



THE COMMONWEALTH OF MASSACHUSETTS
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL
PROTECTION

**Forum on Pharmaceuticals, Personal Care Products and Endocrine-Disrupting
Compounds (PPCPs/EDCs) in Wastewater**

PPCPs and EDCs in Wastewater: Issues and Solutions

Tuesday
SEPTEMBER 22, 2009
9 AM to 3 PM

FEDERAL RESERVE BANK OF BOSTON
600 ATLANTIC AVENUE
BOSTON, MA 02110

Welcome

The Massachusetts Department of Environmental Protection (MassDEP) welcomes you to the Pharmaceuticals and Personal Care Products (PPCP) and Endocrine-Disrupting Chemicals (EDC) in wastewater forum. This forum builds on the success of the initial PPCP Summit held in June 2008 in Boston.

FORUM OVERVIEW

Purpose: This forum provides a forum for a continuing dialogue with stakeholders from industry, government, environmental groups, research, academia, and others on the issue of PPCPs and EDCs in wastewater, including treatment plant effluent used for recharge, and soil adsorption systems in unsewered areas. The focus is on evaluating the occurrence, fate, transport, and treatment effectiveness in surface and subsurface waters, and the best approaches to protecting human health and the environment given the presence of these compounds in wastewater.

Hear presentations from:

- Dr. Nicholas Anastas, MassDEP, Bureau of Resource Protection, Drinking Water Program
- Dr. James Crook, Consultant, National expert on water reclamation and reuse projects
- Dr. Bruce Brownawell, State University of New York, National expert on fate and transport of PPCPs in the environment
- Mr. George Heufelder, M.S. R.S., Director, Massachusetts Alternative Septic System Test Center
- Mr. Marcel Belaval, U.S. Environmental Protection Agency, Region 1.

Learn about:

- The central issues associated with PPCPs/EDCs in wastewater
- The effectiveness of wastewater treatment technologies and septic systems at removing PPCPs and EDCs
- The issue of PPCPs and EDCs as it relates to groundwater recharge and re-use projects

Join in open discussions about:

- Re-using wastewater while still protecting human health and the environment

- Gaps that need to be filled, in the context of future research needs
 - Identifying the most feasible and effective risk reduction strategies
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REGISTRATION

Online registration is available from August 17 through September 21, 2009 at 5 PM. You can also register on site on September 22, 2009; however, we encourage you to register early as space is limited.

Registration Fee: \$50.00

Registration information: www.ppcp2009.eventbrite.com

PROGRAM

(times are provisional)

8:00 am Registration and Complementary Continental Breakfast

9:00 am **Welcome** - Laurie Burt Commissioner, MassDEP

9:20 am **Dr. Nicholas Anastas, MassDEP, Bureau of Resource Protection, Drinking Water Program;**
A Day in the Life of a Medicine: Identifying Opportunities for Risk Reduction

Abstract: Medicines have contributed to increased longevity and improved quality of life. Whether these medicines have their origins in Nature (*e.g.*, aspirin, morphine, Taxol), or if they are the laboratory-based products crafted by the skilled hands of a medicinal chemist, these pharmaceuticals and personal care products (PPCPs) occupy a central role in modern society. Recently, PPCPs have been detected in surface waters (lakes, ponds and streams), groundwater and drinking water, as well as sediments, sewage sludge and aquatic organisms. The reported concentrations of these compounds are generally low, often in the part per billion range and lower. However, research results show that compounds that act on the endocrine system, the so-called endocrine-disrupting chemicals (EDCs), can adversely affect aquatic organisms and other wildlife. The potential adverse outcomes in humans exposed to low levels of a mixture of PPCPs and EDCs over a long period of time are currently unknown, making it an area of active research and discussion. Prudent public health policy demands risk reduction at each stage in the lifecycle of a medicine. The “lifecycle of a medicine” is a term used to include all PPCPs and can be represented by four phases: 1. Discovery and development; 2. Manufacture and distribution; 3. Prescribing and compliance, and 4. Disposal and treatment. This presentation will provide an overview of each phase of the lifecycle, identifying issues and potential opportunities for risk reduction during each phase.

10:00 am **Dr. James Crook, Consultant, National expert on water reclamation and reuse projects;**
The Role of treatment in reducing the environmental load of PPCPs/EDCs

Abstract: Studies have indicated that PPCPs, some of which are EDCs, have adverse effects on aquatic animals in water bodies that receive discharges from wastewater treatment plants. While planned indirect potable reuse using reclaimed water has been practiced in the U.S. since 1962, the number of potable reuse projects has increased substantially in recent years and questions have arisen regarding potential human health effects of PPCPs and EDCs in reclaimed water used for potable supply. Due to the concerns associated with PPCPs and EDCs, extensive monitoring of reclaimed water destined for potable reuse has been conducted at several potable reuse projects in the U.S. and elsewhere. Potable reuse projects are required to meet stringent reclaimed water treatment process requirements and water quality limits for

specific unregulated chemicals and/or surrogate constituents. Treatment process requirements range from tertiary treatment followed by soil aquifer treatment for groundwater recharge via surface spreading, to advanced wastewater treatment processes (including organic removal processes such as reverse osmosis and advanced oxidation) for groundwater recharge via direct injection or surface water augmentation of raw water supplies. This presentation will include information on reclaimed water treatment processes used at existing potable reuse project, data on organics removal from several research studies, and monitoring data from existing potable reuse facilities on the reduction/removal of PPCPs and EDCs

11:00-11:15 **Break**

11:15 am **Dr. Bruce Brownawell, State University of New York**, National expert on fate and transport of PPCPs in the environment; PPCPs and EDCs in Sediments, Sewage Sludge and Biosolids.

Abstract: Many organic contaminants, or their metabolites, present in municipal waste water are particle reactive and can both accumulate in sewage sludge or be found at relatively high levels in sediments in sewage affected bodies of water. This presentation will review the levels of occurrence and fate of PPCPs of concern in municipal sewage sludges, biosolids, and sediments. Two specific cases will be discussed: 1) the sources, occurrence, transformations, and fate of potential endocrine-disrupting contaminants in sewage affected sediment environments, specifically nonylphenol ethoxylate metabolites, natural steroid estrogens, and 2) the discovery of surprisingly high levels of quaternary ammonium compounds in sediments, (e.g., sewage sludges, biosolids). These compounds are very particle reactive cationic surfactants that are widely used as fabric softeners, hair care products, disinfectants, and in a variety of other personal care products. The environmental levels and persistence of these surfactants and their metabolites would not have been predicted based on risk screening methods typically employed or some of the data that is available concerning fate or volume production of these chemicals. The lessons that might be learned from these examples will be discussed.

12:15 pm **Lunch (included)**

1:00 pm **Mr. George Heufelder, M.S. R.S., Director, Massachusetts Alternative Septic System Test Center;** The Fate of Selected Pharmaceuticals and Other Organic Compounds in Wastewater Discharged Through Onsite Septic Systems

Abstract. Domestic wastewater potentially contains a number of organic compounds including pharmaceuticals, endogenous hormones, personal care products and cleaning products. When domestic wastewater is discharged through onsite septic systems, its incomplete treatment presents the potential for intersecting drinking water wells and other sensitive environmental receptors. This presentation will review work performed at Massachusetts Alternative Septic System Test Center in cooperation with the U.S. Geological Survey relating to removal capabilities of standard and advanced onsite treatment systems, and compare these findings with results from other studies that investigated onsite septic systems. The presentation will also review the state of our present understanding regarding the removal of organic wastewater compounds by standard onsite septic system treatment processes and identify future research needs.

2:00 pm **Marcel Belaval, Hydrologist, United States Environmental Protection Agency, Region 1**
Overview of federal research regarding PPCPs/EDCs in wastewater

Abstract: This talk will provide an overview of PPCP studies being conducted nationally by EPA. The US Environmental Protection Agency (EPA) has several ongoing research studies looking at occurrence, fate & transport, exposure, and effects of PPCPs. EPA studies underway include a national rivers and streams assessment looking at fish tissue contaminants, an EPA / USGS collaborative study on PPCPs in drinking water, an evaluation of drinking water treatment technologies for removal of endocrine-disrupting chemicals, and others. The talk will include a summary of recent findings as well as a list of areas requiring further investigation and research.

2:35 pm **Closing Comments**
David C. Noonan, MassDEP, Commissioner's Office and Dr. Nicholas Anastas, MassDEP

3:00 pm **Adjourn**

BIOGRAPHIES

Nicholas D. Anastas, Ph.D., M.S.

Nicholas Anastas holds a doctorate in Environmental, Earth and Ocean Sciences from the University of Massachusetts Boston and received a master's degree in pharmacology from Northeastern University. Dr. Anastas has worked in a variety of programs for the MassDEP since 1988. As a member of the drinking water program, he currently serves as the technical specialist on emerging contaminants, specifically pharmaceuticals/ personal care products and endocrine-disrupting compounds, he is the quality assurance scientist for the program and coordinates the implementation of several Safe Drinking Water Act (SDWA) rules. Previously he was the Source Protection Group Leader responsible for developing policies for protecting surface and groundwater sources of drinking water from contamination. For thirteen years, he was a regulatory toxicologist and risk assessor for the MassDEP's Office of Research and Standards where he developed health-based approaches for characterizing human health risks, provided analytical chemistry support to the department and served as the chief Quality Assurance scientist for the MassDEP. Doctor Anastas has served as a board member of the North Atlantic Chapter of the Society of Toxicology and Environmental Chemistry (NAC SETAC) from 2001-2003; Vice President of the Groundwater Managers- Northeast Section 2003-2004 and Co-chairman of the Federal-State Toxicology and Risk Assessment Committee (FSTRAC) from 1997-2000. Nick has spoken at several national conferences on Pharmaceuticals and Personal Care Products (PPCP) and has written several articles on the impacts of green chemistry to pollution prevention.

James Crook, Ph.D., P.E.

James Crook, Ph.D., P.E., is an independent environmental engineering consultant with more than 37 years experience in state government and consulting engineering arenas serving public and private sectors in the United States and abroad. He is an internationally-recognized expert in the area of water reclamation and reuse and has been involved in numerous projects and research activities involving public health, regulatory and permitting issues, risk assessment, and treatment technology. Dr. Crook currently serves on the National Water Research Institute Research Advisory Board, WateReuse Foundation Research Advisory Committee, and the American Water Works Association, International Water Association and Water Environment Federation Water Reuse Committees. He received his B.S. degree in civil engineering from the University of Massachusetts and his M.S. and Ph.D. degrees in environmental engineering from the University of Cincinnati. Dr. Crook is certified as a Diplomate in the American Academy of Environmental Engineers and is a Registered Professional Engineer in California and Florida

Bruce Brownawell, Ph.D.

Bruce J. Brownawell is an Associate Professor at the School of Marine Sciences at Stony Brook University State University of New York. His research is focused on the trace level detection, transport, fate, and biological effects of anthropogenic organic chemicals in natural waters. Trace level analyses provide us with new opportunities for addressing environmental quality research topics; e.g., whether female steroid hormones or hormone mimics exist in sufficient quantities to cause observed feminization of male or sexually immature fish; potential uses of stable pharmaceuticals and surfactants as tracers of waste waters and sewage contaminated sediment; and better characterization of the toxicity to marine organisms of complex mixtures of anthropogenically-derived chemicals in the environment.

George Heufelder, M.S., R.S.

George Heufelder is the Director of the Barnstable County Department of Health and the Environment which serves Boards of Health in the 15 towns on Cape Cod, Massachusetts. In 1999, with others, Mr. Heufelder established the Massachusetts Alternative Septic System Test Center with grant support from EPA and Massachusetts Department of Environmental Protection. This Center, which he currently directs, is becoming established as one of the foremost third-party testing facilities and is serving as a resource for Boards of Health and other agencies regarding septic system performance. Mr. Heufelder is a Registered Sanitarian and has a B.S. and M.S. in Biology.

Marcel Belaval

Marcel Belaval is a Hydrologist with the Drinking Water Program at EPA Region 1 where he provides technical guidance and assistance on groundwater investigations. Marcel is also working on the implementation of new drinking water regulations including Stage 2, the Radionuclides Rule, and the Ground Water Rule. He holds an M.S. in Geophysics from Boston College and a B.S. in Geology from the University of Connecticut.