livingston Rd	Figure 6	J. C. Parks Elementary School	VOC,SOC, MP	
9	UST	Lackey High School	3000 Chiamaxon Rd	Figure 7	Lackey High School	VOC	2 tanks
10	UST	Mattawoman WWTP	5310 Hawthorne Rd	Figure 7	Indian Head	VOC	2 tanks
11	UST	McDonough High School	7165 Marshall Corner Rd	Figure 8	McDonough High School	VOC	1 tank
12	UST	Malcolm Elementary School	14760 Poplar Hill Rd	Figure 9	Malcolm Elementary School	VOC	1 tank
13	UST	Naval Research Lab- Blossom Pt	Blossom Point Rd	Figure 10	Naval Research Lab-Blossom Pt	VOC	1 tank
14	MISC	Naval Research Lab- Blossom Pt	Blossom Point Rd	Figure 10	Naval Research Lab-Blossom Pt	VOC, HM	Maintenance Stop
15	CERCLA	Naval Research Lab- Blossom Pt	Blossom Point Rd	Figure 10	Naval Research Lab-Blossom Pt	VOC, HM, PER	Site No. MD-136
16	UST	Piccowaxen Middle School	12834 Rock Point Rd	Figure 11	Piccowaxen Middle School	VOC	1 tank
17	UST	Dr. Thomas Higdon Elementary School	12872 Rock Point Rd	Figure 11	Dr. Thomas Higdon MS & Piccowaxem ES	VOC	1 tank
18	DISCH	Piccowaxen Middle School WWTP	12872 Rock Point Rd	Figure 11	Dr. Thomas Higdon Middle School	MP, N	Permit No 90-DP-0636
19	UST	Star of the Sea School	6485 Indian Head Hwy	Figure 12	Star of the Sea School	VOC	1 tank

Table 4. Potential Contaminant Point Sources Within WHPAs.

* See referenced figure for location

ID*	Type	Facility Name	Address	Reference Location*	WHPA System Name	Potential Contaminants	Remarks
20	UST	T.C. Martin Elementary School	6315 Oliver Shop Rd	Figure 13	T.C. Martin Elementary School	VOC	! tank
21	UST	St. Mary's School	13705 Notre Dame Place	Figure 13	St. Mary's School	VOC	4 tanks
22	UST	St. Peters School	3220 St. Peters Drive	Figure 14	St. Peters School	VOC	3 tanks
23	UST	Thunderbird Apartments	9295 Crain Highway	Figure 15	Thunderbird Apartments	VOC	1 tank
24	CHS	State Highway Administration	Harry Nice Memorial Bridge	Figure 16	Morgantown Generating Station	VOC, M	
25	UST	One Stop Travel Plaza	12615 Crain Highway	Figure 16	Morgantown Generating Station	VOC	3 tanks
26	UST	Morgantown Generating Station	12620 Crain Highway	Figure 16	Morgantown Generating Station	VOC	3 tanks
27	CHS	Morgantown Generating Station	12620 Crain Highway	Figure 16	Morgantown Generating Station	HM, M	
28	UST	Grace Bretheren Christian School	1300 Zekiah Drive	Figure 17	Grace Bretheren Christian School	VOC	1 tank
29	UST	Children's Corner, Inc.	7430 Leonardtown Rd	Figure 18	Children's Corner, Inc.	VOC	1 tank
30	UST	Mitchell Home Center	7627 Leonardtown Rd	Figure 18	Children'sCorner, Inc.	VOC	1 tank
31	UST	College of Southern MD	8730 Mitchell Road	Figure 19	College of Southern MD	VOC	6 tanks
32	CHS	College of Southern MD	8730 Mitchell Road	Figure 19	College of Southern MD	VOC	1 tank
33	CHS	Stump Neck Annex	101 Strauss Ave	Figure 20	Stump Neck Annex	VOC	
34	UST	Cooksey's Corner	12090 Charles St	Figure 21	Cooksey's Corner	VOC	5 tanks
35	UST	Mt. Hope Elementary School	9275 Ironsides Rd	Figure 22	Mt. Hope Elementary School	VOC	1 tank

Table 4 (contd). Potential Contaminant Point Sources Within WHPAs. *see referenced figure for location

Contaminant Type: UST- Underground Storage Tank; CHS - Controlled Hazardous Substance; GWD - Ground Water Discharge;DISCH - Surface Water Discharge; CERCLA - Superfund Site, MISC - Miscellaneous

Potential Contaminant: VOC - Volatile Organic Compound, SOC - Synthetic Organic Compound, MP - Microbiological Pathogen, N - Nitrate, HM - Heavy Metals, M - Metals, PER - Perchlorate

PWSID	SYSTEM NAME	PLANT ID	TREATMENT METHOD	PURPOSE
1080002	CHARLES CO. VO-TECH.	01	HYPOCHLORINATION, POST	Disinfection
1080005	SOUTHERN MARYLAND CHRISTIAN ACADEMY	01	NO TREATMENT	N/A
1080005	SOUTHERN MARYLAND CHRISTIAN ACADEMY	02	NO TREATMENT	N/A
1080007	GALE-BAILEY ELEMENTARY SCHOOL	01	HYPOCHLORINATION, POST	Disinfection
1080013	BEL ALTON MULTI-SERVICE CENTER	01	HYPOCHLORINATION, POST	Disinfection
1080014	J.C. PARKS ELEMENTARY SCHOOL	01	HYPOCHLORINATION, POST	Disinfection
1080015	LACKEY HIGH SCHOOL	01	HYPOCHLORINATION, POST	Disinfection
1080016	MALCOLM ELEMENTARY SCHOOL	01	HYPOCHLORINATION, POST	Disinfection
1080017	MATTAWOMAN W.W.T.P.	01	HYPOCHLORINATION, POST	Disinfection
1080017	MATTAWOMAN W.W.T.P.	01	SEQUESTRATION	Iron Removal
1080018	MATTHEW HENSON MIDDLE SCHOOL	01	HYPOCHLORINATION, POST	Disinfection
1080019	MCDONOUGH HIGH SCHOOL	01	HYPOCHLORINATION, POST	Disinfection
1080021	MT. HOPE ELEMENTARY SCHOOL	01	HYPOCHLORINATION, POST	Disinfection
1080021	MT. HOPE ELEMENTARY SCHOOL	01	INHIB., POLYPHOSPHATE	Corrosion Control
1080022	NAVAL RESEARCH LAB BLOSSOM PT	01	HYPOCHLORINATION, POST	Disinfection
1080022	NAVAL RESEARCH LAB BLOSSOM PT	01	GREENSAND FILTER	Iron Removal
1080022	NAVAL RESEARCH LAB BLOSSOM PT	01	REVERSE OSMOSIS	Taste and Odor
1080022	NAVAL RESEARCH LAB BLOSSOM PT	01	ACTIVATED CARBON, GRANULAR	Taste and Odor
1080023	PICCOWAXEN MIDDLE SCHOOL	01	HYPOCHLORINATION, POST	Disinfection
1080025	STAR OF THE SEA SCHOOL	01	NO TREATMENT	N/A
1080026	ST. MARYS SCHOOL	01	HYPOCHLORINATION, POST	Disinfection
1080027	ST. PETERS SCHOOL	01	HYPOCHLORINATION, POST	Disinfection
1080027	ST. PETERS SCHOOL	01	SEQUESTRATION	Iron Removal
1080029	THUNDERBIRD APARTMENTS	01	NO TREATMENT	N/A
1080030	T.C. MARTIN ELEMENTARY SCHOOL	01	HYPOCHLORINATION, POST	Disinfection
1080031	DR. THOMAS HIGDON ELEMENTARY SCHOOL	01	HYPOCHLORINATION, POST	Disinfection
1080032	MORGANTOWN GENERATING STATION	01	HYPOCHLORINATION, POST	Disinfection
1080033	GRACE BRETHREN CHRISTIAN SCHOOL	01	NO TREATMENT	N/A
1080036	CHILDRENS CORNER, INC.	01	NO TREATMENT	N/A
1080038	COLLEGE OF SOUTHERN MD	01	HYPOCHLORINATION, PRE	Disinfection
1080038	COLLEGE OF SOUTHERN MD	02	HYPOCHLORINATION, PRE	Disinfection
1080039	STUMP NECK ANNEX	01	HYPOCHLORINATION, POST	Disinfection
1080039	STUMP NECK ANNEX	02	NO TREATMENT	N/A
1081098	COOKSEY'S CORNER	01	NO TREATMENT	N/A

Table 5. Treatment Methods for Nontransient Noncommunity Systems in Charles County

PWSID	SYSTEM NAME	PLANT ID	IOCs		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
1080002	CHARLES CO. VO-TECH.	01	23	0	7	0	0	0
1080005	SOUTHERN MARYLAND CHRISTIAN ACADEMY	01	19	0	8	0	0	0
1080005	SOUTHERN MARYLAND CHRISTIAN ACADEMY	02	1	0	6	0	1	0
1080007	GALE-BAILEY ELEMENTARY	01	18	0	6	0	0	0
1080013	BEL ALTON MULTI-SERVICE CTR	01	17	0	8	0	0	0
1080014	J.C. PARKS ELEMENTARY	01	14	0	8	0	0	0
1080015	LACKEY HIGH SCHOOL	01	19	0	7	0	0	0
1080016	MALCOLM ELEMENTARY SCHOOL	01	18	0	7	0	0	0
1080017	MATTAWOMAN W.W.T.P.	01	14	0	2	0	0	0
1080018	MATTHEW HENSON MIDDLE SCHO	01	23	0	7	0	0	0
1080019	MCDONOUGH HIGH SCHOOL	01	21	0	7	0	0	0
1080021	MT. HOPE ELEMENTARY SCHOOL	01	18	0	7	0	0	0
1080022	NAVAL RESEARCH LAB- BLOSSOM PT	01	18	0	5	0	0	0
1080023	PICCOWAXEN MIDDLE SCHOOL	01	16	0	7	0	0	0
1080025	STAR OF THE SEA SCHOOL	01	14	0	7	0	0	0
1080026	ST. MARYS SCHOOL	01	17	0	7	0	0	0
1080027	ST. PETERS SCHOOL	01	19	0	8	0	0	0
1080029	THUNDERBIRD APARTMENTS	01	17	0	5	0	0	0
1080030	T.C. MARTIN ELEMENTARY SCHOOL	01	18	1	7	0	0	0
1080031	DR. THOMAS HIGDON ELEMENTARY SCHOOL	01	19	2	13	0	0	0
1080032	MORGANTOWN GENERATING STATION	01	17	0	7	0	0	0
1080033	GRACE BRETHREN CHRISTIAN SCHOOL	01	18	0	5	0	0	0
1080036	CHILDRENS CORNER, INC.	01	16	0	6	0	1	0
1080038	COLLEGE OF SOUTHERN MD	01	22	0	4	0	0	0
1080039	STUMP NECK ANNEX	01	15	0	6	1	3	0
1080039	STUMP NECK ANNEX	02	7	0	0	0	0	0
1081098	COOKSEY'S CORNER	01	11	0	6	0	3	2
		TOTALS	449	3	173	1	8	2

Table 6. Summary of Water Quality Results

PWSID	SYSTEM NAME	PLANT ID	CONTAMINANT NAME	MCL (mg/L)	SAMPLE DATE	RESULT (mg/L)
1080030	T.C. MARTIN ELEMENTARY SCHOOL	01	NITRATE	10	23-Feb-93	5.3
1080031	DR. THOMAS HIGDON ELEMENARY SCHOOL	01	ARSENIC	0.01	21-Jun-93	0.03
1080031	DR. THOMAS HIGDON ELEMENARY SCHOOL	01	BERYLLIUM	0.004	12-Jun-01	0.0032

Table 7a. Inorganic Compounds detected above 50% of their MCLs

PWSID	SYSTEM NAME	PLANT ID	CONTAMINANT NAME	MCL (ug/L)	SAMPLE DATE	RESULT (ug/L)
1080039	STUMP NECK ANNEX	01	METHYLENE CHLORIDE	5	17-Oct-90	7

Table 7b. Volatile Organic Compounds detected above 50% of their MCLs

PWSID	SYSTEM NAME	PLANT ID	CONTAMINANT NAME	MCL (ug/L)	SAMPLE DATE	RESULT (ug/L)
1081098	COOKSEY'S CORNER	01	DI(ETHYLHEXYL) PHTHALATE	6	19-Dec-01	3.1*
1081098	COOKSEY'S CORNER	01	DI(ETHYLHEXYL) PHTHALATE	6	1-Apr-02	3.5*

Table 7c. Synthetic Organic Compounds detected above 50% of their MCLs

*found in laboratory blanks

PWSID	SYSTEM NAME	No. of Samples	No. of Positive Samples	Disinfection Treatment?
1080002	CHARLES CO. VO-TECH.	36	0	Yes
1080005	SOUTHERN MARYLAND CHRISTIAN ACADEMY	46	2	No
1080007	GALE-BAILEY ELEMENTARY	37	0	Yes
1080013	BEL ALTON MULTI-SERVICE CENTER	106	0	Yes
1080014	J.C. PARKS ELEMENTARY	38	0	Yes
1080015	LACKEY HIGH SCHOOL	106	0	Yes
1080016	MALCOLM ELEMENTARY SCHOOL	38	0	Yes
1080017	MATTAWOMAN W.W.T.P.	83	0	Yes
1080018	MATTHEW HENSON MIDDLE SCHOOL	36	0	Yes
1080019	MCDONOUGH HIGH SCHOOL	107	0	Yes
1080021	MT. HOPE ELEMENTARY SCHOOL	36	0	Yes
1080022	NAVAL RESEARCH LAB BLOSSOM PT	35	1	Yes
1080023	PICCOWAXEN MIDDLE SCHOOL	36	0	Yes
1080025	STAR OF THE SEA SCHOOL	38	0	No
1080026	ST. MARYS SCHOOL	37	0	Yes
1080027	ST. PETERS SCHOOL	38	0	Yes
1080029	THUNDERBIRD APARTMENTS	36	0	No
1080030	T.C. MARTIN ELEMENTARY SCHOOL	37	0	Yes
1080031	DR. THOMAS HIGDON ELEMENTARY	38	0	Yes
1080032	MORGANTOWN GENERATING STATION	37	0	Yes
1080033	GRACE BRETHREN CHRISTIAN SCHOOL	36	0	No
1080036	CHILDRENS CORNER, INC.	38	0	No
1080038	COLLEGE OF SOUTHERN MD - MAIN CAMPUS	105	0	Yes
1080039	STUMP NECK ANNEX	100	1	No
1081098	COOKSEY'S CORNER	22	0	No
	TOTALS	1302	4	

Table 8. Routine Bacteriological Monitoring Results from System Distribution

PWSID	SYSTEM NAME	Is the System Susceptible to.....			
		Inorganic Compounds	Volatile Organic Compounds	Synthetic Organic Compounds	Microbiological Contaminants
1080002	CHARLES CO. VO-TECH.	NO	NO	NO	NO
1080005	SOUTHERN MARYLAND CHRISTIAN ACADEMY	NO	NO	NO	NO
1080007	GALE-BAILEY ELEMENTARY	NO	NO	NO	NO
1080013	BEL ALTON MULTI-SERVICE CENTER	NO	NO	NO	NO
1080014	J.C. PARKS ELEMENTARY	NO	NO	NO	NO
1080015	LACKEY HIGH SCHOOL	NO	NO	NO	NO
1080016	MALCOLM ELEMENTARY SCHOOL	NO	NO	NO	NO
1080017	MATTAWOMAN W.W.T.P.	NO	NO	NO	NO
1080018	MATTHEW HENSON MIDDLE SCHOOL	NO	NO	NO	NO
1080019	MCDONOUGH HIGH SCHOOL	NO	NO	NO	NO
1080021	MT. HOPE ELEMENTARY SCHOOL	NO	NO	NO	NO
1080022	NAVAL RESEARCH LAB BLOSSOM PT	NO	NO	NO	NO
1080023	PICCOWAXEN MIDDLE SCHOOL	NO	NO	NO	MAYBE*
1080025	STAR OF THE SEA SCHOOL	NO	NO	NO	NO
1080026	ST. MARYS SCHOOL	NO	NO	NO	NO
1080027	ST. PETERS SCHOOL	NO	NO	NO	NO
1080029	THUNDERBIRD APARTMENTS	NO	NO	NO	NO
1080030	T.C. MARTIN ELEMENTARY SCHOOL	NO	NO	NO	NO
1080031	DR. THOMAS HIGDON ELEMENTARY SCHOOL	NO	NO	NO	NO
1080032	MORGANTOWN GENERATING STATION	NO	NO	NO	NO
1080033	GRACE BRETHREN CHRISTIAN SCHOOL	NO	NO	NO	NO
1080036	CHILDRENS CORNER, INC.	NO	NO	NO	NO
1080038	COLLEGE OF SOUTHERN MD - MAIN CAMPUS	NO	NO	NO	NO
1080039	STUMP NECK ANNEX	NO	NO	NO	MAYBE*
1081098	COOKSEY'S CORNER	NO	NO	NO	NO

**potential for flooding*

Table 9. Susceptibility Analysis Summary

FIGURES

Figure 1. Nontransient Noncommunity Water Systems in Charles County with Wellhead Protection Areas. (see Table 1 for details)

APPENDIX

Blossom Point Field Test Area (MD-136)
Charles County, Maryland

Site Location

The Blossom Point Field Test Area (BPFTA), located approximately 50 miles south of Washington D.C., covers 1,600 acres on the southern end of Cedar Point Neck, in southern Charles County, Maryland. Nanjemoy Creek forms the western boundary and the Potomac River forms the southern and eastern boundaries of the BPFTA. The BPFTA is an active facility under the US Army Research Laboratory (ARL) in Adelphi, Maryland.

Site History

In 1941, the National Bureau of Standards (NBS) leased the southern portion of Cedar Point Neck from the Catholic Church for fuze and ordnance testing. The facility was originally known as the Blossom Point Proving Ground. The Ordnance Development Division of NBS was transferred to the Department of the Army in 1953. The leased facility was also transferred and renamed the Diamond Ordnance Fuze Laboratory Test Area. It was used for the applied research and development of radiating or influence fusing, time fusing, signature analysis and the target intercept phase of terminal guidance as well as ordnance testing. When the Department of the Army reorganized in 1962, the name was again changed to Harry Diamond Laboratory (HDL) Test Area. HDL is one of seven Electronics Research and Development Command laboratories, which are part of the U.S. Army Materiel Development and Readiness Command.

A 23-acre portion of the site was permitted to the Navy in 1956 to establish a tracking system for the early Vanguard missiles, as well as for use as a satellite command and control base for defense related satellite programs.

From 1943 until the early 1970s, portions of the Potomac River and the Nanjemoy Creek served as impact areas from ordnance testing. Both bodies of water are owned by the State of Maryland and use of the surrounding water bodies as impact areas was ceased in the early 1970. However, testing is actively conducted on adjacent Department of Defense controlled land.

From July 1974 to January 1976, testing was suspended at this facility due to the inability to retain technical personnel, as well as increased competition from private industry and other federal agencies. The potential for the sale of the property prompted the Army to investigate the feasibility of decontamination. The Army decided to buy the land from the Catholic Church, and purchased it in June 1980. The name was again changed to its present operating name – the Blossom Point Field Test Activity.

Environmental Investigations

Previous environmental assessments of the BPFTA began in 1973 with the U.S. Army Biomedical Research Team's survey of flora and fauna.

An Installation Assessment conducted in 1981 identified eight sites where chemicals, shell casings, and construction material was buried. These areas were designated Landfills 1 through 8:

- Landfill 1 was used in 1980 to dispose of rocket bodies, shell casings, fuzes, scrap metal and construction debris.

- Landfill 2 was used between 1940 and 1980 and was reported to contain shell casings, metal scraps, rubber tires and packing cases.

- Landfill 3 consists of two small pits whose locations are unknown, pit one was used to bury 200 kg of unknown chemicals from NBS laboratories and the other pit was used to dispose of police confiscated bomb materials, which included perchlorates and metals.

- Landfill 4 was used until 1982 for the disposal of construction debris, rubbish and scrap metal.

- Landfill 5 was used between 1954 and 1960 for the burial of classified fuzes that had been crushed and destroyed before burial.

- Landfill 6 was used to burn and bury out of date film in 1966.

- Landfill 7 was used in 1951 to dispose of chemicals stored at the BPFTA since 1942. It has been reported that they were disposed of in a manner to prevent the bottles from breaking.

- Landfill 8 was reportedly used to dispose of chemicals from 1965 to 1975.

Historically, in addition to the landfills, six active test ranges have also been used since 1945. A wide variety of ordnance including grenades, artillery, ballistic rockets and bombs has been fired on this range. Ranges 2, 3, 4, and 5 were used from 1942 to 1950 for testing ballistic rockets. Range 6 was an earthen embankment used to stop projectiles in a one-time test of a special small caliber weapon. The initial assessment also revealed the suspected presence of ordnance disposal areas, as well as chemical burn areas.

The Army conducted a RI in 1988 at the areas suspected to be landfills 3, 7, and 8. Groundwater samples revealed the presence of trichloroflouromethane, methylene chloride, numerous unknown organic compounds, as well as explosive compounds. Intrusive investigations that occurred at landfills 3, 7 and 8 in 1989 and at landfills 3 and 7 in 1995 did not reveal the presence of buried hazardous waste.

A shoreline stabilization project has been proposed by the Army for the western shoreline along Nanjemoy Creek in order to prevent extensive erosion to this shoreline. However, the Army has not proposed and does not plan any shoreline stabilization projects at the southern shoreline, where waste from the landfills 3 and 7 are in danger of eroding into the Potomac River.

Current Status

Blossom Point Field Test Area is currently an active U.S. Army explosives testing facility. The Army maintains that groundwater contamination within the areas of the suspected landfills is a result of current and historical operation of the firing ranges rather than leachate from the suspected hazardous waste disposal sites.

Facility Contacts

John Fairbank	Maryland Department of the Environment	(410) 537-3440
Kevin Mason	U.S. Army Research Laboratory - Adelphi	(301) 394-6313