

**SOCIETY OF  
ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY  
HUDSON-DELAWARE CHAPTER**



**25<sup>th</sup> ANNUAL MEETING**

**at**

**Overlook Lodge  
Bear Mountain, New York**

**April 23-24, 2009**

<b>Thursday April 23, 2009</b>	
<b>Time</b>	<b>Presentations/Activities</b>
<b>8:00-9:00 a.m.</b>	<i>Registration /Breakfast/Poster Set-up/Networking</i>
<b>Environmental Issues on Military Bases - Session I</b>	
<b>9:00-9:30 a.m.</b>	Remediation at Small Arms Ranges Dave Mackie, AMEC
<b>9:30-10:00 a.m.</b>	Assessing Ecological Risks from Military Munitions in the Marine Environment Diane Wehner, NOAA
<b>10:00-10:30a.m.</b>	Earthworm Toxicogenomics – A Quest for Novel Biomarkers Dr. Ping Gong, USACE
<b>10:30-10:45a.m.</b>	<i>Break</i>
<b>Hudson River Past, Present, and Future – Session II</b>	
<b>10:45-11:15a.m.</b>	Update on the Phase I Remedy of the Hudson River PCBs Site and Associated Monitoring Ben Conetta and Marc Greenberg, USEPA
<b>11:15-11:45a.m.</b>	Upper Hudson River PCBs Site Habitat Assessment and Monitoring Adam Ayers, G.E
<b>11:45-12:15p.m.</b>	Development of Success Criteria for Evaluating Submerged Aquatic Vegetation in the Habitat Restoration Program for the Hudson River PCBs Site David Glaser, Anchor QEA
<b>12:15-1:15 p.m.</b>	<i>Lunch(HDC-Business Meeting and SETAC-NA update)</i>
<b>1:15-1:35 p.m.</b>	Beneficial Use of Dredged Materials and Coal Ash in Mine Reclamation, Ramifications for the Hudson River Andrew S. Voros, Columbia University
<b>1:35-1:55 p.m.</b>	Low Cost, Low Impact Remediation of Recalcitrant Chlorinated Hydrocarbons in Groundwater Laurie Gneiding, AMEC
<b>1:55-2:15 p.m.</b>	Effect of AquaBlok, a Sediment Capping Technology, on Environmental Quality and Benthic Macroinvertebrates Carolyn Bentivegna, Seton Hall University
<b>2:15-2:35 p.m.</b>	<i>Break</i>
<b>2:35-3:55 p.m.</b>	A TEQ Analysis of PCBs and Dioxin/Furans (DxF's) in Fish Tissue from the Delaware River Greg Cavallo, Delaware River Basin Commission
<b>3:55-3:15 p.m.</b>	In-River Habitats of the Hudson River PCB Superfund Site: USEPA Oversight of Characterization and Post-Dredging Reconstruction Mike Traynor, Malcolm Pirnie, Inc.
<b>3:15-3:35 p.m.</b>	Screening Level Ecological Risk Assessment Of Contamination In Wetlands Considered For Restoration In Hackensack Meadowlands District Nancy Palmstrom - AECOM Environment
<b>3:45-5:00 p.m.</b>	<i>Poster Social</i>
<b>5:00-6:00 p.m.</b>	<i>Volleyball Classic</i>
<b>6:00-8:00 p.m.</b>	<i>Social and Dinner</i>
<b>8:00 p.m.</b>	Speaker: Eric Eckl of Water Words that Work The World Outside: What They Say About Why Your Work Matters

## Hudson Delaware Chapter SETAC 2009 Annual Meeting Program

### RETURN OF THE VOLLEYBALL CLASSIC

Once you have absorbed all that you can, unwind at the end of the day on Thursday with friends and colleagues in a game of volleyball. The HDC Board of Directors has never been beaten in a game of volleyball, so if you want to organize a team to oppose us, the HDC Board will take on all comers.

<b>Friday April 24, 2009</b>	
<b>Time</b>	<b>Presentations/Short Course/Activities</b>
<b>8:00-9:00 a.m.</b>	<i>Registration/Breakfast/Poster Set-up/Networking</i>
	<b>Short Courses</b>
<b>9:00-10:30 a.m.</b>	Investigation of Cultural and Environmental History in Conjunction with CERCLA Based Cleanups John Vetter, USEPA
<b>9:00-10:30 a.m.</b>	A 4-Step Method to Turn a Scientific Talk Into Something the Public Understands Eric Eckl, Water Words That Work
<b>10:30-10:45 a.m.</b>	<b>Break</b>
<b>10:45-12:15 p.m.</b>	Mixing Zone Basics and their Implementation in the Delaware River Tom Fikslin, Delaware River Basin Commission
<b>10:45- 12:15 p.m.</b>	Combat Communication: Strategies for Addressing a Hostile Group or a Group with a Different Point of View Eric Eckl Water Words That Work
<b>10:45-12:15 p.m.</b>	Fundamentals of PCB/Dioxin Congeners Scott Kirchner, CDM
<b>12:15-1:15 p.m</b>	<b>Lunch</b> Video of Abora Expedition Courtesy of Aqua Survey, Inc.
<b>1:15-2:15 p.m.</b>	<b>Poster Session</b>
	<b>Short Courses/Field Trip</b>
<b>2:15- 4:30 p.m.</b>	Introduction to Geophysical Surveys (field course) Don Nazario, Aqua Survey, Inc.
<b>4:30 p.m.</b>	<i>Student Awards/ Meeting Adjourn</i>

## Abstracts

### Upper Hudson River PCBs Site Habitat Assessment and Monitoring Ayers, A.

GE Corporate Environmental Programs Albany, NY

#### *Platform Presentation*

In 2002, the USEPA issued a Superfund Record of Decision that called for among other things the removal of a substantial quantity of PCB-containing sediment from the Upper Hudson River in upstate New York. The Record of Decision also called for a habitat replacement program to replace SAV communities, wetlands, and river bank habitat directly impacted by sediment removal activities. A habitat replacement and reconstruction program has been developed for the Upper Hudson River that will be implemented following the completion of the first phase of dredging and backfilling activities, which is scheduled for 2009. Once the Phase 1 habitat replacement/reconstruction has been completed, an Adaptive Management Program will be implemented with the objective of creating the desired range of habitat characteristics by applying site-specific habitat information in an iterative framework of measurement and response. As part of the habitat replacement program, habitat assessment work was initiated in 2003. The goal of this work was to collect information on habitat specific physical and biological variables that are related to the ecological functions provided by those habitats in reference areas and areas potentially affected by sediment removal activities. This information was used to develop the basis of design for the habitat replacement and reconstruction in areas targeted for sediment removal and to help determine when post-remediation habitat conditions are considered successful. This presentation will discuss specific examples of the habitat assessment data collected to develop the basis of design for habitat replacement and for monitoring as well as data used in the development of success criteria.

## Effect of AquaBlok, a Sediment Capping Technology, on Environmental Quality and Benthic Macroinvertebrates

Bentivegna, C.S., A. Brown & A. Gerardi

Department of Biological Sciences, Seton Hall University, South Orange, NJ,

### *Platform Presentation*

Capping is one strategy for reducing biota exposure to sediment contaminants. This investigation studied the ability of a novel capping substrate, AquaBlok (AB), to improve the environmental health of Kearny Marsh, an oligohaline wetland located in the New Jersey Meadowlands, USA. AB was placed over sediments in 60 by 60 foot plots. Treatments included AB with or without 2% peat moss incorporated and control (uncapped) sediment. Environmental health was assessed by benthic macroinvertebrate (BMI) abundance and diversity. BMI were collected using Hester-Dendy at the following times: pre-capping- July 2005, and post-capping- September 2005, May 2006, August 2006, November 2006, May 2007, July 2007 and November 2007. The effect of AB was determined on sediment and water contaminants (heavy metals, PCBs and OCPs) and water quality parameters (pH, temperature, DO, redox, salinity, conductivity, and depth). Contaminants were measured once a year. Results for organics showed that PCBs and OCPs were about 9x lower in AB than sediment and did not increase in AB over time. PCBs and OCPS in water overlaying AB and sediments were similar. Heavy metals (Cd, Cr, Cu, Hg, Ni, Pb and Zn) were about 5-18x lower in AB than sediment and did not increase in AB over time. Heavy metals in water overlaying AB and sediment were similar; however, concentrations spiked right after capping then declined over time. Biodiversity was low with no improvement for any treatment: Shannon-Weiner Index equaled 0 - 0.733. Compared to control, AB did increase BMI total abundance 3-7x in summer. This increase was associated with higher levels of DO and redox at AB plots. In summary, AB contained lower contaminant levels than uncapped sediment for the duration of the study. Biodiversity and abundance did not improve in the marsh over 2.5 years; however, abundance of dominant fauna was higher on AB than control plots during summer months when low DO became a stressor.

## A TEQ Analysis of PCBs and Dioxin/Furans (DxF's) in Fish Tissue from the Delaware River

Cavallo, G. & T. Fikslin

Delaware River Basin Commission-West Trenton NJ

### *Platform Presentation*

Fish samples were collected from five stations in the tidal portion of the Delaware River and three stations in the non-tidal portion from 2004-2006. Representative benthic and pelagic species were collected at each station: white sucker and smallmouth bass, respectively, in the non-tidal portion. And channel catfish and white perch respectively, in the tidal portion of the river. Composite samples of five fish fillets from fish of similar size and weight were analyzed for PCB using EPA method 1668, Revision A for all 209 congeners. Dioxin/Furans were analyzed by EPA method 1613B for 17 individual compounds and for total tetra, penta, hexa, hepta and octa homologs. Median concentrations of PCBs in smallmouth bass and white sucker were 45,000 and 114,000 pg/g wet weight, respectively for the non-tidal river, while median fish tissue concentrations in the tidal portion were approximately one-order of magnitude greater. White perch and channel catfish in the tidal portion of the River exhibited median concentrations of 485,000 and 843,000 pg/g wet weight, respectively. All fish species regardless of location exceed EPA's cancer endpoint of 1,500 pg/g for PCBs. Dioxin/Furan concentrations were four to five orders of magnitudes less than PCBs and exhibited median concentrations of between 1 and 4 pg/g wet weight for the non-tidal fish species and 9 to 11 pg/g wet weight for the tidal fish species. All fish species regardless of location exceed EPA's cancer endpoint of 0.019 pg/g TEQs for Dioxin/Furans. Toxic Equivalents (TEQs) were then calculated for both Dioxin/Furans and the 12 dioxin-like PCB congeners. The combined TEQs greatly exceed the TEQs based only upon Dioxins/Furans particularly in the tidal portion of the Delaware River with PCBs represent approximately 60 % to 80 % of the total TEQ values. This distribution was driven primarily by the elevated concentrations of PCBs in the tidal portion of the estuary. This important component of the potential impact of PCBs needs to be considered in any risk assessment and management of PCB contamination.

Chemically Enhanced Phytoextraction of 2, 4, 6-trinitrotoluene (TNT) by Vetiver Grass (*Vetiveria zizanioides* L.) from a Low Organic Matter Soil

Das, P.<sup>1</sup>, R. Datta<sup>2</sup>, D. Sarkar<sup>1</sup>, P. Punamiya<sup>1</sup> & K.C. Makris<sup>3</sup>

<sup>1</sup>Earth and Environmental Studies Department and Passaic River Institute, Montclair State University, Montclair, NJ, 973-655-7273; [sarkard@mail.montclair.edu](mailto:sarkard@mail.montclair.edu)

<sup>2</sup>Department of Ecology and Botany, Michigan Technological University

<sup>3</sup>Cyprus International Institute of the Environment - Harvard School of Public Health  
*Student Poster Competition*

One of the major challenges in developing an effective phytoremediation-system for TNT contaminated soils is limited plant-uptake because of the low solubility of TNT. Addition of urea as a chaotropic-agent alters the water structure, allowing for lowering of the thermodynamic barrier associated with introduction of a hydrophobic compound such as TNT, thus increasing TNT solubility and plant-uptake. The Immokalee series soil, the State Soil of Florida, contains greater than 90 % sand and minimal soil-organic-matter (0.85 %), and hence has a high tendency to leach TNT. The current study evaluated the effectiveness of a potential urea-catalyzed phytoremediation-model using vetiver grass (*Vetiveria zizanioides* L.) to remove TNT from spiked Immokalee soil. A series of batch-studies was conducted in the absence of the plant to determine the retention/release characteristics of soil-TNT, the effect of soil-aging, and the urea-catalyzed TNT-extraction. A follow-up greenhouse-study was conducted with vetiver grass, a high-biomass potential accumulator grass, in TNT-contaminated (40, 80 mg kg<sup>-1</sup>) soil along with urea (0, 1000 mg kg<sup>-1</sup>) until complete removal of TNT occurred (278 hours) from the soil spiked with relatively low TNT-rates. Results showed that the Immokalee soil could adsorb only 10% of the initially added TNT, and desorbed 60% of the sorbed TNT, whereas addition of urea resulted into 91 % extraction of the sorbed-TNT from soil. Soil-aging (48 days) showed no significant ( $p = 0.475$ ) change in the soil-TNT concentrations. In the presence of the vetiver grass, complete removal of the TNT in the urea-treated soil was accomplished within 3 days at the lower initial TNT loads, whereas at higher initial TNT concentrations, the urea treatment significantly ( $p < 0.05$ ) increased the rate of TNT removal from soil.

**An interaction study determining the effect of atrazine and benzo(a)pyrene on expression of a cytochrome P450 family 4 gene in *Chironomus riparius* (Diptera)**

**Dietzold, J. & C.S. Bentivegna**

Department of Biological Sciences, Seton Hall University, South Orange, NJ

*Student Poster Competition*

To investigate the interaction between atrazine and benzo(a)pyrene, we examined expression levels of cytochrome P450, CYP4G33, in *Chironomus riparius*. We utilized reverse-transcription and semi-quantitative polymerase chain reaction to measure the change in expression levels found after treatment with the individual compounds as well as in combination. We also employed chromosomal puffing analysis to confirm the activity of benzo(a)pyrene, which is shown as a reduction in puff size. This illustrates a decrease in transcription. Densitometry was performed to measure the band density on an agarose gel. After 96 hours a decrease of expression was seen in animals treated with 1 mg/L and 10 mg/L of atrazine. The combination treatment of atrazine and benzo(a)pyrene exhibited an increase in expression at the 96 hour time point for both atrazine doses as compared to the atrazine treatment alone. Based on the preliminary data atrazine down-regulates expression of CYP4G33 in *C. riparius* at concentrations of 1 mg/L and 10 mg/L. When treated with atrazine in conjunction with benzo(a)pyrene an increase in expression is seen after 96 hours. This suggests that benzo(a)pyrene toxicity could be increased in the presence of atrazine.

***In Situ* Co-localization of SINE-CTR1 Retroposon and Hemoglobin Family Genes in the Polytene Chromosomes of *Chironomus riparius* (Diptera)**

**Doan, K. & C.S. Bentivegna**

Department of Biological Sciences, Seton Hall University, South Orange, NJ

*Student Poster Competition*

The hemoglobin family of genes in the dipteran *Chironomus riparius* are environmentally relevant for the species' oxygen tolerant lifestyle. The number of gene copies far exceeds what is required to encode the 28 monomeric and homodimeric hemoglobin (Hb) polypeptides. Transposons such as SINE (short interspersed repetitive element) have been found to relocate genetic information and may account for amplification and dispersion of hemoglobin genes in the chironomid genome. In this study, different hemoglobin genes and SINE-CTR1 were hybridized *in situ* to salivary gland polytene chromosomes in order to investigate the extent to which they might co-localize. Results showed that SINE co-localized with two homodimeric hemoglobin genes at one loci but not with a monomeric hemoglobin gene at another. This indicated that SINE activity may not account for the expansion of the hemoglobin gene family. Adaptive selection appeared to favor mechanisms of gene amplification but not necessarily gene transposition by SINE.

**The World Outside: What *They* Say About Why *Your* Work Matters**  
Eckl, E.

Water Words that Work

*Dinner Speaker*

Have you ever been confounded by the community's reaction to your work? Noted environmental blogger and communicator Eric Eckl will help you crack the code. Join us for a fascinating journey through the insights that social scientists and market researchers can provide about how your work plays on the big stage of public opinion. Sometimes frustrating, sometimes encouraging, always fascinating -- we'll explore what citizens' hear and understand, and the resulting attitudes and actions when presented with information about nature protection and pollution control.

**Combat Communications for Consultants**

Eckl, E.

Water Words that Work

*Short Course*

Businesses that are cleaning up a mess often find themselves in the public cross-currents of emotion and information -- and the more the community temperature rises, the more the regulators and politicians get involved. In this hands on workshop, scientists will learn the fundamentals of "combat communications," the art and science of delivering your message successfully when tempers flare. You will learn successful techniques to deflect false charges, avoid getting trapped in your own words, and prevent damaging misunderstandings.

**Mixing Zone Basics and their Implementation in the Delaware River**

Fikslin, T.

Delaware River Basin Commission

*Short Course*

The basic principles for establishing mixing zones for point source discharges to meet acute and chronic aquatic life criteria will be presented. EPA guidance for mixing zones, and their application in State (DE, NJ, and PA) and interstate (DRBC) regulations will be discussed.

Development of Success Criteria for Evaluating Submerged Aquatic Vegetation in the Habitat Restoration Program for the Hudson River PCBs Site

Glaser, D.<sup>1</sup>, J.W. Kern<sup>2</sup>, R. Davis<sup>1</sup>, M.S. Greenberg<sup>3</sup>, A.A. Hess<sup>3</sup>, M. Gardner<sup>4</sup>, H. Chernoff<sup>5</sup> & A. Ayers<sup>6</sup>

<sup>1</sup>Anchor QEA, 305 West Grand Avenue, Montvale, NJ, 07452; [dglaser@anchoragea.com](mailto:dglaser@anchoragea.com)

<sup>2</sup>Kern Statistical Services, 5175 NE River RD Sauk Rapids, MN, 56379

<sup>3</sup>U.S. EPA Region 2, New York Remedial Branch, 290 Broadway, 19th Floor, New York, N,Y 10007-1866

<sup>4</sup>General Electric Company, 1 Research Circle, K-1 5A15A, Niskayuna, N,Y 12309

<sup>5</sup>EarthTech, One World Financial Center, 200 Liberty Street, New York, NY, 10281

<sup>6</sup>General Electric Company, 319 Great Oaks Blvd, Albany, NY, 12203

*Platform Presentation*

In 2007 and 2008, USEPA and GE collaborated on development of technical criteria and statistical analysis methods for evaluating the success for GE's habitat restoration program to be implemented following remediation at the Hudson River PCBs Superfund Site. The complexity of the riverine ecological system required the collection of reference data on several metrics to adequately characterize the submerged aquatic vegetation (SAV), shoreline, fringing wetland and unconsolidated bottom habitats. Since ecological systems vary temporally, development of a fixed standard to evaluate success for SAV was rejected in favor of a before-after control-impact (BACI) analysis that explicitly accounts for temporal variability not due to the dredging project. To evaluate the post-dredging (restored) SAV habitats, a reverse null hypothesis was chosen as the statistical test for the evaluation (i.e., assume that habitat conditions are below criteria until the data prove the converse with a level of confidence). Tests for bioequivalence within a BACI study design were selected that will evaluate whether restored SAV conditions are reasonably close (i.e. bioequivalent) to reference conditions with a level of statistical confidence. The value of the equivalence coefficient was selected through simulations designed to balance false positive and false negative errors at rates that would provide adequate power to demonstrate success, while ensuring an appropriate level of regulatory protectiveness. Results of the simulations of post-dredging conditions indicated that percent cover is the most robust metric, providing reasonable false positive and false negative rates under a range of simulated conditions. Biomass and stem count are more variable, and under some simulated conditions, give less desirable error rates.

## Low Impact Remediation of Recalcitrant Chlorinated Hydrocarbons in Groundwater

Gneiding, L.<sup>1</sup>, H. Faircloth<sup>2</sup> & T. Fiorillo<sup>3</sup>

<sup>1</sup>AMEC; <sup>2</sup>CORE; <sup>3</sup>45<sup>th</sup> CEV/CEVR

### *Platform Presentation*

The USEPA considers groundwater contamination from chlorinated organic solvents as one of the most serious problems due to the recalcitrant nature. Laboratory and field demonstrations have shown that sulfate-reducing and methanogenic bacteria begin the dechlorination process for tetrachloroethene (PCE) and trichloroethene (TCE), specific dehalo-respiring bacteria are required to the complete dechlorination. Several natural, non-pathogenic microbial consortia have been isolated that are capable of completely dechlorinating TCE to ethene. A pilot study was conducted at Space Launch Complex (SLC) 36 at Cape Canaveral Air Force Station, FL using a commercially available microbial mix and an electron donor combination in groundwater to determine its effects on the chlorinated hydrocarbon plume. Initial results indicate increased bioactivity and reduced VOC concentrations.

## Earthworm Toxicogenomics - A quest for Novel Biomarkers

Gong, P.

### *Platform Presentation*

Earthworms are ecologically important, sentinel species that have been used intensively in ecotoxicological tests. Earthworm growth, lethality, and reproduction toxicity assays have been standardized by many international (OECD, ISO, and ASTM) and national (USEPA and Environmental Canada) organizations. With the explosive evolution of molecular biology and genomics technologies, especially high throughput genomic technologies, there exist great opportunities to apply toxicogenomics approach to discovering novel biological endpoints at the molecular/transcriptional level. In this presentation I will provide an overview of our efforts in developing transcriptomic tools for studying toxicology in the earthworm *Eisenia fetida*. Examples will be given to show how the toxicogenomic approach is applied to decipher the toxicological modes of action for a relatively new explosive compound CL-20, and to discover novel biomarkers for explosives TNT and RDX. Finally, I will discuss how to combine collection of time serial, high dimensional toxicogenomic datasets with computational modeling as part of our new initiative in computational toxicology for developing predictive toxicology modeling.

## Removal of Heavy Metals from Shipyard Stormwater using Residuals of Drinking Water Treatment

Hardy, M.A.<sup>1</sup>, D. Sarkar<sup>1</sup> & R. Datta<sup>2</sup>

<sup>1</sup>Montclair State University, Montclair, New Jersey, USA

<sup>2</sup>Michigan Technological University, Houghton, Michigan, USA

### *Student Poster Competition*

Metals contamination is a significant problem in military sites — especially shipyards, where metals are used in many of the shipbuilding processes. While there are a wide variety of remediation techniques, this study evaluates the use of a waste by-product — drinking water treatment residuals (WTRs) as a low-cost and “green” sorbent to remove metals, including chromium, copper, lead, and zinc from contaminated wastewater. Experiments were conducted using Fe- and Al- based WTRs to evaluate the adsorption/desorption dynamics of metals with WTRs. Both WTRs showed a capacity to adsorb large amounts of all of the metals evaluated. In batch sample experiments using a synthetic wastewater solution, the Al-WTR removed ~64 to 69 % and 88 to 91 % of the initial loads of Cu and Pb, respectively (initial loads: 500 mg/kg for each metal), and approximately 34 to 50 % of the initial load of zinc (5000 mg/kg). Under the same conditions, the Fe-WTR removed approximately 54 to 56 %, 84 to 88 %, and 25 to 47 % of the initial Cu, Pb, and Zn, respectively. In batch studies involving stock solutions of Cr(VI), both WTRs removed greater than 90 % of an initial load of 500 mg/kg Cr(VI) after 24 hours at a soil:solution ratio (SSR) of 1g:5mL. When desorption was induced using phosphate as a competing ion, the Al-WTR desorbed approximately 2-7 % of previously sorbed chromium, while the Fe-WTR desorbed only negligible amounts of Cr(VI). Overall, results for both the Fe and Al-WTRs demonstrated their ability to remove a suite of metals from contaminated wastewater, which could lead to development of a new and low cost remediation technology for metal contaminated shipyard stormwater.

## Fundamental Chemistry of PCBs, Dioxins, and Furans Kirchner, S. & Luke, N.-C.

### *Short Course*

PCBs, PCDDs and PCDFs are persistent bioaccumulative contaminants that are ubiquitously found in environmental matrices, including animal tissues. 2,3,7,8-TCDD is the most toxic in this group. The adverse effects in animals are reported on reproduction, development, and endocrine functions. Several PCDDs, PCDFs and PCBs have been shown to have similar effects. This short course is intended for scientists who wish to understand the basic structure, analysis, and relationship of PCBs, Dioxins, Furans and their congeners. It is intended as an introduction to these environmental contaminants, overview of their origin and industrial uses. The relationship of the compounds molecular structures, naming conventions and congener identification will also be discussed as well as the methods currently used for their analysis. A portion of this class will be devoted to the discussion of the toxicity equivalents (TEQ) approach for dioxin and furan data evaluation. The TEQ approach weighs the toxicity of less toxic compounds as fractions of the toxicity of the most toxic compound, 2,3,7,8-tetrachlorodibenzodioxin (TCDD) by assigning each compound a specific toxicity equivalence factor (TEF). This factor indicates the degree of toxicity compared to 2,3,7,8-TCDD, which is given a reference value of 1. The World Health Organization (WHO) has published TEFs for 17 dioxin and dioxin-like compounds.

### **Brown Bullhead Pathology- What do Tumors tell us about Sediment Contamination and Remedial Objectives?**

Lauren, D.

ENVIRON International, 1760 Market Street, Philadelphia, PA 19103

### *Poster Presentation*

Beneficial use impairments (BUIs) are a metric of environmental degradation in Great Lakes areas of concern (AOC) established by the International Joint Commission (IJC). For 30 years Tumors and Other Deformities in fish have been the poster child for the polluted environment. Because the highest incidences of lesions are found in brown bullhead, this species is the most extensively studied and understood. Recently however, a group of expert panel concluded that only tumors of the liver are sufficiently well linked to sediments to provide a metric that can be related to contamination and recovery or remediation. Although liver tumors have been studied in brown bullhead for over 30 years in the Great Lakes, there are still unresolved issues over natural incidence, effects of age, sex, season, the speed of response to remediation, and the etiology of these tumors. The following is a re-examination of data from the literature as well as a report on current state-of-the-art.

## Nanotechnology: Current Status on Safety and Regulatory Issues

Luke, N.-C.

Camp Dresser & McKee Inc., Edison, New Jersey

### *Poster Presentation*

Nanotechnology offers great potential for benefitting humanity and the global economy. However, nanomaterials pose major concerns for public and regulatory communities due to the limited information on their long term toxicity effects to human health and the fate and transport in the environment. Research communities and regulatory agencies have identified five top priorities for nanotechnology and nanomaterials, and have focused their resources on these topics. The top five priorities are: 1) how to develop the scientific basis for evaluating and characterizing exposure, toxicity, and risks associated with nanomaterials; 2) how to establish toxicity guidelines; 3) how to communicate public understanding of the benefits of nanotechnology and the risk assessment of nanomaterials; 4) how to establish regulatory guidance and regulations to protect human health and the environment; and 5) how to direct research and resources to investigate the impacts of nanomaterials and minimize the health and the environmental risks, while supporting sustainable development. These priorities constitute major challenges for global researchers and regulators in the field of nanotechnology. Much research has been published in these areas. However, the most recent noteworthy development in nanotechnology is that USEPA has issued pre-manufacturing notices for single and multi-walled carbon tubes. These are the first regulatory actions to nanomaterials in the United States. In addition, the National Institute of Occupational Safety & Health (NIOSH) updated its 2006 draft document on what is known about the potential hazards of nanomaterials; how workplace exposure to nanomaterials can be minimized and monitored; and how to safely handle nanomaterials within the work place. These are milestones for this exciting and ever-evolving field of nanotechnology.

## Characterization and Management of Contaminated Soils at Small Arms Firing Ranges

Mackie, D.

AMEC Earth & Environmental, Inc., 285 Davidson Avenue, Suite 405 , Somerset, New Jersey 08873; [david.mackie@amec.com](mailto:david.mackie@amec.com)

### *Platform Presentation*

The success of soil remediation and maintenance projects at small arms firing ranges (SAFRs) depends largely on the quality of the environmental site characterization process and the thoroughness with which potential soil treatment alternatives are evaluated. Cost effective planning and management of SAFR soil treatment projects requires an accurate assessment of the volume of affected soil, as well as an understanding of the feasibility and relative cost of the various soil treatment alternatives. Incomplete characterization of the extent of soil contamination commonly occurs as a result of insufficient historical/operational analysis, the use of inappropriate sampling and analytical methods, or a lack of understanding of small-arms ballistics. Potentially serious economic consequences may result when contracts are awarded for remedial work that is based on inaccurate cost or soil volume estimates. A variety of field screening methods are available which, when used in conjunction with the results of a detailed range operational analysis, enable rapid assessment of the extent of soil contaminants, and at significantly lower cost than a conventional grid-based sampling approaches. For example, field portable X-ray fluorescence analysis can provide for rapid determination of heavy metal concentrations in soil, while field sieving of soils and metal detector surveys can be used to map the extent of particulate metal (*i.e.*, bullet and bullet fragments). Once the horizontal and vertical extent of particulate metal deposition have been delineated, a targeted program of conventional soil sampling and laboratory analysis can be used to verify compliance with applicable remedial goals. Depending on the planned future use of the SAFR site and its proximity to other active ranges, onsite treatment and reuse of contaminated soil may be feasible as a lower-cost alternative to the standard "dig-and-haul" approach. Examples of some potential soil treatment alternatives include water-based density separation (soil washing) or dry soil screening to removed particulate metal, and chemical stabilization of heavy metals using phosphate-based soil amendments. Generally, the feasibility of these alternatives is evaluated through bench-scale testing of bulk composite soil samples, which can be collected in conjunction with the range characterization investigation. Regardless of the presumptive remedy, a relatively small investment in a soil treatability study early in the decision making process can potentially yield large savings in the overall project costs.

**Abora III - Lost in the Atlantic  
Nazario, D.**

Aqua Survey, Inc., 469 Point Breeze Road, Flemington, NJ 08822;  
[nazario@aquasurvey.com](mailto:nazario@aquasurvey.com)

*Video Presentation*

Columbus discovered America in 1492 - an astounding achievement in his time. But there is evidence which indicates stone-age people beat him to it by over 14,000 years. To prove this point a German experimental archeologist Dominique Gorelitz and his crew built the Abora III, a reed vessel that would leave New York Harbor and sail to the Azores near the African coast. The vessel was built entirely from reeds taken from Lake Titicaca in Bolivia by Aymara Indians in their traditional design. In late spring of 2007 the Abora III and its crew arrived at Liberty Harbor Marina in Jersey City, NJ to begin preparations for its journey. By mid July they started off on a historic voyage that would hopefully rewrite history. There is growing evidence that before Columbus or the Vikings made their maiden voyages to the New World, people were regularly crossing the Atlantic to trade goods. How were Stone Age peoples able to make such transatlantic business trips and can a modern crew recreate this voyage using a boat constructed from a prehistoric design? A 20 minute video will provide a glimpse about the crew, the construction of the vessel and the use of ancient constellations to navigate a small reed vessel across the Atlantic Ocean.

**Introduction to Geophysical Surveys  
Nazario, D.**

Aqua Survey, Inc., 469 Point Breeze Road, Flemington, NJ 08822;  
[nazario@aquasurvey.com](mailto:nazario@aquasurvey.com)

*Short Course/Field Trip*

Geophysical Survey refers to the assortment of geophysical data that can be collected using several different remote sensing technologies and systems. The introduction will focus on the systems that are used in marine applications looking either below the water's surface or into the sediment layer beneath the water. The techniques that will be discussed include hydrographic/bathymetric surveys, acoustic doppler current profilers (ADCP), side scan sonar surveys, sub-bottom profiling, magnetometer surveys and electromagnetic (EM) detection systems. Performance of these surveys will be from Aqua Survey's perspective and experience.

**Screening Level Risk Assessment of Contamination in Wetlands Considered for  
Restoration in Hackensack Meadowlands District  
Palmstrom, N.**

AECOM Environment, 78 Main Street, Suite 3, Nyack, NY, 10960

*Platform Presentation*

The NJMC owns or manages approximately 3,400 acres of wetlands, and is actively acquiring more wetlands for preservation and/or restoration. As a result of activities such as development, dredging, draining, mosquito control, landfilling, and industrial pollution, these wetlands have been modified and contaminated to varying degrees. Contaminants such as pesticides, PCBs, and heavy metals have been detected in wetlands. These contaminants, particularly the bioaccumulative ones, may pose risks to fish and wildlife feeding and reproducing in the wetlands. This EPA funded project aimed to develop methods that would support rapid assessment of potential ecological risk in wetlands that the NJMC might be considering for acquisition, management, or restoration. The project included the development of a database of historic data, a screening level ecological risk assessment (SLERA) for several trophic levels, development of wildlife assessment curves based on food web modeling, and efforts to correlate contaminant concentrations with measures of benthic community health and laboratory measured toxicity. The findings of this project indicate that with refinement SLERA and wildlife assessment curves may serve as useful tools for the assessment of potential ecological risk in wetlands being considered for acquisition, management or restoration with a minimum of investigations and analysis.

Preparation and Analysis of Total Mercury in Tissue Samples Using Atomic  
Fluorescence Spectrometry  
Pitts, L.C.

Alpha Analytical, Inc., Mansfield, Massachusetts, USA; [lpitts@alphalab.com](mailto:lpitts@alphalab.com)

*Poster Presentation*

Biological tissues have long been used as indicators of site contamination. Mercury is known to very effectively bioaccumulate and is thus a good indicator for remediation studies. Though mercury is routinely analyzed by atomic absorption spectrometry, atomic fluorescence is an extremely sensitive technique for measurement mercury in tissues and is approximately ten times more sensitive than atomic absorption. The analytical sensitivity can be adjusted for measurement of elevated mercury levels in tissues, or set for trace levels by adjusting the instrumental gain to calibrate and analyze different ranges. Using gold amalgamation pre-concentration for maximum sensitivity, the estimated method detection limit is 0.13 ng/g. Due to the large variety of biological samples encountered in environmental studies and the desire for whole body as well as specific sub-sample analysis, sample preparation is extremely critical to insure minimal sample contamination. Also, a 1-2 g aliquot that is selected for analysis should be representative of the entire sample. Homogenization techniques using titanium utensils and digestion methods including microwave oven heating in high pressure fluorocarbon vessels were performed. The efficacy of these methods is demonstrated by the analysis of quality control samples such as preparation blanks, matrix spikes, matrix duplicates and standard reference materials as used in numerous field studies.

Phytoextraction of Lead Using a Metal-Accumulating Grass (*Vetiveria zizanioides*)  
in the Presence of an Arbuscular Mycorrhizal Fungus, *Glomus mosseae*

Punamiya, P.<sup>1</sup>, S. Barber<sup>2</sup>, P. Das<sup>1</sup>, D. Sarkar<sup>1</sup>, & R. Datta<sup>3</sup>

<sup>1</sup>Department of Earth and Environmental Studies, Montclair State University,  
Montclair, NJ

<sup>2</sup>SUEZ Energy Generation North America

<sup>3</sup>Department of Biological Sciences, Michigan Technological University, Houghton, MI  
*Student Poster Competition*

Phytoextraction of lead (Pb) from contaminated-soils can be a low-cost and environment-friendly alternative to the traditional physical and chemical remediation techniques, particularly for cleanup of Pb-contaminated residential and military sites. For successful Pb-phytoremediation, the potential candidate needs to be a high-biomass plant with ability to uptake and translocate high concentrations of contaminant. Vetiver grass (*Vetiveria zizanioides*) has shown the ability to accumulate high amounts of Pb in wide array of soil and climatic conditions. However, soil-Pb needs to be in a form that vetiver root can uptake, which may be a problem in soils where Pb is in insoluble form. Plant-microbe interaction also plays an important role in enhanced phytoextraction, and hence, in successful phytoremediation. In this study, we investigated the potential of an arbuscular mycorrhizal (AM) fungus, *Glomus mosseae* (*Gm*) in increasing Pb uptake in vetiver grass. We conducted a hydroponic study (Phase-I) and a pot-experiment (Phase-II) in a sandy loam (Millhopper Series), with four different levels of Pb (0, 1, 2, and 4 mM) and (0, 400, 800, and 1200 mg/Kg), respectively. After 4 weeks of growth, plants were harvested and analyzed for total root and shoot biomass, Pb-concentration in root and shoot, chlorophyll activity and low molecular weight thiols (LMWT). The mycorrhizal colonization increased shoot and root dry mass (by 15-18% Phase-I and 18-21% Phase-II), and Pb-uptake (by 30-35% Phase-I and 40-45% Phase-II) at all Pb-application rates. Further, plants colonized with AM-fungi had higher chlorophyll-activity and lower LMWT, suggesting lower metal stress. Microscopic images and PCR reaction confirmed the presence of *Gm* in the roots of inoculated plants. Results from this study indicate that plant-microbe interaction plays an important role, and AMF assisted Pb-phytoextraction may have the potential to develop into an effective phytoremediation system.

**PCBs in Hudson River Fish: Lessons of the Past Applied to the Future**  
**Skinner, L.C. & M.W. Kane**

New York State Department of Environmental Conservation, Division of Fish, Wildlife  
and Marine Resources, Albany, NY, 12233-4756

*Platform Presentation*

The Hudson River in New York is well known for having a history of elevated PCB concentrations in fish. These PCBs have caused restrictive health advisory recommendations for human consumers of fish, and fisheries closures or restrictions which have affected the fishery since 1975-1976. Based on annual surveillance of PCBs in Hudson River fish, PCB concentrations in fish are affected by several factors including proximity to sources and the exposure concentrations from those sources, concentrations in the water column, fish species and their lipid content, time, and other factors which may be fish species dependent (e.g., sex, size/age, and residency patterns). This presentation is an overview of alternative predictive scenarios of how these factors may affect future PCB concentrations in fish during and after removal of PCBs from the sediments and other sources to the Hudson River.

**In-River Habitats of the Hudson River PCB Superfund Site: USEPA Oversight of  
Characterization and Post-Dredging Reconstruction**

**Traynor, M.<sup>1</sup> & M. Greenberg<sup>2</sup>**

<sup>1</sup>Malcolm Pirnie Inc., 43 British American Boulevard, Albany NY, 12110;  
[mtraynor@pirnie.com](mailto:mtraynor@pirnie.com)

<sup>2</sup>USEPA Region 2, Environmental Response Team, 2890 Woodbridge Ave., Edison, NJ,  
08837; [greenberg.marc@epa.gov](mailto:greenberg.marc@epa.gov)

*Platform Presentation*

The Upper Hudson River portion of the Hudson River PCBs Superfund Site encompasses a nearly 40-mile stretch of the Hudson River in eastern New York State from Fort Edward, New York to the Federal Dam at Troy, New York. On January 25, 2008 the US Environmental Protection Agency (USEPA) approved the Phase 1 dredging program design for the removal of PCB-contaminated sediments within approximately 93 acres of river bottom between Fort Edward and the Thompson Island Dam. The approved Phase 1 design includes construction of sediment processing and transport facilities, the first year of the dredging and backfill placement, and the habitat replacement and reconstruction program for those areas dredged during Phase 1. Approved Phase 1 plans include the reconstruction of approximately 2.0 acres of riverine-fringing wetlands, 8.8 acres of submersed aquatic vegetation beds, 68.2 acres of unconsolidated river-bottom and 14,700 linear feet of shoreline following dredging and backfill placement. Prior to approval of the Phase 1 design, several years of habitat data collection was conducted by General Electric Company (GE) with oversight provided by USACE and USEPA. In addition to the dredging and habitat reconstruction plans, a series of habitat characterization reports were published by GE after concurrent review by USEPA and the Natural Resource Trustees. This presentation outlines approved Phase 1 habitat reconstruction plans, the habitat data collection efforts that preceded approval of the Phase 1 habitat reconstruction design, and the anticipated transition from dredging and backfill placement to habitat reconstruction.

## Investigation of Cultural and Environmental History in Conjunction with CERCLA Based Environmental Cleanups.

Vetter, J.

Adelphi University, Department of Anthropology, Garden City, New York

### *Short Course*

The general lack of the applicability of protocols associated with the National Environmental Policy Act (NEPA), to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) remedial cleanup actions, does not leave such sites without appropriate environmental review. Reduction and removal of a contaminant presence is not easily accomplished without ancillary environmental impact. The Applicable or Relevant and Appropriate Requirements (ARARs), associated with individual sites, provide for the necessary compliance with a wide spectrum of standalone environmental statutes. Such is the case with the Hudson River PCBs Superfund Site. Here a series of studies, both ongoing as well as those carried out over a period of many years, have recovered significant data concerning the early occupation, historic settlement, and environmental effect of a protracted human presence in and along the river. These discoveries, both archaeological and structural, have added to the picture of the changing role of the Hudson in conjunction with the associated settlement patterns. Integrating this information with the impending contaminated sediment removal, while at the same time providing protection for specific resources, has required considerable effort from the environmental and engineering community. This session will principally discuss many of the approaches taken to satisfy the requirements of the National Historic Preservation Act. The results of terrestrial and underwater archaeological investigations will be presented, along with the subsequent opportunities for interpretation of the past uses of the Hudson, as well as the directions for the future uses that they support. Additional characterization of the steps associated with wetlands protection, and endangered species consideration will also be addressed.

## Beneficial Use of Coal Ash Amended Sediments for Mine Reclamation: Implications for the Hudson

Voros, A.S.

Columbia University, Department of Earth and Environmental Engineering, 500 West 120th Street, Room 918, New York, NY, 10029; [coast@columbia.edu](mailto:coast@columbia.edu)

### *Platform Presentation*

In 1995, an effort was launched to examine the beneficial use of dredged sediments, amended with alkaline coal ash, for the reclamation of Pennsylvania's abandoned mine lands. About one million tons of amended sediments were used to return one and one-half miles of a strip-mined hillside to its original contour, which was planted and now serves to support, among other things, a population of re-introduced elk. The process, its risk communication, monitoring results and final outcome will be discussed, with a discussion of possible implications for the Hudson region.

## Assessing Risks and Remedial Alternatives for Military Munitions in the Marine Environment

Wehner, D.<sup>1</sup> and Mindy Pensak<sup>2</sup>

<sup>1</sup>NOAA Regional Resource Coordinator, NOAA/NOS/OR&R, Highlands, NJ;

[Diane.Wehner@noaa.gov](mailto:Diane.Wehner@noaa.gov)

<sup>2</sup>USEPA

### *Platform Presentation*

Military munitions were disposed of by the U.S. Armed Forces in the ocean from World War I through the early 1970s. As a result, many rivers, lakes and oceans near military bases contain disposed military munitions (DMM) and unexploded ordnance (UXO). There are many challenges associated with assessing the risks and cleanup options associated with these items. Locating munitions underwater is difficult due to limitations of geophysical survey and other methods for detecting munitions in the aquatic environment, the lack of good positioning for most disposal sites and the movement of the items from intended disposal area by ocean currents. Assessing ecological risk from munitions constituents is hindered by the limited availability of information on the toxicity of ordnance related compounds to aquatic receptors and the fate of these chemicals in the aquatic environment. Ecological benchmarks are lacking for many of the compounds, much of the data that do exist are from laboratory based studies and the fate and toxicity of aged explosives underwater is not well understood. Removing munitions from the ocean floor can be technically challenging and could introduce additional risks during retrieval and transport for onshore disposal or destruction. Blowing ordnance in place could result in significant impacts to underwater habitats such as coral reef ecosystems and aquatic receptors such as sea turtles and marine mammals. An overview of these all challenges will be presented.

## The Program Committee

<i>Meeting Chairs</i>	Don Nazario and Gina Ferreira
<i>Short Courses</i>	Carolyn Bentivegna
<i>Technical Sessions</i>	Laurie Gneiding, Don Nazario, Gina Ferreira and Steve Brown
<i>Poster and Awards</i>	Nai-chi Luke and George Molnar
<i>Abstracts</i>	Ben LePage
<i>Exhibitors</i>	Don Nazario
<i>Program</i>	Ron MacGillivray and Nellie Tsipoura
<i>Registration</i>	Chris Nally
<i>Website</i>	Don Nazario

This year is the first time that HDC-SETAC has held a meeting in the Hudson River Valley. This year is also the 25<sup>th</sup> anniversary year for HDC-SETAC and the quadricentennial of Henry Hudson's voyage along the Hudson River and Delaware Bay.

## HDC-SETAC FALL WORKSHOPS

Plan to attend the HDC-SETAC Fall 2009 workshop. If you have a topic in mind for a one day workshop, suggest it to a HDC-SETAC board member. Updates on the 2009 fall workshop will be available on our website at [www.hdcsetac.org](http://www.hdcsetac.org).

## ***2009 STUDENT POSTER COMPETITION***

The Hudson/Delaware Chapter (HDC) of the Society of Environmental Toxicology and Chemistry is pleased to once again sponsor student research awards. The purpose of these awards is to both recognize outstanding young scholars and to encourage active participation in SETAC and the HDC. Up to six cash prizes are offered:

1. Graduate 1<sup>st</sup> place: \$500
2. Graduate 2<sup>nd</sup> place: \$250
3. Graduate 3<sup>rd</sup> place: \$150
  
4. Undergraduate 1<sup>st</sup> place: \$350
5. Undergraduate 2<sup>nd</sup> place: \$150
6. Undergraduate 3<sup>rd</sup> place: \$75

Prizes will be awarded at the close of the meeting on Friday and will be based on three reviews performed by unbiased peers during the meeting. The HDC Board of Directors will also review all posters and reserves the right, based on scientific merit, to reject any and all materials submitted.

### Eligibility:

- All students must be currently enrolled in an environmental toxicology or chemistry-related undergraduate or graduate program with the following exception: those within one year of graduation may also compete, if the work being evaluated was completed while a student.
- Students and/or their faculty advisors must be HDC members, or must apply for membership at the time of award application. The academic program must be located in the general HDC area (NY/NJ/PA/DE).
- To be considered for any award, a research poster relevant to environmental toxicology and chemistry must be presented at the annual HDC meeting. In advance (typical deadline May 2nd) a 250-word abstract must be submitted for inclusion in the poster program listing.
- Posters should be displayed throughout the 2-day meeting and remain on display through final judging early Friday afternoon. Recognizing that this may not be possible for one-day attendees, posters must be displayed (at a minimum) either all day Thursday or from 8:00 am through completion of judging on Friday.

### To apply for the award, students must submit the following:

- A letter of application from the student if not accompanied by a faculty member including a statement from the major advisor identifying the research presented as predominantly that of the student.
- For all awards, a 250 word abstract.
- The student's campus and permanent address, phone number and email address.
- The major advisor's name, address, phone number, and email address.
- The student's current enrollment (institution, department degree program, and expected date of completion).

## The HDC- SETAC Officers and Current Board of Directors

Position	Name	Affiliation
President	Ron MacGillivray	Delaware River Basin Commission
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Board Member	Nellie Tsipoura	NJ Audubon Society
Board Member	Laurie Gneiding	AMEC Earth & Environmental, Inc.
Student Board Member	Vacant	

HDC-SETAC is a professional society for environmental scientists, engineers and related disciplines concerned with environmental quality located in eastern Pennsylvania, New Jersey, Delaware, and southeaster New York. HDC-SETAC is a regional chapter of SETAC, a scientific non-profit organization of about 5000 members from 50 U.S. states, 13 Canadian provinces, and more than 70 countries worldwide. HDC-SETAC was founded in 1984, making it one of the first established regional chapters within SETAC in North America. HDC-SETAC is all about environmental scientists and students of our region. All meetings and workshops are designed to educate attendees about current issues and topics of the Hudson / Delaware region.

HDC-SETAC is managed by a 13 member Board of Directors which is elected by the voting membership-at-large each spring. Each board member serves a term of three years, and may serve more than one term. Board members must be members in good standing in both HDC-SETAC and SETAC, and must be committed to following the goals and By-laws of HDC-SETAC. Please consider participating as a board member or officer. *Your contributions are necessary for our continued vitality. Current needs include a student board member and a communications coordinator.*

*The board of directors and our membership would like to thank the 2009 Corporate Sponsors for their generous support.*

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