FALL 2006

The Newsletter of
the Department of
Nuclear Engineering and
Radiological Sciences

As the United States embarks on the second nuclear age with the Global Nuclear Energy Partnership and imminent ordering for a new fleet of nuclear power plants, it is imperative to develop advanced nuclear fuel cycles that can meet objectives related to waste reduction, nonproliferation, safety, and cost minimization. Active research in nuclear fuel cycles has been underway in NERS for several years, established initially as part of the DOE Accelerator Transmutation of Waste Program and more recently as part of the Advanced Fuel Cycle Initiative (AFCI). The research involved over the years a number of graduate and undergraduate students and faculty members, including James Holloway, Bill Martin, Ronald Fleming, and John Lee. Recent AFCI activities included thorium-based fuel cycles for both light water reactors (LWRs) and sodium-cooled fast reactors (SFRs), and the development of computational methods for systematically optimizing various fuel cycle objectives. Most notably, two doctoral students, Reuben Sorensen and Jeffrey Davis, working with Professor Lee, have developed an efficient algorithm that optimizes a multitude of fuel cycle objectives while rigorously satisfying operational constraints.

The new optimization methodology systematically and efficiently generates an optimal fuel assembly loading pattern and optimal burnable absorber (BA) distribution that maximizes, for example, the depletion of plutonium in a core loaded with mixed uranium and plutonium oxide fuel or the cycle length for a traditional LWR uranium oxide core. The necessary condition for an optimal BA loading is obtained via calculus of variations subject to a power peaking constraint. The resulting optimality conditions require an iterative solution of the forward and adjoint fuel depletion equations through a conjugate gradient method. The power peaking constraint is rigorously satisfied at each depletion step through a backwards diffusion theory to arrive at optimal BA loadings. Reuben Sorensen

CONTINUED ON PAGE 5
Greetings to all members and friends of the Michigan NERS community! This has been an exciting year for our department, and I would like to share some of last year’s events with you in this short note. I also urge you to peruse the rest of this issue of NERSNotes and catch up on what’s happening in NERS.

Let me start out with changes to our faculty and staff rosters. Two new faculty join us this year, Associate Professor John Foster and Professor Karl Krushelnick. John comes to us from NASA Glenn and works in the areas of plasma processing and plasma space propulsion. He is already hard at work building his research lab in Cooley, and will be teaching NERS 471 (Intro to Plasmas) and NERS 575 (Plasma Lab) during the coming year. Karl wrapped up his previous responsibilities as Professor of Physics and Head of the Plasma Physics Group at Imperial College London. In addition to his professorial appointment in NERS, Karl will be Associate Director of the Center for Ultrafast Optical Science (CUOS), where he will be performing his research. We are pleased to have these two outstanding plasma physicists join our department, bringing our total faculty headcount to 16. On the staff side, Donna Constant joined our staff this past year as an academic secretary. Donna will be assisting Pam Derry with the undergraduate program along with other duties in the department. Sometimes, people leave NERS also! Celebrating retirements during this past year were Pat Moore and Victor Rotberg, and Emily Koopmann left to pursue her education. Finally, Ling-Jian Meng left his research faculty position with NERS to take a professorial position at the University of Illinois. More details on all of our faculty and staff changes can be found in this newsletter.

The vital signs for NERS are very good. Our undergraduate enrollment is 85 sophomores, juniors, and seniors. To put this in perspective, this is twice our enrollment in 2000! This upward trend in undergraduate enrollment is being experienced by nuclear engineering departments nationwide and is one of the positive indicators that has nuclear engineering professionals upbeat about the future of our discipline. Our graduate enrollment is also very strong, numbering about 85-90 students. Of course, a large graduate enrollment requires a strong research program to provide the funding to support those students, and NERS is doing very well on this front as well. Research expenditures per faculty member were over $500,000 last year, one of the highest in the College. But NERS faculty do very well on the instructional side also, instructing more students per capita than all departments in Engineering except Mechanical Engineering. This is primarily due to our decade-long tradition of teaching first-year computing, but our increasing enrollments have contributed as well.

Our students continue their outstanding tradition of activities and service. Following up on last year’s Glasstone Award from the American Nuclear Society for being the best student chapter in the U.S., the student ANS Chapter won the Elaine Harden award from the College of Engineering for their leadership and service as the best student society. From volunteering to judge at science fairs to providing assistance to help seventh and eighth graders from Detroit learn about engineering and opportunities for college, our students have exemplified the best ideals of service to the department, to the profession, and to the greater community. There are several articles on student activities in this newsletter, including ones written by students, so please take the time to read further.

But this tradition of service and commitment to the profession doesn’t end with graduation. Michigan NERS has a very active and productive alumni population, as will be evident if you read...
the articles in this newsletter pertaining to our alumni and their achievements. Most notably, Jack Carpenter, a NERS alum and former NERS faculty member, received the Clifford G. Shull Prize in Neutron Science. Jack has also contributed a personal note about his experiences as a graduate student in NERS (see p. 12). Sam Werner was honored with a symposium (a “Festschrift”) recognizing his career achievements in nuclear physics. Other interesting (and entertaining) notes about our alumni can be seen in the Alumni Notes section.

By now, many of you have heard that the NERS graduate program is ranked number one by the U.S. News and World Report (USNWR)! In the latest ranking released in April, Michigan forged ahead of MIT as having the best graduate program in nuclear engineering in the U.S. Although department rankings are based on opinion surveys of leaders in academe and industry, and not objective data such as used with the college and university rankings, we are nevertheless pleased to receive this recognition. The USNWR rankings receive wide attention nationally and internationally, especially by prospective students, so this ranking is important for the department.

Let me finish this chair’s note with a few comments about the department infrastructure and facilities. The Cooley Building, our longtime home, now belongs entirely to NERS. The thousand square feet of office space on the east end of the second floor, formerly occupied by the College’s Media and Marketing group, now belongs to NERS. Zhong He moved his research group to that space in May and it is now fully occupied by graduate students, research faculty, and visiting scientists. Other improvements in Cooley include extensive renovation of the graduate student spaces on the second floor, with the longterm plan to renew all the graduate student spaces within three years.

So that’s enough for now. Keep reading to get the whole story!

---

**NERS Hosts Radiation Measurements Symposium**

On May 23-26, 2006, NERS hosted the 11th Symposium on Radiation Measurements and Applications (SORMA). This is a major international event in the radiation detection community, held every four years in Ann Arbor, and is the venue where major breakthroughs are often announced. DOE, DTRA, DHS, and U-M all generously provided support for the nearly 350 attendees coming from nearly every continent. The meeting brought together private corporations, national labs, and universities participating in long-term research into the discovery, fabrication, and manufacturing of improved radiation detectors and systems. The social program included an all-American dinner by the Lurie reflecting pool with barbecued burgers, ice cream, and live country music, and a strolling dinner among masterpieces at the Detroit Institute of Arts. The three-day symposium was followed by the Department of Homeland Security’s Domestic Nuclear Detection Office (DNDO) Workshop on Radiation Detector Materials -- their first technical meeting.

There were many exciting results revealed during the 200 presentations, including mastering of the growth of large size scintillating crystals without strain; extremely high resolution (0.75% at 662 keV) room-temperature semiconductor detectors produced by reducing the size of tellurium precipitates; and thermal neutron imaging at unobstructed distances up to 20 m, and fast neutron imaging up to 100 m distances. Our NERS students enjoyed the opportunity to witness the world’s finest researchers in this field and to participate in what is widely regarded as one of the premier international conferences.

---

**NERS Alumni Present Friday Colloquia**

- **Mike Hartman**, National Institute of Standards and Technology
  Investigation of Solid-State Hydrogen Storage Materials Using Neutron Scattering Techniques

- **Jerry Shapiro**, Consultant
  Planning the Rebirth of Nuclear Power in the U.S.

- **Eric Smith**, Pacific Northwest National Laboratory
  Nuclear Science in Homeland Security

- **John Vandenkieboom**, Los Alamos National Laboratory
  Nuclear Weapons Fundamentals and Stewardship Issues

- **Douglas C. Wood**, Advent Engineering Services, Inc.
  The Yucca Mountain Surface Facility: The Forgotten Component of the National High-Level Waste Solution

*If you would like to give a talk, please contact Professor Ed Larsen (edlarsen@umich.edu)*
**Dr. John Foster,** who received his PhD in Applied Physics from the University of Michigan in 1996, has recently joined the faculty as Associate Professor. He comes with a very impressive background.

He earned his Bachelor’s Degree as the Class Valedictorian at Jackson State University in 1991. He has interned at the Massachusetts Institute of Technology (MIT) Lincoln Laboratory and NASA’s Lewis Research Center. He has also worked as a research assistant here at U-M for Dr. Ronald Gilgenbach, and under Dr. Alec Gallimore while pursuing his PhD. He comes to us most recently from NASA, where he worked as a Principal Investigator for the High Power Electric Propulsion Project in support of NASA’s proposed Jupiter Icy Moons Orbiter (JIMO) Mission. He has also authored, and collaborated on, many journal publications, conference papers and NASA Technical Memorandums. A member of such organizations as the American Physical Society, the American Institute of Aeronautics and Astronautics, American Vacuum Society and the National Society of Black Physicists, he has received many honors and awards, including the Black Engineer of the Year Special Recognition Award in 2005 and the NTA Physicist of the Year in 2003. He also holds rights to several patents.

He looks forward to the opportunities Ann Arbor will bring to him as well as his wife Valerie and their children Maya and Miela. He enjoys thinking about God, playing with his children and reading. He especially enjoys the science fiction genre. “I am fascinated with outer space,” he says. “Is there life out there? What secrets does outer space hold that might enlighten us on how to travel among the stars? I firmly believe that unraveling the mysteries of outer space will help us solve not only issues associated with space travel, but also more mundane problems here on earth, like energy.”

---

**Dr. Karl Krushelnick** will be joining the NERS department in September as a Professor as well as Associate Director for High Field Science at the Center for Ultrafast Optical Science in the College of Engineering.

He grew up in Woodstock, Ontario, Canada and received a BSc from the University of Western Ontario in 1987, where he was awarded the Raymond Compton Dearle Gold Medal for the highest graduating GPA in the Physics program. Subsequently he attended Princeton University in New Jersey and obtained his PhD in January 1994. Since then he has worked as a post-doctoral researcher at Cornell University in Ithaca, New York and at the U.S. Naval Research Laboratory in Washington, DC until 1997 when he moved to Imperial College London (University of London) in the UK. Most recently he has been Professor of Physics and Head of the Plasma Physics Group at Imperial College. He is a Fellow of the UK Institute of Physics, a member of the American and European Physical Societies as well as a member of the Optical Society of America. He has co-authored over 100 papers in refereed scientific journals – primarily on intense laser interactions with plasma and applications. In 2006 he was awarded the Charles V. Boys prize for experimental physics by the UK Institute of Physics.

His areas of interest include plasma physics, ultra-high intensity laser system development, inertial confinement fusion, and compact laser-based particle accelerators and applications. He and his wife, Ann Brennan, and their children Joe and Katie are all very excited about moving to Ann Arbor.

---

**Dr. Feng Zhang** joins the research faculty as Assistant Research Scientist. He received his PhD from NERS in December 2004. His primary research interest is in the field of room-temperature semiconductor detectors, especially in subtopics such as detector modeling and simulation, ASIC readout systems and reconstruction of radiation interactions. He is currently working on the development of the 4th-generation 3-D position-sensitive CdZnTe detector array system.
Promotions

Dr. Sébastien Teysseyre has been promoted to Assistant Research Scientist of NERS. He is interested in radiation and environmental effects on materials. His main research activities have been focused on corrosion, stress corrosion cracking and irradiation assisted stress corrosion cracking in supercritical water for the GEN IV Supercritical Water Cooled Reactor concept. He also conceived the Irradiated Material Testing Laboratory (IMTL), a unique laboratory for performing stress corrosion cracking experiments on neutron irradiated specimens in supercritical water.

Associate Professor Michael Atzmon has been promoted to Professor of NERS and MSE. Professor Atzmon’s research interests include fundamental studies of the structure and properties of nonequilibrium materials. In recent years, he has studied structural transformations and deformation behavior in nanocrystalline and amorphous metals. He has been a frequent invited speaker on these subjects at national and international conferences. He has served as the president of the International Mechanochemical Association, a member society of the International Union of Pure and Applied Chemistry. Professor Atzmon has been teaching NERS classes on radiation effects in solids and nuclear-related materials topics.

Fuel Cycle Method

Continued from Page 1

demonstrated in his doctoral research that the optimization algorithm automatically and systematically searches for optimal loadings of BA rod for the Westinghouse AP600 core, yielding a significant reduction in the peaking factor. This implies the potential for an increased power rating and increased fuel cycle length with a more uniform fuel burnup across the core.

Fuel cycle optimization methods currently in use in the industry rely heavily on heuristic or time-consuming stochastic searches for optimal fuel configurations at the assembly level and may only approximately satisfy the power peaking constraint. In contrast, the new optimization methods that the NERS AFCI team has developed would systematically optimize the BA and assembly loading patterns in 2-D and 3-D geometries, while rigorously satisfying the design constraints.

A parallel effort is underway in Jeffrey Davis’s dissertation research to optimize SFR core configurations that offer the potential to optimize individual isotopic inventories of transuranic elements in the global nuclear fuel cycle.

Staff Addition

Donna Constant joined the NERS staff as the Academic Secretary to the Undergraduate Program as well as secretary to the department. For nearly five years she was with the Student Organizations Accounts Service office and thoroughly enjoys working with the student populace here at U-M. With aspirations of being a teacher, she takes pride in helping students achieve their goals. Outside of work she enjoys spending time with her husband and son. She excels at finding new ways to tempt the imagination of her vivacious two-year-old with reading, crafts and outdoor adventures. In her free time she enjoys writing and playing computer/video games. An artistic spirit, she collaborates with several aspiring authors and assists them in editing their works. She is looking forward to the upcoming academic year and working on finishing her degree. Donna is a much-appreciated addition to the newsletter staff as a writer and editor.

Faculty Farewell

Assistant Research Scientist Ling-Jian Meng left NERS in March of this year to join the faculty in the Department of Nuclear, Plasma and Radiological Engineering (NPRE) at the University of Illinois at Urbana-Champaign.
Student ANS Chapter Wins Elaine Harden Award

Last year it was the ANS Samuel Glasstone Award. This year the University of Michigan Student Chapter of the American Nuclear Society (U-M ANS) has been awarded the 2006 Elaine Harden Award. This award is given to the University of Michigan student society that best exemplifies the ideal of Epelans, an Engineering society that recognizes dedicated leaders, develops and motivates leadership, and encourages service.

Driven by the growing enrollments in Nuclear Engineering and Radiological Sciences (NERS), the U-M ANS has increased its membership and its activities over the last few years. The chapter works very hard to maintain the goals of the national society and to represent the NERS Department. In addition to maintaining excellent academic records, the members of U-M ANS participate in service, outreach, social, and professional development activities.

This year the officers of U-M ANS set a series of goals, with the overall aim to establish continuity for the future. Some of these goals have included: holding regular monthly interactive meetings, assisting with recruitment and retention of students in NERS, educating elementary, middle, and high school students about nuclear technologies, continuing involvement with the Michigan Section of the ANS, increasing U-M ANS involvement with the National ANS, and encouraging flexibility and creativity in U-M ANS leadership opportunities.

Service and outreach are important activities for the U-M ANS. This year the chapter members visited Saline Middle School to teach four science classes about basic quantum theory, radioactive decay, nuclear power plants, nuclear weapons, and medical applications of nuclear sciences. Other members served as volunteer judges for the annual Southeast Michigan Science Fair, part of the Intel International Science and Engineering Fair. There were over 200 junior division (seventh and eighth grade) and 45 senior division (high school) projects.

U-M ANS members also served as instructors and teachers’ assistants for the Detroit Area Pre-College Engineering Program (DAPCEP). Over a dozen seventh and eighth graders gave up their Saturdays to attend the “Glow Blue” sessions hosted by our U-M ANS student members. The DAPCEP students learned about isotopes and radiation, detectors, fission and power plants, plasmas and fusion, nuclear waste, and safety of spent fuel casks. DAPCEP students also toured NERS laboratories and visited the Ann Arbor Hands-On Museum. In addition, they constructed and tested egg drop devices, which represented the drop tests performed on spent fuel transportation casks.

The Engineering Advising Center of the College of Engineering introduced Clearing the Fog in 2006 as a program to help undeclared first-year engineering students. A U-M ANS member spoke with students who were interested in nuclear engineering as well as many who were unsure what this field of study was about. In other recruiting activities, the U-M ANS prepared exhibit tables to distribute information about ANS and the NERS Department at the College of Engineering Welcome Days for new students. These events are a great opportunity to meet the incoming students and tell them about the nuclear engineering field.

In another recruiting activity, the U-M ANS prepared an exhibit booth to share information about the department and nuclear engineering in general at Tech Day. Tech Day is one of the College of Engineering’s largest annual recruitment programs, when over 1000 high school students and their parents visit campus, tour the various engineering departments, and meet representatives from student societies.

The Michigan Section of the ANS holds an annual meeting at which U-M ANS members give presentations on their undergraduate or graduate research or class projects. This meeting is an opportunity for students to showcase their work to industry representatives.

But let’s not forget that the U-M ANS also brings members together for fun events. This year they sponsored picnics, pizza parties, a holiday lunch, an ice cream social, ice skating, bowling, reflecting pool races, and intramural sports.
Student Profile
Anree Little (BSE ‘06)

NERS graduate Anree Little earned his BSE degree in May 2006. This is his description of his time with us:

Considering the University of Michigan’s academic reputation in engineering and my being a Detroit native, the decision to come to the university was a simple one. My experience in the naval nuclear propulsion program peaked my interest in the nuclear field. In the spring of 2003, I arrived on North Campus unsure of where the bus stop was located but convinced I wanted to pursue a nuclear engineering degree. Having completed the math prerequisites, I was able to declare nuclear engineering and radiological sciences (NERS) as a major in the following winter term.

I recall a feeling of excitement in declaring NERS. It was an event which I interpreted as a milestone of progress toward the larger goal of graduating. Moreover, becoming an official member of the department gave me a place to call home, a smaller academic and social niche that shielded me from some of the more daunting aspects of going to a large school.

I decided to focus my studies on nuclear reactors rather than radiation health physics because reactor applications would be more beneficial to a naval career. NERS 250 provided a very good introduction to the wide range of topics in the field. I really liked NERS 311 and 312 since we had the opportunity to learn about interesting subjects such as relativity and quantum mechanics. The first laboratory course, NERS 315, was another milestone. The radiation detection and measurement course was not conceptually difficult but the substantial workload acted as proving ground for many students in the department. NERS 441 and 442 concluded my studies of nuclear reactors along with the senior lab course, NERS 425. My NERS electives covered reactor materials, reactor safety, and radiological health fundamentals. Apart from the core technical courses, I took additional math courses as technical electives.

The classes I took at the university and the NERS department in particular provided an adequate foundation of knowledge. The courses gave me the confidence, teamwork ability, and problem-solving skills that will propel me forward in my future endeavors.

Over the three years it took to obtain my degree, I was involved in academic and professional societies and ROTC. One of my most fulfilling experiences was working with “Glow Blue,” a part of DAPCEP (Detroit Area Pre-College Engineering Program). This program brought inner city seventh and eighth graders to the university and taught them engineering concepts of the nuclear field. Most importantly, the children’s interest in technical areas was encouraged.

Under an incredible group of dedicated staff and faculty, the NERS family was invaluable to my success at the university. The small department brought a diverse group of students together whom I now consider lifelong friends. Our relationships were forged by overcoming obstacles and working toward common goals. Group activities with family and friends nurtured the relationships outside the classroom.

Having accepted a commission in the U.S. Navy, I will be an officer on a nuclear-powered submarine after training. My plans for education could include further work in the nuclear field or pursuing an MBA degree. I am looking forward to staying involved with the department in the future and continuing my friendships.

Anree Little accepts commission in the U.S. Navy.

2006 Alumni Society Merit Awardee
Chang Kue Park, President
Korea Atomic Energy Research Institute
Summer of 2006 marked the first year that NERS undergraduates have joined the U-M’s Engineering Study Abroad Program at Shanghai Jiao Tong University (SJTU), one of China’s top-10 universities. Last year, U-M President Mary Sue Coleman visited Shanghai Jiao Tong University, solidifying the U-M and SJTU as partners in education and research. One of the stipulations of the agreement is that professors from U-M will travel to SJTU every summer to teach U-M courses for both SJTU and U-M students. David Sirajuddin and Nick Bachmann were privileged to be the first NERS student ambassadors to China. Below are David’s and Nick’s perspectives of their summer trip to SJTU:

David: On May 3rd, I arrived in China. The campus in which we reside is gargantuan—I recall people telling me it is on the order of $10^6$ square meters. I found that hard to believe, but after a brief tour of only part of the campus it became foolish of me to doubt that figure. I have been here for over a month, and still not seen the entirety of this campus. But, from what I have seen, it is superlatively beautiful and I am sure the rest of it is as or even more beautiful. I would love to spend my days relaxing on one of the many expansive grassy fields outlined in rubber trees whilst being surrounded by a surfeit of structural eye candy; however, one other thing about Shanghai is that it is dehydratingly hot all the time. Temperatures as of late, every day, have been 90-105°F. I often joke that since Shanghai is on the eastern coast of China, and that these high temperatures are always accompanied with intensely uncomfortable levels of humidity, one could never physically become dehydrated as all one has to do for a glass of water is to breathe the air. Thankfully, SJTU took pity upon us international students and granted the international student dormitory air conditioners for every room.

We live on the Engineering campus, or Minhang campus. Despite its size, there are six other campuses of comparatively similar sizes scattered about Shanghai, but this campus is the largest. By the end of this trip, I will have taken two classes: NERS 421, Nuclear Engineering Materials, and MSE 250, Principles of Engineering Materials. NERS 421 was jointly taught by NERS Professors Gary Was and Lumin Wang. MSE 250 is being taught by MSE Professor Joanna Mirecki-Millunchick.

The students in our classes are intelligent, sharp, and generally know some English. We learned from talking with them that starting in the 80s, English has been implemented into the education system. By the time these students reach college, they have had approximately 10 years of English classes (but that does not mean that all of them can speak or understand it). Upon further interaction we also discerned that they take 13 classes a semester, compared to our four or five. That number sounds intimidating, but I found that our school work balances out very well; we just have different education methods. Their classes tend to involve a lot of class time with little, if any, homework. Thus, the courses are graded usually entirely upon examinations, whereas we have little class time, and tens of hours of homework per week, with examinations. When they heard about how many hours of homework we have a week (particularly from a class like NERS 315), they could not believe that we actually do work on weekends instead of going out sometimes. We have been learning about each other, and mutual admiration is always the end result.

I am enjoying my time here taking classes, and seeing the country. Previously, I traveled to Beijing with
NERS alumnus Dr. Steve Aumeier, Director of the Nuclear Nonproliferation Division of Idaho National Laboratory, gave a presentation titled “Nuclear Energy Global Changes for the Future” at the Kick-Off Seminar on Thursday, November 3, 2005. Dr. Aumeier discussed the global evolution of nuclear energy deployment and the prospects for nuclear engineers in this global market. Participants in the 9th Career Fair included: American Electric Power, DTE Energy, Duke Power, Eli Lilly and Company, Areva, Idaho National Laboratory, Knolls Atomic Power Lab, Los Alamos National

Lab, Oak Ridge National Lab and Westinghouse. The four-hour career fair provides an opportunity for students to speak and interview with recruiters, and to distribute resumes to various companies.

If you would like to represent your company or laboratory in the 10th Industry Forum and Career Fair to be held on Friday, November 10, 2006, please contact Pam Derry at (734) 936-3130 or pgderry@umich.edu. This is a great opportunity for you to visit Ann Arbor and the department, to talk with faculty, and to meet the students who are the future of the nuclear engineering field.

Summer in China

continued from previous page

I arrived in Shanghai on May 28, and spent a few days downtown before heading out to the campus to take MSE 250 and Chinese Culture. When I was in the city, it was sometimes hard to communicate, because practically nobody outside of my hotel spoke English, and I speak only very basic Mandarin. Once I got on campus, the language barrier wasn’t so much of a problem because most of the students have studied English. The students are very friendly and very curious about Americans, life in the West, and what we thought of China. During breaks in our materials class, students always have questions for us. Talking with the Chinese students reminds you that despite how westernized China may appear on the surface, it is still a very distinctly eastern country. So far I have had a great time here, and I am excited to be able to do some traveling once my classes end, and see more of China, especially the countryside.
Neutron Science Lab Established

The plan to establish the Neutron Science Laboratory in the newly-named Radiation Sciences Laboratory Building is well on its way. The lab will house two neutron generators to provide compact neutron sources much required for the department following the shutdown of the Ford Nuclear Reactor. An MP-320 neutron generator producing about 10^6 neutrons per second (D-D) was acquired in Fall 2004 and was used as an integral part of NERS 425, Applications of Radiation Laboratory. Two activation analysis experiments were performed with indium foils using the MP-320 and a calibrated HPGe detector to verify inelastic neutron scattering reactions involving 2.3 MeV D-D neutrons and to establish the source strength in long irradiation experiments.

With support from the Office of the Vice President of Research and College of Engineering as well as from the DOE-funded Big-10 INIE (Innovations in Nuclear Infrastructure and Engineering) Consortium, in April 2006 the NERS department placed an order for a D-711 neutron generator, with an expected delivery date in November 2006. The $300,000 machine features a (D-T) neutron tube producing 10^8 neutrons/second with a self-contained chiller and a digital controller. With an innovative compact shielding design for the D-711 neutron generator, effort is underway to renovate Room 122B of the Radiation Sciences Building (formerly the cyclotron bays adjacent to the NAME building) to establish the proper access control for the generator and partition the open space into two separate functional laboratories. We expect to have the Neutron Science Laboratory fully operational by the beginning of the Winter 2007 semester, with a compact shielding cave accommodating both D-711 and MP-320 generators.

Tom Knoll Receives 2005 Alumni Merit Award

Thomas Frederick Knoll is an entrepreneur and senior engineer with Adobe Systems Incorporated. He is the creator and continues to be a developer of what is today known as Adobe Photoshop®, the digital image editing software that has become the industry standard in the fields of graphic design, photo retouching and imaging compositing. Start Adobe Photoshop and read the splash screen: the first name you will see is Thomas Knoll. Tom earned his bachelor's degree in the NERS department's Engineering Physics program, and a master's degree in computer, information and control engineering, also from Michigan.

Besides being an accomplished alum of the NERS department's Engineering Physics program, Tom Knoll is the son of Glenn Knoll, former interim College of Engineering dean and former Chair of NERS, and now Professor Emeritus of NERS. It was in Glenn Knoll’s basement that Tom first developed his interest in photography. He learned about balancing color and contrast and how to develop black-and-white and color prints in the darkroom in his family’s home. Alums of the department will remember that Glenn Knoll was a keen adopter of early personal computer technology, and it was also through Glenn’s first home Macintosh that Tom was introduced to the technology that would lead to Photoshop.

In 1987, while pursuing doctoral studies at the University of Michigan, Tom found that he was not able to display any grayscale levels in his images, so he wrote subroutines to simulate the effect he sought. His brother John worked with Tom to refine what he had developed and convinced him to market a beta version to software companies in Silicon Valley. Within three years, Photoshop was on the market—and cornering it.

For his accomplishment in creating and continuing to develop Adobe Photoshop, Thomas Frederick Knoll was awarded the NERS Alumni Society Merit Award for 2005.

Staff Farewells (More or Less)

Pat Moore, editorial assistant to Glenn Knoll (NIMA) and secretary to David Wehe for over 10 years, retired on January 6 this year, following a farewell luncheon where Bill Martin surprised her with a personalized autographed picture of George and Laura Bush. Pat continues in NERS on a part-time basis as editorial assistant to David, who has succeeded Glenn as an editor of NIMA (Nuclear Instruments and Methods in Physics Research, Section A).

Research Lab Specialist Victor Rothenberg retired from NERS at the end of May this year. Victor started as a Research Associate for the Michigan Ion Beam Lab in 1985 in the areas of ion beam assisted deposition (IBAD) and ion implantation and analysis. He will be missed!

Academic Secretary Emily Koopmann left NERS in January of this year. She is currently on long-term educational leave to attend college full time to earn her degree in Forensic Computer Science.
Alumni Profiles

David Horvath (MSE Electrical & Computer Engineering ’81, MSE NE ’79), Doug Wood (MSE NE ’74) and Mike Wylie (BSE NE ’82) worked for Bechtel Power Corporation in the 1980s. With the cancellation of the Midland Project, and other projects nearing an end, Bechtel was leaving Michigan. But Horvath, Wood and Wylie had a desire to remain in Ann Arbor. They worked temporarily for Tenera, L.P., before deciding that it made more sense to go off on their own. Thus, Advent Engineering Services, Inc. was founded.

Advent is “a multi-discipline engineering, consulting and research firm that specializes in areas of information management, design process improvement, regulatory compliance, complex problem solving, engineering design and evaluations, and quality assurance.” The bulk of their work is with nuclear power utilities.

While the company’s award wall is decorated with many plaques, Doug Wood is the most recent recipient. He was honored with the prestigious 2005 Penn State University (BS ’73) Outstanding Engineering Alumnus Award. The recipients are chosen based on their technical accomplishments and their business success.

Horvath believes the industry has come full circle. The last order for new plant construction was placed in the early 70’s. Since then, work has revolved around supporting current system plants. “Finally, it looks really good. High energy costs and the waste of natural resources to create electricity, along with the rising cost of oil are making people realize the opportunities in nuclear power.” Wood agrees, citing this time as a “window of opportunity for the nuclear power industry.”

In order to ease public opinion, Horvath believes the focus needs to be on Spent Fuel Reprocessing. Wylie waits for people to see nuclear energy as a green solution. Using nuclear power instead of fossil fuel plants “would eliminate probably the single biggest source of carbon dioxide emissions in the world.” Wood believes the most important thing is to preserve the safety record.

Horvath, Wood and Wylie were inspired by members of the NERS faculty in different ways. Dr. Terry Kammash visited West Virginia University to present a colloquium on nuclear fusion during Horvath’s senior year there. Afterwards, he approached Kammash to express his interest in the U-M program. He explained that he would be serving in the Navy soon. Kammash advised him to write when he was out. Before leaving for duty, Horvath grabbed a mimeograph about the program from a bulletin board. He carried it with him for the nearly six years he served. Periodically he would take it out and remind himself, “Dave, this is what you want to do.” When he left the Navy, he wrote to Kammash, who then was the interim Department Chair. He was offered a scholarship and entered the program shortly after.

Wylie remembers Chihiro Kikuchi as the person who kept him interested in nuclear power. “He had interesting ways of presenting the value of nuclear power. Nuclear waste to him was nuclear treasure, with rare earths and metals buried in the by-products of nuclear fuel that no one was paying attention to at the time.”

Wood recognizes Dr. James Duderstadt “as a fireball. He had high expectations and an ability to give a practical feel for how to solve technical problems, how to translate word problems into mathematics and how to get through it. He stood out singularly in the department, at least to me.” He explains that most of the department in the early 70’s was working with KMS Fusion and there was a temporary shortage of interest in fission. But “Duderstadt strongly focused on the non-fusion part of the department.”

When asked to give advice to current students, all three men stressed the importance of being multi-disciplined. Nuclear engineering is “not just designing the fuel in a nuclear reactor. It’s knowing all the different support systems that help make a nuclear power plant work,” says Horvath. “Nuclear Engineering may be the most multi-disciplined engineering group of all the different departments.” They emphasize the importance of thermodynamics and heat transfer knowledge, as well as fluid flow, electrical engineering circuits and polymers. Wood states the importance of teamwork and notes that writing/communications skills are key to a successful career. “Knowing how to solve the problem means next to nothing if you cannot explain to someone what the problem was, why it happened and how you solved it.”

Donna Constant
The Neutron Scattering Society of America (NSSA) announced that the 2006 recipient of the Shull Prize is Dr. J. M. Carpenter, Intense Pulsed Neutron Source Division of the Argonne National Laboratory. The Clifford G. Shull Prize in Neutron Science was created to recognize outstanding research in neutron science and leadership promoting the North American neutron scattering community. The prize is named in honor of 1994 Nobel Laureate Clifford G. Shull.

Dr. Carpenter has been instrumental in the development of spallation neutron sources world-wide. His work has exploited the spallation process, in which high energy protons are used to evaporate large numbers of neutrons from heavy nuclei, and established the advantages of pulsed operation and time-of-flight measurements in the study of the structure and dynamics of materials. He designed the moderator-reflector combination that is at the heart of a modern spallation neutron source.

While reminiscing about his days at the University of Michigan, Carpenter had this to say:

I have always immensely treasured my relationship to Michigan and the NE (now NERS) Department. I came to Michigan as a graduate student in 1957 after earning my BS degree in Engineering Science at Penn State, on a three-year Oak Ridge Institute of Nuclear Studies Fellowship. I completed the MS in Nuclear Engineering in 1958 and the PhD in 1963 (whew! I did an experimental thesis). Dieter Vincent was my very supportive thesis advisor but others were also important in those formative years—John King, Dick Osborn, Paul Zweifel, and Chihiro Kikuchi. The seminar on neutron scattering, which those faculty stimulated and which ran for many years, trained dozens of students in that field. That interest group rose up and educated themselves spontaneously, with little connection to people at places like ORNL, BNL, MIT, and Cambridge. George Summerfield took vigorous part in those same seminars, which spanned the times of both my student and faculty years.

After the PhD, I had a year’s post-doctoral appointment at the U-M Institute for Science and Technology, and then joined the NE faculty in 1964. My main course was the Nuclear Reactor Laboratory, which was great fun for me and a great trial for the students who took the course. It was a wonderful learning experience for me. Ron Fleming became my perennial teaching assistant, and taught me much. Lou Hamilton contributed practical experiments on engineering topics. A few excursions in which I subbed for Lou in his reactor physics course and for Glenn Knoll in his radiation detection course helped round me out. Because I came from an engineering background, I served on some of Fred Hammitt’s students’ doctoral thesis committees, where I learned a great deal about cavitation damage in liquid metals. That experience has come to be very useful in later years in relation to the cavitation damage problems in the mercury target of the SNS, the Spallation Neutron Source at Oak Ridge.

My thesis work building a time-of-flight spectrometer on the Ford Nuclear Reactor was truly a formative experience, which led to later research in neutron scattering with my own doctoral students and to my association with Argonne National Laboratory. A notable collaboration with Kingsley Graham, my early doctoral student, led to a remarkable data base for understanding pulsed source moderator design. An over-arching observation is that through all my years at Michigan, I felt a part of a mutually supportive, collegial group of students and faculty. My education continued with unabated intensity from the start in 1957 through the time that I had to leave, in 1975, to continue the work on spallation neutron sources for which the Michigan experience prepared me so well. I left for Argonne to follow a new calling, with the full realization of what I was leaving behind—valued friends, a challenging university atmosphere, a most pleasant city, and a great football team.

Faculty Kudos

Professor Rodney C. Ewing
Mineralogical Society of America
• Dana Medal

Professor Ronald M. Gilgenbach
Institute of Electrical and Electronics Engineers
• IEEE Fellow
• Outstanding Professional Award
Alumni Notes

Lay-Kee “Ricky” Ang (PhD ‘99) is now an Assistant Professor in the Division of Microelectronics within the School of Electrical and Electronic Engineering at Nanyang Technological University.

Jim Baciak (BSE ’98, MS ’01, PhD ’04) continues to develop his program at the University of Florida. He also recently became engaged to Dr. Rebecca Detwiler, a senior scientist at the Remote Sensing Laboratory in Las Vegas. Jim “may be labeled as a traitor: Rebecca received her PhD in Nuclear Physics from Notre Dame in 2001.”

Clinton T. Ballinger (PhD ’91) along with Michael LoCascio and Dan Landry, founded Evident Technologies in September of 2005. Evident makes nanomaterials and products that are enabled by these materials. He lives in the suburbs of upstate New York with his lovely wife and three children, who “are more fun than an Ed Larsen nuclear reactor theory exam.”

Brad Berles (BSE ’94) is working as a System Engineering Manager at the Palisades Nuclear Plant. He is married with three young children.

Dave Berwald (MSE ’75, PhD ’77) is currently the Director of Systems Engineering at Northrop Grumman Electronic Systems in Baltimore, MD.

Shannon Bragg-Sitton (MS ’01, PhD ’04) of Los Alamos National Laboratory was one of four people elected to the Board of Directors of the American Nuclear Society for the 2006-07 year. Her term began at the conclusion of the June 8 meeting of the Board at the 2006 ANS Annual Meeting in Reno, NV. Shannon is also proud to announce that she and her husband Michael Sitton welcomed their son, Caleb Michael, to the family on December 4, 2005. He weighed in at 6 lb 6 oz and measured 19 inches. “He is a very happy little baby!”

Jeremy Busby (MSE ’99, PhD ’01) received the 2006 Landis Young Member Engineering Achievement Award from the American Nuclear Society. The award was presented at the Honors and Awards Luncheon during the 2006 Annual Meeting of the Society in Reno, Nevada.

Dean Carter (BSE ’88, MSE ’93) completed his MBA at Michigan’s Ross School of Business in December of 2005. After 9 years with the University of Michigan Health System, he left to accept a position as a Business Strategist and participant in an Executive Development Program with Cerner Corporation in March of 2006. Cerner Corp. is a leading global healthcare IT company. He also was married in August of 2005.

Jeremy Conlin (MSE ’05) and his wife Trisha welcomed Lily Conlin to the world on July 4, 2006 at 9:55 PM. She weighed 9 pounds and 11 ounces. Annie and Brigham love their new sister!

Michael Dunning (BSE ’80, MSE ’81, PhD ’87) has been selected as the B Division/B Program Leader at the Lawrence Livermore National Laboratory. In this role Mike provides technical direction of B Program’s nuclear explosive assessment and design efforts, including sustaining confidence in the safety, reliability and effectiveness of the nation’s nuclear stockpile. Formerly, Mike was the Nevada Experiments and Operations Program (N Program) Leader with responsibility for managing LLNL and NNSA/NSO resources to effectively execute Stockpile Stewardship missions in the field, primarily at the Nevada Test Site.

Harry A. Goodman (BSE ’80) is now a Director in Engineering at River Bend Station in Louisiana.

John Hallahan (BSE ’04) is still a corpsman in the military. He was married in July of 2005 and this past March moved with his wife to Jacksonville, NC to be stationed at Camp Lejeune with the Marines. He is currently preparing for Med School and for being deployed to Iraq in January with a helicopter casevac team out of Al Taqaddum.

Neal Ham (MSE ’06) is currently employed at FirstEnergy Nuclear Operating Company at the Davis-Besse Nuclear Power Station near Toledo, OH as an Advanced Nuclear Engineer. He is working in the Reactor Engineering group.

John Hubbell (BSEP ’49, also MS ’50 Physics) is well-known for his evaluations, computations and compilations of photon-atom interaction cross sections and attenuation coefficients, spanning the nine decades of photon energies from 0.1 keV to 100 GeV. Although officially retired, he remains professionally active in support of the NIST Radiation Interactions and Dosimetry Group, in particular with the NIST Photon and Charged Particle Data Center (PCPDC). He is listed in the Marquis’ Who’s Who in the East, Who’s Who in America (since 1992) and for the first time, Who’s Who in the World. John enjoys solar eclipse photography, including the travels to the sometimes-exotic locales where they occur. Earlier this year, he and his wife Jean enjoyed the March 29 total solar eclipse from the Libyan Sahara. The eclipse was the focus of a Genoa-to-Genoa eastern Mediterranean cruise which included excursions to Pompeii, Syracuse in Sicily, Egypt for the Sphinx and Pyramids, Tripoli, Libya, Malta and Salerno. “As our ship passed the isle of Capri (one of my harmonica repertoire tunes) I of course had to pull my ‘royal instrument’ from my pocket and properly observe our proximity!”

Dave Jordan (BSE ’01, MSE ’03, PhD ’05) is currently touring with a rock band.

Sidney Karin (MSE ’67, PhD ’73) is a Professor of Computer Science and Engineering at the University of California at San Diego. His current research interests include computer security and high performance...
Sidney Karin (cont)
computing, and he serves in a part time capacity as a Distinguished Visiting Scientist at both Lawrence Livermore National Laboratory and the Oak Ridge National Laboratory. Karin serves as Chair of the Institute for Defense Analyses Center for Computing Sciences Program Review Committee, as a member of the Science and Technology Advisory Board of Telcordia (Bellcore) and the Board of Directors of Boojum Mobile. Karin, who was recognized in 1989 by the University of Michigan Nuclear Engineering Department as an Outstanding Alumnus, has served as a member of the Program Advisory Group for the Key Studies Development Project of the People’s Republic of China. It was this project that brought the Internet to the PRC. Karin is a Fellow of the American Association for the Advancement of Science, a Fellow of the Association for Computing Machinery and a member of the IEEE Computer Society. He is also listed in Who’s Who in America and in Who’s Who in Engineering and Computer Science Education. Karin holds a DOD Top Secret clearance and a DOE Q clearance. Despite all of his activities within the industry, Karin found time to earn commercial pilot and flight instructor licenses with endorsements for both single- and multi-engine aircraft and instruments.

John E. Kelly (BSE ’76) has been keeping busy on the new Global Nuclear Energy partnership initiative. He is heading up Sandia National Labs efforts to support the initiative. He is also proud to announce that his son graduated with a BSE in Mechanical Engineering at U-M this past April.

Ed Klevans (MS ’58, PhD ’62), together with his wife Deborah, were the coordinators for the World Nuclear University Summer Institute that was held in Idaho Falls, ID from July 19 to Aug. 19, 2005. They organized the Summer Institute while living in London and working at World Nuclear University Coordinating Center. They recruited 77 Fellows to the Institute from 34 countries. The group, consisting of 25% women, averaged 30 years of age. An impressive 44% either had or were working on their PhDs. They were also responsible for recruiting the 52 faculty members who presented 28 topical areas related to nuclear technology; and eight mentors who worked with small groups of Fellows for discussions of the topics and for preparing a final project presentation report.

David Lee, MD (BSE ’72) is currently employed full time at Brockton Hospital in Massachusetts. He is also a clinical instructor at Tufts University School of Medicine. He recently traveled with his family to Normandy, France.

Myoung-Jae Lee (PhD ’94) was appointed as an assistant professor at the Department of Physics at Hanyang University in Seoul, Korea.

J. Carlos Lopez (MSE ’87) would like to congratulate the faculty, students, staff and friends of U-M NERS for being number one!!! “To be featured in U.S. News and World Report (Best Grad Schools) as ‘the one’ has made us all very proud. Keep up the great work!”

John Luginsland (BSE ’92, MSE ’94, PhD ’96) and his wife, Leigh Ann Vaughn (PhD ’98 U-M), are FINALLY living together after years of toughing out the “two-body” PhD problem. They just finished building a home in Ithaca, NY.

Julia McAnallen (BSE ’01) worked for the NRC until 2003, and then decided to pursue her interests outside of engineering, specifically in linguistics. She received her Masters in Slavic Linguistics in December of 2005. She is currently doing PhD coursework in the PhD program in Slavic Linguistics at the University of California, Berkeley.

Tom Mehllhorn (BSE ’74, MSE ’76, PhD ’78), a Sandia physicist and fusion research leader, has been elected a Fellow of the American Association for the Advancement of Science (AAAS). Tom was honored on Feb. 18, 2006 as part of the AAAS Annual Meeting in St. Louis, specifically for “scientific and managerial leadership in studies of high energy density physics, particularly those involving Z-pinches.” He was also honored in 2004 when he received the Lockheed Martin NOVA award as manager of the team that produced thermonuclear fusion at Sandia’s Z machine.

Rick Migliore (BSE ’92, MS ’93) is currently working as a criticality and shielding engineer for Packaging Technology, Inc. in Tacoma, WA. He also writes guest editorials for his local newspaper and has recently finished his first novel, “a trashy piece of pulp that will probably never be published, but I immensely enjoyed writing it.”

Todd Palmer (MS ’88, PhD ’93) along with fellow faculty member Kathryn Higley, hosted the 12th annual “You Thought You Had It Bad, We Had To Teach You!” end-of-the-year barbeque on June 9, 2006 at the Radiation Center at Oregon State University. Students, staff and significant others show up for free food and drink, spontaneous sporting competitions, student awards, and general goofing off. This year the admittedly captive audience was treated (subjected) to a student/faculty rock show. The band—Alex Lopez, Matt Williams, Nathan Barnett and Todd Palmer—(desperately trying to hold on to his youth...) played a mix of tunes.
on to his youth...) played a mix of tunes from the 90s and 00s, including a two-song encore! Palmer, during a post gig interview, had this to say: “I credit my Michigan graduate degrees with helping me reach my true potential!”

Marc Rosser (BSE ’84, MSE ’85) is currently working for Westinghouse as the Nuclear Criticality Safety Programs Manager at their Columbia, SC Fuel Fabrication Facility.

Shane Rye (BSE ’04, MSE ’05) has relocated back home to Kaneohe, Oahu, Hawaii. He is currently working for the Pearl Harbor Naval Shipyard as a Nuclear Shift Test Engineer. He has been working on the maintenance packages for U.S. attack submarines. It is due to this work that he has recently received a big promotion. He has just been moved to the next phase of his training with an office in the “Big Building,” where he is training to be a better supervisor and receives more intense training on the newer class of submarines (Seawolf and Virginia Class) as well as aircraft carriers. He also moonlights as a lifeguard in Kailua. During his free time he enjoys paddling (he sits in seat three) outrigger canoes in the open sea and races several times a year with the Lanikai Canoe Club. It’s a very competitive sport in the islands and in various countries around the Pacific Rim. His team has placed second in a 12-mile race and twice placed third in short one-half mile sprint races.

Thomas E. Sampson (MS ’64, PhD ’69) is currently working part-time as a subcontractor to the Los Alamos National Laboratory and also operates Sampson Professional Services, which provides training and consulting in Nondestructive Assay and Gamma Ray Spectrometry. He retired from full-time work as of 2001, and now lives in Carefree, AZ. He has traveled the world carrying out safeguards programmatic interactions with the International Atomic Energy Agency and the countries of the FSU under the auspices of the Cooperative U.S.-Russian programs in Materials Protection, Control and Accountability.

Douglas Seman (BSE ’93) works in the computer industry, designing computer networks for General Motors using computer skills he learned in his graduate studies in computer simulation of plasmas.

Thomas M. Sutton (MS ’80, PhD ’83) was elected vice-chairman/chairman-elect of the American Nuclear Society Mathematics and Computation Division. He assumed the role of vice-chairman at the conclusion of the June 2006 ANS meeting. He will automatically become chairman at the conclusion of the June 2007 meeting, succeeding Professor Martin in that role. Sutton’s other success this year occurred in May, when his Samoyed Micha placed second in the Albany Obedience Club Rally Trials.

Sam Werner (PhD ’65) was recognized at the ICNS 2005 Symposium held in Sydney, Australia by having a “festschrift” dedicated to him in honor of his pioneering experiments and 30 years of leadership in fundamental neutron physics. In the best tradition of experimental science, Sam’s seminal scattering experiments and quantum mechanical analyses have been recognized at the highest level. While Sam has had many talented collaborators world-wide, his experimental/analytic leadership has underpinned a quarter century of advances in coherent neutron interactions: “…the quantum interference of neutron deBroglie waves extending over macroscopic distances,” as he has phrased it. We can point to the fact that his first experiments, in collaboration with A. W. Overhauser and Tony Arrott (Ford Scientific Labs), and R. Colella (Purdue University) began at the 2.0 MW Ford Reactor in 1967-1975, after he finished his Ph.D. This culminated in the first measurement of the neutron phase shift due to the earth’s gravitational field. Key to the measurement was the construction of a 2-legged path for the split neutron wave packet, in a neutron type Bonse-Hart Interferometer, machined from a large single crystal of silicon, one leg of which was directed through a weak magnetic field.

Steven D. Winter (BSE ’81, MSE ’82) is now working on the Design Basis Reconstitution Project for the Advanced Test Reactor at the Idaho National Laboratory.

DID YOU KNOW...

You can update your alumni record online?

http://www.engin.umich.edu/alumni/
Students Participate in Hurricane Relief Effort

This year the U-M section of ANS was very distressed by the environmental travesties that occurred to the southern portion of the U.S. The wave of hurricanes brought death, destruction and suffering, and the students wanted to be a part of the relief effort. Graduate student Jesse Cheatham decided that he wanted to donate to the effort by auctioning off his next haircut. A price list was generated with such novelties as a Mohawk, corn rows, the pink poodle (use your imagination), and the Captain Jean Luke Picard hairstyle (from the TV show Star Trek). Everyone got together and decided that Jessie would look best with the Picard hairstyle. Below are the before and after pictures.

Before After

News to Share?
E-mail Pam Derry: pgderry@umich.edu

HireMe, the new online recruiting system for the College of Engineering, is up and running. The Engineering Career Resource Center invites you to register in the system, which replaces EnginTrak for job postings and campus interview scheduling:
http://career.engin.umich.edu/alumni.html