LAKE SUPERIOR STATE UNIVERSITY

Provost Office

NOV 16 2009

OFFICE OF THE PROVOST

Lake Superior State University

APPLICATION FOR SABBATICAL LEAVE

(Refer to Section 15.4 of the Faculty Association Agreement)

I. Name David Szlag Date 11/15/2009

Department Chemistry & Env Sci Ext. No. x 2160

Home Address [redacted] Home Phone [redacted]

Sault Ste Marie, MI 49783

II. Application for leave during the following (*indicate semester and/or year*):

Fall 2010 Spring 2011 (Full Year) 2010-2011

III. Number of years of faculty service (*minimum of 5 years required*) 8

IV. Tenure status (*tenure required*) Tenured

V. Semester or year of last sabbatical (*if applicable*) none
(*minimum of 5 years since last sabbatical required*)

VI. Title and description of sabbatical project (*attach pages as appropriate*). Include in the description a discussion of at least one of the following criteria:

1. The strength of the relationship between a sabbatical leave proposal involving applied or theoretical research related to professional activities and the advancement of knowledge within disciplinary areas.

2. The strength of the relationship between a sabbatical leave proposal involving an external, professionally-related experience/study in a business, industrial, health care, scientific or educational setting and the improvement of instructional/professional activities at the University.

3. The strength of the relationship between a sabbatical leave proposal involving travel or advanced study and its yield in improving the quality of instruction at the University.

VII. Attach a statement agreeing to return to the University.

MEMO

To: Sabbatical Leave Committee

From: Dr. David Szlag

Date: November 15, 2009

Subject: Sabbatical Leave Application Fall 2010 –Spring 2011

Improvement and expansion of the undergraduate research experience at Lake Superior State University through the development of new lines of research and curriculum changes

Please find enclosed my sabbatical leave application for the academic year fall 2010 – spring 2011. It includes my application, a cover page, a proposal, and resume. In addition I have included a benefits statement and a statement of intent to return to Lake Superior State University.

MEMO

To: Sabbatical Leave Committee

From: Dr. David Szlag

Date: November 15, 2009

Subject: Sabbatical Leave Application Fall 2010 –Spring 2011

I agree to return to Lake Superior State University for one full academic year immediately following the sabbatical or reimburse in full monetary value encumbered by the Lake Superior State University during the period of my leave. Further, I agree to submit a written summary of my accomplishments before 12/1/11.

Improvement and expansion of the undergraduate research experience at Lake Superior State University through the development of new lines of research and curriculum changes

Sabbatical Leave Proposal Application Fall 2010–Spring 2011

Submitted by

Dr. David Szlag

November 15, 2009

Summary

This proposal describes a two-part approach for enhancing undergraduate research in the Department of Chemistry and Environmental Sciences and improvements to the environmental health degree program. The first objective is to enhance the undergraduate research experience in our school through the development of two new lines of research: 1) techniques for monitoring the distribution of endocrine disrupting chemicals (EDCs) between, surface water, the vadose zone (unsaturated soil) and ground water; and 2) using inexpensive Web cameras and Geographic Information Systems (GIS) for environmental monitoring. These two lines of research may seem far apart but in fact they complement one another and have the benefit of being novel, inexpensive in the sense that much of the equipment and software exists on campus, and being suitable for undergraduates. Furthermore data generated from these projects will allow us to develop proposals and apply for funds from federal agencies and foundations that will enhance our laboratory facilities for instruction and allow us to pursue outside contracts and grants. The second objective consists of modifications and improvements to enhance the quality and availability of education in the B.S. Environmental Health (BSEH) degree program. We must bring this degree program in line with new Environmental Health Accreditation Council (EHAC) content standards, promote this program across the state, and capitalize on opportunities that have emerged regarding the recruitment of Canadian students.

Background

Most of the committee is aware of my efforts to promote the BSEH program at LSSU and Geographic Information Science (GIS). What may surprise some members of the committee is my background. My Ph.D. is in Water Resource Engineering (Civil) and my M.S. degree is in Chemical Engineering. Prior to coming to LSSU, I was instrumental in starting a program at the US Environmental Protection Agency where we began development of a Web based storm water allowance trading system. This program combined environmental chemistry, GIS, watershed hydrology, urban planning and environmental economics. It is this context that I developed my skills in GIS and became aware of the problem of EDCs. Recently, our department, with Judy Westrick taking the lead, submitted a proposal to the National Science Foundation requesting $300,000 dollars for a state-of-the-art liquid chromatograph tandem mass spectrometer. The proposal received reviews of *very good*, *good,* and *fair*, but was not funded. The only significant criticism was that the co-investigators (me amongst them) had not fully developed their research ideas. The line of research proposed below will address this point, move our research into a new area and provide the necessary data to resubmit this proposal.

The BSEH program at LSSU is unique in the state and region and has the potential to attract students from across the upper Midwest and Canada. The BSEH program is also unique in that we have incorporated GIS into the program at a much higher level than other programs. In this context we have been ahead of the curve; our

goal has always been to not only make the BSEH program unique in the state but to also gain national recognition by offering a unique blend of GIS and Environmental Health. Although EHAC unequivocally endorsed our program in 2007 they also suggested some improvements in the curriculum. Most significant among these was the need to increase the content in the area of food safety.

I. Proposed New Lines of Research

Endocrine disrupting chemicals (EDCs) and pharmaceuticals and personal care products (PPCPs)

Pharmaceuticals, personal care products, detergents, and their metabolites are widely distributed at low concentrations in surface and groundwater across the United States and across the world. These compounds generally referred to as endocrine disruptors (EDCs) or pharmaceuticals and personal care products (PPCPs) can alter the sex ratio, behavior, species composition and reproduction of algae, macro invertebrates, fish and amphibians and other organisms at very low concentrations. Although awareness of these problems has become widespread in the scientific community, scientists and the regulatory community still have a very incomplete picture of the environmental and human health risk presented by PPCPs individually and in complex mixtures in the environment. Three major issues hinder our understanding of these problems: 1) the unavailability of standard analytical methods; 2) the fact that the sources of PPCPs in the environment are widely distributed and arise from unregulated personal use; and 3) metabolites and daughter products of the PPCPs are not routinely measured and may present a greater risk than the parent compounds. Over the past seven to ten years, solid phase extraction followed by High Pressure Liquid Chromatography- tandem mass spectrometry (HPLC-MS/MS) or derivitization followed by Gas Chromatography-mass spectrometry (GC-MS) have emerged as the methods of choice for analyzing these compounds in the environment. Although these methods are widely used in academic research no standard method has yet been published by USEPA. The majority of the literature regarding PPCPs over the past decade has focused on: (1) developing analytical methods; (2) occurrence screening studies in surface water; (3) degradation in activated sludge wastewater treatment plants; and (4) the efficacy of oxidation methods, primarily ozone and chlorine, for degrading PPCPs in drinking water. The general consensus emerging from these studies is that receiving waters down gradient from existing conventional waste water treatment facilities have elevated concentrations of these compounds and that existing treatment trains do not completely degrade these compounds and may in fact increase endocrine disrupting potential by creating active daughter or degradation products. Of special concern are the observations that some of these compounds are recalcitrant and mobile and have been observed in well water long distances from any known source.

Studies looking at onsite and small community sewage treatment systems have only recently appeared in the literature. Approximately 30 percent of U.S. households currently rely on onsite systems and 40 percent of new construction use onsite systems. In North America and especially in rural areas, onsite systems account for the largest

volume of contaminated water discharged to the environment. Given the complexity of the surface water/soil//groundwater interaction, much more work must be done to assess the impact of onsite wastewater treatment and PPCPs on U.S. water resources. My research will focus on analyzing PPCPs and their metabolites released from low density residential and seasonal onsite systems by HPLC and GC using mass selective and photodiode array detection methods. Residential systems are weakly regulated and prone to failure. My approach will consist of three parts. First, I will focus on extending existing HPLC-MS/MS and GC-MS methods by improving the reliability of the extraction of PPCPs from septic sludge and soils. Improving the extraction efficiency of PPCPs from solid matrices will improve the mass balance and subsequently improve our understanding of fate and transport. Second, my students and I will identify parent PPCPs and metabolites resulting from anaerobic degradation common in onsite systems. Most current approaches for PPCPs use selective ion monitoring yielding an incomplete view of environmental occurrence by neglecting the unknown portion of unidentified constituents. Third, we will seasonally sample: (1) effluent; (2) soil pore water; and (3) sludge from a variety of residential onsite systems and estimate the relative frequency and total concentrations of PPCPs and metabolites. We hypothesize that onsite systems contribute a higher PPCP load during the spring thaw in the rural areas of the Upper Great Lakes region due to saturation of leach fields and low temperatures

Distributed Web Cameras, GIS and Remote Sensing

When most people think of remote sensing, they think of expensive aerial photography and satellite technology that can effectively look straight down on the Earth. Most of us don't think of the web cam looking back at us from the screen of our laptop as remote sensing-but it could be. An idea occurred to me recently when a student asked if it was possible to use a web cam to monitor algae in Biscayne Bay and I recalled an observation made by a local resident regarding sewage bypasses in the North Channel of the St. Maries River above Sugar Island. The resident noted that flocks of gulls would be observed feeding in the river before sewage "knick knacks" started appearing on residents' shorelines and beaches. I propose to combine these two ideas and test the hypothesis that web cam images of gulls can be used to identify and track sewage by-pass events in the North Channel. A review of the literature turned up few references to using this type of technology for environmental mapping and monitoring. We have recently acquired the ESRI site license for ArcINFO and its extensions. The first task in this project will require us to develop an algorithm using the ESRI software to georeference or transform the Web image so that each pixel can be mapped to real world coordinates. Fixed objects in the image and buoys placed on the river can be used to provide the necessary reference points after their real world location has been determined by GPS technology. The second task will entail development of an image analysis algorithm to identify flocks of gulls in the image time series and the third task will be to correlate the frequency and location of gull observations and the presence or absence of sewage related material. Most importantly the general idea of using inexpensive surface mounted web cams and the occurrence of wildlife to monitor, track, and map events can be extended to many other problems that are spatially and temporally distributed.

II. Modifications and improvements to enhance the quality and availability of education in the B.S. Environmental Health (BSEH) degree program

Since LSSU applied for accreditation of its BSEH program in 2006 and received accreditation in 2007 we have seen slow steady growth in enrollment. This has been positive given that overall enrollment at LSSU has declined. Furthermore, this program is very inexpensive to offer in that it leverages courses that are used by other programs. The EHAC unequivocally endorsed our program in 2007 but they also suggested some additions to the curriculum. Most significant among these was the need to increase the content in the area of food safety. More recently, the EHAC recently revised the curriculum standards and recommended that we increase content in food safety, infectious disease control, and vector and rodent control.

I have recently received training in food safety and vector and rodent control. During my sabbatical I will obtain formal training in pool and spas safety and infectious disease control as well as practical training through the Chippewa County Health Department. I will develop a new course called Environmental Health Applications that will focus on food safety, infectious disease control, vector and rodent control, and pool and spas safety that can be used by BSEH students as well as recreation, nursing, and other students studying environmental science. I will fully evaluate the BSEH curriculum and prepare curriculum proposals that will bring it in-line with the new EHAC guidelines. In addition, to enhance our programs standing I will obtain my REHS credential. This credential requires an evaluation of my education and professional experience and taking and passing the Registered Environmental Health Sanitarian examination (REHS). After obtaining this credential I will be able to better assist LSSU students in their preparation for registration.

Over the past year we have had several discussions with Ms. Cheri Cleeves of the Algoma Health Unit in Ontario, Canada. There is a severe shortage of Health Inspectors in Northern Ontario and across rural Canada. In Canada all health inspectors must hold the Certified Public Health Inspector (PHS) credential from the Canadian Institute of Certified Public Health Inspectors (CIPHI). Graduates may sit for the CIPHI examination only if they are graduates of an accredited Canadian program or hold a valid U.S. REHS. There are only five accredited schools in Canada and the closest to Sault Ontario is Ryerson outside of Toronto. Canadian students that complete our program are immediately eligible to sit for the U.S. REHS credential and CIPHI will accept this credential in lieu of attending one of the five accredited Canadian Schools. This allows a Canadian student who completes our program and passes the U.S. REHS to sit for the CIPHI exam. We would like to develop an articulation agreement between Sault College and LSSU that will capitalize on the existing water Technician program at Sault College.

Benefits

The benefits of this sabbatical application are four-fold and satisfy criteria -1- in the application for sabbatical leave: *the strength of the relationship between a sabbatical leave proposal involving applied or theoretical research related to professional activities*

and the advancement of knowledge with disciplinary areas. The PPCP research is cutting edge research and leverages our existing equipment and expertise. Student projects and data from this research can be presented at the national or state level such as the Michigan Environmental Health Association Conference and provide our students with exposure and contacts. It is anticipated that at least one peer reviewed publication will be generated from this work. We will also resubmit the NSF proposal in the hope that we will be able to acquire even more advanced equipment for our student's educational benefit. The Web cam research is novel and can develop collaborations within the university and provide a valuable community service. If successful we anticipate presenting this work at the National ESRI conference and publishing it in a trade journal. The modifications to the BSEH degree are necessary and will give us an opportunity to revise our curriculum so that it is in-line with national standards and provide us with a forum for discussing our program nationally. Finally and most importantly, the modifications and potential articulation agreement will give our students much greater flexibility in scheduling and should aid student retention. Ultimately all of these proposal objectives satisfy the institutional goals of helping increase student recruitment, retention, and job placement while improving the recognition and quality of the BSEH program.

David C. Szlag, Ph.D., PE
Associate Professor
[redacted]

Education

Ph.D. Civil, Environmental and Architectural Engineering: Water Resources Specialty 1996
University of Colorado, Boulder, CO

M.S. Chemical Engineering: Biotechnology Emphasis 1988
University of Colorado, Boulder, CO

B.S. Chemical Engineering 1985; National Merit Scholar
Wayne State University, Detroit, MI

Experience

2001-present Associate Professor Chemistry and Environmental Science, and Coordinator: Environmental Health Program, Lake Superior State University, Sault Ste. Marie, MI.

Relevant Courses Taught: NS103-Environmental Science; CH091- Basic Chemistry; EV127 –Introduction to GPS; EV128- Introduction to GIS; EV 226- Intermediate Geospatial Analysis; EV227- Geospatial Analysis II; EVRN 325- Advanced raster Analysis; EVRN 345-Spatial Statistics; EV311- Environmental Law; EV313 Solid and Hazardous Waste; EV325- Advanced Geospatial Analysis; EV 425-Environmental Systems; CH 115 and CH116-general Chemistry; CH361- Physical Chemistry. Current research interests center on the integration of GIS into the Environmental Science Curriculum, Environmental Health, Sustainability, and Environmental chemistry

1994-2002 Research Engineer and Team Leader, U.S. Environmental Protection Agency, Office of research and development. National Risk Management Laboratory, Cincinnati OH

Most Recently: Hydrologic Impact Assessment Team Leader. Activities focused on developing ArcView extensions for determining the impact of land-use change and implementing a tradeable storm water credit system.

1991-1994 Research Assistant, Civil, Environmental, and Architectural Engineering, University of Colorado, Boulder, CO

Research Focus: Dissolution of Nonaqueous Phase Liquids in Heterogeneous Aquifers.

1987-1991 Project Engineer, National Institute of Standards and Technology, U.S. Department of Commerce, Boulder, CO

Engineering Responsibilities including collecting fundamental physical/chemical data and developing separation technologies based on emerging membrane materials and liquid-liquid systems.

1985-1987 Research Assistant, Chemical Engineering, University of Colorado, Boulder, CO. Research Focus: Fermentor Design

1983-1985 Electron Microscopy and Darkroom Technician, Wayne State, Detroit, MI

Special Environmental Health Training
Hazardous Materials Incident Response Operations 29 CFR 1910.120 (OSHA 40-Hr)
Emergency Planning and Release Reporting (SARA Title III)
ServSafe Certified
Biology and Control of Vectors and Rodents (NEHA)

Computer Applications and Languages
ArcView 3.x and extensions; ArcGIS 9.x and extensions; MathCAD; AutoCAD; MODFLOW; MT3D; PCSWMM; HEC-RAS; Visual BASIC and FORTRAN

Professional Registration
Colorado Registered Professional Engineer License 28400

Professional Associations
National Environmental Health Association
Michigan Environmental Health Association

Patents
Giuliano, K.A. and **Szlag, D.C.**, Aqueous Two-Phase Protein Extraction, U.S. Patent 5,093,254

Gonzalez, M.A., Kennard, C., and **D.C. Szlag**. Provisional Application: Process for Reduction of Inorganic Contaminants From Waste Streams. October 31, 2003

Relevant Technical Publications and Presentations

Westrick JA, **Szlag, D.**, Monitoring Drinking and Recreational Waters for Freshwater Cyanobacteria and Their Toxins. National Environmental Health Association 73rd Annual Educational Conference and Exhibition, June 23, 2009.

Westrick JA, **Szlag D.**, Monitoring Drinking and Recreational Waters for Freshwater Cyanobacteria and Their Toxins. Michigan Environmental Health Assocition, Traverse City MI, March 19, 2009.

Westrick JA , **Szlag D.**, Toxin producing algae and their occurrence in the Great Lakes, Emerging Issues and Technologies in Drinking Water. The Research and Technical Practices Committee of the Michigan Section, AWWA, Lansing MI, May 19, 2009.

Westrick, J.A., **Szlag, D.C.**, Southwell, B.J., Sinclair, J. (submitted)
A Review of Cyanobacteria and Cyanotoxins Removal/Inactivation in Drinking Water Treatment Analytical and Bioanalytical Chemistry. Manuscript No. ABC-01579-2009.

Westrick JA, Southwell BJ, **Szlag D**, Zimba P. (Accepted 2009), Detection of Cyanotoxins during Potable Water Treatment. Algae in Drinking Water, AWWA.

Thurston, H., Goddard, H. C., **Szlag, D.C**. and Lemberg, B. (2003) Controlling Stormwater Runoff with Tradeable Credits for Impervious Surfaces. Journal of Water Resources Planning and Management, 129 (5), 409-418. Accepted ASCE Journal of Water Resources Planning and Management 2003.

Thurston, H.W., Goddard , H.C., Szlag, D., and Lemberg, B. (2002) Trading stormwater abatement credits in Cincinnati's Shepherd Creek: A proposal to spread responsibility for stormwater control across a watershed cost-effectively and equitably. Stormwater 3(5):50-59.

Bolger, P.T and **D.C Szlag** (2002) An electrochemical system for removing and recovering elemental mercury from a gas stream. Environmental Science and Technology. 36(20) 4430-4435.

Bolger, P.T and **D.C Szlag** (2002) Investigation into the rejuvenation of spent electroless nickel baths by electrodialysis. Environmental Science and Technology. 36(10) 2273-2278.

Szlag, D.C. Thurston, H. and Goddard, H.C. Land-use, Economics, and Hydrologic Impact Assessment: A Step Towards Achieving Sustainable Development. AIChE Annual Meeting. Westin Bonaventure/Marriot, Los Angeles, CA November 12-17, 2000.

Snyder, S. M. Cole, K. D. and **Szlag, D.C**., Phase compositions, viscosities, and densities for aqueous two-phase systems composed of polyethylene glycol and various salts at 25 C, Journal of Chemical & Engineering Reference Data, Vol 37, No. 2, pp.268-274 (1992).

Illangasekare, T.H., **Szlag, D**., Campbell, J., Ramsey, J., Al-Sherida, M., Reible, D.D., Effect of heterogeneities and preferential flow on distribution and recovery of oily wastes in aquifers, Proc. of conference on Hazardous Waste Resh., Kansas State University, Manhattan, May, 1991.

Szlag, D. C. Snyder, S. and Giuliano, K. A., A low-cost aqueous two-phase system for affinity partitioning, Novel Bioseparations, J.F. Hamel, J.Hunter and S.K. Sikdar, Eds. ACS Books, Washington (1991).

Sikdar, S. K., Cole, K. D., Stewart, R. M., **Szlag, D. C**., Todd, P. and Cabezas, H., Jr., Two-phase aqueous extraction in bioseparations: an assessment, Bio/Technology Vol. 9, pp. 253-256 (1990).

Cabezas, H., Evans, J.D. and **Szlag, D.C**., A statistical mechanical model of aqueous two-phase systems, Fluid Phase Equilibria, Vol. 53, pp. 453-462 (1989).

Szlag, D.C. and Giuliano, K.A., A low-cost aqueous two-phase system for enzyme extraction, Biotechnology Techniques, Vol.2, No. 4, pp. 277-282 (1988).

Upon your return to LSSU, you are required to submit a report of your sabbatical leave to the Provost.

15.4.6: Recipients of Sabbatical Leave shall be required, during the first semester of their return, to submit a written report in electronic form outlining their experiences and achievements in keeping with the purposes for which the leave was granted.

Sabbatical Leave Reports will be posted to the Provost web page.

Return Report: Sabbatical Leave

1. Name of Professor: Dr. David Szlag

2. Department: Chemistry and Environmental Sciences

3. Time Frame of the Sabbatical Leave: Fall 2010

4. Title of Sabbatical Leave Proposal: Detection, Occurrence, and Fate of Pharmaceuticals and Personal Care Products released from On-Site Wastewater Systems

5. Narrative of Sabbatical Leave:

The granted sabbatical leave was for one semester rather than the two requested, consequently I narrowed the scope of the original proposal, as suggested by the sabbatical committee, to focus primarily on my research on endocrine disrupting chemicals (EDCs) and pharmaceuticals and personal care products (PPCPs). It was estimated that 8.2 million tons of sewage sludge would be land-applied in the United States in 2010. Numerous studies have shown that many pharmaceuticals and personal care products (PPCPs) and endocrine disrupting chemicals partition from the liquid sewage phase to the biosolids and are not completely removed by conventional treatment. Furthermore, the PPCPs can be transformed in the human body and waste water treatment plants to metabolites that are still bioactive and have ecological and human health effects. The majority of the biosolids are land-applied and the biosolids may concentrate these PPCPs and their metabolites in the soil and create a long-term risk to drinking water sources. In the past 10 years, researchers have reported that conventional drinking water treatment is not completely effective and many PPCPs can be found in the finished drinking water. Consequently, many individuals and small communities that rely on groundwater, which receives little or no treatment, are at risk. Advances in rural sewage treatment are critical to preventing secondary PPCP exposure. The current treatment techniques do not remove these compounds. The bulk of my sabbatical was spent working with a local company called Big Fish LLC (Charlevoix, MI) that is developing small package sewage treatment plants to treat high strength wastewater/ biosolids to remove the PPCPs before land application. This technology offers numerous improvements over conventional treatment methods.

The major innovation that I developed for Bigfish was the incorporation of biological nitrogen removal (BNR) into the Big Fish Environmental treatment process to minimize ecological and human health risk by producing nutrient, pathogen, and PPCP-free effluent, and a marketable EQ Class A biosolids product. Biological nitrogen removal occurs by two primary mechanisms: 1) biomass synthesis (nitrogen assimilation) and 2) biological nitrification and denitrification. I worked with a multi-disciplinary team: John Campbell (Big Fish Environmental), Joan Rose (Michigan State University), Richard Rediske (Grand Valley State University), Judy Westrick (Lake Superior State University) and Paul Zimba (Texas A and M, Corpus Christi), to submit a NSF-SBIR grant incorporating the biological nitrification and denitrification into the Big Fish Environmental's process along with ozonation prior to discharge. Unfortunately, this grant was not funded but the work is continuing at albeit a lower intensity.

In addition I coauthored a grant to NSF entitled, "Acquisition of a Liquid Chromatograph with Tandem Mass Spectrometers for Undergraduate Research and Education focusing on the Environment and Sustainability ($279,000). " My proposed research focused on both the occurrence and removal of endocrine disrupting chemicals (EDCs) and pharmaceuticals and personal care products (PPCPs) contaminants in biosolids and wastewater residuals. This work encompasses developing techniques based on USEPA Method 1694 for the analysis of PPCPs in septic sludge, identifying parent PPCPs and their metabolites, and investigating the efficacy of sludge stabilization techniques. During my sabbatical, I began investigating the removal of PCPPs from biosolids in a novel package waste water treatment plant (WWTP) developed and operated by a local company, Big Fish LLC of Charlevoix, MI. Only the proposed LC/MS/MS combined with isotope dilution can achieve the nanogram per liter detection limits required for meaningful analysis of emerging contaminants such as cyanotoxins and PPCPs in complex environmental matrices. This instrumentation grant would complement my work in PPCPs and EDCs allowing very low level detection and quantification and Dr. Westrick's work in algal toxins. This grant received very good reviews and was recommended for funding, but due to economic circumstances was not awarded. We will resubmit.

Other activities included

Texas A&M University, Corpus Christi, TX. November 2010

I trained in the use of an Agilent HPLC/MS/MS hardware and software and acquired preliminary data for our grant proposal. I ran a modification of : USEPA Method 1694: Pharmaceuticals and Personal care Products in Water, Soil, Sediment, and Biosolids by HPLC/MS/MS

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I also worked on developing a GC method similar to USEPA Method 1698: Steroids and Hormones in Water, Soil, Sediment and Biosolids by HRGC/HRMS with Becky Wilson. She presented her Senior Thesis, " A GC-MS Method for the Analysis of Bis-Phenol A" in spring 2011.

2010 Great Lakes Beach Association Conference. Erie, PA October 19-22, 2010.

I attended the "Virtual Beach Modeling Workshop and received extensive training in the implementation of USEPAs Virtual Beach 2.0 software. I have assisted Shane Albrecht, a student in Biology and intern with the Chippewa County Health Department with calibrating and validating a model for Chippewa County.

Finally I organized a Seminar: Emerging Issues in Children's Environmental Health presented by Maryann Suero of the USEPA Region 5 for our Faculty and students.

Publications completed

Westrick JA, Southwell BJ, **Szlag DC**, Lenca NM *(2011)Technologies for Early Warning and Detection of Cyanobacterial Harmful Algal Blooms Leading to Integrated Source Water Protection.* Water Treatment Processes, Ed: Demadis K, Nova Science Publishers, Inc.

Westrick JA, **Szlag DC**, Southwell BJ, Sinclair J (2010)

A Review of Cyanobacteria and Cyanotoxins Removal/Inactivation in Drinking Water Treatmen. Analytical Bioanalytical Chemistry 397(5):1705-14.

Westrick JA, Southwell B, **Szlag DC**, Zimba P. (2010) Detection of Cyanotoxins during Potable Water Treatment. Algae Source to Treatment, AWWA.

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