

# Ground-Water Quality of the Appoquinimink River Watershed

## DEFINITION

Ground water in the Appoquinimink watershed is found within the Atlantic Coastal Plain sediments of the Columbia, Englishtown, and Mt. Laurel aquifers - water-bearing units of rock, sand, or gravel. The Columbia is an unconfined surficial aquifer blanketing the watershed, which is directly underlain by the Englishtown, and Mt. Laurel confined aquifers. The Englishtown aquifer ranges in thickness from 20-40 feet and the Mt. Laurel aquifer is approximately 85 feet thick at the Appoquinimink River and increases to 140 feet thick in southernmost New Castle County. Due to limited fresh surface water resources, ground water provides the only fresh water supply.

This fact sheet provides a brief synopsis of the Appoquinimink River Watershed's ground-water quality and how it is affected by nutrient loading. Over 70% of the land area in the watershed is used for agricultural, urban, and residential purposes. These landuse activities cycle a large percentage of nitrogen through the soil and ground water, leading to a potential degradation of ground water.

Shallow ground water and dissolved constituents seep into surface water bodies as base flow. This ground-water provides much of the fresh water, but can also contribute contaminants such as dissolved nitrogen compounds.

## WATER QUALITY IMPACTS

Fertilizers and wastewater disposal are the primary source of nitrogen in the watershed. Nitrogen from these sources can rapidly infiltrate the unconfined aquifers due to their shallow depth and high soil permeability. Ground-water quality of the watershed is generally suitable for most uses, according to a 1995 report by the United States Geological Survey and Delaware Geological Survey. However, nitrate in the unconfined aquifers may exceed the United States Environmental Protection Agency maximum contaminant level (USEPA MCL) of 10 milligrams per liter (mg/L). USEPA MCL's are limits set to ensure the health of people consuming the water. These limits are enforceable in public supply wells, but are only used as a guideline for private domestic wells. The confined aquifers underlying the

unconfined aquifer were found to have nitrate levels below the USEPA MCL.

## MANAGEMENT TECHNIQUES

Delaware's history of poor surface and ground water quality due to excess nutrients from farming activities caused legislators to implement the Nutrient Management Law statewide in June 1999 by Governor Thomas Carper. Under this law the Nutrient Management Commission was formed to develop and implement best management practices (BMP's) to improve water quality, optimize nutrient use, and maintain a profitable agricultural industry.

In addition, state regulatory programs governing wastewater disposal help limit the amount of ground-water nutrient contamination derived from on-site septic systems by controlling the density and construction of these systems. Currently, on-site wastewater does not present a problem due to the limited population and relatively low percentage of land area affected by the nutrients; however, the population in the watershed is predicted to continue increasing over the next several years.

The State of Delaware has also implemented a state-wide Wellhead Protection Plan since 1990 and a Source Water Assessment Plan since 1999. There are 29 public wells located in the Appoquinimink watershed that currently have 300-foot radius wellhead protection areas. These programs allow for alternate sources of water supply in the event of a spill or detection of excess pollutant in the ground water.

## IMPLEMENTATION ISSUES

With nutrient input throughout the watershed, it is important that these programs be implemented. While State and County regulatory programs have mandatory requirements, problems exist when trying to implement non-regulatory programs.

Other implementation issues and priorities will be identified as part of the Delaware Bay Whole Basin Assessment, due to be completed in 2002. Specific recommendations to address nutrients in ground water must await this assessment.