



## Protecting the Cape's Water Resources:

### Water Reuse and Groundwater Recharge as Keys for Sustainable Water Management

#### REGISTRATION

[www.waquoitbayreserve.org](http://www.waquoitbayreserve.org)

Click on Full Calendar  
to see event listing.  
There is no charge to attend,  
however pre-registration is  
required.

*Sponsors*  
**Waquoit Bay  
National Estuarine Research  
Reserve/Massachusetts Department of Conservation and  
Recreation**

**Hazen and Sawyer Environmen-  
tal Engineers & Scientists**

*Planning Team*  
**Tonna-Marie Rogers,  
Waquoit Bay National Estuarine  
Research Reserve**

**Richard Cisterna,  
Hazen and Sawyer Environmen-  
tal Engineers & Scientists**

**Alan Slater,  
Massachusetts Department of  
Environmental Protection**

**Tom Cambareri,  
Cape Cod Commission**

For additional information  
please contact Tonna-Marie  
Rogers at 508-457-0495 x110

**Tuesday, May 18, 2010**

8:30 am - 5:00 pm

Cape Cod & Islands Realtors Conference Center  
22 Mid-Tech Drive, Yarmouth

Demands on the Cape's precious water resources have increased as growth and development in the region have blossomed. As a result, protecting and sustaining water resources to meet the needs of present and future generations is a major priority for communities. This one-day conference will examine water reuse and groundwater recharge within the broader context of sustainable water management. Focus areas include new Massachusetts regulations on reclaimed water, treatment technologies, well injection, soil aquifer treatment, water quality, endocrine disruptors and pharmaceuticals, hydrologic balance, ecological issues, protection of surface water dependent ecosystems, parameters for effluent disposal, among others. National and local experts will present on how these various elements are being addressed in other areas of the country and highlight potential applications and lessons for Cape Cod.

#### OBJECTIVES

- Educate communities about the drivers, processes, technologies, opportunities and challenges associated with water reuse and groundwater recharge;
- Equip decision-makers with key information that should be considered in water resources planning and development of solutions for wastewater treatment;
- Present relevant science-based information and case-studies from around the country that can inform local planning efforts;
- Provide a forum for regional discussion on these topics.



# A G E N D A

8:30 – 9:00 Check-in and continental breakfast  
9:00 – 9:15 **Welcome & Opening Remarks**  
Tonna-Marie Rogers, Coastal Training  
Coordinator, Waquoit Bay Reserve

**Morning Session: National Perspectives**  
**Water Reuse and Groundwater Recharge: Emerging  
Solutions for Water Resource Challenges**

Richard Cisterna, Senior Associate, Hazen and Sawyer  
Environmental Engineers & Scientists

**Advanced Technologies for Reclaiming Wastewater to  
Extremely Low Nutrient Levels**

Kevin Alexander, Vice President, Senior Project  
Manager, Separation Processes Inc.

**Sustainable Removal Mechanisms during Soil Aquifer  
Treatment - Nature's Way**

Dr. Peter Fox, Professor, Arizona State University

**Endocrine Disruptors and Pharmaceuticals:  
Implications for Water Sustainability**

Shane Snyder, Professor, University of Arizona & R & D  
Project Manager, Southern Nevada Water Authority  
Applied R & D Center

12:30 – 1:30 Lunch

**Afternoon Session: Local Perspectives and  
Implications for Cape Cod**  
**Development of the Massachusetts Groundwater  
Permit and Reclaimed Water Regulations**

Alan Slater, Section Chief for Groundwater Permitting,  
MA Department of Environmental Protection

**Water Reuse on Cape Cod, Now and Parameters for  
Change**

Tom Cambareri, Hydrogeologist and Manager of Water  
Resources Programs, Cape Cod Commission

**Methods for Returning Treated Groundwater to the  
Aquifer, Massachusetts Military Reservation (MMR)**  
Jon Davis, P.E., Air Force Center for Engineering and the  
Environment Remediation Program Manager, MMR

**Panel Discussion - featuring national experts and local  
scientists, engineers and decision-makers.**

5:00 pm Adjourn

**Richard Cisterna, P.E.** is a Senior Associate at Hazen and Sawyer and has been with the firm for 17 years. Mr. Cisterna leads Hazen and Sawyer's northeast water reuse practice and its corporate water reuse group. He has led many recycled water projects along the east coast, from Florida to Connecticut. Mr. Cisterna's recent work in the northeast was for the University of Connecticut Water Reuse Program (Storrs, CT). He served as Technical Director for this advanced water reuse project, which focuses on reclaiming water as a sustainable approach to offsetting potable water demands. Mr. Cisterna serves on the WaterReuse Research Foundation and the NY Water Environment Association Sustainability and Reuse Committee.

was credited with the first discovery of natural and synthetic estrogens in North American waters. Dr. Snyder also linked the occurrence of steroids in wastewater to potential endocrine impacts in fish in the late 1990's. In 2000, Dr. Snyder became the R&D Project Manager at the Southern Nevada Water Authority's Applied R&D Center (ARDC). Today Dr. Snyder and his team have published nearly 100 peer-reviewed manuscripts and book chapters on emerging contaminant analysis, treatment, and toxicology. In April of 2008, Dr. Snyder was one of six experts to testify before the U.S. Senate regarding pharmaceuticals in US waters. In 2009, Dr. Snyder's research team published the first national survey of pharmaceuticals in US drinking water.

# S P E A K E R S

**Kevin Alexander, P.E.** is the Vice President/Senior Project Manager for Separation Processes, Inc. (SPI). Kevin brings direct and practical experience in planning, pilot testing, demonstration testing, design and implementation of membrane and advanced water treatment processes for water, wastewater and water reclamation facilities around the world. He also has extensive experience in the planning, design and construction of water reclamation facilities to meet very stringent nutrient removal requirements. He has served as project manager and process lead on many projects, and has provided operations monitoring and optimization experience to full scale facilities.

**Dr. Peter Fox** is a Professor at Arizona State Univ. where he has been faculty member in the School of Sustainable Engineering and the Built Environment for 20 years.

Dr. Fox served on the National Academy of Science ad-hoc committee that published the National Research Council report entitled "Prospects for Managed Underground Storage of Recoverable Water" in 2008. Dr. Fox also authored the groundwater recharge chapter in the Metcalf and Eddy textbook on water reuse. In addition, Dr. Fox was an executive committee member for the development of the national roadmap for desalination and water purification.

**Dr. Shane Snyder** is a Professor in the College of Engineering at the University of Arizona. He is also the Co-Director of the Arizona Laboratory for Emerging Contaminants (ALEC). For over 15 years, Dr. Snyder's research has focused on the identification, fate, and health relevance of emerging water pollutants. In 1998, he

**Alan Slater** is currently the Section Chief for Groundwater Permitting in the MA Dept. of Environmental Protection, and has 30 years of experience in wastewater treatment. He is also responsible for the Department's reclaimed water program, and has developed new state regulations both for reclaimed water and the groundwater permitting program.

Mr. Slater previously worked as a Program Manager with the Department's Division of Municipal Services in the financing and technical review of municipal wastewater treatment and collection projects.

**Tom Cambareri** manages the Water Resources Program at the Cape Cod Commission. Tom has 30 years of experience in Cape Cod water issues. He provides professional expertise on emerging and important water resource issues to regional and town officials; coordinates federal and state water resource efforts by representing the region's interest in the formulation of environmental regulations and laws; assists the region in complying with federal and state environmental mandates in a cost effective manner; supports the Commission's regulatory and planning functions; and scopes and conducts hydrogeologic water resource, contaminant assessments and groundwater modeling projects.

**Jon Davis, P.E.** serves as the Remediation Program Manager (RPM) for one of the Department of Defense's (DoD) largest and most visible Superfund cleanup programs: The Massachusetts Military Reservation. His employer, the Air Force Center for Engineering and the Environment, serves as the lead agent for the DoD. As the RPM, Mr. Davis is responsible for the successful execution of the cleanup program while addressing the full spectrum of remedial activities including investigations, feasibility studies, remedy selections, remedial action construction, operations and maintenance, and long term monitoring. Annual budgets for the program have ranged from \$20M to \$70M with government and contract staff requirements ranging between 50 and 180 personnel positions.

**Water Reuse and Groundwater Recharge: Emerging Solutions for Water Resource Challenges**

*Richard Cisterna, Senior Associate, Hazen and Sawyer Environmental Engineers & Scientists*

This presentation will discuss the drivers for water reuse and groundwater recharge around the country and show how they are relevant to Cape Cod's challenges. It will also cover water reuse options for sustainable water resource solutions (to both water supply and wastewater effluent disposal challenges such as nitrogen on the Cape). The presentation will also focus on groundwater recharge and help set the stage for other talks to follow.

**Advanced Technologies for Reclaiming Wastewater to Extremely Low Nutrient Levels**

*Kevin Alexander, Vice President, Senior Project Manager, Separation Processes Inc.*

In many areas of the country there are adequate water sources available yet agencies are turning to advanced wastewater treatment technologies and process configurations to address very low nutrient levels required in the final discharge water quality. Discharge water quality requirements are becoming more stringent to ensure minimal impact on downstream users and environmental receptors and to minimize potential impacts to future potable water uses.

This presentation will focus on the technologies and treatment processes that are being used in urban and rural communities to treat wastewater to very low nutrient levels. The technologies will include both conventional processes converted to allow low nutrient levels as well as membrane bioreactors and ultimately microfiltration and reverse osmosis with advanced oxidation processes. Case studies from Washington State, Florida and California will be discussed.

**Sustainable Removal Mechanisms during Soil Aquifer Treatment - Nature's Way**

*Dr. Peter Fox, Professor, Arizona State University*

This presentation will provide an overview of sustainable removal mechanisms during soil aquifer treatment (SAT). The focus of the presentation will be on the transformation of dissolved organic carbon and how biodegradable organic carbon (BDOC) may affect the removal of trace contaminants. The effects of aquifer type, operating conditions, travel time and potential impacts on redox conditions will be discussed. Sustainable nitrogen removal processes such as anaerobic ammonia oxidation will also be presented.

**Methods for Returning Treated Groundwater to the Aquifer, Massachusetts Military Reservation (MMR)**

*Jon Davis, P.E., Air Force Center for Engineering and the Environment Remediation Program Manager, MMR*

With the coming conversion of thousands of Cape Cod's septic tanks and leach fields to other wastewater treatment methods, communities will be faced with the question of how best to return the treated wastewater to the environment.

This case study presents the methods used to return treated groundwater to the aquifer system as part of the Air Force Center for Engineering and the Environment's (AFCEE) groundwater cleanup program at the (MMR). The MMR is currently extracting, treating and discharging over 14 million gallons of groundwater each day in order to remove contaminants.

The presentation will outline the breadth of the cleanup program with a focus on the reinjection wells, infiltration galleries, and surface water discharge structures used to return treated groundwater to the aquifer system. It will also discuss operation and maintenance issues, lessons learned, and how the program has had to adjust its operation schemes over the past 13 years.

**Endocrine Disruptors and Pharmaceuticals: Implications for Water Sustainability**

*Shane Snyder, Professor, University of Arizona & R & D Project Manager, Southern Nevada Water Authority Applied R & D Center*

The availability of safe freshwater is diminishing at an alarming rate globally. Increasing human population is stressing water supplies and contributing to water pollution. The public perception of water is shifting, with growing public awareness of certain groups of contaminants due to media coverage and non-government organization (NGO) concerns. Modern analytical technology has permitted the discovery that minute concentrations of contaminants of distinctly human origin occur in the water cycle. Many of these so-called "contaminants of emerging concern" have been, and will continue to be, detected in potable water supplies. Without question, the propensity for the contamination of fresh water will rise as human population continues to grow. This presentation will describe the history, current status, and future implications that the detection of endocrine disruptors and pharmaceuticals will have on water and energy sustainability.



**Water Reuse on Cape Cod, Now and Parameters for Change**

*Tom Cambareri, Hydrogeologist and Manager of Water Resources Program, Cape Cod Commission*

It may be surprising to many that Cape Codders presently reuse 100% of their wastewater. The use of water on Cape Cod has already had an impact on the aquifer. Plans to collect, treat and recharge significant volumes of wastewater to restore coastal water quality will add another dimension to the overall hydrologic balance equation. Solving the new equation is not impossible but will require an understanding of the Cape's hydrogeology, our present use of water and its quality, and the water budget of the aquifer. Maintaining a sustainable and safe public water supply and protecting ecological integrity of our fresh surface waters will require the proper tools for evaluating potential proposed effluent recharge sites within the entire aquifer system. These tools together with policies that govern, allow the integration of scientific information, adaptive management, and phased infrastructure implementation, will be necessary to arrive at acceptable and affordable solutions.

**Development of the Massachusetts Groundwater Permit and Reclaimed Water Regulations**

*Alan Slater, Section Chief for Groundwater*

*Permitting, MA Dept. of Environmental Protection*  
Massachusetts has recently revised its groundwater permitting regulations as well as developed a new set of regulations governing the use of reclaimed water. The groundwater permit regulations established new standards for the protection of water supply areas, while the reclaimed water regulations established new uses and standards for the uses, sale and distribution of reclaimed water. In addition to discussing the new requirements for both programs, this session will also outline the process for first proposing and ultimately promulgating the regulations.