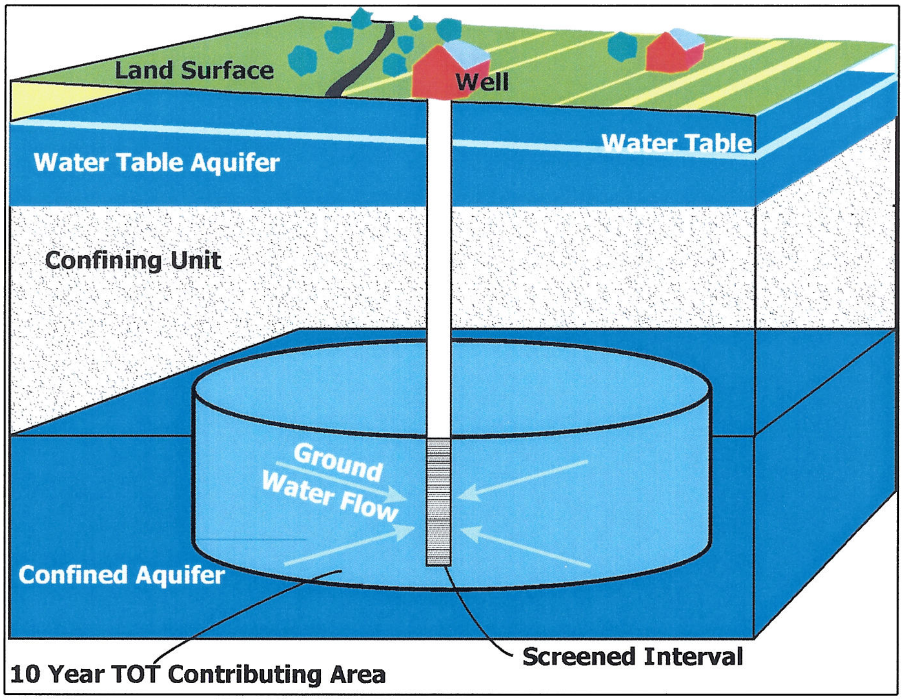
SOURCE WATER ASSESSMENT

FOR SIX NON-TRANSIENT NON-COMMUNITY WATER SYSTEMS IN TALBOT COUNTY, MD



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Summary

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted as Source Water Assessment for six (6) non-transient non-community water systems in Talbot 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 the source; 2) identification of potential sources of contamination; and, 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

Confined aquifers protect water supplies from contaminants originating on the land surface. Non-transient water supply systems in Talbot County use both confined and unconfined aquifers. Thirteen wells supply Talbot County's six non-transient systems. Through investigation of MDE records and interviewing system owners it was concluded that nine of these are completed in confined aquifers. Four wells are completed in unconfined aquifers. The Source Water Assessment Areas for all wells were delineated by the WSP using Environmental Protection Agency (EPA) approved methods specifically designed for each source.

Potential point sources of contamination within the assessment areas were identified from field inspections and contaminate inventory databases. The more common potential sources of contamination are on-site septic systems, ground water discharge sites, underground storage tanks, and hazardous substance generators commonly associated with commercial areas. In confined aquifer settings, sources of contaminant at the 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 have no grout seal. Aerial photographs showing unused wells, and spot satellite images of the wellhead protection areas are enclosed at the end of 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 the inherent vulnerability of the aquifers. It was determined that only one of the non-transient systems is susceptible to surficial contamination. Some of the non-transient non-community water systems are susceptible to naturally occurring arsenic (based on the new EPA standard). The one system with unconfined wells maybe susceptible to volatile organic compound contamination. The six systems were determined not to be susceptible to synthetic organic compounds and microbiological contaminants. This susceptibility could change if the well condition or conditions around the well change. Most of the supply sources were not found to be susceptible to these contaminants and the evidence of proper well construction practices were observed from on-site inspections throughout the county.

INTRODUCTION

The Water Supply Program (WSP) has conducted a Source Water Assessment for six non-transient non-community water systems in Talbot County (Figure 1). As defined in Maryland's Source Water Assessment Plan (SWAP), a non-transient non-community water system is any non-community water system that regularly serves at least twenty-five (25) of the same individuals over six months per year. Some good examples of non-transient water systems include schools, large businesses, and shopping malls.

Talbot County is located on the Delmarva Peninsula along the eastern shore of the Chesapeake Bay. It is bound by Queen Anne's County to the north, by Tuckahoe Creek and the Choptank River to the east and south, and by the Chesapeake Bay to the west. Based on July 2001 data, the total population of Talbot County is 34,000 persons (Md. Assoc. of Counties, 2005/2006). The County lies within the Atlantic Coastal Plain Physiographic Province. The Coastal Plain is geologically the youngest province in Maryland and covers nearly half of the State and consists entirely of unconsolidated sediments. All of the non-transient non-community water systems in Talbot County obtain their water supply from wells of various diameter and depth. Most of these wells are completed in confined aquifers, but some are using unconfined aquifers. For the purpose of this report, depth of well, lithology, and nitrate data were used to determine whether the wells are in confined or unconfined aquifers. An accurate determination of the aquifer type is very important in determining the shape of the wellhead protection area (WHPA) or source water assessment area (SWAA).

WELL INFORMATION

Well information for each system was obtained from the Water Supply Program's database, owner interviews, site visits, well completion reports, sanitary survey inspection reports, and published reports. A total of 13 wells are used by the six systems assessed in this report. The well tag number, which provides vital well information, was found for all 13 wells. From the well tag information, ground water appropriation data, and nitrate sampling data it was concluded that four wells are completed in unconfined aquifers. The remaining nine wells are completed in confined aquifers. Eight of the wells were drilled 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 one of the five wells drilled before 1972 was partially grouted around its casing. This well and the four other wells that were drilled prior to 1973, when current regulations went into effect, may not meet the current construction standards. The well completion report data was not readable for one of the wells drilled prior to 1972. Table 1 contains a summary of well information.

Accurate well location information was needed to delineate the contribution areas for the Talbot County non-transient system wells. This was obtained by using a global positioning system (GPS) unit at each of the 13 well locations. The data was then differentially corrected to increase the accuracy of the information for each location. If a well was inside a building a GPS point was taken outside the building and the offset distance was measured.

Based on site visits, most wells were in good condition and appeared to be regularly maintained, sealed, and protected to insure integrity. One of the wells had a one-piece well cap. Another well was improperly vented and another had an electrical conduit that was not completely sealed. All of these conditions may present a possible route of contamination (insects) through unscreened vents and electrical holes. One water system owns a well that is not in use, which has not been properly abandoned and sealed. 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 permanently abandoned and sealed by a licensed well driller because they represent a pathway for contamination to the aquifer.

PWSID	System Name	Plant ID	Source ID	Well Tag ID	Well Depth	Casing Depth	Year Drilled	Aquifer Code	Aquifer Type	Ground Water Appropriation
1200001	Allen Family Foods, Inc.	01	01	TA-01-6235	65	31	1954	110C	U	TA1954G002
			02	TA-02-7671	65	25	1957	110C	U	TA1954G002
			03	TA-88-0830	730	601	1992	125B	C	TA1991G019
			04	TA-73-0644	56	25	1976	110C	U	TA1954G002
			06	TA-81-0501	75	35	1984	110C	U	TA1954G002
1200015	Calhoon M.E.B.A. School	01	04	TA-94-1389	576	303	2000	125B	C	TA1969G002
			05	TA-94-0568	572	317	1998	125B	C	TA1969G002
		02	02	TA-73-0015	554	130	1972	125B	C	TA1969G002
			03	TA-69-0026	556	174	1968	125B	C	TA1969G002
1200010	Chapel District Elementary School	01	01	TA-88-1449	240	220	1994	124E	C	TA1993G001
1200007	Konsyl Pharmaceuticals	01	01	TA-73-0861	667	315	1976	125B	C	TA1976G004
1200009	Paris Foods	01	01	TA-00-0212	*	*	1946	124E	C	TA1946G001
1200008	Tilghman Elementary School	01	01	TA-92-0142	405	210	1995	125B	C	TA1969G003

Table 1. Talbot County Non-Transient Non-Community Water Systems Well Information.

*Data not legible from the well completion report.

HYDROGEOLOGY

Talbot County is located in the central Eastern Shore of Maryland and 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 to the Continental Shelf (USGS Water Supply Paper 2355-A, 1999). They consist of nearly flat-lying layers of clay, silt, sand, gravel, and shells that 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 schematic cross section showing the hydrogeologic units beneath Talbot County is shown in Figure 2 (Drummond, 2001). Note that the deeper aquifers are overlain by confining clay units of low permeability that may inhibit the infiltration of contaminants from the land surface.

All of the wells in the Talbot County draw water from unconsolidated sediments. Ground water flows through pores between gravel, sand, and silt grains in unconsolidated sedimentary aquifers. Confined aquifers are those formations that are overlain by a confining layer consisting of clay or fine silt. This confining layer allows very little water to travel vertically through it. Unconfined aquifers are those formations that do not have a continuous confining layer above them. Unconfined aquifers are also known as water table aquifers. Precipitation that falls on the ground surface infiltrates directly into the unconfined aquifer in a relatively short period of time. The unconsolidated sediments generally possess large quantities of ground water.

Non-transient water systems in Talbot County pump water from one of three aquifers, which are described in more detail below.

Quaternary System Sediments or Columbia Aquifer (110C)

The Columbia aquifer contains the youngest deposits on the Eastern Shore. It's sediments form a surface blanket over most all of Talbot County, except in some stream valleys where Miocene sediments may be exposed. Most of this formation is sand and gravel with some layers of silty clay and clay. These clay layers are broken and thin enough that true confining layers are not present. These clay layers do however slow down the percolating water somewhat. The sand thickness of the Quaternary sediments ranges from 0 to 80 feet across Talbot County. However, these variations in the sand thickness are not necessarily in relation to changes in the elevation of the land. The quantity of water available from these sediments is very high but the water quality can vary dependant upon the local soil types and land use. Water quality impacts from farming and high-density development with on-site septic systems can lead to elevated nitrate levels. Residues of agricultural herbicides and pesticides are less common, but present in some wells. Low pH along with high iron is a concern in some areas where there is more clay and silt. In these areas the percolation rate is slower allowing iron to dissolve in the water. Some sources have levels of iron high enough that the water must be treated before using (DNR, 1987).

Piney Point Aquifer (124E)

The Piney Point aquifer is sandwiched between the Cheswold aquifer above and the Aquia aquifer beneath. It is present over all but the northwestern edge of Talbot County. The sands range in thickness from 0 to 150 feet thick across the county from west to east. The Piney Point aquifer is separated from the overlying Cheswold aquifer by a thin clayey aquiclude and from the underlying Aquia aquifer by a relatively thick interval of clayey sediments. The Piney Point formation has no outcrop area and on the eastern shore its principal source of recharge is leakage from the semi-permeable confining beds of the Cheswold aquifer. Water quality is generally good and relatively uniform. A recent survey of arsenic levels in coastal plain aquifers revealed that arsenic values above the newly established maximum contaminant level (MCL) of 0.010 milligram per liter (mg/l) are not uncommon in water samples from the Piney Point aquifer.

Aquia Aquifer (125B)

The Aquia aquifer is the most widely used source of water in Talbot County. It is the deepest confined aquifer from which the Talbot County non-transient systems withdraw water. It is present over all but the southeast edge (south and east of Trappe) of Talbot County. The Aquia aquifer is bordered above and below by relatively thick layer of clayey sediments. It has sand thickness ranges from 25 feet in the southeast part of the county to greater than 175 feet in the western and northwest parts of the county. The primary recharge areas for this aquifer extends from the Potomac River Bluffs in Charles County on the western shore to the upper reaches of the Sassafras River in southeast Cecil County on the eastern shore. The outcrop area on the western shore is wide but, on the eastern shore a thin layer of Quaternary sediments covers the aquifer so that outcrops are found only along streambeds. The aquifer dips away from the outcrop area toward the southeast. Overall the water is a good source of drinking water, but the aquifer is susceptible to naturally occurring arsenic (based on the new EPA standard).

SOURCE WATER ASSESSMENT AREA DELINEATION

Within the EPA approved Maryland SWAP there are four different WHPA delineation methods used for coastal plain wells. Three of the four methods are used in this report. The delineation method to define a WHPA for a well varies with aquifer type and the amount of water pumped from the well. Monthly operation reports (MORs) and semi-annual water withdrawal reports for the past twelve months were used to determine the amount of water withdrawn from a well. If any of the pumpage data for the system was incomplete the withdrawal amounts were divided between the wells.

Unconfined Wells > 10,000 gallons per day (gpd)

Maryland's SWAP recommends using EPA's WHPA Code for delineation of systems using greater than 10,000 gpd from the unconfined Coastal Plain aquifers. This model provides a good estimate of time-of-travel zones for a well in an unconfined aquifer.

Two zones were delineated for these wells. Zone 1 is a one-year time-of-travel and is based on a maximum survival time of microbiological organisms in ground water. Zone 2 is a 10-year time-of-travel and provides adequate time for addressing chemical contamination before it can reach a well.

Four of the five wells at Allen Family Foods were evaluated using this method.

<u>Confined Wells < 10,000 gpd</u>

Maryland's SWAP prescribes using a circle with a fixed radius of 600 feet for all confined wells pumping less than 10,000 gpd. The 600-foot radius circle was calculated using the following parameters: minimum aquifer thickness of 20 feet, porosity of 0.25, and daily pumpage of less than 10,000 gpd for ten years. A more detailed explanation of this calculation is described under the next method.

This method was used to define the WHPA for the following water systems: Konsyl Pharmaceuticals, Tilghman Elementary School, Paris Foods, Chapel District Elementary School, and Calhoon M.E.B.A. School (splitting the permitted quantity between four wells lowers the amount to less than 5000 gpd).

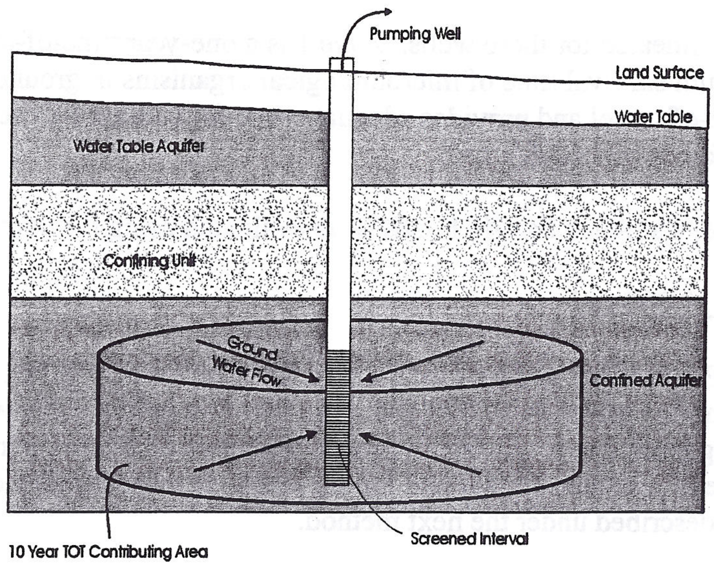
<u>Confined Wells > 10,000 gpd</u>

The "Florida Method" is used to define the WHPA for confined wells pumping more than 10,000 gpd. The area is a radial zone of transport within the aquifer and is based on a 10-year time-of-travel, the pumping rate and the screened interval(s) of the well(s) include 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 in years (yr)
n = aquifer porosity (dimensionless)
H = length of well screen (ft)

The cylinder shown in the figure below represents the aquifer zone of transport in the subsurface as illustrated below.



Conceptual illustration of a zone of transport for a confined aquifer

A conservative estimate of porosity (n) of 25% was used for each of the aquifers based on published reports. The lengths of well screens (H) were obtained from well completion reports. In the instance that a well had multiple screens, the sum of the individual screen lengths was used. The circles represent the aquifer zone of transport in the subsurface as illustrated above.

This method was used to calculate the WHPA delineation for one of the five wells located at Allen Family Foods. The source well, TA-88-0830, has a well screen length (H) of 85 feet, as obtained from the well completion report. The pumping rate (Q), 245,000 gpd, was obtained from the permitted daily average in the water appropriation permit.

Using these parameters the radius was calculated with the above equation for the WHPA delineation (Table 2). The confined aquifer well circle shown in Figures 5A and 5B and the circle shown in Figure 6 represent the aquifer zone of transport in the subsurface as illustrated below.

System/Well Name	Source ID#	Well pumpage (Q) in gpd	Well pumpage (Q) in ft3/yr	Screened interval in feet (H)	Aquifer	Calculated radius for WHPA in feet (r)	Acreage of WHPA	Comments on WHPA
ALLEN FAMILY FOODS CONFINED WELL	03	245,000	11,957,400	85	AQUIA	1338	129	
CALHOON M.E.B.A. SCHOOL	02	3750*	182,996	10	AQUIA	483	16.8	r = 600 used
	03	3750*	182,996	15	AQUIA	394	11.2	
	04	3750*	182,996	50	AQUIA	215	3.3	
	05	3750*	182,996	40	AQUIA	241	4.2	

Table 2. Parameters Used for the Wellhead Protection Area Delineations

* The total permitted allocation of 15,000 gpd was split equally among the four wells.

POTENTIAL SOURCES OF CONTAMINATION

Potential sources of contamination are classified into two types. The first type is point source contamination. Some examples of point source contamination are leaking underground storage tanks, landfills, ground water discharge permits, feed lots, large scale feeding operations, and known ground water contamination sites. Contamination 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. The second type of potential sources of contamination is non-point sources. Non-point sources are associated with certain land use practices such as pesticide and herbicide applications, land application of sludge or animal wastes, and row-crop farming, all of which may lead to ground water contamination over a large are. On-site septic systems are often referred to as non-point pollution as they are used in areas not served by public sewerage collections systems. Over 300,000 households in Maryland rely on-site sewerage disposal for domestic wastes.

In confined aquifer settings, sources of contamination at land surface are generally not a threat. Contamination problems in confined aquifers can occur where 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. Therefore, as long as there is no potential for direct injection into a deeper confined aquifer, water supplies using confined aquifers should be protected from ground water contamination.

<u>Point Sources (unconfined and confined)</u>

Two potential point sources of contamination have been identified within the WHPAs for the unconfined wells at Allen Family Foods. Both of these potential sources of contamination within the unconfined WHPAs are underground storage tanks (USTs). See Figure 5A.

There were five potential point sources of contamination identified to be within the assessment areas for the systems. Two of the potential point sources of contamination are USTs. One of these sites is an above ground storage tank. One CHS site and one groundwater discharge site are also in the assessment areas. See Figures 6 – 10. 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 located near the potential sources of contamination and completed in the water supply aquifer.

Non-Point Sources (unconfined)

The Maryland Office of Planning's 2000 Land Use map for Talbot County was used to identify predominant types of land use within the Allen Family Foods WHPA for its unconfined wells (Figure 5C). The two largest proportions of land use for the unconfined WHPA are for crops and commercial use at 73.5% and 10.7%, respectively. The next most prevalent land use is medium density residential use at 8%. These three land uses make-up 92.2% of the total unconfined WHPA land area. The next three land uses: low-density residential, industrial, and open urban use contributes the remaining 7.8%. Ground water contamination of unconfined aquifers is possible from these land uses if industrial wastes or pesticides are not properly disposed of; if a high density of on-site septic systems is within the WHPA, or if nitrogen loss from row-crops or over-fertilization of lawns occurs.

The Maryland Office of Planning 1999 Talbot County Sewer Map shows that only 4.5 percent of the county currently has sewer service (Figure 3). Another 1.5 percent is expected to have sewer service in 3 to 5 years. And an additional 0.3 percent is scheduled to receive service in 6 to 10 years. At this time there are no plans to provide any new sewer service to the majority (93.7%) of Talbot County.

WATER QUALTIY DATA

Water quality data was reviewed from the Water Supply Program's (WSP) 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. Table 3 summarizes the various treatment methods used at the water treatment plants for each of the six non-transient water systems.

PWSID	PWS_NAME	PLANT ID	TREATMENT METHOD	PURPOSE
	ALLEN FAMILY FOODS, INC.	01	NO TREATMENT	
1200015	CALHOON M.E.B.A. SCHOOL	01	PRE_GASEOUS CHLORINATION	DISINFECTION
			ION EXCHANGE	WATER SOFTENING
		02	PRE_GASEOUS CHLORINATION	DISINFECTION
1200010	CHAPEL DISTRICT ELEMENTARY	01	ION EXCHANGE	WATER SOFTENING
1200007	KONSYL PHARMACEUTICALS	01	NO TREATMENT	
1200009	PARIS FOODS	01	NO TREATMENT	
1200008	TILGHMAN ELEMENTARY SCHOOL	01	NO TREATMENT	

Table 3. Talbot County Non-Transient Non-Community Water Systems Treatment Methods.

A review of the monitoring data was conducted for each non-transient non-community water system. A summary of the water quality sampling results exceeding 50% of the Maximum Contaminant Level (MCL) is shown below in Table 4. More detailed water quality sampling results are contained in Appendix A at the end of the report.

PWSID	PWS_NAME	PLANT ID	IOCs		SOCs		VOCs	
			No. of Samples Collected	No. of samples > 50% MCL	No. of Samples Collected	No. of samples > 50% MCL	No. of Samples Collected	No. of samples > 50% MCL
1200001	ALLEN FAMILY FOODS, INC.	01	128	127	6	0	12	0
1200015	CALHOON M.E.B.A. SCHOOL	01	21	6	1	1	9	0
		02	14	5	1	0	8	0
1200010	CHAPEL DISTRICT ELEMENTARY	01	16	0	3	0	8	0
1200007	KONSYL PHARMACEUTICALS	01	17	0	3	0	10	0
1200009	PARIS FOODS	01	15	1	1	1	7	0
1200008	TILGHMAN ELEMENTARY SCHOOL	01	20	4	5	1	9	1

Table 4 . Summary of Water Quality Samples for Talbot County Non-Transient Non-Community Water Systems.

<u>Inorganic Compounds (IOCs)</u>

A review of the available data shows that nitrate and arsenic were the only IOCs detected at or above 50% of their respective MCLs (Appendix A). Nitrate over the 50% MCL was detected in all samples collected at Allen Family Foods. No other IOCs have been detected at Other detections of IOCs include: sodium (all six systems); calcium, lead, and zinc (only at Tilghman Elementary); chromium (only at Paris Foods); barium (only at Allen Family Foods); magnesium and manganese (at

Allen Family Foods & Tilghman Elementary); chloride (at Tilghman Elementary, Chapel District Elementary, & Calhoon M.E.B.A.); and sulfate and iron (at Tilghman Elementary, Allen Family Foods, Paris Foods, and Konsyl Pharmaceuticals).

Arsenic was detected above 50% of the MCL in two of the six systems, Calhoon M.E.B.A. School and Tilghman Elementary School. The arsenic standard was recently lowered from 0.050 parts per million (ppm) to 0.010 ppm by the USEPA. Arsenic was detected in wells drawing from the Aquia aquifer. No other regulated IOCs were detected at levels of concern for the six non-transient non-community systems.

Synthetic Organic Compounds (SOCs)

The only SOC detected above the 50% threshold was Di (2-Ethylhexyl) Phthalate (Appendix B). This contaminant was found in laboratory blank samples accompanying this detection, and therefore is not believed to represent water quality of the system. This SOC was also detected at low levels well below its respective MCL of 6 parts per billion (ppb) at five of the six water systems in this report.

Atrazine was detected in three samples collected at Allen Family Foods at levels many times less than its MCL of 3 ppb. This herbicide is mainly applied to corn and soybean crops to control broadleaf and grassy weeds. Dinoseb was detected in one sample at Konsyl Pharmaceuticals, again many times less than its MCL of 7 ppb. This herbicide, used primarily on soybeans and vegetables, is for post-emergence weed control. No other SOCs were detected from available sampling results for the remaining systems.

Volatile Organic Compounds (VOCs)

The only VOC reported at levels above 50% of the MCL was tetrachloroethylene (Appendix C). Repeat sampling at the facility with the elevated value did confirm the initial elevated value. Three of the six non-transient non-community water systems had VOCs detected at levels well below their respective MCLs. The detections include the compounds methyl-tert-butyl-ether, tetrachloroethene, p-dichlorobenzene, chloroform, bromoform, bromodichloromethane, and dibromochloromethane. Chloroform, bromoform, bromodichloromethane, and dibromochloromethane are all by-products of disinfection with chlorine and are not in the ground water. No other VOCs were detected from available sampling results of the remaining three systems.

Microbiological Contaminants

Raw water testing has not been required for any of the six non-transient non-community water systems in Talbot County, since the wells draw water from Coastal Plain aquifers made of unconsolidated sediments. They are considered not at risk to surface water influence.

All of the non-transient non-community systems quarterly collect bacteriological samples as required by the Safe Drinking Water Act. Since only one of the water systems disinfects their water at the treatment plants, the finished water data may be 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 of the six systems had positive total coliform results in at least one sample, back in 1997 or 1998. Follow-up samples were also found to have total coliform present (Appendix D) confirming the initial positive result. Quarterly samples taken from 1999 to present have had no positive coliform detects. No positive coliform results were reported from the remaining four water systems from samples collected since 1996.

SUSCEPTIBILITY ANALYSIS

Wells serving the Talbot County non-transient water systems all draw water from unconsolidated sedimentary aquifers. Five of the six system discussed in this report rely solely on wells in 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. This protection can be jeopardized by poorly constructed wells, wells out of use that penetrate the aquifer, or underground injection wells drilled into the aquifer. The unconfined aquifer wells are more susceptible to contamination from surface activities. Talbot County's unconsolidated sediments and soil provide protection from microbiological contamination as water percolates through the overlying soil and aquifer sediments. The lack of positive fecal samples proves this efficiency. However, nitrate and other water-soluble contaminates can percolate through the soil and contaminate unconfined wells. This is evident as shown by the elevated nitrate levels in the unconfined wells (see Appendix A) from Allen Family Foods.

Some contaminates like arsenic, iron, and fluoride are naturally occurring in the aquifer and in some instances can reach concentrations that pose a risk to the water supply. Naturally occurring contaminants present more of a risk to wells in confined aquifers than contaminants at the land surface.

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. Figure 4 illustrates the sub-crop area of the Aquia aquifer (the area where it reaches the ground surface). Note that part of this area is in Queen Anne's County, approximately 10 miles northwest of the northern-most Talbot County border. Generally, water stored in confined aquifers has traveled great distances from it origin at the ground surface. Based on time-of-travel calculations performed by MDE staff, a contaminant that enters the sub-crop area of the Aquia in Queen Anne's County could take over 50,000 years to be withdrawn from an Aquia well in the Easton area of Talbot County. The travel time of a contaminant through the very low permeability confining layers to ultimately reach the Aquia aquifer would take even more time.

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 of each system was based on current conditions and sample results. If changes occur within the WHPA or sample results for a system change, the system's susceptibility could change. Some common changes that may occur resulting in changes to a well's susceptibility are land use changes within the WHPA, an underground storage tank starts to leak, and the well becomes damaged, or changes in uses of local wells completed in the same aquifer.

Allen Family Foods

The susceptibility of Allen Family Foods' water supply to the various contaminant groups is shown in Table 5A and 5B at the end of this section. Four of the Allen Family Foods' wells draw water from an unconfined aquifer. The other well draws water from a confined aquifer. The unconfined aquifer wells are susceptible to contamination from surface activities. Talbot County's unconsolidated sediments, and soil, provide protection from microbiological contamination as water percolates through the overlying soil and aquifer sediments. However, nitrate and other water-soluble contaminants can percolate through the soil and contaminate unconfined wells. This is evident in the elevated nitrate levels in Allen Family Foods' wells (see Appendix A).

Inorganic Compound (IOCs)
Only nitrate has been detected at quantities greater than 50% of the MCL in all routine sampling events since March 1994. Of the 127 samples collected, 117 exceeded the MCL of 10 ppm. The results from this system show how land use affects water quality in the shallow aquifer. A plot of the nitrate data (at the end of this section) however, shows a downward trend over the past five years.

The WHPA for the unconfined wells is predominately cropland but also includes a number of homes on individual septic systems and the facility's wastewater holding lagoon. All of these are possible sources of the high nitrates in the ground water. Allen Family Foods' spray irrigates their effluent, but most of the irrigation area appears to be outside of the WHPA for the unconfined sources.

Some chemical elements (e.g. arsenic) are naturally occurring in the aquifer and in some instances can reach concentrations that pose a risk to water supply. In the case of confined aquifers, this is generally more problematic than contaminants at the land surface.

Based on the natural occurrence of arsenic in the Aquia aquifer, Allen Family Foods' water supply **may be susceptible** to arsenic. Testing for arsenic from the deep Aquia well is recommended. Due to the naturally protected characteristics of the confined aquifers, the water quality data, and the lack of potential sources of contamination, Allen Family Foods' water supply drawn from the confined aquifer **is not** susceptible to the other inorganic compounds. Allen Family Foods' water supply drawn from the unconfined wells **is susceptible** to nitrate contamination but not other inorganic contaminants.

Volatile Organic Compounds (VOCs)
No VOCs above 50% of the MCL have been detected in Allen Family Foods' water supply. The VOCs detected in one sample at very low levels include methyl-tert-butyl-ether, tetrachloroethene, and chloroform. There are two underground storage tanks within the WHPA for the unconfined wells.

Due to the naturally protected characteristics of the confined aquifers and the water quality data, Allen Family Foods' water supply drawn from the confined aquifer **is not susceptible** to VOCs. Due to the vulnerable nature of the unconfined aquifer and the storage of VOCs in the WHPA, Allen Family Foods' water supply drawn from the unconfined wells **maybe susceptible** to VOCs.

Synthetic Organic Compounds (SOCs)
No SOCs have been detected in Allen Family Foods' water supply above 50% of any MCL. The detection of di (2-ethylhexyl) phthalate in a few samples can be attributed to its presence in the laboratory environment. Another SOC detected at levels less than 1 parts ppb on four occasions was atrazine, one of the most heavily used herbicides in the United States. The MCL for atrazine is 3 ppb. The presence of atrazine at these levels is consistent with levels measured under agricultural land from monitoring the shallow ground water on the Eastern Shore by USGS (Denver, et al, 2004).

As levels of atrazine in Allen's water supply are not expected to rise and no other pesticide or herbicide were reported, Allen Family Foods' water supply drawn from confined and unconfined aquifers **is not susceptible** to SOC contamination.

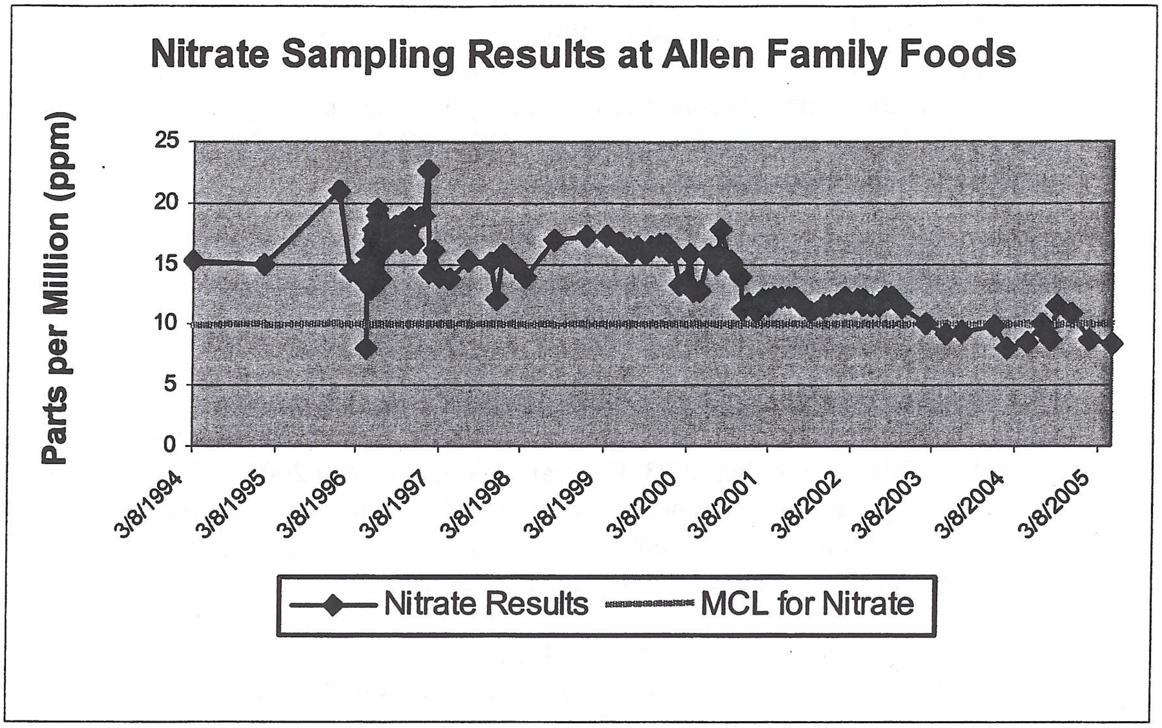
Microbiological Contaminants
Raw water monitoring for microbiological contaminants is not required of water systems in confined aquifers because they are considered naturally protected from sources of pathogens at the land surface. Routine bacteriological testing at Allen Family Foods has shown no positives for total coliform or fecal coliform. Therefore, Allen Family Foods' water supply **is not susceptible** to microbiological contaminants.

CONTAMINANT TYPE	Are Contaminant Sources present in the WHPA?	Are Contaminants detected in WQ samples at 50% of the MCL	Is Well Integrity a Factor?	Is the Aquifer* Vulnerable?	Is the System Susceptible to the Contaminant
Arsenic	NO	NO	NO	NO	NO
Inorganic Compounds (Nitrate)	YES	YES	NO	YES	YES
Volatile Organic Compounds	YES	NO	NO	YES	MAYBE
Synthetic Organic Compounds	YES	NO	NO	NO	NO
Microbiological Contaminants	YES	NO	NO	NO	NO

Table 5A. Susceptibility Chart for Allen Family Foods Water Supply Drawn from Unconfined Wells

CONTAMINANT TYPE	Are Contaminant Sources present in the WHPA?	Are Contaminants detected in WQ samples at 50% of the MCL	Is Well Integrity a Factor?	Is the Aquifer* Vulnerable?	Is the System Susceptible to the Contaminant
Arsenic	NO	NO	NO	YES	MAYBE
Other Inorganic Compounds	NO	NO	NO	NO	NO
Volatile Organic Compounds	NO	NO	NO	NO	NO
Synthetic Organic Compounds	NO	NO	NO	NO	NO
Microbiological Contaminants	NO	NO	NO	NO	NO

Table 5B. Susceptibility Chart for Allen Family Foods Water Supply Drawn from the Confined Well



<u>Other Water Systems</u>

The susceptibility of the water systems for Calhoun M.E.B.A. School, Chapel District Elementary, Konsyl Pharmaceuticals, Paris Foods, and Tilghman Elementary School is shown in Table 6 at the end of this section.

<u>Inorganic Compound (IOCs)</u>

IOCs above 50% of the MCL have been detected in the Calhoon's water supply at both plants. At Plant 1, arsenic has been detected greater than 50% of the MCL six times, February 1998, February 2000, February 2001, March 2004, and twice in June 2005. At Plant 2, arsenic has been detected greater than 50% of the MCL five times, February 1998, February 2000, March 2004, and twice in June 2005. All but two of these eleven results were equal to or greater than the newly established MCL of 10 ppb for arsenic. Other IOCs detected through routine sampling include: sodium (both plants), sulfate (plant 2), chloride (plant 1), nitrate (plant 1), chloride (plant 1), and fluoride (plant 1 and 2).

No IOCs above 50% of the MCL have been detected in the Chapel District Elementary water supply. Other IOCs that have been detected through routine sampling include sodium and chloride.

One IOC, fluoride, has been detected three times (1994, 1997, and 2003) in the Konsyl Pharmaceuticals' water supply. No levels exceeded the secondary standard of 2 ppm. Non-transient non-community water systems are not required to meet the primary drinking water standard of 4 ppm. Other IOCs detected through routine sampling include: iron, sodium, and sulfate.

No IOCs above 50% of the MCL have been detected in the Paris Foods' water supply. Other IOCs that have been detected through routine sampling include: iron, sodium, sulfate, chromium, and nitrate.

IOCs above 50% of the MCL have been detected in the Tilghman Elementary water supply. Arsenic has been detected greater than 50% of the MCL four times, November 1994, September 2003, February 2005, and May 2005. Three of the four samples were greater than the newly established MCL of 10 ppb for arsenic. Other IOCs detected through routine sampling include: iron, sodium, sulfate, chloride, nitrate, calcium, lead, magnesium, manganese, and zinc.

Some chemical elements (e.g. arsenic and fluoride) are naturally occurring in the aquifer and in some instances can reach concentrations that pose a risk to water supply. In the case of confined aquifers, this is generally more problematic than contaminants at the land surface.

Based on the natural occurrence of arsenic in the aquifer and its presence in the water samples, the water systems serving Calhoon M.E.B.A. School and Tilghman Elementary School **are susceptible** to arsenic. Due to the naturally protected characteristics of the confined aquifers, the water quality data, and the lack of potential sources of contamination, these system's water supplies **are not susceptible** to contamination from other inorganic compounds.

Volatile Organic Compounds (VOCs)
Only one of the six non-transient non-community water systems, Tilghman Elementary School, had VOCs measured above 50% of any MCL in their water supply. The only parameter detected more than 50% of a MCL was tetrachloroethylene. None of the other eight VOC samples collected had any tetrachloroethylene. Other VOCs detected at very low levels include: chloroform and p-dichlorobenzene at Tilghman Elementary School; and chloroform, bromoform, bromodichloromethane, and dibromochloromethane at Calhoon M.E.B.A.'s Plant 1. These compounds are formed as a result of chlorine reacting with natural organic compounds in the water during disinfection and are known as trihalomethanes. The maximum contaminate level for total trihalomethanes is 80 ppb.

Due to the naturally protected characteristics of the confined aquifers, the water quality data, and the lack of potential sources of contamination in the aquifers, the water supplies drawing water from confined aquifers **are not susceptible** to volatile organic compounds.

Synthetic Organic Compounds (SOCs)
No SOCs were detected in of the water supplies for the six non-transient non-community water systems above the 50% of the MCL. The detection of di (2-ethylhexyl) phthalate at Calhoon M.E.B.A., Chapel District Elementary, Paris Foods, and Tilghman Elementary can be attributed to its presence in the laboratory environment. An SOC detected in Konsyl Pharmaceuticals water supply at a very low quantity was dinoseb, an herbicide. It has not been detected in routine sampling both prior to and subsequent to 1998.

Based on the above analysis, the water supplies for the five water systems **are not susceptible** to SOC contamination.

Microbiological Contaminants
Raw water monitoring for microbiological contaminants is not required of water systems in confined aquifers because they are considered naturally protected from sources of pathogens at the land surface. Routine bacteriological testing for total coliform at two of the six water systems showed positive results for total coliform. Chapel District Elementary had a positive result in September 1998 and Paris Foods had positive results in June 1997, September 1998, October 1998, and December 1998. Quarterly samples collected at both of these systems since these dates for total coliform and fecal coliform had shown any positive samples. Therefore, the five water supplies **are not susceptible** to microbiological contaminants.

PWSID	SYSTEM NAME	Is the Water System Susceptible to....				
		Inorganic Compounds (except arsenic)	Arsenic	Volatile Organic Compounds	Synthetic Organic Compounds	Microbiological Contaminants
1200007	KONSYL PHARMACEUTICALS	NO	NO	NO	NO	NO
1200008	TILGHMAN ELEMENTARY SCHOOL	NO	YES	NO	NO	NO
1200009	PARIS FOODS	NO	NO	NO	NO	NO
1200010	CHAPEL DISTRICT ELEMENTARY SCHOOL	NO	NO	NO	NO	NO
1200015	CALHOON M.E.B.A. SCHOOL	NO	YES	NO	NO	NO

Table 6. Susceptibility Analysis Summary

MANAGEMENT OF THE SOURCE WATER ASSESSMENT AREA

With the information contained in this report, the individual non-transient non-community water systems in Talbot County may be better able to protect their water supplies by staying aware of the areas delineated for source water protection. Specific management recommendations for consideration are listed below. The following recommendations are intended for individual water systems.

Monitoring

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

Arsenic

Those whose arsenic concentrations exceed the new lower standard of 0.010 ppm should consider locating water in a different aquifer with acceptable water quality, where possible.

Contaminant Source Inventory Updates

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.

Well Inspection/Maintenance

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. All unused wells must be abandoned and seal as per State well construction regulations.

Based on well completion records there is an unused well at Paris Foods that is not being used. This well is completed in two aquifers which is not in compliance with current well construction regulations. As the facility's water needs are significantly less than what was needed when the well was drilled, this unused well should be located and then properly abandoned and sealed in accordance with Maryland's well construction regulations.

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.

Wells 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 onto wells that have one-piece caps.

Changes in Use

The system is required to notify the MDE Water Supply Program if new wells are to be added or an increase in water usage is proposed. An increase in use or the addition of new wells may require revisions to the WHPA.

References

Maryland Association of Counties, Directory of County Officials – 2005/2006, pp. 239.

Maryland Department of the Environment (MDE), Water Supply Program, 1999, Maryland's Source Water Assessment Plan.

Maryland Department of Natural Resources (DNR), 1987, The Quantity and Natural Quality of Ground Water in Maryland: DNR Water Resources Administration.

U.S. Department of the Interior and U.S. Geological Survey, 2004, Water Quality in the Delmarva Peninsula, Delaware, Maryland, and Virginia, 1999-2001, Circular 1228, pp. 27.

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

Other Sources of Data

Water Appropriation and User Permits
MDE Water Supply Program (PDWIS) Database
MDE Waste Management Sites Database
Department of Natural Resources Digital Orthophoto Quarter Quadrangles
USGS Topographic 7.5 Minute Quadrangles
Maryland Office of Planning 2002 Talbot County Land Use Map
Maryland Office of Planning 1999 Talbot County Sewer Map
ADC Maps of Talbot County
SpecPrint Tax Maps of Talbot County
Maryland Department of Assessments and Taxation Real Property Database

FIGURES

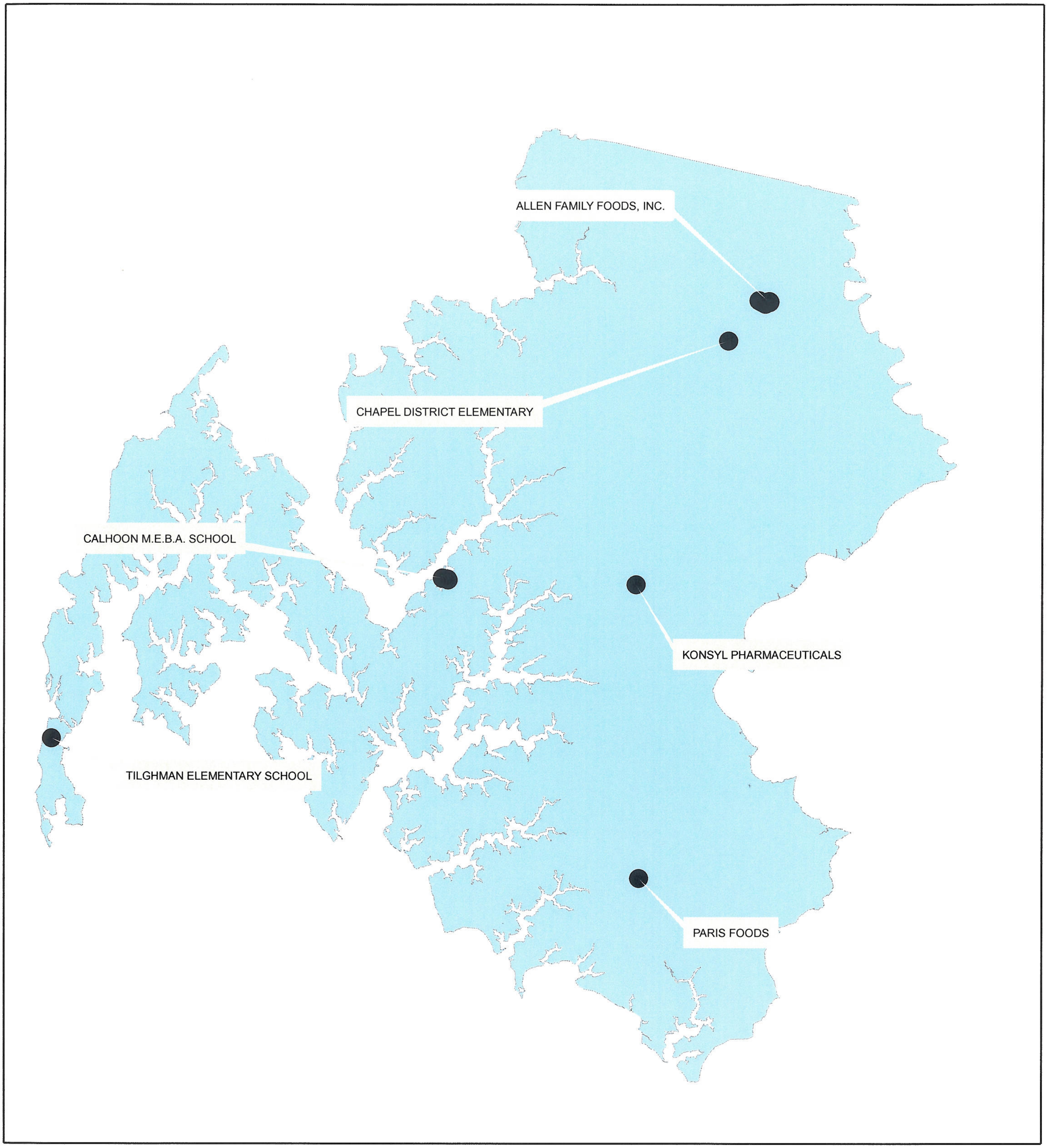
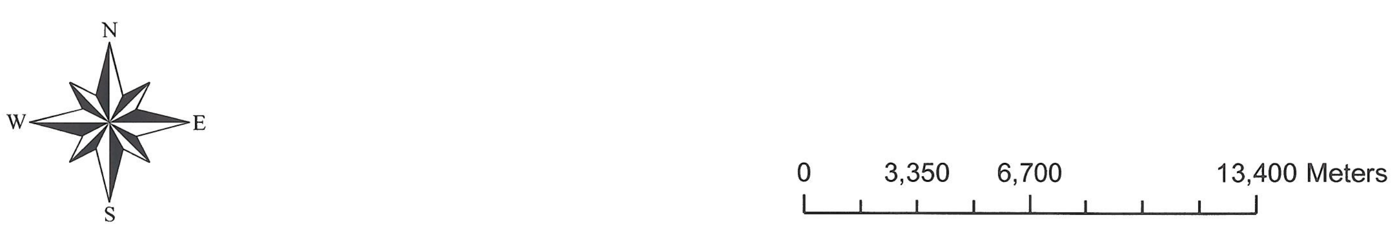


Figure 1. Talbot County Non-Transient Non-Community Water Systems



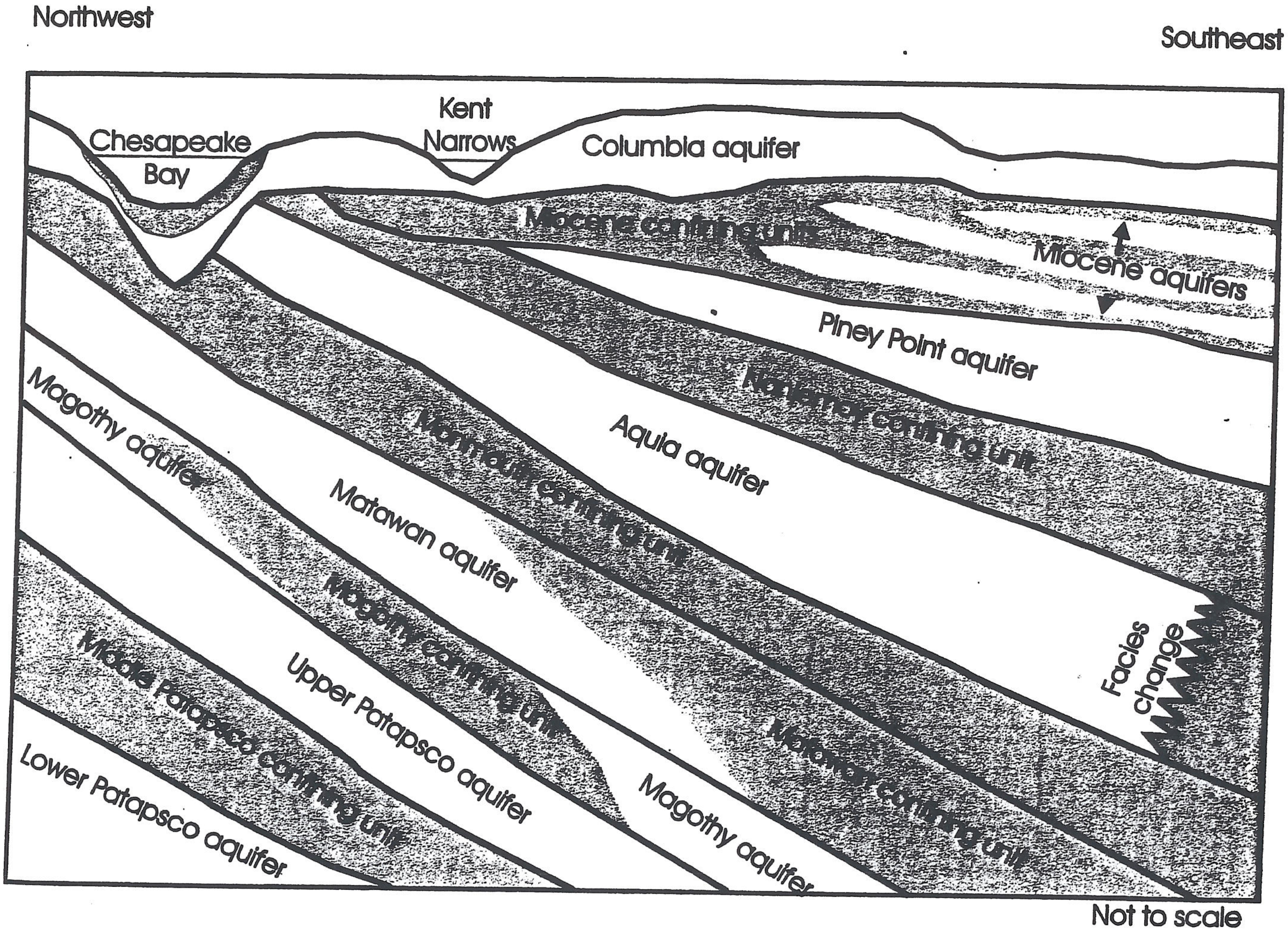


Figure 2. Schematic cross section showing the hydrogeologic units beneath Queen Anne's and Talbot Counties.

From MGS Report of Investigations No. 72 By David D. Drummond, 2001

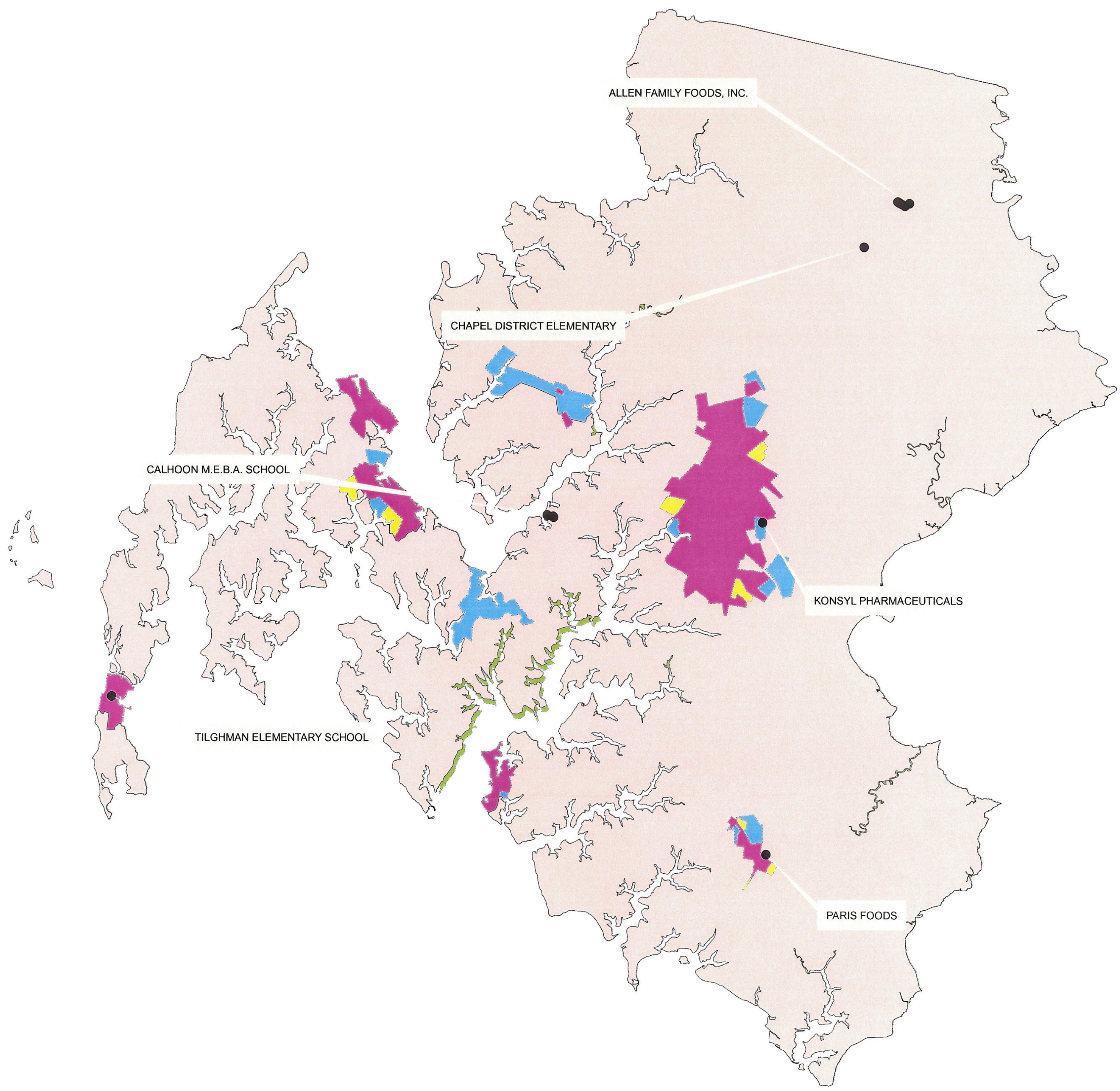


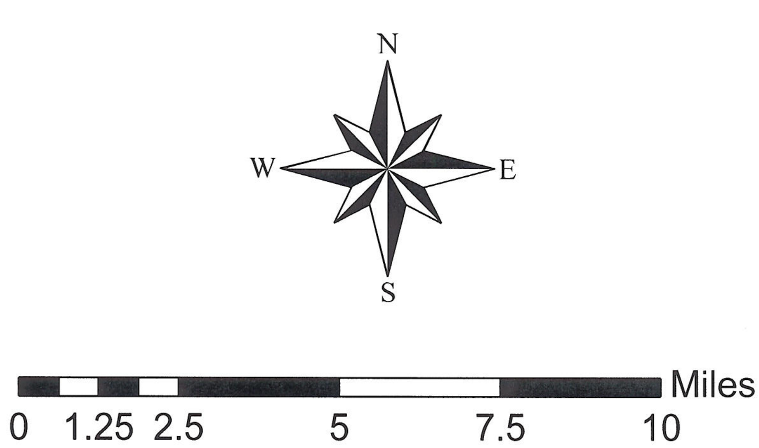
Figure 3. Talbot County Sewer Service Areas

Legend

• NTNC Water System

Talbot County Sewer Service Categories

- No Planned Service Area
- Existing Service Area
- Planned Service Area w/in 3-5 years
- Planned Service Area w/in 6-10 years



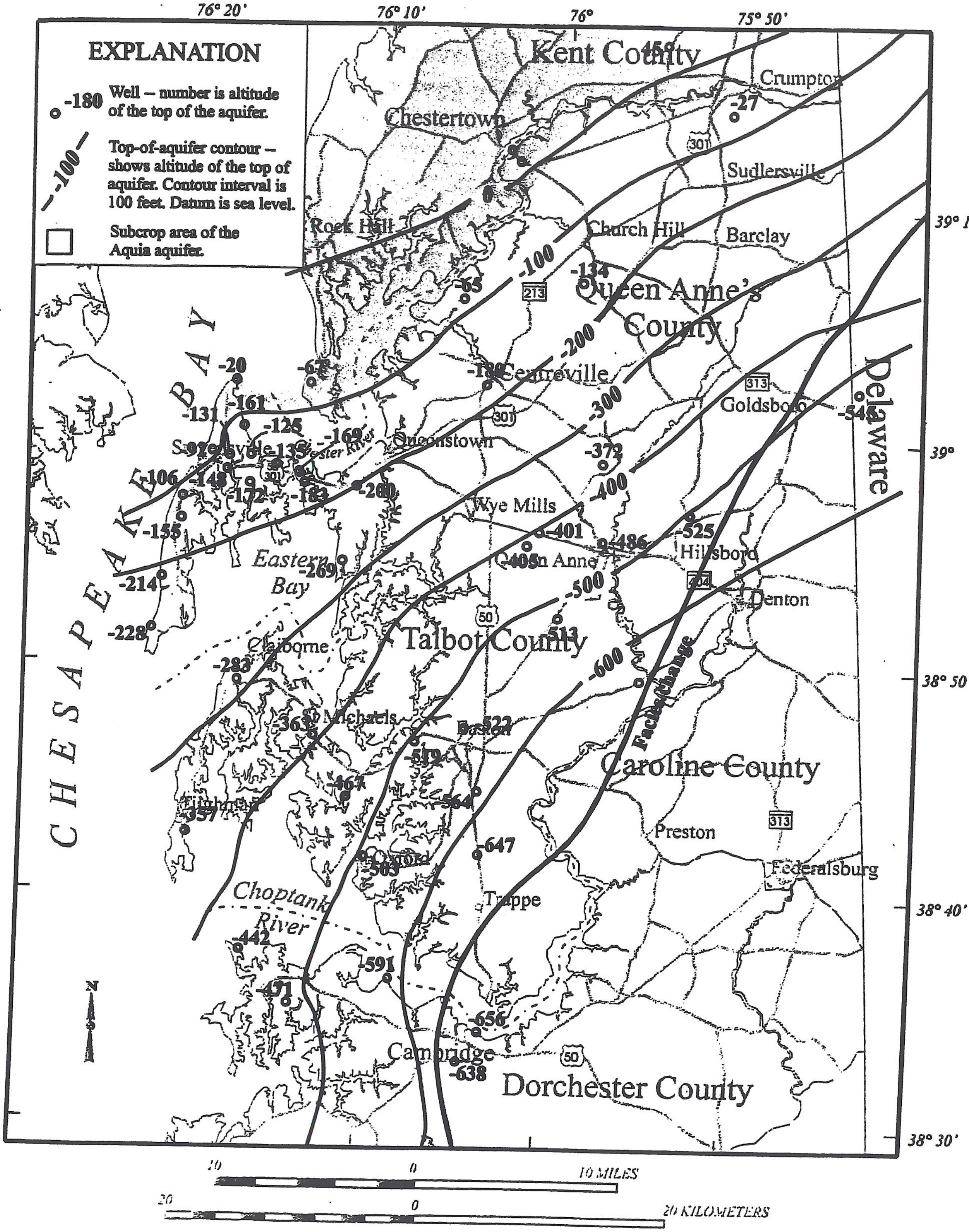


Figure 4. Altitude of the Top of the Aquia Aquifer

From MGS Report of Investigations No. 72 By David D. Drummond, 200

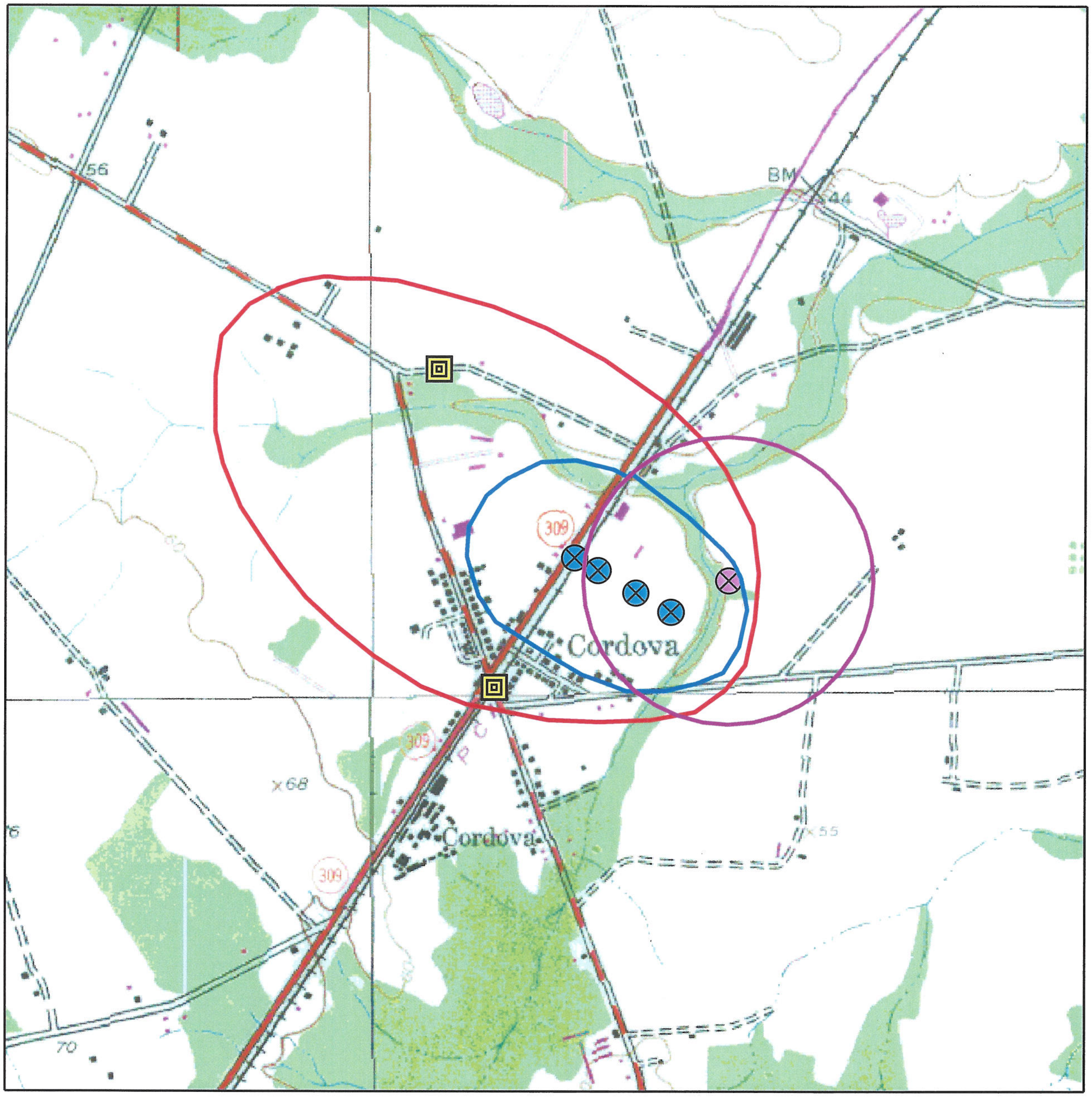


Figure 5B. Allen Family Foods Wellhead Protection Area

Legend

- Unconfined Aquifer Wells
- 1-YR Time of Travel Zone
- 10-YR Time of Travel Zone
- Confined Aquifer Well
- Underground Storage Tank
- Confined Well Wellhead Protection Area

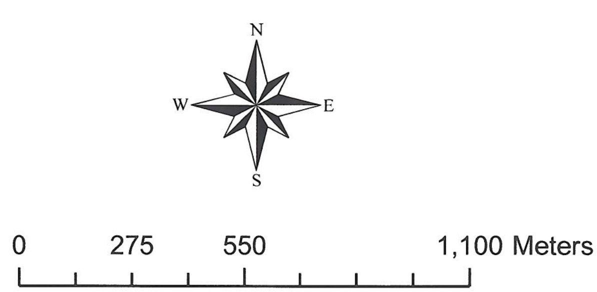


Photo Source: USGS Wye Mills Quadrangle

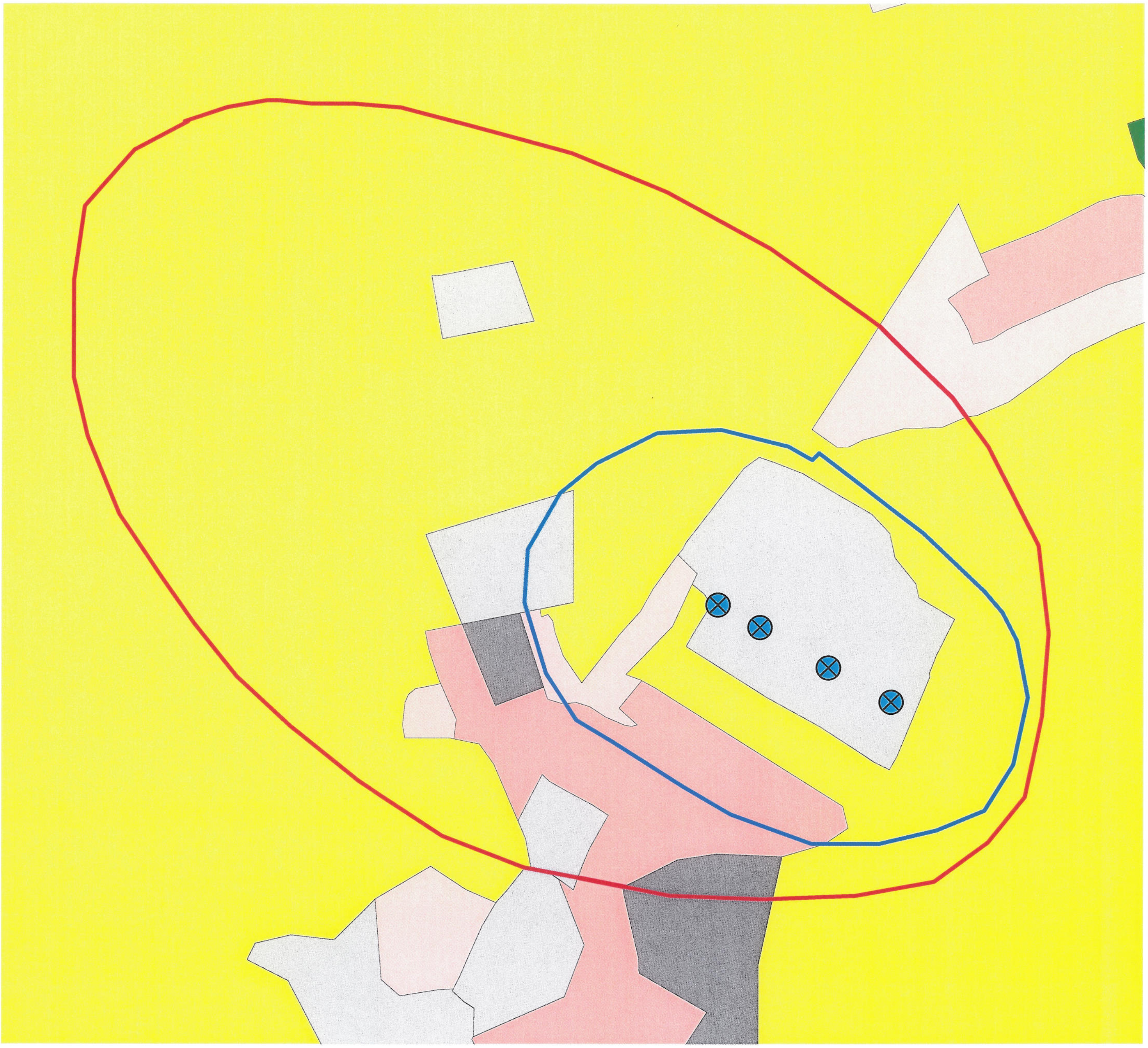
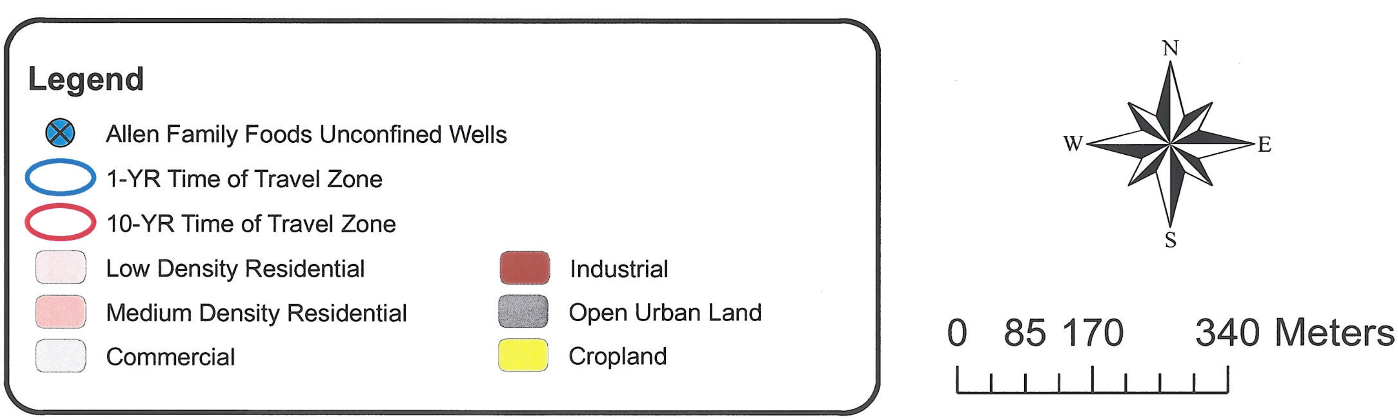


Figure 5C. Allen Family Foods Unconfined Wells WHPA Land Use



APPENDIX

APPENDIX A - INORGANIC COMPOUNDS EXCEEDING 50% OF THE MCL

PWSID	PWS_NAME	PL	CONTAM_NAME	MCL	SAMPLE_DA	RESULT
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	8-Mar-94	15.3
					19-Jan-95	14.9
					12-Dec-95	21
					14-Dec-95	20.9
					8-Feb-96	14.4
					2-Apr-96	13.8
					4-Apr-96	13.9
					16-Apr-96	15
					18-Apr-96	8.1
					18-Apr-96	15.7
					23-Apr-96	14.2
					25-Apr-96	13.9
					30-Apr-96	14.2
					2-May-96	14.3
					7-May-96	14.7
					9-May-96	13
					14-May-96	17.8
					16-May-96	16.9
					21-May-96	16.7
					23-May-96	17.4
					28-May-96	17.3
					30-May-96	19
					4-Jun-96	19.5
					6-Jun-96	17.3
					11-Jun-96	18.2
					13-Jun-96	18.6
					18-Jun-96	15.9
					20-Jun-96	16.6
					24-Jun-96	13.8
					11-Jul-96	18
					30-Jul-96	17.5
					8-Aug-96	16.7
					22-Aug-96	18.1
					19-Sep-96	16.8
					24-Sep-96	18.4

PWSID	PWS_NAME	PL	CONTAM_NAME	MCL	SAMPLE_DA	RESULT
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	10-Oct-96	17.8
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	24-Oct-96	18.8
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	24-Oct-96	18.8
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	14-Nov-96	16.6
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	12-Dec-96	18.8
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	26-Dec-96	18.9
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	16-Jan-97	22.7
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	16-Jan-97	22.7
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	23-Jan-97	14.3
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	13-Feb-97	16.1
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	13-Mar-97	13.9
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	24-Apr-97	13.7
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	17-Jul-97	15.3
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	23-Oct-97	15.1
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	13-Nov-97	12.1
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	11-Dec-97	15.7
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	15-Jan-98	15.15
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	4-Feb-98	14.9
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	19-Mar-98	14
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	28-Jul-98	17
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	17-Dec-98	17.31
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	17-Dec-98	17.31
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	18-Mar-99	17.3
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	18-Mar-99	17.3
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	11-May-99	16.8
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	22-Jun-99	16.2
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	7-Jul-99	15.9
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	3-Aug-99	16.4
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	7-Sep-99	15.8
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	27-Sep-99	16.5
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	3-Nov-99	16.4
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	3-Nov-99	16.6
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	7-Dec-99	16.6
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	21-Dec-99	15.9
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	4-Jan-00	15.9

PWSID	PWS_NAME	PL	CONTAM_NAME	MCL	SAMPLE_DA	RESULT
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	7-Feb-00	13.3
					2-Mar-00	13.6
					16-Mar-00	15.8
					4-Apr-00	12.7
					2-May-00	12.8
					6-Jun-00	15.8
					11-Jul-00	14.9
					27-Jul-00	15.7
					1-Aug-00	17.8
					14-Sep-00	15
					19-Sep-00	15.2
					28-Sep-00	15
					30-Oct-00	14
					7-Nov-00	11.3
					6-Dec-00	11.7
					9-Jan-01	11
					6-Feb-01	12.1
					3-Mar-01	11.5
					7-Mar-01	12.1
					3-Apr-01	12.3
					1-May-01	12.3
					5-Jun-01	12.3
					5-Jul-01	12.2
					7-Aug-01	11.6
					11-Sep-01	11.1
					2-Nov-01	11.5
					6-Nov-01	11.4
					5-Dec-01	11.6
					2-Jan-02	11.7
					2-Feb-02	11.7
					7-Feb-02	12.3
					13-Feb-02	11.8
					13-Feb-02	11.8
					6-Mar-02	11.8
					6-Mar-02	11.8

PWSID	PWS_NAME	PL	CONTAM_NAME	MCL	SAMPLE_DA	RESULT
1200001	ALLEN FAMILY FOODS, INC.	1	NITRATE	10	3-Apr-02	12
					1-May-02	12.1
					7-May-02	11.5
					5-Jun-02	11.6
					11-Jul-02	11.6
					8-Aug-02	12.2
					15-Aug-02	12
					5-Sep-02	12.3
					24-Oct-02	11.4
					6-Feb-03	10
					6-May-03	9.2
					22-Jul-03	9.4
					9-Dec-03	9.9
					3-Feb-04	8
					27-Apr-04	8.5
					7-Jul-04	10
					20-Jul-04	9.2
					4-Aug-04	8.67
					1-Sep-04	11.5
					4-Nov-04	10.9
					27-Jan-05	8.8
					5-May-05	8.4

PWSID	PWS_NAME	PL	CONTAM_NAME	MCL	SAMPLE_DA	RESULT
1200007	KONSYL PHARMACEUTICALS	1	FLUORIDE	4	25-May-94	2
		1	ARSENIC	0.01	2-Nov-94	0.009
					23-Sep-03	0.014
					1-Feb-05	0.0111
					5-May-05	0.012
1200009	PARIS FOODS	1	RADON-222	300	28-Mar-01	160
1200015	CALHOON M.E.B.A. SCHOOL	1	ARSENIC	0.01	10-Feb-98	0.012
					22-Feb-00	0.012
					15-Feb-01	0.015
					31-Mar-04	0.014
					23-Jun-05	0.005
					23-Jun-05	0.0094
			FLUORIDE	4	9-Nov-95	2.5
		2	ARSENIC	0.01	10-Feb-98	0.013
					22-Feb-00	0.01
					31-Mar-04	0.015
					23-Jun-05	0.0121
					23-Jun-05	0.013
			FLUORIDE	4	9-Nov-95	2.5

APPENDIX B - SYNTHETIC ORGANIC COMPOUNDS EXCEEDING 50% OF THE MCL

PWSID	PWS_NAME	PLANT ID	CONTAMINANT	MCL	SAMPLE DATE	RESULT
1200008	TILGHMAN ELEMENTARY SCHOOL	1	DI(2-ETHYLHEXYL) PHTHALATE	6	23-Sep-03	5.1
1200009	PARIS FOODS	1	DI(2-ETHYLHEXYL) PHTHALATE	6	22-Apr-02	3.8
1200015	CALHOON M.E.B.A. SCHOOL	1	DI(2-ETHYLHEXYL) PHTHALATE	6	11-Mar-02	5.7

APPENDIX C - VOLATILE ORGANIC COMPOUNDS EXCEEDING 50% OF THE MCL

PWSID	PWS_NAME	PLANT ID	CONTAMINANT	MCL	SAMPLE DATE	RESULT
1200008	TILGHMAN ELEMENTARY SCHOOL	1	TETRACHLOROETH YLENE	5	23-May-95	4

APPENDIX D - BACTERIOLOGICAL SAMPLES EXCEEDING 50% OF THE MCL

PWSID	PWS_NAME	SAMPLE DATE	NUM_RTN_TAKEN	NUM_RTN_TC_POS	NUM_RTN_FECAL_POS	NUM_RTN_INDETERM	NUM_RPT_TAKEN	NUM_RPT_TC_POS	NUM_RPT_FECAL_POS	NUM_RPT_INDETERM
1200009	PARIS FOODS	1-Jun-97	1	1	0	0	4	2	0	0
		1-Sep-98	1	1	0	0	0			
		1-Oct-98	1	1	0	0	9	4		
		1-Dec-98	1	1	0	0	5	2	0	0
1200010	CHAPEL DISTRICT ELEMENTARY	1-Sep-98	1	1	0	0	4	4		