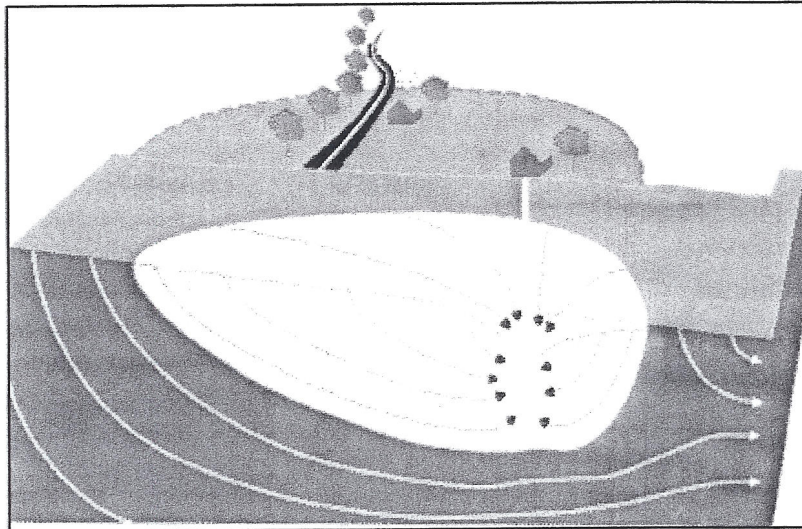


**SOURCE WATER ASSESSMENT
FOR W.L. GORE AT CHERRY HILL
CECIL COUNTY, MD**

*our copy
others had
colored covers*



**Prepared By
Water Management Administration
Water Supply Program
December 2005**



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Governor

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SUMMARY

The Maryland Department of the Environment's (MDE's) Water Supply Program (WSP) has conducted a Source Water Assessment for W.L. Gore & Associates, Inc.'s Cherry Hill Plant located near Elkton in Cecil County, Maryland. This report delineates the area that contributes water to the drinking water wells, identifies potential sources of contamination within the area and determines the susceptibility of the water supply to contamination. Recommendations for protecting the water supply conclude the report.

The source of the plant's potable water supply is a fractured-rock aquifer known as the Port Deposit Gneiss. The system uses three wells to obtain its drinking water supply. The Wellhead Protection Area was delineated using by the WSP using EPA-approved methods.

Point sources of contamination were identified within and near the assessment area from field inspections and MDE databases. The Maryland Department of Planning's 2002 land use map for Cecil County was used to identify non-point sources of contamination. Maps showing location of the wells, potential sources of contamination, and land use are included at the end of this report.

The susceptibility analysis is based on a review of existing water quality data for the water system, the presence of potential sources of contamination, in the assessment area, well integrity and the inherent vulnerability of the aquifer. It was determined that the Cherry Hill Plant's water supply is susceptible to nitrates and to volatile organic contaminants. It is not susceptible to synthetic organic compounds, other inorganic compounds, fecal coliform or protozoans like *cryptosporidia* and *giardia*. To reduce the risk of bacterial contamination, the water system should evaluate the integrity of the casings for both wells and abandon any unused wells on the property. Also, Well 1, which is located next to a road, has no protective structures around it. A structure to protect it from traffic is recommended.

INTRODUCTION

The Water Supply Program has conducted a Source Water Assessment for W.L. Gore & Associates, Inc.'s Cherry Hill Plant located in Cecil County, Maryland. The facility operates its own water treatment plant and uses three wells, which supply the water treatment plant.

As defined as part of Maryland's Source Water Assessment Plan (SWAP), "large systems" are community and non-community water systems that have water appropriation and use permits with average annual appropriation permit exceeding 10,000 gpd. The Cherry Hill Plant's water appropriation and use permit allows for an average annual water use of 55,500 gpd, however, most of the water is used for cooling water, process water and ground water remediation. The plant has about 200 employees and average annual water use for potable and sanitary uses is about 2,000 gpd.

HYDROGEOLOGY

The Cherry Hill Plant is located about four miles north of Elkton (Figure 1). This region is underlain by metamorphic rock. The 1986 Geologic Map of Cecil County designates the underlying rock Gneiss at Rolling Mill. Older literature labels it Port Deposit Gneiss. The rock is described as "Medium Gray, fine- to medium-grained, biotite-quartz-plagioclase gneiss, commonly with crystals of magnetite and tiny garnets. Contacts are very poorly exposed but apparently are gradational and/or interfingering with units of the James Run Formation." In such rocks, water is stored in fractures and in the overlying saprolite and soils. The ground water is generally unconfined and the water table mimics the surface topography. Well yields are dependent on the number and nature of fractures penetrated by the well. Yields range from 1 to 200 gpm, with median yield around 10 gpm.

WELL INFORMATION

Well information for the system was obtained from the Water Supply Program's database, site visits, well completion reports and sanitary survey inspection reports. The plant is served by three potable supply wells that are listed in Table 1. The Appendix consists of copies of the applications to drill the wells and the well completion reports for those wells. There are also six remediation wells on the property. The water from the remediation wells is treated and used for cooling and process water. Since their water is not used for drinking water source waters for those wells have not been included in this report.

TABLE 1. WELL INVENTORY

WELL #	PERMIT #	TOTAL DEPTH	CASING DEPTH	YEAR DRILLED	COMMENTS
WELL 1	CE720386	400'	42'	1972	located along road
WELL 2	CE732923	400'	50'	1979	
WELL 3	CE811412	560'	60'	1985	

SOURCE WATER ASSESSMENT AREA DELINEATION

For ground water systems, a Wellhead Protection Area (WHPA) is considered to be the source water assessment for the system. As defined by Maryland's SWAP, the wellhead protection area for a public water system using less than 10,000 gallons per day whose wells are completed in fractured crystalline rock is a radius of 1,000 feet around the production wells. The water supply wells are located on a topographic high and ground water flow in the vicinity of the Cherry Hill Plant has been altered by the ground water remediation on the property. The WHPA around the water supply wells has been enlarged to a radius of 1,700 feet to account for the impact of their remediation and on-site usage. Figure 2 shows the 208-acre Wellhead Protection Area (WHPA) that was delineated, which is more than adequate to meet the daily average ground water recharge for this system.

POTENTIAL SOURCES OF CONTAMINATION

Potential sources of contamination can be classified as either point or non-point sources. Examples of point sources are underground storage tanks, ground and surface water discharges, landfills, animal feeding operations, and ground water contamination sites. These sites are usually associated with commercial or industrial facilities that use chemicals that may, if handled inappropriately, contaminate ground water via a discrete point location. Non-point sources are associated with land use practices, such as use of pesticides, fertilizer, animal wastes or septic systems, that lead to ground water contamination over a larger area.

Point sources of contamination were identified within and near the assessment area from field inspections and from MDE Water and Waste Management databases. Figure 2 is a topographic map showing potential sources of contamination within and near the WHPA. Three potential contamination sources were found. The closest source is a ground water clean up at the Cherry Hill Plant itself. Impacted ground water is contained on site by a series of recovery wells, treated to remove VOC's, and then returned to the subsurface through an infiltration gallery. There are also two underground storage tanks along Singlerly Road.

The Maryland Department of Planning's 2002 land use map for Cecil County was used to identify non-point sources of contamination (Figure 3). Several land use categories were identified within the delineated WHPA (Table 2). The predominant land use within the WHPA is orchards.

TABLE 2. LAND USE SUMMARY FOR THE WELLHEAD PROTECTION AREA

Land Use Categories	Total Area (acres)	Percentage of WHPA
Orchard	65.6	31.5
Industrial	37.6	18.0
Forest	33.1	15.9
Cropland	31.2	15.0
Commercial	25.8	12.4
Low Density Residential	15.1	7.2

The Maryland Department of Planning's Cecil County 2004 Sewer Map (Figure 4) indicates that the Cherry Hill Plant is served by public sewer. The sewer system runs along Singerly Road and serves most of the neighboring water users (Table 3). Most of the WHPA area, which consists of cropland, orchard and forest, is designated no planned service area.

TABLE 3. SEWER SERVICE SUMMARY FOR THE WELLHEAD PROTECTION AREA

Sewage Service Area	Total Area (acres)	Percentage of WHPA
Existing Service Area	72	34
No Planned Service	136	65

WATER QUALITY DATA

Water quality data from the Water Supply Program's (WSP) database was reviewed for Safe Water Drinking Act (SWDA) contaminants. In accordance with Maryland's SWAP, data submitted by the owner/operator of the system was compared with the Maximum Contaminant Levels (MCLs). If monitoring data is greater than 50% of the MCL, the assessment will describe the typical sources of that contaminant and locate the possible sources of the contaminant for this site. At the Cherry Hill Plant, drinking water is treated with post hypochlorination, ultraviolet radiation, activated carbon granules and cartridge filtration.

Inorganic Compounds (IOCs)

Two inorganic compounds were detected in quantities greater than 50% of the MCL. Nitrate has been measured numerous times during the past eleven years. Before 1997, nitrate was present at levels of less than half the MCL of 10 ppm. It appears to be gradually increasing (Figure 4). The high nitrates may be attributed to fertilizer that is applied to the large orchard that is located immediately west of the wells. On-site fertilization of the facility's gardens, trees and grounds can also be a source of elevated nitrates. In 2003 to 2005, nitrate levels ranged from 6.1 ppm to 8.1 ppm.

Table 4. Inorganic Compounds Detected Above 50% of the MCL

CONTAMINANT NAME	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
NITRATE	10	7-Nov-97	5.8
NITRATE	10	29-Jan-98	5.47
NITRATE	10	15-Jun-99	5.09
NITRATE	10	3-Dec-99	5.58
NITRATE	10	7-Feb-00	5.4
NITRATE	10	5-May-00	5.4

Table 4 continued:

NITRATE	10	1-Sep-00	7.1
NITRATE	10	8-Dec-00	6.32
NITRATE	10	1-Nov-01	7.34
NITRATE	10	21-Dec-01	6
NITRATE	10	21-Dec-01	6
NITRATE	10	9-Dec-02	7.35
NITRATE	10	10-Jan-03	7.52
NITRATE	10	4-Mar-03	7.5
NITRATE	10	7-Mar-03	7.87
NITRATE	10	11-Apr-03	7.31
NITRATE	10	2-May-03	8.13
NITRATE	10	6-Jun-03	7.23
NITRATE	10	7-Jun-03	7.23
NITRATE	10	5-Sep-03	8.09
NITRATE	10	5-Dec-03	6.38
NITRATE	10	5-Mar-04	5.56
NITRATE	10	4-Jun-04	7.18
NITRATE	10	3-Sep-04	7.25
NITRATE	10	3-Dec-04	7.15
NITRATE	10	7-Mar-05	6.58
NITRATE	10	1-Apr-05	6.5
NITRATE	10	6-May-05	6.08
NITRATE	10	3-Jun-05	6.9

Volatile Organic Compounds (VOCs)

A review of the data indicates that no from 1997 to 2000, methyl tert butyl ether levels ranging from 0.9 ppb to 9.0 ppb. Chloroform levels ranging from 0.7 ppb to 3.6 ppb were detected from 2001 to 2004. Trichloroethane and dibromochloromethane were each detected once at levels of 2.5 ppb and 2.8 ppb respectively. Chloroform and dibromochloromethane are both disinfection by products and therefore are not related to ground water contamination.

Synthetic Organic Contaminants (SOCs)

A review of the data indicates that no SOC's have been detected above 50% of the MCL.

Microbiological Contaminants

Routine bacteriological monitoring, which measures total coliform bacteria, is conducted in the finished water for each noncommunity water system on a quarterly basis. Total coliform bacteria are not pathogenic but are used as indicator-organisms for other disease-causing microorganisms. No microbiological contaminants were found in samples from 1996 to 2005. In 2002, additional raw water samples were collected for an evaluation of the sensitivity of the supply wells to microorganisms found in surface water, such as

giardia or cryptosporidium. Initial samples showed low levels of coliform organisms, but after chlorination, flushing and resampling, no coliform organisms were detected.

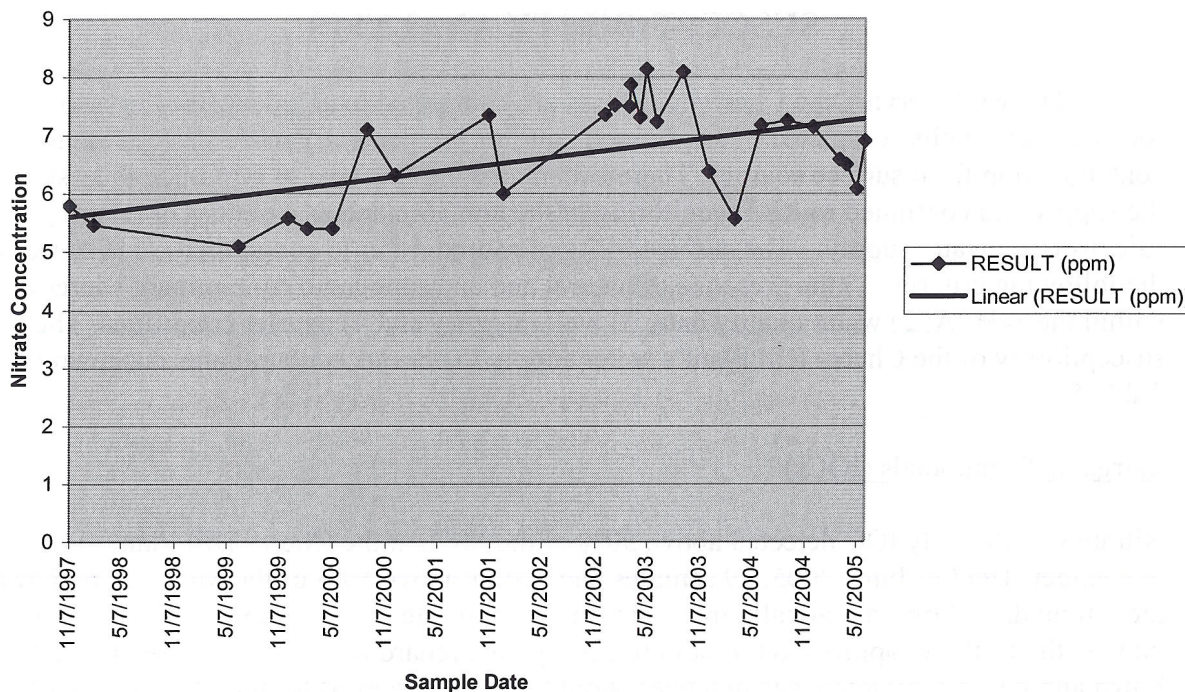
SUSCEPTIBILITY ANALYSIS

The wells serving the Cherry Hill Plant are completed in an unconfined crystalline rock aquifer. Wells completed in unconfined aquifers are generally more susceptible to contamination from surface sources. Therefore, managing this area to minimize the risk to the supply and continued routine monitoring of the contaminants is essential in assuring a safe drinking water supply. The susceptibility of source water to contamination is 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) aquifer conditions. The susceptibility of the Cherry Hill Plant's water supply to various contaminants is shown in Table 5.

Inorganic Compounds (IOCs)

Nitrate was the only IOC detected above 50% of the MCL at the Cherry Hill Plant. From November, 1997 to June, 2005, 29 samples had results above 50% of the MCL. A review of the nitrate data shows a gradually increasing trend in nitrate levels. The source of nitrate may be the fertilizer applied to but not utilized by the orchard that is located next to wells. Lawn and grounds maintenance practices should also be reviewed for the plant and nearby school properties to determine if they are also possible sources of nitrate in ground water. Most of the WHPA is in an area not planned for public sewer, but only 7.2 % of the area uses onsite septic systems for wastewater disposal. Onsite septic systems in the WHPA are also sources of nitrate in ground water.

NITRATE RESULTS (ppm)



Volatile Organic Compounds (VOC's)

No VOC's above 50% of the MCL have been detected in samples of treated water at the Cherry Hill Plant, however, since a ground water clean up is in process within the wellhead protection area, the wells are considered vulnerable to VOC contamination. In addition, MTBE has been detected in the water supply on several occasions. The majority of sample results that are available for MDE to evaluate are from finished water samples from which most VOCs are likely to be removed.

Synthetic Organic Compounds (SOC's)

Repeated samples have been collected for SOC's from the Cherry Hill Plant's water sources. No detections have been at levels of concern. The Cherry Hill Plant's water supply is not considered susceptible to SOC contamination.

Radionuclides

Nontransient, noncommunity systems are currently not regulated for radionuclides. No data is available about the presence of radionuclides in the Cherry Hill Plant's water supply.

Microbiological Contaminants

Based on raw water bacteriological data, the Cherry Hill Plant's wells were determined not to be under the influence of surface water. In addition, no bacteria have been detected in any of the routine bacteriological samples that have been collected. The Cherry Hill Plant's water supply is not susceptible to microbiological contaminants.

TABLE 5. SUSCEPTIBILITY CHART

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?
Inorganic Compounds	YES	YES	NO	YES	YES
Volatile Organic Compounds	YES	YES	NO	YES	YES
Synthetic Organic Compounds	NO	NO	NO	YES	NO
Microbiological Contaminants	NO	NO	NO	NO	NO

MANAGEMENT OF THE SOURCE WATER ASSESSMENT AREA

The wells serving the Cherry Hill Plant appear to be in good condition. Water quality testing indicated the presence of nitrates and four VOCs. Recommendations for maintaining the integrity of this system are listed below:

- Well 1 is located next to an internal road on the plant property. Construction of a protective barrier around the well is recommended to protect it from passing vehicles.
- Continue maintenance and protection of the wells.
- Abandon all wells that are not in use according to State regulations.
- Continue monitoring for VOCs, IOCs, SOCs and radionuclides in accordance with MDE's requirements.
- Annual sampling of raw water for microbiological contaminants is recommended. It is a good indicator of the integrity of the wellhead.
- Any increase in pumpage or addition of new wells to the system may require extension of the WHPA. The system is required to contact the Water Supply Program when an increase in pumpage is applied for or when new wells are being considered.

REFERENCES

- Bartlett, C.L., K.P. Garon, and M.J. Liberati, 1993, Hydrogeologic Evaluation Report, W.L. Gore and Associates, Inc., Cherry Hill, Maryland; Dupont Environmental Remediation Services, Wilmington, DE, 26 p.
- Higgins, M.W. and L.B. Conant, 1990, The Geology Cecil County, Maryland, Maryland Geological Survey Bulletin 37, 183p.
- Otton, E.G., R.E. Willey, R.A. McGregor, G. Achmad, S.N. Hiortdahl, and J.M. Gerhart, 1988, Water Resources and Estimated Effects of Ground-Water Development, Cecil County, Maryland, Maryland Geological Survey Bulletin 34, 133p.
- Maryland Department of the Environment, Water Supply Program, 1999, Maryland's Source Water Assessment Plan, 36p.

FIGURES

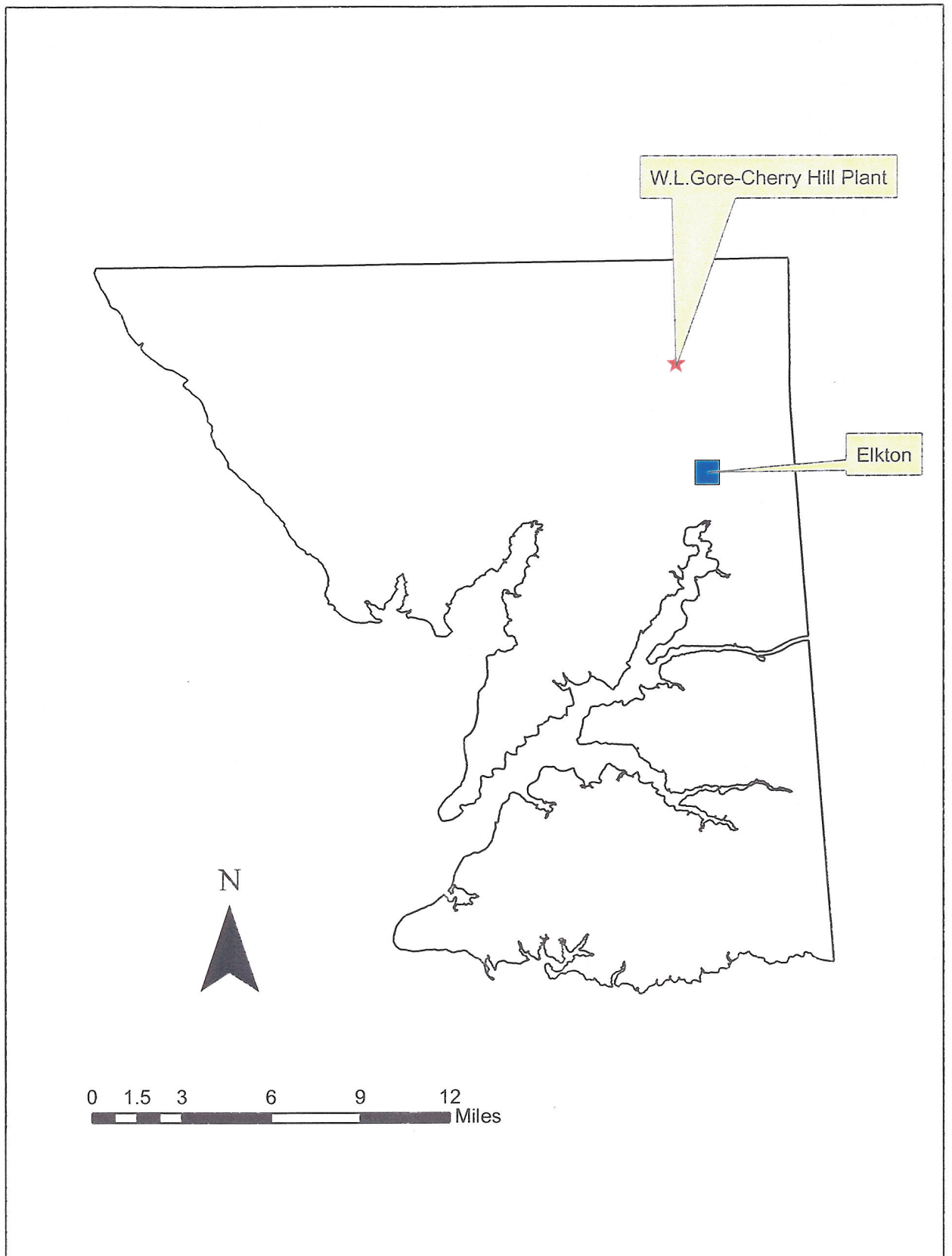


Figure 1. Location Map

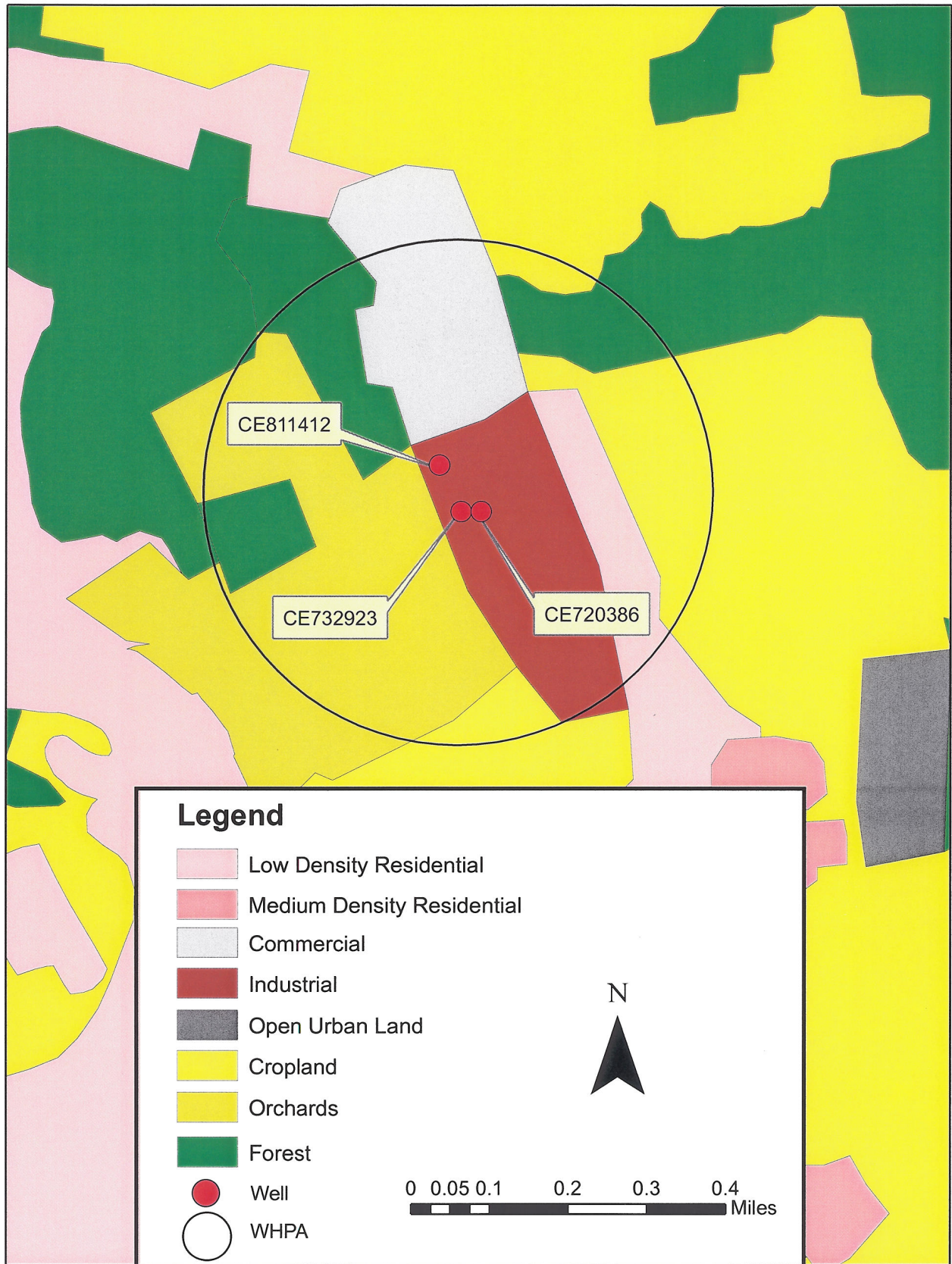


Figure 3. Land Use Map

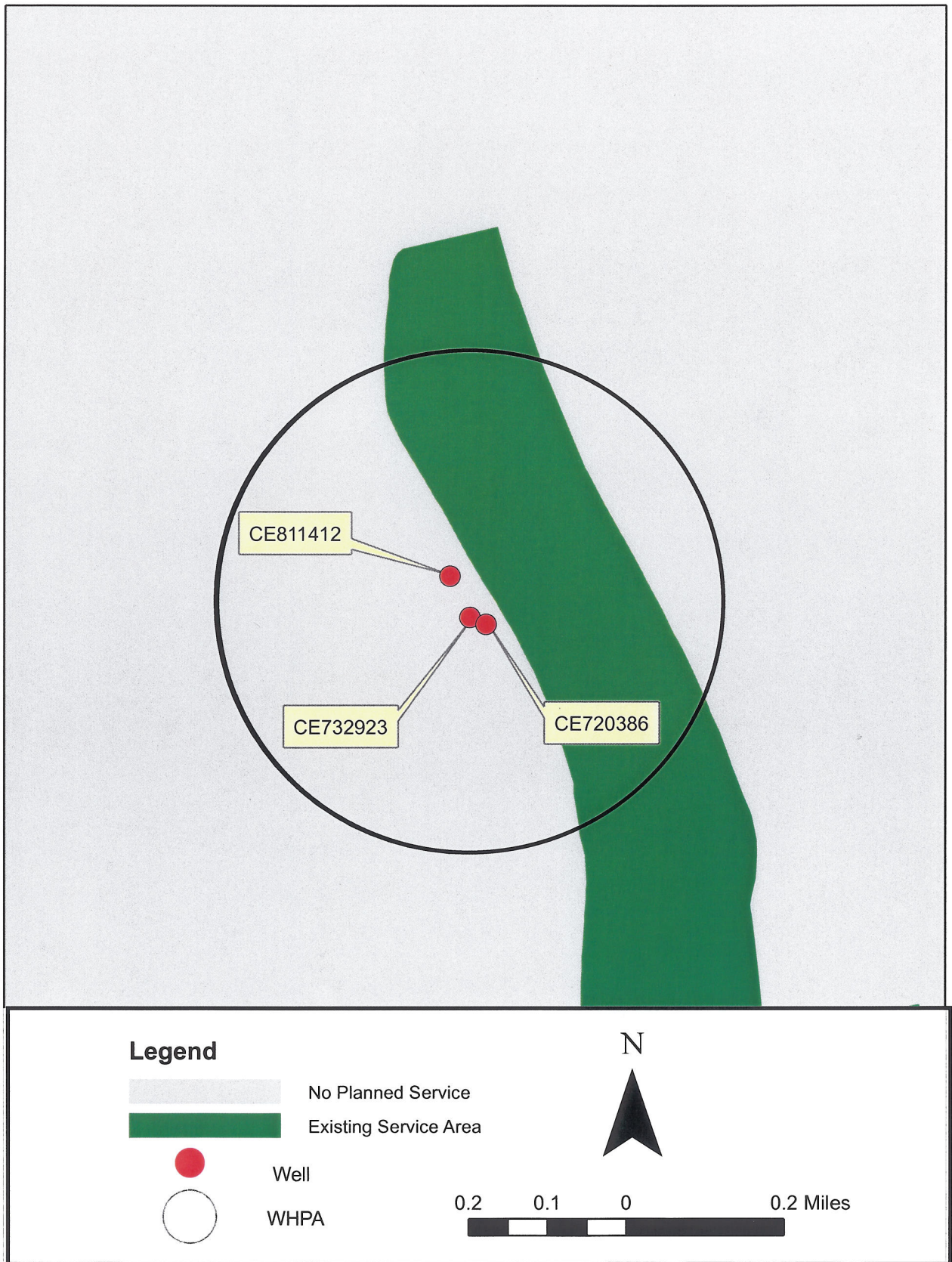


Figure 4. Sewer Map

APPENDIX

SEQUENCE NO. (OEP USE ONLY) **8661**
 (THIS NUMBER IS TO BE PUNCHED IN COLS. 38 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
 FILL IN THIS FORM COMPLETELY
 PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER **W.L. Gore - Cherry Hill**

DATE RECEIVED **JUL 1 1985**

DATE WELL COMPLETED **7/13/85**

Depth of Well **560**
 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" **CE-81-1412**

OWNER **Gore W.L. & Associates**
 STREET OR RFD **2301 Sincerely Rd.** TOWN **Elkton, Md.**
 SUBDIVISION _____ SECTION _____ LOT _____

WELL LOG
 Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET		Check if water bearing
	FROM	TO	
Brn. Wea. Rock	0	4	
Lt. Brn. Sandy Wea. Rock	4	22	
Tan Wea. Rock	22	41	
Gray schist	41	143	
Gray schist & Quartz	143	146	
Quartz & Feldspar	146	183	
Gray schist	183	244	✓
Quartz & Feldspar	244	255	
Gray schist	255	300	✓
Gray schist	300	417	
Gray Reg. & schist	417	560	✓

GROUTING RECORD
 WELL HAS BEEN GROUTED (Circle Appropriate Box) **Y** **N**
 TYPE OF GROUTING MATERIAL
 CEMENT **CM** BENTONITE CLAY **BC**

NO. OF BAGS **11** NO. OF POUNDS **1034**
 GALLONS OF WATER **55**
 DEPTH OF GROUT SEAL (to nearest foot)
 from **0** ft. to **60** ft.
 (enter 0 if from surface)

CASING RECORD
 casing types insert appropriate code below
ST **CO**
 STEEL CONCRETE
PL **OT**
 PLASTIC OTHER

MAIN CASING TYPE **ST** **6** **60**
 Nominal diameter top (main) casing (nearest inch)
 Total depth of main casing (nearest foot)

OTHER CASING (if used)
 diameter inch depth (feet) from to

SCREEN RECORD
 screen type or open hole insert appropriate code below
ST **BR** **HO**
 STEEL BRASS OPEN HOLE
PL **OT**
 PLASTIC OTHER

FACT SHEET

DEPTH (nearest ft.)	SLOT SIZE		DIAMETER OF SCREEN (NEAREST INCH)
	from	to	
1 HO 60 560	8	15	21
2	23	30	36
3	38	45	51

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS IDENT. NO. **278**
Max L. Walter
 DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GRAVEL PACK _____
 IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

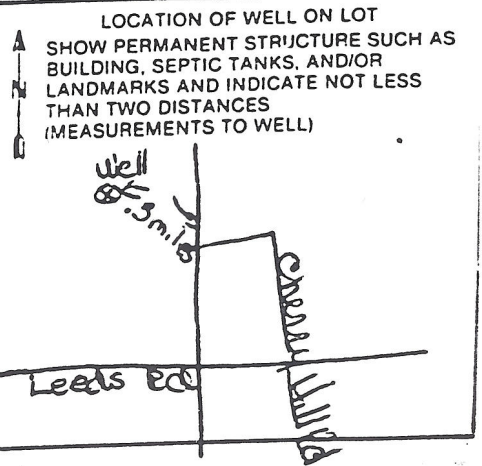
OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)
 T (E.R.O.S.) **WO**
 70 72 74 75 76
 TELESCOPE CASING LOG INDICATOR OTHER DATA

PUMPING TEST

HOURS PUMPED (nearest hour) **6**
 PUMPING RATE (gal. per min. to nearest gal.) **4**
 METHOD USED TO MEASURE PUMPING RATE **Sh. Water & Meter**
 WATER LEVEL (distance from land surface) BEFORE PUMPING **35** WHEN PUMPING **500**
 TYPE OF PUMP USED (for test) **A** air **P** piston **T** turbine **C** centrifugal **R** rotary **O** other (describe below) **J** jet **S** submersible

PUMP INSTALLED

DRILLER WILL INSTALL PUMP YES **NO**
 (CIRCLE) (YES or NO)
 IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE
 TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX-SEE ABOVE:
 CAPACITY: GALLONS PER MINUTE (to nearest gallon) _____
 PUMP HORSE POWER _____
 PUMP COLUMN LENGTH (nearest ft.) _____
 CASING HEIGHT (circle appropriate box and enter casing height) **+** above } LAND SURFACE (nearest foot) **1**
- below }



1121

SEQUENCE NO. (OEP USE ONLY)

STATE OF MARYLAND APPLICATION FOR PERMIT TO DRILL WELL please print or type

03-81-1412

(THIS NUMBER IS TO BE PUNCHED IN COLS. 36 ON ALL CARDS)

Date Received 022685 OWNER INFORMATION CORE W L ASSOCIATES 2401 SINGERLY RD ELKTON MD 21921

LOCATION OF WELL W. Gore Cherry Hill 23 SUBDIVISION SECTION 44 LOT 48 52 NEAREST TOWN CHERRY HILL 57 MILES FROM TOWN 17 MI

DRILLER INFORMATION Max R. WALTON WALTON CORPORATION P.O. Box 1097 Newark DE 19715 25 FEB 85

B 4 DIRECTION OF WELL FROM TOWN (CIRCLE BOX) SINGERLY ROAD NEAR WHAT ROAD ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX) DISTANCE FROM ROAD 400 FT

WELL INFORMATION APPROX. PUMPING RATE (GAL. PER MIN.) 12 AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY) 10000

USE FOR WATER (CIRCLE APPROPRIATE BOX) HOME (SINGLE OR DOUBLE HOUSEHOLD UNIT ONLY) FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION) INDUSTRIAL, COMMERCIAL, STATE AND FEDERAL GOV. OTHER (REQUIRES APPROPRIATION PERMIT) PUBLIC OR PRIVATE WATER COMPANY (REQUIRES APPROPRIATION PERMIT AND STATE HEALTH DEPARTMENT APPROVAL) TEST, OBSERVATION, MONITORING (MAY REQUIRE APPROPRIATION PERMIT)

NOT TO BE FILLED IN BY DRILLER HEALTH DEPARTMENT APPROVAL Cecil COUNTY NAME COUNTY NO. OEP SIGNATURE DATE ISSUED 030185 Charles E. Simpson 9/1/85 NORTH GRID 671000 EAST GRID 1120000

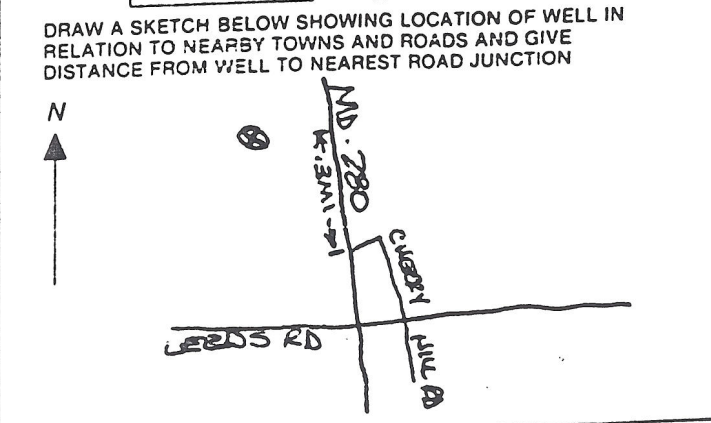
APPROXIMATE DEPTH OF WELL 300 FEET

APPROXIMATE DIAMETER OF WELL 6 INCH NEAREST

METHOD OF DRILLING (circle one) BORED (or Augered) JETTED Jetted & DRIVEN AIR-ROTARY AIR-PERCussion ROTARY (Hydraulic Rotary) CABLE REVERSE-ROTARY Drive-POINT

SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X SOURCES OF DRILLING WATER 1. DRILLED WELL WRITE THE BOX NUMBER FROM THE MAP HERE E 1120 N 670

REPLACEMENT OR DEEPEMED WELLS (CIRCLE APPROPRIATE BOX) THIS WELL WILL NOT REPLACE AN EXISTING WELL THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY THIS WELL WILL DEEPEM AN EXISTING WELL PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPEMED (IF AVAILABLE)



APPROP. PERMIT NUMBER C E 7 2 G A P O 1 0

FORCE CS INITIALS IN BOX PERMIT No. 03-81-1412

SPECIAL CONDITIONS

STATE OF MARYLAND WATER RESOURCES ADMINISTRATION TAWES STATE OFFICE BLDG., ANNAPOLIS, MD. 21401 WELL COMPLETION REPORT

THIS REPORT MUST BE SUBMITTED IN 30 DAYS AFTER WELL COMPLETE

CI 8002 SEQUENCE NO. (W/RA USE ONLY) DATE RECEIVED (W/RA USE ONLY) JUN 07 1979 DATE WELL COMPLETED May 29 79

FILL IN THIS FORM COMPLETELY COUNTY NUMBER Replacement PERMIT NO. FROM "PERMIT TO DRILL WELL" CE-73-2923 DRILLERS IDENTIFICATION NO. 278

OWNER W.D. Moore Associates FIRST NAME Eikton Md. STREET OR RFD P.O. Box 1220 POST OFFICE

WELL LOG STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

Table with columns: DESCRIPTION, FEET FROM, FEET TO, CHECK IF WATER BEARING. Includes entries like Overburden, Blue Wooded, Mica Schist, Gray Mica Schist, Sand, Fractured @ 53.0, Sand Fractured @ 245, Sand small fractures @ 300.0.

GROUTING RECORD WELL HAS BEEN GROUTED (CIRCLE APPROPRIATE BOX) YES [X] NO [] TYPE OF GROUTING MATERIAL (CIRCLE BOX) CEMENT [CM] BENTONITE CLAY [BC]

NO. OF BAGS 8 NO. OF POUNDS 752 GALLONS OF WATER 40 DEPTH OF GROUT SEAL (TO NEAREST FOOT) FROM 6 FT. TO 50 FT.

CASING RECORD (INSERT APPROPRIATE CODE BELOW) STEEL [X] CONCRETE [CO] PLASTIC [PL] OTHER [OT]

MAIN CASING TYPE [ST] NOMINAL DIAMETER TOP (NEAREST INCH) 6 TOTAL DEPTH OF MAIN CASING (NEAREST FOOT) 50

OTHER CASING (IF USED) DIAMETER (INCH) DEPTH (FEET) FROM TO

SCREEN RECORD (INSERT APPROPRIATE CODE BELOW) STEEL [ST] BRASS OR BRONZE [BR] GREEN HOLE [GH] PLASTIC [PL] OTHER [OT]

DEPTH (NEAREST WHOLE FOOT) FROM TO 1: 50 400 2: 23 24 25 30 32 36 3: 29 30 41 45 37 51

DIAMETER OF SCREEN 55 INCHES NEAREST INCH. SPAVEL PACK IF WELL DRILLED WAS A FLOWING WELL (CIRCLE YES) YES [X] NO []

WPA USE ONLY (NOT TO BE FILLED IN BY DRILLER) YES [] NO []

PUMPING TEST 1 2 3 (SEQ. NO.) 6 HOURS PUMPED (TO NEAREST HOUR) 4 PUMPING RATE (GALLONS PER MINUTE TO NEAREST GALLON) 12

METHOD USED TO MEASURE PUMPING RATE stop watch & container WATER LEVEL (DISTANCE FROM LAND SURFACE) BEFORE PUMPING 4 (NEAREST FOOT) WHEN PUMPING 22 (NEAREST FOOT)

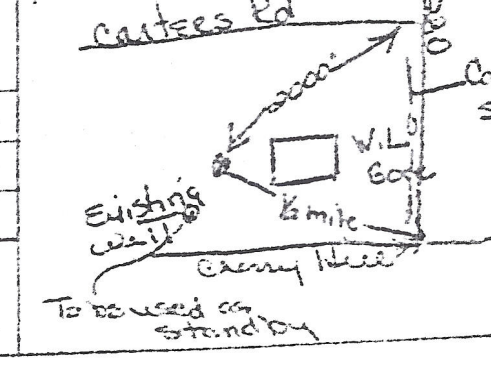
TYPE OF PUMPED USED (CIRCLE APPROPRIATE BOX) (FOR PUMPING TEST) [A] [P] [T] [C] [R] [O] [J] [S]

PUMP INSTALLED TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE: A, C, J, P, R, S, T, O) DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX) YES [] NO [X]

CAPACITY: GALLONS PER MINUTE (TO NEAREST GALLON) 31 35 PUMP HORSE POWER 37 41 PUMP COLUMN LENGTH (NEAREST FOOT) 43 47

CASING HEIGHT (CIRCLE APPROPRIATE BOX AND ENTER CASING HEIGHT) [+] ABOVE [] BELOW LAND SURFACE 50 (NEAREST FOOT)

LOCATION OF WELL ON LOT SHOW PERMANENT STRUCTURE SUCH AS BUILDINGS, SEPTIC TANKS, AND OTHER LAND MARKS AND INDICATE NOT LESS THAN TWO DISTANCE MEASUREMENTS TO WELL.



CIRCLE APPROPRIATE BOXES [] [] [] I HEREBY CERTIFY THAT I HAVE COMPLETED WITH ALL CONDITIONS STATED ON THE ABOVE-CAPTIONED "PERMIT TO DRILL WELL", AND THAT INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF. NAME: Max P. Watten

CE-73-2923

FILE IN THIS FORM COMPLETELY

STATE OF MARYLAND
WATER RESOURCES ADMINISTRATION
TAWES STATE OFFICE BLDG., ANNAPOLIS, MARYLAND 21401
APPLICATION FOR PERMIT TO DRILL WELL

REPLACEMENT

SEQUENCE NO. (WRA USE ONLY)
9521

DATE RECEIVED (WRA USE ONLY)
APR 20 1979
APR 18 1979

OWNER: CORE W.L. & ASSOCS.
STREET OR RFD: MD 280
POST OFFICE: ELKTON

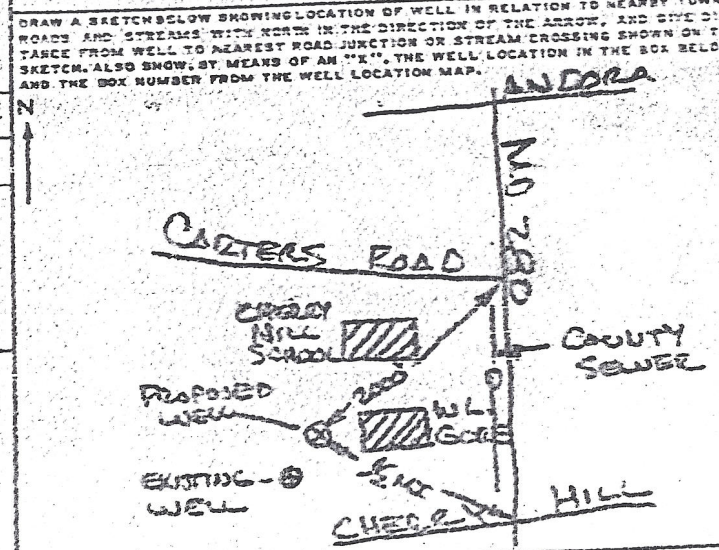
DRILLER INFORMATION
DATE: 5 APR 79
LICENSE NUMBER: 278
DRILLER: Max WALTON
SIGNATURE: Max L. Walton

LOCATION OF WELL
COUNTY: CECIL
SUBDIVISION: 23
SECTION: 44 LOT: 48
NEAREST TOWN: CHEROY HILL
MILES FROM TOWN: 1/2

WELL INFORMATION
MAXIMUM PUMPING RATE: 10
AVERAGE DAILY QUANTITY NEEDED: 2700
USE FOR WATER: INDUSTRIAL, COMMERCIAL, STATE AND FEDERAL GOVERNMENT.

DIRECTION FROM TOWN
DIRECTION: NORTH
NEAR WHAT ROAD: MD 280
DISTANCE FROM ROAD: 1000

APPROXIMATE DEPTH OF WELL: 250 FEET
APPROXIMATE DIAMETER OF WELL: 6 (NEAREST INCH)
METHOD OF DRILLING USED: AIR-PERCUSSION



REPLACEMENT OR DEEPEINED WELLS (CIRCLE APPROPRIATE BOX)
THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY

NOT TO BE FILLED IN BY DRILLER (WRA USE ONLY)
APPROPRIATION PERMIT NUMBER: CE732923
ENGINEER REVIEW DISTRICT NO. 09
FORCE: CB

BOX NUMBER: 1120
NORTH COORDINATE: 670000
EAST COORDINATE: 1120000
ELEVATION AT WELL HEAD (FEET): 0/0

HEALTH DEPARTMENT APPROVAL
COUNTY NAME: Cecil
APPROVED BY: Wm. R. Summers

C 1 01079

SEQUENCE NO. (OWN USE ONLY)

STATE OF MARYLAND DEPARTMENT OF WATER RESOURCES STATE OFFICE BLDG., ANNAPOLIS, MARYLAND 21401 WELL COMPLETION REPORT

THIS REPORT MUST BE SUBMITTED WITHIN 30 DAYS AFTER WELL COMPLETION

FILL IN THIS FORM COMPLETELY

COUNTY NUMBER

PERMIT NO. FROM "PERMIT TO DRILL WELL"

CE-72-0384

(THIS NUMBER IS TO BE PUNCHED IN COLUMNS 3-6 ON ALL CARDS)

DATE RECEIVED (OWN USE ONLY)

092572

DATE WELL COMPLETED

082872

DEPTH OF WELL

400

(TO NEAREST FOOT)

DRILLERS IDENTIFICATION NO.

OWNER: GARE W.L. + ASSOCIATES

FIRST NAME: NEWARK, DEL. 19711

STREET OR RFD: 555 Papermill Rd.

POST OFFICE

WELL LOG

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

Table with columns: DESCRIPTION, FEET (FROM, TO), and CIRCLE IF WATER BEARING. Includes entries for Topsoil, lt. shale, lt. gray granite, etc.

GROUTING RECORD: WELL HAS BEEN GROUTED (Y), TYPE OF GROUTING MATERIAL (CEMENT), NO. OF BAGS (6), NO. OF POUNDS (540), GALLONS OF WATER (30), DEPTH OF GROUT SEAL (42 ft).

CASING RECORD: MAIN CASING TYPE (ST), NOMINAL DIAMETER TOP (6.5 in), TOTAL DEPTH OF MAIN CASING (42 ft 4 in).

OTHER CASING (IF USED): TABLE for diameter and depth.

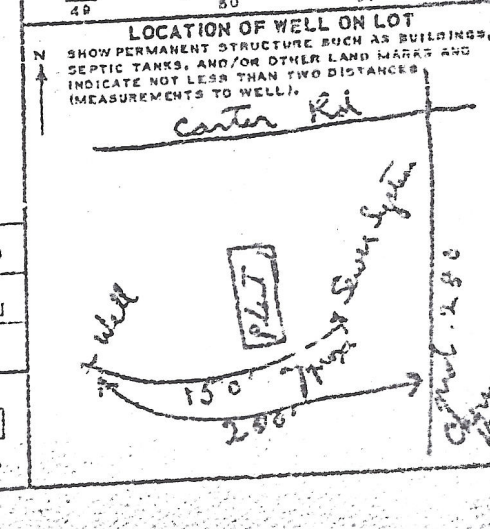
SCREEN RECORD: SCREEN TYPE (ST), DIAMETER OF SCREEN (54 in), GRAVEL PACK.

DEPTH (NEAREST WHOLE FOOT) TO: 400'

PUMPING TEST: HOURS PUMPED (2), PUMPING RATE (7), WATER LEVEL (60'), TYPE OF PUMPED USED (AIR).

PUMP INSTALLED: TYPE OF PUMP (A), DRILLER WILL INSTALL PUMP (Y), CAPACITY (31), PUMP HORSE POWER (37).

CASING HEIGHT (ABOVE/BELOW LAND SURFACE): 1'



CIRCLE APPROPRIATE BOXES: A (Abandoned), C (Electric Log), D (Test Well). Includes certifier name Constantine DeFilippo.

DRILLER'S NAME: Constantine DeFilippo. Includes telephone and other data.

EMERGENCY NO. (if any) -

STATE OF MARYLAND
DEPARTMENT OF WATER RESOURCES
STATE OFFICE BLDG., ANNAPOLIS, MARYLAND 21401
APPLICATION FOR PERMIT TO DRILL WELL

DWR PERMIT NUMBER

CE-72-0386
FILL IN THIS FORM COMPLETELY

1 2 3 (REQ. NO.)
1 08396
THIS NUMBER IS TO BE ENTERED IN COLS. 2-4 OF ALL CARDS

DATE RECEIVED (DWR USE ONLY)
051278
OWNER: Mass L. Associates, Inc.
STREET OR RFD: 555 Popcorn Rd
POST OFFICE: Newark, Del. 19711

FIRST NAME: NEW
COL. 52
COL. 53
COL. 54

DRILLER INFORMATION
1 2 3 (REQ. NO.)
DATE: May 19, 1972
LICENSE NUMBER: 250
DRILLER: Constantine D. Filippa, Jr.
SIGNATURE: Constantine D. Filippa, Jr.

LOCATION OF WELL
1 2 3 (REQ. NO.)
COUNTY: Cecil
SUBDIVISION: 23
SECTION: 44 LOT: 48
NEAREST TOWN: Elkton
MILES FROM TOWN (ENTER 0 IF IN TOWN): 8

WELL INFORMATION
1 2 3 (REQ. NO.)
MAXIMUM PUMPING RATE (GALLONS PER MINUTE): 30
AVERAGE DAILY QUANTITY NEEDED (GALLONS PER DAY): 20,000
USE FOR WATER (CIRCLE APPROPRIATE BOX)
 INDUSTRIAL, COMMERCIAL, STATE AND FEDERAL GOVERNMENT.
 DOMESTIC HOME (SINGLE OR DOUBLE HOUSEHOLD UNIT ONLY)
 FARMING, AGRICULTURE, IRRIGATION
 MUNICIPAL WATER SUPPLY
 PRIVATE WATER COMPANY
 TEST
MUST HAVE STATE HEALTH DEPT. APPROVAL

DIRECTION FROM TOWN (CIRCLE APPROPRIATE BOX)
1 2 3 (REQ. NO.)
BEAR WHAT: IND 280
ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX): W
DISTANCE FROM ROAD (ENTER DISTANCE AND CIRCLE APPROPRIATE BOX): approx. 250

APPROXIMATE DEPTH OF WELL: 130 FEET
APPROXIMATE DIAMETER OF WELL: 6 3/4 (NEAREST INCH)
METHOD OF DRILLING USED (CIRCLE APPROPRIATE METHOD)
BORED (OR AUGERED) DRIVEN
30-37 AIR-ROTARY AIR-DEPRESSION ROTARY (HYDRAULIC ROTARY)
CABLE REVERSE-ROTARY DRIVE-POINT
OTHER (DESCRIBE):

REPLACEMENT OR DEEPENED WELLS (CIRCLE APPROPRIATE BOX)
 THIS WELL WILL NOT REPLACE AN EXISTING WELL
 THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
 THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY
 THIS WELL WILL DEEPEN AN EXISTING WELL PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE):

NOT TO BE FILLED IN BY DRILLER (DWR USE ONLY)
APPROPRIATION PERMIT NUMBER: CE720386
ENGINEER REVIEW DISTRICT NO.: 03
FORCE: JV WHITE INITIALS IN BOX: WQ
CONDITIONS: 01 02 03 04 05 06 07 08 09
HEALTH DEPARTMENT APPROVAL
DATE: 051972
APPROVED BY: Cecil

