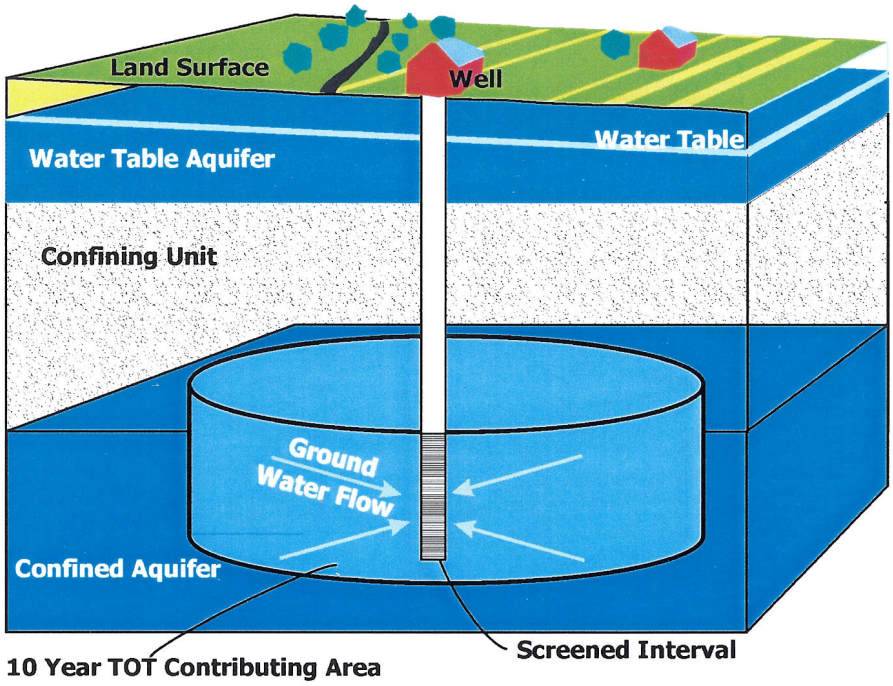
Source Water Assessment

for Community Water Systems

in Caroline County, MD



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FINAL

TABLE OF CONTENTS

TABLE OF CONTENTS
(cont.)

SUMMARY

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting drinking water supplies conclude this report.

The water supply sources of the nineteen community water systems in Caroline County included in this report are naturally protected confined aquifers of the Atlantic Coastal Plain physiographic province. The nineteen community water systems included in this report are currently using thirty-seven wells that draw from six different confined aquifers. The Source Water Assessment areas were delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment areas from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. Maps and aerial photography showing the Source Water Assessment areas are included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the water supplies are not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. Some naturally occurring contaminants do pose a risk to the water supply. It was determined that some water systems that draw water from the Aquia and Piney Point aquifers are susceptible to arsenic. Several systems are susceptible to fluoride, although no direct correlation with aquifers was evident. Some water systems may be susceptible to Radon depending upon the final adopted MCL.

EXECUTIVE SUMMARY
TOWN OF DENTON WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Town of Denton water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of the Town of Denton's water supply is the Piney Point aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Town of Denton water system currently uses two wells and has one emergency backup well in the Piney Point. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. Maps and aerial photography showing the Source Water Assessment areas are included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Town of Denton water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. However, it was determined that arsenic and fluoride, two naturally occuring contaminants, do pose a risk to the water supply. The susceptibility of the water supply to Radon will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
TOWN OF FEDERALSBURG WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Town of Federalsburg water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The sources of the Town of Federalsburg's water supply are the Manokin, Federalsburg, and Cheswold aquifers, three naturally protected confined aquifers of the Atlantic Coastal Plain physiographic province. The Town of Federalsburg's water system currently uses five wells in these aquifers. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. A map showing the Source Water Assessment areas is included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Town of Federalsburg water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The susceptibility of the water supply to Radon, a naturally occurring element, will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
GREENSBORO WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Greensboro water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Greensboro's water supply is the Piney Point aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Greensboro water system currently uses three wells in the Piney Point. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. Maps and aerial photography showing the Source Water Assessment areas are included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Greensboro water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. However, it was determined that fluoride, a naturally occurring contaminant, does pose a risk to the water supply. The susceptibility of the water supply to Radon will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
PRESTON WATERWORKS – NELPHINE HEIGHTS WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Preston Waterworks water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Preston Waterworks' water supply is the Piney Point aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Preston Waterworks' water system currently uses one well in the Piney Point. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. A map showing the Source Water Assessment areas is included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Preston Waterworks water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The susceptibility of the water supply to Radon, a naturally occurring element, will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
TOWN OF PRESTON WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Town of Preston water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Town of Preston's water supply is the Piney Point aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Town of Preston water system currently uses two wells in the Piney Point. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. Maps and aerial photography showing the Source Water Assessment areas are included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Town of Preston water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The susceptibility of the water supply to Radon, a naturally occurring element, will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
RIDGELY WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Ridgely water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Ridgely's water supply is the Piney Point aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Ridgely water system currently uses two wells and has one well planned for use in the Piney Point. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. Maps and aerial photography showing the Source Water Assessment areas are included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Ridgely water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The susceptibility of the water supply to Radon, a naturally occurring element, will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
HARMAN SUBDIVISION WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Harman Subdivision water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Harman Subdivision's water supply is the Aquia aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Harman Subdivision's water system currently uses one well in the Aquia. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. A map showing the Source Water Assessment areas is included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Harman Subdivision water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. However, it was determined that arsenic and fluoride, two naturally occuring contaminants, do pose a risk to the water supply. The susceptibility of the water supply to Radon will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
HENDERSON WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Henderson water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Henderson's water supply is the Piney Point aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Henderson water system currently uses three wells in the Piney Point. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. Maps and aerial photography showing the Source Water Assessment areas are included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Henderson water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. However, it was determined that arsenic and fluoride, two naturally occurring contaminants, do pose a risk to the water supply.

EXECUTIVE SUMMARY
CAROLINE ACRES MOBILE HOME PARK WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Caroline Acres Mobile Home Park water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Caroline Acres Mobile Home Park's water supply is the Piney Point aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Caroline Acres Mobile Home Park's water system currently uses three wells in the Piney Point. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. A map showing the Source Water Assessment areas is included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Caroline Acres Mobile Home Park water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. However, it was determined that arsenic, a naturally occurring contaminant, does pose a risk to the water supply. The susceptibility of the water supply to Radon will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
CEDAR MOBILE HOME PARK WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Cedar Mobile Home Park water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Cedar Mobile Home Park's water supply is the Piney Point aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Cedar Mobile Home Park's water system currently uses two wells in the Piney Point. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. A map showing the Source Water Assessment areas is included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Cedar Mobile Home Park water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. However, it was determined that arsenic and fluoride, two naturally occuring contaminants, do pose a risk to the water supply. The susceptibility of the water supply to Radon will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
HOLLY COVE HARBOR MOBILE HOME PARK WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Holly Cove Harbor Mobile Home Park water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Holly Cove Harbor Mobile Home Park's water supply is the Piney Point aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Holly Cove Harbor Mobile Home Park's water system currently uses one well in the Piney Point. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. A map showing the Source Water Assessment areas is included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Holly Cove Harbor Mobile Home Park water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. However, it was determined that fluoride, a naturally occurring contaminant, does pose a risk to the water supply.

EXECUTIVE SUMMARY
MEADOW BROOK COURT WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Meadow Brook Court water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Meadow Brook Court's water supply is the Frederica aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Meadow Brook Court's water system currently uses one well in the Piney Point. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. A map showing the Source Water Assessment areas is included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Meadow Brook Court water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. However, it was determined that fluoride, a naturally occurring contaminant, does pose a risk to the water supply. The susceptibility of the water supply to Radon will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
PRETTYMAN MANOR MOBILE HOME PARK WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Prettyman Manor Mobile Home Park water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The sources of Prettyman Manor Mobile Home Park's water supply are the Piney Point and Federalsburg aquifers, two naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Prettyman Manor Mobile Home Park's water system currently uses three wells in these aquifers. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. A map showing the Source Water Assessment areas is included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Prettyman Manor Mobile Home Park water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The susceptibility of the water supply to Radon, a naturally occurring element, will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
NELPINE MOBILE HOME PARK WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Nelpine Mobile Home Park water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Nelpine Mobile Home Park's water supply is the Piney Point aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Nelpine Mobile Home Park's water system currently uses one well in the Piney Point. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. A map showing the Source Water Assessment areas is included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Nelpine Mobile Home Park water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The susceptibility of the water supply to Radon, a naturally occurring element, will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
HILLTOP MOBILE HOME PARK WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Hilltop Mobile Home Park water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Hilltop Mobile Home Park's water supply is the Cheswold aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Hilltop Mobile Home Park's water system currently uses one well in the Cheswold. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. A map showing the Source Water Assessment areas is included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Hilltop Mobile Home Park water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The susceptibility of the water supply to Radon, a naturally occurring element, will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
TOWER COURT MOBILE HOME PARK WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Tower Court Mobile Home Park water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Tower Court Mobile Home Park's water supply is the Piney Point aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Tower Court Mobile Home Park's water system currently uses one well in the Piney Point. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. A map showing the Source Water Assessment areas is included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Tower Court Mobile Home Park water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The susceptibility of the water supply to Radon, a naturally occurring element, will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
DENNY TAYLOR MOBILE HOME PARK WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Denny Taylor Mobile Home Park water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Denny Taylor Mobile Home Park's water supply is the Cheswold aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Denny Taylor Mobile Home Park's water system currently uses one well in the Cheswold. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. A map showing the Source Water Assessment areas is included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Denny Taylor Mobile Home Park water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The susceptibility of the water supply to Radon, a naturally occurring element, will depend upon the final MCL that is adopted for this contaminant.

EXECUTIVE SUMMARY
MARSH CREEK MOBILE HOME PARK WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Marsh Creek Mobile Home Park water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Marsh Creek Mobile Home Park's water supply is the Federalsburg aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Marsh Creek Mobile Home Park's water system currently uses one well in the Federalsburg aquifer. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. A map showing the Source Water Assessment areas is included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Marsh Creek Mobile Home Park water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. However, it was determined that fluoride, a naturally occurring contaminant, does pose a risk to the water supply.

EXECUTIVE SUMMARY
BLUE HERON ASSISTED LIVING WATER SYSTEM

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for nineteen community water systems in Caroline County, including the Blue Heron Assisted Living water system. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Blue Heron Assisted Living's water supply is the Cheswold aquifer, a naturally protected confined aquifer of the Atlantic Coastal Plain physiographic province. The Blue Heron Assisted Living's water system currently uses one well in the Cheswold. The Source Water Assessment area was delineated by the WSP using U.S. EPA approved methods specifically designed for water supplies in confined aquifers.

Potential sources of contamination were researched and identified within the assessment area from field inspections, contaminant and well inventory databases, and land use maps. Well information and water quality data were also reviewed. A map showing the Source Water Assessment areas is included in this report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the Blue Heron Assisted Living water supply is not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. The susceptibility of the water supply to Radon, a naturally occurring element, will depend upon the final MCL that is adopted for this contaminant.

INTRODUCTION

The Water Supply Program has conducted Source Water Assessments for nineteen of the twenty-one community water systems in Caroline County. Caroline County is on the eastern shore of the State and its total population, reported in July 2001, is 30,100 (Md. Assoc. of Counties, 2000/2001). The nineteen community water systems included in this report serve a population of approximately 10,500 of the county residents, while the remaining residents in the county obtain their water supply from individual wells. The community water systems include five incorporated municipalities, several unincorporated areas whose water systems are owned and operated by community associations or other private entities, and one residential school (Table 1). There are two water systems that are not included in this report because they use a different type of water source and therefore require different assessment methods. The community water systems included in this report are shown in Figure 1.

WELL INFORMATION

Well information for each system was obtained from the Water Supply Program's database, site visits, well completion reports, sanitary survey inspection reports, and published reports. Amongst the nineteen community water systems included in this report, a total of 37 wells are currently used or are backup wells. Twenty-eight of these wells were drilled after 1973 and should comply with Maryland's well construction regulations. The remaining nine wells drilled prior to 1973, when regulations went into effect, and may not meet the current construction standards. Table 2 contains a summary of well information for each of the community water systems.

Based on site visits, most wells were in good condition and appeared to be regularly maintained, sealed, and protected to insure integrity. Some of the older wells had a one-piece well cap, which may present a possible route of contamination (insects) through unscreened vents and electrical holes. This situation is easily remedied with the installation of a new two-piece sanitary well cap to prevent contamination. There are some wells observed during field inspections that appear unused or in disrepair. If these wells are screened in the same aquifer they may represent a potential source of contamination to the supply wells. Some are backup wells and as long as these wells are sealed with a tight cap, and the pumps are exercised regularly they pose little threat to the production wells. However, unused wells with loose caps, no pumps, or with no potential for use in the future should be rectified or permanently abandoned and sealed by a licensed well driller because they represent a pathway for contamination to the deep aquifer.

HYDROGEOLOGY

Ground water flows through pores between gravel, sand, and silt grains in unconsolidated sedimentary aquifers such as those used by the community water systems in Caroline County. An aquifer is any formation that is capable of yielding a significant amount of water. The transmissivity is a measure of the amount of water an aquifer is capable of producing and is related to the hydraulic conductivity and the thickness of the aquifer. A confining unit is a layer generally composed of fine material such as clay and silt, which transmits relatively very little water. Confined aquifers are those formations that are overlain by a confining unit. Confined aquifers are recharged from the water stored in the confining unit above and from precipitation that infiltrates into the formation where it is exposed at the surface. Due to the depth and areal extent of the unconsolidated sediments on the Eastern Shore of Maryland, water stored in these aquifers is very old and the water pumped from wells in these aquifers has generally traveled great distances from its origin at the land surface.

Caroline County lies within the Atlantic Coastal Plain physiographic province, which in Maryland includes roughly the area east of Interstate 95. This province is characterized by low topography due to the underlying horizontal layers of unconsolidated clastic sediments that are Lower Cretaceous to recent in age and thicken to the southeast. In Caroline County, the community water system's included in this report draw water from six different confined aquifers that are in three major hydrologic systems known as the Chesapeake Group, the Piney Point Formation, and the Aquia Formation aquifers (Appendix, Tables 1 and 2). These aquifers have been studied considerably and hydrologic, lithologic, and geochemical data is available in several Maryland Geological Survey Reports (1977, 1979, 1983, 1984, 1988, 1996, 2001). The descriptive material below is summarized from these reports and the reader is referred to them for further information.

The Aquia is used by only one community water system in Caroline County, despite being used extensively throughout Southern Maryland and the upper Eastern Shore for water supply. The extent of the Aquia aquifer is limited to the northern and western borders of Caroline County due to a change in composition, which makes it a poor aquifer in the rest of the county. Therefore, most information on the Aquia comes from studies in neighboring counties. The top of the Aquia aquifer in Caroline County ranges from 300 feet below sea level near the northern tip of the County to approximately 600 feet below sea level near Denton (Appendix, Fig. 20). The Aquia is overlain by the Nanjemoy formation, which acts as a leaky confining unit, and is between 200 and 300 feet thick depending on the geographic location. The Aquia is composed of fine to medium-grained sands, of varying composition but are generally quartz and glauconite rich with calcite cementation. Shell material differentiates is present in the upper portion of the aquifer. Transmissivity values, determined by aquifer tests on the Aquia in the Kent Island area of Queen Anne's County, ranged from 900 to 4800 $feet^2/day$.

The Piney Point Formation represents the largest water use by community water systems in Caroline County due to its accessibility, its generally high transmissivity, and

its relatively good water quality. The top of the aquifer in Caroline County ranges from 150 feet below sea level near the northern tip of the county to approximately 500 feet below sea level in the southeastern corner (Appendix, Figs. 3). The Piney Point does not crop out at the surface in Maryland and is overlain by the Chesapeake Group sediments, which vary in thickness depending on the geographic location. The Piney Point aquifer is composed primarily of quartz sand, glauconite, and shell fragments. Clay content tends to increase towards the bottom of the formation. The effective thickness (the thickness of the sandy portion of the formation that produces water) of the Piney Point in Caroline County ranges from approximately 50 to 80 feet. Transmissivity values, estimated by modeling and aquifer tests, range from approximately 500 to 1800 feet^2/day, and are highest near Denton in the central part of the County.

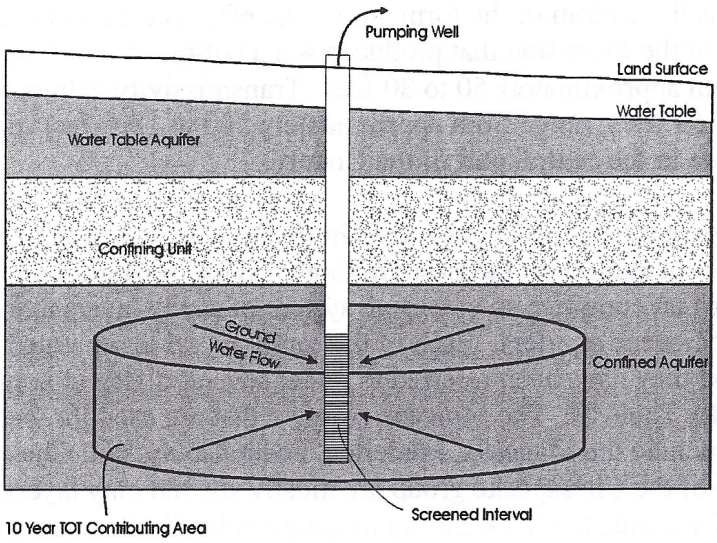
The geologic units in the Chesapeake Group are a thick wedge of sediments that overly the Piney Point aquifer on the Eastern Shore. The Chesapeake Group consists of several formations that comprise an extensive system of sandy layers that are commonly referred to as the Miocene aquifers. Each of the sandy layers is separated by silt and clay confining units and they have been referred to under several different nomenclatures over the years (Appendix Table 2). The Miocene aquifers that are used for water supply in Caroline County include the Manokin, Frederica, Federalsburg, and Cheswold aquifers. The upper portion of the Chesapeake group are mostly silt and clay layers that act as a confining unit and separate the Miocene aquifers hydraulically from the overlying Columbia aquifer. The Chesapeake group sediments consist primarily of gray quartz sand and dark gray clay with abundant shell material. Transmissivity values have been reported between 170 and 470 feet^2/day. The thickness of these sediments is highly variable in Caroline County, but they generally thicken to the southeast. These aquifers are a good source for the smaller water supplies due to their accessibility and excellent water quality. However, some of the larger water supplies may find them insufficient to meet large demands.

SOURCE WATER ASSESSMENT AREA DELINEATION

For ground water systems, a Wellhead Protection Area (WHPA) is considered the source water assessment area for the system. The WHPA's were delineated using the methodology described in Maryland's Source Water Assessment Plan (MDE, 1999) for confined aquifers in the coastal plain, often referred to as the "Florida Method". The area is a radial zone of transport within the aquifer and is based on a 10-year time of travel (TOT), the pumping rate and the screened interval(s) of the well or wells included in the WHPA, and the porosity of the aquifer (see illustration below for conceptual model). The Florida Method is a modification of Darcy's law for radial flow to a well and the WHPA's were calculated using the following volumetric equation:

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

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



Conceptual illustration of a zone of transport for a confined aquifer

Table 3 gives the values used and the calculated radius for each water system's WHPA. The pumping rate (Q) used is generally the permitted daily average. If a water system has more than one well, the wells usually alternate pumpage. Therefore, the total appropriated amount was used in the calculation for each well, since, in theory each well is producing a zone of transport based on the average pumping rate. In some cases, the wells are a significant distance apart and the areas were merged. In others, the zone of transport for one well encompasses that of a nearby well due to differences in screen length.

A conservative estimate of porosity (n) of 25% was used for each of the aquifers based on published reports. The lengths of the well screens (H) were obtained from well completion reports. In the instance that there were multiples screens, the sum of the individual screen lengths was used. Using these parameters the radius was calculated with the above equation for the WHPA delineation (Table 3). Circles around each of the wells with the appropriate calculated radius represents the WHPA and are shown in Figure 2. The circles represent the aquifer zone of transport in the subsurface as illustrated above.

POTENTIAL SOURCES OF CONTAMINATION

In confined aquifer settings, sources of contamination at the land surface are generally not a threat unless there is a pathway for direct injection into the deeper aquifer

such as through unused wells or along well casings that are not intact or have no grout seal.

Potential sources of contamination are classified as either point or non-point sources. Examples of point sources of contamination are leaking underground storage tanks, landfills, discharge permits, large-scale feeding operations, and CERCLA sites. These sites are generally associated with commercial or industrial facilities that use chemical substances that may, if inappropriately handled, contaminate ground water via a discrete point location. Non-point sources of contamination are associated with certain land use activities that may lead to ground water contamination over a larger area. All potential sources of contamination are identified at the land surface and therefore have the potential to impact the shallow water table aquifer. Therefore, as long as there is no potential for direct injection into the deeper confined aquifers, the water supply used by the community water systems should be well protected from ground water contamination.

Potential sources are identified if they fall within the WHPA for awareness and to ensure that the deep aquifer does not become affected by unused wells or poorly constructed wells in the water supply aquifer. Table 4 lists the facilities identified from MDE databases as potential sources of contamination and their locations are show in Figures 3a-g. Underground storage tanks (UST's) sites are facilities that store petroleum on site in underground tanks registered with the MDE Waste Management Administration. Controlled Hazardous Substance generators (CHS) are facilities that may use or store any hazardous substance on site. Ground water discharge (GWDP) permits are issued by MDE's water management administration for discharge of wastewater to ground water. Pesticide Dealers (PEST) are facilities that sell or store large quantities of these chemicals on site.

The contaminants associated with the types of facilities are based on generalized categories and often the potential contaminant depends on the specific chemicals and processes being used at the individual facility. The potential contaminants for an activity may not be limited to those listed in Table 4. Potential contaminants are grouped as Volatile Organic Compounds (VOC), Synthetic Organic Compounds (SOC), Heavy Metals (HM), Metals (M), Nitrate/Nitrite (NN), and Microbiological Pathogens (MP).

WATER QUALITY DATA

Water Quality data was reviewed from the Water Supply Program's database for Safe Drinking Water Act (SDWA) contaminants. The State's SWAP defines a threshold for reporting water quality data as 50% of the Maximum Contaminant Level (MCL). If a monitoring result is greater than 50% of an MCL, this report will describe the sources of such a contaminant and, if possible, locate the specific sources that are the cause of the elevated contaminant level. All data reported is from the finished (treated) water unless otherwise noted. Table 5 summarizes the various treatment methods used at the water treatment plants for each of the nineteen community water systems.

A review of the monitoring data for the nineteen community water systems indicates that the water supplies meet drinking water standards with the exception of arsenic and fluoride for two systems. Table 6 summarizes the water quality results for each of the water systems by contaminant group.

Inorganic Compounds (IOCs)

A review of the data shows that the only two inorganic compound detected above 50% of an MCL were fluoride and arsenic, which occurred in eight and five different water systems respectively (Tables 7a, 7b).

Fluoride is a naturally occurring element that is sometimes added to water for dental health benefits. The presence of fluoride in the water supplies is not due to addition, but due to the presence of fluoride in minerals and shell fossils that make up the aquifer material. In seven of the eight systems, fluoride was detected above the 50% threshold level in multiple samples. The fluoride values in these water systems range from non-detected to 4.14 mg/L (Table 7a.). The MCL for fluoride is 4.0 mg/L for health effects and the secondary MCL is 2.0 mg/L because it can cause dental fluorosis (yellow-staining of developing teeth) in children at or above this concentration. The values detected in these water supplies are not unusual for the aquifers they utilize due to the abundance of shell material and possibly shark teeth as a source of the fluoride.

Arsenic is another contaminant commonly detected above 50% of the MCL for the water systems assessed in this report. Five of the nineteen water systems had one or more results above 50% of the MCL, and one had levels at or above the arsenic standard of 0.010 mg/L (Table 7b). The arsenic standard was recently lowered by the U.S. Environmental Protection Agency and therefore, these results were not considered violations at the time they were collected. However, for many of these systems, additional water treatment will be necessary to meet the new standard, which will be enforced starting January 23, 2006.

Arsenic is present in ground water in Maryland's Coastal Plain due to the natural presence of this contaminant in aquifer material. The five water systems that reported arsenic above 0.005 mg/L all draw water from either the Piney Point or Aquia aquifers. A recent study of arsenic concentrations in the major aquifers of the Coastal Plain indicates that arsenic is present at the highest concentrations in the Aquia aquifer on the Eastern Shore of Maryland (MGS Draft Interim Report, 2003). Arsenic is commonly found in the range of 0.002-0.010 mg/L in the Piney Point in Caroline County based on the reports findings.

A review of the data shows that other inorganic compounds were not detected above 50% of their MCL's in the nineteen community water systems.

Radionuclides

Radium-226+228 was reported above 50% of the MCL in the Town of Preston's water system on one occasion (Table 7c). Radium is only measured when gross-

alpha radiation exceeds 5 pCi/L. Other results for gross-alpha and radium for this system did not exceed 50% of the MCL's. Gross-alpha is a measure of alpha radiation, which is emitted from certain radioactive elements such as Radium.

Radon-222 was reported above 150 pCi/L in fifteen water systems (Table 7c). There is currently no MCL for Radon-222, however EPA has proposed an MCL of 300 pCi/L or an alternate of 4000 pCi/L for community water systems if the State has a program to address the more significant risk from radon in indoor air. The EPA received many comments in response to their proposed rule, and promulgation may be delayed. Radon-222 values were above 50% of the lower proposed MCL of 300 pCi/L but well below the higher proposed MCL of 4000 pCi/L.

Volatile Organic Compounds (VOCs)

A review of the data for the nineteen water systems shows that VOCs have not been detected above 50% of an MCL.

Synthetic Organic Compounds (SOCs)

A review of the data shows that SOCs have not been detected above 50% of an MCL with the exception of Di(2-Ethylhexyl)Phthalate (Table 7d). However, the laboratory reported each sample result as being less than 10 times the amount found in laboratory blank samples and therefore they are not considered valid.

Microbiological Contaminants

Routine bacteriological monitoring is conducted in the finished water for each water system on a monthly basis and measures Total Coliform bacteria. In water systems that disinfect their water at the treatment plant, the finished water data does not give much indication of the quality of raw water directly from the well. Several of the water systems do not have any disinfection treatment and therefore their water samples are more indicative of the source water quality (Table 8). Three systems that do not disinfect had positive Total Coliform results. Total Coliform bacteria are not pathogenic, but are used as an indicator organism for other disease-causing microorganisms. Total Coliform are ubiquitous in the environment and detection could be result of a variety of deficiencies in the well integrity. Loose caps or insufficient seals are common causes of coliform contamination since insects are able to crawl in the wellhead. These situations are easily remedied.

A major breach of the system or the aquifer would likely cause a positive total coliform result in systems with disinfection and would require followup Total and Fecal Coliform analysis. Three water systems that do have disinfection treatment had positive Total Coliform in their routine bacteriological samples (Table 8), but in no instance were follow-up samples found to have positive Total or Fecal Coliform present.

SUSCEPTIBILITY ANALYSIS

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

Some contaminants such as radionuclides and other chemical elements are naturally occurring in the aquifer and in some instances can reach concentrations that pose a risk to the water supply. In the case of confined aquifers, this is generally more problematic than contaminants at the land surface. The Aquia and Piney Point aquifers are generally susceptible to arsenic. All of the aquifers used for water supply in Caroline County tend to have Radon. Otherwise, water quality is excellent and even taste and odor constituents such as Iron are generally low in these water supplies.

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

Inorganic Compounds

Inorganic compounds were not present at significant levels with the exceptions of fluoride and arsenic as described above. The source of inorganic compounds can be either the aquifer material or from human activity. Due to the confined nature of the aquifers, these contaminants are unlikely to originate from the land surface. In addition, the levels reported for both contaminants are consistent with naturally occurring levels present in these aquifers.

Fluoride is present in significant concentrations in eight of the ninenteen water systems as discussed above. The source of fluoride in these water supplies is the natural occurrence of this element in the minerals and shells that make up the aquifer material. The mobility of fluoride in ground water is largely dependent on geochemical factors such as pH and the concentration of other ions. The variation in concentration in the water supplies is difficult to explain since it appears in every aquifer utilized, however it is likely to do with geochemical variation spatially within the aquifers. The susceptibility determination can only be based on the water quality data, and therefore the water systems that detected fluoride above 50% of its MCL are susceptible to this contaminant and are indicated in Table 9.

Arsenic is present in significant concentrations in five of the nineteen community water systems. The source of arsenic in these water supplies is the natural occurrence and mobility of this contaminant in the aquifer material. A recent study of the occurrence of arsenic in Coastal Plain aquifers indicates that the highest concentrations are found in the Aquia aquifer on the Eastern Shore. The data has not been fully interpreted, but it is does not seem to be related to any geochemical indices such as pH or specific conductance. The concentration of arsenic in ground water of these aquifers may simply be dependent on the amount of arsenic in the aquifer at certain locations. Due to the presence and levels of arsenic in the Aquia and Piney Point aquifers, many water supplies drawing from these aquifers **are susceptible** to this contaminant (Table 9).

Several other water systems that use the Piney Point aquifer did not detect arsenic at significant levels and therefore are **not susceptible** to arsenic. These wells are located in an area of the County that has been shown to have lower ground water arsenic. Therefore, it appears that geographic location within the aquifer has the most bearing on arsenic concentrations in ground water.

The arsenic levels in the Miocene aquifers used by the community water systems are not as significant, and there were no detects above 0.005 mg/L. Therefore wells drawing from these aquifers are **not susceptible** to arsenic.

The only significant sources of inorganic contaminants identified within the WHPAs is the ground water discharge permit in the Caroline Acres areas (Fig. 3a.) In this case, the discharge is treated wastewater to the water table aquifer. Although the point of discharge is within the zone of transport at the surface, the water supply should not be impacted as long as there is no direct route (such as unused wells) from the water table aquifer to the deeper aquifers. The ground water discharge permit in the Town of Denton's WHPA is in the same aquifer that the town draws from, but the discharge is limited to non-contact cooling and heating water for a heat pump system. Therefore, this discharge water has no potential to introduce contaminants to the aquifer.

Due to the naturally protected characteristics of the confined aquifers, the water quality data, and the lack of potential sources of contamination, the water supplies are considered **not susceptible** to other inorganic compounds.

Radionuclides

The source of radionuclides in ground water can be traced back to the natural occurrence of uranium in rocks. Radionuclides are present in ground water due to radioactive decay of uranium bearing minerals in the sediment that makes up the aquifer material.

There is currently no MCL for Radon-222, however EPA has proposed an MCL of 300 pCi/L or an alternate of 4000 pCi/L if the State has a program to address the more significant risk from radon in indoor air. Radon is present in ~~fifteen~~ the Liberty MHP's water

systems at a level that is greater than 50% of the lower proposed MCL of 300 pCi/L. The EPA has information on proposed regulations for radon in indoor air and drinking water on their web site (http://www.epa.gov/OGWDW/radon.html). Currently, it appears that these ~~fifteen~~ water systems ~~may be~~ susceptible to radon if the lower standard is adopted.

Radium 226+228 was detected in the water supply above 50% of the MCL in one sample from one water system. The result was not repeated. Based on the water quality data, the community water systems are **not susceptible** to radiological contaminants other than Radon-222.

Volatile Organic Compounds

Volatile organic compounds have not been detected in the routine samples collected for the water systems. Several potential sources for these types of contaminants were identified in the Wellhead Protection Areas, mostly in the form of gasoline or heating oil storage. However, as long as there is no potential for direct injection into the aquifer, the water supplies should **not** be susceptible to VOC contamination.

Synthetic Organic Compounds

Synthetic organic compounds have not been detected in the water supplies and a confined aquifer waiver has been issued for each water system for monitoring for these contaminants. SOC sources are generally pesticides and herbicides application and due to the confined nature of the aquifers, they do not pose a threat to the water supply. Therefore based on lack of contaminant sources and water quality data, the water supplies are considered **not** susceptible to SOCs.

Microbiological Contaminants

Raw water microbiological monitoring is not required of water systems in confined aquifers because they are considered naturally protected from sources of pathogens at the land surface. However, some systems that do not use disinfection treatment showed positive Total Coliform results. These are likely to be the result of well construction deficiencies and are unlikely to be representative of the water quality of the aquifer. In these instances the wellheads should be inspected and any obivious deficiencies remedied. In any case, it does not appear to be a common occurrence. Due to the confined nature of the aquifers the water supplies are considered **not** susceptible to microbiological contaminants.

MANAGEMENT OF THE SOURCE WATER ASSESSMENT AREA

With the information contained in this report the community water systems in Caroline County are in a position to protect their water supplies by staying aware of the area delineated for source water protection. Specific management recommendations for consideration are listed below:

Form a Local Planning Team

- The team should represent all the interests in the community, such as the water suppliers, home association officers, the County Health Department, local planning agencies, local business, developers, and property owners, and residents within and near the WHPA. The team should work to reach a consensus on how to protect the water supply.

Public Awareness and Outreach

- The Consumer Confidence Report should list that this report is available to the general public through their county library, by contacting the operator or MDE.
- Conduct educational outreach to businesses and residents within the WHPA focusing on potential contaminant sources. Important topics include: (a) compliance with MDE and federal guidelines for gasoline and heating oil UST's, (c) hazardous material disposal and storage, (d) well abandonment regulations and procedures.

Monitoring

- Continue to monitor for all required Safe Drinking Water Act contaminants.
- Annual raw water bacteriological testing is a good test for well integrity.

Contingency Plan

- COMAR 26.04.01.22 requires all community water systems to prepare and submit for approval a plan for providing a safe and adequate drinking water supply under emergency conditions.

Contaminant Source Inventory Updates/ Inspections/Maintenance

- Conduct a survey of the WHPA and inventory any potential sources of contamination, including unused wells, that may have not been included in this report. Keep records of new development within the WHPA and new potential sources of contamination that may be associated with the new use.
- Work with the County Health Department to ensure that there are no unused wells within the WHPA. An improperly abandoned well can be a potential source of contamination to the aquifer.
- Water operation personnel should have a program for periodic inspections and maintenance of the supply wells and backup wells to ensure their integrity and protect the aquifer from contamination.

Changes in Use

- An increase in use or the addition of new wells may require revisions to the WHPA. The water system is required to notify MDE if such changes are proposed.

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OTHER SOURCES OF DATA

Water Appropriation and Use Permits
Public Water Supply Sanitary Survey Inspection Reports
MDE Water Supply Program Oracle® Database
MDE Waste Management Sites Database
Department of Natural Resources Digital Orthophoto Quarter Quadrangles in Caroline County
USGS Topographic 7.5 Minute Quadrangles in Caroline County
Maryland Office of Planning 2000 Caroline County Digital Land Use Map
Maryland Office of Planning 1996 Caroline County Digital Sewer Map

TABLES

PUBLIC WATER SYSTEM ID (PWSID)	SYSTEM NAME	POPULATION SERVED	OWNER/OPERATOR TYPE
0050001	TOWN OF DENTON	3000	LOCAL GOVERNMENT
0050002	TOWN OF FEDERALSBURG	2450	LOCAL GOVERNMENT
0050003	GREENSBORO	1500	LOCAL GOVERNMENT
0050004	PRESTON WATERWORKS - NELPHINE HGTS.	100	INVESTOR/TRUST/WATER ASSOC
0050005	TOWN OF PRESTON	437	LOCAL GOVERNMENT
0050006	RIDGELY	1400	LOCAL GOVERNMENT
0050007	HARMAN SUBDIVISION	35	INVESTOR/TRUST/WATER ASSOC
0050008	HENDERSON	154	INVESTOR/TRUST/WATER ASSOC
0050201 [1]	BENEDICTINE SCHOOL	300	INVESTOR/TRUST/WATER ASSOC
0050204	CAROLINE ACRES M.H.P.	300	INVESTOR/TRUST/WATER ASSOC
0050205	CEDAR MOBILE HOME PARK	285	INVESTOR/TRUST/WATER ASSOC
0050206	HOLLY COVE HARBOR M.H.P.	45	INVESTOR/TRUST/WATER ASSOC
0050207 [1]	LIBERTY MOBILE HOME PARK	60	INVESTOR/TRUST/WATER ASSOC
0050208	MEADOW BROOK COURT	50	INVESTOR/TRUST/WATER ASSOC
0050209	PRETTYMAN MANOR M.H.P.	100	INVESTOR/TRUST/WATER ASSOC
0050210	NELPINE MOBILE HOME PARK	70	INVESTOR/TRUST/WATER ASSOC
0050214	HILLTOP MOBILE HOME PARK	45	INVESTOR/TRUST/WATER ASSOC
0050216	TOWER COURT MOBILE HOME PARK	40	INVESTOR/TRUST/WATER ASSOC
0050217	DENNY TAYLOR MOBILE HOME PARK	45	INVESTOR/TRUST/WATER ASSOC
0050218	MARSH CREEK MOBILE HOME PARK	35	INVESTOR/TRUST/WATER ASSOC
0050219	BLUE HERON ASSISTED LIVING	47	INVESTOR/TRUST/WATER ASSOC

Table 1. Community Water Systems in Caroline County

[1] These systems are not assessed in this report because they use wells in unconfined aquifers.

PWSID	SYSTEM NAME	PLANT ID	SOURCE ID	USE CODE	WELL NAME	WELL PERMIT NO.	WELL DEPTH	CASING DEPTH	SCREENED DEPTH(S)	YEAR DRILLED	AQUIFER
0050001	TOWN OF DENTON	01	01	E	DENTON 1		400	361	361-400		PINEY POINT FORMATION
		02	03	P	DENTON 3	CO710034	439	367	364-439	1970	PINEY POINT FORMATION
		04	04	P	DENTON 5	CO941450	510	365	365-500	2000	PINEY POINT FORMATION
0050002	TOWN OF FEDERALSBURG	01	01	P	WELL 3		280	240	240-280		MANOKIN AQUIFER
		02	02	P	WELL 5	CO700007	301	250	245-301	1969	FEDERALSBURG AQUIFER
		03	03	P	WELL 7	CO670009	331	290	291-321	1966	CHESWOLD AQUIFER
		04	04	P	WELL 8	CO018775	320	294	294-314	1955	CHESWOLD AQUIFER
		05	05	S	WELL 9	CO029899	332	284	284-316	1958	CHESWOLD AQUIFER
0050003	GREENSBORO	01	01	P	GREENSBORO 3	CO710026	350	233	289-350	1970	PINEY POINT FORMATION
		02	02	P	GREENSBORO 4	CO811069	390	302	302-390	1986	PINEY POINT FORMATION
		03	03	P	NEW WELL	CO941726	360	320	320-360	2001	PINEY POINT FORMATION
0050004	PRESTON WATERWORKS - NELPHINE HGTS.	01	03	P	PWW 3	CO810631	445	200	420-445	1985	PINEY POINT FORMATION
0050005	TOWN OF PRESTON	01	01	P	PRESTON 1	CO731597	520	435	429-520	1980	PINEY POINT FORMATION
			02	P	PRESTON 4	CO812189	530	420	420-530	1990	PINEY POINT FORMATION

Table 2. Well Information for Community Water Systems in Caroline County

PWSID	SYSTEM NAME	PLANT ID	SOURCE ID	USE CODE	WELL NAME	WELL PERMIT NO.	WELL DEPTH	CASING DEPTH	SCREENED DEPTH(S)	YEAR DRILLED	AQUIFER
0050006	RIDGELY	01	01	P	WELL 2	CO810750	344	311	309-344	1985	PINEY POINT FORMATION
			02	P	WELL 3	CO810751	347	311	309-345	1985	PINEY POINT FORMATION
			04	F	WELL 4	CO940919	356	310	308-356	2000	PINEY POINT FORMATION
0050007	HARMAN SUBDIVISION	01	01	P	WELL 1	CO730371	331	301	301-311, 311-321	1975	AQUIA FORMATION
0050008	HENDERSON	02	03	P	WELL 1	CO940705	360	300	300-360	1998	PINEY POINT FORMATION
			04	P	WELL 2	CO940742	365	305	305-365	1998	PINEY POINT FORMATION
			05	P	WELL 3	CO940741	360	300	300-360	1998	PINEY POINT FORMATION
0050204	CAROLINE ACRES M.H.P.	01	01	P	CAROLINE ACRES 1	CO700065	445	214	214-445	1970	PINEY POINT FORMATION
			03	P	CAROLINE ACRES 3	CO920135	352	302	302-352	1994	PINEY POINT FORMATION
		02	02	P	CAROLINE ACRES 2	CO680041	349	189	189-349	1968	PINEY POINT FORMATION
0050205	CEDAR MOBILE HOME PARK	01	01	P	WALKERS TP WELL 1A	CO731118	325	160	265-325	1978	PINEY POINT FORMATION
		02	02	P	WALKERS TP WELL	CO940524	400	120	390-400	1998	PINEY POINT FORMATION
0050206	HOLLY COVE HARBOR M.H.P.	01	01	P	HOLLY COVE	CO810345	430	140	380-400	1984	PINEY POINT FORMATION
0050208	MEADOW BROOK COURT	01	01	P	MEADOWBROOK	CO810056	280	160	240-280	1982	FREDERICA AQUIFER

Table 2. Well Information for Community Water Systems in Caroline County

PWSID	SYSTEM NAME	PLANT ID	SOURCE ID	USE CODE	WELL NAME	WELL PERMIT NO.	WELL DEPTH	CASING DEPTH	SCREENED DEPTH(S)	YEAR DRILLED	AQUIFER
0050209	PRETTYMAN MANOR M.H.P.	01	01	S	MOBIL MANOR 1	CO730188	165	162	142-162	1973	FEDERALSBURG AQUIFER
			02	P	WELL 2	CO880191	380	360	360-380	1991	PINEY POINT FORMATION
		02	03	P	WELL 3	CO880190	360	340	340-360	1993	PINEY POINT FORMATION
0050210	NELPINE MOBILE HOME PARK	01	01	P	NELPINE TP	CO810292	440	140	420-440	1983	PINEY POINT FORMATION
0050214	HILLTOP MOBILE HOME PARK	01	01	P	HILLTOP TP	CO730065	152	60	137-152	1973	CHESWOLD AQUIFER
0050216	TOWER COURT MOBILE HOME PARK	01	02	P	TOWER 2	CO730746	406	376	376-406	1977	PINEY POINT FORMATION
0050217	DENNY TAYLOR MOBILE HOME PARK	01	01	P	TAYLORS MHP	CO730877	203	129	129-203	1977	CHESWOLD AQUIFER
0050218	MARSH CREEK MOBILE HOME PARK	01	01	P	MARSH CREEK MHP	CO730915	369	345	345-369	1977	FEDERALSBURG AQUIFER
0050219	BLUE HERON ASSISTED LIVING	01	01	P	WELL	CO690072	unknown	unknown	unknown	1969	CHESWOLD AQUIFER

Table 2. Well Information for Community Water Systems in Caroline County (cont.)

WATER SUPPLY PROGRAM DATABASE FIELD NAMES:
PWSID = Public Water System ID Number
PLANT ID = Water Treatment Plant ID Number
SOURCE ID = Unique Identifier Number for Well
USE CODE: P = Production, S = Standby, F = Future, E = Emergency Backup, T* = Test, (* Wells not included in assessment delineation)

PWSID	System Name	Wells included in WHPA	Aquifer	Discharge (Q) in gal/day	Screened Interval (H) in feet	Calculated Radius for WHPA in feet	Acreage of WHPA	Comment
0050001	TOWN OF DENTON	DENTON 1	PINEY POINT FORMATION	420000	39	2600	485	
0050001	TOWN OF DENTON	DENTON 3	PINEY POINT FORMATION	420000	75	1900	259	
0050001	TOWN OF DENTON	DENTON 5	PINEY POINT FORMATION	420000	135	1400	141	Screen length estimated
0050002	TOWN OF FEDERALSBURG	WELL 3	MANOKIN AQUIFER	140000	40	1500	161	Well 1 area encompasses others
0050002	TOWN OF FEDERALSBURG	WELL 5	FEDERALSBURG AQUIFER	186000	56	1500	161	Two circles merged
0050002	TOWN OF FEDERALSBURG	WELL 7, 8, 9	CHESWOLD AQUIFER	274000	20	3000	677	Well 8 area encompasses others
0050003	GREENSBORO	GREENSBORO 3	PINEY POINT FORMATION	200000	61	1500	161	Two circles merged
0050003	GREENSBORO	GREENSBORO 4	PINEY POINT FORMATION	200000	88	1200	103	
0050003	GREENSBORO	NEW WELL	PINEY POINT FORMATION	200000	40	1800	232	
0050004	PRESTON WATERWORKS - NELPHINE	PWW 3	PINEY POINT FORMATION	4600	25	600	26	
0050005	TOWN OF PRESTON	WELL 1, 4	PINEY POINT FORMATION	80000	91, 110	800, 700	51	Two circles merged
0050006	RIDGELY	WELL 2, 3, 4	PINEY POINT FORMATION	200000	35, 36, 48	1900, 1900, 1700	461	Three circles merged
0050007	HARMAN SUBDIVISION	WELL 1	AQUIA FORMATION	4200	30	600	26	
0050008	HENDERSON	WELLS 1, 2, 3	PINEY POINT FORMATION	9800	60	400	26	Three circles merged
0050204	CAROLINE ACRES M.H.P.	WELLS 1, 2, 3	PINEY POINT FORMATION	73000	50	1000	78	Three circles merged
0050205	CEDAR MOBILE HOME PARK	WELL 1, 1A	PINEY POINT FORMATION	35000	10	1500	161	Well 1 area encompasses other

Table 3. Parameters used for WHPA delineations.

PWSID	System Name	Wells included in WHPA	Aquifer	Discharge (Q) in gal/day	Screened Interval (H) in feet	Calculated Radius for WHPA in feet	Acreage of WHPA	Comment
0050206	HOLLY COVE HARBOR M.H.P.	HOLLY COVE	PINEY POINT FORMATION	3200	20	600	26	
0050208	MEADOW BROOK COURT	MEADOWBROOK	FREDERICA AQUIFER	4000	40	600	26	
0050209	PRETTYMAN MANOR M.H.P.	MOBIL MANOR 1	FEDERALSBURG AQUIFER	1000	20	600	26	
0050209	PRETTYMAN MANOR M.H.P.	WELL 2	PINEY POINT FORMATION	9000	20	600	26	
0050209	PRETTYMAN MANOR M.H.P.	WELL 3	PINEY POINT FORMATION	9000	20	600	26	
0050210	NELPINE MOBILE HOME PARK	NELPINE TP	PINEY POINT FORMATION	5000	20	600	26	Two circles merged
0050214	HILLTOP MOBILE HOME PARK	HILLTOP TP	CHESWOLD AQUIFER	2400	15	600	26	
0050216	TOWER COURT MOBILE HOME PARK	TOWER 2	PINEY POINT FORMATION	4000	30	600	26	Two circles merged
0050217	DENNY TAYLOR MOBILE HOME PARK	TAYLORS MHP	CHESWOLD AQUIFER	5000	74	600	26	Two circles merged
0050218	MARSH CREEK MOBILE HOME PARK	MARSH CREEK MHP	FEDERALSBURG AQUIFER	3000	24	600	26	
0050219	BLUE HERON ASSISTED LIVING	WELL	CHESWOLD AQUIFER	3100	10	600	26	Well screen estimated

Table 3. Parameters used for WHPA delineations (cont.)

ID*	Type	Facility Name	Address	*Reference Location	WHPA System Name	No. of UST's/ Capacity/Substance/ Other Comments	Potential Contaminants
1	UST	B & R Auto Supply	308 N 6Th St	Figure 3a	Town of Denton	Four tanks closed in place, three tanks removed from ground.	VOC
2	UST	Bargain Beverage	100 Franklin St	Figure 3a	Town of Denton	Two 10,000 gal. Gasoline, One 10,000 gal. Kerosene	VOC
3	UST	Calvert C. Merriken	8 N 2Nd St	Figure 3a	Town of Denton	One 550 gal. Heating Oil	VOC
4	UST	Caroline County Dept of Public Works	520 Wilmuth St	Figure 3a	Town of Denton	One 20,000 gal. Gasoline, one 1000 gal. Heating Oil, One 500 gal. Used Oil	VOC
5	UST	Christ Episcopal Church	107 Gay St	Figure 3a	Town of Denton	One 500 gal. Heating Oil	VOC
6	UST	Dollar General Store	301 Market St	Figure 3a	Town of Denton	One 1,000 gal. Heating Oil	VOC
7	UST	Doug Lynch Estate	12 N 6Th St	Figure 3a	Town of Denton	Three tanks closed in place, five tanks removed from ground.	VOC
8	UST	Franklin Square Building	110 Franklin St	Figure 3a	Town of Denton	One 2,000 gal. Heating Oil	VOC
9	UST	Joseph R. Smith, Inc.	903 Crystal Ave	Figure 3a	Town of Denton	One 3,000 gal. Gasoline, one 1,000 gal. Diesel	VOC
10	UST	Lockerman Middle School	410 Lockerman St	Figure 3a	Town of Denton	One 20,000 gal. Heating Oil (removed from ground)	VOC
11	UST	Maryland State Highway Administration	508 Caroline St	Figure 3a	Town of Denton	One 10,000 gal. Gasoline, One 10,000 gal. Diesel	VOC
12	UST	Peoples Bank of Maryland	205 Market St	Figure 3a	Town of Denton	One tank closed in place	VOC
13	UST	Royal Farms #04	502 Market St	Figure 3a	Town of Denton	Three 8,000 gal. Gasoline	VOC
14	UST	United Concerned Christians of Caroline	12 N 5Th St	Figure 3a	Town of Denton	Three tanks out of use, removal status unknown	VOC

Table 4. Potential Contaminant Point Sources Within WHPA's.

*See referenced figure for location

ID*	Type	Facility Name	Address	*Reference Location	WHPA System Name	No. of UST's/ Capacity/Substance/ Other Comments	Potential Contaminants
15	UST	United States Postal Service	503 Market St	Figure 3a	Town of Denton	One tank closed in place, one removed from ground	VOC
16	UST	Warehouse	N 5Th St At Gay St	Figure 3a	Town of Denton	One 1,000 gal. Heating Oil	VOC
17	UST	Zebuline Brody Property	300 Market St	Figure 3a	Town of Denton	Two tanks closed in place	VOC
18	UST	Caroline Nursing Home, Inc.	520 Kerr Ave	Figure 3a	Town of Denton	One 8,000 and One 10,000 gal. Heating Oil	VOC
19	UST	Denton Citgo	405 S 5Th Ave	Figure 3a	Town of Denton	Three 6,000 gal. Gasoline	VOC
20	UST	Hershey Creamery Company	118 Legion Rd	Figure 3a	Town of Denton	Two tanks closed in place	VOC
21	UST	Robert H. & Mary L. Krida	101 S 7Th St	Figure 3a	Town of Denton	One tank closed in place	VOC
22	UST	Federalsburg Coastal Station	105 E Central Ave	Figure 3b	Town of Federalsburg	Three 6,000 gal. Gasoline, One 1,000 gal. Kerosene	VOC
23	UST	Masonic Lodge	112 N Main St	Figure 3b	Town of Federalsburg	Three tanks closed in place	VOC
24	UST	Sewing Outlet	121 N Main St	Figure 3b	Town of Federalsburg	One 550 gal. Heating Oil	VOC
25	UST	Super Soda Center	102 W Central Ave	Figure 3b	Town of Federalsburg	Two 6,000 and one 10,000 gal. Gasoline, one 6,000 gal. Kerosene	VOC
26	UST	Union United Methodist Church	301 N Main St	Figure 3b	Town of Federalsburg	One 2,000 gal. Heating Oil	VOC
27	UST	Uncle Willie #2	Liberty Rd At E Central Ave	Figure 3b	Town of Federalsburg	Four 4,000 gal. Gasoline, one 4,000 gal. Kerosene	VOC
28	UST	Chesapeake Wholesale Florist	320 Holt St	Figure 3b	Town of Federalsburg	One tank closed in place	VOC

Table 4. Potential Contaminant Point Sources Within WHPA's (cont.)

*See referenced figure for location

ID*	Type	Facility Name	Address	*Reference Location	WHPA System Name	No. of UST's/ Capacity/Substance/ Other Comments	Potential Contaminants
29	UST	Federalsburg Elementary School	302 S University Ave	Figure 3b	Town of Federalsburg	One 15,000 gal. Heating Oil	VOC
30	UST	Maryland Plastics, Inc.	251 E Central Ave	Figure 3b	Town of Federalsburg	One tank out of use, removal status unknown	VOC
31	UST	S & S Market	521 S Main St	Figure 3b	Town of Federalsburg	Four 4,000 gal. Gasoline	VOC
32	UST	Bodie's Dairy Market #5	100 New St	Figure 3c	Greensboro	Two 4,000 and one 10,000 gal. Gasoline	VOC
33	UST	Pulse Specialty Components	213 Church St	Figure 3c	Greensboro	One tank closed in place	VOC
34	UST	St. Paul's United Methodist Church	300 W Sunset Ave	Figure 3c	Greensboro	One 2,000 gal. Heating Oil	VOC
35	UST	Kinnamon's Exxon	13301 Greensboro Rd	Figure 3c	Greensboro	One 8,000 and One 12,000 gal. Gasoline, One 10,000 gal. Diesel	VOC
36	UST	Albert W. Sisk & Son, Inc.	Lednium Ave At Mill St	Figure 3d	Town of Preston	Two tanks out of use, removal status unknown	VOC
37	UST	Eveys, Inc.	145 Main St	Figure 3d	Town of Preston	One 500 gal. Heating Oil	VOC
38	UST	Preston CDO (GLC-37173)	100 Harmony Rd	Figure 3d	Town of Preston	One tank closed in place	VOC
39	UST	Super Soda Center	101 Maple Ave	Figure 3d	Town of Preston	Three 6,000 gal. Gasoline, one 3,000 gal. Kerosene	VOC
40	UST	Ridgely Vounteer Fire Dept., Inc.	8 W 1St St	Figure 3e	Ridgely	Two tanks closed in place	VOC
41	UST	Walker's Grocery	18230 Henderson Rd	Figure 3g	Cedar Mobile Home Park	One 10,000 and one 8,000 gal. Gasoline	VOC
42	CHS	Maryland State Highway Adminis	Md Rte 313 At Carroline Street	Figure 3a	Town Of Denton		VOC

Table 4. Potential Contaminant Point Sources Within WHPA's (cont.)

*See referenced figure for location

ID*	Type	Facility Name	Address	*Reference Location	WHPA System Name	No. of UST's/ Capacity/Substance/ Other Comments	Potential Contaminants
43	CHS	Chesapeake & Potomac Tele Co	310 Franklin Street	Figure 3a	Town Of Denton		VOC, SOC
44	CHS	Passwaters, Wilford H & Co Inc	2332 Carter Ave	Figure 3a	Town Of Denton		VOC
45	CHS	Caroline Auto Body & Frame Shop	12 N 5Th St	Figure 3a	Town Of Denton		VOC
46	CHS	Maryland Plastics, Inc.	251 E Central Ave	Figure 3b	Town Of Federalsburg		VOC
47	CHS	Dannys Auto Body	325 South University Ave	Figure 3b	Town Of Federalsburg		VOC
48	CHS	M&M Refrigeration	University & Railroad Avenue	Figure 3b	Town Of Federalsburg		VOC
49	CHS	Technitrol Inc	Church & Cedar Lane	Figure 3c	Greensboro		VOC
50	CHS	Gadow Body Shop	Maryland Ave	Figure 3d	Town Of Preston		VOC
51	PEST	Millford Fertilizer Co.	Sunset Ave	Figure 3c	Greensboro		SOC
52	GWDP	Chesapeak Farm Credit	Deep Shore Rd	Figure 3a	Town of Denton	Discharge to Piney Point aquifer of non-contact cooling/ heating water from heat pump system	NONE
53	GWDP	Caroline Acres MHP		Figure 3f		Irrigation of waste water discharges to water table aquifer	MP, NN, VOC, SOC, M

Table 4. Potential Contaminant Point Sources Within WHPA's (cont.)

*See referenced figure for location

UST =Underground Storage Tank of Petroleum Products

CHS = Controlled Hazardous Substance Generator

PEST = Pesticide Dealer

GWDP = State of Maryland Ground Water Discharge Permit

PWSID	PWS NAME	PLANT ID	TREATMENT METHOD	PURPOSE
0050001	Town Of Denton	02	Hypochlorination, Pre	Disinfection
		04	Hypochlorination, Pre	Disinfection
0050002	Town Of Federalsburg	01	Gaseous Chlorination, Post	Disinfection
		02	Gaseous Chlorination, Post	Disinfection
		03	Gaseous Chlorination, Post	Disinfection
		04	Gaseous Chlorination, Post	Disinfection
0050003	Greensboro	01	Hypochlorination, Post	Disinfection
		02	Hypochlorination, Post	Disinfection
		03	Hypochlorination, Post	Disinfection
0050004	Preston Waterworks - Nelphine Hgts.	01	Ultraviolet Radiation	Disinfection
0050005	Town Of Preston	01	Hypochlorination, Pre	Disinfection
0050006	Ridgely	01	Hypochlorination, Post	Disinfection
0050007	Harman Subdivision	01	Hypochlorination, Post	Disinfection
0050008	Henderson	02	No Treatment	
0050204	Caroline Acres M.H.P.	01	Hypochlorination, Post	Disinfection
		02	Hypochlorination, Post	Disinfection
0050205	Cedar Mobile Home Park	01	Hypochlorination, Pre	Disinfection
0050206	Holly Cove Harbor M.H.P.	01	No Treatment	
0050208	Meadow Brook Court	01	No Treatment	
0050209	Prettyman Manor M.H.P.	01	No Treatment	
0050210	Nelpine Mobile Home Park	01	No Treatment	
0050214	Hilltop Mobile Home Park	01	No Treatment	
0050216	Tower Court Mobile Home Park	01	No Treatment	
0050217	Denny Taylor Mobile Home Park	01	No Treatment	
0050218	Marsh Creek Mobile Home Park	01	No Treatment	
0050219	Blue Heron Assisted Living	01	Hypochlorination, Post	Disinfection

Table 5. Treatment Methods

PWSID	PWS NAME	PLANT ID	IOCs (except Arsenic)		Arsenic		Radionuclides		VOCs		SOCs	
			No. of Samples Collected	No. of Samples > Half MCL	No. of Samples Collected	No. of Samples > Half MCL	No. of Samples Collected	No. of Samples > Half MCL	No. of Samples Collected	No. of Samples > Half MCL	No. of Samples Collected	No. of Samples > Half MCL
0050001	TOWN OF DENTON	02	51	1	3	1	5	1[1]	2	0	0	0
		04	42	0	2	0	0	0	5	0	1	1[2]
0050002	TOWN OF FEDERALSBURG	01	62	0	5	0	5	0	6	0	4	0
		02	52	0	3	0	5	0	3	0	5	0
		03	68	0	5	0	5	1[1]	6	0	4	0
		04	60	1	3	0	4	0	8	0	4	0
0050003	GREENSBORO	01	105	2	6	0	5	1[1]	3	0	2	0
		02	91	1	5	0	5	0	3	0	2	0
		03	37	1	2	0	4	0	2	0	2	0
0050004	PRESTON WATERWORKS - NELPHINE HGTS.	01	40	0	3	0	5	1[1]	2	0	0	0
0050005	TOWN OF PRESTON	01	47	1	2	0	5	1	6	0	2	1[2]
0050006	RIDGELY	01	67	0	4	0	7	3[1]	5	0	2	0
0050007	HARMAN SUBDIVISION	01	45	4	5	3	5	1[1]	6	0	0	0
0050008	HENDERSON	02	77	4	1	1	6	0	9	0	0	0
0050204	CAROLINE ACRES M.H.P.	01	65	0	4	1	5	1[1]	6	0	0	0
		02	58	0	3	2	5	1[1]	5	0	0	0
0050205	CEDAR MOBILE HOME PARK	01	59	1	4	3	5	1[1]	8	0	1	0
0050206	HOLLY COVE HARBOR M.H.P.	01	44	2	4	0	5	0	6	0	0	0
0050208	MEADOW BROOK COURT	01	42	1	4	0	5	1[1]	6	0	0	0
0050209	PRETTYMAN MANOR M.H.P.	01	72	0	6	0	9	1[1]	3	0	0	0
0050210	NELPINE MOBILE HOME PARK	01	55	0	5	0	5	1[1]	6	0	0	0

Table 6. Summary of Water Quality Results

PWSID	PWS NAME	PLANT ID	IOCs (except Arsenic)		Arsenic		Radionuclides		VOCs		SOCs	
			No. of Samples Collected	No. of Samples > Half MCL	No. of Samples Collected	No. of Samples > Half MCL	No. of Samples Collected	No. of Samples > Half MCL	No. of Samples Collected	No. of Samples > Half MCL	No. of Samples Collected	No. of Samples > Half MCL
0050214	HILLTOP MOBILE HOME PARK	01	52	0	5	0	5	1[1]	6	0	0	0
0050216	TOWER COURT MOBILE HOME	01	71	1	5	0	5	1[1]	6	0	1	0
0050217	DENNY TAYLOR MOBILE HOME PARK	01	54	0	4	0	5	1[1]	6	0	0	0
0050218	MARSH CREEK MOBILE HOME PARK	01	53	1	3	0	5	0	7	0	2	1[2]
0050219	BLUE HERON ASSISTED LIVING	01	21	0	1	0	22	2[1]	6	0	1	0

Table 6. Summary of Water Quality Results (cont.)

[1] Proposed MCL for Radon-222

[2] Sample for Di(2-Ethylhexyl)Phthalate invalid because of presence in blank

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (mg/L)	SAMPLE DATE	RESULT (mg/L)[1]
0050001	TOWN OF DENTON	02	FLUORIDE	4	26-Dec-95	**4.14**
		02	FLUORIDE	4	18-Jul-96	1.18
		02	FLUORIDE	4	03-Feb-97	1.43
		02	FLUORIDE	4	16-Nov-00	1.38
0050003	GREENSBORO	01	FLUORIDE	4	01-Nov-94	**2.20**
		01	FLUORIDE	4	02-Dec-97	0.52
		01	FLUORIDE	4	23-Dec-97	0.52
		01	FLUORIDE	4	28-Jul-98	1.08
		01	FLUORIDE	4	20-Nov-00	1.02
		01	FLUORIDE	4	07-Aug-01	**2.20**
		02	FLUORIDE	4	01-Nov-94	**2.00**
		02	FLUORIDE	4	02-Dec-97	0.52
		02	FLUORIDE	4	23-Dec-97	0.51
		02	FLUORIDE	4	28-Jul-98	1.04
		02	FLUORIDE	4	20-Nov-00	1.05
		03	FLUORIDE	4	07-Aug-01	**2.20**
		03	FLUORIDE	4	04-Mar-03	1.25
0050007	HARMAN SUBDIVISION	01	FLUORIDE	4	30-Mar-94	**2.04**
		01	FLUORIDE	4	08-Apr-97	**2.18**
		01	FLUORIDE	4	05-Jun-97	**2.18**
		01	FLUORIDE	4	05-May-98	1.99
		01	FLUORIDE	4	19-Dec-00	**2.00**
0050008	HENDERSON	02	FLUORIDE	4	01-Apr-99	**2.07**
		02	FLUORIDE	4	01-Apr-99	**2.18**
		02	FLUORIDE	4	01-Apr-99	**2.02**
		02	FLUORIDE	4	19-Feb-02	**2.08**
0050205	CEDAR MOBILE HOME PARK	01	FLUORIDE	4	05-Apr-94	**2.00**
		01	FLUORIDE	4	04-Dec-97	1.41
		01	FLUORIDE	4	19-Dec-00	1.90
		01	FLUORIDE	4	04-Feb-03	1.90
0050206	HOLLY COVE HARBOR M.H.P.	01	FLUORIDE	4	21-Dec-95	**2.88**
		01	FLUORIDE	4	03-Feb-97	1.98
		01	FLUORIDE	4	24-Aug-98	**2.02**
		01	FLUORIDE	4	14-Nov-00	1.98
0050208	MEADOW BROOK COURT	01	FLUORIDE	4	21-Dec-95	3.30
		01	FLUORIDE	4	02-Jan-97	-0.50
		01	FLUORIDE	4	28-Jan-97	-0.50
		01	FLUORIDE	4	03-Feb-97	0.21
		01	FLUORIDE	4	21-Dec-98	0.21
		01	FLUORIDE	4	23-Oct-00	0.21
0050218	MARSH CREEK MOBILE HOME PARK	01	FLUORIDE	4	18-Jul-94	1.70
		01	FLUORIDE	4	27-Oct-94	0.41
		01	FLUORIDE	4	09-Oct-97	1.85
		01	FLUORIDE	4	15-Nov-00	1.91
		01	FLUORIDE	4	07-Jan-03	**2.02**

Table 7a. Results of Fluoride where detected above 50% of the MCL.
(Results in bold are greater than 50% of MCL)

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (mg/L)	SAMPLE DATE	RESULT (mg/L)[1]
0050001	TOWN OF DENTON	02	ARSENIC	0.010	26-Dec-95	0.003
		02	ARSENIC	0.010	09-Jun-98	**0.008**
		02	ARSENIC	0.010	16-Nov-00	0.003
0050007	HARMAN SUBDIVISION	01	ARSENIC	0.010	11-Jan-94	-0.010
		01	ARSENIC	0.010	08-Apr-97	**0.005**
		01	ARSENIC	0.010	05-Jun-97	**0.005**
		01	ARSENIC	0.010	05-May-98	-0.010
		01	ARSENIC	0.010	19-Dec-00	**0.009**
0050008	HENDERSON	02	ARSENIC	0.010	19-Feb-02	**0.006**
0050204	CAROLINE ACRES M.H.P.	01	ARSENIC	0.010	11-Jan-94	0.000
		01	ARSENIC	0.010	06-Nov-97	0.004
		01	ARSENIC	0.010	28-Jul-98	-0.010
		01	ARSENIC	0.010	19-Dec-00	**0.006**
		02	ARSENIC	0.010	06-Nov-97	**0.008**
		02	ARSENIC	0.010	28-Jul-98	-0.010
		02	ARSENIC	0.010	19-Dec-00	**0.007**
0050205	CEDAR MOBILE HOME PARK	01	ARSENIC	0.010	11-Jan-94	0.000
		01	ARSENIC	0.010	04-Dec-97	**0.010**
		01	ARSENIC	0.010	19-Dec-00	**0.016**
		01	ARSENIC	0.010	04-Feb-03	**0.013**

Table 7b. Arsenic results where detected above 50% of the MCL.

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (pCi/L)	SAMPLE DATE	RESULT (pCi/L)[1]
0050001	TOWN OF DENTON	02	RADON-222	300 [2]	01-Nov-00	290
0050002	TOWN OF FEDERALSBURG	03	RADON-222	300 [2]	28-Mar-94	165
0050003	GREENSBORO	01	RADON-222	300 [2]	20-Nov-00	160
0050004	PRESTON WATERWORKS - NELPHINE	01	RADON-222	300 [2]	31-Oct-00	360
0050005	TOWN OF PRESTON	01	RADIUM-226+228	5	26-Oct-00	2.6
0050006	RIDGELY	01	RADON-222	300 [2]	11-Apr-94	220
		01	RADON-222	300 [2]	11-Apr-94	235
		01	RADON-222	300 [2]	28-Nov-00	225
0050007	HARMAN SUBDIVISION	01	RADON-222	300 [2]	19-Dec-00	570
0050204	CAROLINE ACRES M.H.P.	01	RADON-222	300 [2]	30-Nov-00	690
		02	RADON-222	300 [2]	30-Nov-00	445
0050205	CEDAR MOBILE HOME PARK	01	RADON-222	300 [2]	19-Dec-00	865
0050208	MEADOW BROOK COURT	01	RADON-222	300 [2]	23-Oct-00	390
0050209	PRETTYMAN MANOR M.H.P.	01	RADON-222	300 [2]	14-Nov-00	230
0050210	NELPINE MOBILE HOME PARK	01	RADON-222	300 [2]	31-Oct-00	435

Table 7c. Results of Radionuclides detected above 50% of their MCL.

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (pCi/L)	SAMPLE DATE	RESULT (pCi/L)[1]
0050214	HILLTOP MOBILE HOME PARK	01	RADON-222	300 [2]	29-Nov-00	185
0050216	TOWER COURT MOBILE HOME PARK	01	RADON-222	300 [2]	27-Nov-00	265
0050217	DENNY TAYLOR MOBILE HOME PARK	01	RADON-222	300 [2]	27-Nov-00	300
0050219	BLUE HERON ASSISTED LIVING	01	RADON-222	300 [2]	16-Jan-01	390
		01	RADON-222	300 [2]	16-Jan-01	390

Table 7c. Results of Radionuclides detected above 50% of their MCL. (cont.)

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (ug/L)	SAMPLE DATE	RESULT (ug/L)[1]
0050001	TOWN OF DENTON	04	DI(2-ETHYLHEXYL) PHTHALATE	6.0	10-Jun-02	13.7 [3]
0050005	TOWN OF PRESTON	01	DI(2-ETHYLHEXYL) PHTHALATE	6.0	24-Aug-98	4.2 [3]
0050218	MARSH CREEK MOBILE HOME PARK	01	DI(2-ETHYLHEXYL) PHTHALATE	6.0	24-Aug-98	3.7 [3]

Table 7d. Results of Synthetic Organic Compounds where detected above 50% of their MCL.

[1] A negative symbol indicates below the detectable level shown. Results in bold are greater than 50% of the MCL.

[2] Proposed MCL

[3] Sample for Di(2-Ethylhexyl)Phthalate invalid because of presence in blank

PWSID	PWS NAME	No. of Samples Collected	No. of Positve Samples	Disinfection Treatment?
0050001	TOWN OF DENTON	75	1	Y
0050002	TOWN OF FEDERALSBURG	74	0	Y
0050003	GREENSBORO	74	0	Y
0050004	PRESTON WATERWORKS - NELPHINE HGTS.	57	6	Y
0050005	TOWN OF PRESTON	72	1	Y
0050006	RIDGELY	74	0	Y
0050007	HARMAN SUBDIVISION	74	2	Y
0050008	HENDERSON	74	6	N
0050204	CAROLINE ACRES M.H.P.	73	0	Y
0050205	CEDAR MOBILE HOME PARK	73	0	Y
0050206	HOLLY COVE HARBOR M.H.P.	73	0	N
0050208	MEADOW BROOK COURT	73	0	N
0050209	PRETTYMAN MANOR M.H.P.	74	4	N
0050210	NELPINE MOBILE HOME PARK	74	0	N
0050214	HILLTOP MOBILE HOME PARK	74	0	N
0050216	TOWER COURT MOBILE HOME PARK	74	1	N
0050217	DENNY TAYLOR MOBILE HOME PARK	74	0	N
0050218	MARSH CREEK MOBILE HOME PARK	75	0	N
0050219	BLUE HERON ASSISTED LIVING	25	0	Y

Table 8. Routine Bacteriological Monitoring Results from System Distribution
(Sample results available since 1995)

PWSID	PWS Name	Is the Water System Susceptible to...						
		Inorganic Compounds (except Fluoride and Arsenic)	Fluoride	Arsenic	Radionuclides	Volatile Organic Compounds	Synthetic Organic Compounds	Microbiological Contaminants
0050001	TOWN OF DENTON	N	Y	Y	YES [1]	N	N	N
0050002	TOWN OF FEDERALSBURG	N	N	N	YES [1]	N	N	N
0050003	GREENSBORO	N	Y	N	YES [1]	N	N	N
0050004	PRESTON WATERWORKS - NELPHINE HGTS.	N	N	N	YES [1]	N	N	N
0050005	TOWN OF PRESTON	N	N	N	YES [1]	N	N	N
0050006	RIDGELY	N	N	N	YES [1]	N	N	N
0050007	HARMAN SUBDIVISION	N	Y	Y	YES [1]	N	N	N
0050008	HENDERSON	N	Y	Y	N	N	N	N
0050204	CAROLINE ACRES M.H.P.	N	N	Y	YES [1]	N	N	N
0050205	CEDAR MOBILE HOME PARK	N	Y	Y	YES [1]	N	N	N
0050206	HOLLY COVE HARBOR M.H.P.	N	Y	N	N	N	N	N
0050208	MEADOW BROOK COURT	N	Y	N	YES [1]	N	N	N

Table 9. Susceptibility Analysis Summary

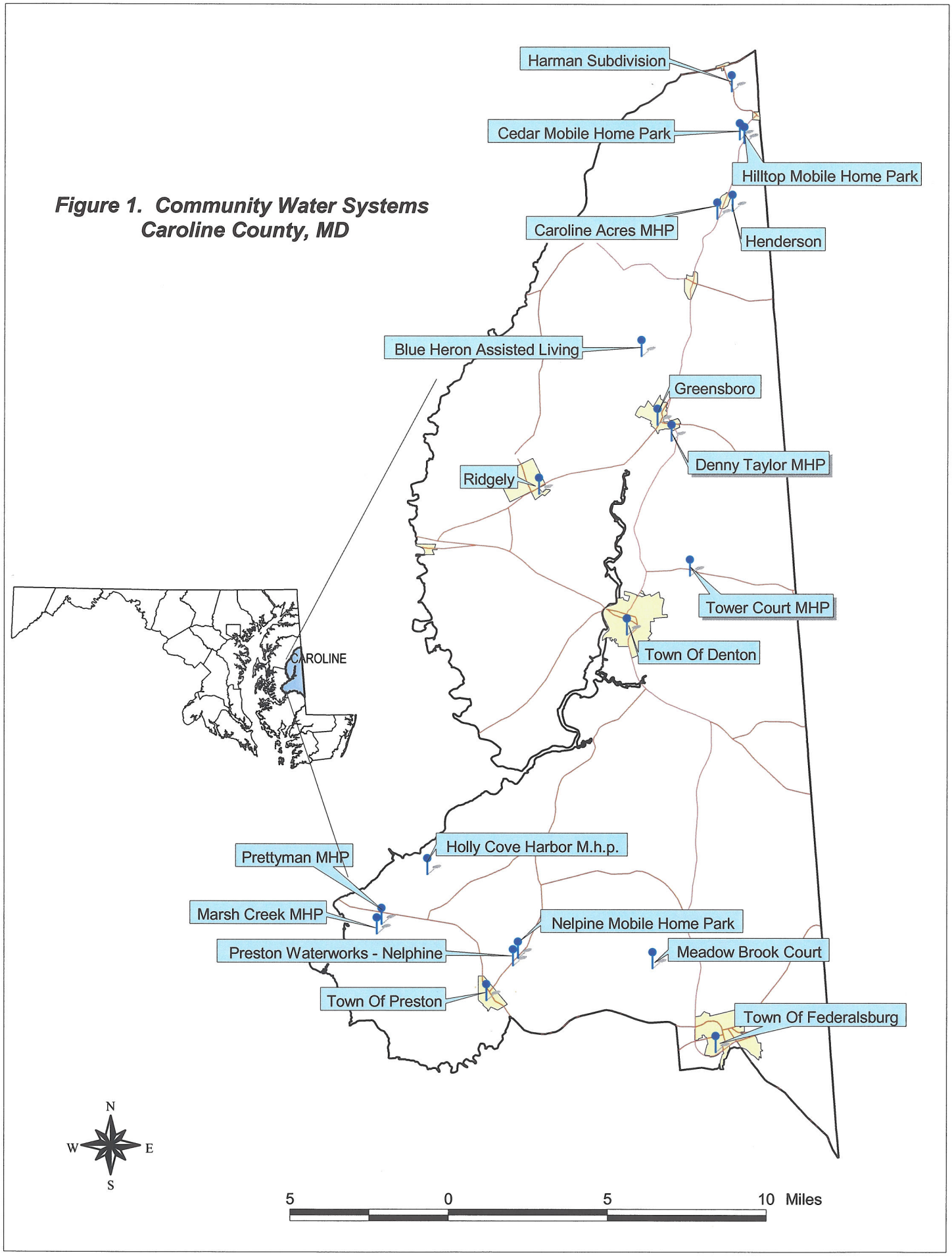
PWSID	PWS Name	Is the Water System Susceptible to...						
		Inorganic Compounds (except Fluoride and Arsenic)	Fluoride	Arsenic	Radionuclides	Volatile Organic Compounds	Synthetic Organic Compounds	Microbiological Contaminants
0050209	PRETTYMAN MANOR M.H.P.	N	N	N	YES [1]	N	N	N
0050210	NELPINE MOBILE HOME PARK	N	N	N	YES [1]	N	N	N
0050214	HILLTOP MOBILE HOME PARK	N	N	N	YES [1]	N	N	N
0050216	TOWER COURT MOBILE HOME PARK	N	N	N	YES [1]	N	N	N
0050217	DENNY TAYLOR MOBILE HOME PARK	N	N	N	YES [1]	N	N	N
0050218	MARSH CREEK MOBILE HOME PARK	N	Y	N	N	N	N	N
0050219	BLUE HERON ASSISTED LIVING	N	N	N	YES [1]	N	N	N

Table 9. Susceptibility Analysis Summary (cont.)

[1] Based on Proposed MCL for Radon-222

FIGURES

Figure 1. Community Water Systems
Caroline County, MD



APPENDIX

Table 1. — Coastal Plain stratigraphic nomenclature and aquifers of the Eastern Shore of Maryland.

System	Series (Group)	Geologic Unit	Thickness (feet)	Hydrogeologic Unit(s)	Dominant Lithologic Character
QUATERNARY & TERTIARY (?)	Holocene	Holocene deposits	0 - 40	---	Soil, alluvial sand and silt, dune sand, and peat. Disconformable base.
	Pleistocene and Pliocene (?) (Columbia Group)	Shoreline complex	0 - 230	Columbia aquifer	Lenticular deposits of sand, silt, clay, and peat. Some beds of coarse sand and fine gravel. Tan; some gray and blue clay.
		Salisbury Formation: Beaverdam Fm. and Pensauken Fm. of Owens and Denny (1979)			Beaverdam Sand: Light gray to light tan, fine to coarse grained, moderately sorted, feldspathic sand. Pensauken Formation: Light tan to orange tan, medium to coarse grained, moderately to poorly sorted, pebbly feldspathic sand.
?	?	?			
TERTIARY	Miocene (Chesapeake Group)	Upper Miocene Aquifer Complex	0 - 50	Upper confining bed	Lenticular silts, clays, and fine sands. Green-blue silt and fine gray sand most common, but occasionally includes blue-green pebbly clay.
			0 - 80	Pocomoke aquifer	Sand, gray or tan-gray; coarse and pebbly generally, but locally fine.
		Yorktown and Cohansey Formations (?) of Rasmussen and Slaughter (1955)	0 - 85	Lower confining bed	Blue and gray clayey silt and sand; some peat. Some beds of shell and calcite and/or limestone.
				Ocean City aquifer	Coarse gray sand, fine gravel.
			0 - 240	Manokin aquifer	Fine to very coarse gray sand, and some lignite or peat. Some silty sand and clay. Occasional beds of shell and/or "rock".
		St. Marys Formation	0 - 190	Confining layer	Gray fossiliferous clay, silt, fine sand, and silty and sandy clay.
		Choptank Formation	0 - 240	Frederica aquifer and confining layer	Gray fine sand. Thin beds of shell and calcite. Green or brown clay and fine sand. Thin beds of shell and calcite or limestone.
		Calvert Formation	0 - 680	Cheswold aquifer and confining layers	Gray sand and diatomaceous silt and clay. Shell beds.
	Eocene	Piney Point Formation	0 - 220	Piney Point aquifer	Olive-green to greenish-gray quartz sand, slightly to moderately glauconitic; shell beds.
		Nanjemoy Formation	0 - 294	Confining layer	Gray to dark gray, glauconitic, silt, sand, and clay.
	Paleocene	Aquia and Hornerstown Formations (undivided)	0 - 165	Aquia aquifer	Green to brown, fine to coarse grained, glauconitic sand; interstratified with grayish-green silt and clays; calcite cemented sands and fossil beds.
		Brightseat Formation	0 - <100	Confining layer	Dark gray clay and fine, silty, micaceous sand.
CRETACEOUS	Upper Cretaceous	Matawan and Monmouth Formations (undivided)	0 - 960 ?	Matawan-Monmouth aquifers	Dark greenish-gray to reddish-brown, fine to occasionally coarse quartz sand. Facies may be glauconitic, micaceous, shelly and/or clayey.
		Magothy Formation	<50 - 100	Magothy aquifer	Light gray to white "sugary", medium to coarse grained quartz sand and fine gravel; interbedded dark gray clays in upper part.
	Lower Cretaceous (Potomac Group)	Patapsco Formation	<50 - 1,750	Aquifers and confining layers	Interbedded, variegated (gray, brown, and red) silt and clay, and argillaceous, subrounded, fine to medium quartz sand.
		Arundel and Patuxent Formations (undivided)	<50 - 2,950	Aquifers and confining layers	White to light gray to orange brown, moderately sorted, angular and subrounded quartz sand; also gray to ocherous silt and clay beds, which occur in amounts ranging from less than 25% to greater than 75% of formation.
JURASSIC (?)	---	Unnamed	0 - 135	---	White quartzite conglomerate, dark gray, reddish-green and apple green shales, sandy shales, and arkosic sandstones. Does not outcrop on the Eastern Shore.
PALEOZOIC (?) & PRECAMBRIAN	Basement Complex			---	Believed to be chiefly schist, granite, gabbro, and gneiss.

1/ The nomenclature is that of the Maryland Geological Survey.

2/ Compiled from Rasmussen and Slaughter (1957), Hansen (1972; oral commun., 1982), and Weigle (1974).

FROM MGS R.I. NO. 40 (1984)

Table 2. — Names used in previous reports for the geologic units of the surficial sediments.

Rasmussen and Slaughter (1955) Central Delmarva			Rasmussen and Slaughter (1957) Talbot, Caroline, and Dorchester Counties			Overbeck and Slaughter (1958) Northern Delmarva			Hansen (1966) Salisbury Area			Boggess and Heidel (1968) Salisbury Area			Denny and Others (1979) Owens and Denny (1979) Central Delmarva		
SERIES	GROUP	Formation — member / member and informal names	SERIES	GROUP		SERIES	GROUP		SERIES	GROUP		SERIES	GROUP		SERIES	GROUP	
HOLOCENE		Recent deposits	HOLOCENE		Recent deposits	HOLOCENE		Recent deposits	HOLOCENE		Recent deposits	HOLOCENE		Recent deposits	HOLOCENE		Recent deposits
PLEISTOCENE	Columbia	Parsonsburg Sand Talbot and Pamlico Formations undivided	PLEISTOCENE	Columbia	Parsonsburg Sand Talbot and Pamlico Formations undifferentiated	PLEISTOCENE	Columbia	Talbot Formation	PLEISTOCENE	Columbia	Parsonsburg Sand	PLEISTOCENE	Columbia	Parsonsburg Sand	PLEISTOCENE		Kent Island / Parsonsburg (Wicomico County) / Sinepuxtent (Worcester County) Ironshire Formation Omar Formation
		Walston Silt			Walston Silt			(Walston not present in this part of study area)			Walston Formation			Walston Silt			Walston Silt
		Beaverdam Sand			Beaverdam Sand			Wicomico Formation			Salisbury — Beaverdam facies / Red Gravelly facies			Salisbury — Beaverdam facies / Red Gravelly facies	PLIOCENE		Beaverdam Sand
PLIOCENE(?)		Brandywine Formation, Bryn Mawr and Beacon Hill Gravels	PLIOCENE		Brandywine Formation and Bryn Mawr Gravels	PLIOCENE		Brandywine Formation and Bryn Mawr Gravels									Pensauken
MIOCENE		Yorktown and Cohansey (?)	MIOCENE			MIOCENE			MIOCENE		Yorktown and Cohansey	MIOCENE		Yorktown and Cohansey (?)	MIOCENE		"Yorktown and Cohansey (?)"
	Chesapeake	St. Marys Formation		Chesapeake	St. Marys Formation Choptank Formation		Chesapeake	Choptank Formation									

FROM MGS R.I. NO.40 (1984)

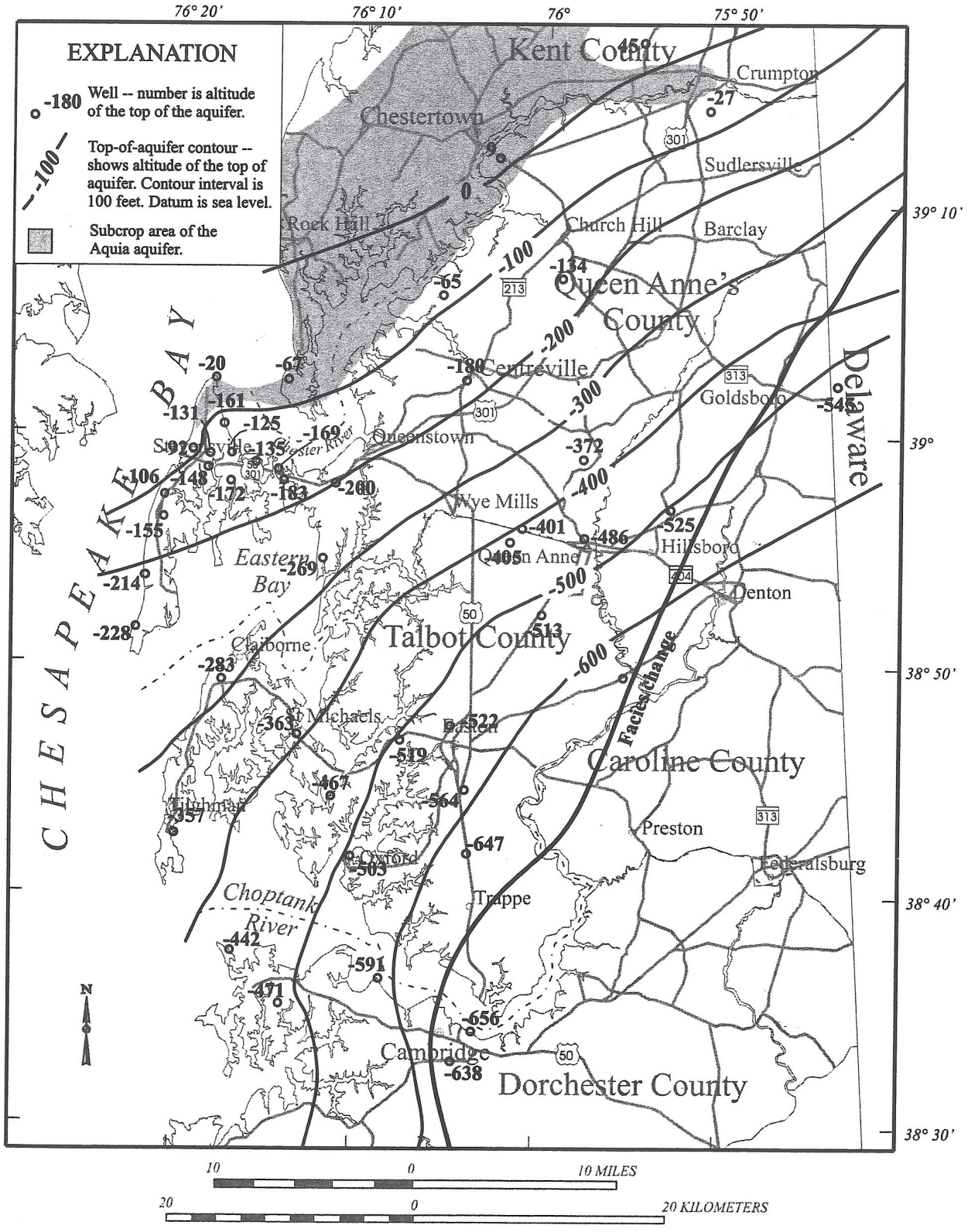


Figure 20. Altitude of the top of the Aquia aquifer.

FROM MGS R.I. NO. 72 (2001)

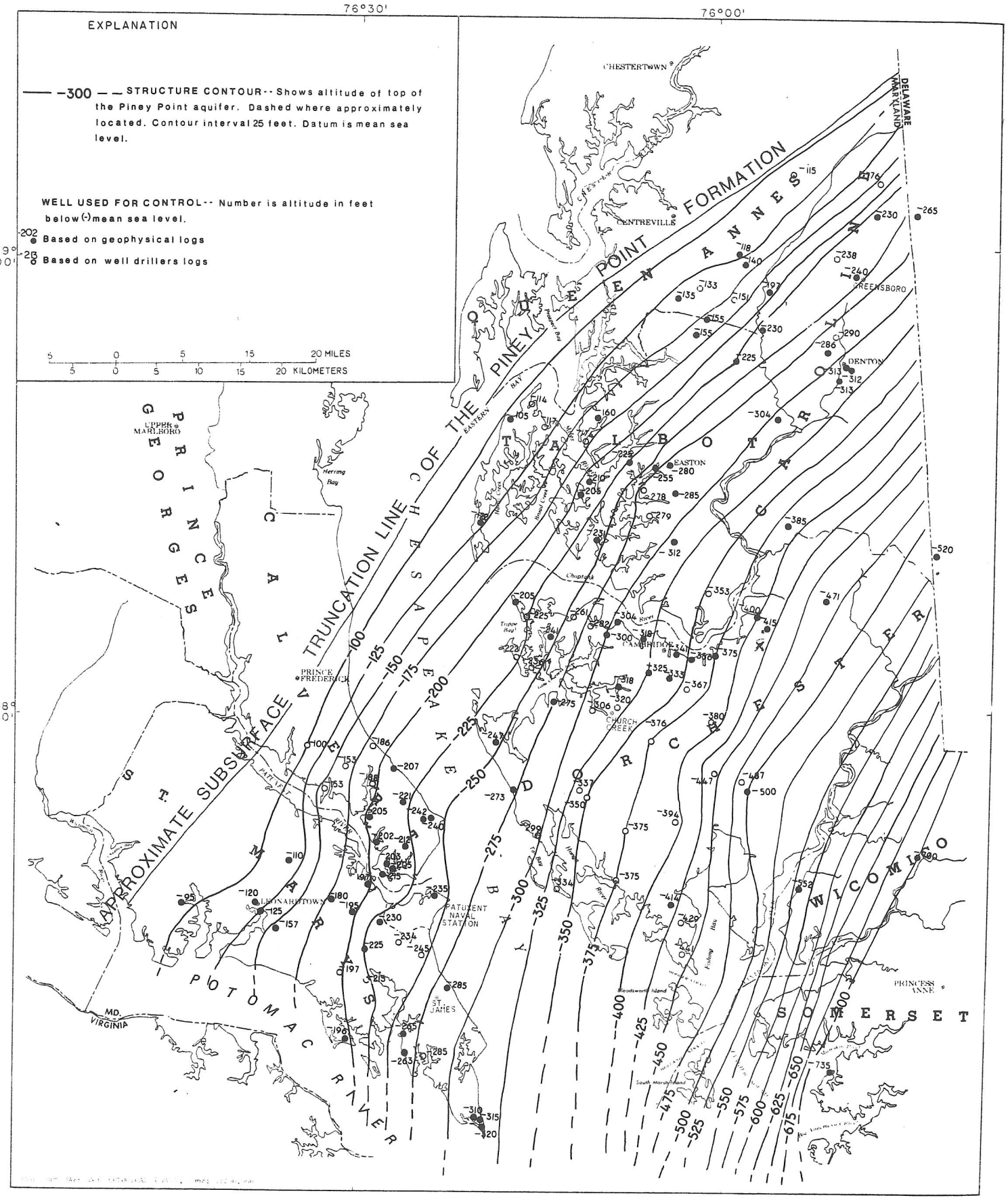


Figure 3.—Altitude of the top of the Piney Point aquifer.

FROM MGS R.I. NO. 31 (1979)