Speaker Abstracts

Maryland
Ground Water Symposium

Concurrent Sessions

September 27, 2007

10:40—11:10

Hydrogeologic Disposal of Large Storm Runoff in Karst Terrain Using a Gravity Recharge Method

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Wayne Room, Moderated by John Smith

Attempting to manage the runoff from large storms such as a 2-year storm in karst terrain utilizing conventional infiltration BMPs brings considerable risk of ground failure from sinkhole collapse and subsidence of the supporting ground. An approach to disposing of stormwater in karstified bedrock has been developed with the potential to accept greater than a 2-year storm event. The stormwater will be pre-treated and will enter the deeper epikarstic flow conduits through a series of vertical gravity drain constructs. The stormwater once it enters the epikarstic natural plumbing system will flow laterally through open channels and the perched water table, until the driving head dissipates. At that time, the stormwater will dissipate by infiltrating downward to the water table beneath the property.

This technique is applicable to sites in karst terrain that contain a fabric of anastomosing flow conduits which lend large permeability to the shallow bedrock. The hydrogeologic investigation of the site to demonstrate the permeability must be done in concert with a geotechnical assessment of the epikarst for ground stability beneath heavy structures. Scouring of the epikarst leading to compaction and densification of the bedrock are possible outcomes that need to be evaluated fully before implementation.

An Overview of Ground Water In Maryland

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Maryland Room, Moderated by Allison Tritt

The occurrence of ground water in Maryland is largely dependent on the subsurface geology in which it is found. The aquifers consisting of unconsolidated sediments of the Coastal Plain, for example, will store and transmit ground water very differently from the fractured crystalline bedrock of the Piedmont. As a result, aquifers in the varied regions of the state will respond differently to drought and excessive pumping, and will be susceptible to contamination in different ways.

This talk will introduce the fundamental concepts of ground water, with emphasis on ground-water settings we have in Maryland. Topics for discussion will include the hydrologic cycle, porosity, permeability, recharge, water table versus confined aquifers, and cones of depression. Methods of investigation including water-level measurement, geophysical well logs, pump tests, and ground-water flow models will

be covered. In addition, challenges to our ground-water supply including drought, drawdown, and saltwater intrusion will be discussed.

Water Reuse: Opportunities and Challenges

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Regency Room, Moderated by Jay Prager

Provide an introduction/overview of water reuse and recycling practices and current requirements from across the country, ranging from land treatment systems that also incidentally recharge groundwater to systems designed to recharge groundwater aquifers or augment surface water supplies, as well as the use of dual water systems to make reclaimed water available as an alternative water supply for a wide range of uses, such as irrigation of all types of agricultural crops and urban landscapes, toilet & urinal flushing, industrial cooling and process water, wetland habitat creation & maintenance, etc.

Anne Arundel County Use of GIS to Prioritize BRF Grant Funding

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Embassy Room, Moderated by Shan Abeywickrama

The Anne Arundel County Department of Health currently uses our GIS system to process and qualify applicants for Bay Restoration Grant Funds. This presentation will; give a brief background of nitrogen reducing septic systems in Anne Arundel County, provide a brief explanation of BRF grant applications review criteria, describe use of GIS in reviewing application and give examples of typical applications.

11:15—11:45

Retention Ponds as a Key to Long-Term Salinization of Shallow Groundwater

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Wayne Room, Moderated by John Smith

Road salts have little affinity for soil particulate matter and can be directly transported into surface waters or leached into groundwater. A study recently conducted in Central Maryland indicated that increasing stream salinity in the northeastern United States poses a threat to potable water sources and habitat for freshwater wildlife (Kaushal et al. 2005). This gradual increase in surface water salinity coincides with an increase in impervious surface and an associated increase in storm water management systems over the last 20 years.

More than 70 storm water retention basins within the Red Run watershed in Owings Mills, Maryland have been surveyed over the last year. The elevated conductivities associated with groundwater recharge from storm water retention basins in the Red Run watershed suggests that these basins may serve as a mechanism for the long-term salinization of surface waters by enhancing the proportion of road salt that enters a slow-moving groundwater domain. This may account for year-round elevated chloride levels that have been observed in surface waters in this region.

Demonstrating Groundwater Flow in Confined and Unconfined Aquifers

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Maryland Room, Moderated by Allison Tritt

A tabletop groundwater flow simulator (Envision 3000) is used to demonstrate groundwater flow and the potential for contamination in both unconfined and confined sand and gravel aquifers overlying a cavernous limestone and fractured-bedrock aquifer. Flow patterns among various types of aquifers are compared and contrasted and the potential for contamination of wells in various kinds of aquifers is explored. A video camera and digital projector are used to allow a large audience to clearly view the simulation. Aquifers in the various physiogeographic regions of Maryland are briefly discussed to illustrate the practical benefit of the simulation.

The Performance of a Submerged Attached Growth Bioreactor (SAGB) Coupled with Membrane Filtration for Water Reuse

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Regency Room, Moderated by Jay Prager

This paper discusses the integration of a submerged attached growth bioreactor (SAGB) with hollow fiber membrane microfiltration (MF) to meet the reuse requirements for a small decentralized wastewater treatment plant. The use of a SAGB for biological nitrogen removal provides a system with a small footprint due to the ability of the system to operate with high concentrations of biomass. This particular SAGB is constructed in concrete tanks below grade thereby reducing the area of the building required for the ancillary equipment. The biological nutrient removal (BNR) process, upstream of the microfiltration process, produces a high quality feed water to the MF unit. The coupling of a submerged attached growth bioreactor with microfiltration (SAGB/MF) is a technology that has applications where space is limited and stringent effluent limits exist. This technology was applied to the decentralized wastewater treatment plant at the Jefferson at Bellingham, Massachusetts. During the first year and a half of operation, the average effluent total nitrogen concentration was 3.57 mg/l and median fecal coliform was zero.

Long Term Performance of Pressure Distribution Networks in Maryland

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Embassy Room, Moderated by Shan Abeywickrama

Problems with clogging in pressure distribution commonly used in sand mounds and other sewage disposal systems in Maryland can result in system failures, increased maintenance, or operational problems when devices such as timers are employed to achieve flow equalization. In 1997, what is now MDE's Delegated Programs Section conducted a study of 29 sewage disposal systems to evaluate the degree of clogging that was occurring in their pressure distribution networks. The oldest of these systems had only been installed for 6 years. This study revisits several of these systems ten years later to determine long term performance relating to the clogging of their distribution networks. These networks employed designs specifically intended to retard clogging.

1:10—1:40

Environmental Site Design and the Stormwater Management Act of 2007

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Wayne Room, Moderated by Stew Comstock

The Stormwater Management Act of 2007 requires that "environmental site design" practices be implemented for addressing stormwater caused by urban land use changes. Practices like green roofs, rain gardens, conservation areas, rain barrels, narrower roads, and shared driveways will soon become part of the toolbox that designers use to help protect local streams. The Maryland Department of the Environment has recently begun a process to write regulations and develop guidance to make these softer, nonstructural techniques more common. The process will include participation from all facets of Maryland's stormwater management community. When complete, an improved way of controlling urban pollution should result.

Applications of Ground-Water Flow Models

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Maryland Room, Moderated by Chris Carski

Ground-water flow models are often used to estimate the effects of new ground-water withdrawals, and to evaluate the importance of hydrogeologic controls. Although time-consuming to develop, flow models provide the best tool to assess the response of water levels and flow rates to various hydraulic stresses on an aquifer system. A fundamental understanding of flow modeling is necessary to ensure that a model is constructed properly, assumptions inherent to the model are met, and that results are reasonable. This talk presents some fundamentals of how flow models are developed, and describes some applications. Some basics are provided such as finite-difference equations, layering schemes, boundary conditions, time discretization, and simulation of pumpage.

Protection of the Linganore Creek Watershed in Frederick County, Maryland

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Regency Room, Moderated by Cindy Latham

In 2002, the Board of County Commissioners of Frederick County supported the creation of a watershed management plan designed to address the water quality impairment of Lake Linganore, a recreational lake and drinking water reservoir impaired by sediments and nutrients. The Linganore Action Plan, approved by the County in early 2006, proposes specific amendments to various codes and ordinances, changes to operational policy, and modifications to existing programs. The Linganore Action Plan is divided into five main areas of focus: Agriculture, Land Development, Infrastructure and Maintenance, Homeowner Practices, and Education/Outreach. Several Action Plan items have been implemented since 2006. Development of the Linganore Action Plan, its components and the stream buffer law will be discussed.

Nutrient Loading From Onsite Sewage Disposal Systems

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Embassy Room, Moderated by John Boris

This presentation will discuss nutrient loading from onsite sewage disposal systems (OSDS) to surface and ground waters. The role of OSDS in water quality standards, nutrient load caps, offsets and nutrient trading will be discussed.

1:45—2:15

Design, Construction, and Benefits of Integrated Sand Seepage Stream and Wetland Construction Projects.

Keith Underwood, Erik Michelsen, and Joe Berg
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Wayne Room, Moderated by Stew Comstock

The creation of integrated sand seepage stream and wetland systems using a combination of pools, sand berms and cobble weirs results in a system of physical features, chemical processes, and biological mechanisms that can have dramatic effects on the hydrology of the project site. The physical modifications necessary to establish the sand seepage hydrology most suitable for the establishment of seepage wetlands result in the creation of a series of well vegetated stilling pools, sand seepage beds replete with above and below-ground biomass, and associated flow paths through low areas dominated by native wetland plants.

The system's porosity, as well as its ability to retain water, allow it to naturalize quickly, providing habitat for native organisms. Once established, these systems are expected to provide beneficial bio-feedback and be self-maintaining. This system has been adopted by Anne Arundel County, MD as their preferred method of stream and wetland restoration and stormwater management.

Basic Water Treatment for Transient Noncommunity Systems

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Maryland Room, Moderated by Chris Carski

This session is an interactive presentation of water treatment used by transient non-community systems to rectify source related problems and naturally occurring water quality issues throughout the State. Basic treatment technology will be presented, as well as recommendations for County oversight of plant operations. The discussion will be geared towards the audience's experience in an effort to aid the sanitarians' knowledge of working water systems.

Protection of Ground and Surface Waters in Agricultural Areas

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Regency Room, Moderated by Cindy Latham

Maryland farms raise millions of animals each year for human consumption, as well as animal products like milk and eggs. These farms keep land uses at least nominally agricultural, with minimal impervious surfaces, although some produce as much waste as densely populated areas.

In an ideal world, how are these wastes handled? What are the practical limitations to perfect planning? What else can be done?

Cooking Grease: Its Effect on our Water Infrastructure

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Embassy Room, Moderated by John Boris

How fats, oil, & grease (FOG) contribute to sewer/septic backups/overflows. A review of grease interceptors, Best Management Practices, and grease recycling options.

2:35—3:05

Artificial Recharge in Fractured Bedrock Aquifers

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Wayne Room, Moderated by Marcia Smith

Recent studies of fractured bedrock aquifers indicate that ancient thrust faults may serve as natural conduits for recharging deep fractured aquifers from the shallow soil and bedrock materials. Subcrop and outcrop areas of the updip portion of ancient thrust faults can act as infiltration zones that provide recharge to the deeper aquifers. Delineation and analysis of these natural infiltration zones may provide information for designing and locating artificial recharge systems for these types of aquifers. Projects involving artificial recharge will require investigation of aquifer contamination issues and a reevaluation of wellhead protection regulations.

Overview and Historical Perspective of Operator Certification

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Maryland Room, Moderated by Mark Jacob

This presentation will show the how and why of operator certification, as it relates in general to various water and wastewater treatment facilities, in the State of Maryland. The primary objective of the presentation is to give the audience a greater understanding of the problems solved by having a strong "Operator Certification Program". The audience will have a greater appreciation of the benefits of having an "Operator Certification Program".

Norovirus Outbreak at a Camp in August 2006—Investigation and Epidemiology

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Regency Room, Moderated by Sean Kenny

In August 2006 the Harford County Health Department responded to a Norovirus outbreak impacting about 150 people out of 900 staying at a camp in Harford County. The outbreak investigation discovered a number of contributing factors at the camp property. This presentation will briefly discuss the Norovirus

outbreak, and discoveries made regarding the water distribution and septic disposal systems during the investigation as well as the corrective measures taken since the outbreak.

This session (2:20—2:35) will cover the epidemiology and Harford County role in the investigation. A second session (3:10—3:40) will cover MDE's role and the dye study performed at the camp.

Decentralized Wastewater Treatment and the Path to Affordable Infrastructure Reform

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Embassy Room, Moderated by Eric Dougherty

Decentralized wastewater treatment emerged from the framework of onsite wastewater treatment and it retains many of the characteristics of its twin influences, agricultural engineering and Environmental Health. As such it only hints at the full potential of decentralization.

Decentralization is about re-localization. It is about a holistic approach to water, where wastewater and storm water management will become a subset of the larger demand for integrated water resource and watershed management. Wastewater is no longer a pollutant. It is a resource.

It is the capacity to realize a vast array of unresolved social and environmental aspirations that make decentralization more than simply alternative technologies and more than an alternative architecture. Rather decentralization has broad catalytic potential to reveal the capital forming and revenue generating potential of decentralized wastewater treatment.

3:10—3:40

Steady-State Ground-Water/Stream Flow Model for the Monocacy River Basin

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Wayne Room, Moderated by Marcia Smith

Discusses the first phase of development of a regional ground-water and stream flow model for the Monocacy River basin. The model simulates steady-state conditions in the basin, including ground-water levels in the fractured bedrock aquifers, discharge of ground-water to basin streams, and the rate of flow in streams. It was calibrated with available data from 1980, a time period chosen to represent pre-development conditions. The calibrated model simulates mean annual ground-water levels and stream base flows for 1980 with reasonable accuracy. The model's sensitivity to changes in inputs has been investigated, with a focus on stream flow predictions. The steady-state model may be used in future projects to simulate average summertime conditions and to investigate the impact of future demand on summertime water availability. It also may serve as the basis for construction of a transient model, which would be capable of simulating seasonal fluctuations in ground-water levels and stream flows, providing a more realistic predictive tool for evaluating summertime water availability.

Toward Zero Discharge in Water Treatment

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Maryland Room, Moderated by Mark Jacobs

This session will present, discuss and analyze the latest developments in water treatment technology which reduce the quantity and adverse quality of discharge water. The three primary advances in 2007 are hollow-fiber ultrafiltration, nano-medias and plate distributors. Taken together, and applied properly, these technologies may dramatically reduce the waste discharge in both residential and commercial water treatment. This presentation is intended to update the participants in what is currently available from the commercial water treatment industry.

Norovirus Outbreak at a Camp in August 2006—Dye Trace Studies

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Regency Room, Moderated by Sean Kenny

This is the second part of the discussion of the viral outbreak at a camp in Harford County. This presentation will focus on dye trace studies and MDE's role in the investigation.

Exploring the Concepts of Social Marketing for the Use of Best Available Technologies (BAT) in Onsite Sewage Disposal Systems (OSDS).

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Embassy Room, Moderated by Eric Dougherty

With an intensive effort focusing on the populous of the Corsica River watershed in Queen Anne's County, the Maryland Department of the Environment (MDE) is attempting to test the theory of social marketing in efforts related to the implementation of the BRF for OSDS upgrades. By presenting water quality survey data generated from the Science Services Administration (MDE), septic tank effluent data gathered from the Water Management Administration (MDE), and population characteristics that were obtained from U.S. Census Bureau data and other local resources an exploratory attempt to develop a social marketing campaign for the Corsica River watershed to promote the use of BAT for nitrogen reduction can begin to be developed.

3:45—4:15

An Aquifer Information System for Assessment and Allocation of Ground Water in the Atlantic Coastal Plain

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Wayne Room, Moderated by Marcia Smith

The Atlantic Coastal Plain aquifer system is the principal or sole source of water supply in southern Maryland and the Eastern Shore. Water-allocation decisions for these aquifers are made by the water management staff at the Maryland Department of the Environment (MDE) using published data and investigative reports that provide information on the geometry, extent, and hydraulic characteristics of the aquifer system, past and current water levels, and projected water-level declines caused by pumpage. The U.S. Geological Survey, Maryland Geological Survey, and MDE are collaboratively implementing a computerized aquifer information system (AIS) to serve as a central access point to these data. The AIS includes basic geographic data such as maps of the extent and thickness of each major aquifer, well locations, pumpage rates, aquifer test locations, and geophysical log locations. Using standard GIS functionality and custom tools, AIS users can produce cartographic products and visualize data in many ways. As the AIS continues to mature beyond its current beta-test phase, additional data will be loaded, existing tools will be refined, and additional custom tools will be created.

New Appropriation Permit Regulations

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Maryland Room, Moderated by Mark Jacobs

Discusses changes enacted by the Maryland General Assembly (2007 Session) pertaining directly to ground water regulation. Under Senate Bill 970, the Maryland General Assembly changed the existing environmental law by creating an exemption for users of groundwater provided the use meets specific criteria, which will be discussed. The new law also authorizes increased enforcement powers for the Department of the Environment to make sure that users comply with their authorized permit limits and do not cause adverse impacts to other users or the natural resource in sensitive areas around the State.

Impacts of Fly Ash on Groundwater in Anne Arundel County, Maryland

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Regency Room, Moderated by Sean Kenny

The Anne Arundel County Department of Health evaluated the impact to local residents and businesses using groundwater in an area adjacent to a mining operation where fly ash from the Brandon Shores and H. A. Wagner power plants was used as a fill material. Water quality testing of 83 homes and businesses was initiated under the direction of the Maryland Department of the Environment in October 2006. The results of the investigation demonstrate how fly ash constituents including aluminum, arsenic, beryllium, cadmium, lead, manganese, and sulfates can precipitate from a mine and reclamation site and contaminate off-site private wells.

Operation & Maintenance of OSDS

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Embassy Room, Moderated by Eric Dougherty

A new paradigm is forming with the expected influx of a variety of small and medium Onsite Treatment systems. This is being driven in large part by the Bay Restoration Fund (BRF). A large number of the new treatment systems will be for individual residences, but medium sized systems for communities will also be funded.

This presentation will give a brief overview of the challenges and opportunities of developing an effective OSDS Operation and Maintenance program in Maryland to insure that the goals of the BRF are met.

MDE

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