Public Water Supply
Source Water Assessment
for

Artesian Water Co. (Hockessin)

PWS ID: DE0000552

New Castle County, Delaware

Final Report: December 31, 2003

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Summary

The Delaware Department of Natural Resources and Environmental Control's (DNREC) Division of Water Resources has completed the Source Water Assessment for the public water supply wells for Artesian Water Co. (Hockessin) as required under the 1996 amendments to the Safe Drinking Water Act. This assessment has been performed using the methods specified in the State of Delaware Source Water Assessment Plan (DNREC, 1999).

Artesian Water Co. (Hockessin) uses six wells to provide drinking water to the system. All six wells withdraw water from the karst Cockeysville aquifer. These wells are classified as highly vulnerable to contamination from surficial processes as they are withdrawing water from voids in the in the karst Cockeysville aquifer. The wellhead protection areas for these wells were delineated using best professional judgement based on the known hydrology of the area.

This public water supply system provides water to an average daily population of 200000 residential consumers from January 1 to December 31 through 66431 residential service connections.

There are 18 discrete sources of potential contamination in the wellhead protection areas. The majority of these sites have only negligible contaminant potentials and these pose little or no threat to the drinking water resources. However, some sites that have substantial contaminant potentials exist in the area as well.

An analysis of land use activities in the area show almost 41 percent of the total wellhead protection area for the system contains residential land uses. There are 10 other land uses covering the remaining portions percent of the wellfield.

Although water samples may have been taken from within the distribution system, no raw water (well tap) samples have been recorded for this Public Water Supply System.

Overall, Artesian Water Co. (Hockessin) has a moderate susceptibility to nutrients, a moderate susceptibility to pathogens, a **very high** susceptibility to petroleum hydrocarbons, a moderate susceptibility to pesticides, a moderate susceptibility to PCBs, a **very high** susceptibility to other organic compounds, a moderate susceptibility to metals and, a moderate susceptibility to other inorganic compounds.

Introduction

The 1996 amendments to the Safe Drinking Water Act (SDWA) require that source water assessments be performed for all sources of public drinking water in each state. Because of this, each state was required to develop a Source Water Assessment Plan (SWAP). The State of Delaware' s SWAP was developed by a committee of scientists, water industry professionals, conservation groups, government agencies, and interested citizens in 1998 and approved by the United States Environmental Protection Agency in October, 1999.

This assessment for Artesian Water Co. (Hockessin) has been performed using the methods specified in the State of Delaware Source Water Assessment Plan (DNREC, 1999)

The assessment consists of these four critical steps:

1) Delineation of source water areas;
2) Determination of the vulnerability of a well or intake to contamination;
3) Identification of existing and potential sources of contamination; and
4) Determination of the susceptibility of the source water area to contamination.

Step 1 consists of mapping the land surface area that contributes to the water supply. For ground water systems, this is called the wellhead protection area. Artesian Water Co. (Hockessin) uses six wells to provide drinking water to the system. All six wells withdraw water from the karst Cockeysville aquifer. These wells are classified as highly vulnerable to contamination from surficial processes as they are withdrawing water from voids in the in the karst Cockeysville aquifer. The wellhead protection areas for these wells were delineated using best professional judgement based on the known hydrology of the area.

Step 2 uses a step-by-step decision making process by which each well or surface water intake for a particular system is examined to determine its vulnerability to contamination. Vulnerability is the relative ease with which contaminants, if released into a source water area, could move and enter a public water supply well or intake at concentrations of concern. Vulnerability includes consideration of such factors as aquifer characteristics, well or surface water intake integrity, and wellscreen depth. A series of questions about the type of system (surface water or ground water), hydrologic setting, and well construction are used in the decision-making process.

Step 3 consists of creating an inventory of all existing and potential sources of contamination within the delineated source water protection areas. This was done utilizing DNREC's contaminant site inventories, 1997 land use maps, analytical data compiled by the Office of Drinking Water and through visual examination during site visits.

Step 4 consists of determining the susceptibility of the source water area to contamination. This process combines steps 1, 2, 3, water quality reports, and other information.

This information must be summarized into a report and made available to the public. It is the goal of the Division of Water Resources that the summaries provided from the source water assessment and protection program will help drinking-water systems better understand the potential threats to their drinking water supply and to work to protect these drinking water resources.

Study Area

Artesian Water Co. (Hockessin) is located approximately 2,600 feet southwest of Hockessin Corner. This location is shown on Map 1 Base Map for Artesian Water Co. (Hockessin). This public water supply system provides water to an average daily population of 200000 residential consumers from January 1 to December 31 through 66431 residential service connections.

Public Water Supply Well Data

Information about the construction and operation of these wells is summarized in Table1. This information was gathered from various sources (DNREC, Delaware Geological Survey, Department of Health and Social Services), and a letter requesting confirmation from the system.

Table 1: Well Construction Data

Well #	Permit #	Allocation #	Year Constructed	Well Capacity (gpm)	Diameter (inches)	Screen Interval (fbgs)	Aquifer
Hockessin P1	10010	75-WS-1	1970	425	16	32-312	Cockeysville
Hockessin P2	10011	75-WS-1	1968	425	16	65-332	Cockeysville
Hockessin P3	10012	75-WS-1	1967	425	16	54-312	Cockeysville
Hockessin P4	31820	75-WS-1	1974	700	16	85-244	Cockeysville
Hockessin PG-1	30266	75-WS-1	1972	400	14	130-190	Cockeysville
Hockessin PG-3	31614	75-WS-1	1974	400	12	?-?	Cockeysville

* fbgs = feet below ground surface

Geology and Hydrogeology

Karst Aquifer(s)

Cockeysville
In Delaware the Cockeysville Formation underlies both the Hockessin-Yorklyn valley and the Pleasant Hill Valley in northern New Castle County (Plank et al., 2000). Ideally, the Cockeysville Formation consists of primarily pure, coarsely crystalline, blue-white dolomitic marble with minor thin lenses/layers of coarsely crystalline, blue-white calcite marble; and zones of fine to medium-grained, light-gray, foliated, micaceous calc-schist and has an overall estimated thickness of approximately 400 to 800 feet (Talley et al, 1995).

The Cockeysville Formation serves as a major aquifer in northern New Castle County where approximately 1.5 million gallons per day of water are extracted from it on average from domestic, industrial, and public water supply wells (Talley et al, 1995). Ground-water flow in the Cockeysville aquifer takes place through fractures in the limestone/dolomite and solution channels/cavities caused by the dissolving of the rock by the groundwater. Recharge of the ground-water to the Cockeysville Aquifer takes place through a combination of direct infiltration from rainfall, discharge from overlying streams, and leakance from the adjacent fractured crystalline formations (Woodruff, et al., 1991).

It should be noted that the Cockeysville formation in both the Hockessin-Yorklyn and Pleasant Hill valleys appear to have no direct interconnection to each other. This is due to the location of a northwest trending fault cutting through the southwestern portion of the Hockessin valley. Because of this there is also no evidence of well pump interaction between wells drilled in the Pleasant Hill valley and those drilled in the Hockessin-Yorklyn valley (Talley et al., 1995).

Source Water Protection Area Delineation

The State of Delaware' s Source Water Assessment Plan describes the methods to be used for the delineation of the areas that contribute water to public drinking water supplies. These source water areas are delineated by applying the methodology described in section 3.5 of the Delaware SWAP to an understanding of the geologic and hydrologic setting of the area coupled with a review of well logs and well construction information. The wellhead areas for this system were delineated using a best professional judgement based on the known hydrology of the area. The modeling methods are summarized in Table 2a.

Table 2a: Aquifer type and Delineation Method

Well #	Permit #	Aquifer	Aquifer Type	Delineation Method
Hockessin P1	10010	Cockeysville	karst	Hydrologically Mapped (Class C WRPA)
Hockessin P2	10011	Cockeysville	karst	Hydrologically Mapped (Class C WRPA)
Hockessin P3	10012	Cockeysville	karst	Hydrologically Mapped (Class C WRPA)
Hockessin P4	31820	Cockeysville	karst	Hydrologically Mapped (Class C WRPA)
Hockessin PG-1	30266	Cockeysville	karst	Hydrologically Mapped (Class C WRPA)
Hockessin PG-3	31614	Cockeysville	karst	Hydrologically Mapped (Class C WRPA)

The area(s) delineated by this process are shown on Map 2 Delineation Map for Artesian Water Co. (Hockessin). The Hockessin Basin in Delaware contains all six Artesian Water Company wells (1 – 10010, 2 – 10011, 3 – 10012, 4 – 31820, G-1 – 30266, and G-3 – 31614), however, due to the karst (fractured/dissolved marble/limestone) nature of the

Cockeysville Formation, the aquifer is not well protected (confined) from surface processes and activities distant from the physical location of the wells can contribute to water quality problems. Table 2b below list any wellfields and their associated wells and acreages.

Table 2b: Delineated Source Water Areas

Wellfield	Wells	Acreage	Vulnerability
10010	10010 AWC Hockessin1	956.73	High
10011	10011 AWC Hockessin2	956.73	High
10012	10012 AWC Hockessin3	956.73	High
30266	30266 AWC HockessinG1	956.73	High
31614	31614 AWC HockessinG3	956.73	High
31820	31820 AWC Hockessin4	956.73	High

Vulnerability Determination

The vulnerability is the relative ease with which contaminants, if released into a source water area, could move and enter a public water supply well or surface water intake at concentrations of concern. Individual intakes or wells are ranked as having high, medium, or low vulnerability according to the process described in section 5.1 of the Delaware SWAP. The determination of this vulnerability is conducted through a series of questions about the type of intake (surface or ground water), hydrogeologic setting, and construction.

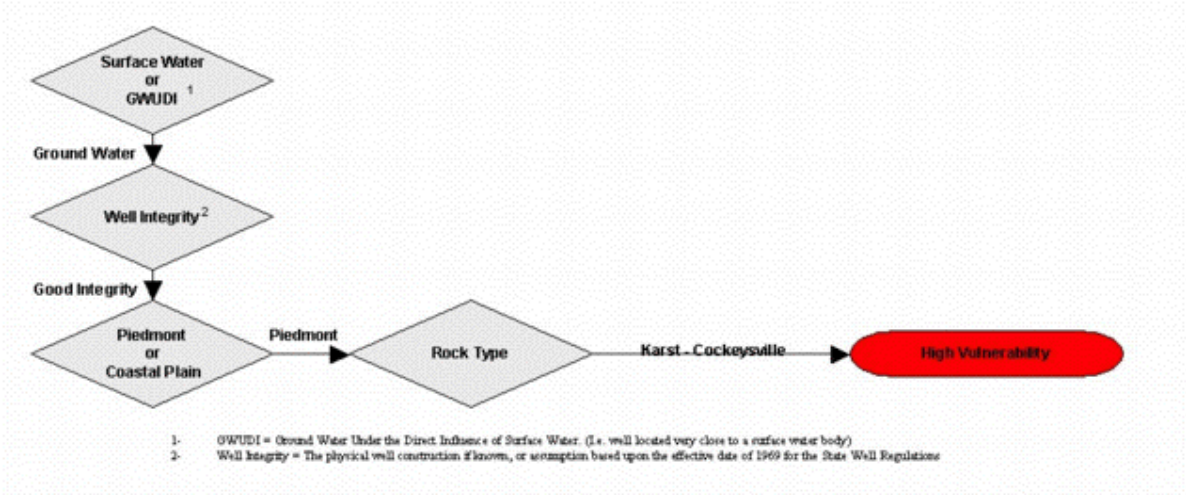

Figure 1: Vulnerability Determination process

Artesian Water Co. (Hockessin) uses six wells to provide drinking water to the system. All six wells withdraw water from the karst Cockeysville aquifer. These wells are classified as highly vulnerable to contamination from surficial processes as they are

withdrawing water from voids in the in the karst Cockeysville aquifer. The wellhead protection areas for these wells were delineated using best professional judgement based on the known hydrology of the area.

Existing and Potential Sources of Contamination

There are a multitude of potential contaminant sources that, if present, could degrade drinking water quality. Most of these sources are anthropogenic, however, natural 'contaminants' such as salt water or iron deposits can also impact water supplies. Most human impacts occur at or just below the ground surface and therefore are much more of a concern for shallow water supplies that lack a protective confining layer.

Discrete Sources

Discrete sources are defined as existing or potential sources of pollution to surface or ground water supplies at well defined, usually manufactured 'points' or locations. The Source Water Program has divided the discrete sources into the following categories:

Underground Storage Tanks
Landfills / Dumps
National Pollutant Discharge Elimination Sys.
Tire Piles
Hazardous Waste Generators
Toxic Release Inventory
Salvage Yards
Pesticide Loading, Mixing, & Storage Facility
State and Federal Superfund Sites
Large On-Site Septic
Wastewater Spray Irrigation
Waste Sludge Application
Animal Feedlot Operations
Combined Sewer Overflows
Dredge Spoils
Golf Courses
Domestic Septic Systems

These discrete sources can contaminate source waters depending upon their location, the severity of a release, and other factors. For example, golf courses may contribute both pesticides and nutrients to the surface and ground waters by means of surface application for landscaping purposes, whereas tire piles generally do not pose a threat to the waters of the state unless they begin to burn. There are 18 unique discrete sources of potential contamination in the wellhead protection areas. The majority of these sites have only negligible contaminant potentials and these pose little or no threat to the drinking water resources. However, some sites that have substantial contaminant potentials exist in the area as well. A brief description of each of these sites and their associated contaminant potentials follows.

10010 AWC Hockessin 1, 10011 AWC Hockessin 2, 10012 AWC Hockessin 3, 31820 AWC Hockessin 4, 30266 AWC Hockessin G1, and 31614 AWC Hockessin G3

NVF Company (MAPID: UT3622)
This is an underground storage tank facility with a historic product release. This site has a **high** contaminant potential for petroleum hydrocarbons, and a negligible contaminant potential for nutrients, pathogens, pesticides, PCBs, other organic compounds, metals, and other inorganic compounds.

Jopson Petroleum t/a Hockessin Gulf (MAPID: UT3833)
This is an underground storage tank facility with a historic product release. This site has a **high** contaminant potential for petroleum hydrocarbons, and a negligible contaminant potential for nutrients, pathogens, pesticides, PCBs, other organic compounds, metals, and other inorganic compounds.

Hockessin Exxon #25351 (MAPID: UT3853)
This is an underground storage tank facility with a historic product release. This site has a **high** contaminant potential for petroleum hydrocarbons, and a negligible contaminant potential for nutrients, pathogens, pesticides, PCBs, other organic compounds, metals, and other inorganic compounds.

SOUTHWOOD Farms (MAPID: UT4428)
This is an underground storage tank facility with a historic product release. This site has a **high** contaminant potential for petroleum hydrocarbons, and other organic compounds, and a negligible contaminant potential for nutrients, pathogens, pesticides, PCBs, metals, and other inorganic compounds.

HOCKESSIN Texaco (MAPID: UT3796)
This is an underground storage tank facility. This site has a medium contaminant potential for petroleum hydrocarbons, and a negligible contaminant potential for nutrients, pathogens, pesticides, PCBs, other organic compounds, metals, and other inorganic compounds.

Hockessin Sunoco 0004/743 (MAPID: UT3961)
This is an underground storage tank facility. This site has a medium contaminant potential for petroleum hydrocarbons, and a negligible contaminant potential for nutrients, pathogens, pesticides, PCBs, other organic compounds, metals, and other inorganic compounds.

GREGGS Bus Service Inc (MAPID: UT4066)
This is an underground storage tank facility. This site has a medium contaminant potential for petroleum hydrocarbons, and a negligible contaminant potential for nutrients, pathogens, pesticides, PCBs, other organic compounds, metals, and other inorganic compounds.

M A Zeccola & Sons (MAPID: UT5021)
This is an underground storage tank facility. This site has a medium contaminant potential for petroleum hydrocarbons, and a negligible contaminant potential for nutrients, pathogens, pesticides, PCBs, other organic compounds, metals, and other inorganic compounds.

Domestic Septic Systems (MAPID: 68 Systems - 0.07 per Acre)
Domestic septic systems may exist in the source water area. This site has a low contaminant potential for nutrients, and a negligible contaminant potential for pathogens,

petroleum hydrocarbons, pesticides, PCBs, other organic compounds, metals, and other inorganic compounds.

Exxon (MAPID: HW6980)
This is a hazardous waste generating facility. This site has a low contaminant potential for other organic compounds, and a negligible contaminant potential for nutrients, pathogens, petroleum hydrocarbons, pesticides, PCBs, metals, and other inorganic compounds.

N V F Co Yorklyn Plant Complex (MAPID: HW7084)
This is a hazardous waste generating facility. This site has a low contaminant potential for metals, and other inorganic compounds, and a negligible contaminant potential for nutrients, pathogens, petroleum hydrocarbons, pesticides, PCBs, and other organic compounds.

Hockessin Cleaners (MAPID: HW7822)
This is a hazardous waste generating facility. This site has a low contaminant potential for other organic compounds, and metals, and a negligible contaminant potential for nutrients, pathogens, petroleum hydrocarbons, pesticides, PCBs, and other inorganic compounds.

NVF (MAPID: DE 00451)
This is the location of a wastewater outfall. This site has a negligible contaminant potential for all contaminant categories.

NVF (YORKLYN) (MAPID: SF6482)
This site has been or is being investigated by the State's Superfund program. This site has a negligible contaminant potential for all contaminant categories.

BELL PROPERTY DISPOSAL PIT (MAPID: SF6770)
This site has been or is being investigated by the State's Superfund program. This site has a negligible contaminant potential for all contaminant categories.

Bell AtlanticDE Inc (MAPID: UT4011)
This is an underground storage tank facility. This site has a negligible contaminant potential for all contaminant categories.

CAMORIANO MUSHROOMS (MAPID: UT4776)
This is an underground storage tank facility. This site has a negligible contaminant potential for all contaminant categories.

Delmarva Power & Light Company (MAPID: UT4896)
This is an underground storage tank facility. This site has a negligible contaminant potential for all contaminant categories.

Additional information for other contaminant sources can be found on the state web site (http://www.dnrec.state.de.us/) using the Environmental Navigator. The inventory contains categorized data for multiple forms of media (surface water, ground water, etc).

Land Use / Land Cover

Anthropogenic activities associated with various land uses have the potential to contribute to ground-water quality problems, particularly when examining potential 'non-point' source contamination. There is, however, some overlap between discrete sources of contamination and some land use categories. For instance, individual domestic septic systems may be considered discrete sources, however, the regional impact of a number of systems in a large development might also be considered as 'non-point'.

Map 4 Land Use Map for Artesian Water Co. (Hockessin) shows the land use within the delineated area. The table on Map 4 summarizes the system-wide land use that is the percent of the entire system's source water area overlain by that particular land use. Based upon the SWAP, the contaminant potential could be adjusted depending on the percentage of land use within the WHPA, with land uses occupying the greatest portion of the wellhead areas having a more significant potential impact.

Using the most recent GIS information, almost 41 percent of the total wellhead protection area for the system contains residential land uses. There are 11 other land uses covering the remaining portions percent of the wellfield.

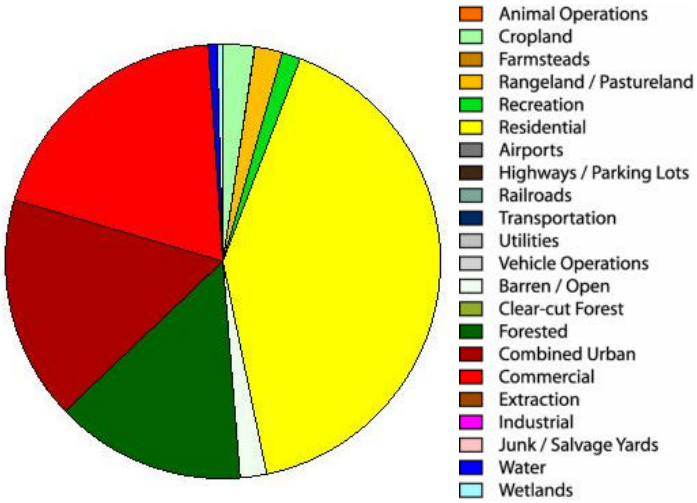

Figure 2: System-Wide Land Use

Roads and Railroads

Roads and railroads represent potential conduits for the entry of contaminants into soils and ground water. The possibility exists that an accident, such as a spill, could impact water quality. Furthermore, certain upkeep and maintenance practices such as road salting, or pesticides applications could also introduce contaminants along these transportation pathways. Table 3 summarizes the lengths and types of conduits that run through the various wellhead areas. These are the highlighted roads and railroads shown on Map 3 Discrete Sources Map for Artesian Water Co. (Hockessin) and Map 4 Land Use

Map for Artesian Water Co. (Hockessin). Smaller (tertiary), or private roads are not included in the assessment because of the lack of consistent data across the State.

Table 3: Roads and Railways found within WHPA

Wellfield	Conduit	Mileage	Type
Hockessin Wells G-1, G-3, 1, 2, 3, and 4	Road	4.24	Secondary
Hockessin Wells G-1, G-3, 1, 2, 3, and 4	Rail	2.5	Main
Hockessin Wells G-1, G-3, 1, 2, 3, and 4	Road	1.29	Major
Hockessin Wells G-1, G-3, 1, 2, 3, and 4	Rail	0.48	Siding
Hockessin Wells G-1, G-3, 1, 2, 3, and 4	Road	0.1	Primary

Water Quality Data

This portion of the source water assessment evaluates the water quality of raw water *before* it enters into any treatment process (i.e. filtration, disinfection, fluoridation, softening, etc.) and/or the distribution system. However, it should be noted that many water supply systems utilize certain treatment methods that remove contaminants or impurities from the drinking water before it is delivered to the public.

The Delaware SWAP classifies contaminants into eight (8) categories. Examples of contaminants within each of the eight categories are as follows:

Other Inorganic:	Fluoride, Chloride, pH, Sulfate, Radon, Radium, Strontium,
Metals:	Copper, Arsenic, Iron, Manganese
Nutrients:	Nitrate, Nitrite
Other Organics:	Vinyl Chloride, PCE, TCE
Pathogens:	Coliform Bacteria, Cryptosporidium, Giardia lambia
Pesticides:	Alachlor, Atrazine, Glyphosate
Petroleum Hydrocarbons:	Gasoline, Heating Oil, Benzene, Toluene
Polychlorinated Biphenyls:	PCB

The Source Water Assessment and Protection Program has reviewed the available analytical data for this system for the previous five years. While this report may show that a drinking water standard was exceeded for a particular contaminant at one instance, the Department of Health and Social Services, Division of Public Health, Office of Drinking Water, which regulates drinking water quality, may not consider it a violation based upon more detailed procedures detailed within their regulations (DHSS, 2002). In the event that a contaminant, which is not naturally found in the source water, has been detected as a result of maintenance to the water distribution system, its results will be noted and explained within the text. These results may not be considered when determining the final susceptibility for a well and/or public water system.

Naturally Occurring Contaminants

There are several naturally occurring potential contaminants that will be identified as part of the assessments of public water supplies. These include iron, chloride, sodium, radon, radium, manganese, sulfate and others. These will be identified as part of the susceptibility determination for each well and listed as being naturally occurring if detected.

Analytical Data

Data from the Department of Health and Social Services' Division of Public Health's Office of Drinking Water's (DPH-ODW) analytical database and studies on public well water quality by both the United States Geological Survey (2001) and the DNREC Site Investigation and Restoration Branch (2002) was reviewed for raw/untreated water quality data for the past five years.

A review of available analytical data for raw (ground) water samples shows the following: **drinking water standards have been exceeded** for PCE (Tetrachloroethylene) in wells G-3 (31614) and 4 (31820), elevated levels of PCE in well G-1 (30266); detection of the gasoline additive MTBE in wells G-3 and 4; detections of various disinfection byproducts (chloroform, bromoform, etc), organic/chlorinated solvents (PCE/TCE/Nitrobenzene, etc), and pesticides in wells G-1 and G-3; and detections of chlorination byproducts, and organic/chlorinated solvents in well 4.

Water Treatment Methods

Raw water from six wells is pumped to the Hockessin Station where a series of treatment processes are employed to meet state and federal drinking water standards. Chlorine is used for disinfection. Fluoride and a phosphate-based corrosion inhibitor are added after the treatment process. PCE in the station effluent is below the MCL as a result of blending the water from the six wells.

For more information about the water treatment used please contact Artesian Water Co. (Hockessin) or the Division of Public Health's Office of Drinking Water at (302) 739-5410.

Susceptibility Determination

The key part of a source water assessment is the determination of the likelihood that a particular public water supply system will capture contaminants at concentrations of concern. This analysis, termed susceptibility determination, combines the source water

protection area delineation, the vulnerability determination for the wells, the contaminant source inventory, and the water quality information to yield a relative susceptibility for the public water system. Each individual water source is rated for each of the eight-contaminant categories on a scale ranging from no susceptibility to having been documented as having exceeded drinking-water standards.

Vulnerability

Artesian Water Co. (Hockessin) uses six wells to provide drinking water to the system. All six wells withdraw water from the karst Cockeysville aquifer. These wells are classified as highly vulnerable to contamination from surficial processes as they are withdrawing water from voids in the in the karst Cockeysville aquifer. The wellhead protection areas for these wells were delineated using best professional judgement based on the known hydrology of the area.

Contaminant Inventory

There are 18 unique discrete sources of potential contamination in the wellhead protection areas. The majority of these sites have only negligible contaminant potentials and these pose little or no threat to the drinking water resources. However, some sites that have substantial contaminant potentials exist in the area as well.

The contaminant potential from all discrete sources is as follows:

Low Contaminant Potential for Nutrients
Negligible Contaminant Potential for Pathogens
High Contaminant Potential for Petroleum
Negligible Contaminant Potential for Pesticides
Negligible Contaminant Potential for PCBs
High Contaminant Potential for Other Organic
Low Contaminant Potential for Metals
Low Contaminant Potential for Other Inorganic

As stated previously, almost 41 percent of the total wellhead protection area for the system contains residential land uses. There are 11 other land uses covering the remaining portions percent of the wellfield.

The contaminant potential from all land uses is as follows:

Low Contaminant Potential for Nutrients
Low Contaminant Potential for Pathogens
Low Contaminant Potential for Petroleum
Low Contaminant Potential for Pesticides
Low Contaminant Potential for PCBs
Low Contaminant Potential for Other Organic
Low Contaminant Potential for Metals
Low Contaminant Potential for Other Inorganic

Water Quality

Susceptibility ratings need to be adjusted, per policy, take the following into consideration: drinking water standards have been exceeded for other organics in wells 31614 and 31820; elevated levels of PCE (Tetrachloroethylene) in well 30266; very low detections of organics 1,1-DCE, Chloroform, Nitrobenzene, TCE, and pesticides Dacthal and Dalapon in well 30266, very low detections of the organics 1,1-DCE, Bromoform, cis-1,2-DCE, TCE, petroleum additive MTBE, and pesticides Dacthal and Dalapon in well 31614; and very low detections of organics 1,1-DCE Chloroform, Bromoform, 1,1,1-TCA, cis-1,2-DCE, TCE, and the petroleum additive MTBE in well 31820.

Individual Source Susceptibility

All of the wells for Artesian Water Co. (Hockessin) have unique properties, such as depth, location, date drilled, and pumping rate. These influence the delineated area, the vulnerability determination, and the contaminant inventory. This water system has one unique wellhead area for the six wells on the system. A Susceptibility Assessment must be performed for each individual well in the delineated area/wellfield. A brief discussion for each wellfield follows and the results are further summarized in Appendix B Table 7: Well Specific Susceptibility.

The 10010 AWC Hockessin 1 wellfield has a moderate susceptibility to nutrients due to both discrete sources and land use activities, a moderate susceptibility to pathogens due to land use activities, a **very high** susceptibility to petroleum hydrocarbons due to discrete sources, a moderate susceptibility to pesticides due to land use activities, a moderate susceptibility to PCBs due to land use activities, a **very high** susceptibility to other organic compounds due to discrete sources, a moderate susceptibility to metals due to both discrete sources and land use activities and, a moderate susceptibility to other inorganic compounds due to both discrete sources and land use activities.

The 10011 AWC Hockessin 2 wellfield has a moderate susceptibility to nutrients due to both discrete sources and land use activities, a moderate susceptibility to pathogens due to land use activities, a **very high** susceptibility to petroleum hydrocarbons due to discrete sources, a moderate susceptibility to pesticides due to land use activities, a moderate susceptibility to PCBs due to land use activities, a **very high** susceptibility to other organic compounds due to discrete sources, a moderate susceptibility to metals due to both discrete sources and land use activities and, a moderate susceptibility to other inorganic compounds due to both discrete sources and land use activities.

The 10012 AWC Hockessin 3 wellfield has a moderate susceptibility to nutrients due to both discrete sources and land use activities, a moderate susceptibility to pathogens due to land use activities, a **very high** susceptibility to petroleum hydrocarbons due to discrete sources, a moderate susceptibility to pesticides due to land use activities, a moderate susceptibility to PCBs due to land use activities, a **very high** susceptibility to other organic compounds due to discrete sources, a moderate susceptibility to metals due to both discrete sources and land use activities and, a moderate susceptibility to other inorganic compounds due to both discrete sources and land use activities.

The 30266 AWC Hockessin G1 wellfield has a moderate susceptibility to nutrients due to both discrete sources and land use activities, a moderate susceptibility to pathogens due to land use activities, a **very high** susceptibility to petroleum hydrocarbons due to discrete sources, a **very high** susceptibility to pesticides due to land use activities and available analytical data, a moderate susceptibility to PCBs due to land use activities, a **very high** susceptibility to other organic compounds due to discrete sources and available analytical data, a moderate susceptibility to metals due to both discrete sources and land use activities and, a moderate susceptibility to other inorganic compounds due to both discrete sources and land use activities.

The 31614 AWC Hockessin G3 wellfield has a moderate susceptibility to nutrients due to both discrete sources and land use activities, a moderate susceptibility to pathogens due to land use activities, a **very high** susceptibility to petroleum hydrocarbons due to discrete sources, a **very high** susceptibility to pesticides due to land use activities and available analytical data, a moderate susceptibility to PCBs due to land use activities, a **exceeds drinking water standards** for other organic compounds due to discrete sources and available analytical data, a moderate susceptibility to metals due to both discrete sources and land use activities and, a moderate susceptibility to other inorganic compounds due to both discrete sources and land use activities.

The 31820 AWC Hockessin 4 wellfield has a moderate susceptibility to nutrients due to both discrete sources and land use activities, a moderate susceptibility to pathogens due to land use activities, a **very high** susceptibility to petroleum hydrocarbons due to discrete sources, a moderate susceptibility to pesticides due to land use activities, a moderate susceptibility to PCBs due to land use activities, **exceeds drinking water standards** for other organic compounds due to discrete sources and available analytical data, a moderate susceptibility to metals due to both discrete sources and land use activities and, a moderate susceptibility to other inorganic compounds due to both discrete sources and land use activities.

System Wide Susceptibility

The individual susceptibilities of each of this system's wells are detailed in the previous section. On a source-by-source basis these wells could have very different susceptibility ratings. When looked at as a group for the entire system some generalized, conservative statements can be made. For instance, if one assumes that the system is only as protected as it's weakest link, then the system-wide susceptibility to any given contaminant category is determined by the most susceptible water source. Using this methodology, a drinking water system with five wells that have a low susceptibility to metals, and one well that is highly susceptible to metals would be rated as having a high susceptibility to that contaminant category. In many instances this could mean that a particular land use overlying an unconfined well could drive the system-wide susceptibility higher. However, it is also possible that a confined-aquifer well that withdraws iron-rich water could dramatically raise this system's susceptibility rating for metals.

As stated, this system-wide susceptibility is a conservative rating that summarizes the most susceptible portions of any system. This susceptibility is the relative likelihood that a

public water supply might draw water contaminated at concentrations of concern to public health. This Susceptibility Assessment is a summary of the vulnerability and contaminant potential to raw water supplies. The actual water quality delivered to the consumer is monitored by Public Health's Office of Drinking Water (and for community systems is reported in the Consumer Confidence Reports) and is not part of this assessment.

Overall, Artesian Water Co. (Hockessin) has a moderate susceptibility to nutrients, a moderate susceptibility to pathogens, a **very high** susceptibility to petroleum hydrocarbons, a **very high** susceptibility to pesticides, a moderate susceptibility to PCBs, a **exceeds drinking water standards for** other organic compounds, a moderate susceptibility to metals and, a moderate susceptibility to other inorganic compounds. The individual well contributions to the system-wide susceptibility are explained below with a further summary provided in Appendix B Table8: Overall System Susceptibility.

Table 4: Overall Susceptibility Rating

Susceptibility	Contaminant Category
Exceeds Standards	Other Organics
Very High	Petroleum Hydrocarbons Pesticides
Moderate	Nutrients Pathogens PCBs Metals Other Inorganics

References

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Talley, John H. (ed.), Woodruff, K. D., Plank, M.O., and Werkheiser, W.H., 1995, Geology and Hydrology of the Cockeysville Formation Northern New Castle County, Delaware: Delaware Geological Survey Bulletin No. 19.

Woodruff, Kenneth, and Talley, J.H. 1991, unpublished Summary Report Geology and Hydrogeology of the Cockeysville Formation, New Castle County Delaware. Prepared for the Water Resources Agency of New Castle County and the Delaware Department of Natural Resources and Environmental Control.

Appendix A: Maps

Map 1: Base Map for Wellhead Areas

Map 1: Base Map

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Please contact the Source Water Assessment and Protection Program at Phone: (302) 739-4793 or Fax: (302) 739-2296 to request more information regarding this map.

Map 2: Delineation Map for Wellhead Areas

Map 2: Delineation Map

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Please contact the Source Water Assessment and Protection Program at Phone: (302) 739-4793 or Fax: (302) 739-2296 to request more information regarding this map.

Map 3: Discrete Sources Within Wellhead Areas

Map 3: Discrete Source Map

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Please contact the Source Water Assessment and Protection Program at Phone: (302) 739-4793 or Fax: (302) 739-2296 to request more information regarding this map.

Map 4: Land Use Within Wellhead Areas

Map 4: Land Use Map

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Please contact the Source Water Assessment and Protection Program at Phone: (302) 739-4793 or Fax: (302) 739-2296 to request more information regarding this map.

Appendix B: Tables

Table 5: Discrete Sources Within Wellhead Areas

Wellfield	SiteType	SiteID	Nutrients	Pathogens	Petroleum	Pesticides	PCBs	Other Organic	Metals	Other Inorganic
All AWC Hockessin Wells	Underground Storage Tanks	3000301	N	N	H	N	N	N	N	N
All AWC Hockessin Wells	Underground Storage Tanks	3000321	N	N	H	N	N	N	N	N
All AWC Hockessin Wells	Underground Storage Tanks	3000089	N	N	H	N	N	N	N	N
All AWC Hockessin Wells	Underground Storage Tanks	3000932	N	N	H	N	N	H	N	N
All AWC Hockessin Wells	Underground Storage Tanks	3000264	N	N	M	N	N	N	N	N
All AWC Hockessin Wells	Underground Storage Tanks	3000431	N	N	M	N	N	N	N	N
All AWC Hockessin Wells	Underground Storage Tanks	3001594	N	N	M	N	N	N	N	N
All AWC Hockessin Wells	Underground Storage Tanks	3000543	N	N	M	N	N	N	N	N
All AWC Hockessin Wells	Hazardous Waste Generators	DED-98407139	N	N	N	N	N	L	N	N
All AWC Hockessin Wells	Hazardous Waste Generators	DED00233780	N	N	N	N	N	N	L	L
All AWC Hockessin Wells	Hazardous Waste Generators	DED98407636	N	N	N	N	N	L	L	N
All AWC Hockessin Wells	Domestic Septic System		L	N	N	N	N	N	N	N
All AWC Hockessin Wells	Superfund Sites	DE-071	N	N	N	N	N	N	N	N
All AWC Hockessin Wells	Superfund Sites	DE-215	N	N	N	N	N	N	N	N
All AWC Hockessin Wells	Underground Storage Tanks	3000483	N	N	N	N	N	N	N	N
All AWC Hockessin Wells	Underground Storage Tanks	3001307	N	N	N	N	N	N	N	N
All AWC Hockessin Wells	Underground Storage Tanks	3001449	N	N	N	N	N	N	N	N
All AWC Hockessin Wells	Underground Storage Tanks	3000089	N	N	H	N	N	N	N	N
All AWC Hockessin Wells	Waste Water Outfall	DE 00451	N	N	N	N	N	N	N	N

Wellfield Summary	SiteType	SiteID	Nutrients	Pathogens	Petroleum	Pesticides	PCBs	Other Organic	Metals	Other Inorganic
10010 AWC Hockessin1	All Site Types	All Sites	L	N	H	N	N	H	L	L
10011 AWC Hockessin2	All Site Types	All Sites	L	N	H	N	N	H	L	L
10012 AWC Hockessin3	All Site Types	All Sites	L	N	H	N	N	H	L	L
30266 AWC HockessinG1	All Site Types	All Sites	L	N	H	N	N	H	L	L
31614 AWC HockessinG3	All Site Types	All Sites	L	N	H	N	N	H	L	L
31820 AWC Hockessin4	All Site Types	All Sites	L	N	H	N	N	H	L	L

System Summary	Nutrients	Pathogens	Petroleum	Pesticides	PCBs	Other Organic	Metals	Other Inorganic
Overall	L	N	H	N	N	H	L	L

Table 6: Land Use Within Wellhead Area

Wellfield	Land Use	Area (acres)	Percent	Nutrients	Pathogens	Petroleum	Pesticides	PCBs	Other Organic	Metals	Other Inorganic
All AWC Hockessin Wells	Residential	391.97	40.96	L	L	L	L	N	N	N	N
All AWC Hockessin Wells	Commercial	185.11	19.34	L	N	L	L	L	L	L	L
All AWC Hockessin Wells	Combined Urban	159.67	16.69	N	N	L	L	N	L	N	L
All AWC Hockessin Wells	Forested	135.45	14.15	N	N	N	L	N	N	N	N
All AWC Hockessin Wells	Cropland	22.43	2.34	N	N	N	L	N	N	N	L
All AWC Hockessin Wells	Rangeland / Pastureland	19.52	2.04	L	L	N	L	N	N	N	N
All AWC Hockessin Wells	Barren / Open	18.82	1.97	N	N	N	N	N	N	N	N
All AWC Hockessin Wells	Recreation	13.26	1.39	L	N	N	L	N	N	N	N
All AWC Hockessin Wells	Water	5.98	0.63	N	N	N	N	N	N	N	N
All AWC Hockessin Wells	Wetlands	4.22	0.44	N	N	N	N	N	N	N	N
All AWC Hockessin Wells	Farmsteads	0.24	0.03	L	L	L	L	N	N	N	L

Wellfield Summary	Land Use	Area (acres)	Nutrients	Pathogens	Petroleum	Pesticides	PCBs	Other Organic	Metals	Other Inorganic
10010 AWC Hockessin1	All Land Uses	10524.03	L	L	L	L	L	L	L	L
10011 AWC Hockessin2	All Land Uses	10524.03	L	L	L	L	L	L	L	L
10012 AWC Hockessin3	All Land Uses	10524.03	L	L	L	L	L	L	L	L
30266 AWC Hockessin G1	All Land Uses	10524.03	L	L	L	L	L	L	L	L
31614 AWC Hockessin G3	All Land Uses	10524.03	L	L	L	L	L	L	L	L
31820 AWC Hockessin4	All Land Uses	10524.03	L	L	L	L	L	L	L	L

System Summary	Nutrients	Pathogens	Petroleum	Pesticides	PCBs	Other Organic	Metals	Other Inorganic
Overall	L	L	L	L	L	L	L	L

Table 7: Individual Well Susceptibility

Wellfield	DNREC ID	Based On	Vulnerability	Nutrients	Pathogens	Petroleum	Pesticides	PCBs	Other Organic	Metals	Other Inorganic
10010 AWC Hockessin1	10010	Discrete Sources	High	Moderate Susceptibility	Low Susceptibility	Very High Susceptibility	Low Susceptibility	Low Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
10010 AWC Hockessin1	10010	Land Use	High	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility
10010 AWC Hockessin1	10010	Overall	High	Moderate Susceptibility	Moderate Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
10011 AWC Hockessin2	10011	Discrete Sources	High	Moderate Susceptibility	Low Susceptibility	Very High Susceptibility	Low Susceptibility	Low Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
10011 AWC Hockessin2	10011	Land Use	High	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility
10011 AWC Hockessin2	10011	Overall	High	Moderate Susceptibility	Moderate Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
10012 AWC Hockessin3	10012	Discrete Sources	High	Moderate Susceptibility	Low Susceptibility	Very High Susceptibility	Low Susceptibility	Low Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
10012 AWC Hockessin3	10012	Land Use	High	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility
10012 AWC Hockessin3	10012	Overall	High	Moderate Susceptibility	Moderate Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
30266 AWC HockessinG1	30266	Discrete Sources	High	Moderate Susceptibility	Low Susceptibility	Very High Susceptibility	Low Susceptibility	Low Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
30266 AWC HockessinG1	30266	Land Use	High	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility
30266 AWC HockessinG1	30266	Analytical Data	--	--	--	--	Very High Susceptibility	--	Very High Susceptibility	--	--
30266 AWC HockessinG1	30266	Overall	High	Moderate Susceptibility	Moderate Susceptibility	Very High Susceptibility	Very High Susceptibility	Moderate Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
31614 AWC HockessinG3	31614	Discrete Sources	High	Moderate Susceptibility	Low Susceptibility	Very High Susceptibility	Low Susceptibility	Low Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
31614 AWC HockessinG3	31614	Land Use	High	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility
31614 AWC HockessinG3	31614	Analytical Data	--	--	--	Very High Susceptibility	Very High Susceptibility	--	Exceeds Standards	--	--
31614 AWC HockessinG3	31614	Overall	High	Moderate Susceptibility	Moderate Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Exceeds Standards	Moderate Susceptibility	Moderate Susceptibility
31820 AWC Hockessin4	31820	Discrete Sources	High	Moderate Susceptibility	Low Susceptibility	Very High Susceptibility	Low Susceptibility	Low Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
31820 AWC Hockessin4	31820	Land Use	High	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility
31820 AWC Hockessin4	31820	Analytical Data	--	--	--	Very High Susceptibility	--	--	Exceeds Standards	--	--
31820 AWC Hockessin4	31820	Overall	High	Moderate Susceptibility	Moderate Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Exceeds Standards	Moderate Susceptibility	Moderate Susceptibility

Wellfield	Based On	Vulnerability	Nutrients	Pathogens	Petroleum	Pesticides	PCBs	Other Organic	Metals	Other Inorganic
10010 AWC Hockessin1	Discrete Sources	High	Moderate Susceptibility	Low Susceptibility	Very High Susceptibility	Low Susceptibility	Low Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
10010 AWC Hockessin1	Land Use	High	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility
10010 AWC Hockessin1	**Overall**	**High**	**Moderate Susceptibility**	**Moderate Susceptibility**	**Very High Susceptibility**	**Moderate Susceptibility**	**Moderate Susceptibility**	**Very High Susceptibility**	**Moderate Susceptibility**	**Moderate Susceptibility**
10011 AWC Hockessin2	Discrete Sources	High	Moderate Susceptibility	Low Susceptibility	Very High Susceptibility	Low Susceptibility	Low Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
10011 AWC Hockessin2	Land Use	High	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility
10011 AWC Hockessin2	**Overall**	**High**	**Moderate Susceptibility**	**Moderate Susceptibility**	**Very High Susceptibility**	**Moderate Susceptibility**	**Moderate Susceptibility**	**Very High Susceptibility**	**Moderate Susceptibility**	**Moderate Susceptibility**
10012 AWC Hockessin3	Discrete Sources	High	Moderate Susceptibility	Low Susceptibility	Very High Susceptibility	Low Susceptibility	Low Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
10012 AWC Hockessin3	Land Use	High	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility
10012 AWC Hockessin3	**Overall**	**High**	**Moderate Susceptibility**	**Moderate Susceptibility**	**Very High Susceptibility**	**Moderate Susceptibility**	**Moderate Susceptibility**	**Very High Susceptibility**	**Moderate Susceptibility**	**Moderate Susceptibility**
30266 AWC HockessinG1	Discrete Sources	High	Moderate Susceptibility	Low Susceptibility	Very High Susceptibility	Low Susceptibility	Low Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
30266 AWC HockessinG1	Land Use	High	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility
30266 AWC HockessinG1	Analytical Data	--	--	--	--	Very High Susceptibility	--	Very High Susceptibility	--	--
30266 AWC HockessinG1	**Overall**	**High**	**Moderate Susceptibility**	**Moderate Susceptibility**	**Very High Susceptibility**	**Moderate Susceptibility**	**Moderate Susceptibility**	**Very High Susceptibility**	**Moderate Susceptibility**	**Moderate Susceptibility**
31614 AWC HockessinG3	Discrete Sources	High	Moderate Susceptibility	Low Susceptibility	Very High Susceptibility	Low Susceptibility	Low Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
31614 AWC HockessinG3	Land Use	High	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility
31614 AWC HockessinG3	Analytical Data	--	--	--	Very High Susceptibility	Very High Susceptibility	--	Exceeds Standards	--	--
31614 AWC HockessinG3	**Overall**	**High**	**Moderate Susceptibility**	**Moderate Susceptibility**	**Very High Susceptibility**	**Very High Susceptibility**	**Moderate Susceptibility**	**Very High Susceptibility**	**Moderate Susceptibility**	**Moderate Susceptibility**
31820 AWC Hockessin4	Discrete Sources	High	Moderate Susceptibility	Low Susceptibility	Very High Susceptibility	Low Susceptibility	Low Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
31820 AWC Hockessin4	Land Use	High	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility
31820 AWC Hockessin4	Analytical Data	--	--	--	Very High Susceptibility	--	--	Exceeds Standards	--	--
31820 AWC Hockessin4	**Overall**	**High**	**Moderate Susceptibility**	**Moderate Susceptibility**	**Very High Susceptibility**	**Moderate Susceptibility**	**Moderate Susceptibility**	**Very High Susceptibility**	**Moderate Susceptibility**	**Moderate Susceptibility**

Table 8: Overall System Susceptibility

Based On	Vulnerability	Nutrients	Pathogens	Petroleum	Pesticides	PCBs	Other Organic	Metals	Other Inorganic
Discrete Sources	High	Moderate Susceptibility	Low Susceptibility	Very High Susceptibility	Low Susceptibility	Low Susceptibility	Very High Susceptibility	Moderate Susceptibility	Moderate Susceptibility
Land Use	High	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility	Moderate Susceptibility
Analytical Data	--	--	--	Very High Susceptibility	Very High Susceptibility	--	Exceeds Standards	--	--
Overall	High	Moderate Susceptibility	Moderate Susceptibility	Very High Susceptibility	Very High Susceptibility	Moderate Susceptibility	Exceeds Standards	Moderate Susceptibility	Moderate Susceptibility

Appendix C: Analytical Data

Artesian Water Company

Hockessin Wellfield

Well Number	Sample Date	Contaminant Class	Analyte	Sample Result µg/l*	(P/S)MCL** *if applicable µg/l	(P/S)MCL Violation?	Greater than 50% of MCL	Synthetic Substance Detection?
Well G-1 (30266)	8/21/2001	Other Organics	1,1-DCE (1,1-Dichloroethylene)	0.1J	7			Yes
	8/21/2001	Other Organics	Chloroform	0.1J	80[A]			Yes
	8/21/2001	Other Organics	Nitrobenzene	0.086	0.4[B]			Yes
	8/21/2001	Other Organics	PCE (Tetrachloroethylene)	3.1	5		Yes	
	8/21/2001	Other Organics	TCE (Trichloroethylene)	0.086	5			Yes
	8/21/2001	Pesticides	Dacthal	0.33	37			Yes
	8/21/2001	Pesticides	Dalapon	0.71J	200[B]			Yes

Well Number	Sample Date	Contaminant Class	Analyte	Sample Result µg/l*	(P/S)MCL** *if applicable µg/l	(P/S)MCL Violation?	Greater than 50% of MCL	Synthetic Substance Detection?
Well G-3 (31614)	8/21/2001	Other Organics	1,1-DCE (1,1-Dichloroethylene)	0.1J	7			Yes
	8/21/2001	Other Organics	Bromoform	0.8	80[A]			Yes
	8/21/2001	Other Organics	Cis-1,2-DCE	0.1J	70			Yes
	8/21/2001	Other Organics	PCE (Tetrachloroethylene)	5.6	5	Yes		
	8/21/2001	Other Organics	TCE (Trichloroethylene)	0.2J	5			Yes
	8/21/2001	Petroleum Hydrocarbons	MTBE	0.2J	10			Yes
	8/21/2001	Pesticides	Dacthal	0.05J	37			Yes
	8/21/2001	Pesticides	Dalapon	0.73J	200[B]			Yes

Well Number	Sample Date	Contaminant Class	Analyte	Sample Result µg/l*	(P/S)MCL** *if applicable µg/l	(P/S)MCL Violation?	Greater than 50% of MCL	Synthetic Substance Detection?
Well 4 (31820)	8/21/2001	Other Organics	1,1-DCE (1,1-Dichloroethylene)	0.1J	7			Yes
		Other Organics	Chloroform	0.1J	80[A]			Yes
	8/21/2001	Other Organics	Bromoform	1.0	80[A]			Yes
		Other Organics	1,1,1-TCA (1,1,1-Trichloroethane)	0.1J	100			Yes
	8/21/2001	Other Organics	Cis-1,2-DCE	0.2J	70			Yes
	8/21/2001	Other Organics	PCE (Tetrachloroethylene)	5.7	5	Yes		
	8/21/2001	Other Organics	TCE (Trichloroethylene)	0.4J	5			Yes
	8/21/2001	Petroleum Hydrocarbons	MTBE	0.2J	10			Yes

* : Results are in micrograms/liter unless listed otherwise

**: PMCL = Primary Maximum Contaminant Level, SMCL = Secondary Maximum Contaminant Level

A: Bromoform, Chloroform, Bromodichloromethane, Dibromochloromethane, and Trichlorofluoromethane are constituents of the Trihalomethane Group which has a total PMCL of 80 µg/l.

B: Delaware Uniform Risk-Based Standard or Proposed State-instituted MCL

J: Laboratory Qualifier indicating that substance was present though the quantity is at levels just above the detection limits of the equiment.

Appendix D: Data Sources

Data Sources Used in Source Water Assessments

Type	Organization	Section	Phone Number
Public Water Supply Well Data	Department of Natural Resources and Environmental Control	Water Supply Section	(302) 739-4793
Public Water Supply Well Data	Delaware Geological Survey		(302) 831-2833
Water Quality Data	Department of Health and Social Services	Division of Public Health Office of Drinking Water	(302) 739-5410
Land Use / Land Cover GIS Coverage	Delaware Office of State Planning Coordination		(302) 739-3090
Animal Feedlot Operations	County Conservation Districts	Kent	(302) 697-2600
Animal Feedlot Operations	County Conservation Districts	New Castle	(302) 832-3100
Animal Feedlot Operations	County Conservation Districts	Sussex	(302) 856-3990
Combined Sewer Overflows (CSOs)	Department of Natural Resources and Environmental Control	Surface Water Discharges Section	(302) 739-5731
Dredge Spoil Disposal Areas	Department of Natural Resources and Environmental Control	Soil and Water Conservation	(302) 739-4411
Hazardous Waste Generator Sites	Department of Natural Resources and Environmental Control	Solid and Hazardous Waste Management Branch	(302) 739-3689
Landfills and Dumps	Department of Natural Resources and Environmental Control	Solid and Hazardous Waste Management Branch	(302) 739-3689
Large On-site Septic Systems	Department of Natural Resources and Environmental Control	Ground Water Discharges Section	(302) 739-4762
NPDES Wastewater Outfalls	Department of Natural Resources and Environmental Control	Surface Water Discharges Section	(302) 739-5731
Pesticide Loading, Mixing, and Storage Facilities	Delaware Department of Agriculture	Pesticide Management Section	(302) 739-4811
Salvage Yards	Department of Natural Resources and Environmental Control	Solid and Hazardous Waste Management Branch	(302) 739-3689
Site Investigation and Restoration Branch (SIRB) [Superfund] Sites	Department of Natural Resources and Environmental Control	Site Investigation and Restoration Branch	(302) 395-2600
Sludge Application Sites	Department of Natural Resources and Environmental Control	Surface Water Discharges Section	(302) 739-5731
Spray Irrigation Sites	Department of Natural Resources and Environmental Control	Ground Water Discharges Section	(302) 739-4762
Tire Piles	Department of Natural Resources and Environmental Control	Solid and Hazardous Waste Management Branch	(302) 739-3820
Toxic Release Inventory Sites	Department of Natural Resources and Environmental Control	Air Quality Management Section	(302) 739-4791
Underground Storage Tanks	Department of Natural Resources and Environmental Control	Underground Storage Tank Branch	(302) 395-2500