

Speaker Abstracts

2006 State-County Ground Water Symposium



September 20, 2006

2006 State-County Ground Water Symposium

Welcome to the 15th annual State-County Ground Water Symposium! The Maryland Department of the Environment is pleased to host this event, which is intended to provide an opportunity for information exchange among ground water professionals from around the State about new technologies, current programs, and other relevant topics of interest. This year's program includes presentations on technical topics, policy discussions, and new initiatives in ground water management and regulation. Thank you for your continued interest and enthusiasm.

Plenary Speakers AM

Keynote Address: THE ADAPTABLE FROG

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THE MDE PERSPECTIVE—HB1141

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THE LOCAL ENVIRONMENTAL HEALTH PERSPECTIVE—A Brief History of the Sanitarian Profession

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PM

MDE'S APPROVAL OF NEW WATER SYSTEMS - WHAT'S INVOLVED?

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PROTECTION OF THE POOLESVILLE SOLE SOURCE AQUIFER

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Maryland Department of the Environment (MDE) collaborated with VIEW Engineering to assist the Town of Poolesville with its Source Water Assessment Program. VIEW Engineering groundwater scientists assessed the nine existing public water supply wells that serve Poolesville, each of which are located in the New Oxford Formation. The New Oxford Formation has been designated as a sole source aquifer drinking water source for Poolesville, therefore protecting this very valuable source is critical to the area. A unique approach was taken to delineate the wellhead protection area including a regional, high-resolution, GPS survey of available wells to create a regional water table map depicting the wellfield's recharge area. Poolesville's drinking water quality is generally very good, however remains susceptible to contamination. Currently measures are being taken to work with all regional stakeholders to ensure the long-term protection of this valuable drinking water resource.

MTBE AND THE IMPACT OF NEW NOTIFICATION REQUIREMENTS ON LOCAL GOVERNMENTS

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In the last ten years Carroll County, along with the rest of Maryland, has seen a significant rise in the number of wells contaminated with MTBE. This presentation will discuss how the CCHD has dealt with legislative

repercussions, toxicological uncertainty, and increased workload associated with MTBE contamination. Also discussed will be the CCHD's approach to MTBE contamination, and how the Department conducts a groundwater investigation.

EPA'S DECENTRALIZED WASTEWATER MANAGEMENT HANDBOOK: A GUIDE FOR DEVELOPING AND IMPLEMENTING MANAGEMENT PROGRAMS

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US EPA released the "Handbook for Managing Onsite and Clustered (Decentralized) Wastewater Treatment Systems" as a web document in December 2005, with full publication in January 2006. The Management Handbook was developed as a result of EPA's 1997 Response to Congress on Use of Decentralized Wastewater Treatment Systems, which concluded that decentralized wastewater systems were a viable alternative to centralized facilities - if they were properly managed.

After release of the Response to Congress, EPA launched a number of major initiatives to develop more specific management guidelines, update technical guidance for system design (the 2002 Onsite Wastewater Treatment Systems Manual), increase the competence and professionalism of industry service providers, and aggressively promote the enhancement or adoption of management programs to wide range of public and private sector partners. The Management Handbook is part of this series of strategic actions, and is designed to assist local communities, health

departments, and planners with developing new management programs or strengthening existing ones.

This session will provide an overview of the Handbook and EPA's other activities related to decentralized wastewater management.

SOURCE WATER PROTECTION AND WELLHEAD PROTECTION IN US EPA REGION 3

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This presentation will describe the goals of EPA's source water and wellhead protection programs, outline how the Safe Drinking Water Act established a protection framework for sources of drinking water, the current status of EPA's source water protection program, the regulatory and non-regulatory strategies a community or public water supply system can use to protect sources of drinking water, and give examples of source water protection mechanisms currently employed in Region 3.

CADMIUM IN GROUND WATER AND SEDIMENT SAMPLES IN THE AQUIA AQUIFER IN CENTRAL ANNE ARUNDEL COUNTY, MARYLAND

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In 2003, water samples collected from the Aquia aquifer in the Woodland Beach community in Anne Arundel County, Maryland exceeded the U.S. Environmental Protection Agency's Maximum Contaminant Level of 5 micrograms per liter ($\mu\text{g}/\text{L}$) for cadmium. To further investigate the cadmium distribution as well as hydrogeologic and geochemical relations, the Maryland Geological Survey collected and analyzed additional water and sediment samples in June 2005 from the Aquia aquifer in central Anne Arundel County.

Cadmium concentrations in 19 water samples collected by MGS ranged from less than 2.5 to 66 $\mu\text{g}/\text{L}$. Four of the 19 samples exceeded the MCL of 5 $\mu\text{g}/\text{L}$ (fig. 2). Cadmium concentrations in sediments ranged from less than 0.01 to 1.41 milligrams per kilogram (mg/kg). Elevated ($>5 \mu\text{g}/\text{L}$) groundwater cadmium concentrations were found only within a weathered zone of the Aquia Formation that had been identified previously in test wells. There was little overall difference in sediment-cadmium concentrations between the weathered and unweathered zones. The weathered zone extends from Edgewater to Sandy Point State Park on the Broadneck Peninsula. The deepest part of the weathered zone appears to be about 50 feet below sea level near Woodland Beach. All samples having elevated cadmium levels had pH values less than about 5.5, with cadmium concentrations tending to increase with decreasing pH. Most samples having more than 50 mg/L chloride also had cadmium concentrations greater than 5 $\mu\text{g}/\text{L}$, with cadmium concentrations tending to increase with

increasing chloride concentrations. The source of cadmium in ground water could not be determined from the data collected in this study; both natural and human factors may be involved.

A map was developed showing the depth to the bottom of the weathered zone of the Aquia aquifer. Because no elevated cadmium samples were found in wells screened below the weathered zone, the map is being used by the Anne Arundel County Health Department to guide depth specifications for new wells. The map will be modified as additional data are collected.

USING A SUBMERGED ATTACHED GROWTH BIOREACTOR AS AN EFFECTIVE BIOLOGICAL NUTRIENT REMOVAL PROCESS FOR SMALL DECENTRALIZED WASTEWATER TREATMENT PLANTS

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Simultaneous oxidation of organics, oxidation of ammonium and reduction of nitrates within a single submerged attached growth bioreactor (SAGB). Two primary advantages of a SAGB are the small volume requirement and the elimination of downstream clarification, which make it an effective biological nutrient removal (BNR) process for small decentralized wastewater treatment plants.

BASEFLOW ANALYSIS OF THE FRACTURED BEDROCK UNIT IN THE POTOMAC RIVER BASIN

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The fractured bedrock unit in the Potomac River Basin is generally understood to be a major contributor to the baseflow of the network of streams that form tributaries of the Potomac River. Studying baseflow statistics is an indirect means of evaluating water availability. A study was conducted to determine water availability in the fractured bedrock units of the Potomac River Basin by analyzing annual baseflow statistics and developing statistical models. Preliminary results which include estimates of annual availability of water in gaged and ungaged sub-basins in the Potomac basin are presented. The preliminary results indicate the statistically significant hydrologic parameters and basin characteristics that influence estimates of water availability. The comparison of water availability with demand helps to identify potential areas of shortage and thus a more focused planning for sustainable water resources management.

WHY WE GET POSITIVE BACTI RESULTS FROM WELLS USING CONFINED AQUIFERS

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As we completed the source water assessments for transient water systems in the Southern and Eastern Shore Counties of Maryland we noticed a significant number of positive total coliform water samples. Surprisingly, many of these water systems were using wells completed in confined aquifers. Confined aquifers are protected sources of water that shouldn't contain any bacteria. Fieldwork was performed with county sanitarians at problem sites to try and determine why so many confined wells were having positive coliform water samples. The fieldwork revealed that many systems had similar problems that are likely causing the positive coliform water samples. Correcting the problems addressed in this presentation should alleviate future positive coliform water samples.

BAY RESTORATION FUND UPDATE

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The Chesapeake Bay has experienced a decline in water quality due to over enrichment of nutrients (mainly phosphorus and nitrogen). Funds generated through the Bay Restoration Fund (BRF) from onsite sewage

disposal system users, are to be used to provide grants to upgrade OSDs, commonly known as septic systems, to the Best Available Technology (BAT) to reduce nitrogen inputs to ground and surface waters of the state. This presentation provides BRF progress in identifying technologies, outsourcing to local jurisdictions and next steps.

WATER AVAILABILITY IN THE CATOCTIN CREEK WATERSHED, FREDERICK COUNTY

Andrea Korsak, Geologist

In 2005, MDE examined water resources in the Catoctin Creek watershed in Frederick County. The goal of the study was to assess the available water resources and evaluate their adequacy with respect to current and projected demands, taking into account environmental factors that may affect water availability for future needs. This presentation will describe the findings of this study and discuss some of the technical and policy implications raised by the findings.

POINT OF USE AND POINT OF ENTRY TREATMENT ALTERNATIVES FOR MEETING ARSENIC STANDARDS

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This presentation will highlight what has occurred in Maryland since the new 10 ppb standard went into effect January 23, 2006. A general overview of the Maryland public water systems will be presented as well as

information on technologies that have been used around the country. Treatment and non-treatment options will be discussed.

USE OF NITROGEN REMOVING TECHNOLOGY IN OSDS UNDER THE BAY RESTORATION FUND AND ITS IMPLEMENTATION IN THE CORSICA RIVER WATERSHED

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The Bay Restoration Fund was signed in to law May 26th, 2004. The fund requires all users of onsite sewage disposal systems (OSDS), commonly referred to as septic systems, to pay a \$30 annual fee. There are approximately 420,000 OSDS in Maryland, which would generate a potential annual income of \$12.6 million for the state. Sixty percent of these funds will be used for septic system upgrades and the remaining 40 percent will be used for cover crops. With priority given to failing septic systems in Critical Areas, funds can be provided for upgrades of existing systems to best available technology (BAT) for nitrogen removal or for the marginal cost of using BAT instead of conventional technology.

Funds were allocated to ten counties based on proposals submitted. The funds were distributed based on several factors such as proximity to critical area and recreational waters, number of systems to be upgraded and management plan.

One of the proposals that will be examined closely is for the Corsica River watershed. The proposed Total Maximum Daily Load (TMDL)

implementation plan for the watershed will be examined in relation to the submitted proposal for the watershed and its calculated TMDL. Discussion will include analysis of Non Point Source (NPS) loads; in particular current septic loads and advantages of using BAT.

INVESTIGATION AND CLEANUP OF OIL CONTAMINATION IN A RESIDENTIAL WELL

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Investigation of a complaint identifies a somewhat unorthodox source of oil contamination in a Carroll County residential well. The beginning of the session will focus on field observations and session participants will be asked to identify the source of contamination. Cleanup of the well will be detailed to conclude the session.

A ROADMAP FOR SCIENTIFIC ASSESSMENT OF MARYLAND'S COASTAL PLAIN GROUNDWATER RESOURCES

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Population growth in Maryland's Coastal Plain is projected to increase by 37% and ground-water usage by 22 % between 2000 and 2030. This region is almost entirely dependent upon groundwater for its water supply. However, ground-water levels in parts of the Maryland Coastal Plain have been declining for several decades, and continued declines could affect the long-term sustainability of Coastal Plain ground-water resources.

The Governor's Advisory Committee on the Management and Protection of the State's Water Resources recommended that a comprehensive scientific assessment be conducted of Maryland's Coastal Plain groundwater resources. In response to this recommendation, the U.S. Geological Survey and the Maryland Geological Survey have developed a Science Plan that will provide a comprehensive scientific framework and management tools for use in allocating ground water. The Science Plan has five goals: 1) Establishment of the hydrogeologic framework and aquifer properties; 2) Development of regional ground-water flow and water

budgets; 3) Determination of water quality patterns in the regional aquifers; 4) Enhancement of monitoring networks; and 5) Development of management tools for ground-water allocation.

This work will result in a Coastal Plain Aquifer Information System that will contain information and data in a web-based interactive GIS system; provide easy access for water managers; and establish an efficient method for evaluating water-allocation strategies.

The assessment is divided into three phases. Phase 1 was implemented in January 2006 with emphasis on development of the hydrogeologic framework, design of a GIS-based aquifer data system, and initiation of flow and management models. Model development and research will occur in Phase 2, and development of a decision-support system will occur in Phase 3.

PREDICTING THE INFLUENCE OF OPERATING CHARACTERISTICS ON PPCP REMOVAL IN WASTEWATER TREATMENT PLANTS

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Recent studies of the occurrence of pharmaceuticals and personal care products (PPCPs) in sewage treatment plants (STPs) have revealed that removal efficiencies may vary substantially from one STP to the next for reasons that are not always entirely clear. Removal efficiency can in principle be predicted from plant operation characteristics and chemical-specific rate or partition coefficients, although only plant operational characteristics and certain chemical data (such as BOD5 and nitrate) are

readily available. Many important physical/chemical properties pertaining to PPCPs can be estimated from quantitative structure-activity relationships (QSARs), allowing many aspects of their behavior to be predicted. In this study, our occurrence data of 18 acidic PPCPs sampled in the Back River STP (Baltimore, MD), along with plant operation characteristics and potential sorption to biomass, were used to calculate biodegradation rates. By combining calculated biodegradation rate coefficients with estimated sorption loss, the rate of PPCP removal can be modeled under different conditions (e.g., different solids residence times, hydraulic residence times, influent concentrations, and temperatures). Sensitivity analyses reveal how these different conditions affect predicted removal rates.

AN OVERVIEW OF THE MARYLAND DEPARTMENT OF THE ENVIRONMENT'S VOLUNTARY CLEANUP PROGRAM

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Established by the State legislature in 1997, Maryland's Voluntary Cleanup Program (VCP) is administered by the Waste Management Administration's Department of Environmental Restoration and Redevelopment Program (WAS ERRP) to provide State oversight for voluntary cleanups of properties contaminated with hazardous substances and petroleum. The goal of the program is to increase the number of sites cleaned by streamlining the cleanup process while ensuring compliance with existing environmental regulations. Projects range from simple sites with a limited amount of contaminated soil to complex sites with multiple contaminants in soil, groundwater, surface water, sediment, and/or air.

This presentation will briefly summarize the VCP application process and site assessment requirements. The risk based site evaluation process used by the VCP to determine if the site qualifies for a no further requirements determination (NFRD) or whether a response action plan (RAP) is necessary to address site contaminants will also be discussed.

PANEL DISCUSSION ON THE ASSESSMENT OF THE ATLANTIC COASTAL PLAIN AQUIFER SYSTEM IN MARYLAND

Maryland Geological Survey
U.S. Geological Survey
Maryland Department of the Environment
Maryland Department of the Planning
Tri-County Council

In response to a recommendation from the Advisory Committee on the Management and Protection of the State's Water Resources, a comprehensive assessment of the ground-water resources of the Atlantic Coastal Plain in Maryland has been initiated. The study is being jointly planned and conducted by the Maryland Department of Environment, Maryland Geological Survey, and U.S. Geological Survey. The assessment is being planned in three major overlapping phases that are outlined in a USGS Fact Sheet entitled "Sustainability of the Ground-Water Resources in the Atlantic Coastal Plain of Maryland." The assessment is designed to improve our understanding of the hydrogeologic framework and water budget of the coastal plain aquifer system. The work is expected to produce new tools for managing ground-water information and optimizing the development of the ground-water resources.

A key part of the planning process is the solicitation of comments about the usefulness of the information and tools generated by the assessment to different stakeholder groups. These stakeholder groups include water-

resource managers and regulators, natural and agricultural resource managers, state and local planners, and developers. The stakeholders also will include county and municipal governments. The panel in this symposium is being asked to comment on several points or questions including: 1) the major interests of their stakeholder group in the results of this assessment, 2) the specific information and tools that would most interest them, and 3) recommendations on how to engage stakeholders throughout the duration of the assessment, which is expected to extend from 2006 through 2013.

WATER SUPPLY CAPACITY MANAGEMENT PLAN GUIDANCE

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These presentations will focus on MDE's new requirements for owners of certain water supply systems and wastewater systems to manage the capacity of their systems. Any water supply system over 20,000 gpd that is operating at 80% or more of its Water Appropriation Permit is now required to submit a Water Supply Capacity Management Plan to MDE. Likewise, any wastewater system that is operating at 80% of its design capacity is required to submit a Wastewater Capacity Management Plan to MDE. These presentations will review MDE's guidance for preparing Capacity Management Plans.

OVERVIEW OF WATER TREATMENT EFFLUENTS

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This session will provide a survey and analysis of the non-product effluents by various water treatment technologies. The technologies will be sorted by target contaminant, treated product and resulting effluent to drain.

Additionally, the variables of effluent quality and quantity will be addressed for each technology. The intent of this session is to provide an appreciation for the discharges of current residential and commercial water treatment systems alternatives.

DEVELOPMENT OF AN AQUIFER INFORMATION SYSTEM FOR ASSESSMENT AND ALLOCATION OF GROUND-WATER IN THE ATLANTIC COASTAL PLAIN

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The aquifer system that underlies the Atlantic Coastal Plain in Maryland is the principal or sole source of water supply in southern Maryland and the Eastern Shore. Withdrawals from the major confined aquifers have caused declines in ground-water levels of over 200 feet in some areas. The water management staff at the Maryland Department of Environment is using information from many published data and investigative reports to make decisions on water allocations in the Coastal Plain. Many of these reports have detailed information on the geometry, extent, and hydraulic characteristics of the aquifers and confining layers, past and current water levels, and projected declines in water-levels caused by pumpage. What is

not available is a computerized system that provides a central access point to all the available data with summary, graphic display, and data visualization capabilities.

The U.S. Geological Survey, the Maryland Geological Survey, and the Maryland Department of the Environment are collaborating to create a Geographic Information System (GIS) based aquifer information system using ESRI's ArcHydro Ground-Water Data Model. The proposed system will include basic aquifer geographic datasets such as maps of the extent and thickness of each major aquifer, well locations and pumpage data, aquifer test locations, and geophysical log locations. Updated aquifer base maps will be created and provided to the aquifer information system as scientists from the Maryland Geological Survey refine the hydrogeologic framework. As the system matures, custom GIS tools will be created that allow the user enhanced and simplified data access and visualization.

MANAGEMENT OF PHOTOCHEMICAL WASTES

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This presentation will cover various aspects of the management of photochemical wastes including:

- Major photochemicals in use
- Waste disposal options for onsite disposal systems
- Silver recovery systems
- Best management practices

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