IUPUI
INDIANA UNIVERSITY–PURDUE UNIVERSITY INDIANAPOLIS

School of Science
Department of Geology
402 N. Blackford Street
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OWNING A SUCCESSFUL ENVIRONMENTAL CONSULTING FIRM:

1988 Alumna Deborah Peters Describes What It Takes

Deborah Peters has translated her Geology education into a successful environmental consulting business. She credits her professors and course work for helping her develop skills that she uses everyday.

What steps did you take to start your firm?
While working for an engineering firm, I had established an environmental department. The firm offered me the opportunity to purchase the environmental business in 1995. I worked with my attorney and accountant to put together an asset purchase agreement with the engineering firm. Then, I prepared a five-year business plan and completed a small business loan application, which was approved. I used this loan and everything in my personal savings account to capitalize Quality Environmental Professionals, Inc. (QEPI). One month after I founded QEPI, I allowed three QEPI employees to purchase a total of 15 percent of the company, which provided additional capital.

Establishing a business meant more than just going out and completing environmental work, it also meant establishing policies and procedures, creating an accounting and administrative department, arranging lease options for phone systems and company vehicles, leasing office space and securing rental insurance. It also meant establishing employee health care programs, employee training programs and purchasing professional liability insurance and workers compensation. Then, of course, the company needed business bank accounts, payroll accounts, 401(k) plans, corporate health and safety plans, quarterly tax installment payment plans, stockholders agreements, articles of incorporation and a federal tax ID number. Thank goodness I was a business finance/marketing major before I was a geology student at IUPUI.

What were the obstacles to building your firm, and what are the continuing issues?
The major obstacles for QEPI in the beginning are the same challenges we face today. That is: securing enough working capital to grow the company and hiring the right individuals.

What has been the most challenging or exciting project that your company has tackled to date?
One of QEPI's most exciting projects was a hazardous waste site where more than 1,000 drums and numerous tanks were dumped into an abandoned industrial facility. This site had explosive materials, requiring QEPI staff to work with IDEM and EPA staff, as well as the local fire department. This project came at a time when the company was still very small; we had to complete it with less than 11 people over the Christmas and New Year holidays. For three weeks, my entire staff worked on the site, and I was solo in the office handling marketing, administrative work and operational management.

How did your training and experiences at IUPUI help your career?
My geology training at IUPUI helped me many ways. I learned to work hard during my hydrogeology course with Professor **Bob Hall**. Professor **Art Mirsky's** reporting skills for geosciences course taught me how to speak to a group and to understand the importance of deadlines. Professor **Gary Rosenberg's** un-answerable essay taught me how to be more creative, rather than dogmatic. And, yes, Dr. Rosenberg allowed his students to look in the text to find an answer for that un-answerable essay. Physics taught me anger management, and organic chemistry lab taught me to concentrate and slow down. I enjoyed the smaller class sizes and the personal attention that I received from IUPUI Geology instructors, as compared to IU business classes. It was a very beneficial educational experience—and a great deal of fun!

Do you currently interact with IUPUI Geology?
Yes, I still interact with IUPUI Geology! I like to hire graduates from IUPUI because I am aware that they are good, hardworking geologists. In fact, I have a couple of IUPUI trained geologists who work at QEPI.

What advice would you give to students if they want to prepare for a career in environmental geosciences?
A geology student at IUPUI who is interested in becoming an environmental consultant should take electives in the areas of business management, finance, report writing and communications. All of these courses are essential to becoming a great geologist in environmental consulting. Some of the very best technical geologists do not succeed in consulting because they cannot communicate in a manner the client can understand, nor can they complete the product work in the timeframe that is needed by the client. Also, students should work in the environmental field as interns. These experiences illustrate how course work is applied in field practices.

Deborah Peters is the founder and president of Quality Environmental Professionals, Inc. (QEPI), as well as the managing principal and the director of business development for the company. In 1988, she earned her bachelor of arts in geology from IUPUI. Peters has a unique and diverse background that has enabled her to provide her clients with the most economical and innovative technology for every environmental and management project. A licensed professional geologist in Indiana, Illinois and Tennessee, Peters has more than 21 years of management experience and more than 19 years of experience in environmental consulting. She has conducted project work throughout the country in nine different USEPA regions and in 20 different states. QEPI operates under a team leadership philosophy, with QEPI's greatest assets being the employees.

A PUBLICATION FOR THE ALUMNI AND FRIENDS OF THE DEPARTMENT OF GEOLOGY AT IUPUI

FALL 2005

horizons

FROM THE DESK OF THE CHAIR

GABE FILIPPELLI
Fourth Chair of the Department of Geology

Friends,

Welcome to the 2005 edition of Horizons, *a newsletter for IUPUI Geology alumni and friends.* In this issue, we are spotlighting our alumni, revealing where they've gone and what they're doing.

Dr. Jennifer Latimer offers a primer on issues surrounding global warming; she writes from her new faculty office at Indiana State University where she began the fall semester as an assistant professor of geology. Deb Peters shares words of wisdom from her executive office. Deb has grown from humble IUPUI Geology student to CEO, having established a thriving business that is among the top environmental consulting firms in central Indiana. Robyn Raftis speaks from the front—the Front Range that is—as she describes her recent experiences working for the National Park Service at Grand Teton National Park.

With these profiles, we illustrate the variety of opportunities available to IUPUI Geology alumni, and how you, as an alumnus/a, are building upon your geology background. If we had highlighted all of the wonderful things our alumni are doing, *Horizons* may be nearly 100 pages rather than four. Yet, these four pages reflect our pride for you and your accomplishments.

With a stable faculty that now totals 11, the Geology Department is focused this year on advancing further the quality of geology and environmental science education and research. The Indiana Commission for Higher Education recently approved a new B.S. degree in environmental science, expanding the department's bachelor's degree options to three. We expect our first students during the 2006-07 academic year. At 16, we have reached capacity for full-time graduate students. If we continue successfully with this trend, we will have to convert our graduate student office into a bi-level arrangement. (Remember *Being John Malkovich*?) Our proposal for a Ph.D. degree in interdisciplinary applied earth sciences is nearly finalized, and we hope to advance this through the university administration in the coming year. Finally, the faculty has been extraordinarily successful with external funding. They've made a record number of grant applications and have received funding for a large number of those, including three major, multi-year projects funded by the National Science Foundation.

The department is growing and changing, but we have not forgotten our most important job—to teach geology students. To that end, we are revising our curriculum. The revisions will integrate the traditional needs of a basic geoscience background with some of the newer, interdisciplinary directions that are driving much of today's geoscience research and teaching across the country. Our goal is to establish a strong footing in the geosciences for our students, while providing some detailed and interdisciplinary training in related science fields.

This background should provide students with the tools to accomplish their goals, regardless if they choose professions like those that are highlighted in this issue's alumni profiles or in fields of which we cannot conceive today.

Best wishes for a wonderful year, and please keep in touch!

Gabe Filippelli

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IN THIS ISSUE

IUPUI
Indiana University–Purdue University Indianapolis

GEOLOGY AND ENVIRONMENTAL SCIENCE
ARE INDIANA UNIVERSITY DEGREE PROGRAMS
OF THE IUPUI SCHOOL OF SCIENCE

AN UPDATE FROM THE HIGHEST, DRIEST, COLDEST, WINDIEST CONTINENT ON EARTH

Geology faculty members ***Kathy Licht*** *and* ***Andy Barth****, along with graduate student* ***Emerson Palmer*** *(B.S. 2004) and colleagues from other universities, recently returned from Antarctica, where they were conducting field research as part of a project funded by the National Science Foundation. Following is an excerpt from their adventures.*

On Friday, we were some very lucky geologists! Emerson, Peter (an Antarctic mountaineer) and I were scheduled to go out to the Byrd Glacier, which is one of the most gnarled on the planet. It drains about 1,000,000 km^2 of the East Antarctic ice sheet and flows over 800 meters per year (one of the fastest on earth). It is heavily crevassed (fractured) and is usually thrashed by extreme winds. As such, few people have had the good fortune to get near it.

Peter (who has more than 20 years of experience) predicted that the chance of us getting to any sites along the glacier was less than five percent. But on that Friday, we had the right weather and the right pilot, allowing us to land at three sites along its edges! Our pilot was brilliant and landed on small frozen ponds between the main part of the glacier and the cliffs along its sides. After landing, it was only a short walk with our sampling supplies to the glacial moraines where we spent about two hours collecting samples. At each site, we collected more than 150 pounds of rocks and sediment for analysis back in the U.S.

Kathy Licht, assistant professor of geology, was among a team of geologists who returned recently from Antarctica.

Our last site of the day was Mt. Tuatara, where we experienced some of the typical Byrd Glacier winds. We experienced quite a bit of turbulence during our approach. The pilot made us wait a few minutes in the plane after landing. During our wait, the pilot anchored down the plane with screws into the ice; he wanted to make sure that the plane was still there when we finished our sampling! We named one of the sampling sites after that pilot, calling it the "Crazy Jim" site.

JOIN THE GEOLOGY ALUMNI COUNCIL

Geology Alumni Council President Lorraine Wright invites all Geology graduates to participate in the Alumni Council. The Alumni Council sponsors a student-centered career day, technical programs and a holiday party for alumni, students and faculty. The Council is an affiliated group of the IUPUI School of Science Alumni Association.

To join, contact Lorraine Wright at 784-1159 or lwright@indy.rr.com.

Geology graduate **Jennifer Latimer, Ph.D.** is an assistant professor of geology at Indiana State University, where she continues her research in environmental geochemistry.

GLOBAL WARMING: A Conversation with Jennifer Latimer '98 '04

We hear a lot about global warming, but could you briefly explain the natural processes related to climate change and the concept of global warming?

A very complicated set of processes controls earth's climate, including the concentration of greenhouse gases in the atmosphere, how the continents are arranged, earth-sun geometry and ocean circulation, but in general, earth's climate is determined by how much solar radiation is absorbed by the earth or reflected back into space. Greenhouse gases in the atmosphere act to trap heat, warming the earth and making earth livable. However, if greenhouse gas concentrations continue to rise, earth will continue to warm, and there may be significant impacts on ecosystems, water resources and crop yields. In addition, sea level may rise, and the occurrence of extreme weather events may increase. Global warming simply means that earth's average surfaces temperature is rising.

There is still some remaining uncertainties about people's role in global warming. Have humans contributed to warming, and if so, how do we know?

We know from studying ice cores that today's atmospheric CO_2 levels have exceeded the natural variability of the last 400 thousand years and have been rising dramatically since the Industrial Revolution. We also know, from studying instrumental records such as those at Mauno Loa, Hawaii, that CO_2 levels have been steadily rising since the 1950s. The rise in CO_2 is largely attributed to the burning of fossil fuels and deforestation.

Several proposals have arisen to reduce greenhouse gases in the atmosphere, including reduced emission from cars and power production and storing carbon dioxide in the deep earth and ocean. One additional popular idea is that we could "seed" parts of the ocean with iron to "suck up" carbon dioxide. Could you explain this theory?

Carbon fixation is a natural process where plants remove carbon from the atmosphere and store it in their tissues through photosynthesis. Single-celled marine plants (phytoplankton) are responsible for about 40-50 percent of all carbon fixation on earth. Just like on land, marine plants require certain fertilizer elements for their growth, such as nitrogen and phosphorus. Usually, the availability of these fertilizer elements controls how many marine plants there are—in other words, how productive they are. In most ocean settings, these fertilizer elements are completely consumed by the marine plants. However, in a few ocean settings, marine plants have plenty of nitrogen and phosphorus and instead are controlled by iron availability. If we add iron to these areas, many believe that carbon fixation would increase and ultimately lead to the storage of this carbon in the deep ocean. Open ocean fertilization experiments in the Southern Ocean, equatorial Pacific and sub-Arctic north Pacific have demonstrated that adding iron to surface waters does lead to a temporary increase in productivity, but little is known about how much of the carbon, if any, is stored in the ocean.

You have conducted research on the past history of the ocean with a focus on iron fertilization. What have you found?

Often, the rationale for iron fertilization of the modern ocean relies on the hypothesis that iron coming off of the continents as dust during the last ice age was deposited in the oceans, which led to higher levels of carbon fixation and carbon sequestration. However, we have found that most of the dust-iron is almost undetectable in Southern Ocean sediment cores and that most of the iron reaching phytoplankton is actually transported by ocean currents rather than winds. There doesn't seem to be a straightforward relationship between climate state and productivity. Currently, there is no unequivocal evidence that phytoplankton productivity in the Southern Ocean was higher during the last ice age.

Can you provide recommendations about how we might be able to respond to global warming and perhaps limit its effects?

We need to limit our emissions of greenhouse gases, including carbon dioxide, and our reliance on fossil fuels. This means that we should explore alternative energy sources and new technology such as the hybrid electric vehicles that get significantly better gas mileage. One of the easiest ways for all of us to make a contribution is to simply drive our cars less.

Jennifer Latimer, Ph.D. is an assistant professor of geology in the Department of Geography, Geology and Anthropology at Indiana State University. Latimer earned a bachelor's degree in chemistry at IUPUI in 1995. She holds two geology degrees, earning her master's degree in 1998 and a Ph.D. in 2004. Latimer's research specialties include sediment geochemistry, paleoceanography and environmental geochemistry.

NEW RESEARCH CENTER TO FOCUS ON THE INTERACTIONS BETWEEN GEOLOGY, ENVIRONMENTAL QUALITY AND HUMAN HEALTH

The quality of the environment significantly impacts human health, and many human diseases are directly related to the environment. The significance of this relationship is evidenced by the creation of international and national organizations such as the World Health Organization and the National Institutes of Health.

Locally, environmentally-driven human disease negatively impacts the state of Indiana with the loss of jobs, revenue and quality of life. To reverse these trends, IUPUI is leading a coordinated effort in environmental health sciences. The combination of academic health science research, environmental research, county and state public health programs, state environmental programs, information technology and centers for policy are all located on or near the IUPUI campus. IUPUI provides an excellent geographic and philosophical template to foster understanding and improving human health and the environment.

To pursue this effort, **Gabe Filippelli**, chair and professor of geology, and **Jim Klaunig,** professor of toxicology (IU School of Medicine), recently created a new research center of excellence to be named the Center for Environmental Health. Filippelli will serve as the associate director, while Klaunig directs the center.

The mission of the Center for Environmental Health is:

- To nucleate and support interdisciplinary research programs bridging environmental analysis with human health.
- To enhance the quality of life of people in Indiana and around the world.
- To cultivate external grant proposal development in environmental health.
- To maximize resource use efficiency in the health sciences, environmental sciences and information technology.
- To develop training programs to equip individuals with the knowledge to integrate environmental and health issues.

DEPARTMENT OFFERS NEW BACHELOR'S DEGREE

Environmental science is an interdisciplinary field of study that investigates questions related to the human population, natural resources and environmental management. It includes the study of the interrelationships in the modern environment of humans and natural phenomena. Environmental science focuses on important modern concerns, like how our global climate is changing and how that change may affect human activities; how to maintain and improve vital natural resources like drinking water; and how to manage and balance the quality of the environment in the face of improving the quality of life in the United States and abroad.

Now, students have an opportunity to earn a degree in environmental science at IUPUI. The bachelor of science in environmental science (BSES) is an interdisciplinary degree offered by the School of Science in partnership with the IUPUI schools of Public and Environmental Affairs and Liberal Arts. Professor **Lenore Tedesco** is the BSES program director.

Additional environmental programs are offered in the schools of Science, Public and Environmental Affairs and Liberal Arts. The Department of Geology offers both the bachelor of arts and bachelor of science in geology with opportunities to study environmental problems. The School of Public and Environmental Affairs offers a bachelor's degree in public health with a major in environmental science and health. Finally, the School of Liberal Arts offers the bachelor of arts in geography and an array of environmentally-focused courses in various disciplines.

NEW DEGREE

If you have a story you'd like to share with other IUPUI Geology alumni and friends, please send your information to:

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The Grand Teton National Park is more than beautiful scenery and magnificent wildlife. It's a workplace for 2001 Geology alumna Robyn Raftis, who is working toward a career that will allow her to protect the precious places of our earth.

ROBYN RAFTIS'01 JOINS THE NATIONAL PARK SERVICE

How did your opportunity to work for the National Park Service arise?

One day, when I was meditating on what job would truly make me happy, I decided I wanted to work to protect the sacred, beautiful places of our world. In March 2005, I found a federal government job posting for interpretive park ranger positions and learned that in this position I could plan programs for park visitors. So, I applied. By the end of April, after 10 rejection letters, I realized that it isn't easy to become a park ranger with the National Park Service. But, I wasn't deterred, not yet anyway. An additional 15 letters later, I lowered my salary standards and applied for a visitor use position at Grand Teton National Park. Visitor use translates to fee collector at the south entrance of Yellowstone National Park.

I interviewed with the supervisors at Grand Teton on a Sunday and agreed to travel west by the following Friday, if I was chosen. I told them of my inner need for a position with the National Park Service. I described my commitment to the job, even though I was "technically" over qualified. I learned that some of the top officials began their careers at entrance gates. Later that Sunday night, I received a call. I was on my way to Wyoming by Thursday evening.

What qualifications does NPS look for in hiring people?

The most important quality, which seems to be pretty important regardless of what position you take, is connection to people in the industry—networking. If someone in the park service knows you are interested in a position, and if you have worked for the park service before, even as a lodge employee, that individual will be looking out for you. Of course, a college degree is important because the number of people interested in park service jobs is greater than the number of jobs that are available.

You have to like people too. In 1872, when Yellowstone was named the first national park, it was founded for the "enjoyment and benefit of the people." Park service people are very patient, kind and gentle everyday to the hundreds of excited visitors. When I'm not writing on my master's thesis, getting ready for GSA, working the entrance gate or enjoying the mountains, I volunteer at the Moose Visitor Center. The interpreters there answer many of the same questions that I answer on the gate. Also, I initiate new members to the Young Naturalist program; it's one of my favorite things to do.

What drove your interest in working for the NPS?

It has a lot to do with coming out of a cloud and realizing that I can do what ever I want to do, which means I can actually be happy with my career. Nature was there for me as a child, and now, I can help to protect it. Many people volunteer or give money; I wanted to be a breathing part of the system. Politics exist. There are times that I want to be back in my comfortable office located in the basement of the science building. But, all I have to do is look at the mountains, and I remember why I am here.

What do people do on a day-day basis at the Grand Teton National Park?

The park has three visitor centers and campgrounds, as well as trails that wind around the peripheries of glacial lakes and traverse canyons and mountain peaks. Oh, and I would be remiss if I didn't mention the wildlife! Bison, moose, bald eagles, mule deer and elk all live here. Grizzly and black bear sightings are a daily occurrence in the summer. In Indianapolis, there are traffic jams. At Grand Teton, there are critter jams! The daily operations of the park involve the management of all these various aspects, with law enforcement being a big one. Rangers patrol the trails, rivers, lakes, campgrounds and park roads.

What are your personal long-term career goals?

My first goal is to engage in on-going research and/or education for the NPS. I am willing to do either. I have made it this far, and the exposure has been invaluable. I imagine at sometime that it will be my responsibility to get into the political arena and to lobby for the funding and protection of the precious places of our earth.

Robyn Raftis received her bachelor of arts degree in geology in 2001. While in Wyoming, she's completing work on her master's thesis.

FACULTY AND STUDENT RESEARCH ACCOMPLISHMENTS:
January-May 2005

Papers Published or Accepted

LICHT, KJ, Lederer, JR, and SWOPE, RJ, *in press*. Provenance of LGM Glacial Till (sand fraction) across the Ross Embayment, Antarctica. *Quaternary Science Reviews*, v. 24.

JACINTHE, PA and Lal, R, 2005. Labile carbon and methane uptake as affected by tillage intensity in a Mollisol. *Soil and Tillage Research 80* (1-2): 35-45.

FILIPPELLI, GM, Laidlaw, M, Raftis, R, and Latimer, JC, 2005. Urban lead poisoning and medical geology: An unfinished story. *GSA Today,* v. 15: 4-11. (doi: 10.1130/1052-5173(2005)015<4:ULPAMG>2.0.CO;2).

Laidlaw, M, Mielke, HW, FILIPPELLI, GM, Johnson, D, and Gonzales, CR, 2005. Seasonality and children's blood lead levels: Developing a predictive model using climatic variables and blood lead data from three US cities. *Environmental Health Perspectives,* (doi:10.1289/ehp.7759).

Flores, JA, Sierro, FJ, FILIPPELLI, GM, Bárcena, MA, Pérez-Folgado, M, Vázquez, A, and Utrilla, R, *in press.* Surface water dynamics and phytoplankton communities during deposition of cyclic late Messinian sapropel sequences in the western Mediterranean. *Marine Micropaleontology.*

Huerta-Diaz, MA, Tovar-Sánchez, A, FILIPPELLI, GM, Latimer, JC, and Sañudo-Wilhelmy, SA, *in press.* A novel method for the determination of phosphorus associated with sedimentary iron oxyhydroxides. *Applied Geochemistry.*

Whiting, ML, LIN, L, and Ustin, SL, *in press.* Effects of overlapping absorption on soil mineral content estimates, *Remote Sensing of Environment.*

LIN, L and Mustard, JF, *in press.* On lateral mixing efficiency of lunar regolith, *Journal of Geophysical Research-Planets.*

LIN L, Ustin, SL, and Lay, M, *in press.* Mapping vegetation of costal salt marsh with multiple endmember spectral mixture analysis (MESMA) of hyperspectral AVIRIS imagery, *International Journal of Remote Sensing.*

LIN L and Ustin, SL, 2005. Application of AVIRIS data in detection oil-induced vegetation stress and land cover change at Jornada, New Mexico, *Remote Sensing of Environment,* 94: 1-16.

Papers Submitted

VIDON, P and Kao C, 2005 *in review.* Impact of stream water level on water table fluctuation and nitrogen evolution in a grassed riparian zone. *Biogeochemistry.*

TEDESCO, LP, and Salazar, KA, *in review.* Using Environmental Service Learning in an Urban Environment to Address Water Quality. *Journal of Geoscience Education, Special Issue Teaching in the Field.*

Mulitsch, M, LIN L, and Ustin, SL, *in review.* Effects of climate change on San Francisco Bay estuary communities, *Ecological Application.*

FILIPPELLI, GM, Murray, RW, Flores, JA, and Latimer, JC, *in review.* Deep ocean support for the glacial shelf-nutrient hypothesis. *Nature.*

FILIPPELLI, GM, Souch, C, Horn, SP, and Newkirk, D, *in review.* The influence of climatic and anthropogenic factors on terrestrial nutrient cycling: Insight from lake phosphorus geochemical records. *Earth Interactions.*

External Grants Funded

Collaborative Research: Integrated Study of East Antarctica ice sheet Tills (ISET): Tracers of ice flow and proxies of the ice-covered continental shield. National Science Foundation, Office of Polar Programs. PIs: K LICHT, J SWOPE with two outside collaborating PIs. $152,944, 6/05-5/08.

Testing the shelf-nutrient hypothesis by examining the oceanic phosphorus cycle on glacial timescales. National Science Foundation, Marine Geology and Geophysics. sole PI: GM FILIPPELLI. $300,000, 4/05-4/09.

Current ongoing external grants include National Institutes of Health research support for G ROSENBERG and National Science Foundation support for A BARTH.

External Grants Submitted

Creating sustainable drinking water supplies for Central Indiana: innovations to achieve reductions in watershed and reservoir nutrient levels. Environmental Protection Agency: Targeted Watersheds Grant Program. Main PI: L Tedesco with J Ramos and P VIDON. $898,559.

Soil properties and processes controlling methane oxidation in a no-tillage chronosequence. USDA-NRICGP 2005, Soils and Soil Biology program. Main PI: P JACINTHE with R Lal and WA Dick. $189,105.

Global Lunar Regolith Mixing Constrained by Compositional Mapping and Monte Carlo Modeling Using Clementine UVVIS/NIR Data. NASA. Main PI: L LIN with A BARTH, RJ SWOPE, and two other collaborators. $235,397.

Impact of Two Riparian Zone Installation Strategies on Nutrient and Sediment Exports at the Watershed Scale. U.S. Department of Agriculture. National Research Initiative Competitive Grant Program. PI: P VIDON. $391,721.

Collaborative Research: Implementation of Best Practices in Designing Online Learning Materials to Research Effective Online Geoscience Teaching Strategies. National Science Foundation, Course Curriculum and Laboratory Improvement. Main PI: C THOMAS with co-PIs: R Schultz, A Morrone, and J Young. $150,000

Identifying sources of lead to children in urban Indianapolis as a means to reduce elevated blood lead levels. US Environmental Protection Agency. PIs: GM FILIPPELLI, L LIN, and three others. $86,500.

Indiana Superfund Basic Research Grant. National Institutes of Health. Co-PI: GM FILIPPELLI with 15 others, main PI: J Klaunig. $16,420,959 (FILIPPELLI portion $315,000).

Comparative Role of Point Sources Versus Atmospheric Input in Heavy Metal Contribution to Southern Lake Michigan. NOAA-Illinois-Indiana Sea Grant Program. Lead PI: GM FILIPPELLI with three others. $49,995.

ENSEMBLE: Extensive Networked Scientific-Enquiry Mobile-Based Learning Environment. National Science Foundation NSDL Program. Co-PI: LP TEDESCO with co-PIs: Y Rogers, P Baker, K Connelly, J Mostafa. $499,911 pending.

Hyperspectral Remote Sensing for Water Quality Classification of Central Indiana Reservoirs. US Environmental Protection Agency. Main PI: L LIN with LP TEDESCO and W Jones. $235,361.

Developing a Survey Tool for the Rapid Assessment of Blue-Green Algae in Central Indiana's Reservoirs. Indiana Development of Natural Resources Division of Soil Conservation. Main PI: L LIN with LP TEDESCO. $20,062.